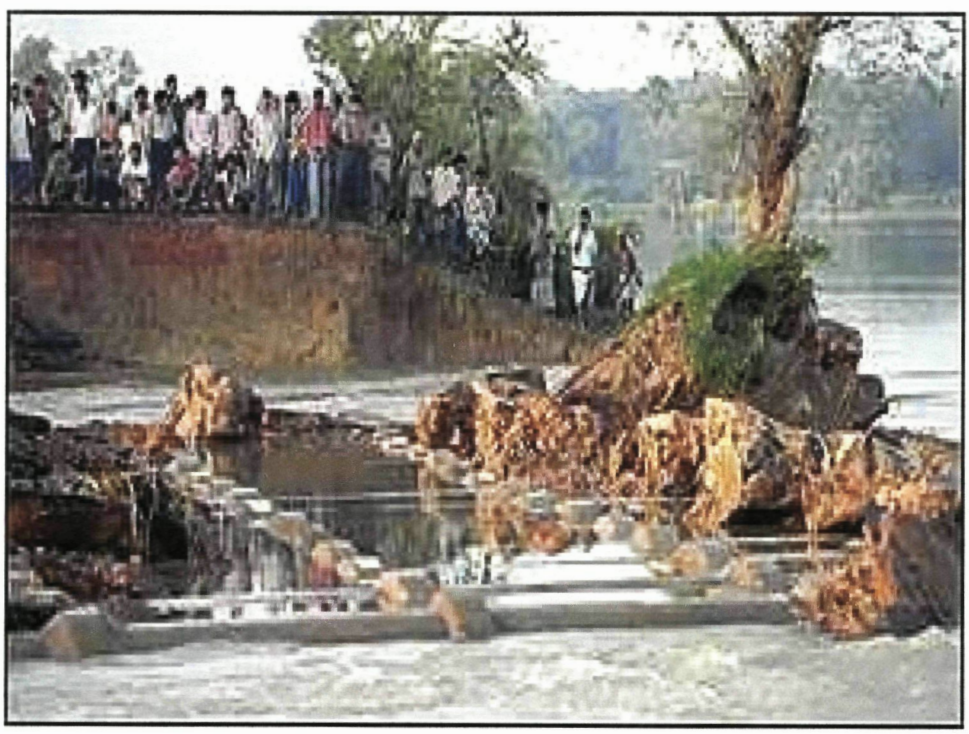
The JCOMM/IODE/GOOS Combined Modeling and Data Management Training Workshop "Jamboree"



Norwegian Meteorological Institute
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The JCOMM/IODE/GOOS Combined Modeling and Data Management Training Workshop, ("Jamboree"). Curriculum and agenda.

Oostende, Belgium, and Bergen, Norway, date of draft: 31 August 2005

Curriculum.

The joint GOOS/JCOMM Panel for Capacity Building, working jointly with IODE, will hold the Combined Modeling and Data Management Training Workshop (CMDM) 5 – 10 September 2005, in the IOC Project Office for IODE in Oostende, Belgium, with major preparations taking place in Bergen, Norway. The workshop with its popular name "Jamboree" will be attended by trainees from countries of the Indian Ocean region, Africa, and Central/South America.

The purposes of the CMDM workshop are;

- to initiate improved interaction/mutual understanding between ocean numerical modelers and ocean data managers;
- To enable attendants to implement national services for warnings of wind waves, storm surges, and potential application services such as oil spill simulations.

Consequently, a team of modeling experts from India and Norway, will design a PC based "Numerical Modeling Laboratory" (NML), including all necessary components for ocean numerical forecasting. NML will include a small number of freeware, transportable numerical ocean models termed 'community models'. The NML team will contribute to a "*recipe*" for corresponding observation data requirements for the tuning and validation of the models applied. An initial version of this "recipe" will be formed by a small team of data managers (DM), who will attend the workshop and observe a series of numerical experiment to demonstrate the rationale of this recipe. It is the aim that trainees having participated in JAMBOREE will be 'trained to become trainers', and as such qualify as future CB focal/resource persons in their home country or region.

The designed NML was applied also in a separate, similar workshop in Beijing 25 – 29 July, with attendants from South China Sea facing countries. At this workshop, data management issues have less priority, but an experimentation plan (Tropical Ocean Waves and Storm Surges) was prepared with several similarities to the CMDM. 4 resource persons from the Beijing workshop will participate in CMDM workshop, where attendants will exercise experiments in numerical modeling and the application of observed data for model tuning and validation. The CMDM workshop will reflect the scientific background for ocean data acquisition and numerical modeling. The 'trained trainees' will thereby perceive the dynamic interaction between science and observations and models, and in their subsequent trainer activities be enabled to transfer this knowledge to trainees in their country and region.

Attendants will represent a mixture of DM expertise and NML expertise, and the aim is to equip them with a toolkit for installation of operational services where both DM and NML play complementary roles. DM attendants must (as a rule) successfully have completed the ODINAFRICA training programme (3 years) and work in an IODE data center as data manager, as well as have proven experience in knowledge transfer (training) at the local level. These attendants will learn;

- requirements in data and data quality control for numerical modeling;
- the scientific background and motivation for ocean observations;
- defining locations for sustained observations platforms;
- managing datastreams of sustained observation platforms;
- skills to transfer acquired knowledge to colleagues at the national level.

Modeling attendants have been selected on the basis of having lead responsibilities at a forecasting or operational modeling center/network, plus a general knowledge of the way numerical prediction models work. Their home position and responsibility should be appropriate for the potential and subsequent implementation of operational, numerical models for prediction of the coastal/marine environment (e.g. ocean waves, coastal circulation and storm surge, tsunamis, pollution dispersion, etc.) They should also declare intention/willingness to engage in CB activities at their national and regional levels, both in terms of lecturing others, as well as assisting with implementations of models and data managements. These attendants will have learned;

- principal, scientific functioning of selected numerical models,
- operational setup with topography/bathymetry, forcing fields, graphics for presentation and modes of dissemination,
- exercising model sensitivities and case studies,
- methodology for acquisition/search for relevant observation data through IODE systems,
- skills to lecture this knowledge to colleagues at the national/regional level.

The present workshop will be seen as a phase I in the development of a more constructive series of workshops co-organized by IODE and JCOMM. The experience from the CMDM workshop will form basic advisory material for this more long term Capacity Building effort.

Organization, Resource Persons, Trainees.

Lists of organising committee, resource persons and invited trainees for the CMDM workshop, Oostende, Belgium, 5 – 10 September 2005:

Organising Committee (11):

The Organising Committee includes representatives of JCOMM, IODE, JCOMM/GOOS CB Panel, modeling resource persons, DM trainers, and coordinators of ODIN projects.

Name	Country	E-mail	Remarks
Johannes Guddal	Norway	j.guddal@met.no	JCOMM
Vladimir Vladymyrov	IODE/Belgium	v.vladymyrov@iode.org	IODE
Kristin de Lichtervelde	IODE/VLIZ		IODE
Peter Pissierssens	IODE/IOC	p.pissierssens@unesco.org	IODE
Miriam Andrioli	Argentina	msandrioli@fibertel.com.ar	JCOMM/GOOS
Peter Haugan	Norway	Peter.haugan@gfi.uib.no	Uni-Bergen
Murray Brown	USA	murraybr@bellsouth.net	DM Trainer
Greg Reed	Australia	greg@metoc.gov.au	DM Trainer

Mika Odido	Kenya	m.odido@odinafrica.net	ODINAFRICA
Rodney Martinez Guingla	Ecuador	r.martinez@ciifen-int.org	ODINCARSA
Nasser Zaker	Iran	nhzaker@inco.ac.ir	ODINCINDIO

Resource persons and observers (9):

Name	Country/Company	E-mail or address	Remarks
Shishir Dube	India	skdube@iitkgp.ernet.in	IIT
Oeyvind Breivik	Norway	o.breivik@met.no	DNMI
Oeyvind Saetra	Norway	o.saetra@met.no	DNMI
Magnar Reistad	Norway	m.reistad@met.no	DNMI
Reinoud Bokhorst	Norway	r.bokhorst@met.no	DNMI
Gennady Korotaev	Ukraine	ipdop@ukrcom.sebastopol.ua	MHI
Francisco Hernandez	Belgium	francisco.hernandez@vliz.be	VLIZ
Serge Scory	Belgium	s.scory@mumm.ac.be	Observer
Edward Vanden Berghe	Belgium	wardvdb@vliz.be	Observer

Trainees (13)

#	**Name (Modellers)**	**Country.**	**E-mail**
1	Alberto Mawume	Mozambique	amavume@yahoo.co.uk
2	Lahaouria Benrekta	Algerie	h.benrekta@meteo.dz
3	O. Ratomahenia	Madagascar	Richardrato@hotmail.com
4	Juan Pablo Belmar Palacios	Chile	oceanografia@shoa.cl
5	Katiusca Briones Estebane	Ecuador	modelamiento@inocar.mil.ec
6	Vladimir Caballero Camejo	Cuba	amaurya@ama.cu
7	Miryan Tamayo	Peru	naylamp@dhn.mil.pe
8	Kesrin Hanprasert	Thailand	kesrin_h@hotmail.com
9	B.R.S.B. Basnayake	Sri Lanka	senakab@hotmail.com
10	Sujit Kumar Debsarma	Bangladesh	sujit_debsarma@yahoo.co.in
11	Indu Jain	India	indu_jain@yahoo.com
	Name (Data Managers)		
12	John Bemiasa	Madagascar	j.bemiasa@odinafrica.net
13	Masoud Moradi	Iran	moradi@inco.ac.ir

The JCOMM/IODE/GOOS Combined Modeling and Data Management Training Workshop (Oostende, Belgium)

Tentative Agenda

First week:

Friday 2 September & Saturday 3 September: Pre-installation and testing of NML. Tentatively with this minimum requirement, example given by wave modellers:

> The WAM model we provide are tested on Linux Redhat 9 (kernel 2.4) only. But it could be compiled and run on any Linux/Unix system.
>
> WAM is compiled with the FORTRAN 77 compiler, g77 which is the GNU project F77 compiler available with LINUX.
>
> OS: Redhat 9 should be ready installed. Additional programs needed:
> * Perl5, comes with LINUX (available at www.perl.com), freeware
> * GrADS LINUX binary, available at http://grads.iges.org/grads, freeware
> * wgrib and gribmap, available with the GrADS binary, freeware
> * gnuplot 3.8 or higher (must include pm3d module). Used for spectral and timeserie plots. freeware.
> * shell scripts, fortran conversion programs. Provided by Norw. Meteorological Institute, freeware.

All necessary software will be provided to each trainee on CDs (DVD) along with the instruction on their installation.

Sunday 4 September. Latest arrival of trainees.

Second week

A. Introductory and frame-setting lectures

Monday 5 September:

- 0830 – 0930: Registration.
- 0930 - 0945: Welcome by hosting agency IODE/VLIZ (V. Vladymyrov)
- 0945 – 1000: Address by supporting agencies (R. Hermans??)
- 1000 - 1030: Introduction on 'operational oceanography'. (Professor Peter Haugan)
- 1030 - 1100: Introduction by JCOMM (Miriam Andrioli and Johannes Guddal)
- 1100 – 1130: Coffee break.
- 1130 – 1200: Round table participant introductions. Both trainees, resource persons, members of the steering committee, and observers are invited to express their expectation to the workshop.
- 1200 - 1230: Overview of the workshop, reference to the similar Beijing workshop. (JG) Plan for organization of experiment groups.
- 1230 – 1300: The OceanTeacher programme. Dr. Murray Brown.
- 1400 – 1700 including coffee break: Installation of the operational system (LINUX&tools) and model implementation under the resource persons supervision. There will be 3 experimentation groups, each group with 5 – 6 trainees and one group leader. The group leader will have a "master PC" already made ready before the workshop. He will use this to teach the trainees the whole installation process. The installation process will be guided and advised by Francisco Hernandez and Reinoud Bokhorst. Note that the installation process, in

particular the model software parts, continues also Tuesday, and the Tuesday agenda will as well include model presentations by resource persons.

Tuesday 6 September:

- 0830 – 0900: Scientific lecture 1: Wave research (Reistad, Norway)
- 0900 – 0930: Scientific lecture 2: Modelling Tropical Cyclone storm surges (S. Dube, India)
- 0930 – 1000: Scientific lecture 3: Storm surge modeling (Ø. Saetra, Norway)
- 1000 – 1030: Coffee break.
- 1030 - 1300: Continued installation and preparation for experiments.
- 1300 - 1400: Lunch break.
- 1400 - 1430: Scientific lecture 4: Applications in ocean modeling (search and rescue) (Breivik, Norway)
- 1430 – 1500 : Scientific lecture 5: Circulation (Gennady Korotaev)
- 1500 - 1530: Scientific lecture 6: Ecological modeling (Gennady Korotaev)
- 1530 – 1600: Coffee break.
- 1600 – 1730: Options for additional presentations or inputs from trainees. Continued installation/implementation.

B. Experiments

Wednesday 7 September 0830 - 1730:

- Presentation of a tentative plan of experiments (area configuration etc.). Group leader use this plan only as a Strawman. (JG)
- Consideration of 'recipe for modelers' requirements for ocean observation data'. (MR et al)
- Review of software/hardware&links configuration for experiments (Hernandez,Bokhorst). Organization of experiments in groups; leaders and rapporteurs (JG)
- Start of groupwise experiments.
- 18.00 – Reception on behalf of the Project Office and VLIZ

Thursday 8 September 0830 - 1730:

- Continued experiments
- Half way briefing of progress in experimentations. Corrective actions if necessary.
- Agreement on details of the remaining part of the workshop.

Friday 9 September 0830 - 1730:

- Finalizing experiments, compilation of reports etc.

C. Reporting results and conclusions.

Saturday 10 September (morning session)

- Finalizing of the modeling reports
- Presentations and submissions of the reports
- Consideration of "Requirements for ocean data in support of numerical regional ocean models"
- Adjourn expect for data managers.

D. Data Managers' summary meeting.

Saturday 10 September (afternoon session)

- Summary review and analysis of the workshop by data managers, with potential recommendations for future CB arrangements.

Sunday 11 September. Departure of the last workshop participants

Tentative JAMBOREE Experimentation Plan (JEP)
(Finally to be amended at the workshop by decision of experiment leaders and trainees)

Introduction
The core substance of this workshop is to provide experimenters with a set of forcing fields, plus a set of numerical wave and ocean models, and a plan for experiments where observation data are needed. Three experimentation groups will be organized, each with one experiment leaders and a rapporteur to provide requested reports.

Purpose of the JEP experiments
The purpose of JEP is primarily to enable trainees to run operational, local/regional oceanographic (wave, storm surge, circulation) forecasting models with corresponding application of ocean observation data., and secondly to familiarize with application models in support of oil spill combat and search and rescue. The experiments are organized in terms of case studies, either real time, historical or hypothetical ones. Trainees will be trained to carry out the hardware/software (operational) installation of numerical models, presented with the most important features of the models, and subsequently perform JEP exercises to focus on issues such as:

- forecast sensitivity to accuracy of input fields and basin geometry,
- forecast sensitivity to model differences
- utility of ensemble forecasting,
- time/spatial variation in model outputs,
- methods and sources for validation of forecasts,
- assessment of benefits in homeland forecasting,
- advancing science/research in related modeling or observations,
- requirements for ocean data management related to model applications.

The latter issue shall be emphasized; and a "Requirement for ocean data management in support of numerical models" shall be formulated and offered as an additional element to the OceanTeacher.

Subsequent to the workshop, an informal 'Support Unit" (SU) will continue to advice trainees as these trainees proceed to implement domestic services, or they themselves become trainers in their own country or region. The informal SU will include relevant IODE and JCOMM experts, it will work on a non-cost basis via emails, and submit summary reports to JCOMM and IODE governing bodies.

JEP Laboratory requirements.
Prior to the workshop, a PC laboratory is set up, with the following prerequisites:
- 18 to 20 strong PC's provided by IODE/Oostende, including one PC as a "hub" for the others, providing input data from Internett and other data sources, and access to peripheral units such as printers;
- A minimum set of software tools for compilation of model source codes, provision of data transfers, graphics for presentation of results;
- A template specification of model characteristics, accessible forcing data needed; wind/pressure fields, ocean currents data, bathymetry;

- A "Strawman" advisory guiding modelers to observational data sources which can serve to (1) Validate model outputs, and (2) Tune the models if required. To some extent, case studies may be identified where such data are available.

Numerical Model Tools
Also prior to the workshop, numerical models need to be installed and prepared for experiments. It is a precondition that models are flexibly coded so they can be implemented for any geographical area with any resolution. The model experiments will be set up so as not to violate the "lab framework defined above". Within these restrictions, experimentation groups will design their own experiments.

The first 3 of the numerical models listed below will be preinstalled and made ready for the JEP experiments. The other two will be presented and potentially made ready for experiments in a later workshop.

1. DNMI Wave Modeling System based on WAM (Guidance by M. Reistad and R. Bokhorst)
2. India Information Technology Storm Surge Modeling (Guidance by S. Dube)
3. DNMI Storm Surge model (Guidance by Ø. Saetra)
4. DNMI Search and Rescue support model (Presentation only)
5. Regional 3D circulation model (Presentation only)

All models will be freeware, open source coded, and transportable to any resolution and geographical area. Copies will be provided in CD. Introductions and scientific backgrounds for the models will be given at the beginning of the workshop.

Suggested areas for model simulations
The suggested areas for numerical simulations and comparison/validation towards observation data are:
- One area in the Indian Ocean.
- One area in the Gulf of Guinea or outside West Africa.
- One area in the Caribbean Sea.
- One area at the Pacific side of Central America..

Input fields
These are;
- bathymetry downloaded from Internett.
- Wind/pressure fields from a variety of sources.
-

Ocean observation data.
These data are needed for model tuning and/or validation of results from the experiments (numerical data assimilation is beyond the remits of the workshop). It is conceivable that at the time of the workshop, no predefined linkage has been set up for immediate access/provision of such data. The exception would be if some specific case studies have been identified where this is possible, and a Strawman suggestion for "model-data" combination will be presented.
At the conclusion of the workshop, however, a "Recipe" for the combination of models and observational data will be drafted and discussed, and possibly included in a future OceanTeacher course manual.

Experiments
The following text provides "Strawman" guidelines for experiment group leaders. Leaders will be prepared to teach how to access necessary forcing data etc.. Leaders are free to define their groups experiments, but should target major issues such as model sensitivies. Leaders are encouraged to identify case studies which in particular demonstrate major issues of interest. Modeling areas and resolutions will be decided the beginning of the workshop.

Task sheet JEP Group A - Task leader: Magnar Reistad
Wind waves modeling.

Objective:

To study the sensitivity of wave fields (integrated parameters such as Hs) to a storm tracks's and the wind fields features. In present day operational forecasting, these have large error bars. Training in model implementation, such as access to forcing data, will be emphasized.

Suggested actions:

Have at their disposal 3 historical sets numerical wind fields. They can also create artificial wind fields by means of simple algorithms that would be available at the workshop. They could also create an "ensemble" forecasting study by manipulating the track positions of the moving storm fields. Specify boundary conditions and initialization.

Reporting:

Describe the setup and rationale of the experiments. Illustrate with maps the forcing fields applied. Illustrate results by mapping fields and plotting time series. In the case of "ensemble forecasting" illustrate results by showing shift in positions of extremes etc. Suggest a useful model output to operational forecasters.

Requirement for ocean data:

The group will formulate requirements to relevant data for validation of real case experiments, for tuning of models in a preoperational phase, and for possible assimilation. These requirements will be transferred to the Ocean Teacher.

Task sheet JEP Group B . Task leader: Professor Shishir Dube, India. Member of JCOMM Expert Team on wind waves and storm surges.
Storm surge modeling.

Objective:

To study storm surge simulation sensitivity to variability and perceived error bars in the forcing wind/pressure fields as well as the geometrical shapes of the basins of incidents.

Suggested actions:

Create a set of "artificial" wind fields wind/pressure fields given by simple algorithms available at the workshop. Specify boundary conditions and initialization. Manipulate tracks and forcing fields to simulate "ensemble", as per advice from the experiment board.

Reporting:

Describe the setup and rationale of the experiments. Illustrate forcing fields by examples. Illustrate model results by mappings and time series. Suggest a useful output to operational forecasters.

Requirements to ocean data:
Formulate such requirements by keeping in view needs for model forcing, validation, tuning, and assimilation.

Task sheet JEP Group C – Task leader: Øyvind Saetra. Storm surge modeling under extratropical conditions.

Objective:

To install, set up and operate an operational storm surge model for different model domains. The model will be tested on selected historical storms, and whenever possible, be validated by comparing the results against sea-level observations. Focus will be on defining new model domains, retrieving bathymetry and atmospheric forcing data and adjust the model parameters such as time step according to the grid resolution etc.

Suggested actions:

3 or 4 selected historical atmospheric data sets from the ERA40 reanalysis will be made available on GRIB format. To enable the students to set up the storm surge modeling for any chosen area, a global bathymetry database (ETOPO2) will be provided together with the software necessary to extract the data and store it on a file format that can be identified by the numerical model. The students will be encouraged to set up and run the model for an area that is of particular interest to them. The model results will be converted to GRIB format and displayed with the GRADS plotting software. If possible, the results should also be compared with those obtained with the model used under task group B. For areas and time period when observations of sea-surface elevation is available, the student shall compare the results and calculate some basic statistical parameters and try to determine the quality of the model performance.

Reporting:

Describe the setup and rationale of the experiments. Illustrate with maps the forcing fields applied. Illustrate results by mapping fields and plotting time series. The report shall also discuss the model performance compared with the observations and discuss any possible systematic errors etc.

Requirement for ocean data:

The group will formulate requirements to relevant data for validation of real case experiments and for tuning of models in a preoperational phase. These requirements will be transferred to the Ocean Teacher.

Task sheet JEP Group D - Task leader: Øyvind Breivik (NMI) Predictions in support of Search&Rescue (kept for later experiments)

Objective:

To run test cases, and perceived "real cases" with support predictions to oil spill combat and search and rescue. To teach the practicalities of setting up these services in an operational system. One test case could be estuarine, in the case that river discharge mechanisms can be simulated.

Suggested actions:
Selection of test cases and discussion of results (TBD).

Reporting:

Describe the setup and rationale of the experiments. Illustrate differences by mappings and time series. Discuss results and arrive at conclusions.
Discuss potential need of ocean data acquisition and management .

Task sheet JEP Group D – Task leader Gennady Korotaev (kept for later experiments)

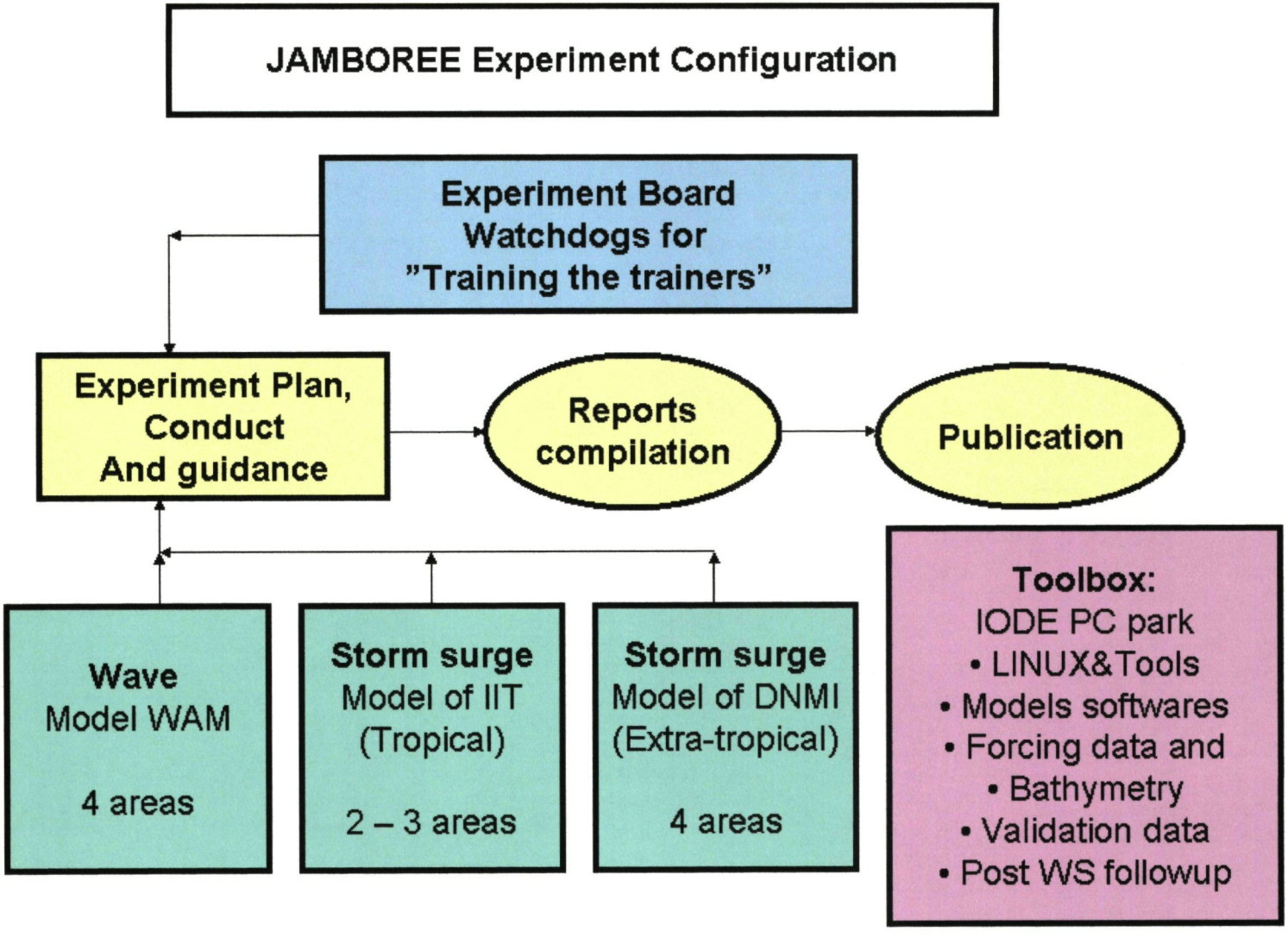
Objective:
Training in model implementation with the given framework. Consideration of mechanisms for transferring the model to "any are any resolution". Acquisition of climatic current and salinity fields via IODE.

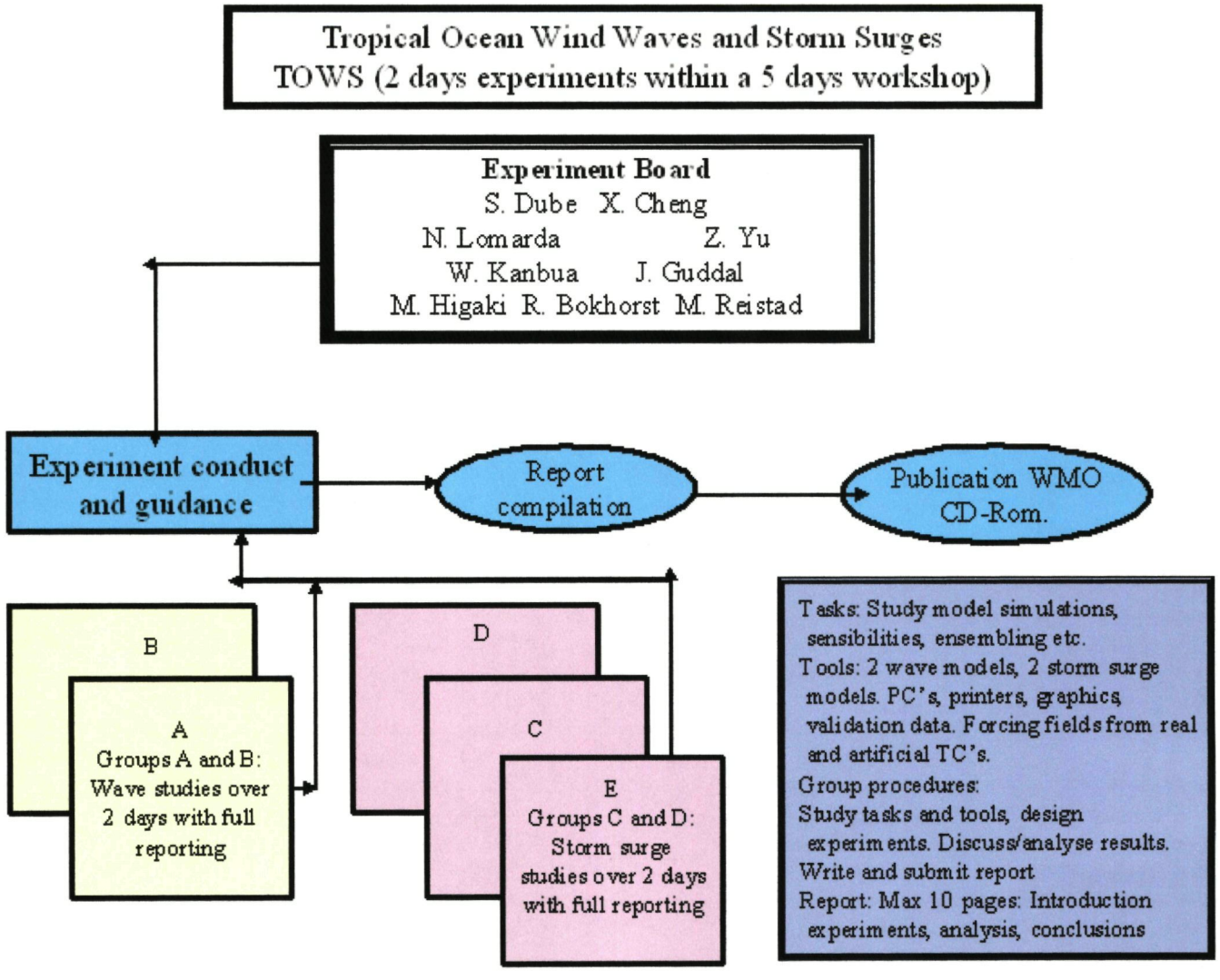
Rest to be decided.

Tentative Jamboree experiment groups

Function	WAM wave model	IIT storm surge model	DNMI storm surge model
Leader	Magnar Reistad	Shishir Dube	Øyvind Saetra
Co-leader	Reinoud Bokhorst	Indu Jain	Øyvind Breivik 1. day
Rapporteur	Lahaouria Benrekta	Vladimir C. Camejo	Alberto Mawume
Trainee	Onesine Ratomahenia	John Bemiasa	Katiusca B. Estebane
Trainee	Kesrin Hanprasert	Sujit K. Debsarma	Miriam Tamayo
Trainee	Masoud Moradi	B.R.S.B. Basnayake	Juan Pablo Palacios
Observer	Miriam Andrioli	Murray Brown	Gennady Korotaev
Observer	Greg Reed	?	?

Installation will be exercised on Monday. Francisco Hernandez and Reinoud Bokhorst will supervise and assist with the installation.
Models will be described on Tuesday and Wednesday.
Groups will decide and start on experiments from Wednesday.
18 PCs available, one for each leader, rapporteur, and trainee.
Trainees may trade positions if they like.
Observers will select a group themselves trying to keep a balance of the participants


JAMBOREE Experiment Configuration
Experiment Board
Watchdogs for
"Training the trainers"
Experiment Plan,
Conduct
And guidance
Reports
compilation
Publication
Wave
Model WAM
4 areas
Storm surge
Model of IIT
(Tropical)
2 – 3 areas
Storm surge
Model of DNMI
(Extra-tropical)
4 areas
Toolbox:
IODE PC park
• LINUX&Tools
• Models softwares
• Forcing data and
• Bathymetry
• Validation data
• Post WS followup



Organization applied at a similar WS in Beijing in July 2005