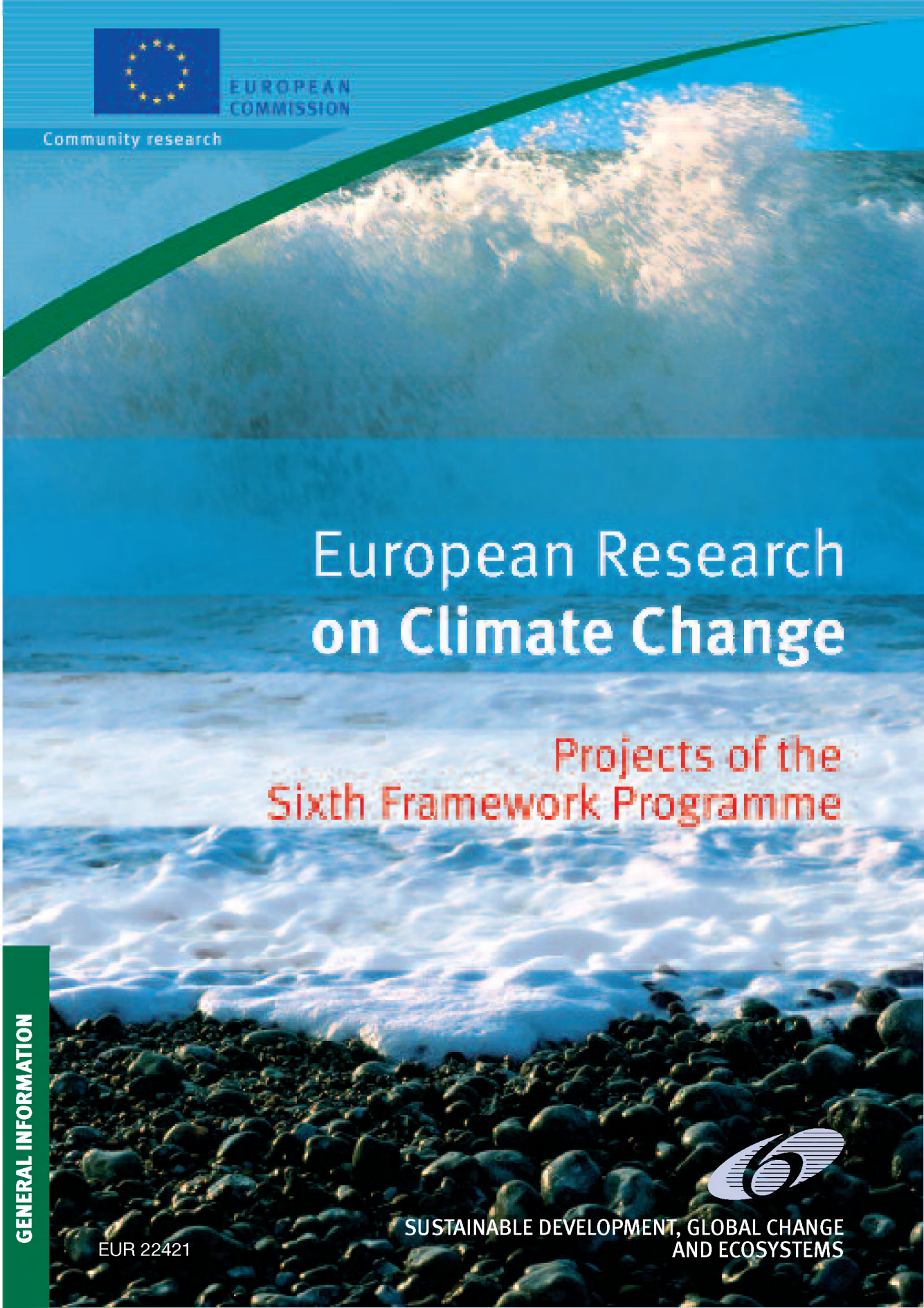

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FOREWORD

European research contributes to better understand the origin, consequences of climate change and to predict the future evolution. Such knowledge not only guides and supports the implementation of EU's international Commitments and Protocols (i.e. Kyoto Protocol) but also provides the basis for effective adaptation/mitigation measures. There are also significant research needs arising from existing and emerging EU policies.

The global dimension of the problem related to climate change has initiated a number of international research efforts and collaborations, in which Europe has played and continues to play a key role.

Under the European Union's Sixth Framework Programme several projects were financed with the objective to detect and describe global change processes associated with greenhouse gas emissions and atmospheric pollutants from all sources, to improve prediction of climate change and its impacts and to evaluate adaptation and mitigation options and strategies.

With these objectives research is focussing on studies and modelling of the terrestrial and marine carbon and nitrogen budgets, on the chemistry of atmospheric pollutants and greenhouse gases, the formation of aerosols and ozone, their impact on air quality and climate, on future stratospheric ozone levels and on systematic observations of climate parameters. It also focuses on the impacts of climate change, including sea-level rise, changes in precipitation and storminess, and severity and frequency of floods and droughts. Models for predicting future climate change and its impacts need to be further developed and the uncertainties associated with these predictions need to be further studied. This catalogue provides information on all projects with the above objectives financed under the calls for proposals of the priority Global Change and Ecosystems.

The goal of this publication is to contribute, with projects financed by the European Commission, to the overall picture of research on climate change undertaken in Europe. We believe that these projects will help answer key scientific and policy questions related to the present and future climate, its impacts and the possible mitigation and adaptation options.

Elisabeth Lipiatou
Head of Climate Change and Environmental Risks Unit
Directorate General for Research

Acknowledgements
Special acknowledgements are due to Sandrine Geeraert and Marina Vereertbrugghen for their contributions to the editing and publication of this catalogue.

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Carbon and Nitrogen Cycles: Sources and Sinks

CARBOAFRICA – Quantification, understanding and prediction of carbon cycle, and other GHG gases, in Sub-Saharian Africa

CT - 037132

http://dwms.fao.org/temp/carboafrica/index_en.asp

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 01/10/2006
Total project cost:	3.808.758 €	Duration: 36 months
EC Contribution:	2.810.044 €	
Organisation:	Università degli Studi della Tuscia	
	Viterbo - Italy	
Co-ordinator:	Riccardo Valentini (rik@unitus.it)	
EC Officer:	Anastasios Kentarchos (anastasios.kentarchos@ec.europa.eu)	

Abstract

Africa is a region highly vulnerable to climatic change due to both ecological and socio-economic factors; however it is the least well-covered region by studies on climate change. For these reasons, the overarching goal of this project is to set up a first attempt of a GHG fluxes monitoring network of Africa, in order to quantify, understand and predict, by a multi-disciplinary integrated approach, GHG emissions in Sub-Saharan Africa and its associated spatial and temporal variability. We will start building on the state of the art of the carbon studies in Africa, filling the gaps of knowledge, and then we will utilize and expand existing carbon observing systems, together with the establishment of new infrastructures, improving the required monitoring systems. We also conduct specific regional studies in key areas, considering both carbon sources and sinks. The components of the African greenhouse gas budget have so far not been adequately determined, and the implementation of the Kyoto Protocol requirements is far to be achieved. There is consequently a significant need for an assessment of the current land use change, evaluating the potential for carbon sequestration in Sub-Saharan Africa in the context of the Kyoto Protocol. The existing GHG observations capabilities for fluxes and stocks of carbon, their geographical distribution, the end users requirements for UNFCCC and IPCC guidelines implementation, will be used to design an optimal monitoring system network and the identification of its components. The CARBOAFRICA network will contribute to the enhancement of an Earth observations system, strengthening the capacity of Europe to understand global change process. The scientific and technological results, in addition to the capacity building activities foreseen by this project, will promote the integration of the environmental dimension in the social and economic context, supporting Sub-Saharan African countries on the path of a sustainable development.

Objectives

The overarching goal of this project is to set up a first attempt of a GHG fluxes monitoring network of Africa, in order to quantify, understand and predict, by a multi-disciplinary integrated approach, greenhouse gas emissions in Sub-Saharan Africa and its associated spatial and temporal variability. We will start building on the state of the art of the carbon studies in Africa filling the gaps of knowledge, and then we will utilize and expand existing carbon observing systems, together with the establishment of new infrastructures, improving the required monitoring systems. We also conduct specific regional studies in key areas, considering both carbon sources and sinks. Moreover, there is a growing interest in the implementation of the Kyoto protocol through its flexible mechanism, such as CDM (Clean Development Mechanism) in the context of land use change and forestry in Africa, therefore CARBOAFRICA will address the potential for carbon sequestration in Sub-Saharan Africa by means of specific studies. The improvement of an African GHG network will contribute to the enhancement of an Earth observations system, strengthening the capacity of Europe to understand global change for the future orientation of mitigation strategy. The scientific and technological results, in addition to the capacity building activities foreseen by this project, will promote the integration of the African environmental dimension in its social and economic context, giving African people the skills to start out on the path of a sustainable development.

Objective 1: Consolidate and expand terrestrial carbon and other GHG fluxes monitoring network of Sub-Saharan Africa

CARBOAFRICA project will expand and improve the existing carbon observing systems in Africa. We will collect existing knowledge and coordinate existing efforts through harmonization and exchange of methodologies for flux measurements and ecological sampling across the regions. We will enhance the monitoring capabilities by expanding flux towers and ecological measurements in different ecosystem types, representative of the Africa's biodiversity and will be the first initiative to cover tropical forest which was not considered so far. Those actions will be the base for setting up a full greenhouse gas monitoring system in Sub-Saharan Africa. We will also integrate the TEMS (Terrestrial Ecosystem Monitoring Sites) existing network for input to model parameterization.

Objective 2: Provide an analysis of the requirements in order to establish a terrestrial GHG monitoring systems for Sub-Saharan Africa

One of the aims of CARBOAFRICA is to make use of the existing GHG observations capabilities for fluxes and stocks of carbon, their current geographical distribution, the end users requirements for UNFCCC and IPCC guidelines implementation, to design an optimal monitoring system network and the identification of its components.

Objective 3: Understand quantify and predict the GHG budget of Sub-Saharan Africa and its associated spatial and temporal variability

By an integrated approach, considering flux measurements together with specific models which assimilate data on soil, atmosphere, agriculture, hydrology, fires and ecological variables, we will identify the links between carbon cycle and nutrients, hydrology, fires, and land use, which will be used as a first broad attempt to produce spatial distribution of sources and sinks and their time behaviour. Water and the nutrient cycles are important drivers of the carbon dynamics in savannas, and fires control carbon allocation as well, both directly and indirectly. A complex interaction between these factors also controls vegetation types and dynamics, thus indirectly carbon allocation. Data assimilation will comprise own measurements around the identified core sites with flux towers but also integrating the relevant amount of knowledge that was achieved during seven decades of ecological research in Africa. Models will be validated using flux tower data at specific locations. A specific activity will be conducted to evaluate models estimates at regional scale by using aircraft based measurements across a regional transect in west Africa. The process level understanding will help to consolidate reviews of the greenhouse gas budget for all relevant Sub- Sahara African ecosystem-types (tropical forests, savannas, scrublands, grasslands, deserts). The results of this work will provide the knowledge elements necessary for reducing uncertain and bias in GHG budget estimates and to contribute to the revision of the IPCC guidelines.

Objective 4: Assess the current land use change and evaluate the potential for carbon sequestration in Sub-Saharan Africa in the context inter alia of the Kyoto Protocol

An attainable objective will be the recommendations regarding the potential of natural ecosystems to act as carbon sinks, and the management actions that would need to take place to achieve this, thus implementing the strategies necessary to mitigate global change. In particular also the potential role of CDM mechanisms concerning afforestation and reforestation will be evaluated in Sub-Saharan Africa. Within this objective we will provide: the dissemination of data on carbon sequestration and other GHG fluxes to States and Stake Holders; recommendations for a sustainable use of land and a rational use of natural resources in the main African ecosystems.

Partners

N°	Organisation	Country
1.	Università degli Studi della Tuscia	Italy
2.	Max Planck Institute for Biogeochemistry	Germany
3.	Lunds Universitet	Sweden
4.	Global Terrestrial Observing System Food and Agriculture Organization of the United Nations	Italy

5.	Centre de Coopération Internat. en Recherche Agronomique pour le Développement	France
6.	Natural Environment Research Council Centre for Ecology and Hydrology	UK
7.	Consiglio Nazionale delle Ricerche	Italy
8.	Istituto Agronomico per L'oltremare	Italy
9.	Seconda Università di Napoli	Italy
10.	Council for Scientific and Industrial Research	South Africa
11.	Unité de Recherche sur la Productivité des Plantations Industrielles	Congo
12.	Agricultural Research Corporation	Sudan
13.	Commissariat à l'Energie Atomique	France
14.	Centre Nationale de la Recherche Scientifique	France
15.	King's College London	UK

CARBOEUROPE – Assessment of the European Terrestrial Carbon Balance

CT - 505572

http://www.carboeurope.org/

Instrument:	Integrated Project (IP)	Contract starting date: 01/01/2004
Total project cost:	25.115.542 €	Duration: 60 months
EC Contribution:	16.310.000 €	
Organisation:	Max Planck Gesellschaft zur Förderung der Wissenschaften E.V. Jena - Germany	
Co-ordinator:	Ernst-Detlef Schulze (dschulze@bgc-jena.mpg.de)	
EC Officer:	Anastasios Kentarchos (anastasios.kentarchos@ec.europa.eu)	

Abstract

The overarching aim of the CARBOEUROPE-IP is to understand, quantify and predict the terrestrial carbon balance of Europe and the uncertainty at local, regional and continental scale. This is achieved by (1) executing a strategically focussed set of surface based ecological measurements of carbon pools and CO_2 exchange, (2) further enhancement of an atmospheric high precision observation system for CO_2 and other trace gases, (3) execution of a regional high spatial resolution experiment and (4) integration of these components by means of innovative data assimilation systems and modelling. The key innovation of the CARBOEUROPE-IP is solving the scientific challenge of quantifying the terrestrial carbon balance at different scales and with known, acceptable uncertainties. The increase in spatial and temporal resolution of the observational and modelling program will allow for the first time a consistent application of a multiple constraint approach of bottom-up and top-down estimates to determine the terrestrial carbon balance of Europe with the geographical patterns and variability of sources and sinks. CARBOEUROPE-IP aims at providing a system for carbon accounting for the European continent, and it will further investigate the main controlling mechanisms of carbon cycling in European ecosystems. CARBOEUROPE-IP integrates and expands the research efforts of 95 European institutes. CARBOEUROPE-IP addresses basic scientific questions of high political relevance.

Objectives

The overarching aim of the CARBOEUROPE-IP is to understand and quantify the present terrestrial carbon balance of Europe and the associated uncertainty at local, regional and continental scale. In order to achieve this, the project addresses the three major topics:

1. Determination of the carbon balance of the European continent, its geographical patterns, and changes over time. This is achieved by (1) executing a strategically focussed set of surface based ecological measurements of carbon pools and CO_2 exchange, (2) further enhancement of an atmospheric high precision observation system for CO_2 and other trace gases, (3) execution of a regional high spatial resolution experiment, and (4) integration of these components by means of innovative data assimilation systems, bottom-up process modelling and top-down inverse modelling. The key innovation of the CARBOEUROPE-IP is in its conception as to apply single comprehensive experimental strategy, and its integration into a comprehensive carbon data assimilation framework. It is solving the scientific challenge of quantifying the terrestrial carbon balance at different scales and with known, acceptable uncertainties. The increase in spatial and temporal resolution of the observational and modelling program will allow for the first time a consistent application of a multiple constraint approach of bottom-up and top-down estimates to determine the terrestrial carbon balance of Europe with the geographical patterns and variability of sources and sinks.

2. Enhanced understanding of the controlling mechanisms of carbon cycling in European ecosystems, and the impact of climate change and variability, and changing land management on the European carbon balance. This is achieved by (1) the partitioning of carbon fluxes into their constituent parts (assimilation, respiration, fossil fuel burning), at local, regional and continental scales, (2) the quantification of the effects of management on net ecosystem carbon exchange based on data synthesis, and (3) the development, evaluation and optimisation of ecosystem process models.

3. Design and development of an observation system to detect changes of carbon stocks and carbon fluxes related to the European commitments under the Kyoto Protocol. This is achieved by (1) atmospheric measurements and a modelling framework to detect changes in atmospheric CO_2 concentrations during the time frame of a Kyoto commitment period, and (2) the outline of a carbon accounting system for the second Commitment period based on measuring carbon fluxes, stock changes by soil and biomass inventories, vegetation properties by remote sensing, and atmospheric concentrations. CARBOEUROPE-IP integrates and expands the research efforts of 67 European contractors and around 30 associated institutes. CARBOEUROPE-IP addresses basic scientific questions of high political relevance.

Strategic Objectives

The overarching aim of the CARBOEUROPE-IP is to understand and quantify the terrestrial carbon balance of Europe and associated uncertainties at local, regional and continental scale. In order to achieve this strategic objective, the project addresses the following topics and associated questions:

- The European Carbon Balance" What is the carbon balance of the European continent and its geographical pattern, and how does it change over time?
- "Processes and Modelling" What are the controlling mechanisms of carbon cycling in European ecosystems? How do external parameters such as climate change and variability, and changing land management affect the European carbon balance?
- "Detection of Kyoto" Can the effective CO_2 reduction in the atmosphere in response to fossil fuel emission reduction and enhanced carbon sequestration on land be detected in the context of the Kyoto commitments of Europe?

Main Objectives

The European Carbon Balance

- To determine the time-varying distribution of atmospheric concentrations of CO_2 and other Carbon Cycle related tracers by taking high precision measurements as input to top-down inverse modelling techniques (MO1).
- To determine net ecosystem carbon fluxes from eddy covariance towers, changes in carbon pools from land carbon inventories, and biophysical parameters from remote sensing as input to bottom-up process modelling (MO2).
- To develop an innovative data assimilation framework for the application of a multiple constraint approach where observations of different nature will optimally quantify the European carbon balance (MO3).

Processes and Modelling

- To determine the partitioning of carbon fluxes into its constituent parts (assimilation, respiration, fossil fuel burning), at local, regional and continental scales and its relation to external parameters, and present human activities (MO4).
- To quantify the effects of management on net ecosystem carbon exchange based on data synthesis (MO5).
- To develop, evaluate and optimise ecosystem process models (MO6).

Detection of Kyoto

- To provide an observation system of atmospheric measurements and a modelling framework to detect changes in atmospheric CO_2 concentrations during the time frame of a Kyoto commitment period (MO7).
- To develop the outline of a carbon accounting system for the second Commitment period based on measuring carbon fluxes, stock changes by soil and biomass inventories, vegetation properties by remote sensing, and atmospheric concentrations (MO8).

Specific Objectives

The Main Objectives are met by organising the IP into four "Components" that deal with:

- ecosystem level measurements (Component 1),
- high precision continental scale atmospheric measurements (Component 2),
- a regional experiment aimed at reducing uncertainties in scaling (Component 3), and
- a Continental Integration Component (Component 4) that merges the various data streams into a comprehensive assessment of the European carbon balance.

Partners

N°	Organisation	Country
1.	Max Planck Gesellschaft zur Foerderung der Wissenschaften E.V.	Germany
2.	Università degli Studi della Tuscia	Italy
3.	Vrije Universiteit Amsterdam	Netherlands
4.	Commissariat à l'Energie Atomique	France
5.	University of Edinburgh	UK
6.	University of Aberdeen	UK
7.	Institut National de la Recherche Agronomique	France
8.	Faculté Universitaire des Sciences Agronomiques de Gembloux	Belgium
9.	Météo France	France
10.	Consiglio Nazionale delle Ricerche	Italy
11.	Energieonderzoek Centrum Nederland	Netherlands
12.	Ruprecht-Karls-Universitaet Heidelberg	Germany
13.	Alterra B.V.	Netherlands
14.	Commission of the European Communities - Joint Research Centre	Belgium
15.	Joanneum Research Forschungsgesellschaft Gmbh	Austria
16.	Met Office	UK
17.	Potsdam Institut fuer Klimafolgenforschung	Germany
18.	Provincia Autonoma di Bolzano	Italy
19.	Centro di Ecologia Alpina	Italy
20.	Fundacion Centro de Estudios Ambientales	Spain
21.	Natural Environment Research Council	UK
22.	Centre National de la Recherche Scientifique	France
23.	Centre Tecnolologic Forestal de Catalunya	Spain
24.	Eidgenoessische Forschungsanstalt fuer Agraroekologie und Landbau	Switzerland
25.	Ilmatieteen Laitos	Finland
26.	Institute of Landscape Ecology of the Czech Academy of Sciences	Czech Rep.
27.	Instituto Superior Tecnico	Portugal
28.	Lunds Universitet	Sweden
29.	Om Forskningscenter Risoe	Denmark
30.	Sveriges Lantbruksuniversitet	Sweden
31.	Nationaal Instituut voor Ruimteonderzoek	Netherlands
32.	Seconda Università degli Studi di Napoli	Italy
33.	Trinity College Dublin	Ireland

34.	Technische Universitaet Dresden	Germany
35.	Technische Universitaet Muenchen	Germany
36.	Universiteit Antwerpen	Belgium
37.	Universitaet Bayreuth	Germany
38.	National University of Ireland Cork	Ireland
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54.	Akademia Gorniczo-Hutnicza	Poland
55.	Universitaet Stuttgart	Germany
56.	European Forest Institute	Finland
57.	Danmarks Miljoeundersoegelser	Denmark
58.	Tueringer Landesanstalt fuer Wald, Jagd und Fischerei	Germany
59.	Philippe Saugier International Educational Projects	France
60.	Kobenhavns Universitet	Denmark
61.	Universidade de Aveiro	Portugal

CARBO-NORTH – Quantifying the Carbon Budget in Northern Russia: Past, Present and Future

CT - 036993

http://www.carbo.org/

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 01/11/2006
Total project cost:	3.622.074 €	Duration: 42 months
EC Contribution:	3.099.822 €	
Organisation:	Stockholms Universitet	
	Stockholm - Sweden	
Co-ordinator:	Peter Kuhry (peter.kuhry@natgeo.su.se)	
EC Officer:	Anastasios Kentarchos (anastasios.kentarchos@ec.europa.eu)	

Abstract

CARBO-North aims at quantifying the carbon budget in Northern Russia across temporal and spatial scales. Activities address rates of ecosystem change, effects on the carbon budget (radiative forcing), and global climate and policy implications (Kyoto). Recent research on the impacts of climate change in high latitude regions has mostly assessed the equilibrium response of ecosystems, for instance what is the potential location of the arctic treeline or the southern limit of permafrost under conditions of global warming. However, transient responses are of much greater importance from a policy perspective.

- How quickly will the arctic treeline migrate?
- How quickly will permafrost thaw?
- How quickly will enhanced soil organic matter decay result in increased greenhouse gas emissions and leaching?

Different time lags in these processes will cause significant deviations from equilibrium response. Proposed field study areas in Northeast European Russia are characterized by gradual lowland transitions in vegetation and permafrost conditions. Dedicated climate models will provide requested variables and time slices as input to ecosystem studies. Analyses will be conducted to assess the sensitivity of climate model output to a suite of land cover, ground and permafrost schemes. Proxydata will be used to evaluate rates of ecosystem change under past climatic changes. The present environment will be studied from the plot to landscape scales with a variety of approaches, including assessments of human-induced and natural disturbances. Detailed monitoring and mapping of vegetation, soil and permafrost will provide input for process-oriented studies (treeline patch dynamics; tundra/forest/river carbon fluxes; ground subsidence, etc) and GIS-based upscaling to regional levels. Results are used for integrated ecosystem modeling, calculation of net radiative effects and assessment of the sensitivity of climate model predictions to transient environmental changes.

Objectives

The CARBO-North project integrates state-of-the-art science in the areas of flux measurements, carbon stock inventories, ecological understanding and Earth System modeling to quantify the long-term fluxes of greenhouse gases from the Northern Russian land mass, in order to support implementation of the Kyoto Protocol. Specifically, it will produce regional carbon budgets for Northern Russia for successive time slices of the 21st century (and beyond) that are used to calculate changes in net radiative forcing and effects on future global climate predictions.

Carbon sinks and sources are investigated across spatial and temporal scales. Assessments at the plot to landscape levels carried out at intensive study sites in Northeast European Russia will be upscaled to regional and panarctic levels using GIS and modelling approaches. Investigations will focus on the rate at which critical ecosystem processes take place, including effects of human-induced and natural disturbances.

For this purpose we will reconstruct past changes in climate and environment, monitor and interpret present-day processes, and model future 'transient' and 'equilibrium' ecosystem responses for the next 100 years and beyond. All components of the regional carbon balance are studied, including tundra, taiga, wetlands, aquatic ecosystems and river export and their interconnections, with an integration of results through the application of a regional ecosystem model, the calculation of net radiative effects, and an assessment of the sensitivity of climate model predictions to expected ecosystem changes.

Through a comparison of regional carbon budgets under past and recent natural climate variability with future 'transient' and 'equilibrium' responses under global warming, an attribution of the relative importance of anthropogenic climate change and natural variability can be made. Results will aid EU policymakers to adjust criteria in greenhouse gas emission reduction targets.

SMEs involved in the project will perform an important role through dissemination and popularization of project objectives and results, both in Western Europe and Russia.

Partners

N°	Organisation	Country
1.	Stockholms Universitet	Sweden
2.	Lunds Universitet	Sweden
3.	Alfred-Wegener-Institut fuer Polar und Meeresforschung	Germany
4.	Ernst-Moritz-Arndt-University of Greifswald	Germany
5.	Danmarks Meteorologiske Institut	Denmark
6.	Kobenhavns Universitet	Denmark
7.	Institute of Biology of Komi Scientific Center of the Rural Branch of the	Russian
8.	Russian Academy Of Sciences	Federation
9.	Met Office	UK
10.	University College London.	UK
11.	University of Nottingham	UK
12.	Helsingin Yliopisto	Finland
13.	Kuopion Yliopisto	Finland
14.	Universiteit Utrecht	Netherlands
15.	Wageningen Universiteit	Netherlands
16.	Ensis Ltd	UK
17.	Chermet	Russia

CARBO-OCEAN – Marine Carbon Sources and Sinks Assessment

CT - 511176

http://www.carboocean.org

Instrument:	Integrated Project (IP)	Contract starting date: 01/01/2005
Total project cost:	19.271.618 €	Duration: 60 months
EC Contribution:	14.499.600 €	
Organisation:	Universiteteit Bergen	
	Bergen - Norway	
Co-ordinator:	Christoph Heinze (heinze@gfi.uib.no)	
EC Officer:	Anastasios Kentarchos (anastasios.kentarchos@ec.europa.eu)	

Abstract

CARBOOCEAN IP aims at an accurate assessment of the marine carbon sources and sinks. Target is to reduce the present uncertainties in the quantification of net annual air-sea CO_2 fluxes by a factor of 2 for the world ocean and by a factor of 4 for the Atlantic Ocean. The IP will deliver description, process oriented understanding and prediction of the marine carbon sources and sinks with special emphasis on the Atlantic and Southern Oceans on a time scale -200 to +200 years from now. Expected breakthroughs by CARBOOCEAN IP will be firm answers to the following as yet unresolved questions: How large are the Atlantic and Southern Ocean CO_2 sinks precisely, i.e. how efficient is the downward transport of carbon in the deep-water production areas of the world ocean? What do European rivers and shelf seas contribute to the large scale CO_2 sources and sinks pattern of the North Atlantic Ocean in relation to uptake within Western Europe? What are the key biogeochemical feedbacks that can affect ocean carbon uptake and how do they operate? What is the quantitative global and regional impact of such feedbacks when forced by climatic change in the next 200 years? CARBOOCEAN IP will answer these questions through basic research in a strategic combination of extensive large-scale observations, process studies and advanced computer models focusing on all quantitatively important aspects to the problem. The project is based on three elements - observations, process studies, and integrative modelling - equivalent to description, understanding and prediction: A marine carbon balance for the last 200 years based on high quality observations. A process-based understanding of the marine carbon cycle response to a change in forcing as derived from process studies in the field, in the laboratory, and through modelling. Integrated carbon budgets for the interval -200 to +200 years from now by synthesis of a modelling framework with observation and new feedback processes.

Objectives

The CARBOOCEAN Integrated Project aims at an accurate scientific assessment of the marine carbon sources and sinks within space and time. It focuses on the Atlantic and Southern Oceans and a time interval of -200 to +200 years from now. CARBOOCEAN will determine the ocean's quantitative role for uptake of atmospheric carbon dioxide (CO_2), the most important manageable driving agent for climate change. The ocean has the most significant overall potential as a sink for anthropogenic CO_2. The correct quantification of this sink is a fundamental necessary condition for all realistic prognostic climate simulations. CARBOOCEAN will thus create scientific knowledge, which is essential to a quantitative risk/uncertainty judgement on the expected consequences of rising atmospheric CO2 concentrations. Based on this judgement, it will be possible to guide the development of appropriate mitigation actions, such as management of CO_2 emission reductions within a global context (e.g., Kyoto Protocol, United Nations, 1997). CARBOOCEAN combines the key European experts and scientific resources in the field through an integrated research effort. The effort complements other major research programmes on oceanic, atmospheric, and terrestrial carbon cycling and is linked to these programmes.

Potential impact

The main goal of this ambitious IP (reducing the uncertainties in the quantification of net annual air-sea CO_2

fluxes by a factor of 2) has major implications:

- clarifying the impact of European emissions on a regional and global scale
- input into international negotiations
- input into climate policy strategies

In order to achieve this goal, a joint effort such as this project is pursuing at the European level, is not only of added value, but also vital. It will increase the competitiveness of European research. It integrates current efforts and initiatives into a coordinated and larger scale project. Exploitation and dissemination plans are fully described and appropriate for a project of this kind. The relevant stakeholders are targeted as recipients of the results. Scientific and technological excellence in research and innovation: The IP has clearly defined objectives through the definition of 5 Core Themes and 3 Overarching Activities. If achieved, they will result into a significant progress of the current state-of-the-art. An interdisciplinary approach is pursued covering the relevant aspects of ocean physics, biogeochemistry and ecology based on observational programmes, process studies and a hierarchy of coupled models. Altogether this will provide a unique data set. The probability to reach the ambitious goals is very high.

Quality of the consortium

The consortium includes high profile scientists and institutions from Europe and is further strengthened by leading US partners who either participate directly in or collaborate with the consortium. It is a very complementary partnership of field experimentalists and modellers from a range of European countries closely resembling the relative contribution of each member state to this field of research. They have a proven track record of success in European projects as coordinators and partners.

Quality of the management

The project is horizontally and vertically well structured. The responsibilities for different WP's and activities are clearly defined. Two boards offer a clear hierarchy in the project. The data management is planned very well and the related manpower adequate. There is an extensive plan for the management of knowledge, intellectual property and of other innovation-related activities.

Mobilisation of resources

The allocated resources are coherent with the project's tasks. The consortium includes large European research institutions which are expected to contribute significantly to the overall costs of the project by matching the requested funding. A commitment should be obtained from the national agencies to deliver their part of the funding.

Partners

N°	Organisation	Country
1.	Universiteteit Bergen	Norway
2.	Université Libre de Bruxelles	Belgium
3.	Alfred-Wegener-Institut fuer Polar und Meeresforschung	Germany
4.	Leibniz-Institut fuer Meereswissenschaften	Germany
5.	Consejo Superior de Investigaciones Cientificas	Spain
6.	Commisariat à l'énergie Atomique	France
7.	Université Pierre et Marie Curie - Paris VI	France
8.	Stichting Nederlands Instituut voor Onderzoek der Zee	Netherlands
9.	University of East Anglia	UK
10.	Université de Liège	Belgium
11.	Universitaet Bern	Switzerland
12.	Max Planck Gesellschaft zur Foerderung der Wissenschaften E.V.	Germany
13.	Technische Universitaet Hamburg Harburg	Germany

14.	Universitaet Bremen	Germany
15.	Danmarks Miljoeundersoegelser	Denmark
16.	Universidad de las Palmas de Gran Canaria	Spain
17.	Institut Francais de Recherche pour l'exploitation de la Mer	France
18.	Centre National de la Recherche Scientifique	France
19.	Université de Perpignan	France
20.	Hafrannsoknastofnunin	Iceland
21.	Institut National de Recherche Halieutique	Morocco
22.	Rijksuniversiteit Groningen	Netherlands
23.	Koninklijke Nederlandse Akademie van Wetenschappen	Netherlands
24.	Stiftelsen Nansen Senter for Fjernmaaling	Norway
25.	Norsk Institutt for Luftforskning	Norway
26.	Instytut Ocanologii - Polskiej Akademii Nauk	Poland
27.	Goeteborgs Universitet	Sweden
28.	Met Office	UK
29.	Natural Environment Research Council	UK
30.	University of Essex	UK
31.	Fastopt Gbr	Germany
32.	Intergovernmental Oceanographic Commission of Unesco	France
33.	Nilu Polska Ltd.	Poland
34.	Philippe Saugier International Educational Projects	France
35.	Princeton University	USA

INSEA – Integrated Sink Enhancement Assessment

CT - 503614

http://www.iiasa.ac.at/research/for/INSEA

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 01/01/2004
Total project cost:	2.553.530 €	Duration: 30 months
EC Contribution:	1.488.750 €	
Organisation:	International Institute for Applied Systems Analysis	
	Laxenburg - Austria	
Co-ordinator:	Michael Obersteiner (oberstei@iiasa.ac.at)	
EC Officer:	Anastasios Kentarchos (anastasios.kentarchos@ec.europa.eu)	

Abstract

Among the key global public goods that require special attention and governance, the climate, global food security, the protection of natural resources, and the supply of sustainable energy are unprecedented challenges. The Integrated Sink Enhancement Assessment (INSEA) project aims at an understanding of how the forestry and agricultural sectors contribute to the production of these public goods and, eventually, how these two sectors can contribute to a sustainable development process by the adoption of environmental technologies mitigating anthropogenic greenhouse gas (GHG) emissions. The project aims at developing a transparent toolbox that can be trusted, understood, and shared by stakeholders, as well as sharing scientifically validated data. Greenhouse-gas mitigation measures in agriculture and forestry are part of the Bonn/Marrakech Accords within the Kyoto Protocol. If adopted, these measures could turn out to be instrumental in attaining climate-mitigation goals in an efficient manner, contribute to sustainable farming and also to become a major driver of how terrestrial ecosystems are managed. A thorough integrated economic and environmental assessment of the economic and sustainable potentials of these measures has yet to be carried out, however, either for the European Union or internationally. The INSEA project seeks to develop appropriate analytical tools for policy assessment of these practices and thus contribute to the climate negotiation process as well as support the implementation of the Kyoto Protocol commitments and the post-Kyoto negotiations. By their very nature, land use, land-use change, and forestry (LULUCF) activities occupy space. Starting with a thorough analysis and modelling of the emission balance of agriculture, forestry and livestock activities as a function of technologies, the INSEA approach seeks to integrate farm-level and forest-plot models with regional and national models for an assessment of the potential economic and environmental impacts of policy change. A multifaceted approach across different scales should guarantee robustness and consistency in the assessment of sustainable and cost-effective GHG emission mitigation policies. The bottom-up approach on the one hand will facilitate the validation of aggregate results and, on the other, will help illustrate behavioural change on the micro scale that the policies seek to influence. Right from the start, a common database will be made available to all partners and, with some restrictions, to the outside. Common GHG accounting and cost accounting standards will be developed providing input to detailed biophysical models assessing GHG - mitigation effects due to management change as a consequence of technological adoption. Likewise, system boundaries and baselines all the way to scenario assumptions will be harmonized. The final structure will form the basis for incremental improvement to tailor the approach to the requirements of the stakeholders within an integrated policy framework.

Partners

N°	Organisation	Country
1.	International Institute for Applied Systems Analysis	Austria
2.	Joint Research Center (Ispra)	Italy
3.	Federal Institute for Geosciences and Natural Resources	Germany
4.	Soil Science and Conservation Research Institute	Slovakia

5.	Lulea University of Technology	Sweden
6.	University of Hohenheim	Germany
7.	Institut National de la Recherche Agronomique	France
8.	Joanneum Research	Austria
9.	University of Bodenkultur	Austria
10.	Centre de Coopération Internat. en Recherche Agronomique pour le Developpement	France
11.	European Forest Institute	Finland

NEU-CO_2-III – Continuation of the "International Network Non-energy use and CO2 emissions (NEU-CO_2)", Phase III

CT - 505345

http://www.chem.uu.nl/nws/www/nenergy/

Instrument:	Specific Support Action (SSA)	Contract starting date: 01/09/2004
Total project cost:	289.656 €	Duration: 24 months
EC Contribution:	289.656 €	
Organisation:	Universiteit Utrecht	
	Utrecht - Netherlands	
Co-ordinator:	Martin Patel (m.patel@chem.uu.nl)	
EC Officer:	Anastasios Kentarchos (anastasios.kentarchos@ec.europa.eu)	

Abstract

A significant fraction of fossil fuels is consumed as non-energy use, i.e. as feedstock for the manufacture of synthetic materials and chemical products, e.g. plastics, paints, solvents, lubricants and bitumen. In the long run, these products contribute substantially to CO2 emissions. In Western Europe, non-energy use represents 11-12% of the total amount of fossil fuels for final consumption. In other parts of the world, the manufacture of non-energy products is increasing very rapidly, e.g. in China. CO_2 emissions from non-energy use continue to be a major source of uncertainty in national greenhouse gas (GHG) emission accounting. The NEU-CO_2 network has been working on this issue since 1999. In this proposal the continuation of the network is applied for (Phase III). Given the success of the network to date, the goals of Phase III are: to expand the existing network by a Chinese, German, South Korean & South African partner, to develop the so-called Simplified Approach, which requires much less data than the NEAT model (developed in Phase I&II) and can hence be applied worldwide more easily, to apply it to all countries represented in the NEU-CO_2 network and to evaluate the accuracy of the results by comparison with detailed country-specific estimation methods, to pool bottom-up information on materials with complicated pathways in production, use and waste management such as solvents and lubricants, to monitor the experience made with the improved IEA/EUROSTAT energy balance questionnaire and to make further steps towards harmonisation, to initiate and accompany national analyses similar to those for the Netherlands, Austria & Flanders in Belgium, to contribute to rewriting of the IPCC Guidelines for National GHG emission inventories in order to improve the terminology, remove ambiguity & contradictions and to introduce improved estimation methods, to disseminate the results by two workshops, by the website and by other means.

Partners

N°	Organisation	Country
1.	Universiteit Utrecht	Netherlands
2.	Ente per le Nuove Tecnologie, l'Energia e l'Ambiente	Italy
3.	Avonlog Ltd	UK
4.	Institut fuer Industrielle Oekologie	Austria
5.	Risoe National Laboratory	Denmark
6.	Centre Interprofessionnel Technique d'Etudes de la Pollution Atmosphérique	France
7.	Vlaamse Instelling voor Technologisch Onderzoek	Belgium
8.	Center for Energy Efficiency	Russia
9.	Ecofys Polska Sp Z.O.O.	Poland
10.	The Energy and Resources Institute	India

11.	Inha University	Korea Rep.
12.	Icf Consulting, Ltd.	UK
13.	University of Cape Town.	South Africa
14.	Energieonderzoek Centrum Nederland	Netherlands
15.	International Energy Agency	France

NITROEUROPE – The Nitrogen Cycle and its Influence on the European Greenhouse Gas Balance

CT - 017841

http://www.neu.ceh.ac.uk/

Instrument:	Integrated Project (IP)	Contract under negotiation
Total project cost:	28.310.000 €	Duration: 60 months
EC Contribution:	16.600.000 €	
Organisation:	Natural Environment Research Council	
	Swindon - UK	
Co-ordinator:	Mark Sutton (ms@ceh.ac.uk)	
EC Officer:	Anastasios Kentarchos (anastasios.kentarchos@ec.europa.eu)	

Abstract

The NitroEurope IP – or NEU for short – addresses the major question: What is the effect of reactive nitrogen (Nr) supply on net greenhouse gas budgets for Europe? The objectives are to:

- establish robust datasets of N fluxes and net greenhouse-gas exchange (NGE) in relation to C-N cycling of representative European ecosystems, as a basis to investigate interactions and assess long-term change;
- quantify the effects of past and present global changes (climate, atmospheric composition, land-use/land-management) on CN cycling and NGE;
- simulate the observed fluxes of N and NGE, their interactions and responses to global change/land-management decisions, through refinement of plot-scale models;
- quantify multiple N and C fluxes for contrasting European landscapes, including interactions between farm-scale management, atmospheric and water dispersion, and consideration of the implications for net fluxes and strategies;
- scale up Nr and NGE fluxes for terrestrial ecosystems to regional and European levels, considering spatial variability and allowing assessment of past, present and future changes;
- assess uncertainties in the European model results and use these together with independent measurement/inverse modelling approaches for verification of European N_2O and CH4 inventories and refinement of IPCC approaches.

These objectives are met by a programme that integrates:

- an observing system for N fluxes and pools,
- a network of manipulation experiments,
- plot-scale C-N modelling,
- landscape analysis,
- European up-scaling
- uncertainty and verification of European estimates. Cross-cutting activities address management, databases, training & dissemination.

NEU will advance the fundamental understanding of C-N interactions at different scales and deliver: process-based models, landscape-level assessments, European maps of C-N pools, Nr fluxes and NGE, and independent verification of GHG inventories, as required under the Kyoto Protocol.

Objectives

The NitroEurope IP – or NEU for short – addresses the major question: What is the effect of reactive nitrogen (Nr) supply on net greenhouse gas budgets for Europe? The objectives are to:

- establish robust datasets of N fluxes and net greenhouse-gas exchange (NGE) in relation to C-N cycling of representative European ecosystems, as a basis to investigate interactions and assess long-term change;
- quantify the effects of past and present global changes (climate, atmospheric composition, land-use/land-management) on CN cycling and NGE;
- simulate the observed fluxes of N and NGE, their interactions and responses to global change/land-management decisions, through refinement of plot-scale models;
- quantify multiple N and C fluxes for contrasting European landscapes, including interactions between farm-scale management, atmospheric and water dispersion, and consideration of the implications for net fluxes and strategies,
- scale up Nr and NGE fluxes for terrestrial ecosystems to regional and European levels, considering spatial variability and allowing assessment of past, present and future changes;
- assess uncertainties in the European model results and use these together with independent measurement/inverse modelling approaches for verification of European N2O and CH4 inventories and refinement of IPCC approaches.

NEU will advance the fundamental understanding of C-N interactions at different scales and deliver: process-based models, landscape-level assessments, European maps of C-N pools, Nr fluxes and NGE, and independent verification of GHG inventories, as required under the Kyoto Protocol.

Partners

N°	Organisation	Country
1.	Natural Environment Research Council	UK
2.	Stichting Energieonderzoek Centrum Nederland	Netherlands
3.	Forschungszentrum Karlsruhe, Institute for Meteorology and Climate Research	Germany
4.	Forskningscenter Risoe, Risoe National Laboratory	Denmark
5.	Alterra Green World Research	Netherlands
6.	Institut National de la Recherche Agronomique	France
7.	Seconda Università degli Studi Napoli	Italy
8.	European Commission – Directorate General Joint Research Centre	Italy
9.	Agroscope Fal Reckenholz, Swiss Federal Research Station for Agroecol & Agriculture	Switzerland
10.	Center For Skov, Landskab, Og Planlægning, Kvl	Denmark
11.	Max Planck Gesellschaft Zur Foerderung der Wissenschaften E.V.	Germany
12.	Consiglio Nazionale delle Ricerche	Italy
13.	Federal Office and Research Centre for Forests	Austria
14.	Helsingin Yliopisto, University of Helsinki	Finland
15.	Danmarks Jordbrugsforskning	Denmark
16.	Scottish Agricultural College	UK
17.	University of Aberdeen	UK
18.	International Institute for Applied Systems Analysis	Austria
19.	Wageningen University	Netherlands
20.	The August Cieszkowski Agricultural, University of Poznan	Poland
21.	Ilmatieteen Laitos, Finnish Meteorological Institute	Finland
22.	Forest Research Institute	Hungary
23.	Meteorological & Hydrolog. Service Of Croatia	Croatia
24.	Norsk Institutt for Luftforskning	Norway

25.	Slovenský Hydrometeorologický Ústav,	Slovakia
26.	Trinity College Dublin	Ireland
27.	Netherlands Organisation for Applied Scientific Research	Netherlands
28.	The University of Manchester	UK
29.	University of Cork, National University of Ireland	Ireland
30.	The University of Edinburgh	UK
31.	Università degli Studi della Tuscia,	Italy
32.	Odessa National University	UKraine
33.	Göteborg University	Sweden
34.	Den Kongelige Veterinaer- Og Landbohoejskole	Denmark
35.	St Stephens University	Hungary
36.	Universiteit Gent	Belgium
37.	University of Zimbabwe	Zimbabwe
38.	Leibniz-Zentrum Für Agrarlandschafts und Landnutzungsforschung E.V.	Germany
39.	Kungliga Tekniska Högskolan	Sweden
40.	Chinese Academy Of Sciences	China
41.	Indian Agricultural Research Institute	India
42.	Russian Academy of Sciences,	Russia
43.	Polish Academy of Science, Research Centre for Agricultural and Forest Environment	Poland
44.	Justus-Liebig-Universitaet Giessen,	Germany
45.	Commissariat à l'énergie Atomique	France
46.	Rijksinstituut voor Volksgezondheid en Milieu	Netherlands
47.	Meteorologisk Institutt	Norway
48.	Meteorological Office	UK
49.	Centro di Ecologia Alpina	Italy
50.	Fundacion Centro de Estudios Ambientales del Mediterraneo	Spain
51.	Bundesforschungsanstalt für Landwirtschaft	Germany
52.	Centre Nationale de la Recherche Scientifique	France
53.	Russian Academy of Sciences, A.N.Severtsov Institute of Ecology and Evolution	Russia
54.	Eotvos Lorand Tudomanyegyetem	Hungary
55.	Tartu Uelikool	Estonia
56.	Centre de Recerca Ecològica i Aplicacions Forestals	Spain
57.	Instituto Superior de Agronomia, Universidade Técnica de Lisboa	Portugal
58.	Swedish Environmental Research Institute	Sweden
59.	Universiteit van Amsterdam	Netherlands
60.	Lunds Universitet	Sweden
61.	Universidad Politécnica de Madrid	Spain
62.	Eidgenoessische Forschungsanstalt	Switzerland
63.	Roskilde Universitetscenter	Denmark
64.	Suomen Ympäristökeskus	Finland
65.	Szegedi Tudomanyegyetem	Hungary

PAN-AMAZONIA – Project for the Advancement of Networked Science in Amazonia

CT - 505335

http://www.geog.ox.ac.uk/research/projects/panamazonia/index.html

Instrument:	Specific Support Action (SSA)	Contract starting date: 01/01/2004
Total project cost:	400.000 €	Duration: 36 months
EC Contribution:	400.000 €	
Organisation:	University of Oxford	
	Oxford - UK	
Co-ordinator:	Yadvinder Malhi (yadvinder.malhi@ouce.ox.ac.uk)	
EC Officer:	Anastasios Kentarchos (anastasios.kentarchos@ec.europa.eu)	

Abstract

PAN-AMAZONIA encompasses three integrated scientific networks designed to meld together currently disparate research efforts across the Amazon Basin in terms of global change and tropical forest ecosystem function. Specifically addressing current European Union carbon cycle and biodiversity priorities, PAN-AMAZONIA will form and strengthen transnational networks covering forest diversity and dynamics, tree biodiversity and whole ecosystem physiology and carbon dynamics, involving around 70 researchers from ten Latin American countries linked together with the overall aim of advancing our long term understanding of Amazonian forest structure and function in the face of global change. With the specific support of the Inter-American Institute for Global Change Research, training of Latin American early stage researchers will form a key focus of PAN-AMAZONIA, with six Advanced Study Workshops to be held with instruction provided by leading European and South American scientists. Early on in the project exceptional students will be identified at the early post¬ graduate level for Investigador Pan-Amazonia Fellowships. Those selected will work in close liaison with top-level European scientists on previously identified projects that specifically address comparison and integration of research across the Amazon Basin. Integration of global change research in the Amazon will be further strengthened by producing a comprehensive set of multi¬ lingual manuals and by synthesizing existing knowledge of forest biodiversity, ecology and change into authoritative database products. By forming new Regional Research Networks and strengthening European co-operation with Latin American partners, PAN-AMAZONIA will develop the critical mass of human capacity and techniques for monitoring and understanding the Amazon ecosystem's role in climate change and maintenance of biodiversity, and the effects of global change on the Amazon ecosystem. The project therefore simultaneously addresses the ENRICH objectives of strengthening co-operation with partners in the developing world on issues such as climate change, biodiversity, ecosystems, natural risks and hazards.

Partners

N°	Organisation	Country
1.	University of Oxford	UK
2.	University of Leeds	UK
3.	Vrije Universiteit Amsterdam	Netherlands
4.	Centre National de la Recherche Scientifique	France
5.	Alterra B.V.	Netherlands
6.	Universiteit Utrecht	Netherlands
7.	Max Planck Gesellschaft zur Foerderung der Wissenschaften E.V.	Germany
8.	Instituto Nacional de Pesquisas da Amazonia	Brazil
9.	Museu Paraense Emilio Goeldi	Brazil
10.	Museo de Historia Natural Noel Kempff Mercado	Bolivia

Atmospheric Pollutants and their Regional Impacts

ACCENT – Atmospheric Composition Change: A European Network

CT - 505337

http://www.accent-network.org

Instrument:	Network of Excellence (NoE)	Contract starting date: 01/03/2004
Total project cost:	13.220.000 €	Duration: 60 months
EC Contribution:	11.220.000 €	
Organisation:	Consiglio Nazionale delle Ricerche	
	Roma - Italy	
Co-ordinator:	Sandro Fuzzi (s.fuzzi@isac.cnr.it)	
EC Officer:	Ib Troen (ib.troen@ec.europa.eu)	

Abstract

Changes in atmospheric composition directly affect many aspects of life, determining climate, air quality and atmospheric inputs to ecosystems. In turn, these changes affect the fundamental necessities for human existence: human health, food production, ecosystem health and water. Atmospheric composition change research is therefore fundamental for the future orientation of Europe's Sustainable Development strategy. The overall goals of ACCENT are to promote a common European strategy for research on atmospheric composition change, to develop and maintain durable means of communication and collaboration within the European scientific community, to facilitate this research and to optimise two-way interactions with policy-makers and the general public. ACCENT will establish Europe as an international leader in atmospheric composition change research, able to steer research agendas through its involvement in major international programmes. ACCENT furthermore aims to become the authoritative voice in Europe on issues dealing with atmospheric composition change and sustainability. The ACCENT joint research programme focuses on aerosols, biosphere-atmosphere interaction and transport and transformation of pollutants and it also looks for new partnership in economic and Earth System analysis. Integration will be achieved by creating common facilities and activities including: a dedicated interactive web portal, models, data-bases, measurement platforms, training and education opportunities, quality assurance procedures and facilities, integrated assessment and synthesis of scientific results and an interface with the general public. The excellence and the commitment of the ACCENT Partnership guarantee an effective and durable integration of the European atmospheric composition change research and that it becomes a pillar of the European Research Area.'

Objectives

The overall goals of ACCENT are to promote a common European strategy for research on atmospheric composition sustainability, to develop and maintain durable means of communication and collaboration within the European scientific community, to facilitate this research and to optimise the interactions with policy-makers and the general public. In so doing, ACCENT will establish Europe as an international leader in atmospheric composition research, able to steer research agendas through its involvement in major international programmes. ACCENT will also reinforce European environmental policy-making and will support Member States and the European Union in international negotiations and agreements.

ACCENT aims to become the authoritative voice in Europe on issues dealing with atmospheric composition sustainability and its societal implications. Such authority will be based on the integration of competencies and activities of the Partners and of the wider European scientific community in the field, and on the interaction with the international scientific community.

ACCENT deals with important societal problems, and will therefore endeavour to set up a dialogue with society, involving different players such as policy-makers, non-governmental organisations and the general public as participants and contributors in its activities. The overall goal of ACCENT will be pursued through specific objectives which can be classified as: a) a joint research programme, b) tasks for integration and c) outreach tasks.

Joint research programme

A broad common research agenda agreed by the Partners in the ACCENT Network, also in collaboration with the wider European research community, is the basis for a real integration of the European research efforts in this field, and for linking national programmes to joint European and international research projects. A biennial European Symposium would be a prime tool for defining, promoting and updating a common research agenda. The understanding of atmospheric composition sustainability requires further advancement in a number of specific areas in atmospheric research which have been identified as currently having major gaps in knowledge or showing the need for integration with other research areas. These are:

- the importance of aerosols for air quality and climate;
- the biosphere-atmosphere exchange as a source and receptor of atmospheric chemical species;
- the transport and transformation of atmospheric constituents at different spatial and temporal scales;
- the linkages between economics, policy-making, Earth System analysis and atmospheric composition change research.

Subprojects will be set up, each with its own organisation, to focus and streamline European research within these areas. The subprojects, each led by a Co-ordinator and a Steering Committee, will organise their activities to:

- evaluate the state of the art of research in the respective areas;
- compile and disseminate information on national research programmes in the respective areas;
- organise workshops on key issues;
- propose and execute joint research activities at European and international level;
- synthesise and integrate research results for policy-makers and the general public.

Tasks for integration

ACCENT will provide a framework for co-ordination and communication among the Partners in the Network and the wider European research community. It will thereby have the effect of restructuring European research on the sustainability of atmospheric composition, leading to a durable integration. This will be accomplished through a number of tasks organised by ACCENT:

- Fostering interactions with the international community. European research has the potential to lead in setting the research agenda world-wide. ACCENT will promote and co-ordinate European contributions to international programmes such as the International Global Atmospheric Chemistry project (IGAC) of the International Geosphere-Biosphere Programme (IGBP), the Global Atmospheric Watch (GAW) of the World Meteorological Organisation (WMO), the European Monitoring and Evaluation Programme (EMEP) under the Convention on Long-range Transboundary Air Pollution (CLRTAP) and the Intergovernmental Panel on Climate Change (IPCC).
- ACCENT web portal. An extensive use of Internet-based techniques will be made within ACCENT to facilitate communication within the atmospheric chemistry community, provide access to information for all and to implement a number of ACCENT activities. The web portal will also be an invaluable instrument for training activities and to reach out to policy-makers and the general public.
- Modelling. The main goal of this task is to establish a basis for co-ordinated research activities in atmospheric modelling at different scales, from local to global, within the European research community, making the results from these activities available for the science community at large and for training purposes.
- Access to information (organisation of databases). Emission inventories, data from monitoring networks, experimental campaigns, laboratory experiments, models and model output, and remote sensing data are essential tools for scientists, but they are presently dispersed across a multitude of institutions. ACCENT aims at rationalising the compilation and ease of access to such data, thereby increasing their usefulness for research and training.
- Access to research infrastructures. Rectifying the lack of truly European, large-scale facilities for atmospheric research (aircraft, field stations, laboratory facilities, etc.) requires co-ordination between national facilities for joint European research. ACCENT will collect and provide information on available relevant infrastructures and will facilitate the access to them for research and training. At the same time a mechanism will be created to improve the co-ordinated activities of such infrastructures.
- Satellite remote sensing of atmospheric constituents. The exploitation of satellite data for tropospheric research is currently poorly focused within Europe. One of the tasks of ACCENT will be to co-ordinate

and promote the use of the satellite data for tropospheric research and environmental policy applications. This represents an exciting and challenging opportunity to make a significant impact on the generation, interpretation and exploitation of these novel data.

- Data quality assurance (QA). Data of known and high quality are essential for the veracity of results on atmospheric composition change and for enhancing their impact. ACCENT will evaluate and define data quality objectives and will organise instrument comparisons in relevant areas, also in connection with other national and international programmes.

Outreach tasks

ACCENT involves European institutions and scientists at the highest level of excellence in the field of atmospheric composition research. However, in order to reach its overall objectives, ACCENT must reach out to the whole of the scientific community in Europe and raise the standards of European research. An important aspect of this is the fostering of new expertise, in particular in the area of sustainability research, and the creation of interactive links with policy and the public.

- Providing training and education. Preparing the new generation of atmospheric scientists and increasing the expertise to a common level across Europe (including Accession Countries) is essential for the future of scientific endeavour in the field. Furthermore, the subject of atmospheric composition change has become sufficiently important to be part of the curricula of educational institutions at different levels. Outreach to the developing world is also important. An effective web-based management system will serve to administer training and education activities.
- Synthesising research results for the policy and the public. Scientific knowledge needs to be integrated and synthesised by an authoritative body before it can be used as reference in the policy-making process and in the creation of public awareness. For this purpose, ACCENT will set up points of contact between the scientific community and policy-makers (EMEP, CAFÉ, IPCC) to facilitate a two-way communication process. ACCENT also aims at providing information on research results on atmospheric composition change and the environmental implication to the general public, directly or through the media. Internet-based information tools will again play an important role for this task

Partners

N°	Organisation	Country
1.	Consiglio Nazionale delle Ricerche	Italy
2.	Commission of the European Communities - Joint Research Centre	Belgium
3.	International Institute for Applied System Analysis	Austria
4.	Universitaet fuer Bodenkultur	Austria
5.	Belgisch Instituut voor Ruimte Aeronomie	Belgium
6.	National Institute of Meteorology and Hydrology of The Bulgarian Academy of Sciences	Bulgaria
7.	Risoe National Laboratory	Denmark
8.	Helsingin Yliopisto	Finland
9.	Centre National de la Recherche Scientifique	France
10.	Météo-France	France
11.	Forschungszentrum Juelich Gmbh	Germany
12.	Leibniz Institut fuer Troposphaerenforschung E.V.-	Germany
13.	Max Planck Gesellschaft Zur Foerderung der Wissenschaften E.V.	Germany
14.	Universitaet Bremen	Germany
15.	Ruprecht-Karls-Universitaet Heidelberg.	Germany
16.	University of Crete	Greece
17.	Aristoteleio Panepistimio Thessalonikis	Greece

18.	Veszpremi Egyetem	Hungary
19.	National University of Ireland	Ireland
20.	Latvijas Universitate	Latvia
21.	Institute of Physics	Lithuania
22.	Norsk Institutt for Luftforskning	Norway
23.	University of Oslo	Norway
24.	Institute of Environmental Protection	Poland
25.	Universidade de Aveiro	Portugal
26.	Fundacion Centro de Estudios Ambientales del Mediterraneo	Spain
27.	Stockholms Universitet.	Sweden
28.	University of Berne	Switzerland
29.	Paul Scherrer Institut	Switzerland
30.	Koninklijk Nederlands Meteorologisch Instituut	Netherlands
31.	Natural Environment Research Council	UK
32.	Universita degli Studi di Urbino "Carlo Bo"	Italy
33.	University of Kuopio	Finland
34.	Ilmatieteen Laitos	Finland
35.	Deutsches Zentrum fuer Luft und. Raumfahrt E.V	Germany
36.	Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek	Netherlands
37.	Rijksinstituut voor Volksgezondheid en Milieu	Netherlands
38.	Energieonderzoek Centrum Nederland	Netherlands
39.	Imperial College of Science, Technology And Medicine	UK
40.	University of Cambridge	UK
41.	University of Leicester	UK
42.	University of East Anglia	UK
43.	University of Manchester Institute of Science and Technology	UK

AIR4EU – Air Quality Assessment for Europe from Local to Continental

CT - 503596

http://www.air4eu.nl

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 01/01/2004
Total project cost:	2.927.506 €	Duration: 36 months
EC Contribution:	1.958.181 €	
Organisation:	Nederlandse Organisatie voor Toegepast	
	Natuurwetenschappelijk Onderzoek	
	Delft - Netherlands	
Co-ordinator:	Peter Builtjes (p.j.h.builtjes@mep.tno.nl)	
EC Officer:	Ib Troen (ib.troen@ec.europa.eu)	

Abstract

AIR4EU addresses the needs for policy-orientated research on integrated air quality (AQ) assessment by monitoring methods and modelling at different temporal and spatial scales for regulated components in Europe: PM10 (and PM2.5), NO_2, CO, SO_2, O3 and benzene. Policy support on AQ assessment has been recognised a priority issue within the "Clean Air for Europe- CAFE" programme. There are a wide variety of AQ assessment methods based upon monitoring and modelling, but these methods depend on the spatial and temporal scales, and are often not or only partially compatible. Consequently, there is a need for scientific sound and practical recommendations on how to integrate monitoring and modelling methods into internally consistent, comprehensive and cost-effective assessment methods. The aim of AIR4EU is to provide recommendations on AQ assessment for different temporal and spatial scales: ranging from hourly to annual and from "hotspot"/street to continental scale. Case studies are implemented with partners in Paris, Rome, Prague, London, Athens, Rotterdam and Oslo, to test and further develop the recommendations. AIR4EU will also prepare AQ maps at different scales in Europe based upon available data sets (monitoring, meteorology and emissions) and the recommended methods. The cooperation of European top-scientists from six member states representing four universities, two research institutes and eight user-partners will support the establishment of the European Research Area. AIR4EU will co-operate with on-going relevant projects (e.g. ENV-e-CITY; OSCAR; CLEAR; MERLIN) and networks (e.g. INTEGAIRE, CITY-Delta; POLIS), and specific liaison will be established with the CAFE programme. AIR4EU will disseminate its results by a Website and through Newsletters and Workshops to the scientific community, environmental authorities, policy makers and other stakeholders in AQ in Europe.

Objectives

The overall aims of the project AIR4EU are:

- To formulate a guidance document on best practices for the combined use of monitoring methods and models to assess AQ in Europe from hotspot/street level to continental level for various users on local, regional, national and European level and for various purposes;
- To prepare maps of air quality in Europe based on the available European wide data sets and best technique of assessment. AIR4EU will present AQ maps covering the European scale, including examples of the hotspot, street, urban, agglomeration and regional level for PM10, PM2.5, NO_2, O_3, CO, SO_2 and benzene. These maps will illustrate the application of the recommendations, which have been validated in a number of case studies.

Operational objectives include:

- To set the policy framework for AIR4EU and identify the user needs in relation to air quality assessment methods;
- To establish and implement the consultation with the high-level Expert group, policy makers, authorities, practitioners and other stakeholders;

- To review and examine the benefits and drawbacks, including the variability and uncertainty of a range of monitoring and modelling air quality assessment methods relevant to local/hotspot, urban/agglomeration and regional/EU spatial scales and at various temporal scales;
- To review and assess the procedures for quantifying the main natural and anthropogenic sources and emissions and to estimate the quality of such data relevant to local/hotspot, urban/agglomeration and regional/EU spatial scale air quality assessment;
- To synthesise and harmonise the benefits and drawbacks of AQ assessment methods and their variability and uncertainties, as well as procedures for quantification of natural and anthropogenic emissions;
- To prepare draft recommendations on best techniques for assessment of air quality relevant to local/hotspot, urban/agglomeration and regional/EU spatial scales and at various temporal scales;
- To specify the criteria and develop the protocols for case studies: objectives, contents and types of results;
- To prepare, implement and evaluate case studies in the seven application cities according to the protocols and reflect the appropriateness of the draft recommendations.

Partners

N°	Organisation	Country
1.	Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek	Netherlands
2.	Norsk Institutt for Luftforskning	Norway
3.	Aristoteleio Panepistimio Thessalonikis	Greece
4.	Universitaet Stuttgart	Germany
5.	University of Hertfordshire	UK
6.	Universidade de Aveiro	Portugal
7.	Airparif	France
8.	Societa Trasporti Automobilistici Spa	Italy
9.	Environment Agency	UK
10.	Utvar Rozvoje Hlavniho Mesta Prahy	Czech Rep.
11.	Enveco S.A. Environmental Protection Management And Economics	Greece
12.	Gemeentewerken Rotterdam	Netherlands
13.	Dcmr Milieudienst Rijnmond	Netherlands
14.	Oslo Kommune Helsevernetaten	Norway

EUCAARI – European Integrated Project on Aerosol Cloud Climate and Air Quality Interactions

CT - 036833

http://www.atm.helsinki.fi/eucaari/

Instrument:	Integrated Project (IP)	Contract starting date: 01/01/2007
Total project cost:	14.952.000 €	Duration: 48 months
EC Contribution:	9.999.627 €	
Organisation:	Helsingin yliopisto	
	Helsinki - Finland	
Co-ordinator:	Markku Kulmala (markku.kulmala@helsinki.fi)	
EC Officer:	Ib Troen (ib.troen@ec.europa.eu)	

Abstract

The European Integrated project on Aerosol Cloud Climate and Air Quality Interactions, EUCAARI, brings together the leading European research groups, state-of-the-art infrastructure and key players from third countries to investigate the role of aerosol on climate and air quality. The objectives of EUCAARI are:

- Reduction of the current uncertainty of the impact of aerosol particles on climate by 50% and quantification of the relationship between anthropogenic aerosol particles and regional air quality, and
- Quantification of the side effects of European air quality directives on global and regional climate, and provide tools for future quantifications for different stakeholders.

EUCAARI will also contribute to technological developments in the aerosol measurement industry, enhancing future experiments and air-quality monitoring networks.

The project is organised into four scientific elements designed to maximize the integration of methodologies, scales and ultimately our understanding of air quality and climate. New ground-based, aircraft and satellite measurements will be integrated with existing data to produce a global consistent dataset with the highest possible accuracy. A European measurement campaign will be designed around simultaneous multi-station observations, Lagrangian aircraft measurements and carefully selected ""super-sites"". A hierarchy of models will be developed based on the results of the laboratory and theoretical investigations. The models will be used to interpret the measurements and will be integrated in regional air quality and global climate models.

The result will be measurable improvements in the project's climate and air quality models. The outcomes (scenarios, recommendations, models, harmonized datasets and new knowledge) will be disseminated to authorities, policy makers, the research community, industry, instrument designers, and the EU-ESA Global Monitoring for Environment and Security (GMES).

Objectives

EUCAARI will make progress on the following ten scientific problems with the greatest uncertainty:

- In-situ formation (nucleation) of aerosols;
- Number and mass emissions of primary aerosol from natural and anthropogenic sources at urban, regional, and global scales;
- Formation of secondary organic aerosol and the partitioning of semi-volatile compounds between the gas and aerosol phases;
- Ageing of aerosols and evolution of their properties during their atmospheric lifetime;
- Attribution of the different aerosol mass components in Europe to specific sources;

- Current and future contributions of natural versus anthropogenic, and primary versus secondary sources to particle number concentrations;
- Long-range transport of aerosol particles and their precursors from and to Europe as well as their transport within Europe;
- The impact of aerosols and trace gases on cloud droplet activation, cloud lifetime, and extent (the aerosol indirect effect);
- Interactions between the aerosol cycle, the water cycle, and the biosphere;
- Climatic feedbacks related to anthropogenic/biosphere-aerosol-cloud-climate interactions.

In this EUCAARI focuses on quantification of key processes and the impact of aerosols on climate and air quality. It also completes other ongoing efforts in Europe such as the EU-FP6-IP-ENSEMBLES ("Methods to reconcile disparate national forecasts of medium and long-range atmospheric dispersion") and EU-FP6-SCOUT-O3 (Stratosphere-Climate Links with Emphasis on the UTLS) projects as well as integrate national and international activities related to air quality and climate change issues. This wide-angle perspective supports European governmental policy, since most European countries have also signed the Vienna Convention on the Protection of the Ozone Layer and the Convention of Long-Range Transport of Air Pollutants.

EUCAARI integrates all important aerosol processes (formation, emission, physical and chemical transformations, transport, and removal) at all relevant scales (from nano to global scale) to address the role of atmospheric aerosol in climate change and air quality. EUCAARI investigates the complex system involving atmospheric dynamics, chemical composition and interactions within the overall Earth system, and stresses the importance of links between air quality and climate.

EUCAARI aims to reduce the uncertainty associated with the impact of aerosol on climate by 50%. It will also better constrain the impact of emission control strategies on climate and air quality over Europe. An integrated modelling approach involving molecular-level calculations, process models, as well as regional and global scale models will be developed, tested and used. These model simulations will culminate in extensive improvements to aerosol schemes in the project's climate models. Model evaluation will make full use of existing measurement networks and will add new aircraft and ground-based measurements during co-ordinated field measurement campaigns over Europe. On the technological side, EUCAARI will develop and test aerosol instruments by working with specialist SMEs. The project will also make significant improvements to regional and global scale chemical transport models and cloud models usable in future operational models.

Partners

N°	Organisation	Country
1.	Helsingin Yliopisto	Finland
2.	Centre National de la Recherche Scientifique	France
3.	Max-Planck-Gesellschaft Zur Förderung der Wissenschaften E.V	Germany
4.	Leibniz Institute for Tropospheric Research	Germany
5.	Consiglio Nazionale delle Ricerche - Istituto di Scienze dell'Atmosfera e del Clima	Italy
6.	Swiss Federal Institute of Technology Zurich	Switzerland
7.	Netherlands Organisation for Applied Scientific Research	Netherlands
8.	Netherlands Royal Meteorological Institute	Netherlands
9.	Max-Planck-Society for the Advancement of Science	Germany
10.	University of Leeds	UK
11.	Lund University	Sweden
12.	University of Veszprem	Hungary
13.	Ilmatieteen Laitos	Finland

14.	European Commission Directorate General - Joint Research Centre	Italy
15.	Met Office	UK
16.	Norsk Institutt for Luftforskning	Norway
17.	Meteorologisk Institutt	Norway
18.	National University of Ireland	Ireland
19.	Paul Scherrer Institut	Switzerland
20.	University of Oslo	Norway
21.	Institute of Chemical Engineering & High Temperature Chemical Processes	Greece
22.	Ustav Chemickych Procesu - Akademie Ved Ceske	Czech Rep.
23.	Météo-France - Centre National de Recherches Météorologiques	France
24.	Forschungszentrum Juelich Gmbh	Germany
25.	North-West University	South Africa
26.	The Energy and Resources Institute	India
27.	University of Copenhagen	Denmark
28.	University of East Anglia	UK
29.	University of Kuopio	Finland
30.	The University of Manchester	UK
31.	Instituto De Fisica da Universidade de Sao Paulo	Brazil
32.	Airel Ltd	Estonia
33.	University of Birmingham	UK
34.	Deutsches Zentrum fur Luft- Und Raumfahrt E.V.	Germany
35.	University of Crete	Greece
36.	The Hebrew University of Jerusalem	Israel
37.	International Institute of Applied Systems Analysis	Austria
38.	Stockholm University	Sweden
39.	Warsaw University	Poland
40.	University of Aveiro	Portugal
41.	Institute of Environmental Physics, University of Tartu	Estonia
42.	Johannes Gutenberg-Universität Mainz	Germany
43.	Peking University	China
44.	Chinese Academy of Meteorological Sciences	China
45.	University of the Aegean	Greece
46.	Commissariat à l'Energie Atomique	France
47.	Risoe National Laboratory	Denmark
48.	Deutscher Wetterdienst	Germany

EUROHYDROS – A European Network for Atmospheric Hydrogen Observation and Studies

CT - 036916

http://www.meteor.uni-frankfurt.de/eurohydros/

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 01/08/2006
Total project cost:	3.528.800 €	Duration: 36 months
EC Contribution:	2.838.000 €	
Organisation:	Johann Wolfgang Goethe Universität	
	Frankfurt - Germany	
Co-ordinator:	Andreas Engel (an.engel@meteor.uni-frankfurt.de)	
EC Officer:	Ib Troen (ib.troen@ec.europa.eu)	

Abstract

We propose to initialise a European Network for observations of molecular Hydrogen and to put in place a new and consistent calibration scale for molecular Hydrogen. The observational network will have 12 continuous measurements sites in Europe, 7 flask sampling sites in Europe and 6 global flask sampling sites. Concerning the European sites, a range of observation from clean air stations for measurements of atmospheric background to moderately polluted (e.g. urban outflow) and urban (i.e. polluted) sites was chosen. This will enable to improve the understanding of hydrogen in the global background atmosphere and of the impact of European emissions on the present day atmosphere, e.g. using local modelling techniques and radon flux calculations. We further propose to perform budget studies of molecular hydrogen (on a global and regional scale) and to study sinks and sources. Especially the important soil sink will be studied (mechanistically and experimentally). A first systematic study of isotopic composition of molecular hydrogen in the atmosphere is proposed, using observations from global and European flask sampling sites and global models, which hydrogen isotope fractionation processes will be incorporated. Global and regional models will be used to investigate the budget of atmospheric hydrogen, by comparing mixing ratios and isotope ratios between model and observations and by varying underlying model emission patterns. The Proposal further includes some studies to assess the impact of atmospheric hydrogen on the present day atmosphere, i.e. the influence on the oxidation capacity of the troposphere, the lifetimes of greenhouse gases like CH4 and on the stratospheric budgets of water vapour and ozone. Some exploratory studies will be carried out to investigate these impacts under changed atmospheric hydrogen levels, associated with the use of hydrogen as a carrier of economy.

Little is known about the biogeochemical cycle of hydrogen, its emissions into and removal from the atmosphere, and to a large extent this is due to the limited number of measurements performed to this date. For the most part hydrogen observations have been sporadic and they have often been limited to remote background sites. The two existing long-term records of global atmospheric H_2 surface mixing ratios yield contradictory results on whether tropospheric mixing ratios were decreasing or rising during the 1990s. As fossil fuel sources will run out in the future and the emission of greenhouse gases into the atmosphere must be reduced in order to mitigate the effects of climate change, molecular hydrogen is certain to play an important role in the energy supply chain of the coming decades. A future wide-spread use of hydrogen and the expected Earth surface temperature rise might significantly alter the sources and sinks of atmospheric hydrogen. It is therefore crucial to quantify and monitor the present day global and regional distribution of molecular hydrogen, and to analyze its budget and the recent trends of its atmospheric concentration before these changes occur. Initial studies suggest that a hydrogen economy may bring both atmospheric benefit and danger although especially the results concerning possibly negative effects on the atmosphere are ambiguous.

A better understanding of molecular hydrogen in the environment is important for the following reasons:

1. While molecular hydrogen does not influence the radiation budget of the atmosphere directly, it affects its oxidation capacity, through reaction with the OH radical. Increased atmospheric hydrogen levels lead

to an increased lifetime of many atmospheric constituents (e.g. Methane), making H_2 an indirect greenhouse gas.

2. Changes of molecular hydrogen in the atmosphere will also influence water vapour (H_2O) in the stratosphere. This in turn influences the radiation budget of the atmosphere (increased water vapour will cool the stratosphere) and is expected to enhance polar ozone depletion, as the condensation of stratospheric particles will occur more rapidly, leading to a wider spread heterogeneous activation of chlorine and more ozone depletion in the stratosphere.

The microbiological uptake of atmospheric H_2 in soils constitutes the major sink term in the global H_2 budget, but remains very poorly understood. While it appears rather unlikely at present, it is nevertheless conceivable that future climate or atmospheric composition changes could lead to perturbations in the soil system, which could have a major influence on atmospheric hydrogen, and in turn greenhouse gas concentrations. Finally, a robust understanding of the atmospheric hydrogen budget, atmospheric hydrogen concentration trends, and the isotopic signature of atmospheric hydrogen might add important contributions to the understanding of other important environmental issues, for example the poorly understood trends in stratospheric water vapour or the global budget of carbon monoxide

Partners

N°	Organisation	Country
1.	Johann Wolfgang Goethe Universitaet Frankfurt Am Main	Germany
2.	Royal Holloway and Bedford New College.	UK
3.	University of Oslo	Norway
4.	Ruprecht-Karls-Universitat Heidelberg	Germany
5.	Akademia Gorniczo-Hutnicza	Poland
6.	Eidgenoessische Materialpruefungs und Forschungsanstalt	Switzerland
7.	Ilmatieteen Laitos (Finnish Meteorological Institute)	Finland
8.	Centre National de la Recherche Scientifique	France
9.	Commissariat à l'energie Atomique (Cea)	France
10.	Università degli Studi di Urbino Carlo Bo	Italy
11.	Met Office	UK
12.	University of Bristol	UK
13.	Universiteit Utrecht	Netherlands
14.	University of East Anglia	UK
15.	Max-Planck-Gesellschaft Zur Foerderung der Wissenschaften E.V.	Germany
16.	Norsk Institutt for Luftforskning	Norway
17.	Forschungszentrum Juelich Gmbh	Germany
18.	Voeikov Main Geophysical Observatory Research Center for Atmospheric Remote Sensing	Russian Fed.

HYMN – Hydrogen, Methane and Nitrous oxide: Trend variability, Budgets and Interactions with the Biosphere

CT - 037048

http://www.knmi.nl/samenw/hymn/

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 01/09/2006
Total project cost:	2.325.711 €	Duration: 36 months
EC Contribution:	1.772.933 €	
Organisation:	Koninklijk Nederlands Meteorologisch Instituut	
	De Bilt - Netherlands	
Co-ordinator:	Peter Van Velhoven (velthove@knmi.nl)	
EC Officer:	Ib Troen (ib.troen@ec.europa.eu)	

Abstract

The global atmospheric cycles of methane, nitrous oxide and hydrogen, are coupled and include various interactions with the biosphere. Apart from classical surface observations of these gases that are part of the GAW and CMDL networks, new detailed information on the regional scale about methane and nitrous oxide can and will be obtained from recently become available satellite observations by SCIAMACHY and IASI and from remote sensing observations by FTIR. In Hymn these observational data sets will be homogenised and evaluated against each other in order to derive consistent long-term time series. The error statistics of the observations will be carefully determined. By subsequently applying advanced emission inversion and data assimilation techniques to the validated observations in atmospheric chemistry models coupled to a new biosphere model, the sources and sinks of these gases will be quantified on regional scales (up to 1x1 degree). The coupling between the cycles of these gases and OH will be investigated focussing on presently not well understood relations between variations in their trends. The new models will furthermore be applied to investigate the effects of a future transfer to a hydrogen economy and of the associated reduction in fossil fuel burning emissions (NOX, CO, VOCs) on the coupled cycles of H2, CH4 , OH, and O3 taking into account interactions with the biosphere.

Objectives

- To improve the process modelling of the land-biosphere-atmosphere exchange of the HYMN gases and to provide global and regional estimates of their natural sources and sinks;
- To contribute to global monitoring by provision of multi-year global satellite data sets of the CH_4 and CO distribution and long-term time series for CH_4 and N_2O at a range of observing stations;
- To provide advice on the further optimisation of monitoring networks for the HYMN gases;
- To quantify atmospheric loss of CH_4 and H_2 and the impact of changing anthropogenic and natural (climate-induced) emissions on regional OH trends and on current and future global CH_4 and H_2 levels;
- To quantify how the possible future change to a *hydrogen economy* will affect the H_2 distribution and the distribution of CH_4 and O_3 through changes in emissions of H_2 and pollutants (NO_X, CO, VOCs);
- To evaluate the simulations with a novel coupled atmospheric chemistry-biosphere model for CH_4, N_2O and H_2 by comparison with ground based and satellite observations on a global and regional scale;
- To make new estimates of the sources and sinks of CH_4 and H_2 including their temporal and spatial variability.

HYMN will make use of several basic methods to improve knowledge on global and regional natural sources and sinks of atmospheric gases: up-scaling of local (flux) measurements, process-based land-biosphere modelling and top-down inverse modelling using atmospheric concentration variabilities. HYMN will use these three methods in their optimal combination and confront the obtained results with satellite and surface-based observations.

The direct coupling of land-biosphere processes to anthropogenic emission distribution patterns, atmospheric chemistry and long-range transport models will allow to quantify important feedback mechanisms related to wetlands, permafrost, wildfires, soil moisture and temperature, and vegetation changes.

Using the newly developed modelling and inversion tools HYMN will be able to provide advice on future emission reduction strategies based on improved knowledge on the budgets, biogeochemical cycles and spatio-temporal distributions of sources and sinks of the HYMN gases

Partners

N°	Organisation	Country
1.	Koninklijk Nederlands Meteorologisch Instituut	Netherlands
2.	University of Bristol	UK
3.	University of Oslo	Norway
4.	Ruprecht-Karls-Universitaet Heidelberg.	Germany
5.	Centre National de la Recherche Scientifique (CNRS)	France
6.	Universität Bremen	Germany
7.	Belgisch Instituut voor Ruimte Aeronomie	Belgium
8.	Université de Liège.	Belgium
9.	Chalmers Tekniska Hoegskola Aktiebolag	Sweden
10.	Forschungszentrum Karlsruhe Gmbh	Germany
11.	Universitaet Karlsruhe (Technische Hochschule)	Germany
12.	Commissariat à l'énergie Atomique (CEA)	France

MAP – Secondary Marine Aerosol Production from Natural Sources

CT - 018332

http://macehead.nuigalway.ie/map/

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 15/09/2005
Total project cost:	3.943.700 €	Duration: 36 months
EC Contribution:	2.600.000 €	
Organisation:	National University of Ireland	
	Ireland	
Co-ordinator:	Colin O'Dowd (colin.odowd@cmas.demon.co.uk)	
EC Officer:	Ib Troen (ib.troen@ec.europa.eu)	

Abstract

Marine aerosol contributes significantly to the global radiative budget and consequently, changes in marine aerosol abundance and/or chemical composition will impact on climate change. Various climate feedback mechanisms have been proposed involving the sulphur, sea-salt, iodine and organic sea-spray cycles; however, all cycles and their impacts on aerosol haze and cloud layers remains poorly quantified. MAP will consolidate the current state-of-the-art in the fields of aerosol nucleation and growth and primary marine aerosol (PMA) production to quantify the key processes associated with primary and secondary marine aerosol (SMA) production from natural sources. MAP will focus on the newly identified aerosol formation mechanisms involving iodine oxides, for secondary aerosol production, and the primary production of marine organic matter aerosols produced by plankton and transferred to the atmosphere via the bubble bursting process at the ocean surface. Key processes will be identified, parameterized and implemented in a Global/Regional-scale chemical transport model and in a regional climate model. Combining the knowledge gathered on key processes with satellite-derived information on oceanic and meteorological parameters, an algorithm will be developed to produce a Sea-Spray Source Function (S3F) which will subsequently be used in large scale models to quantify the impacts of marine aerosols. The algorithm and its application will be proposed as a service contributing to GMES/GEOSS. Similarly, an organo-iodine source function will also be developed. The impact of marine aerosol on atmospheric chemistry, radiative forcing and climate will be evaluated using the large-scale models.

Objectives

- To elucidate the dominant condensable vapours driving secondary marine aerosol (SMA) formation;
- To quantify the number and size flux of primary inorganic and organic marine sea-spray aerosol (PMA);
- To produce a PMA and iodo-carbon source function using integrated Global Earth Observing satellite data and in-situ data;
- To quantify the impact of SMA and PMA on radiative forcing and atmospheric chemistry.

MAP will integrate Europe's leading expertise in aerosol physics and chemistry and marine biogeochemistry to quantify the production of primary and secondary marine aerosol formation from natural sources. The project will build on the current state-of-the-art and recent ground- breaking results and will focus on the key questions highlighted above.

The field component of MAP will focus on quantifying marine secondary and primary aerosol formation as a function of season and biological activity over the North Atlantic and determine the relative contributions of natural and anthropogenic sources to North Atlantic aerosol. With continuous measurements of aerosol micro-physics, 10 and detailed aerosol chemistry, with improved analytical techniques and higher time resolution, the seasonal dependence of SMA and PMA formation on biological activity will be quantified. It should be noted that while there are clearly coastal influence on SMA, a careful analysis on the potential coastal contribution to PMA at Mace Head has illustrated that such sources account <5% to the Aitken and

accumulation mode aerosol fields (0 'Dowd et al. 2004). To contrast with the cleaner North Atlantic aerosol, parallel measurements of size resolved aerosol chemistry will be made in the more polluted Mediterranean which is subject to a greater variety of aerosol sources. This component will result in an urgent seasonal quantification of aerosol chemical characteristics and formation processes.

The most advanced suite of aerosol and gas analytical technology will be deployed during one ship- borne Intensive Observation Period (IOP) over the North Atlantic during the period of peak plankton activity. In particular, state-of-the-art instruments for measuring aerosol precursors such as iodine oxides, 12, organo-iodine compounds, sulphuric acid, 502 and organic vapours -all key species involved in secondary new particle formation, will be deployed alongside the most advanced suite of aerosol- and ion/cluster physics measurements. This will provide the most appropriate suite of instrumentation to address key issues associated with new particle formation in the marine boundary layer.

In terms of aerosol chemistry, the best available-technology and analytical tools for the characterisation and quantification of both the inorganic and organic components of marine aerosol, and their hygroscopic properties will be deployed. Particular attention will focus on the organic component of marine aerosol and the characterisation of its properties. A wide range of techniques ranging from HNMR to mass spectrometry will be used. Innovative techniques, recently evaluated, will be used to identify biological components, and in particular, DNA associated with airborne organic particles. This DNA fingerprinting will provide a direct quantitative link between marine aerosols and specific plankton blooms and life cycles. Micro-meteorological fluxes and fluxes of PMA, surface water speciation of organic matter, sea-air transfer of iodine precursors, and in-situ bubble-mediated aerosol production experiments during the campaign will also represent the state- of-the-art in these areas. It should be noted that while MAP will quantify PMA fluxes and composition up to 10 microns, the main focus will be on the sub-micron component since this dominates the PMA number concentration rather than mass concentration.

The extensive field results will be combined with laboratory results of bubble-mediated sea-air aerosol and gas transfer in the presence of surfactants to develop a more thorough understanding of the key processes relating to primary and secondary aerosol formation. In particular, PMA aerosol production and its chemical speciation and Iodine vapour sea-air transfer will be quantified as a function of in-situ characterisation of organic matter at the ocean surface and as a function of satellite derived chlorophyll, wind fields and white cap coverage. This integration of the field, lab, remote-sensing and process model studies will form two GEOSS products which can be integrated into the large scale models to quantify the source of primary aerosol over the ocean and to provide an estimate of the global sea-air transfer of organo-iodine. The resulting modelling tools and integrated GEOSS products will significantly advance our capability of quantifying the impact of marine aerosol on marine boundary layer chemistry, direct and indirect radiative forcing, and impacts on climate and will provide the first assessment of marine aerosol effects with particular attention to iodine-forming aerosols and biogenic bubble-mediated aerosol formation. The large scale models, integrating the most advanced knowledge of marine aerosols into their predictions, will represent the most comprehensive advance in our quantification of the impacts of marine aerosols on atmospheric chemistry and climate.

Partners

N°	Organisation	Country
1.	National University of Ireland, Galway	Ireland
2.	Netherlands Organisation for Applied Scientific Research	Netherlands
3.	Consiglio Nazionale delle Ricerche	Italy
4.	University of Helsinki	Finland
5.	University of Kuopio	Finland
6.	Finnish Meteorological Institute	Finland
7.	University of Manchester	UK
8.	University of York	UK
9.	University of East Anglia	UK
10.	Stockholms Universitet	Sweden

11.	Ruprecht-Karls-Universität Heidelberg	Germany
12.	Max-Planck-Gesellschaft Zur Förderung der Wissenschaften E.V.	Germany
13.	Johannes Gutenberg-Universität Mainz	Germany
14.	Joint Research Centre	Italy
15.	University Of Crete	Greece
16.	Ecotechsystems	Italy

NATAIR – Improving and Applying Methods for the Calculation of Natural and Biogenic Emissions and Assessment of Impacts on Air Quality

CT - 513699

http://natair.ier.uni-stuttgart.de

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 01/01/2005
Total project cost:	956.586 €	Duration: 27 months
EC Contribution:	600.000 €	
Organisation:	Universitaet Stuttgart	
	Stuttgart - Germany	
Co-ordinator:	Rainer Friedrich (Rainer.Friedrich@ier.uni-stuttgart.de)	
EC Officer:	Ib Troen (ib.troen@ec.europa.eu)	

Abstract

The proposed project aims to improve methods for the calculation of natural and biogenic emissions from various sources and the assessment of impacts on air quality policy implementation. Air pollutants from natural und biogenic sources contribute to ambient air concentrations in the same way as anthropogenic emissions; however, the knowledge about the uncertainty of current methods for the estimation of these natural and biogenic emissions is vast. At the same time, with anthropogenic emissions currently decreasing due to emission control activities in many sectors, the relative importance of other sources increases. Thus, it is essential to develop new and improve existing methods for the quantification of emissions from natural and biogenic sources. The proposal takes into account the latest research results on air pollutant emissions and their impacts, covering all relevant substances {NOX, SOX, NH3, PM, NMVOC; CH4, CO, DMS) from natural and biogenic sources in Europe, e.g. the results from the "Nature Panel" of the EMEP/CORINAIR Atmospheric Emission Guidebook and includes anthropogenic emissions officially reported to EMEP by countries. Furthermore, the National Reports for the NEC directive for SOX, NOX, NH3 and NMVOC will be taken into account, as well as, the results of ED research project such as NofRETETE or the results from the EUROTRAC Subproject GENEMIS. As a major innovation, satellite data are used e.g. for the improvement of calculations from forests in general as well as forest fires in particular. In order to assess the impacts of emissions from natural and biogenic sources on air quality policy implementation; the project is designed to advance the current state-of-the-art in methodology for the calculation of natural and biogenic emissions. After the analysis of temporal and spatial variabilities and the assessment of uncertainties and sensitivities, some test cases on EU and local scale will be modelled with the chemical transport model CHIMERE to calculate ambient air concentrations of the pollutants considered under “low anthropogenic emission” scenario conditions.

Objectives

This project aims to improve methods for the calculation of natural and biogenic emissions from various sources and the assessment of impacts on air quality policy implementation. Air pollutants from natural und biogenic sources contribute to ambient air concentrations in the same way as anthropogenic emissions, however, the knowledge about these sources is limited, and uncertainty introduced by an inadequate coverage of natural emissions to assess anthropogenically induced effects may be considerable. As emission control activities successfully decrease anthropogenic emissions in many sectors over time, the relative importance of other sources even increases. Thus, it is essential to develop new and improve existing methods for the quantification of emissions from natural and biogenic sources.

The project takes into account state-of-the-art research results on air pollutant emissions and their impacts, covering all relevant substances (NOx, SOx, NH3, PM, NMVOC; CH4, CO, DMS) responsible for direct and indirect (secondary) air pollution. As it is difficult to strictly distinguish between anthropogenic and natural sources, the work will include a clear definition of a system boundary, i.e. which sources to cover. Clearly, natural sources, i.e. those fully unaffected from human activities, will be included, as well as emissions from

biogenic processes. Domestic animal activities, sometimes considered to be semi-natural, will not be considered. The work will be based on most recent scientific results in the area, including the contributions from the "Nature Panel" within the UNECE Task Force Emission Inventories and Projection to the Convention on Long Range Transboundary Air Pollution (CLRTAP), the results of EU research projects such as NofRETETE1 or the results from the EUROTRAC Subproject GENEMIS2. As a major innovation, satellite data will be used e.g. for the improvement of calculations of emissions from forests in general as well as forest fires in particular. In order to assess the impacts of emissions from natural and biogenic sources on air quality policy implementation, the project is designed to advance the current state-of-the-art in methodology for the calculation of natural and biogenic emissions. After the analysis of the temporal and spatial variability and the assessment of uncertainties and sensitivities, selected test cases on European scale will be modelled with the chemical transport model CHIMERE to calculate ambient air concentrations of the pollutants considered under "low anthropogenic emission" scenario conditions. These anthropogenic emissions will be taken from the official country reports to EMEP3 as well as the National Reports for SOx, NOx, NH3 and NMVOC emissions for 2010 according to the NEC directive.

Finally, policy instruments applied by the EU and in the frame of the UNECE CLRTAP to reduce anthropogenic emissions will be assessed in the view of these new results and recommendations for the future design of air quality policies and the ongoing reviews of existing directives and protocols will be derived.

While policy analysis and detailed evaluation will be limited to EU25 (European Union as of May 2004), excluding overseas territories, all emission assessments will, as much as data allow, be extended to the whole geographical area of Europe and include all accession countries. Furthermore, due to the known influence to Europe, Saharan dust emissions will also be considered.

Partners

N°	Organisation	Country
1.	Universitaet Stuttgart	Germany
2.	Arc Systems Research Gmbh	Austria
3.	Forschungszentrum Karlsruhe Gmbh	Germany
4.	AEA Technology Plc	UK
5.	Institute for Ecology of Industrial Areas	Poland
6.	Centre National de la Recherche Scientifique	France
7.	Agenzia per la Protezione dell'ambiente e per i Servizi Tecnici	Italy
8.	Joensuun Yliopisto (University of Joensuu)	Finland
9.	Commission of the European Communities - Joint Research Centre	Belgium

OOMPH – Organics over the Ocean Modifying Particles in both Hemispheres

CT - 018419

http://www.atmosphere.mpg.de/enid/oomph

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 01/09/2005
Total project cost:	2.488.648 €	Duration: 36 months
EC Contribution:	1.931.648 €	
Organisation:	Max-Planck-Institut für Chemie	
	Mainz - Germany	
Co-ordinator	Jonathan Williams (williams@mpch-mainz.mpg.de)	
EC Officer:	Ib Troen (ib.troen@ec.europa.eu)	

Abstract

Considering its size and potential importance, the ocean is surprisingly poorly characterised in terms of organic gases that play important roles in global atmospheric chemistry. In this project we aim to characterise the nature of organic trace species, in particular organic oxygenates, and the rate of emissions from marine biology. The oxidation of these compounds in air is directly linked to the global ozone budget while the oxidation pathways in seawater are largely unknown. We will conduct laboratory experiments on seawater samples and specific phytoplankton types to determine the effect of basic biophysical parameters (e.g. temperature, pH, plankton growth rate and physiological state) on the emission of organic species. The photooxidation rates and products of these species will be examined through measurements. Marine aerosols, with emphasis on the organic fraction, will also be investigated in terms of physical, chemical (mass closure), hygroscopic and optical properties. Two shipborne research cruises will be performed to assess both emission and uptake in the open ocean, and contrast the pristine tropical Southern Hemispheric with the more strongly anthropogenically affected Northern Hemisphere. Based on the laboratory and field measurements an interactive atmosphere-ocean chemistry model will be developed, basic to global Earth system simulations.

Objectives

The science plan comprises of five main components:

- a technology development phase,
- a laboratory intensive phase,
- a shipborne experiment in the northern hemisphere tropical Atlantic,
- a shipborne experiment, as well as extensive monitoring activities in the pristine southern hemisphere,
- a data analysis phase.

With the objectives:

- To determine which organic species are emitted by ocean biology into seawater and air,
- To determine fluxes for key organic species between sea and air,
- To determine main driving factors for organic species emission in the marine boundary layer,
- To determine which oxygenated products are formed by the oxidation of primary emissions in seawater and in air,
- To determine which organic chemical species are found on marine aerosols,
- To determine the role of organic species in the physical properties of marine aerosols,
- To construct an air/sea/aerosol box model of organic species in the marine boundary layer.
- To use proven box model chemistry in a global model.

Partners

N°	Organisation	Country
1.	Max-Planck-Institut für Chemie	Germany
2.	Centre National de la Recherche Scientifique	France
3.	Istituto di Biometeorologia - Consiglio Nazionale delle Ricerche	Italy
4.	University of Crete	Greece
5.	University of East Anglia	UK
6.	Leibniz Institut für Meereswissenschaften	Germany
7.	Universiteit Antwerpen	Belgium
8.	Universiteit Gent	Belgium
9.	University of Veszprém	Hungary

Stratospheric Ozone and Climate Interactions

ATTICA – European assessment of the Transport Impacts on Climate Change and Ozone Depletion

CT - 036746

http://www.pa.op.dir.de/attica/

Instrument:	Specific Support Action (SSA)	Contract starting date: 01/06/2006
Total project cost:	680.000 €	Duration: 42 months
EC Contribution:	680.000 €	
Organisation:	Deutsches Zentrum für Luft- und Raumfahrt e.v.	
	Köln - Germany	
Co-ordinator:	Robert Sausen (robert.sausen@dlr.de)	
EC Officer:	Claus Brüning (claus.bruning@ec.europa.eu)	

Abstract

The ATTICA consortium offers to provide the European community with a coherent series of assessments of the impact of transport emissions on climate change and ozone depletion. Three assessments will cover the emissions of single transport sectors, viz. of aviation, shipping, and road and rail traffic. Another assessment deals with metrics that allow to describe, quantify, and compare in a fair way the effects of the transport emissions in the atmosphere. Finally, a synthesis of the foregoing assessments will be written that will provide the overview of the impacts of the emissions of all transport sectors on climate change and the ozone layer.

For the first time, different modes of transport will be consistently assessed. The consistent assessment allows the interested citizen to estimate in principle their own contribution to environmental problems and to compare it to that of others. Apart from policy and decision makers, the synthesis assessment will help journalists, teachers, and others, to digest the results and to present them in public media, in schools and universities, ensuring wide spread of the results.

The assessments and the synthesis report will inform the EU in developing its policy and will strengthen its position in international climate conventions and other international agreements. It will help finding emission reduction and mitigation strategies, and give advice for industry on design of future engines and vehicles, thereby strengthening the European position.

Objectives

The main goal of the Specific Support Action ATTICA is to assess the current state of knowledge how transport impacts climate change and ozone de-pletion.

Our main goal will be approached through the following objectives:

- To assess the impact of aviation on climate change and ozone depletion,
- To assess the impact of shipping on climate change and ozone depletion,
- To assess the impact of land surface transport (road and railroad traffic) on climate change and ozone depletion,
- To assess current metrics of climate change and ozone depletion,
- To synthesise the results on the individual modes of transport and on metrics.

We plan that the assessments will be based on the results of recently finished FP 5 projects (e.g. AEROCHEM-2, TRADEOFF, SCENIC, METRIC), on results already available from on-going FP 6 projects (e.g. QUANTIFY, SCOUT-O3, ACCENT, ECATS, HISAC), on results from national projects (e.g. SeaKLIM) and on information available from other sources, such as peer-reviewed scientific papers.

The transport sector contributes about 22% to the total global anthropogenic CO_2 emissions from fossil fuel burning and the annual growth rate of transport related greenhouse gas emissions is larger than for other mature industrial sectors. In the light of the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol, and possible follow-up Protocols, this rate of increase creates a severe problem when trying to achieve emission reduction targets. In addition, the impact of the transport sector on climate is complex and is mediated through more than just the list of gases in the Kyoto Protocol1. Furthermore, transport emissions contribute to the change of the ozone concentration (ozone production at low altitude and ozone depletion at high altitudes), which may interfere with the goals of the Montreal Protocol and its and Copenhagen amendment.

Nonetheless, the global and European economic systems are largely dependent on an efficient transport system. This dependency has intensified during recent decades: changes in life style, mobility and the availability of cheaper transport in developed countries are also increasing demand and placing additional pressure on environmental initiatives and policies. Because of these factors, strong growth of the transport sector is expected in developing countries and indeed, is already evident. In the long term, a sustainable transport system is needed that satisfies in an optimal way the demands of economy and population whilst following the constraints of limiting climate change and not impeding recovery of the ozone layer. In order to meet these constraints, clear information on the impact of transport on climate change and ozone depletion is needed.

Partners

N°	Organisation	Country
1.	Deutsches Zentrum für Luft und Raumfahrt E.V	Germany
2.	Cicero Senter for Klimaforskning	Norway
3.	Univerzita Karlova V Praze	Czeck Rep.
4.	The Manchester Metropolitan University	UK
5.	Max Planck Gesellschaft zur Foerderung der Wissenschaften E.V.	Germany
6.	The Chancellor, Masters And Scholars of the University of Cambridge	UK
7.	University of Oslo	Norway
8.	Università degli Studi dell'Aquila	Italy
9.	The University of Reading	UK

HCFCWORKSHOPS – International Workshop on HCFC Alternatives and Intermediate Reduction Steps for Developing Countries

CT - 044312

Instrument:	Specific Support Action (SSA)	Contract starting date: 01/01/2007
Total project cost:	300.000 €	Duration: 12 months
EC Contribution:	300.000 €	
Organisation:	ICF Consulting Ltd	
	London - UK	
Co-ordinator:	Abyd Karmali (akarmali@icfconsulting.com)	
EC Officer:	Claus Brüning (claus.bruning@ec.europa.eu)	

Abstract

The production and consumption of ozone-depleting HCFCs used as refrigerants, blowing agents, solvents, aerosols, and fire suppressants are increasing rapidly in developing countries, as they are being gradually phased out in developed countries under the Montreal Protocol. Because developing countries are not required under the Protocol to freeze consumption until 2016, or reduce consumption until 2040, global HCFC consumption could remain excessively high for the next 35 years, undermining the phaseout efforts of developed countries and threatening the recovery of the ozone layer and human health. Currently, there are only limited discussions on the post-2016 phaseout of HCFCs in developing countries.

To address this issue, ICF is pleased to submit a proposal to support DG RTD/DG ENV in organising an innovative international workshop to target the reduction of HCFC consumption in developing countries between now and 2015, and yield a draft agreement on intermediate reduction steps between 2016 and 2040. Specifically, the workshop will provide developing country stakeholders with the technical tools needed to phaseout HCFCs (e.g., information on viable alternatives, technology transfer, funding opportunities) and to build consensus among stakeholders on an intermediate phaseout schedule to be implemented under the Montreal Protocol.

Objectives

More than 190 countries have signed the Montreal Protocol, a landmark international agreement thataims to restore the Earth's deteriorating stratospheric ozone layer. The global success of this effort to protect our environment requires that the world's developing (Article 5(1)) and developed (non- Article 5(1)) countries eliminate emissions to the atmosphere of most ozone depleting substances (ODS). Chlorofluorocarbons (CFCs) and halons are some of the most damaging ODS, and their phaseout in developed countries was implemented in 1996 and 1994, respectively. In developing countries, CFC and halon consumption will be completely phased out by 2010. Hydrochlorofluorocarbons (HCFCs), used in large part as replacements for CFCs, also deplete stratospheric ozone and are controlled under the Montreal Protocol as Annex C Group 1 substances. In developed countries, HCFC consumption is being reduced progressively to reach complete phaseout in 2030. In developing countries, the Montreal Protocol requires that HCFC consumption freeze in 2016 and complete phaseout will occur in 2040, but no intermediate reduction steps are in place.

If no action is taken in the next few years to ensure that consumption of HCFCs in developing countries does not expand unchecked, it will be more difficult to effectively reduce consumption in a step-wise manner between 2016 and 2040. In particular, it is important that the 2015 base level of consumption in developing countries not become inflated with excessive use of HCFCs between now and the cut-off date. Additionally, it is critical that efforts undertaken to reduce HCFC consumption in developed countries over the last 10 years not be overshadowed by run-away consumption in developing countries. Moreover, if action is not taken to establish an agreement on intermediate reduction steps for developing countries between 2016 and 2040, HCFC consumption could remain excessively high for the next 35 years, threatening the recovery of the

ozone layer and human health. Currently, there are only limited discussions on the post-2016 phaseout of HCFCs.

The objective of this workshop is to assess and discuss policy options to help enable developing countries to phase-out their consumption ahead of the schedule currently provided under the Montreal Protocol, by negotiating a series of interim reduction steps. By gathering representatives of industry, international experts, and developing country representatives at these workshops, a cross-fertilisation of ideas, success stories, and technologies can take place. Additionally, a broad consensus on interim reduction steps can be reached among stakeholders worldwide. Ozone depletion is a global problem, and the health of all people in developing and developed countries will be at risk if the goals of the Montreal Protocol are not augmented and achieved.

The International Workshop will provide an action-oriented forum to advance the goals of the Montreal Protocol by proactively fostering the technical means and political commitment to reduce consumption of HCFCs in developing countries—where they are otherwise projected to grow significantly—over the coming decades.

Partner

N°	Organisation	Country
1.	ICF Consulting LTD	UK

THE MAIN AIM QOS2004 – Quadrennial Ozone Symposium 2004

CT - 505404

http://www.qos2004.gr

Instrument:	Specific Support Action (SSA)	Contract starting date: 01/10/2003
Total project cost:	232.000 €	Duration: 12 months
EC Contribution:	63.000 €	
Organisation:	National and Kapodistrian University of Athens	
	Athens - Greece	
Co-ordinator:	Christos Zerefos (zerefos@geol.uoa.gr)	
EC Officer:	Claus Brüning (claus.bruning@ec.europa.eu)	

Abstract

The project aims to support preparation and organisation of the next Quadrennial Ozone Symposium (QOS2004). This will be achieved through making local arrangements and providing support for young scientists and for scientists from accession countries to attend. A well-organised meeting is planned in which all current issues in stratospheric research are discussed. EU and other countries are supporting substantial programmes of research on stratospheric ozone and related issues (UV) and it is important to ensure that maximum benefit is gained from this research. The relevance and innovative nature of future work will be promoted through the discussions between scientists from all over the world, enhancing also cooperation of EU with other international projects. The Symposium provides an excellent forum for researchers carrying out innovative work in the areas of field measurements, laboratory measurements, modelling and theoretical research in the ozone layer, which ensures that the latest findings will be widely discussed and disseminated. As such it will facilitate communication between researchers, in each area covered by the Symposium, so promoting exchange of knowledge, encourage scientific collaboration across the sub-disciplines of the field and world-wide, assist in the early identification of key concepts and questions and so help to direct resources and research towards the critical issues in the field. At the QOS2004 the discussions and presentations will include research on future stratospheric ozone levels affected by halogens, aerosols, water and greenhouse gas emissions and how physical, radiative and chemical changes in the global stratosphere will be affected by climate change.

Partner

N°	Organisation	Country
1.	National and Kapodistrian University of Athens	Greece

QUANTIFY – Quantifying the Climate Impact of Global and European Transport Systems

CT - 003893

http://www.pa.op.dlr.de/quantify/

Instrument:	Integrated Project (IP)	Contract starting date: 01/03/2005
Total project cost:	12.000.000 €	Duration: 60 months
EC Contribution:	8.000.000 €	
Organisation:	Deutsches Zentrum für Luft- und Raumfahrt e.v.	
	Köln - Germany	
Co-ordinator:	Robert Sausen (robert.sausen@dlr.de)	
EC Officer:	Claus Brüning (claus.bruning@ec.europa.eu)	

Abstract

The main goal of QUANTIFY is to quantify the climate impact of global and European transport systems for the present situation and for several scenarios of future development. The climate impact of various transport modes (land surface, shipping, aviation) will be assessed, including those of long-lived greenhouse gases like CO_2 and N_2O, and in particular the effects of emissions of ozone precursors and particles, as well as of contrails and ship tracks. The project goal includes provision of forecasts and other policy-relevant advice, which will be supplied to governments and to international assessments of climate change and ozone depletion, such as the IPCC reports (Kyoto Protocol) and WMO-UNEP ozone assessments (Montreal Protocol). Using significantly improved transport emission inventories, better evaluated and hence more reliable models, these new forecasts in QUANTIFY will represent a considerable improvement of current predictions. Long time scales are involved in the transport system and its effects on climate: Some transportation modes have long development and in-service times; some emissions have long residence times and thermal inertia of the climate system protracts possible effects. Yet the impact of short-lived species depends on location and time of the emissions. So several transport scenarios and potential mitigation options need to be assessed on a sound common basis to identify the most effective combination of short and long-term measures and to inform policymakers and industry. We aim to provide such guidance by focused field measurements, exploitation of existing data, a range of numerical models, and new policy-relevant metrics of climate change. To achieve the goal, several advances in our fundamental understanding of atmospheric processes will be required such as the mechanisms by which pollutants are transported from exhaust into the free atmosphere, the impact of pollutants on clouds and the role of absorbing aerosols.

Objectives

Long time scales are involved in the transport system and its effects on climate: some transportation modes have long development and in-service times; some emissions have long residence times and the thermal inertia of the climate system protracts possible effects. Thus, it is clear that potential mitigation procedures need to be assessed soon to provide policymakers and industry with adequate guidance for decisions. It is our aim to provide such guidance through the QUANTIFY Integrated Project, based on new focused field measurements, further exploitation of existing observations, and a range of chemical, radiative and coupled climate models. The central project goal of QUANTIFY is to quantify the climate impact of the global and European transport systems for the present situation and for different scenarios of future development.

Our project goal requires the production of projections and other policy relevant advice, which will be supplied to governments and to international assessments of climate change and ozone depletion prepared in support of policy such as the IPCC reports (Kyoto protocol) and the WMO-UNEP ozone assessments (Montreal Protocol). The forecasts will be built on models, which will be refined and improved in this project by exploitation of existing data for model testing and validation and by the provision of new data on fundamental processes. Using significantly improved transport emission inventories and more reliable models, our new forecasts will represent a considerable improvement on current predictions. The central project goal of QUANTIFY will be achieved through the following main objectives:

- To establish consistent inventories of (direct) emissions (greenhouse gases, particles, precursors of greenhouse gases and aerosols) from present day and past transport, separately for the different modes of transport;
- To generate transport (direct) emission inventories for scenarios of future development, which are consistent with the IPCC SRES scenarios;
- To determine the fate of emissions from shipping during dilution to regions of the size of global scale models, i.e., to scales in the range from 100 to 500 km;
- To develop parameterisations for "effective emission indices" linking local emissions (at the exhaust) to scales appropriate for use in global models for all modes of transport (aviation, shipping, land surface transport);
- To consistently calculate the global chemical impact of the different modes of transport, for present day conditions and several future scenarios;
- To determine regional structures in transport-induced perturbations of the chemical composition of the atmosphere, e.g., North-South contrast, tropics versus extra-tropics, with emphasis on the UTLS region, where changes in the atmospheric composition have a particularly large radiative impact;
- To provide quantitative estimates of the impact of the different modes of transport on aerosols and clouds, in particular on cirrus (contrails and contrail-cirrus) and low marine clouds (ship tracks) in terms of, e.g. cloud cover and cloud optical properties;
- To test the hypothesis that anthropogenic aerosol causes the formation of additional cirrus clouds;
- To consistently determine the radiative forcing from transport-induced changes in atmospheric (and surface) parameters, including the separation of the contributions from different modes of transport, for present day transport and for several future scenarios;
- To determine the spatial and temporal patterns of transport-induced climate change and to search for specific fingerprints;
- To develop and evaluate policy relevant metrics that comprise all important impacts on climate and that take the particular characteristics of transport into account;
- To estimate the impact of potential transport related mitigation options on atmospheric composition and climate.

Partners

N°	Organisation	Country
1.	Deutsches Zentrum für Luft Und Raumfahrt E.V.	Germany
2.	Airbus France	France
3.	Commissariat à l'énergie Atomique	France
4.	Cambridge Environmental Research Consultants Ltd	UK
5.	Centre Européen de Recherche et de Formation Avancée en Calcul Scientifique	France
6.	Cicero Senter for Klimaforskning	Norway
7.	Météo-France	France
8.	Centre National de la Recherche Scientifique	France
9.	Univerzita Karlova V Praze	Czech Rep.
10.	Danmarks Meteorologiske Institut	Denmark
11.	Det Norske Veritas As	Norway
12.	Eidgenoessische Technische Hochschule	Switzerland
13.	Heavens-Above Gmbh	Germany
14.	Administratia Nationala de Meteorologie	Romania
15.	Universitaet Bremen	Germany
16.	Ivl Svenska Miljoeinstitutet Ab	Sweden
17.	Koninklijk Nederlands Meteorologisch Instituut	Netherlands

18.	Koezlekedestudomanyi Intezet Koezhasznu Tarsasag	Hungary
19.	The Manchester Metropolitan University	UK
20.	Max Planck Gesellschaft zur Foerderung der Wissenschaften E.V.	Germany
21.	National and Kapodistrian University of Athens	Greece
22.	National Institute of Meteorology and Hydrology of the Bulgarian Academy of Sciences	Bulgaria
23.	Office National d'études et de Recherches Aérospatiales	France
24.	Paul Scherrer Institut	Switzerland
25.	University of Szeged	Hungary
26.	Transport & Mobility Leuven	Belgium
27.	University of Cambridge	UK
28.	The Regents of the University of California States	United
29.	University of Oslo	Norway
30.	The Regents of the University of Michigan	US
31.	Universitaet Hamburg	Germany
32.	University of Oxford	UK
33.	The University of Reading	UK
34.	Uniwersytet Warszawski	Poland
35.	University of York	UK

QUANTIFY-TTC – Quantifying the Climate Impact of Global and European Transport System - Extension

CT - 045640

http://www.pa.op.dlr.de/quantify

Instrument:	Integrated Project (IP)	Contract starting date: 01/12/2006
Total project cost:	619.172 €	Duration: 39 months
EC Contribution:	388.172 €	
Organisation:	Deutsches Zentrum für Luft- und Raumfahrt e.v.	
	Köln - Germany	
Co-ordinator:	Robert Sausen (robert.sausen@dlr.de)	
EC Officer:	Claus Brüning (claus.bruning@ec.europa.eu)	

Abstract

The main goal of the IP QUANTIFY is to quantify the climate impact of global and European transport systems for the present situation and for several scenarios of future development. The climate impacts of various transport modes (land, shipping, and aviation) are assessed in high resolution, including long-lived greenhouse gases like CO2 and N2O, and in particular the effects of emissions of ozone precursors and particles, as well as of contrails and ship tracks. The project goal includes provision of forecasts and other policy-relevant advice, which will be supplied to governments and to international assessments of climate change and ozone depletion, such as the IPCC reports and WMO-UNEP ozone assessments. Using significantly improved transport emission inventories, better evaluated and hence more reliable models, these new forecasts will represent a considerable improvement of current predictions.

Several transport scenarios and potential mitigation options need to be assessed to inform policymakers and industry. QUANTIFY provides such guidance by focused field measurements, exploitation of existing data, a range of numerical models, and new policy-relevant metrics of climate change. To achieve the goal, several advances in our fundamental understanding of atmospheric processes will be required such as the mechanisms by which pollutants are transported from exhaust into the free atmosphere, the impact of pollutants on clouds and the role of absorbing aerosols.

The QUANTIFY-TTC extension aims to enhance QUANTIFY by integrating partners from Russia, India, and China to provide transport emission and -scenario information from this rapidly developing region of the world, to obtain empirical data to significantly reduce uncertainties and to strengthen the flight campaign and cloud-aerosol interaction research by providing presently unavailable experimental data. Consequences and intervention options for European policy and technology can thus be identified.

Objectives

The basic concept behind the proposed QUANTIFY-TTC extension is to increase the knowledge base necessary to reach the main QUANTIFY goal in those areas where either modellers and cloud microphysicists can strongly benefit from presently unavailable experimental data, or where the present QUANTIFY emission inventory databases can be significantly augmented fro the currently rapidly developing Russian and Asian region.

Partners

N°	Organisation	Country
1.	Deutsches Zentrum für Luft und Raumfahrt E.V.	Germany
2.	Central Aerological Observatory Fed.	Russian Fed.
3.	Skobeltsyn Institute of Nuclear Physics Fed. of Moscow State University	Russian Fed.
4.	State Unitary Enterprise Central Aerohydrodynamic Fed.	Russian Fed.
5.	Center for Sustainable Transportation, China Academy of Transportation Sciences	China
6.	Department of Environmental Sciences and Engineering, Tsinghua University	China
7.	Central Institute of Road Transport, Pune	India

SCOUT-O3 – Stratosphere-Climate Links with Emphasis on the UTLS

CT - 505390

http://www.ozone-sec.ch.cam.ac.uk/scout_o3

Instrument:	Integrated Project (IP)	Contract starting date: 01/05/2004
Total project cost:	23.315.623 €	Duration: 60 months
EC Contribution:	15.000.000 €	
Organisation:	University of Cambridge	
	Cambridge - UK	
Co-ordinator:	John Adrian Pyle (john.pyle@atm.ch.cam.ac.uk)	
EC Officer:	Claus Brüning (claus.bruning@ec.europa.eu)	

Abstract

Reliable prediction of the future evolution of the ozone layer and surface UV is urgently required as a basis for informed decisions by European policy makers. The state of the ozone layer over the next decades will depend on the interplay between climate change and the impact and evolution of ozone depleting substances such as CFCs. The Montreal Protocol has successfully in reduced emissions and atmospheric concentrations of CFCs, which should return to their pre-ozone hole concentrations by about 2050. However, the ozone layer will most likely not return to its pre-ozone hole state and so the central question of the Montreal process - how and when will ozone and UV radiation recover as CFC concentrations fall? - remains. Indeed, in order to provide essential advice to policy makers, the answer to that question is required within the next years. In this ambitious integrated project, the European predictive capability will be strengthened by focusing effort on 6 main interlinked areas of research: coupled chemistry/climate models; the tropical UTLS; extra-tropical ozone and water vapour; UV radiation; global modelling; and fundamental chemical and microphysical processes. Strong scientific management, built on Europe's excellent previous experience in stratospheric science, will bring together a critical mass of European experts in laboratory studies, atmospheric measurements and modelling. It will exploit new satellite data, such as from ENVISAT, and new modelling approaches (e.g. fully-coupled chemistry-climate models; and the growing interaction with the numerical weather forecasting community), and take advantage of new and existing research facilities being developed at the national level. Valuable information for the assessment of the atmospheric impact of aviation will be obtained. This integrated project will thus provide essential information to European government and industry and will maintain Europe's leading position in stratospheric research.

Objectives

The central aim of this research is to provide best scientific knowledge for international assessments on ozone depletion and climate change for the Montreal and Kyoto Protocols. These protocols, and the associated energy, environment and emission policies, are of fundamental importance to European quality of life and competitiveness. We are providing new knowledge to the EU and national governments to develop the European position in discussions related to the Protocols with policies for sustainable development. SCOUT-O3 maintains the excellence of the European atmospheric science community and leads to further integration of its activities. SCOUT-O3 involves the research efforts of 59 partners and more than 100 scientific groups and takes full advantage of new and existing research facilities developed at the national level.

Reliable prediction of the future evolution of the ozone layer and surface UV is urgently required as a basis for informed decisions by European policy makers. The state of the ozone layer over the next decades will depend on the interplay between climate change and the impact and evolution of ozone depleting substances such as CFCs. The Montreal Protocol has successfully reduced emissions and atmospheric concentrations of CFCs, which should return to their pre-ozone hole concentrations by about 2050. However, the ozone layer will most likely not return to its pre-ozone hole state and so the central question of the Montreal process – how and when will ozone and UV radiation recover as CFC concentrations fall? –

remains. Indeed, in order to provide essential advice to policy makers, the answer to that question is required within the next years.

The research in this ambitious integrated project is focused on strengthening the European predictive capability through improving the use of coupled chemistry/climate models (CCMs). An improved understanding of model performance is gained from on-going validation and comparisons from existing and new measurements. Interpretation of the measurements is achieved using a variety of models operating on all spatial scales.

Lack of knowledge about the tropical stratosphere and upper troposphere is addressed through tropical field campaigns involving aircraft and balloons to investigate the detailed mechanisms by which air passes from the troposphere to the stratosphere. New fundamental information about chemical and microphysical processes gained from laboratory studies will improve the models used to interpret these measurements. Understanding of the larger scale importance is gained through analysis of satellite measurements (e.g. from ENVISAT and CALIPSO), meteorological analyses and other global fields.

Denitrification in the polar vortices is being studied to remove one of the major uncertainties regarding polar ozone loss. Better understanding of processes in the UTLS through modelling and data analysis and studies of the long-term variability in extra-tropical large scale transport are also being performed to improve long-term predictions of mid- and high latitude ozone and UV. Past and present variability in UV radiation is determined using re-evaluated and quality controlled data sets. Focussed studies involving measurements and modelling are used to improve understanding of how clouds and aerosols modify atmospheric radiation.

The integration of process studies within a modelling framework will enable SCOUT-03 to analyse and predict the current status and future evolution of the ozone layer and surface UV-levels with high confidence. A comprehensive range of scenarios is used in the CCMs to provide the basis for a comprehensive study of the evolution and feedback of the coupled chemistry / climate system.

Partners

N°	Organisation	Country
1.	University Of Cambridge	UK
2.	Stiftung Alfred-Wegener-Institut Für Polar und Meeresforschung	Germany
3.	Belgisch Instituut voor Ruimte Aeronomie	Belgium
4.	Central Aerological Observatory	Russian
5.	Centre National de la Recherche Scientifique	France
6.	Chalmers Tekniska Hogskola Ab	Sweden
7.	Kemiai Kutatokozpont - Magyar Tudomanyos Akademia	Hungary
8.	Consiglio Nazionale delle Ricerche	Italy
9.	Cesky Hydrometeorologicky Ustav	Czech Rep.
10.	Danmarks Meteorologiske Institut	Denmark
11.	Psysikalisch-Meteorologisches Observatorium Davos und Welstrahlungszentrum	Switzerland
12.	Democritus University of Thrace	Greece
13.	Deutsches Zentrum für Luft und Raumfahrt E.V.	Germany
14.	Deutscher Wetterdienst	Germany
15.	Ente per le Nuove Tecnologie, l'Energia e L'ambiente	Italy
16.	Eidgenoessische Technische Hochschule	Switzerland
17.	Ilmatieteen Laitos	Finland
18.	Freie Universitaet Berlin.	Germany
19.	Forschungszentrum Juelich Gmbh	Germany

20.	Forschungszentrum Karlsruhe Gmbh	Germany
21.	Imperial College of Science, Technology and Medicine.	UK
22.	Instituto Nacional de Tecnica Aeroespacial	Spain
23.	Istituto Nazionale di Geofisica e Vulcanologia	Italy
24.	Istituto Nazionale ei Ottica Applicata	Italy
25.	Johannes Gutenberg Universitaet Mainz	Germany
26.	Universitaet Graz	Austria
27.	Max Planck Gesellschaft zur Foerderung der Wissenschaften E.V.	Germany
28.	Météo-France	France
29.	National and Kapodistrian University of Athens.	Greece
30.	Norsk Institutt for Luftforskning	Norway
31.	Observatoire Cantonal de Neuchatel	Switzerland
32.	Paul Scherrer Institut	Switzerland
33.	Rijksinstituut voor Volksgezondheid en Milieu	Netherlands
34.	Koninklijk Nederlands Meteorologisch Instituut	Netherlands
35.	Sveriges Meteorologiska Och Hydrologiska Institut	Sweden
36.	Stratosphere - M, Ltd	Russia
37.	Universitaet Bern	Switzerland
38.	Universitaet Bremen	Germany
39.	Universidad de Buenos Aires	Argentina
40.	University of Crete	Greece
41.	Johann Wolfgang Goethe Universitaet Frankfurt Am Main	Germany
42.	Goeteborgs Universitet.	Sweden
43.	Universitaet Hannover.	Germany
44.	Ruprecht-Karls-Universitaet Heidelberg.	Germany
45.	Medizin Universitaet Innsbruck	Austria
46.	Universitaet Karlsruhe (Technische Hochschule)	Germany
47.	Lancaster University	UK
48.	Università degli Studi de l'Aquila	Italy
49.	University of Leeds.	UK
50.	University of Leicester	UK
51.	University of Manchester Institute of Science and Technology	UK
52.	University of Oslo	Norway
53.	Aristoteleio Panepistimio Thessalonikis	Greece
54.	University of Wyoming	US
55.	The Regents of the University of California	US
56.	Met Office	UK
57.	University of East Anglia	UK
58.	Universitaet fuer Bodenkultur	Austria
59.	Weather Informatics Ltd	UK

Climate Dynamics and Variability

DYNAMITE – Understanding the Dynamics of the Coupled Climate System

CT - 003903

http://dynamite.nersc.no/

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 01/03/2005
Total project cost:	3.122.214 €	Duration: 36 months
EC Contribution:	1.999.998 €	
Organisation:	Nansen Environmental and Remote Sensing Center	
	Bergen - Norway	
Co-ordinator:	Helge Drange (helge.drange@nersc.no)	
EC Officer:	Georgios Amanatidis (georgios.amanatidis@ec.europa.eu)	

Abstract

Deeper understanding of the intrinsic variability and stability properties of the main climate variability modes is needed to assess confidence in the detection, attribution and prediction of global and regional climate change, to improve seasonal predictions, and to understand the shortcomings of current prediction systems. DYNAMITE will explore the fundamental dynamical mechanisms of two of the most important modes of climate variability: the North Atlantic Oscillation/Arctic Oscillation (NAO/AO) and the El Niño-Southern Oscillation (ENSO). The project will elucidate key theoretical and practical aspects of the NAO/AO and ENSO through analyses of available observations, application of classical and new theory, and use of idealised and state-of-the-art numerical models of the atmosphere, ocean, land-surface, sea-ice, marine biology, and the coupled climate system. Specifically, DYNAMITE will advance the understanding of strongly and weakly coupled processes underlying the natural variability of ENSO and NAO/AO; it will evaluate the representation of the coupled processes underlying ENSO and the NAO in state-of-the-art models used to predict climate change; it will advance understanding of the response of ENSO and NAO/AO to climate change; and it will assess the role of ocean biology in the variability of the tropical coupled climate system, including ENSO. DYNAMITE will be implemented by a partnership of world class climate research institutions, including a candidate country and several SMEs. All of the results and findings gained in DYNAMITE will be transferred to the climate modelling community both in and outside Europe by bi-annual electronic newsletters and a dedicated and open DYNAMITE model workshop at the end of the project. DYNAMITE will improve the European capability to make predictions of the state of the climate system from seasons to centuries ahead, thereby contributing to the competitiveness and sustainability of the European Union.

Objectives

Progress in understanding the fundamental modes of the climate system, in particular the coupled ocean-atmosphere system, is essential to improve the detection, attribution and prediction of global and regional climate change. DYNAMITE will explore the fundamental dynamics of, and the similarities and differences between, two of the most important modes of climate variability: the North Atlantic Oscillation/Arctic Oscillation (NAO/AO) and the El Niño-Southern Oscillation (ENSO).

The project will elucidate key theoretical and practical aspects of NAO/AO and ENSO through a coordinated, focussed and open effort based on analyses of available observations, application of classical and new theory, and use of idealised and state-of-the-art numerical atmosphere, ocean/sea ice, coupled atmosphere-ocean/sea ice and coupled atmosphere-ocean/sea ice-ecosystem General Circulation Models (GCMs).

DYNAMITE will advance understanding of the intrinsic characteristics of NAO/AO and ENSO, and also the response of these modes to enhanced concentrations of greenhouse gases. Based on this, the specific objectives of DYNAMITE are:

- To quantify strongly and weakly coupled processes underlying the natural variability of ENSO and NAO/AO;

- To evaluate the representation of the coupled processes underlying ENSO (wind stress, weather noise, phase synchronisation and locking, tropical scale interactions, wave activity) and the NAO (SST, snow cover, sea ice cover, troposphere/stratosphere coupling) in state-of-art models used to predict climate change;
- To identify the response of ENSO and NAO/AO to climate change;
- To quantify the role of ocean biology in the variability of the tropical coupled climate system, including ENSO.

A central part of DYNAMITE is a set of co-ordinated model experiments. Detailed protocols for experimental design, implementation and analysis have been defined with the aim to address:
- How the ocean responds to realistic and idealised NAO-forcing,
- How the atmosphere responds to realistic and idealised SST and sea ice anomalies,
- How the short and long term atmosphere-ocean coupling strength inluence ENSO,
- How NAO and ENSO may change as a result of global warming,
- How the marine biota may influence the coupled atmosphere-ocean climate system,
- How NAO and ENSO are coupled.

An open workshop will be held at the end of DYNAMITE. Here all interested European and non-European climate research scientists and groups will be informed about the research, findings, results and knowledge obtained in DYNAMITE. Special focus will be put on distributing information about the basic operation of NAO/OA and ENSO, and how climate models should be constructed (particularly linked to model formulation and resoluttion) to improve climate scenario integrations, climate prediction experiments and regional downscaling.

Partners

N°	Organisation	Country
1.	Stiftelsen Nansen Senter for Fjernmaaling	Norway
2.	University of Reading	UK
3.	Centre Européen de Recherche et de Formation avancée en Calcul Scientifique	France
4.	Met Office	UK
5.	Centre National de la Recherche Scientifique	France
6.	Chinese Academy of Sciences - Institute of Atmospheric Physics	China
7.	Leibniz Institut fuer Meereswissenschaften	Germany
8.	Istituto Nazionale di Geofisica e Vulcanologia	Italy
9.	Administratia Nationala de Meteorologie	Romania
10.	Vestas Asia Pacific A/S	Denmark
11.	Bergenshalvoeens Kommunale Kraftselskap Raadgiving As	Norway
12.	Societa Generale di Ingegneria - S.G.I. Spa di Rubano	Italy
13.	Vexcel UK Limited	UK

ENHANCE – Enhancing the European Participation in Living with Climate Variability and Change: Understanding the Uncertainties and Managing the Risks

CT - 036895

http://www.livingwithclimate.fi/

Instrument:	Specific Support Action (SSA)	Contract starting date: 1/05/2006
Total project cost:	424.822 €	Duration: 9 months
EC Contribution:	60.000 €	
Organisation:	Finnish Meteorological Institute	
	Helsinki - Finland	
Co-ordinator:	Jaakko Helminen (jaakko.helminen@fmi.fi)	
EC Officer:	Georgios Amanatidis (georgios.amanatidis@ec.europa.eu)	

Abstract

Climate change is becoming a sensitive factor in human socio-economical activities as anthropogenic activities alter the Earth system. This can entail rising losses and damage associated with climatic hazards, thus requiring urgent and purposeful adaptation to climate conditions and managing climate-related risks.

The conference ""WMO Conference on Living with Climate Variability and Change: Understanding the uncertainties and managing the risks"" (LWCVC) to be held in Espoo, Finland, 17- 21 July 2006, co-sponsored by the World Meteorological Organization, the Finnish Meteorological Institute, and the International Research Institute for Climate Prediction will review possibilities and constraints in integrating climate risks and uncertainties into the main decision-making areas that are critically sensitive to climate variability and change. The conference will draw on the experiences of public and private organizations worldwide that have been engaged in creating and using climate information and predictions to assess and manage related risks. Particular efforts will be devoted to the dissemination of the conference recommendations to key stake holders.

The focus of the conference is on decision-processes in a real-world context with critical climate relationships. Europe has a responsibility in global impacts but certainly much to offer world-wide in terms of political will, technological expertise and management practices. It is thus timely that Europe takes a leading role in this endeavour to harness management, technological and institutional issues at stake.

The goal of the conference is to make substantial progress in the establishment of an operative agenda for laying down adaptation measures to climate variability and change, to launch a lasting process for future initiatives and to enhance European participation in these. The conference will also contribute to the achievements of the international development goals established under the 2000 United Nations Millennium Declaration."

Objectives

The proposed project will deliver all arrangements as to organizational andimplementation aspects of the WMO Conference on Living with Climate Variability and Change: Understanding the uncertainties and managing the risks (LWCVC) on 17 – 21 July, 2006 in Dipoli, Espoo, Finland. The LWCVC is being co-organized by the World Meteorological Organization (WMO), the Finnish Meteorological Institute (FMI) and the International Research Institute for Climate and Society (IRI), while the FMI is the host of the conference.

The LWCVC is being convened by the co-organizing organizations in recognition that climate can no longer be taken for granted by any community, country, region of the world as a whole. Furthermore, societies are becoming increasingly interdependent in the provision of food, water, and energy resources. The climate system is changing and losses associated with climate hazards are rising.

In its structure the LWCVC will cover decision making research and the following five key sectors that are especially sensitive to climate variability and change: agriculture and food security, disasters and early warning, energy and built environment, human health and disease control, and water resources. The sectors will be considered from three different perspectives: business, society, and environmental protection.

In addition, the scientific organizing committee (SOC) has suggested for the LWCVC five cross-cutting issues: long-term planning & development: from the perspective of the public and private sector, risk assessment & risk management, interdisciplinary applied research, financial mechanisms, and long-term planning & development: from the perspective of developing countries. The LWCVC itself will decide the final cross-cutting themes to be considered in the breakout sessions.

Through the project, the LWCVC will shed light on how best to integrate climate information, including current information, predictions, and scenarios, into strategic planning, day-to-day decision-making and risk management, recognizing that climate will frequently be only one of several contributing information streams.

The LWCVC will:
- encompass all planning horizons (1 month -> 100 years) relating to climate variability and change, where climate variability is expressed as distributions of describing variables, like monthly mean temperatures, while climate change allows for changes in the distribution;
- take up the combined consequences of increasing or decreasing climate variability, and of monotonic change;
- investigate how to meet the needs for climate data and information on all planning horizons and at all spatial scales relevant to the functioning of societies, e.g. data in the form of distributions pertinent to the user in the context of decision making;
- consider how to ensure that regional predictions, scenarios and other forms of climate information are brought to the fore whenever plans are being formulated and decisions being made in areas of food security, health, environmental management, water management, and overall sustainable development;
- examine in detail the technical methods for and difficulties associated with integrating data and information of disparate forms, including climate, for planning, making decisions and managing risks;
- draw participants from many disciplines in both the private and public sectors, including mathematics, psychology, climate, agriculture, health, hydrology, sociology, governance, development, energy and environment;
- explore how climate information, knowledge, predictions and scenarios can contribute to societal planning, decision processes and risk management - where there are demonstrated sensitivities to climate variability and change.

The LWCVC will also provide the opportunity to discuss options to initiate the design of an on-going process through which the results of climate science will continue to be promoted and brought routinely and more effectively into the mainstreams of societal planning, decision processes and risk management. In this regard, the WMO views the LWCVC as an important preparatory step for the convening of the Third World Climate Conference[1].

The state of the art in the topics to be covered by the LWCVC is both in its early development and relatively scattered among some institutes and organizations. One important achievement has been the establishment of regional climate outlook forums starting from tropical regions. The SOC of the LWCVC is well aware of these developments. In addition one of the co-organizers, IRI, is pursuing active research in this area with cooperative field experiments mainly in several tropical locations. All this has demonstrated the growing need for multi-scientific and multi-organizational cooperation between the climate information suppliers and users. From this context rises also the need to design and develop on-going processes to support the decision making by assessing the total risk and the risks for climate as a part of it. The computational Bayesian methods represent one interesting development in the modern probabilistic methods to be applied in these risk assessments and related fusion of different information sources.

[1] The First World Climate Conference in 1979 led to the establishment of the World Climate Programme, while the Second World Climate Conference in 1990, together with the first assessment report of the Intergovernmental Panel on Climate Change (IPCC), laid much of the scientific groundwork for the establishment of the UN Framework Convention on Climate Change.

Partner

N°	Organisation	Country
1.	Ilmatieteen Laitos	Finland

EPICA-MIS – New Paleoreconstructions from Antarctic Ice and Marine Records

CT - 003868

http://www-lgge.ujf-grenoble/fr/epica-mis/

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 01/12/2004
Total project cost:	5.470.257 €	Duration: 36 months
EC Contribution:	2.500.000 €	
Organisation:	Centre National de la Recherche Scientifique	
	Grenoble, France	
Co-ordinator:	Dominique Raynaud (raynaud@lgge.obs.ujf-grenoble.fr)	
EC Officer:	Riccardo Casale (riccardo.casale@ec.europa.eu)	
	Damien Cardinal (damien.cardinal@ec.europa.eu)	

Abstract

The objective of the Specific Targeted Research Project EPICA-MIS is to produce palaeoreconstructions and integrated climate analysis through marine and ice core studies. It will contribute to the development of novel paleoreconstruction methods by providing unique paleorecords and developing new proxies of critical properties of the climate system. The two Antarctic deep ice cores will be completed and they will for the first time reveal atmospheric records of greenhouse gases like CO_2 and methane reaching 800,000 years back in time. Novel multi-parameter and high-resolution records of climate-relevant parameters like ice isotopes, greenhouse gases, dust and soluble impurities will be produced from the new Antarctic ice cores. They will be compared and correlated with palaeoreconstructions from marine, Greenland and other Antarctic regions. A key task here is to produce common timescales for the records by comparing the individual datings and by investigating novel tephra and paleomagnetic correlation methods. The produced multiproxy reconstructions will provide an outstanding platform for understanding and modelling the past and present climate. Because the reconstructions from both ocean and ice cores will be integrated and will use novel indicators for instance for sea ice, Antarctic insolation, iron or opal isotopes, climatic issues like the carbon cycle, sea surface temperature, and the climatic coupling between the northern and southern hemispheres can be addressed with new perspectives. As strategies for mitigation and adaptation to global change have to be based on predictions on future climate, the EPICA-MIS novel palaeoreconstructions will produce new evidence about climate dynamics and variability necessary to improve and test policy-relevant models. The Research Project described here goes a step further in integrating the European ice core research groups with marine palaeoclimate research groups, thus forming a strong European Research Area.

Partners

N°	Organisation	Country
1.	Centre National de la Recherche Scientifique	France
2.	Alfred-Wegener-Institut für Polar - und Meeresforschung	Germany
3.	Consorzio Nazionale Interuniversitario per le Scienze del Mare	Italy
4.	Université Libre de Bruxelles	Belgium
5.	Koebenhavns Universitet	Denmark
6.	Institut Polaire Français - Paul Emile Victor	France
7.	Utrecht University	Netherlands
8.	Stockholms Universitet	Sweden
9.	Norwegian Polar Institute	Norway
10.	University of Bern	Switzerland

11.	Natural Environment Research Council	UK
12.	University of Cambridge	UK
13.	Commissariat à l'Energie Atomique	France
14.	Consorzio per L'attuazione del Programma Nazionale di Ricerche in Antartide	Italy

IPY-CARE – Climate of the Arctic and its Role for Europe (CARE) – A European component of the International Polar Year

CT - 010292

http://www.ipy-care.org/

Instrument:	Specific Support Action (SSA)	Contract starting date: 01/07/2005
Total project cost:	409.000 €	Duration: 21 months
EC Contribution:	395.000 €	
Organisation:	Nansen Environmental and Remote Sensing Center	
	Bergen, Norway	
Co-ordinator:	Ola M. Johannessen (ola.johannessen@nersc.no)	
EC Officer:	Riccardo Casale (riccardo.casale@ec.europa.eu)	
	Damien Cardinal (damien.cardinal@ec.europa.eu)	

Abstract

The overall objective of IPY-CARE is to create, co-ordinate and prepare a Pan-European science and implementation plan for Arctic climate change and ecosystems research programme as contribution to the International Polar Year.

The Arctic has over the last 2-3 decades warmed more than other regions of the world, and the sea ice cover has decreased in the order of 10% in the same period. Climate models furthermore indicate that anthropogenic global warming will be enhanced in the northern high latitudes due to complex feedback mechanisms in the atmosphere–ocean–ice system. At the end of this century, the Arctic Ocean is predicted to be "a blue ocean" during summer time. The Arctic may therefore encounter the most rapid and dramatic changes during the 21st century, with significant consequences for environment and human activities.

The IPY-CARE Specific Support Action will create a coordinated plan for European Arctic climate and ecosystem research programme by organising expert groups who will develop a science and implementation plan for a coordinated pan-European IPY-CARE programme. Expert groups will be established for the following six modules which represent the main components of the programme: M1: Processes determining Arctic climate variability and changes; M2: Marine biological processes in response to climate change; M3: Air-sea-ice meso-scale processes and climate variability; M4: Past climate variability; M5: Remote sensing and new technology for climate data provision, and M6: Assessment of Arctic climate change impacts on climate in Europe including the Mediterranean area and socio-economic consequences for Europe. An important part of the expert groups' activities will be to organize an Arctic climate symposium open for all.

IPY-CARE will require large and multi-disciplinary resources that can only be mobilized by a joint effort of a broad consortium, which includes all the major polar research institutions and groups in Europe. IPY-CARE will build up promotion and outreach activities to rise the awareness of the importance of the Arctic for global climate, resource exploitation, transport and environmental vulnerability. Furthermore, IPY-CARE will develop education and training programmes in the area of Arctic climate research for young scientists in Europe.

Partners

N°	Organisation	Country
1.	Nansen Environmental and Remote Sensing Center	Norway
2.	Alfred Wegener Institute for Polar Research	Germany
3.	Max Planck Institute for Meteorology	Germany

4.	The Norwegian Polar Institute	Norway
5.	Academy of Sciences Mainz/Institute for Polar Ecology & Geomar Center for Marine Geosiences	Germany
6.	University of Bergen, The Bjerknes Centre for Climate Research	Norway
7.	Pierre et Marie Curie University (Upmc)/Lodyc)	France
8.	Finnish Institute of Marine Research	Finland
9.	Göteborg University (Ugot), Deparment of Chemistry	Sweden
10.	Scottish Assosiation for Marine Science	UK
11.	Danish Meteorological Institute	Denmark
12.	State Research Center Arctic and Antarctic Research Institute	Russia
13.	Nansen International Environmental and Remote Sensing Center	Russia
14.	Centre National de la Recherche Scientifique	France
15.	Foundation for Research and Technology	Greece
16.	National Meteorological Administration	Romania
17.	Institute de Ciencia i Tecnologia Ambientals	Spain
18.	Institute of Oceanology, Polish Aceademy of Sciences	Poland
19.	International Polar Foundation	Belgium

MILLENNIUM – European Climate of the Last Millennium

CT - 017008

http://www.millenniumproject.net/

Instrument:	Integrated Project (IP)	Contract starting date: 01/01/2006
Total project cost:	16.025.487 €	Duration: 48 months
EC Contribution:	12.600.000 €	
Organization:	University of Wales Swansea	
	Swansea, UK	
Co-ordinator:	Danny McCarroll (D.McCarroll@swansea.ac.uk)	
EC Officer:	Riccardo Casale (riccardo.casale@ec.europa.eu)	
	Damien Cardinal (damien.cardinal@ec.europa.eu)	

Abstract

Millennium will answer one of the most critical questions in climate research: does the magnitude and rate of 20th Century climate change exceed the natural variability of European climate over the last millennium? Existing climate reconstructions rely on inadequate data and underestimate variability. Improved GCM parameterization requires more accurate reconstructions and integrated modelling. We will supply high-resolution chronologies that capture the magnitude and rate of change and the magnitude and frequency of extreme events over the last 1000 years. Our multi-disciplinary team will use innovative and developing technologies to extract quantitative palaeoclimate information from documentary and natural archives, including trees, lakes, mires and ice cores. A multi-proxy approach provides seasonal palaeoclimate signals with quantified precision. Advances in dating allow us, for the first time, to place terrestrial and marine proxy records on the same timescale, allowing lead and lag relationships in ocean-atmosphere forcing to be captured. Annually banded seashells will be cross-dated like tree rings, and tephra-rich sediments used to construct a marine chronology independent of P14PC dating. This can be used to reconstruct changes in ventilation linked directly to the strength of North Atlantic circulation. Millennial reconstructions of European climate, at a range of scales, will define whether recent climate change is unusual in the context of past variability. Millennium proxy-based reconstructions will be fused with a hierarchy of models, run over both millennium and century time scales using a purpose-built PC cluster and the huge resources of the Climateprediction.net distributed computing network. Integrated hind- and forecast modelling, (using HadCM3) will allow us to test whether current empirically reconstructed climate records based on regression methods underestimate climate sensitivity or if current GCM simulations give overestimates.

Objectives

Millennium has a single clear objective: to determine with quantifiable precision whether the magnitude and rate of 20P^{thP} Century climate change exceeds the natural variability of European climate over the last millennium. To do this the project will use the very best documentary, biological and sedimentary archives available across Europe and apply the most powerful techniques to extract palaeoclimate signals. By harnessing some of the best laboratory facilities available we will produce multi-proxy climate reconstructions of unparalleled accuracy and precision. Combined with existing instrumental and proxy palaeoclimate data, our results will allow us to model the past and future impacts of anthropogenic climate forcing using realistic patterns of natural climate variability across Europe.

The Millennium project will achieve six aims:

- It will produce a database of the best data on past climate;
- It will produce new millennial-length palaeoclimate data using the most powerful and innovative methods;
- It will combine the existing and new data to reconstruct the climate of Europe for the last one thousand years at a range of spatial scales;

- It will use the reconstructions to define the natural variability of European climate, over both space and time, and taking account of changes in seasonality;
- It will test the ability of the most commonly used climate model to reproduce the magnitude of natural climate variability in the past;
- It will predict the probability of European climate passing critical thresholds, taking full account of the natural variability as well as greenhouse forcing.

To place recent climate change in a longer term context, several studies have developed millennial length, annually resolved reconstructions of northern hemispheric temperatures. However, despite the high profile status of some of these data-sets, they are limited for a variety of reasons:

- Such time-series provide only a large-scale picture of the mean state of one climate parameter - i.e. mean temperature. The spatial complexity of climate change cannot be assessed from these data;
- The fidelity/robustness of these reconstructions quickly diminishes back in time as very few proxies were included in the early portions of these series;
- Methods used to develop these reconstructions can potentially underestimate the temperature amplitude change over the whole millennium. A more precise assessment of the absolute reconstructed temperature amplitude change is needed to help quantify the relative influences of forcing mechanisms in climate models;
- Due to the strong bias to tree ring-width data, the reconstructions are also likely biased to the summer season, despite the fact that greatest recent changes have been observed in the winter months.

There is therefore a need for complementary investigations at small and intermediate scales with the expressed aim of reconstructing other climatic parameters (e.g. precipitation) and not just temperature. The record breaking central European floods in and the widespread European drought in 2003, demonstrate the need for a better understanding of precipitation variability in this region. The Millennium project will focus its investigations on Europe where previous research has shown a more varied climate compared to the large-scale Northern Hemisphere reconstructions. The project is built on the rationale that a multi-proxy research approach represents the most productive route towards understanding climate variability, and more specifically for placing the 20P^{thP} and 21Pst century climates in the context of the last millennium.

Europe is unique in that there exist long high-quality instrumental records with which assessment of proxy series can be made. This project will not only utilise existing proxy records (e.g. tree-ring and documentary sources), but will emphasise the development of isotopic tree-ring records as well as incorporating a range of new exciting proxy sources (e.g. isotopic records from molluscs, high resolution sedimentary archives and Alpine ice cores). The resulting multi-proxy data-base will not only be rigorously calibrated and furnished with realistic error estimates, but separate calculations for specific parameters, regions, times and time-scales will also be developed. From these data the project will provide the best available information on characteristic modes and magnitudes of natural climate variability for comparison with the natural forcing histories and outputs from climate models. The important questions about the nature, and the significance, of recent climate change can be addressed in separate model-based, and observational domains and ultimately, the issue of attribution can be explored using the combined information from both approaches.

Millennium directly addresses the central objective of Sub-Priority 1.1.6.3 'Global Change and Ecosystems' by strengthening the scientific basis for understanding the processes and factors controlling global change and hence contributes to the protection of ecosystems and the preservation of biodiversity. Ultimately, the project will focus clearly on the most critical unresolved question concerning climate change in Europe, specifically: does the magnitude and rate of 20P^{thP} Century climate change exceed the natural variability of European climate over the last millennium?

Partners

N°	Organisation	Country
1.	University of Wales Swansea	UK
2.	University of Oulu	Finland
3.	Masaryk University of Brno	Czech Rep.

4.	University Court of The University of St Andrews	UK
5.	Swiss Federal Research Institute Wsl	Switzerland
6.	Scottish Association for Marine Science	UK
7.	University of Tromsø	Norway
8.	University of Oxford	UK
9.	University of Bern	Switzerland
10.	Paul Scherrer Institut	Switzerland
11.	Slovenian Forestry Institute	Slovenia
12.	Dm Technology Limited	UK
13.	Cox Analytical Systems Sweden Ab	Sweden
14.	Anglia Polytechnic University	UK
15.	Helsingin Yliopisto	Finland
16.	Ufz - Umweltforschungszentrum Leipzig - Halle Gmbh	Germany
17.	Stockholms Universitet	Sweden
18.	University of Wales, Bangor	UK
19.	Utrecht University	Netherlands
20.	Forschungszentrum Juelich Gmbh	Germany
21.	Finnish Forest Research Institute	Finland
22.	Norwegian Polar Institute	Norway
23.	University of Aarhus	Denmark
24.	Science Institute, University of Iceland	Iceland
25.	Nerc Isotope Geosciences Laboratory, British Geological Survey	UK
26.	Umeå University	Sweden
27.	Hohenheim University	Germany
28.	Universitat de Barcelona	Spain
29.	Adam Mickiewicz University	Poland
30.	Institute of Geography Russian Academy of Sciences	Russia
31.	Albert-Ludwigs-Universität Freiburg	Germany
32.	The University of Edinburgh	UK
33.	University of Sunderland	UK
34.	Koninklijk Nederlands Meteorologisch Instituut	Netherlands
35.	Institute of Meteorology and Water Management	Poland
36.	University of Szeged	Hungary
37.	Centre for Ecology and Hydrology	UK
38.	University of Exeter	UK
39.	Italian National Research Council	Italy

Prediction of Climatic Change and its Impacts

AMMA – African Monsoon Multidisciplinary Analysis

CT - 004089

http://www.amma-eu.org

Instrument:	Integrated Project (IP)	Contract starting date: 01/01/2005
Total project cost:	34.962.795 €	Duration: 60 months
EC Contribution:	11.700.000 €	
Organisation:	Centre National de la Recherche Scientifique (CNRS)	
	Paris - France	
Co-ordinator:	Jan Polcher (jan.polcher@lmd.jussieu.fr)	
EC Officer:	Georgios Amanatidis (georgios.amanatidis@ec.europa.eu)	

Abstract

The dramatic change in the region of the West African monsoon (WAM) from wet conditions in the 50s and 60s to much drier conditions from the 70s to the 90s represents one of the strongest inter-decadal signals on the planet in the 20th century. Marked inter-annual variations in recent decades have resulted in extremely dry years with devastating environmental and socio-economic impacts. The abrupt decrease of water resources in the Sahel divided by two the cattle population and some exportation cultures disappeared. Vulnerability of West African societies to climate variability is likely to increase in the next decades as demands on resources increase due to the rapidly growing population. The situation may be exacerbated by the effects of climate change, land degradation caused by the growing population and water pollution. Motivated by the need to develop strategies to reduce the socioeconomic impacts of climate variability and change in WAM we aim : i) To improve our ability to predict the WAM and its impacts on intra-seasonal to decadal timescales, ii) To improve our ability to predict the consequences of climate change on WAM variability and its impacts. These objectives will be achieved in the African Monsoon Multidisciplinary Analysis (AMMA) project by re-enforcing the regional environmental monitoring systems and conducting intensive field campaigns. This will lead to a better understanding of the mechanisms involved and in-fine improve our models and their predictive skills. The observational system will cover the regional water cycle, the atmospheric dynamics and chemistry, the land-surface and oceanic conditions. It will cover 3 time scales: i) a long term monitoring, ii) an enhanced observing period of two years and iii) a special observing periods over one rainy season. In order to monitor the human dimension of the West African monsoon variability crop yields, water resources and health will be monitored with the same strategy.

Objectives

Based on the objectives and the state of environmental monitoring and forecasting today, the AMMA consortium has chosen five goals to focus the effort of all partners and to allow each one to evaluate our progress and achievements during the course of the project:

1. Short to medium range weather forecasting

   The intensive field campaign AMMA will provide the data needed to ascertain hypotheses on tropical convection, its interaction with the large scale dynamics and its role in the regional water cycle. Within this project the process studies on convection will be integrated with our improved knowledge of land-surface processes, interactions with aerosols and chemistry in order to be translated into improved parameterizations for the large scale models used in forecasting. Kilometric resolution models able to explicitly represent the convection will be used. Fine scale analyses integrating a maximum of data collected during the Special Observing Period (SOP) will be performed through variational assimilation.

2. Seasonal to climate forecasting

   The long term monitoring of the water cycle put into place within AMMA will improve our understanding of the characteristics of the inter-annual rainfall variability. This will provide leads as to which of the slow

components in the system have the strongest predictive skill and which of the processes need to be better understood. Key to any significant progress will be an integrative approach which views the monsoon as an object built out of internal interactions but with strong external influences. An improved conceptual view of the monsoon will help the statistical as well as the dynamic seasonal forecasts and allow us to estimate error bars for the climate change studies. The land surface data assimilation system will be improved over the AMMA region thanks to observational effort. This will allow the evaluation for the first time of the potential predictability of rainfall associated with soil moisture, which is believed to be high. Systematic observations of chemical composition over West Africa during AMMA will provide constraints on models, which will be used to assess the processing, export and impact of emissions from West Africa. The strong meridional gradients of the vegetation types and soil moisture of West Africa lead to strong gradients in certain emissions, and small changes in synoptic, seasonal or interannual climate may have large effects on the emissions from West Africa. Thus the interactions of the land surface and monsoon dynamics with the chemistry will be a critical part of this analysis.

3. Food security management

AMMA will produce estimates of a range of direct and indirect effects of changes in WAM on food security to define the vulnerability context over the region and to improve the prediction of seasonal production to serve as input for Early Warning Systems. The direct effects will include changes in yields of rain-fed crops and changes in water resources available for irrigated cultivation. Indirect effects will evaluate changes in agricultural and livelihood strategies as well as land use. Effects of, and adaptations to, climate change interact with a range of other development trends such as economic demographical evolutions. AMMA will develop scenarios for such complex situations, as a basis for analysing the specific sensitivity to WAM changes for each of them, and will test their application in operational Early Warning Systems for food security supporting the decision making process.

4. Environmental monitoring

AMMA will implement a multi-scale and integrated monitoring network providing key parameters for multidisciplinary scientific investigation. One of the issues is to determine future monitoring strategies to be implemented in an operational mode. Within the AMMA project we will upgrade the radiosonde network and provide the personnel with the appropriate training to maintain them over the long term. The project will demonstrate the benefit for weather and climatic forecasting of these enhancements in the upper air soundings to motivate their funding at international level. Some key catchments will be instrumented to demonstrate to the local authorities the value of environmental monitoring for water resource management. AMMA will also demonstrate the impact of emissions at regional scales on local air quality. AMMA aims to improve and to evaluate satellite products which are critical for West Africa (precipitation is one of the key parameters). AMMA will also provide the basis for a system of satellite-based environmental monitoring procedures, focusing on crop and vegetation productivity, and hydrology.

5. Training and education

AMMA will show that the African monsoon is a tropic of fundamental research which can mobilise the best scientists in Europe. This will entice African students and scientists to enter this field of research. This movement will be fostered by the organisation of summer schools and university PhD programs locally to provide the interested students with access to the expertise they sought abroad and allow the build up of a critical mass which will then enable a continuous scientific activity on African environmental issues. In gathering together African and European students and scientists in a motivating project, AMMA will contribute to consolidate both the scientific expertise and the long term collaboration at European and African scale.

Partners

N°	Organisation	Country
1.	Centre National de la Recherche Scientifique	France
2.	Institut de Recherche pour le Développement	France
3.	Universitaet zu Koeln	Germany

4.	Deutsches Zentrum fur Luft und Raumfahrt E.V.	Germany
5.	University of Leeds	UK
6.	Natural Environment Research Council	UK
7.	Koebenhavns Universitet	Denmark
8.	Centre National de Recherches Météorologiques, Météo France	France
9.	Medias France	France
10.	Université de Bourgogne: Dijon	France
11.	Université Paris XII - Val de Marne	France
12.	Université Paul Sabatier - Toulouse III	France
13.	Centre de Coopération Internationale en Recherche Agronomique pour le Développement	France
14.	Universitaet Bremen	Germany
15.	Forschungszentrum Karlsruhe Gmbh	Germany
16.	Leibniz Institut fur Meereswissenschaften	Germany
17.	Ludwig-Maximilians-Universitaet Muenchen	Germany
18.	Rheinische Friedrich-Wilhelms - Universitaet Bonn	Germany
19.	University of East Anglia	UK
20.	The University of Liverpool	UK
21.	University of York	UK
22.	University of Leicester	UK
23.	The University of Manchester	UK
24.	University of Cambridge	UK
25.	Consiglio Nazionale delle Ricerche	Italy
26.	Ente Per Le Nuove Tecnologie, l'Energia e l'Ambiente	Italy
27.	Università degli Studi di Perugia	Italy
28.	Universidad de Castilla - La Mancha	Spain
29.	Universidad Complutense de Madrid	Spain
30.	Universidad Politecnica de Cartagena	Spain
31.	Université Catholique de Louvain	Belgium
32.	European Centre for Medium - Range Weather Forecasts	UK
33.	Centre Regional de Formation et d'Application en Agrometeorologie et Hydrologie Operationnelle	Niger
34.	Centre de Recherche Médicale et Sanitaire	Niger
35.	Ecole Inter-Etats d'Ingénieurs de l'Equipement Rural Faso	Burkina
36.	African Centre for Meteorological Application for Development	Niger
37.	Vaisala Oyj	Finland
38.	Ocean Scientific International	UK
39.	Koninklijk Nederlands Meteorologisch Instituut (KNMI)	Netherlands
40.	Agence pour la Sécurité de la Navigation Aerienne en Afrique et à Madagascar	Senegal
41.	Universitaet Karlsruhe (Technische Hochschule)	Germany
42.	Université Cheikh Anta Diop de Dakar	Senegal
43.	Université de Ouagadougo	Burkina-Faso
44.	Université de Bamako	Mali

45.	Université Abdou Moumouni de Niamey	Niger
46.	Université Abomey Calavi (Cotonou)	Benin
47.	Direction de la Météorologie du Mali	Mali
48.	Direction de la Météorologie du Niger	Niger
49.	Direction de la Météorologie du Sénégal	Senegal
50.	Direction de la Météorologie de Guinée	Guinea
51.	Kwame Nkrumah University of Science and Technology	Ghana
52.	Ghana Meteorological Agency	Ghana
53.	Institut Sénégalais de Recherches Agricoles	Senegal
54.	Centre d'Etudes Régional pour l'Amélioration de l'adaptation à la Sècheresse	Senegal
55.	Institut de l'Environnement et de Recherches Agricoles	Burkina-Faso
56.	Institut d'Economie Rurale	Mali
57.	Centre de Suivi Ecologique	Senegal
58.	University of Jos	Nigeria

AMMA TTC – African Monsoon Multidisciplinary Analysis - Extension

CT - 045954

http://www.amma-eu.org

Instrument:	Integrated Project (IP)	Contract starting date: 01/01/2007
Total project cost:	1.335.960 €	Duration: 36 months
EC Contribution:	1.251.960 €	
Organisation:	Centre National de la Recherche Scientifique (CNRS)	
	Paris - France	
Co-ordinator:	Jan Polcher (jan.polcher@lmd.jussieu.fr)	
EC Officer:	Georgios Amanatidis (georgios.amanatidis@ec.europa.eu)	

Abstract

The overarching purposes of AMMA-TTC are to:

- Assist in the achievement of the UN Millennium Development Goals in Africa and the implementation of the EU Strategy for Africa, which includes action to counter the effects of climate change and the development of local capabilities to generate reliable information on the location, condition and evolution of environmental resources, food availability and crisis situations;
- Add to the African participation and ownership of AMMA research activities, and strengthen the linkages between European research institutions and the West African research community;
- Ensure that the further development of national expertise is maintained beyond the AMMA project.

To help meet these high level objectives, the specific objectives of AMMA-TTC are to:

- Identify short and longer term impacts that changes in the WAM are likely to have on agriculture and land productivity, land use, water resources, health and food security;
- Investigate the options for adaptation to the above impacts;
- Improve the ability of operational centres to forecast seasonal variation in the WAM;
- Compile the results of this research and communicate them to the user communities.

The overall strategy for the implementation of the extension of the project have been to define a complementary partnership with universities, research institutions and operational centres that constitute a long term knowledge base to feed expertise, methods and tools to operational centres. AMMA-results will be extended to include investigation of the impacts of changes and variability of the West African Monsoon, and also options for adaptation to the variability and changes. AMMA-TTC will promote the multidisciplinary approach to WAM research, by integrating geophysical research on biophysical processes with broader-based impacts. AMMA-knowledge will be disseminated to participating centers, allowing the services provided to decision makers to be improved."

Objectives

The AMMA project is providing underpinning science that will create new knowledge of the functioning of the West African Monsoon (WAM), the processes which drive its variability and how the timing and intensity of the monsoon may change in a future climate. This extension, AMMA-TTC, will exploit that new knowledge for the benefit of those West African states in the Sahel-Sudan zone, which will be most affected by the impacts of climate change on the region.

AMMA-TTC will reinforce the existing interactions and partnerships between European and African researchers, but expand them to create a new, stronger synergy, which combines the latest European developments in WAM research with the insights gained from regional knowledge and understanding. The African scientific community are best placed to transfer new AMMA knowledge to the policy and decision makers faced with the need to implement adaptive strategies; AMMA-TTC will empower them to do this.

The overarching purpose of AMMA-TTC is to assist in the achievement of the UN Millennium Development Goals in Africa and the implementation of the EU Strategy for Africa, which includes "action to counter the effects of climate change" and "the development of local capabilities to generate reliable information on the location, condition and evolution of environmental resources, food availability and crisis situations." The three 'Rio-conventions' on climate change, biological diversity and desertification deal with strongly interrelated issues, not least when seen in a West African perspective. Research taking its point of departure in the climate domain will have important implications for understanding the likely development pathways with respect to land degradation and ecosystem structure and functioning. This calls for linking of geophysical and ecological research. To help meet these high level objectives, the specific objectives of AMMA-TTC are:

- To identify short and longer term impacts that changes in the WAM are likely to have on agriculture and land productivity, land use, water resources, health and food security;
- To investigate the options for adaptation to the above impacts;
- To improve the ability of operational centres to forecast seasonal variation in the WAM;
- To compile the results of this research and communicate them to the user communities.

These objectives will be achieved through the following activities:

- Exploiting AMMA results to investigate the impacts of, and options for adaptation to, changes in the WAM;
- Providing funding to strengthen the African participation in, and ownership of, AMMA research activities;
- Strengthening the linkages between European research institutions and African universities 4/66 AMMA-TTC 09/11/06 and research centres;
- Promoting a multidisciplinary approach to WAM research, integrating geophysical research on bio-physical processes with broader-based impacts;
- Providing regional and national operational centres with better tools and knowledge, allowing the services provided to decision makers to be improved;
- Ensuring that the further development of national expertise is maintained beyond the AMMA project.

To achieve its objectives AMMA-TTC will focus on a range of issues and research tasks. Although these issues are also addressed by AMMA, there is a new emphasis which extends the work from basic geophysical research into processes, towards research aimed at understanding the impacts of change in the WAM and the options for adaptations to those changes. These issues thus require translation of the geophysical research results of AMMA on the functioning and change of the WAM into scenarios of climate change, defining the relevant impacts and adaptation strategies to be studied.

The research issues are:

- How can better seasonal forecasting be used to improve farmers' strategies and decision making?
- What are the climate change adaptation options and strategies available to farmers and pastoralists?
- How should water resource management adapt to the impacts of hydrological change at the river basin scale?
- What is the impact of climate variability on disease transmission and then the consequences of climate change on the epidemiological patterns of malaria and rift valley fever in West Africa?
- How can AMMA results be translated into improved seasonal forecasts of the WAM?

Partners

N°	Organisation	Country
1.	Université Cheikh Anta Diop de Dakar	Senegal
2.	Université de Ouagadougo	Burkina-Faso
3.	Université de Bamako	Mali
4.	Université Abdou Moumouni de Niamey	Niger
5.	Université Abomey Calavi (Cotonou)	Benin
6.	Direction de la Météorologie du Mali	Mali

7.	Direction de la Météorologie du Niger	Niger
8.	Direction de la Météorologie du Sénégal	Senegal
9.	Direction de la Météorologie de Guinée	Guinea
10.	Kwame Nkrumah University of Science and Technology	Ghana
11.	Ghana Meteorological Agency	Ghana
12.	Institut Sénégalais de Recherches Agricoles	Senegal
13.	Centre d'Etudes Régional pour l'Amélioration de l'adaptation à la Sècheresse	Senegal
14.	Institut de l'Environnement et de Recherches Agricoles	Burkina-Faso
15.	Institut d'Economie Rurale	Mali
16.	Centre de Suivi Ecologique	Senegal
17.	University of Jos	Nigeria

CECILIA – Central and Eastern European Climate Change Impact and Vulnerability Assessment

CT - 037005

http://www.cecilia-eu.org

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 01/06/2006
Total project cost:	3.367.022 €	Duration: 36 months
EC Contribution:	2.749.891 €	
Organisation:	Charles University	
	Prague - Czech Republic	
Co-ordinator:	Tomas Halenka (tomas.halenka@mff.cuni.cz)	
EC Officer:	Georgios Amanatidis (georgios.amanatidis@ec.europa.eu)	

Abstract

The main objective of CECILIA is to deliver a climate change impacts and vulnerability assessment in targeted areas of Central and Eastern Europe. Emphasis is given to applications of regional climate modelling studies at a resolution of 10 km for local impact studies in key sectors of the region. The project contains studies of hydrology, water quality and water management (focusing at medium-sized river catchments and the Black Sea coast), air quality issues in urban areas (Black Triangle - a polluted region around the common borders of the Czech Republic, Poland and Germany), agriculture (crop yield, pests and diseases, carbon cycle), and forestry (management, carbon cycle). Very high resolution simulations over this region are necessary due to the presence of complex topographical and land use features. Climate change impacts on large urban and industrial areas modulated by topographical and land-use effects which can be resolved at the 10 km scale, are investigated by CECILIA. The high spatial and temporal resolution of dense national observational networks at high temporal resolution and of the CECILIA regional model experiments will uniquely feed into investigations of climate change consequences for weather extremes in the region under study. Comparison with the results based on statistical downscaling techniques will also be provided. Statistical downscaling methods for verification localization of model output for impact studies will be performed.

Objectives

After the political changes that occurred in countries of the former Eastern Block at the end of 80's, climate change started to be taken into account to some extent at the governmental level. In particular, from the scientific point of view, at the beginning of 90's the access to information and data started to become a reality. Around the mid 90's significant improvements in cooperation were promoted by the US Country Study Programme. Under this framework, many countries from the former Eastern Block obtained access to global climate-change scenarios and longer series of global climatological data. They participated to workshops on the use of this information for the assessment of climate-change impacts on agriculture, forestry, water management and health. Unfortunately, at that time there was very limited equipment to handle large amount of data and, moreover, not sufficient know-how in this region to start real cooperation efforts in the field of climate-change modelling. However, this knowledge gap has been progressively eliminated and when the regional climate model RegCM appeared through ICTP in several countries of Central and Eastern Europe at the end of 90's, it proved the feasibility of carrying out regional climate-change studies performed by local users in this area. Eventually the adaptation of a commonly used NWP model in LACE countries, i.e. the model ALADIN from Météo-France, started in 2001 in Czech Republic and now this model, ALADIN-Climate, has taken part in the EC FP6 project ENSEMBLES. Thus, the door has been opened for real climate change impact and vulnerability assessments for central and eastern Europe based on locally provided high resolution regional climate modelling.

During the last decade regional climate models (RCMs) have been increasingly used to examine climate variations at scales that are not resolved by global models. To the extent that they produce realistic climate simulations, such models can be powerful tools in the study of regional climate impacts. Since the field of regional climate prediction is still evolving, the skill of RCMs in simulating climate variability has not been extensively evaluated. This is planned within the framework of the project ENSEMBLES for simulations of 50 to 25 km resolution driven by ERA40 reanalyses. As part of the ENSEMBLES project transient scenario runs of 100 – 150 year's length are also planned under different greenhouse gases (GHG) and aerosol forcing. In this proposal we plan a detailed analysis and use of the results of the project ENSEMBLES for focused initial impact studies in our target region. However, one of the main objectives of this proposal is also to adapt a few of the models used for ENSEMBLES (ALADIN-Climate and RegCM) for very high resolution (grid spacing of 10 km) simulations over selected sub-domains, which will provide additional information related to the complex terrain of the region. The assessment of the role of significant but previously not resolved topographical features and land-use patterns will be provided in these experiments as well as the evaluation of the sensitivity of the simulations to the choice and size of the model domain. Moreover, development of new features in the parameterization of high resolution physics in the models is expected (e.g. cloud microphysics, chemistry of urban areas etc.). This will provide a connection with the EC FP6 Project QUANTIFY, which aims at quantifying the impact of transportation on climate change. Our project will also provide insights on the validation and relative merits of statistical and dynamical downscaling, in particular as applied to provide local climate information.

Main goal

The main goal of the proposal is to integrate results from different previous and ongoing modelling activities and approaches to provide the basis for very high resolution climate change impact and vulnerability assessment in important human activity sectors and natural ecosystems. It is prohibitive to cover within the STREP all the sectors in their complexity, so that we target our analysis on some key areas of specific interest to the region. For example, the flood and drought conditions which occurred in recent summers over the region highlight the importance of the hydrologic cycle and water management in the Elbe and Danube river catchments in response to changes in the occurrence of precipitation extremes. Impacts on agriculture and forestry influencing the economy of countries in the region will be studied with emphasis on the main productions in the area. The 2003 heat wave demonstrated the importance of studies of the health impacts of extreme conditions that would also lead to considerable changes in air quality, both regionally and in major urban centres.

The proposed research will benefit greatly from previous and ongoing European projects and programmes with related objectives, e.g.:

- Modelling the Impact of Climate Extremes (MICE),
- Statistical and regional dynamical downscaling of extremes for European regions (STARDEX),
- Prediction of Regional scenarios and Uncertainties for Defining European Climate change risks and Effects (PRUDENCE),
- ENSEMBLE-based Predictions of Climate Changes and their Impacts (ENSEMBLES),
- Quantifying the Climate Impact of Global and European Transport Systems (QUANTIFY),

Aims

The overall aim of this proposal is to assess the impact of climate change at the regional to local scale for the territory of central and Eastern Europe, with emphasis on using very high climate resolution in order to capture the effects of the complex terrain of the region. From the viewpoint of climate scenario production, this goal will be achieved through a strategy of multiple and combined approaches, namely variable resolution models, RCMs and statistical downscaling methodologies. The primary tools, however, will be very high resolution RCMs run locally for targeted areas. From the impact viewpoint, the most important sectors for the economies and welfare of individual countries will be selected. These objectives will be achieved through the execution of the following specific tasks:

- To collect, assess and make available for first local impact studies the scenarios and climate simulations produced in previous relevant projects, especially PRUDENCE, STARTDEX, MICE and ENSEMBLES, where available;
- To adapt and develop very high resolution RCMs for the region (10 km grid spacing) and perform regional time-slice nested simulations driven by ERA40 data and by GCMs for selected GHG change scenarios.
- To verify the model results, compare RCM and statistical downscaling results, analyze and develop the methods for verification, particularly at local scales;

- To estimate the effect of global climate change on the occurrence of extreme events (heavy precipitation, heat waves, droughts) in the region, including the assessment of the added value of high-resolution experiments for the simulation of the relevant processes and feedbacks;
- To evaluate uncertainties in regional climate change projections by intercomparing results obtained in previous projects (PRUDENCE, ENSEMBLES) and the present ones;
- To assess (based on the high resolution downscaling results) the impacts of climate change on the hydrological cycle and water resources over selected catchments in the region; to study the effects of climate change on the Black Sea;
- To study (based on the high resolution downscaling results) the impacts of climate change on agriculture and forestry, carbon cycle and selected species;
- To study (based on the high resolution downscaling results) the impacts of climate change on health and air quality (photochemistry of air pollution, aerosols).

Partners

N°	Organisation	Country
1.	Univerzita Karlova V Praze	Czech Rep.
2.	The Abdus Salam International Centre for Theoretical Physics	Italy
3.	Météo-France	France
4.	Danmarks Meteorologiske Institut.	Denmark
5.	Aristotelio Panepistimio Thessalonikis	Greece
6.	Cesky Hydrometeorologicky Ustav	Czech Rep.
7.	Ustav Fyziky Atmosfery Av Cr	Czech Rep.
8.	Eidgenoessische Technische Hochschule Zuerich	Switzerland
9.	Boku - Universitaet fuer Bodenkultur Wien	Austria
10.	Administratia Nationala de Meteorologie	Romania
11.	National Institute of Meteorology and Hydrology of the Bulgarian Academy of Sciences	Bulgaria
12.	Institutut National de Hidrologie si Gospodarire a Apelor	Romania
13.	Orszagos Meteorologiai Szolgalat	Hungary
14.	Narodne Lesnicke Centrum	Slovakia
15.	Politechnika Warszawska	Poland
16.	Eotvos Lorand Tudomanyegyetem	Hungary

CIRCE – Climate Change and Impact Research: the Mediterranean Environment

CT - 036961

http://www.bo.ingv.it/circeip/

Instrument:	Integrated Project (IP)	Contract starting date: 01/04/2007
Total project cost:	16.554.294 €	Duration: 48 months
EC Contribution:	10.000.000 €	
Organisation:	Istituto Nazionale di Geofisica e Vulcanologia	
	Rome - Italy	
Co-ordinator:	Antonia Navarra (navarra@bo.ingv.it)	
EC Officer:	Henrietta Hampel (henrietta.hampel@ec.europa.eu)	

Abstract

CIRCE aims at developing for the first time an assessment of the climate change impacts in the Mediterranean area. The objectives of the project are:

- To predict and to quantify physical impacts of climate change in the Mediterranean area,
- To evaluate the consequences of climate change for the society and the economy of the populations located in the Mediterranean area,
- To develop an integrated approach to understand combined effects of climate change,
- To identify adaptation and mitigation strategies in collaboration with regional stakeholders CIRCE wants to understand and to explain how climate will change in the Mediterranean area.

The project will investigate how global and Mediterranean climates interact, how the radiative properties of the atmosphere and the radiative fluxes vary, the interaction between cloudiness and aerosol, the modifications in the water cycle. Recent observed modifications in the climate variables and detected trends will be compared.

The economic and social consequences of climate change shall be evaluated by analyzing direct impacts on migration, tourism and energy markets together with indirect impacts on the economic system. CIRCE will moreover investigate the consequences on agriculture, forests and ecosystems, human health and air quality. The variability of extreme events in the future scenario and their impacts will be assessed.

A rigorous common framework, including a set of quantitative indicators developed specifically for the Mediterranean environment will be developed and used in collaboration with regional stakeholders. The results will be incorporated in a decision support system tool and disseminated to the relevant users. Possible adaptation and mitigation strategies will be identified. The integrated results discussed by the project CIRCE will be presented in the first Regional Assessment of Climate Change in the Mediterranean area.

Objectives

The main objectives of CIRCE are to predict and to quantify the physical impacts of climate change in the Mediterranean, and to assess the most influential consequences for the population of the region. The knowledge yielded by the different specialised investigations will then be linked in an integrated inter-disciplinary approach designed to study the total effect of climate change. CIRCE will integrate cutting-edge scientific research with the needs of end-users and communities. Thus, CIRCE will be able to quantify the impact of global warming on Mediterranean climate variables, whilst also taking into account the regional social, economic and policy aspects of the process. In this way, CIRCE will make a powerful contribution to the definition and evaluation of adaptation and mitigation strategies.

Recent observed changes in climate variables will be documented. Detectable trends and variability will be identified and described, and then compared with a series of possible explanations. An optimal mix of

plausible forcing factors will be derived as the best explanatory interpretation of ongoing changes. In this way, a comprehensive set of data describing the physical impacts of climate change will be developed, and then used to assess the consequences of climate change for human society and ecosystems. CIRCE will analyse a number of climate parameters including: temperature, precipitation, atmospheric humidity, wind, waves, sea-level rise, surface radiative fluxes, balance between evaporation-precipitation, saline output to the Atlantic, water vapour export, frequency and distribution of extreme events, nutrient load into the sea, and sensitivity to water stress. CIRCE will build on the extensive modelling experience already available, but it will develop specific modelling scenarios for the Mediterranean, in terms of resolution, process and feedback inclusions, understanding and specific diagnostic studies for the Mediterranean area.

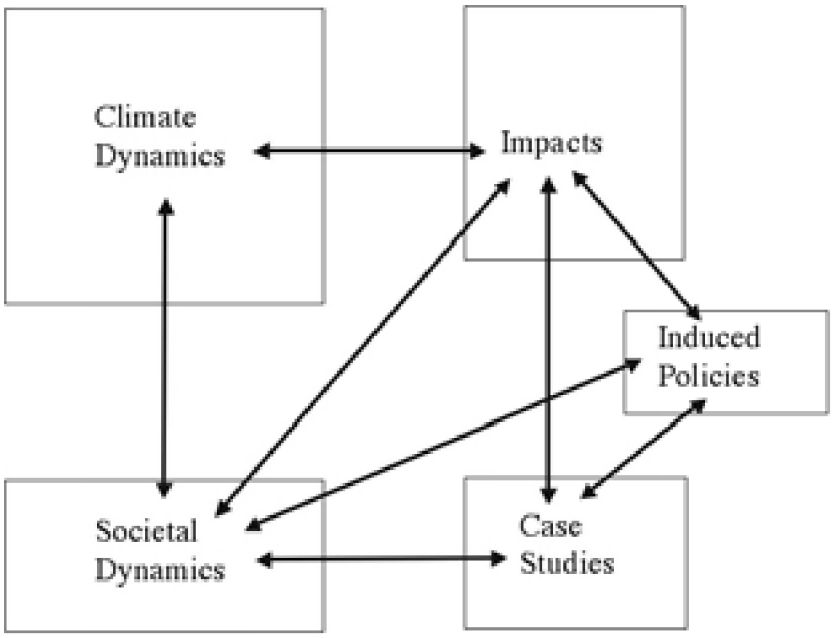
The impacts of climate change will be analysed and evaluated in their oceanographic, meteorological, ecological, economic and societal dimensions. Information will be provided in terms of economically meaningful variables such as productivity changes, variation of resource stocks, shifts in technology and demand patterns. Economic consequences for agriculture will be evaluated through estimation of agricultural productivity, management and profit. Similarly, impacts on forestry and on biodiversity will be investigated. CIRCE will focus particularly on the direct economic impacts for four crucial sectors for the Mediterranean region: health, tourism, energy demand, and human migration. The project will provide the advances required to meet policy needs in these sectors. To do that CIRCE aims to build a new vision of the interactions between climate factors and socio economic evolutions trying to overcome two classical obstacles faced by a number of research projects on climate impacts.

The first obstacle is often the imbalance between physical and natural science and social sciences. In Circe this imbalance has been corrected and social sciences are a strong component of the project. CIRCE brings together the natural sciences community and social community in a new integrated and comprehensive way.

The second obstacle is linked to the first, a “climate all vision of society” that is to put climate as the major constraint of human behaviour to understand adaptation. This bias is sometimes necessary for the needs of modelling but then produces irrelevant elements of analysis for policy making. A more realistic approach is needed to match stakeholders and policy maker’s demands.

Most climate impact assessments so far have focussed on a causal chain from climate change to economic and social impacts, adaptation policies being the direct responses to climate impacts.

CIRCE analyse climate impacts as the “joint product” of climate change and socio economic dynamics/ human behaviour which are most of the time independent of climate change. In this non linear approach, impacts of climate change are analysed with reference to specific socio economic scenarios, with particular attention to relevant sector and policies which can actually emphasize or reduce effect of climate change. On the other side responses strategies are not pure “adaptation” responses to climate change but a mix of long trends evolutions, progressive reorientation of sectoral policies which can also have positive or adverse effects on resilience or vulnerability to climate change. CIRCE makes a strong point in producing relevant research for the actors of the region. For that reason it is essential to provide assessments that can be integrated in practical decision making, therefore this more comprehensive method is necessary and more able to represent the reality as many impacts – on health, tourism, migration, etc. – cannot be reliably expressed as a function of climate change alone. The end result of the political economy of economic and social policies of the region will not be “climate first” but “development first” for a number of years to come. Keeping that framework in mind give the best chance to reach relevant actors and improve relevant strategies. That is the underlying concept of the CIRCE project



The CIRCE concept

To integrate the assessment of cross-sectoral impacts of climate change, for selected case-study regions, CIRCE will adopt a risk-based approach based on the conclusions developed in the specialised investigations. A rigorous common framework, including a set of quantitative indicators tailored specifically for the Mediterranean environment will be developed and used in collaboration with regional stakeholders and policy makers. The results will be incorporated in a decision support system tool and disseminated to the appropriate end-users. Likely adaptation and mitigation strategies will be identified using bottom-up (via regional workshops) and top-down approaches. The case-study areas will include North African, Middle Eastern and European locations.

The end products of CIRCE will be published in the open scientific literature and summarised in less technical terms in the Final Report - Regional Assessment of Climate Change in the Mediterranean (RACCM). The Report will be organized in three parts. The first part will be a synthesis report of the entire RACCM. The second part will contain the results from the thematic assessments described in the section on Research Lines (RLs). The third part will contain the results from the test-cases for selected regions and areas, and will show how the general results obtained in the RLs can be applied and integrated to real cases.

The RACCM will be produced in close consultation with stakeholders. The startup meeting of the project will be held jointly with carefully-selected stakeholders, who will contribute to better-defined and more relevant priorities and issues. Thus CIRCE will develop an understanding of the different needs of the European Region, and enhance and develop analysis methods, models and indicators. Under the project, the interactive effects of climate change will become better understood, and predictions of risk and the prior assessment of policy effects will be improved. The project will thus provide cutting-edge scientific results that will help establish:

- The methodology for including stakeholders needs and questions in the scientific discourse,
- The information on possible climate changes for the 21st century in the Mediterranean Area,
- A framework for the preparation, reviewing and dissemination of the Regional Assessment Report,
- A set of policy-specific indicators and assessments that can be used to:
  - Inform environmental reporting,
  - Enable international comparisons in terms of quality of life, environment, economy and health,

- Define a set of objectives and targets, and to monitor trends and progress towards these targets.

Partners

N°	Organisation	Country
1.	Istituto Nazionale di Geofisica e Vulcanologia	Italy
2.	Consejo Superior de Investigaciones Científicas, Instituto de Ciencias de la Tierra "Jaume Almera“	Spain
3.	Fundación Centro de Estudios Ambientales del Mediterráneo	Spain
4.	CLU Ltd	Italy
5.	Danish Meteorological Institute	Denmark
6.	University of Crete, Environmental Chemical Processes Laboratory	Greece
7.	Ente per le Nuove Tecnologie, l'Energia e l'Ambiente	Italy
8.	Fondazione ENI Enrico Mattei	Italy
9.	Universidad Complutense de Madrid	Spain
10.	Institute for Coastal Research GKSS	Germany
11.	Institute of Accelerating Systems and Applications	Australia
12.	Consiglio Nazionale delle Ricerche	Italy
13.	Potsdam Institut für Klimafolgenforschung	Germany
14.	Centre de Coopération Internationale en Recherche Agronomique pour le Développement	France
15.	Centre National de la Recherche Scientifique	France
16.	Universidad Politecnica de Madrid	Spain
17.	World Health Organisation, Regional Office for Europe	
18.	Institut du Développement durable et des relations Internationales	France
19.	Natural Environment Research Council	UK
20.	Max-Planck Society for the Advancement of Science	Germany
21.	National Observatory of Athens	Greece
22.	National Institute of Marine Sciences and Technologies	Tunisia
23.	University of Haifa	Israel
24.	University of Natural Resources and Applied Life Sciences	Austria
25.	European Commission Joint Research Centre	Italy
26.	Parc Cientific de Barcelona	Spain
27.	ASL RME, Department of Epidemiology	Italy
28.	Météo France	France
29.	MET Office	UK
30.	Università degli Studi della Tuscia	Italy
31.	Stockholm Environment Institute, University of York	UK
32.	University of Birmingham	UK
33.	Universidad del Pais Vasco	Spain
34.	Universitat Politècnica de Catalunya	Spaine
35.	Nacional and Kapodistrian University of Athens	Greece
36.	Tel-Aviv University	Israel

37.	Universidad de Alcala	Spain
38.	Zadigroma SRL	Italy
39.	University of East Anglia	UK
40.	Universitat de les Illes Balears	Spain
41.	Instituto de Ciência Aplicada e Tecnologia, Universidade de Lisboa	Portugal
42.	Universität Hamburg	Germany
43.	University of Aegean	Greece
44.	Centre for Environment and Development for Arab Region and Europe	Egypt
45.	University of Bern	Switzerland
46.	Università degli Studi l'Aquila	Italy
47.	Freie Universität Berlin	Germany
48.	University of Lecce	Italy
49.	European Climate Forum	Germany
50.	Vrije Universiteit Amsterdam	Netherlands
51.	The Hebrew University of Jerusalem	Israel
52.	Università di Santiago di Compostela	Spain
53.	Centro Euro-Mediterraneo per i Cambiamenti Climatici	Italy
54.	Institute Pasteur de Tunis	Tunisia
55.	Association pour la Recherche sur le Climat et l'Environnement	Algeria
56.	International Center for Agricultural Research in the Dry Areas	Syria
57.	Hellenic Center for Marine Research	Greece
58.	University of Southampton	UK
59.	Ben-Gurion University of the Negev	Israel
60.	Paul Scherrer Institut	Switzerland
61.	Institute of Communication and Computer Systems	Greece
62.	Instituto Nazionale di Oceanografia e Geofisica Sperimentale	Italy
63.	Alma Mater Studiorum, Università di Bologna	Italy
64.	Medias – France	France

CLARIS – A Europe-South America Network for Climate Change Assessment and Impact Studies

CT-001454

http://www.claris-eu.org

Instrument:	Specific Support Action (SSA)	Contract starting date: 01/07/2004
Total project cost:	1.118.479 €	Duration: 36 months
EC Contribution:	499.998 €	
Organisation:	Centre National de la Recherche Scientifique	
	Paris - France	
Co-ordinator:	Jean-Philippe Boulanger (jpb@lodyc.jussieu.fr)	
EC Officer:	Georgios Amanatidis (georgios.amanatidis@ec.europa.eu)	

Abstract

The CLARIS project aims at strengthening collaborations between Europe and South America to develop common research strategies on climate change and impact issues in the subtropical region of South America through a multi-scale integrated approach (continental-regional-local). First, CLARIS will favour the transfer of knowledge and expertise on Earth System Models, their different components and coupling procedures. Moreover, it will offer an easy access to large scale climate data sets and climate simulations mainly obtained in the context of past, present or future European projects. Second, CLARIS will provide to European and South American scientists involved in regional climate modelling in South America the framework to compare and exchange their methodologies (dynamical and statistical). Complementary to that modelling aspect, it is a major goal for CLARIS to initiate the setting-up of a high-quality daily climate database for temperature and precipitation. The European expertise acquired through the European Climate Assessment Project will be essential to meet this objective. The resulting database will be of great value to validate and evaluate the model skills in simulating climate trends and extreme event frequency changes. Finally, at a local scale, CLARIS aims at promoting three pilot actions designed to integrate multi-disciplinary components and to demonstrate the potential and feasibility of using climate information in the decision-making process in three major areas: agriculture, health and pollution. The CLARIS framework will facilitate the participation of European researchers to IAI (Inter American Institute) projects and the submission of new common research proposals. Moreover, its opening towards stakeholders (e.g. agriculture, reinsurance, hydroelectricity), associated to the project through an expert group, will promote future initiatives on climate impact analysis, thus, contributing to related sustainable development strategies.

Partners

N°	Organisation	Country
1.	Centre National de la Recherche Scientifique	France
2.	Centre de Coopération Internationale en Recherche Agronomique pour le Développement	France
3.	Consejo Nacional de Investigaciones Cientificas y Técnicas	Argentina
4.	Universidad de Buenos Aires	Argentina
5.	Instituto Nacional de Pesquisas Espaciais	Brazil
6.	Universidade de Sao Paulo	Brazil
7.	Istituto Nazionale di Geofisica e Vulcanologia	Italy
8.	Consiglio per la Ricerca e Sperimentazione in Agricoltura	Italy
9.	Universidad de Castilla La Mancha	Spain

10.	Universidad de la Republica	Uruguay
11.	Plant Research International B. V.	Netherlands
12.	Universidad de Chile	Chile
13.	Institut de Recherche pour le Développement	France
14.	Max Planck Society for the Advancement of Science	Germany

CLAVIER – Climate Change and Variability: Impact on Central and Eastern Europe

CT - 037013

http://www.clavier-eu.org/clavier/

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 01/09/2006
Total project cost:	2.855.080 €	Duration: 36 months
EC Contribution:	2.020.990 €	
Organisation:	Max-Planck-Gesellschaft zur Förderung der Wissenschaften e.V Hamburg - Germany	
Co-ordinator:	Daniela Jacob (jacob@dkrz.de)	
EC Officer:	Georgios Amanatidis (georgios.amanatidis@ec.europa.eu)	

Abstract

Observational records show that the global climate is changing and ongoing changes are also visible in Central Eastern Europe. About 64% of all catastrophic events in Europe since 1980 can directly be attributed to weather and climate extremes. Climate change projections show even an increasing likelihood of extremes. Certainly negative impacts of climate change will involve significant economic losses in several regions of Europe, while others may bring health or welfare problems somewhere else. Within CLAVIER three representative Central and Eastern European Countries (CEEC) will be studied in detail: Hungary, Romania, and Bulgaria. Researches from 6 countries and different disciplines, will identify linkages between climate change and its impact on weather patterns with consequences on air pollution, extreme events, and on water resources. Furthermore, an evaluation of the economic impact on agriculture, tourism, energy supply and the public sector will be conducted. This is of increasing importance for CEEC, which are currently facing a rapid economic development, but also for the European Union as e.g. Romania's and Bulgaria's high vulnerability from extreme events such as floods will impact not only the respective economic goals for joining the EU but also the EU solidarity fund. CLAVIER will focus on ongoing and future climate changes in Central and Eastern European Countries using measurements and existing regional scenarios to determine possible developments of the climate and to address related uncertainty. In addition, climate projections with very high detail will be carried out for CEEC to fulfill the need for a large amount of detail in time and space which is inherent in local and regional impact assessment. CLAVIER will establish a large data base, tools and methodologies, which contribute to reasonable planning for a successful development of society and economy in Central and Eastern European countries under climate change conditions.

Objectives

The nations in central and Eastern Europe (CEE) face triple challenges of the ongoing economic and political transition, continuing vulnerability to environmental hazards, and longer term impacts of global climate change. Most but not all nations of this region are members of the North Atlantic Treaty Organization (NATO) and the European Union (EU) or are on the way of accession. Domestic development of market economies and democratic institutions is taking place in the context of complying the rules of these international bodies. At the same time, vulnerability to natural and human environmental hazards knows no boundaries in time and space. Examples include a series of extreme floods hitting the Tisza basin in the period of 1998-2001, the catastrophic dam failure such as the Baia Mare gold mine dam failure in Romania which resulted in cyanide pollution of the Lapus-Somes-Tisza-Danube Rivers (January 2000; Relief Web, 2000), a number of other flood events such as the Labe/Elbe and Danube Rivers (August 2002), a sequence of mostly flash flood disasters throughout Romania in 2005, plus the ongoing menace of air pollution, drought, deforestation, land slides and soil erosion. In addition to these challenges, long term global climate change may offer opportunities as well as threats to environment, resources, and national well-being amidst the on-going stresses of transition and capricious environmental forces (most of it citation from Climate change in Central and Eastern Europe: Introduction, GeoJournal 57, 2002: 113-115).

It is urgently needed to address the ongoing and future climatic changes and possible consequences in Central and Eastern European Countries. Therefore CLAVIER addresses the following three scientific goals:

- Investigation of ongoing and future climate changes and their associated uncertainties in Central and Eastern European Countries (CEEC);
- Analyses of possible impact of climate changes in CEEC on weather pattern and extremes, air pollution, human health, natural ecosystems, forestry, agriculture and infrastructure as well as water resources;
- Evaluation of the economic impacts of climate changes on CEEC economies, concentrating on four economic sectors, which are agriculture, tourism, energy supply and the public sector.

To meet the project goals CLAVIER is split into a number of scientific objectives:

Contribution to scientific goal 1

The objective is to provide reliable climate evolution scenarios of the first half period of the 21st century for impact researches of the project. The issue of climate change uncertainties is particularly addressed. This objective will be achieved through work according to the tasks 1.1 to 1.4 in WP1. The tasks include assembling and assessment of existing climate scenarios for the region, the validation and improvement of the regional climate models, the performance of regional climate change simulations and the detailed assessment of the associated uncertainties.

Contribution to scientific goals 1 and 2 (interfacing objective)

The major aim of WP2 is to establish and optimize the interfaces between regional climate models from WP1 and models or studies focusing on impacts of climate and climate change in Central and Eastern Europe (CEE) (WPs 3 and 4). This objective will strongly link the climate change modelling community with the needs for impact assessment.

Contribution to scientific goal 2

To reach the 2nd scientific goal of CLAVIER several objectives will be addressed which stretch through workpackages 3a to 3d. Here the analysis of the impact of climate change on specific areas is carried out, in close cooperation with WP1 and through the interface of WP2. The connected objectives include a complete analysis of weather regimes for the region of Central and Eastern Europe for the present-day climate, an investigation of future changes of weather regimes and their implication to air pollution levels, the assessment of the impact of climate change on extreme events, the dependence of simulated extreme events on model biases and horizontal resolution, as well as the assessment of the potential impacts of climate change on forestry and water management, soil and agriculture on specific hydrological basins which could be affected by extreme events. WP3c is aiming at the production of future hydrological and agricultural scenarios based on the output of regional climate models. The analysis of the simulation results received by hydrological models serves as direct or indirect input for water management Decision Support Systems. Finally the primary aim of WP3d is to develop and apply a methodology, which provides scientifically credible information for the decision makers about the various impacts of climate change on regional and local levels.

Contribution to scientific goal 3

Finally the knowledge gained through the achievement of the scientific goals 1 and 2 and within all workpackages builds the basis for the work in WP4. The objective of WP4 is to evaluate economic impacts of Climate Change on CEEC economies, as studied in WP 1-3, while concentrating on four economic sectors of main concern. A quick study of vulnerabilities of the study regions (in a socio-economic vulnerability approach), that exist prior to and independently of hazards related to Climate Change and that put socio-economic structures at center stage are an important prerequisite and starting point of such analyses.

Partners

N°	Organisation	Country
1.	Max Planck Gesellschaft zur Foerderung der Wissenschaften E.V.	Germany
2.	Orszagos Meteorologiai Szolgalat	Hungary
3.	Karl-Franzens-Universitaet Graz.	Austria
4.	Centre National de la Recherche Scientifique	France
5.	Joanneum Research Forschungsgesellschaft Gmbh.	Austria
6.	Vituki	Hungary
7.	Budapesti Muszaki Es Gazdasagtudomanyi Egyetem	Hungary
8.	Env-In-Cent Kornyezetvedelmi Tanacsado Kft	Hungary
9.	National Institute of Meteorology and Hydrology of the Bulgarian Academy of Sciences	Bulgaria
10.	University of National and World Economy	Bulgaria
11.	Institutul National de Hidrologie si Gospodarire a Apelor	Romania
12.	Universitatea Babes Bolyai	Romania
13.	Institute of Geography of the Romanian Academy	Romania

ENSEMBLES – Ensemble based Predictions of Climate Changes and their Impacts

CT - 505539

http://www.ensembles-eu.org

Instrument:	Integrated Project (IP)	Contract starting date: 01/09/2004
Project total cost:	22,561,908 €	Duration: 60 months
EC contribution:	15.000.000 €	
Organisation:	Met Office, Hadley Center	
	Exeter - UK	
Co-ordinator:	David Griggs (dave.griggs@metoffice.gov.uk)	
EC Officer:	Georgios Amanatidis (georgios.amanatidis@ec.europa.eu)	

Abstract

Prediction of both natural climate variability and human impact on climate is inherently probabilistic, due to uncertainties in forecast initial conditions, representation of key processes within models, and climatic forcing factors. Hence, reliable estimates of climatic risk can only be made through ensemble integrations of Earth - System Models in which these uncertainties are explicitly incorporated. For the first time ever, a common ensemble forecast system will be developed for use across a range of timescales (seasonal, decadal, and longer) and spatial scales (global, regional, and local). This model system will be used to construct integrated scenarios of future climate change, including both non-intervention and stabilisation scenarios. This will provide a basis for quantitative risk assessment of climate change and climate variability, with emphasis on changes in extremes, including changes in storminess and precipitation, and the severity and frequency of drought, and the effects of "surprises", such as the shutdown of the thermohaline circulation. Most importantly, the model system will be extensively validated. Hind casts made by the model system for the 20th century will be compared against quality-controlled, high-resolution gridded datasets for Europe. Probability forecasts made with the model system on the seasonal and decadal timescales will also be validated against existing data. The exploitation of the results will be maximised by linking the outputs of the ensemble prediction system to a wide range of applications. In turn, feedbacks from these impact areas back to the climate system will also be addressed. Thus ENSEMBLES will have a structuring effect on European research by bringing together an unprecedented spectrum of world-leading expertise. This expertise will be mobilised to maintain and extend European pre-eminence in the provision of policy-relevant information on climate and climate change and its interactions with society.

Objectives

The overall goal of ENSEMBLES is to maintain and extend European pre-eminence in the provision of policy relevant information on climate and climate change and its interactions with society. ENSEMBLES will achieve this by:

- Developing an ensemble prediction system based on the principal state-of-the-art, high resolution, global and regional Earth System models developed in Europe, validated against quality controlled, high resolution gridded datasets for Europe, to produce for the first time, an objective probabilistic estimate of uncertainty in future climate at the seasonal to decadal and longer timescales;
- Quantifying and reducing the uncertainty in the representation of physical, chemical, biological and human-related feedbacks in the Earth System (including water resource, land use, and air quality issues, and carbon cycle feedbacks);
- Maximising the exploitation of the results by linking the outputs of the ensemble prediction system to a range of applications, including agriculture, health, food security, energy, water resources, insurance and weather risk management.

To meet the Project Goal the project is split into a number of scientific and technological objectives with a number of operational goals. The work in the project is conducted through 10 closely connected Research Themes (RTs), each of which has Major Milestones (MMs) which are the means of assessing progress towards the project objectives and operational goals.

ENSEMBLES will be a major step forward in climate and climate change science. Over the next five years the major progress in climate science is expected mainly to take place in six areas:

- The production of probabilistic predictions from seasonal to decadal and longer timescales through the use of ensembles
- The integration of additional processes in climate models to produce true Earth System models
- Higher resolution climate models to provide more regionally detailed climate predictions and better information on extreme events
- Reduction of uncertainty in climate predictions through increased understanding of climate processes and feedbacks and through evaluation and validation of models and techniques
- The increased application of climate predictions by a growing and increasingly diverse user community.
- The increased availability of scientific knowledge within the scientific community and to stakeholders, policymakers and the public.

ENSEMBLES will make major scientific contributions in all these areas and, most importantly, will ensure that these six strands are all taken forward in an integrated and co-ordinated way. This will be possible because ENSEMBLES encases each of these elements within a planned and actively managed programme.

All of the major groups in Europe, who would individually be involved in the six elements, are participants in the project. In numerous ways ENSEMBLES will extend the state of the art in the prediction of climate change and its impacts at seasonal to decadal and longer timescales. Foremost in this will be the development of the first global, high resolution, fully comprehensive, ensemble based, modelling system for the prediction of climate change and its impacts. This will confirm and maintain Europe's position as the world leader in climate change prediction. The integrated system to be developed for this project will deal with issues related to:

- natural variability of climate in the context of a changing chemical environment,
- non-linearity in the response both at the global and regional scale,
- quantitative estimates of uncertainty guided by observations, relevant to policy makers.

This will require:

- Inclusion of the non-linear feedbacks between climate and the impacts of climate change (e.g. water resource management, changes in land use, energy needs). This requires a more integrated approach to the assessment of the impacts of climate change than has hitherto been undertaken within a sophisticated, state-of-the-art earth system model;
- Quantifying uncertainty in individual components of the earth system and in the interaction between individual components, through the use of (i) different model constructions and (ii) ensemble-based "perturbed physics" versions of each model. The incorporation of "perturbed physics" techniques within the modelling framework allows for an exploration of uncertainties associated with the representation of individual processes (particularly relevant for those which cannot be resolved at the model grid-scale), and together with the multi-model approach will provide a much more complete estimate of uncertainty than has thus far been possible;
- Construction of an ensemble of earth system models to provide estimates of climate and other environmental change for the next 10 to 100 years. Model diversity is a key essential for providing a level of confidence to European predictions of climate change;
- Derivation of an objective method of deriving probability distributions using ensembles of models, weighted according to the ability of an individual model to represent key aspects of observed climate. Evaluation of model skill is an essential part of the process, which will involve the development of new methodologies for diagnosing key processes and phenomena in models and for confronting them with satellite and in situ observations;
- Using the probability distributions of the impacts of climate change from the integrated system (including water management, land use, air quality, carbon management and energy use) to determine the social and economic effects and provide a risk assessment for selected emissions scenarios (policies);
- Developing a comprehensive approach to the validation of climate change ensembles and the impacts assessments, which includes the exploitation of seasonal to decadal predictability studies, thereby providing for the first time a sound, quantitative measure of confidence in future scenarios.

Thus, ENSEMBLES will begin to move the state of the art in climate prediction from a small number of deterministic predictions with no quantitative assessment of relative confidence towards an end-to-end multi-model ensemble prediction system (quantitatively validated against recent past climates and against the ability to predict future climate at the seasonal to decadal timescales) which would be able to provide

probabilistic estimates of future climate change and its impacts on key sectors, at the European and global scales.

Partners

N°	Organisation	Country
1.	Met Office, Hadley Center	UK
2.	Météo France, Centre National de Recherches Météorologiques	France
3.	Centre National de la Recherche Scientifique	France
4.	Danmarks Meteorologiske Institut.	Denmark
5.	European Centre for Medium-Range Weather Forecasts	UK
6.	International Institute for Applied Systems Analysis	Austria
7.	Istituto Nazionale di Geofisica e Vulcanologia	Italy
8.	Koninklijk Nederlands Meteorologisch Instituut	Netherlands
9.	University of Bristol	UK
10.	Max Planck Gesellschaft zur Foerderung der Wissenschaften E.V.	Germany
11.	National Observatory of Athens	Greece
12.	Sveriges Meteorologiska och Hydrologiska Institut	Sweden
13.	University of East Anglia	UK
14.	Universite de Fribourg	Switzerland
15.	Universität Hamburg	Germany
16.	University of Reading	UK
17.	Agenzia Regionale per la Prevenzione e l'Ambiente dell'Emilia-Romagna Servizio Meteorologico Regionale'	Italy
18.	Aristotle University of Thessaloniki	Greece
19.	Bureau of Meteorology Research Centre	Australia
20.	Centre Européen pour la Recherche et la Formation Avancée en Calcul	France
21.	Cesky Hydrometeorologicky Ustav	Czech Rep.
22.	Cicero Senter for Klimaforskning	Norway
23.	Climpact	France
24.	Consiglio Nazionale delle Ricerche	Italy
25.	Univerzita Karlova V Praze	Czech Rep.
26.	Danmarks Jordbrugsforskning	Denmark
27.	Universita degli Studi Di Firenze	Italy
28.	Deutscher Wetterdienst	Germany
29.	Electricité de France	France
30.	Ecole Normale Supérieure	France
31.	Eidgenoessische Technische Hochschule Zuerich	Switzerland
32.	Fondazione Eni Enrico Mattei	Italy
33.	Fundación Para la Investigación del Clima	Spain
34.	Ilmatieteen Laitos	Finland
35.	Fachhochschule für Technik Stuttgart	Germany
36.	Freie Universitaet Berlin	Germany

37.	Gkss Forschungszentrum Geesthacht Gmbh	Germany
38.	Ustav Fyziky Atmosfery Av Cr	Czech Rep.
39.	The Abdus Salam International Centre for Theoretical Physics	Italy
40.	Institut Für Meereskunde an der Universitaet	Germany
41.	Instituto Nacional de Meteorologia	Spain
42.	The Trustees of Columbia University in New York City	USA
43.	Institut Universitaire Kurt Boesch	Switzerland
44.	Universität Stuttgart	Germany
45.	Commission of the European Communities - Joint Research Centre	Belgium
46.	London School of Economics and Political Science	UK
47.	London School of Hygiene and Tropical Medicine	UK
48.	Meteorologisk Institutt	Norway
49.	Meteoschweiz	Switzerland
50.	Nansen Environmental and Remote Sensing Center	Norway
51.	Institutul National de Hidrologie si Gospodarire a Apelor Bucuresti	Romania
52.	Administratia Nationala de Meteorologie	Romania
53.	Research Centre for Agricultural and Forest Environment Polish Academy of Sciences	Poland
54.	Potsdam-Institut für Klimafolgenforschung E.V.	Germany
55.	Rijksinstituut voor Volksgezondheid en Milieu	Netherlands
56.	Société de Mathématiques appliquées et de Sciences Humaines	France
57.	Suomen Ymparistokeskus	Finland
58.	Universidad de Cantabria	Spain
59.	Université Catholique de Louvain	Belgium
60.	Universidad de Castilla la Mancha	Spain
61.	Universitetet I Oslo	Norway
62.	Lunds Universitet	Sweden
63.	Universität Kassel	Germany
64.	University of Liverpool	UK
65.	University of Oxford	UK
66.	Université Joseph Fourier Grenoble 1	France
67.	Met Eireann	Ireland

WATCH – Water and Global Change

CT - 036946

Instrument:	Integrated Project (STREP)	Contract starting date: 01/02/2007
Total project cost:	13.897.779€	Duration: 48 months
EC Contribution:	9.980.096€	
Organisation:	Natural Environment Research Council	
	UK, Swindon	
Co-ordinator:	Richard Harding (rjh@ceh.ac.uk)	
EC Officer:	Marta Moren Abat (marta.moren-abat@ec.europa.eu)	

Abstract

The Integrated Project (WATCH) which will bring together the hydrological, water resources and climate communities to analyse, quantify and predict the components of the current and future global water cycles and related water resources states, evaluate their uncertainties and clarify the overall vulnerability of global water resources related to the main societal and economic sectors.

WATCH project will:

- analyse and describe the current global water cycle, especially causal chains leading to observable changes in extremes (droughts and floods),
- evaluate how the global water cycle and its extremes respond to future drivers of global change (including greenhouse gas release and land cover change),
- evaluate feedbacks in the coupled system as they affect the global water cycle,
- evaluate the uncertainties in the predictions of coupled climate-hydrological- land-use models using a combination of model ensembles and observations,
- develop an enhanced (modelling) framework to assess the future vulnerability of water as a resource, and in relation to water/climate related vulnerabilities and risks of the major water related sectors, such as agriculture, nature and utilities (energy, industry and drinking water sector),
- provide comprehensive quantitative and qualitative assessments and predictions of the vulnerability of the water resources and water-/climate-related vulnerabilities and risks for the 21st century,
- collaborate intensively with the key leading research groups on water cycle and water resources in USA and Japan,
- collaborate intensively in dissemination of its scientific results with major research programmes worldwide (WCRP, IGBP),
- collaborate intensively in dissemination of its practical and applied results with major water resources and water management platforms and professional organisations worldwide (WWC, IWA) and at a scale of 5 selected river basins in Europe.

Objectives

WATCH will develop a new consolidated dataset, and a new, highly consistent modelling framework for water resources, hydrology and climate studies. This framework, however, will *not* be attempting to fully link individual model segments into a fully coupled modelling system. Instead, WATCH analyses, data consolidation and modelling efforts will focus on building a new generation of interfaces between water resources, hydrological and climate models, attempting a maximum possible consistency in spatial and time scales involved, and in related process descriptions. This will comprise one of the main innovative components of WATCH. A key component of WATCH will be the attribution of changes in rainfall and the hydrological cycle at both global and regional levels to external drivers, both natural and anthropogenic, and internal variability.

WATCH will consolidate global datasets available from the hydrological (river flow, evaporation, groundwater, river regulation, irrigation use) and climate (CRU, ERA40, ELDAS, GSWP) communities at a

scale of approximately 50 km, with regional datasets down to 10 km. These datasets will be used for the assessment of the water cycle in the 20th century. Compatible datasets from the climate modelling (and scenario) communities (such as those from the PRUDENCE consortia and ENSEMBLES IP) will also be incorporated into this data framework. Finally, water use reconstructions and scenarios will be produced and also be incorporated into this data framework, so that:

- the same modelling systems, developed and validated on the 20th century datasets, can be run into the future;
- consistent downscaling algorithms are used;
- the uncertainties in future simulations can be assessed (using the ensembles of climate and associated hydrology model simulations for the 20th century and the consolidated global and regional databases).

A number of hydrological models with a wide range of processes and influences (sub-grid and global, physical and human) and data that describe the past and future water use (irrigation etc.) will be incorporated in the modelling framework.

By bringing together hydrologists, water cycle experts and climate modellers, WATCH will develop new methods to obtain the relevant information (means, extremes and uncertainties) from global datasets and climate model outputs. The end product (threats to future water resources) will drive the combination of this new hydro-climatological approach of assessing floods and droughts in the 21st century with assessments of human and ecological water demands.

Partners

N°	Organisation	Country
1.	Natural Environment Research Council	UK
2.	Wageningen Universiteit	Netherlands
3.	Vereniging voor Christelijk Hoger Onderwijs Wetenschappelijk Onderzoek en Patientenzorg	Netherlands
4.	Danmarks Meteorologiske Institut	Denmark
5.	Centre National du Machinisme Agricole, du Génie Rural, des Eaux et des Forets	France
6.	Johann Wolfgang Goethe Universitaet Frankfurt Am Main	Germany
7.	The Abdus Salam International Centre For Theoretical Physics	Italy
8.	Met Office	UK
9.	Max Planck Gesellschaft Zur Foerderung Der Wissenschaften E.V	Germany
10.	Zakladu Badan Srodowiska Rolniczego I Lesnego - Polskiej Akadeemii Nauk	Poland
11.	Potsdam Institut fuer Klimafolgenforschung	Germany
12.	Technical University of Crete	Greece
13.	Universitetet I Oslo	Norway
14.	Universitat de Valencia	Spain
15.	The Chancellor, Masters and Scholars of the University of Oxford	UK
16.	International Institute for Applied System Analysis - Iiasa	Austria
17.	Centre National de la Recherche Scientifique	France
18.	Fundacao da Faculdade de Ciencias da Universidade de Lisboa	Portugal
19.	Univerzita Komenskeho V Bratislave.	Slovakia
20.	Consejo Superior De Investigaciones Cientificas	Spain
21.	Universitaet Kassel	Germany
22.	Kiwa Nv	Netherlands
23.	Observatoire De Paris	France

24.	Vyzkumny Ustav Vodohospodarsky T.G. Masaryka	Czech Rep
25.	Noregs Vassdrags- Og Energidirektorat	Norway

Adaptation and Mitigation Strategies

ADAM – Adaptation and Mitigation Strategies: Supporting European Climate Policy

CT - 018476

http://www.adamproject.eu/

Instrument:	Integrated Project (IP)	Contract starting date: 01/03/2006
Total project cost:	18.197.000 €	Duration: 36 months
EC Contribution:	12.905.000 €	
Organisation:	University of East Anglia	
	Norwich - UK	
Co-ordinator:	Michael Hulme (m.hulme@uea.ac.uk)	
EC Officer:	Wolfram Schrimpf (wolfram.schrimpf@ec.europa.eu)	

Abstract

The ADAM project will lead to a better understanding of the synergies, trade-offs and conflicts that exist between adaptation and mitigation policies at multiple scales. Crucially, ADAM will support EU policy development in the next stage of the development of the Kyoto Protocol, in particular negotiations around a post-2012 global climate policy regime, and will inform the emergence of new adaptation strategies for Europe. The main impact of the ADAM project will be to improve the quality and relevance of scientific and stakeholder contributions to the development and evaluation of climate change policy options within the European Commission. This will help the Commission to deliver on its current medium-term climate policy objectives and help inform its development of a longer-term climate strategy.

With the entry into force of the Kyoto Protocol on 16 February 2005, the world embarks on a new phase in its relationship with global climate change. The first phase –which started with the discoveries of Jean-Baptiste Joseph Fourier, John Tyndall and Svente Arrhenius in the nineteenth century and which continues through to the present-day with the preparation of the IPCC Fourth Assessment Report - might be regarded as the *scientific phase*. The second phase – which commenced with the Toronto Conference on the Changing Atmosphere of June 1988 and which continues today through the annual meetings of the Conference of the Parties to the UN FCCC – might be regarded as the *policy negotiation phase*. The third - and new phase from 16 February 2005 –might be regarded as the *policy implementation phase*. All three dimensions of activity now continue in parallel –research, negotiation and implementation –and therefore the need for adequate and robust connections to be made between these three distinct, but not independent, domains of activity becomes increasingly important.

Global climate change continues to present new challenges for the development of public policy, not least the establishment of a post-2012 global climate governance regime (EC, 2005)[2]. The entry in force of the Kyoto Protocol is a huge landmark for global climate governance, but it in no way lessons the importance, urgency or difficulty of securing a new, more comprehensive, international agreement for the post-2012 period. The unique challenges presented by climate change arise because:

- of the time-scales involved between policy implementation and desired outcome are much longer than in other policy areas;
- many areas of policy planning need simultaneously to be addressed, therefore placing a greater demand on the integration of policy across different realms;
- the opportunities that climate change opens up for technological innovation and comparative economic advantage for first-mover regions, whilst considerable, are not inevitable;
- the truly global nature of the problem requires national or regional policies to be designed within some framework of global strategy.

[2] European Commission (2005) *Winning the battle against global climate change* Communication from the Commission to the Council, the European Parliament, the European Economics and Social Committee and the Committee of the Regions. COM (2005) 35 final. Commission of the European Communities, Brussels, Belgium, February 9 2005.

These challenges are true for all nations, yet are particularly acute for the European Union (EU) which has assumed a leading role in the design of international climate policies. Appropriate European climate change policies therefore need simultaneously to secure long-term climate protection goals, to be integrated across multiple-sectors, to secure economic benefits, and to be designed to resonate with emerging international agreements and geo-political discourses. They must also be acceptable to Europe's citizens and stakeholders, a specific challenge in democratic societies when costs may be incurred now, yet benefits are realised for future decades.

These are challenging objectives. In order to meet them, Europe will need to harness available scientific expertise to identify, illuminate and appraise the available policy options. These options must address the demands a de-stabilised climate will place on protecting citizens and valued ecosystems – i.e., *adaptation* – as well as addressing the necessity to stabilize humankind's perturbation to global climate at a minimum desirable level whilst safeguarding and transforming economic activities –i.e., *mitigation*. The appraisal of these options must recognize the existence of multiple criteria, such as cost-benefit, cost effectiveness, equity, legitimacy, societal support and environmental integrity. Such an appraisal must also identify where policy options can contribute to both objectives –i.e., *adaptation and mitigation* - and where policy trade-offs may emerge.

It is in this territory – the interface between research, negotiation and implementation, in particular providing new insights, tools and process in support of policy appraisal – that the ADAM project will operate.

Objectives

The core objectives proposed by the ADAM (Adaptation and Mitigation) Consortium are therefore:

- To assess the extent to which existing and evolving EU (and world) mitigation and adaptation policies can achieve a tolerable transition (a 'soft landing') to a world with a global climate no warmer than 2°C above pre-industrial levels, and to identify their associated costs and effectiveness, including an assessment of the damages avoided compared to a scenario where climate change continues unchecked to 5°C.
- To develop and appraise a portfolio of longer term strategic policy options that could contribute to addressing identified shortfalls both between existing mitigation policies and the achievement of the EU's 2°C target, and between existing adaptation policy development and implied EU goals and targets for adaptation.
- To develop a novel Policy-options Appraisal Framework and apply it both to existing and evolving policies, and to new, long-term strategic policy options, so as to inform: European and international climate protection strategy in post-2012 Kyoto negotiations, a re-structuring of International Development Assistance, the EU electricity sector and regional spatial planning.)

A mature climate strategy will integrate mitigation and adaptation policies and embed (mainstream) them within other non-climate policy realms, including aspects of technological and institutional innovation and economic development. The ADAM project will lead to a better understanding of the complementarities, trade-offs and distinctions that exist between adaptation and mitigation policies and policy options, in the EU and internationally. In particular, the project will support EU policy development in the context of negotiations around a post-2012 global climate governance regime, and will inform the emergence of new adaptation strategies for Europe. In research on adaptation policy options, special attention will be paid to the role of extreme events as both exposing vulnerability, as a signal for change and as a motor for adaptation.

In terms of policy development, the principal time horizon of the project will be from the present to 2025, while the time horizon for the appraisal of innovative longer-term policy options will be to 2100. The dominant unit of analysis for the project will be the EU and its current 25 member states, but will specifically include global analyses where this clearly affects the interests of EU citizens and states (for example, international emissions trading; development assistance; the dependence of Europe on the climate change policies of other continents, etc.). The ADAM Consortium includes two 3rd Country collaborating partners (in India and China) to ensure that our research is grounded in a global perspective, both benefiting from and informing non-Annex I insights and positions.

Partners

N°	Organisation	Country
1.	University of East Anglia	UK
2.	Potsdam-Institut für Klimafolgenforschung E.V.	Germany
3.	Vrije Universiteit Amsterdam	Netherlands
4.	Center for International Climate and Environmental Research	Norway
5.	Wageningen University Research - Alterra	Netherlands
6.	International Institute for Applied Systems Analysis	Austria
7.	Paul Scherrer Institut	Switzerland
8.	Lunds Universitet	Sweden
9.	International Centre for Integrated Studies, University of Maastricht	Netherlands
10.	Universitat Autònoma de Barcelona	Spain
11.	Research Centre for Agricultural and Environment - Polish Academy of Forest Sciences	Poland
12.	National Institute of Public Health and the Environment	Netherlands
13.	Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung E.V.	Germany
14.	University of Cambridge	UK
15.	European Commission Directorate General - Joint Research Centre	Belgium
16.	University of Florence	Italy
17.	Stockholm Environment Institute	Sweden
18.	Centre National de la Recherche Scientifique	France
19.	Corvinus University of Budapest	Hungary
20.	Enerdata Sa	France
21.	Deutsches Institut für Wirtschaftsforschung Berlin e.v.	Germany
22.	Eidgenoessische Technische Hochschule Zürich	Switzerland
23.	Wageningen University	Netherlands
24.	Centre for European Policy Studies	Belgium
25.	The Energy and Resources Institute	India
26.	Regional Center for Temperate East Asia, Chinese Academy of Sciences	China

GAINS-ASIA – Greenhouse Gas and Air Pollution Interactions and Synergies

CT - 022652

http://www.iiasa.ac.at/rains/gains_asia/

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 1/11/2005
Total project cost:	1.161.102 €	Duration: 24 months
EC Contribution:	695.000 €	
Organisation:	International Institute for Applied Systems Analysis	
	Laxenburg, Austria	
Co-ordinator:	Markus Amann (amann@iiasa.ac.at)	
EC Officer:	Wolfram Schrimpf (wolfram.schrimpf@ec.europa.eu)	

Abstract

GAINS-Asia brings together state-of-the-art disciplinary models on air pollution and climate change to assess technical and market based policies that maximize synergies and benefits between these policy areas. GAINS-Asia will integrate policy-relevant information from the BernCC carbon cycle model, the MESSAGE global energy scenario model, the RAINS air pollution integrated assessment model, its extension addressing mitigation potentials for greenhouse gas emissions in Europe, the TM5 hemispheric atmospheric chemistry and transport model, and the implementations of the MARKAL and IPAC energy models for India and China. GAINS-Asia will construct reduced-form representations of these models and combine these functional relationships at the meta-level into a new GAINS-Asia policy assessment framework. This tool will allow interactive analyses of the cost-effectiveness and benefits of a wide range of technical and market based policy options. Optimization approaches will be developed to identify combinations of policies aimed at reducing long-range and hemispheric air pollution alongside with greenhouse gas emissions in order to optimise overall benefits in the medium and long term.

GAINS-Asia will focus on near- to medium term policy measures for European and Asian countries that maximize synergies between areas of air pollution and greenhouse gas mitigation, while embedding them in global strategies that would achieve stabilization of greenhouse gas concentrations in the long-term.

GAINS-Asia will be implemented for 43 European countries including Russia, and for China and India. To enable analyses in a global context, the rest of the world will be represented at an aggregated level. An interactive software will be developed that allows stakeholders to use GAINS-Asia over the Internet for exploring the interactions between air pollution and climate change for their own analyses."

Objectives

- Developing a practical policy anlaysis framework for a comprehensive assessment of the costs and benefits of technological and market-based measures for controlling air pollution and greenhouse gas emissions. The framework will embed the analysis of medium-term emission reduction potentials and costs at national scales into global long-term assessments of greenhouse gas stabilization strategies and explore their site-specific and near-term benefits on a range of air pollution impacts;
- Bringing together, for use in this policy analysis framework, established state-of-the-art models dealing with the most important aspects that are relevant for a joint policy analysis of greenhouse gas mititgation and air polllution control measures and their benefits;
- Deriving "reduced-form" representations of these disciplinary models that work with different time horizons and with different spatial resolutions to represent their response towards emission reductions in the GAINS-Asia policy assessment framework;
- Implementing the assessment framework with real-world data for individual countries for Europe, all provinces in China, all states in India and in aggregated form at the global scale;

– Producing an initial policy assessment of joint air pollution and climate change policies, identifying the scope for cost-effective measures both in the EU and in two important developing countries (China and India) up to 2030.

Partners

N°	Organisation	Country
1.	International Institute for Applied System Analysis – IIASA	Austria
2.	Commission of the European Communities – Joint Research Centre	Belgium
3.	Universitaet Bern	Switzerland
4.	Energy Research Institute	China
5.	The Energy and Resources Institute	India

SERPEC-CC – Sectoral Emission Reduction Potentials and Economic Costs for Climate Change

CT - 044109

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 01/10/2006
Total project cost:	660.550 €	Duration: 24 months
EC Contribution:	416.375 €	
Organisation:	Ecofys B.V.	
	Utrecht - Netherlands	
Co-ordinator:	Ernst Worrell (e.worrell@ecofys.nl)	
EC Officer:	Wolfram Schrimpf (wolfram.schrimpf@ec.europa.eu)	

Abstract

The scope of the proposed work is to identify the least-cost contribution of different sectors and gases for meeting post-2012 EU-25+ (EU25, Romania, Bulgaria and if possible, Croatia and Turkey) quantitative reduction objectives for all greenhouse gases, and to determine a package of cost-effective policies and measures for all sectors and gases towards meeting these goals. The project aims for a comprehensive update of a 2002 exercise undertaken by DG Environment on "Economic Evaluation of Sectoral Emission Reduction Objectives for Climate Change".

The project will cover:

- Techno-economical research on greenhouse gas emission reduction options, and assessment of least-cost policies and measures using the GENESIS database;
- Runs of the PRIMES model (an energy system partial equilibrum model) with inclusion of reduction options for non-CO_2 greenhouse gases and options that are not (or not fully) included in the PRIMES model, which will identify the least-cost allocation of objectives for different sectors and greenhouse gases.

Objectives

- Identify emerging technologies and measures to reduce greenhouse gas emissions;
- Identify the (least-cost) contribution of different sectors and gases for meeting the EU's (EU-25 plus Romania, Bulgaria, and, if possible Croatia and Turkey) future quantitative reduction for greehouse gas emissions;
- Determine a package of cost-effective policies and measures for all sectors and gases towards meeting any targets set in possible post-2012 regimes;
- Identify technical control options and describe them in terms of emission reduction potentials and costs. This assessment will cover the six (groups of) greenhouse gases covered by the Kyoto Protocol: CO2, CH4, N2O, HFCs, PFCs and SF6. The description will be given by country, sector and greenhouse gas;
- Construction of greenhouse gas integrated least-cost curves for each sector and each EU-25 Member State, and for Romania and Bulgaria. (Information on reduction potentials and costs for Croatia and Turkey will be given for energy related CO2 emissions using the PRIMES model, but only indicatively for the other gases, due to the foreseen lack of statistical and other data);
- Preparation of a "package of cost-effective policies and measures" to meet post-2012 climate policy targets;
- Evaluation of the effects of emission trading and how this may influence or even change overall results on the cost-estimates;
- Evaluation of the EU objective to reach the post-2012 climate change policy targets at a system level by using energy system partial equilibrium models that will complement (and furthermore be consistent with) a bottom-up engineering analysis;
- The implications for the European security of energy supply.

Partners

N°	Organisation	Country
1.	Ecofys B.V.	Netherlands
2.	Institute of Communication and Computer Systems	Greece
3.	European Commission – Directorat General Joint Research Centre	Spain

TETRIS – Technology Transfer and Investment Risk in International Emissions Trading

CT – 006624

http://www.zew.de/en/kooperationen/umw/tetris/index.php

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 1/06/2005
Total project cost:	1.010.475 €	Duration: 18 months
EC Contribution:	699.976 €	
Organisation:	Zentrum für Europäische	
	Wirtschaftsforschung GmbH	
	Mannheim - Germany	
Co-ordinator:	Christoph Böhringer (boehringer@zew.de)	
EC Officer:	Wolfram Schrimpf (wolfram.schrimpf@ec.europa.eu)	

Abstract

The TETRIS project aims to explore the economic and industrial impacts as well as the prospects for achieving technology transfer associated with the implementation of the Kyoto flexible mechanisms. Comprehensive risk indicators measuring the risks of investing in climate change mitigation in foreign countries will be developed. These indicators will be incorporated into an economic model of international emissions trading. Using quantitative methods and actual market experience from early transactions involving a broad range of technologies, we will assess the technology transfer and cost savings that can be realized through the Clean Development Mechanism (CDM) and Joint Implementation (JI). Another goal of our project is to examine to what extent GHG emissions trading schemes outside the European Union are compatible with each other and the proposed European emissions trading scheme. Our results will provide valuable insights about technology transfer and risk management in carbon markets for policy makers and the business community.

Objectives

1. The first objective of the TETRIS project is to explore the technology transfer related to the implementation of the Kyoto mechanisms in developing and EU accession countries. Behind most transactions in emissions trading markets, there is a technology transfer or implementation that allows the reduction of GHG emissions. We will analyze how the Kyoto flexible mechanisms can initiate or facilitate technology transfer (TT) to developing or transition countries. Key determinants of TT will be identified from the literature on technology transfer by commercial companies, government agencies, and multinational organizations. Case studies of real projects undertaken under early greenhouse gas trading initiatives (AIJ program, World Bank Prototype Carbon Fund, Senter) will describe the types of technology that have been transferred and the host country benefits. Critical factors such as the crediting period will be explored and illustrated using real data from the case studies. We will analyse the potential for TT in several other large potential CDM host countries such as Brazil and China.
2. The second objective is the incorporation of investment risk into the analysis of ET markets. As mentioned above, the risks of investment in climate change mitigation are substantial, but often ignored in analyses of climate policy and emissions trading. To account for these risks, we will develop indicators of the investment climate for GHG abatement projects for the main seller countries. These indicators shall describe the costs and risks of investments in climate change mitigation in a comprehensive manner, taking into account macroeconomic stability, the institutional environment for JI and CDM, and political risk. These indicators will be integrated into the quantitative analysis at a later stage.
3. The third objective of the project is to examine to what extent other GHG emissions trading schemes are compatible with the proposed European emissions trading scheme, and identify potential problems of integrating them. The analysis will consist of two parts: Analysis of trading systems in European countries which are not members of the EU (Switzerland, Norway), and of countries outside Europe

which are crucial for the implementation of the Kyoto Protocol (Japan, Canada). A key problem is the fundamental differences between the design of national climate policies and ET systems. Climate policy in Switzerland, for example, is a combination of carbon taxes, voluntary agreements, and emissions trading. Whether this complicated system can be linked to the EU ETS, and whether the Swiss allowances can be considered equivalent to EU allowances, remains to be seen.

4. The fourth objective is the quantification of the economic and industrial impacts of international emissions trading using an established large-scale multi-region multi-sector computable general equilibrium model of international trade and energy use (see Böhringer 2000, Böhringer 2002b). This model represents the analytical backbone of our project and will be extended in several steps to accommodate adequate quantitative analysis of the above mentioned policy issues. In a first step, the European market for tradable CO_2 allowances as envisaged under the EU Directive will be modelled in detail. The impact analysis of the EU trading scheme will serve as a benchmark for the investigation of JI and CDM. In a second step, the model will be extended to represent a world-wide ET system (including JI and CDM mechanisms) encompassing transition and developing countries under realistic conditions (including investment risks and transaction costs). The comprehensive ET system will then be compared to the benchmark case. Integrating JI and the CDM is expected to further enhance the cost effectiveness of emissions trading. Besides this, we are interested in the industrial impacts (by sectors), allowance prices, and, particularly, the impact of investment risk on the magnitude and regional distribution of emissions trading.

   The work we propose to carry out is novel in several respects:
   - Technology transfer is often mentioned as an important part of the Kyoto mechanisms. However, it has hardly been analysed thoroughly in this context. Our project shall examine both the theoretical potential for technology transfer and the experiences made in pilot trading schemes until today;
   - Only few studies of the global market for tradable GHG permits have incorporated investment risks. Where this has been done, rather simple risk indicators were used. In contrast, the work described in the present proposal aims to develop indicators which reflect investment risks in a comprehensive way;
   - Emissions trading schemes are being planned or implemented in many countries now, perhaps inspired by the successful trading system for sulphur dioxide in the United States. However, it is often overlooked that cost savings can only be achieved if trading partners and abatement options are numerous. Small, isolated markets are unlikely to yield substantial cost savings. Hence, it is important to learn how emissions trading schemes around the world could be linked or integrated to form an efficient common market;
   - Emissions trading at the global level has been the subject of a great number of scientific analyses. In contrast to most existing studies, we plan to model the global emissions trading market starting from a detailed representation of the EU-wide market for CO_2, which will be extended to include other countries via JI and the CDM.

   The TETRIS project shall provide insights which enable policy makers to fully exploit the economic and environmental benefits of emissions trading. The project delivers valuable results regarding the emerging market for tradable GHG permits and its impact on industry and technology transfer.

Partners

N°	Organisation	Country
1.	Zentrum für Europäische Wirtschaftsforshung GmbH	Germany
2.	Ecoplan Economie Research and Policy Consultancy	Switzerland
3.	Energieonderzoek Centrum Nederland	Netherlands
4.	Natsource Europe Ltd	UK
5.	Agentura Pro Ciste Prostredi (Center for Clean Air Policy)	Czech Rep.

TOCSIN – Technology-Oriented Cooperation and Strategies in India and China: Reinforcing the EU dialogue with Developing Countries on Climate Change Mitigation

CT - 044287

http://reme.epfl.ch

Instrument:	Specific Targeted Research Project (STREP)	Contract starting date: 01/01/2007
Total project cost:	1.382.000 €	Duration: 30 months
EC Contribution:	1.069.000 €	
Organisation:	Ecole Polytechnique Fédérale de Lausanne	
	Lausanne - Switzerland	
Co-ordinator:	Philippe Thalmann (Philippe.Thalmann@epfl.ch)	
EC Officer:	Wolfram Schrimpf (wolfram.schrimpf@ec.europa.eu)	

Abstract

This research will evaluate climate change mitigation options in China and India and the conditions for a strategic cooperation on RD&D and technology transfer with EU. This project will identify and assess technology options that might significantly reduce greenhouse gases (GHG) emissions in China and India in key sectors (i.e. power generation, transport, agriculture, and heavy industry). It will also define the necessary institutional and organizational architecture that would stimulate technology cooperation. The research will emphasize the strategic dimension of RD&D cooperation, and the key role of creating incentives for the participation of developing countries (DCs) in post-2012 GHG emissions reduction strategies and technological cooperation. Finally it will evaluate how the Clean Development Mechanism (CDM) and international emission trading (IET) might improve the attractiveness of new energy technology options for DCs, and thus contribute to stimulate RD&D cooperation and technology transfers toward China and India.

The research will be structured around the use of an ensemble of models that will be coupled together via advanced large scale mathematical programming techniques:

- World and regional (i.e. China and India) MARKAL/TIMES bottom-up techno-economic models permitting a global assessment of technology options in different regions of the world;
- a CGE multi-country and multi-region model of the world economy (GEMINI-E3) that includes a representation of developing countries' economies (i.e. China and India) permitting an assessment of welfare, terms of trade and emissions trading effects;
- a multi-region integrated model (WITCH) representing the effect on economic growth of technology competition in a global climate change mitigation context;
- a game theoretic framework that will be implemented to analyze self-enforcing agreements regarding abatement commitment and technological cooperation.

Objectives

The main objective of this research is to assess the benefits and costs of possible self-enforcing technology-based international agreements involving the EU, China and India with the aim of stabilizing the long term atmospheric concentrations of GHGs. The specific objectives of the project are:

- To provide a detailed description of the available energy/technology options that might significantly reduce GHG emissions in China and India and their relative costs in comparison with EU and other OECD members (the possibility of endogenous technological learning (ETL) and the competition for innovation, expected in a world adapting to a new technology environment, being also analyzed);
- To define the possible self-enforcing international agreements on GHG emission abatement, taking into account their economic impacts, including terms of trade changes, as well as the possible gains of multilateral and bilateral collaborations, Clean Development Mechanisms (CDM) and international

emission trading (IET) in order to stimulate RD&D cooperation and technology transfers toward China and India;

- To promote capacity building for modelling activities in China and India. Researchers from China and India who joined this project will benefit from high level scientific cooperation with leading European researchers and will develop databases and models for China and India that will be fully compatible with the most recent developments in EU and America concerning BU (bottom-up) and TD (top-down) modeling for energy-environment policy analysis. This ensemble of compatible models will be of great help for the development of a consistent dialogue between the parties in post-Kyoto negotiations.

Partners

N°	Organisation	Country
1.	Ecole Polytechnique Fédérale de Lausanne	Switzerland
2.	Fondazione Eni Enrico Mattei	Italy
3.	The Chancellor, Masters and Scholars of the University Of Cambridge	UK
4.	Tsinghua University	China
5.	Hong Kong Baptist University	Hong Kong
6.	Sarl Kanlo Consultants S.A.R.L.	France
7.	Ordecsys S.A.R.L.	Switzerland
8.	Indian Institute of Management	India

Observing and Forecasting Systems (Selected Projects)

DAMOCLES – Developing Arctic Modelling and Observing Capabilities for Long-term Environmental Studies

CT - 018509

http://www.damocles-eu.org/

Instrument:	Integrated Project (IP)	Contract starting date: 01/12/2005
Total project cost:	24.670.000 €	Duration: 48 months
EC Contribution:	16.100.000 €	
Organisation:	University Pierre and Marie Curie	
	Paris - France	
Co-ordinator:	Jean-Claude Gascard (gascard@lodyc.jussieu.fr)	
EC Officer:	Riccardo Casale (riccardo.casale@ec.europa.eu)	
	Damien Cardinal (damien.cardinal@ec.europa.eu)	

Abstract

All state-of-the-art climate models predict that the perennial sea-ice of the Arctic Ocean will disappear within a few decades or less. Important questions remain as to whether this expectation is justified, and if so when this change will take place and what effect it will have on climate on a regional-to-global scale. Such a dramatic physical affront to the ocean-atmosphere-cryosphere system in northern latitudes which corresponds to a change in surface albedo from more than 0.8 to less than 0.3 over a surface larger than Europe, is bound to have radical effects on human activities with immediate impacts on the indigenous inhabitants of the circum-Arctic region and the ecosystem on which they depend, and widespread effects on socio-economic activity on hemispheric scale. We propose an Integrated Project for Developing Arctic Modelling and Observing Capabilities for Long-term Environmental Studies (DAMOCLES) with the following objectives: (1) identify and understand the changes occurring in the Sea-Ice, Atmosphere and Ocean of the Arctic and Sub arctic domain, (2) improve the realism by which these changes are simulated in models, thus extending the lead-time prior to the onset of extreme climate events, -3) determine appropriate adaptation strategies for a range of anticipated socio-economic impacts following the disappearance of the perennial Sea-Ice. At a time when the International Polar Year (IPY) will focus on the science of the polar regions and on the human dimension of polar change, DAMOCLES will provide a contribution to reflect both the skills of European Sciences and the importance to European interests. DAMOCLES represents the integrated efforts of 45 European research institutions including 10 SMEs distributed among 12 European countries, and coordinated with the USA, Russia, Canada and Japan.

Objectives

The main objective of DAMOCLES is to reduce the uncertainties in our understanding of climate change in the Arctic and in the impacts thereof. To meet this objective DAMOCLES will, following the approach of Numerical Weather Prediction Centers, develop an integrated system for obtaining relevant geophysical observations, transferring them to a central databank, distributing them to the modelling centers, and producing nowcasts and forecasts of the Arctic climate. But since there exists no such thing as an Arctic Ocean Observing System, nor fully validated models for Arctic climate, nor accepted methods for forecasting of climate, a number of specific objectives need to be met in DAMOCLES:

- Synoptic observational coverage of the Arctic Ocean sea-ice cover
  The variability of sea-ice thickness, extent, concentration, ice-type and drift will be monitored by remote and in-situ systems in near real-time. Sea-ice dynamics and thermodynamics will be scrutinized to better understand their role for the large-scale ice-atmosphere-ocean system

- Synoptic observation and investigation of atmospheric key processes
  Aimed at a better predictability of the Arctic weather and climate key processes are investigated in a combined observational/process-modelling effort: the effects of Arctic cyclone on sea-ice in terms of heat and moisture transport, an improvement of boundary-layer physics over ice and ocean, an improvement of the radiative transfers and its interaction with snow and sea-ice.

- Synoptic observation of the Arctic Ocean circulation and key processes
  An observational system will be set up with the aim to improve the understanding of the large-scale circulation of the Arctic Ocean and its vertical and lateral exchanges as well as the communication between central basins and the shelves. New techniques will be used to assess synoptically the state of the ocean under the ice and the fluxes of heat, salt and volume across the boundaries.

- Integration and assimilation of observations with large-scale models
  Model sensitivities will be investigated and performance be improved by model-model and model-data comparison, aiming at an improved predictability. Observations will be enhanced by a set of assimilation activities to deliver reanalysed Arctic variables in time and space. To address the question of potential impacts of climate change in the Arctic the following specific objective of DAMOCLES can be formulated:

- Assessment of impact on environment and humans
  The observationally supported model improvements, the model sensitivities and past ranges of variability will be combined with new field data. The aim is to evaluate improved predictability and its consequences, as well as the impact of projected changes on adaptation capabilities and vulnerability of the environment and human activities. DAMOCLES will not work in isolation – it serves the European community. Exploitation and dissemination of the results are key elements of the project. Thus, a 6th specific objective is:

- User-friendly return of information to the community
  A website will be available; giving the community updated information about the state of the Arctic (e.g. real-time information of key atmospheric, ice and ocean variables) as well as information about the progress of the science of DAMOCLES. Education will be provided, through workshops and student scholarships.

The main technological objective of DAMOCLES is to develop a prototype for an Arctic Ocean Observing System (AOOS) including major innovations and breakthrough in High Technology instrumentation adapted to a remote and harsh environment such as the Arctic Ocean. The DAMOCLES AOOS prototype system will be composed of very modern and sophisticated instruments for in situ measurements involving near real time transmission and remote sensing such as:

- Satellite radar altimetry, Scatterometers (QuickSCAT), passive microwave radiometers (SSM/IS, AMSR-E), SAR imagery (ENVISAT, RADARSAT);
- Ice Tethered Platforms equipped with vertical CTD profilers for taking daily profiles of temperature and salinity versus depth;
- Sea-Gliders like autonomous underwater vehicles measuring 1000s of slanted profiles of temperature and salinity along transects between ITPs and Moorings equipped with acoustic transponders;
- Neutrally buoyant floats drifting at constant depth and equipped with Upward Looking Sonars to measure Sea-Ice draft from underneath;
- Tiltmeters for detecting flexural-gravity waves propagating through the ice and deducing sea-ice thickness over an averaged area.

One of the most important challenges of DAMOCLES is related to multi-faceted applications of underwater acoustic technology such as:

- Upward Looking Sonar (ULS) mounted on neutrally buoyant isobaric drifting floats and/or on moorings for measuring sea-ice draft;
- Long range navigation using Sound Fixing and Ranging (SOFAR/RAFOS) technique for navigating underwater Floats and Sea-Gliders under sea-ice;
- Short range navigation and data transfer using acoustic modems on all the instruments fixed on moorings (eulerian) or freely drifting (lagrangian) for near real time data transmission;
- Acoustic Doppler profilers measuring vertical profiles of horizontal currents;
- Tomography for measuring temperature along vertical sections after inversion;

- Acoustic based technology will also be used in the atmosphere for measuring winds with sonic anemometers.

DAMOCLES will for the first time achieve a systematic approach to observing, understanding and quantifying climate change in the Arctic through:

- Developing and deploying an advanced observing system that provides for the synoptic, continuous and long-term monitoring of the lower atmosphere, sea-ice and the upper ocean;
- Evaluating and improving global and regional climate forecasting models based on validation by, and assimilation and integration of observed data;
- Designing and testing an integrated ice-atmosphere-ocean monitoring and forecasting system.

The ultimate deliverable will be to lengthen the lead-time of extreme climate changes predicted to occur in the Arctic within this century and thus to improve the ability of society to mitigate for their impacts. DAMOCLES research will provide a substantial step forward from the present state-of the-art by:

- improving monitoring capabilities of the Arctic Ocean, ice and atmosphere through innovative technological advances;
- improving the data transfer from instruments to users, through innovative technological advances, the use of an operational databank, and unprecedented data delivery and format agreements between all partners;
- increasing the knowledge concerning dynamics and thermodynamics of the Arctic Ocean Sea-ice cover and the understanding of its interaction with the Ocean and the Atmosphere in the northern hemisphere climate system;
- improving significantly the ability to predict extreme climate events in the Arctic, such as the disappearance of the perennial ice-cover;
- contributing to the development and implementation of observing and forecasting systems to make long-term systematic observations of marine and atmospheric parameters of the Arctic Environment necessary for global change research and management strategies;
- improving the knowledge on the adaptive capacity and vulnerability of human activities and the environment with respect to such an event, and thus enhance the European Union's preparedness in terms of environmental and societal terms.

Partners

N°	Organisation	Country
1.	Université Pierre et Marie Curie	France
2.	Alfred Wegener Institute for Polar and Marine Research	Germany
3.	Swedish Meteorological and Hydrological Institute	Sweden
4.	Nansen Environmental and Remote Sensing Center	Norway
5.	Finnish Institute of Marine Research	Finland
6.	Meteorologisk Institut	Norway
7.	Norwegian Polar Institute	Norway
8.	Arctic Centre University of Lapland	Finland
9.	Goteborg University	Sweden
10.	Institute of Marine Research	Norway
11.	The Secretary of State for Environment Food and Rural Affairs Acting	UK
12.	Danish Meteorological Institute	Denmark
13.	University of Cambridge	UK
14.	University of Bremen	Germany
15.	University College London	UK

16.	Stockholm University	Sweden
17.	University of Bergen	Norway
18.	Foundation for Research and Technology - Hellas	Greece
19.	University Of Hamburg	Germany
20.	Instytut Oceanologii, Polska Akademia Nauk	Poland
21.	Optimare Sensorsysteme Ag	Germany
22.	Finnish Meteorological Institute	Finland
23.	The University Centre in Svalbarb	Norway
24.	Institut Français de Recherche pour l'Exploitation de la Mer	France
25.	Centre National de la Recherche Scientifique	France
26.	Université de Savoie	France
27.	Institut Polaire Français - Paul Emile Victor	France
28.	Technical University of Denmark	Denmark
29.	Danish National Space Center	Denmark
30.	State Research Center Arctic and Antarctic Research Institute	Russia
31.	Tartu Uelikool	Estonia
32.	P.P. Shirshov Institute Of Oceanology, Russian Academy Of Science	Russia
33.	The University of Reading	UK
34.	Ecole Nationale Supérieure des Ingénieurs des Etudes et Techniques d'Armement	France
35.	Scottish Association for Marine Science	UK
36.	O.A. Sys - Ocean Atmosphere Systems	Germany
37.	International Polar Foundation	Belgium
38.	Center for International and Environmental Research	Norway
39.	Martec Serpe Iesm	France
40.	Fastopt Ralf Giering and Thomas Kaminski Gbr	Germany
41.	Naxys As	Norway
42.	Helsinki University of Technology	Finland
43.	Aanderaa Instruments A:S	Norway
44.	Aquatec Telemetry Limited	UK
45.	Cerpolex	France
46.	Caisse des Dépôts et Consignations	France

DAMOCLES-TTC – Developing Arctic Modelling and Observing Capabilities for Long-term Environmental Studies - Extension

CT - 045928

http://www.damocles-eu.org/

Instrument:	Integrated Project (IP)	Contract starting date: 01/11/2006
Total project cost:	422.914 €	Duration: 36 months
EC Contribution:	422.914 €	
Organisation:	Université Pierre et Marie Curie	
	Paris - France	
Co-ordinator:	Jean-Claude Gascard (gascard@lodyc.jussieu.fr)	
EC Officer:	Riccardo Casale (riccardo.casale@ec.europa.eu)	
	Damien Cardinal (damien.cardinal@ec.europa.eu)	

Abstract

DAMOCLES IP aims at reducing the uncertainties in our understanding of climate change in the Arctic and their impacts. Over the last 3 decades, the Arctic has warmed more than any other regions of the world, and the sea-ice cover has decreased significantly. DAMOCLES is the largest ever effort to assemble simultaneous observations of the Arctic atmosphere-ice-ocean system. The observational time period coincides with the International Polar Year (IPY) and DAMOCLES will be an outstanding contribution, from the European Community to the IPY. The DAMOCLES data set will be assimilated in models for quantitative estimates of circulation and used for:

- Validating and improving numerical models;
- Increasing our understanding of the processes and mechanisms underpinning the Arctic climate system;
- Initialising ensemble forecasts of the future state of the Arctic DAMOCLES Extension (DAMOCLES TTC) programme and will enhance quite significantly 2 major issues of DAMOCLES IP undertaken by 4 new TTC partners.

One of the main objectives of the DAMOCLES Extension proposal is to investigate the Arctic sea ice by means of extensive data archives from Russian satellites and Arctic expeditions, as well as from new observations by Russian satellites and field experiments in 2007 - 2009. Satellite data archive and in situ measurements from expeditions, represent a unique wealth of information about the Arctic. Russian and Belarus experts involved in sea-ice, satellite remote sensing and modelling will provide high value data sets and analyses for DAMOCLES.

Objectives

The DAMOCLES Extension (DAMOCLES TTC) programme of activities will enhance quite significantly two major issues of the DAMOCLES Integrated Project undertaken by four new TTC partners.

The first major issue concerns DAMOCLES work dedicated to Sea-Ice which is one of the central and most important theme of DAMOCLES. Three new partners, one from Belarus and two from Russia, will contribute to an extension over 4 different tasks: Sea-Ice thickness, Snow characteristics, Sea-Ice categories and Sea-Ice types, and Sea-Ice thermodynamics.

The second major issue concerns DAMOCLES work dedicated to modelling and in particular model sensitivity studies taking into account some oceanic, atmospheric and terrestrial specific effects such as tides for instance which have not been addressed into the DAMOCLES IP work programme. One new partner from the Russian Academy of Sciences, Institute of Numerical mathematics in Moscow will contribute to dedicated studies of ocean tidal dynamics on long-term development of sea-ice, hydrography and ocean currents. DAMOCLES work will also greatly benefit from Russian ice data to be made available.

The extension work to be performed by the new partners will include:

- Provision of extensive archives of Russian satellite data of arctic sea-ice as well as new high resolution optical and IR images supporting DAMOCLES field experiments;
- Data analysis of ice thickness, density, freeboard, snow cover from previous Russian expeditions needed for validation of satellite altimeter retrievals of ice thickness;
- Investigation of retrieval of thin ice thickness from satellite IR data in combination with models, complementing other ice thickness observing methods performed during DAMOCLES IP;
- Improvement of multiyear ice concentration retrieval using combination of passive microwave and scatterometer data. Use of Okean SLR data with similar capacity as scatterometer to identify MYI, will be investigated;
- Dedicated studies of leads and polynyas by integrating optical, IR and radar satellite data, both with Russian and non Russian data supported by field experiments;
- Investigation of sea-ice thermodynamics using surface temperature retrievals from satellites in combination with in situ data from field experiments;
- Performing field investigations of sea-ice and snow cover from the Russian drifting station and expedition by the Russian icebreaker A. Fedorov during the International Polar Year (2007-2008);
- Retrieval of snow grain size and snow pollution in the Arctic from optical satellite sensors;
- Improvement of estimation of sea-ice dynamical and thermodynamical properties;
- Improvement for large scale modelling and forecasting capabilities;
- Dedicated studies of ocean tidal dynamics on long-term development of sea-ice, hydrography and ocean currents;
- Model sensitivity experiments including boundary conditions, atmospheric forcing and river run-off, based on a finite-element model including tidal effects;
- Adding value to the integrated DAMOCLES model intercomparison and sensitivity studies by extending the range of parameters;
- Data dissemination according to DAMOCLES IP specifications.

Partners

N°	Organisation	Country
1.	Université Pierre et Marie Curie	France
2.	B.I. Stepanov Institute Physics, National Academy of Sciences	Belarus
3.	Institute Numerical Mathematics, Russian Academy of Sciences	Russia
4.	Nansen International Environmental Remote Sensing Center	Russia
5.	Research Centre Earth Operative Monitoring	Russia

GAGOS – Assessing and Forward Planning of the Geodetic and Geohazard Observing Systems for GMES Applications

CT - 010329

Instrument:	Specific Support Action (SSA)	Contract starting date: 01/02/2005
Total project cost:	229.620 €	Duration: 24 months
EC Contribution:	229.620 €	
Organisation:	GeoForschungsZentrum Potsdam	
	Potsdam - Germany	
Co-ordinator:	Markus Rothacher (rothacher@gfz-potsdam.de)	
EC Officer:	Riccardo Casale (riccardo.casale@ec.europa.eu)	
	Damien Cardinal (damien.cardinal@ec.europa.eu)	

Abstract

Substantial improvement of our present knowledge of Earth System dynamics is paramount for the development of reliable strategies for actions vital to the human society in terms of achieving sustainable development and ensuring security. This requires for the various system components long-term integrated global data series from a large variety of sensors and networks combined with high performance rapid computing and a uniform and efficient access to distributed data archives and data information systems.

The material generated in the course of this project aims:

- to assess the status quo situation of two major components of the Earth observing system, namely the global geodetic and global geohazards observing systems as indispensable prerequisites for the consistent global monitoring of the Earth system environment and security aspects of population;
- to identify deficiencies and gaps in both components and provide advice for the implementation of necessary adaptations and potential new developments in network-, shared computing-, and information/data management task for the observing techniques involved.

Partners

N°	Organisation	Country
1.	Geoforschungszentrum Potsdam	Germany
2.	Deutsches Geodätisches Forschungsinstitut	Germany
3.	Statens Kartverk	Norway

GEOMON – Global Earth Observation and Monitoring

CT - 036677

http://geomon.ipsl.jussieu.fr/

Instrument:	Integrated Project (IP)	Contract starting date: 01/03/2006
Total project cost:	10.046.950 €	Duration: 48 months
EC Contribution:	6.621.740 €	
Organisation:	Commissariat à l'Energie Atomique	
	Paris - France	
Co-ordinator:	Philippe Ciais (philippe.ciais@cea.fr; cecilia.garrec@cea.fr)	
EC Officer:	Claus Brüning (claus.bruning@ec.europa.eu)	

Abstract

The overall goal of the GEOMON project is to sustain and analyze European ground-based observations of atmospheric composition, complementary with satellite measurements, in order to quantify and understand the ongoing changes. GEOMON is a first step to build a future integrated pan-European Atmospheric Observing System dealing with systematic observations of long-lived greenhouse gases, reactive gases, aerosols, and stratospheric ozone. This will lay the foundations for a European contribution to GEOSS and optimize the European strategy of environmental monitoring in the field of atmospheric composition observations. Specifically, we will unify and harmonize the main Europeans networks of surface and aircraft-based measurements of atmospheric composition parameters and integrate these measurements with those of satellites. The access to data and data-products will be coordinated at a common data centre for more efficient use. GEOMon will support data gathering at existing networks if necessary, rescue and compile existing ground-based data, and develop new methodologies to use these data for satellite validation and interpretation.. In addition, GEOMON will enable innovative ground-based measurements complementary to satellites, made by upward looking ground based remote sensing instruments Max-DOAS, FTIR, and LIDAR and by systematic measurement programmes of upper-tropospheric composition using passenger aircrafts CARIBIC and MOZAIC. These data will serve to reduce biases and random errors in satellite observations and facilitate interpretation of the columnar measurements in combination with surface data. This will result in a significant improvement in the use of existing and future satellite data. Common techniques and modelling tools will be used in order to add value to the GEOMON data observations, to facilitate their use in satellite validation and help design an optimal network.

Objectives

The overarching aim of GEOMON is to construct a prototype system for atmospheric composition monitoring for climate applications, by the combination of ground-based with satellite observations. This strategic objective will answer the three overarching scientific questions:

1) What are the regional European trends and variability of greenhouse gases, tropospheric and stratospheric ozone, aerosols, and pollutants in relation to changes in surface emissions?
2) How to validate top-down satellite observation of the changing atmospheric composition, and integrate them with ground based stations and airborne observations into a coherent picture?
3) What are the global trends of atmospheric composition from ground-based and satellite observations assimilated in modelling studies, and what key measurements should be added for reducing uncertainties on surface emissions and atmospheric processes?

Question 1: Quantify atmospheric composition trends over Europe

- Sustain long-term measurements of atmospheric composition in the European air shed, from existing ground-based networks. Priority is given to continuing programs which have demonstrated excellence, but are today in funding hiatus, and to develop new Near Real Time data products

- Provide quality assured, harmonized, and select regionally representative long-term datasets for the chemical and aerosol composition of the boundary layer over the European air shed, using surface observations.

Question 2: Integrate satellite and ground-based observation

- Develop innovative methodologies combining ground-based upward looking remote sensing and surface in-situ measurements to validate satellite retrievals;
- Provide quality assured and integrated chemical composition measurements of the global free;
- troposphere, with focus on CO2, CH4, ozone and precursors including CO using instrumented passenger aircraft programs and link them to satellite with model studies;
- Support continuation of the acquisition of the target parameters at the Network for Detection of Atmospheric Composition Change (NDACC) stations operated by European partners, and develop innovative model tools to integrate these data with complementary satellite observations.

Question 3: Quantify global trends and uncertainties

- Analyse time series of ground-based and satellite observations to identify long-term trends in tropospheric and stratospheric composition related to climate change, and compare the observed trends to global Chemical Transport Models results;
- Develop integrated data products combining ground-based networks and remote sensing fields to assess the spatial and temporal distributions of greenhouse gases, aerosols, chemical pollutants, and stratospheric ozone;

Establish a Data Centre to provide users with comprehensive and easy access to key European atmospheric composition data and data-products and ensure appropriate dissemination at various levels of the quality assured and integrated data sets to assist scientific and policy communities, in compliance with GEOSS aims These main objectives are met by organizing the IP into six complementary main “Activities” which provide essential ground-based observations of CO2 and CH4 greenhouse gases (Activity 1), reactive gases (Activity 2), aerosols (Activity 3] and stratospheric ozone and related species (Activity 4] to assess the long term trends and enable understanding of their controlling processes (Activity 5], and ensure access and dissemination of these results (Activity 6].

Partners

N°	Organisation	Country
1.	Commissariat à l'Energie Atomique	France
2.	Finnish Meteorological Institute	Finland
3.	Royal Holloway and Bedford New College, University of London	UK
4.	Energy Research Center of the Netherlands	Netherlands
5.	University of Bremen	Germany
6.	University of Leicester	UK
7.	European Centre for Medium-Range Weather Forecasts	UK
8.	Eidgenoessische Materialpruefungs- und Forschungsanstalt	Switzerland
9.	Norsk Institutt for Luftforskning	Norway
10.	Belgisch Instituut voor Ruimte Aeronomie	Belgium
11.	World Meteorological Organization	Zwitzerland
12.	National and Kapodistrian University of Athens	Greece
13.	Max-Planck-Society for the Advancement of Sciences	Germany
14.	Ruprecht-Karls-Universität Heidelberg	Germany
15.	Koninklijk Nederlands Meteorologisch Instituut	Netherlands
16.	Netherlands Organisation for Applied Scientific Research	Netherlands

17.	Paul Scherrer Institut	Switzerland
18.	Consiglio Nazionale delle Ricerche	Italy
19.	National University of Ireland, Galway	Ireland
20.	Natural Environment Research Council	UK
21.	University of Bern	Switzerland
22.	Alfred-Wegener-Institut für Polar- und Meeresforschung	Germany
23.	Danish Meteorological Institute	Denmark
24.	Instituto Nacional de Técnica Aeroespacial Esteban Terradas	Spain
25.	University of Liège - Institute of Astrophysics and Geophysics	Belgium
26.	Chalmers University of Technology	Sweden
27.	University of Leeds	UK
28.	Universitetet I Oslo	Norway
29.	Institut National de l'Environnement Industriel et des Risques	France
30.	Unité Mixte de Recherche. Icare UMS-2877	France
31.	Université de Versailles Saint-Quentin en Yvelines	France
32.	Forschungszentrum Karlsruhe Gmbh	Germany
33.	Universitaet Karlsruhe	Germany
34.	Parc Cientific de Barcelona	Spain
35.	A.N.Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences	Russian Fed.
36.	CNRS - Institut National des Sciences de l'Univers	France
37.	Centre National d'Etudes Spatiales	France

SOGE-A – System for Observation of Halogenated Greenhouse Gases in Europe and Asia

CT - 505419

http://www.nilu.no/soge/files/China/china.cfm

Instrument:	Specific Support Action (SSA)	Contract starting date: 01/02/2004
Total project cost:	828.500 €	Duration: 36 months
EC Contribution:	380.000 €	
Organisation:	Norsk Institutt for Luftforskning	
	Kjeller - Norway	
Co-ordinator:	Frode Stordal (Frode.Stordal@geo.uio.no)	
EC Officer:	Riccardo Casale (riccardo.casale@ec.europa.eu)	
	Damien Cardinal (damien.cardinal@ec.europa.eu)	

Abstract

SOGE-A will provide a European contribution to extension of an international observation system for greenhouse gases by setting up a Chinese measurement system. The project builds upon SOGE, an existing integrated system for observation of halogenated greenhouse gases in Europe, funded through the Energy, Environment and Sustainable Development Program (FP5) and national contributions. The gases that are in focus, CFCs, HCFCs and MFCs, are included in the Montreal and the Kyoto protocols, as they contribute to depletion of the stratospheric ozone layer as well as global warming.

The setting-up of a measurement system in China includes installing in instrument for measurements of halogenated compounds, linking and harmonization of the Chinese station to SOGE, and estimation of emissions by combining measurements with meteorological data and model tools. The project also focuses on teaching, training and dissemination of results to end-users. China still (legally) emits significant amounts of CFCs. China's importance as a source of HCFC and HFC is increasing rapidly.

SOGE-A will be linked to the SOGE network that has been developed between four stations in Europe with full intercalibration. SOGE is collaborating with the international network of Advanced Global Atmospheric Gases Experiment (AGAGE), which is funded partly by NASA in the US and partly by the governments of Australia, United Kingdom and Japan. AGAGE collaborates with the network of National Ocean and Atmosphere Administration (NOAA) in the US. NASA and NOAA, and also the Global Atmosphere Watch (GAW) program, support the establishment of observations in China, due to significant emissions and missing observations in the region.'

Partners in the consortium are in the forefront on the development of instrumentation for observations of halogenated greenhouse gases and they have developed the instrumentation currently used. Extension of the international observational system will thus imply a transfer of technologies and competencies, and an educational programme will be a part of the project.

Partners

N°	Organisation	Country
1.	Norsk Institutt for Luftforskning	Norway
2.	Chinese Academy of Meterological Sciences	China
3.	University of Bristol	UK
4.	Eidgenoessische Materialpruefungs- Und Forschungsanstalt	Switzerland
5.	Università degli Studi di Urbino "Carlo Bo"	Italy

SEARCH for DAMOCLES – Study of Environmental Arctic Change – Developing Arctic Modelling and Observing Capability for Long-term Environment Studies

CT - 037111

http://www.damocles-eu.org/

Instrument:	Specific Support Action (SSA)	Contract starting date: 01/10/2006
Total project cost:	605.000 €	Duration: 36 months
EC Contribution:	605.000 €	
Organisation:	Université Pierre et Marie Curie	
	Paris - France	
Co-ordinator:	Jean-Claude Gascard (gascard@lodyc.jussieu.fr)	
EC Officer:	Riccardo Casale (riccardo.casale@ec.europa.eu)	
	Damien Cardinal (damien.cardinal@ec.europa.eu)	

Abstract

SEARCH for DAMOCLES is proposing an SSA that is based on recent initiatives started in Europe and the USA in the field of Arctic marine ecosystems and Global change, with specific emphasis on Arctic Ocean long-term observatories. The SSA will capitalize on opportunities and significant benefits arising from coordination of large scale research programmes such as the European Integrated Project DAMOCLES (Developing Arctic Modelling and Observing Capabilities for Long-term Environmental studies) and the US research program SEARCH (Study of Environmental ARctic Change). SEARCH for DAMOCLES, positioned in the domain of Arctic Science, will be particularly timely in the context of the International Polar Year and will significantly contribute to the coordinated implementation of the DAMOCLES and SEARCH work programmes in the field of Global Change and Ecosystems. Close synchronization of these programmes will enhance the acquisition of pan-arctic data sets, and their analysis, the dissemination and archiving of results, as well as heightening public awareness. International workshops and conferences including other partners such as Canada, Russia, and Asian countries (Japan, China, and South Korea), will enable translation of the results into planning of integrated, future activities that will be based on the SSA SEARCH for DAMOCLES. The coordination and synchronization of Arctic programs such as DAMOCLES and SEARCH, through an SSA is a unique opportunity to ensure the necessary pan-arctic coverage of observations and data evaluation for understanding Arctic system variability, avoiding major gaps and unnecessary overlaps. This EU-US SSA will also contribute to promotion and facilitation of future RTD activities via prospective studies, exploratory measures and pilot actions. The EU-US SSA SEARCH for DAMOCLES is proposed for 3 years covering the 3 last years of the 4-year DAMOCLES Integrated Project (2006-2009) and the 2 years of the IPY (2007-2008).

Objectives

Recently the two independent pan-Arctic, long-term research programmes SEARCH (Study of Environmental Arctic Change) and DAMOCLES (Developing Arctic Modelling and Observing Capabilities for Long-term Environmental Studies) have been designed in the US and Europe, respectively, to increase our capability for predicting Arctic Climate changes. Both programmes propose elements of an integrated observing and forecasting system on seasonal to climate time scales. These programmes have been funded independently: SEARCH by a US interagency consortium (NSF, NOAA, NASA etc.) and DAMOCLES by the European Union under the 6th Framework Programme. Both projects have set out ambitious goals that challenge the intellectual and infrastructural resources of the Arctic science community. In spite of these challenges, they certainly will constitute one of the highlights of the upcoming International Polar Year (IPY) in 2007 and 2008. DAMOCLES represents a major effort in Europe gathering 45 institutions (more than 100 principal investigators) in 12 European countries (including Russia). SEARCH reaches similarly deep into the US Arctic science community. The main objective of the Specific Support Action "SEARCH for DAMOCLES" is to explore and realize opportunities and benefits to coordinate these two large research programmes that

represent major efforts by EU and US scientists and have largely common goals and objectives. This EU-US SSA will be a key enabling mechanism for the two programmes SEARCH and DAMOCLES to successfully tackle one of the largest challenges Arctic scientists have faced. The SSA will also contribute to reinforce the international cooperation to develop long-term environmental research programme in the Arctic regions to answer the key questions underlying the observed rapid changes and their impact on physical, biological and human domains in a fragile and delicately balanced Arctic system.

The overall objectives of SEARCH for DAMOCLES are to:

- Coordinate across the Atlantic the scientific efforts to make systematic observations of atmospheric and oceanic variables in the Arctic and subarctic domain, including those of sea-ice, so as to improve forecasting of the Arctic marine and atmospheric environment, as well as projections of long-term trends;
- Consolidate long-term observations required for documentation and modelling of change and in particular prediction of extreme climate events;
- Establish common data bases and contribute to international programmes (ISAC, IPY, CliC, CLIVAR, AOSB).

The specific objectives of SEARCH and DAMOCLES are to coordinate the research conducted within the SEARCH and DAMOCLES programmes required for answering fundamental scientific questions with the goal to:

- Determine the processes responsible for present variability and changes in the Arctic Climate system;
- Improve our capabilities to Predict Arctic Climate changes in particular extreme climate events;
- Design optimal components of a long-term integrated monitoring and forecasting system for the Arctic Ocean;
- Assess impacts of an extreme climate event such as the disappearance of the Arctic perennial Sea-Ice.

Partners

N°	Organisation	Country
1.	Université Pierre et Marie Curie	France
2.	Colombia University	Usa
3.	Norwegian Meteorological Institute	Norway
4.	University of Alaska Fairbanks	Usa
5.	Swedish Meteorological and Hydrological Institute	Sweden
6.	Center for International and Environmental Research	Norway
7.	Alfred-Wegener-Institut für Polar- und Meeresforschung	Germany
8.	University of Alaska	USA
9.	National Snow and Ice Data Center, University of Colorado	USA

STAR – Support for Tropical Atmospheric Research

CT - 506651

http://www.knmi.nl/samenw/star

Instrument:	Specific Support Action (SSA)	Contract starting date: 01/03/2004
Total project cost:	448.216 €	Duration: 30 months
EC Contribution:	310.000 €	
Organisation:	Koninklijk Nederlands Meteorologisch Instituut	
	De Bilt - Netherlands	
Co-ordinator:	Ge Verver (ge.verver@knmi.nl)	
EC Officer:	Riccardo Casale (riccardo.casale@ec.europa.eu)	
	Damien Cardinal (damien.cardinal@ec.europa.eu)	

Abstract

The objective of the proposed STAR project (Support for Tropical Atmospheric Research) is to strengthen the European contribution to the global observation system, and to support international cooperation in setting up these observation systems in the tropics. It is a joint effort of European, Japanese, and American research groups to establish a shared atmospheric observatory in Paramaribo, Suriname at the northern coast of South America at 5.8°N and 55.2°W. The location of the observatory is unique because of the fact that it lies very close to the Equator, at a location in the middle of the annual migration range of the Inter-Tropical Convergence Zone (ITCZ). Hence air from both hemispheres can be sampled at different times of the year. The station fills in an important gap in the global atmospheric observatory network. The proposed project will facilitate access of European and other research groups to the observatory, enhance the technical capabilities of the site, build capacity for global change research in the tropics and improve the conditions for the execution of a long-term observational program. The project will contribute to the implementation of the FP6 work program and support international networks and programs like the WMO Global Atmosphere Watch (GAW) program, GCOS, the WCRP SPARC project, and the NDSC and SHADOZ networks. The proposed STAR project involves (1) a significant upgrading of the site to be able to host additional instruments and visiting scientist, (2) development of a site coordination plan, (3) short pilot studies to assess the feasibility and requirements of operating several additional instruments at the site; (4) the development of a program to intensify the collaboration between local scientists and the other partners of the Paramaribo observatory, and (5) the retrieval and homogenisation of historical observational data from the region.

Partners

N°	Organisation	Country
1.	Koninklijk Nederlands Meteorologisch Instituut	Netherlands
2.	Meteorologische Dienst Suriname	Suriname
3.	Belgisch Instituut voor Ruimte Aeronomie	Belgium
4.	Ruprecht-Karls-Universitaet Heidelberg	Germany
5.	Universitaet Bremen	Germany
6.	Technische Universiteit Eindhoven	Netherlands
7.	Anton de Kom Universiteit van Suriname	Suriname
8.	Stiftung Alfred-Wegener-Institut für Polar- und Meeresforschung	Germany
9.	Hokkaido University	Japan

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