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**Third IOC/WESTPAC Workshop on Ocean
Forecasting Demonstration System (OFDS)
“Project Planning Meeting for the Second
Phase of IOC/WESTPAC-SEAGOOOS Ocean
Forecasting System”**

Qingdao, China
23 July 2012

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**UNESCO/IOC SUB-COMMISSION FOR THE WESTERN PACIFIC
(WESTPAC)**

**Third IOC/WESTPAC Workshop on Ocean Forecasting Demonstration System (OFDS)
-Project Planning Meeting for the Second Phase of IOC/WESTPAC-SEAGOOOS Ocean
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Qingdao, China, 23 July 2012

Summary Report

1. OPENING AND SELF INTRODUCTION

1. The third IOC/WESTPAC Workshop on Ocean Forecasting Demonstration System (OFDS) held on 23 July 2012 in Qingdao, China, hosted by the First Institute of Oceanography (FIO), State Oceanic Administration of China. This workshop is designed as one project planning meeting for the second phase of IOC/WESTPAC-SEAGOOOS Ocean Forecasting System. Mr Wenxi Zhu, Head of IOC Regional Office for the Western Pacific (WESTPAC Office), opened the meeting. Prof Fangli Qiao, welcomed all participants to FIO, Qingdao, China on behalf of the local host. Dr Somkiat Khokiattiwong, Chairperson of the IOC Sub-Commission for the Western Pacific (WESTPAC) delivered his congratulatory address. Mr Wenxi Zhu briefed the meeting that the meeting would be divided into two sessions with the morning session dedicated to progress reports on the first phase of the Ocean Forecasting Demonstration System (OFDS) project and presentations of ocean forecasting system in other regions, and the afternoon session allotted for the discussion on way forward for the second phase of the project.

2. REVIEW ON THE IMPLEMENTATION OF OFDS IN ITS FIRST PHASE (JUNE 2010- MAY 2012)

2. Prof Fredolin Tangang, Project Leader of the OFDS reviewed the project background and highlighted significant achievements of the first phase (June 2010 - May 2012). The OFDS was a SEAGOOS Pilot Project under the IOC/WESTPAC and initially involving 3 countries, i.e. China, Malaysia and Thailand. It had three objectives comprising of developing operational ocean forecasting model for Peninsular Malaysia's eastern shelf and the Gulf of Thailand, enhancing understanding of physical processes and developing modeling capability of Malaysian and Thai researchers. Prof. Fredolin explained the chronology of the project, which received institutional and country supports in view of its potential scientific and social benefit the system would be able to generate. Many activities had been successfully implemented including model development, joint cruises and capacity building. Six researchers from Malaysia and Thailand joined the first WESTPAC Training Course on Ocean Modeling at the UNESCO/IOC Regional Training and Research Center (UNESCO/IOC-ODC Center) in FIO during June 2011. Two joint-cruises were carried out with one conducted between FIO and Thai researchers in August 2011, and the

other between FIO and Malaysian researchers in September 2011. One joint publication between FIO and Malaysian researchers was published in *Ocean Dynamics* in 2011. The OFDS Web Portal was officially launched at the 9th Intergovernmental Session of IOC Sub-Commission for the Western Pacific (WESTPAC-IX, Busan, Republic of Korea, 9-12 May, 2012) by Dr Wendy Watson-Wright, Executive Secretary of IOC and Assistant Director General of UNESCO. The 9th Intergovernmental Session has also approved the extension of the Project into its Second Phase (June 2012- May 2014). He also proposed the direction and focus for the Second Phase of the Project including the involvement of other countries. He suggested that the Ocean Forecasting Demonstration System (OFDS) now be renamed as Ocean Forecasting System (OFS) in view of the fact the project has achieved its major objectives in the first demonstration phase with the operation of the OFDS Web Portal at (http://221.0.186.5/IOC-WESTPAC_OFDS/index.jsp).

3. Prof Fangli Qiao, Leader of Chinese components of OFDS, highlighted the importance of model development and model validation in the development of the OFDS. The forecast products from the OFDS comprised surface wave height, wave period, sea level, three-dimension current, sea temperature and salinity. The model outputs were extensively validated with satellite products and cruise data. Despite those achievements, Prof Fangli reflected that there were still outstanding issues, which urgently need to be improved. These include the acquisition of river discharge and high resolution topographic data for a better prediction of salinity and tide respectively, and acquisition of continuous data for model initialization and validation, data assimilation and high resolution model development for sub-domains.
4. Dr Somkiat Khokiattiwong, Leader of Thai component of OFDS, presented the progress during the first phase. This included the FIO-Thailand joint cruise during August 2011 which aimed to gather observational evidence of bottom compensation current during Southwest monsoon. Influence of fresh water input from rivers to the Gulf of Thailand was also noted. He proposed that the water exchange between the Gulf of Thailand and the South China Sea should be further investigated in the next phase of the project.
5. Prof Fredolin Tangang, Leader of Malaysian component of OFDS presented the progress made by the Malaysian team. Prof Fredolin highlighted earlier collaboration between National University of Malaysia and First Institute of Oceanography in numerical ocean modeling that laid a solid foundation for the establishment of the OFDS project. Prof Fredolin then invited Dr Mohd Fadzil Mohd Akhir to present results from FIO-Malaysian joint cruises in September 2011 and 27 June – 3 July 2012. Interesting features were found during the field surveys including the existing of well-mixed, warm, low-salinity in the upper layer, and cold, saline water very near the bottom. These features as well as eddies should be further investigated. Prof Fredolin also added that, due to lack of funding in the early stage, some anticipated activities such as workshops did not take place. However he had since managed to secure funding for the second phase of the project.
6. Dr Park Kwang Soon, Korean Institute of Ocean Science and Technology, gave an overview of the Korea Operational Oceanographic System. He stressed that the

design of the system was driven very much by the needs of the public and hence received full support from related government agencies.

7. Dr Rita Tisiana Dwi Kuswardani (Anna), Agency for Marine and Fisheries Research and Development, Ministry of Maritime Affairs and Fisheries, Indonesia, gave a presentation of the model simulation of the Upwelling off South Java coast which she had developed during her PhD. She planned to extend the domain of the model to cover all of the Indonesian fishery zones in the future.

3. WAY FORWARD FOR THE SECOND PHASE OF OFDS (2012-2014)

Renaming of OFDS as OFS

8. With many achievements from the first phase of the project, it is timely to change the name of the project from Ocean Forecasting Demonstration System (OFDS) to Ocean Forecasting System (OFS). The meeting decided that subsequent documents and website related to this project should refer to OFS.

Involvement of new members

9. One inquiry was made on the procedure about how researchers from countries, which are currently not part of the OFDS, can participate in the project. Mr Wenxi clarified that WESTPAC is a scientific organization with one of major mandates to develop, facilitate and provide regional platforms for researchers who have common interests to work together. Therefore those who are interested in joining the project can do so without prerequisite of any formal agreement among governments. Dr Somkiat added that countries can choose to participate in the project as developers or as users, depending on their level of needs and readiness. At this point, the meeting noted the interest from Cambodia and Vietnam, and welcomed a verbal confirmation from Indonesia to participate in the second phase of the project.

Funding and Capacity Building

10. It was recognized that funding for cruises should be sought from respective national agencies through available bilateral and/or national projects. In addition, funding for regional workshop could be possibly sought from WESTPAC as it was done for the first workshop on OFDS, Phuket, Thailand, 30 Sep- 1 Oct 2010. Dr Somkiat added that the requirement for capacity building could be met at two levels. For key persons who are actively involved in the OFS (3-4 persons each country), WESTPAC could support a targeted workshop provided that a justifiable proposal could be prepared and submitted. For researchers and PhD students, opportunity is available through the provision of the regular trainings on ocean models and dynamics provided at the UNESCO/IOC-ODC Center. Two regional technical workshops were proposed, one in either Thailand or Malaysia at the early stage and the other toward the end of the second phase with resource persons from FIO, particularly those on operational oceanography.

Extension of OFS Geographic Coverage

11. With the participation of new members including Indonesia, it was agreed to extend the model domain to (20°S-20°N, 80°E-120°E) which can cover the Indonesian Seas, the eastern part of Malaysia and the Andaman Sea with horizontal resolutions no less than $(1/6)^\circ \times (1/6)^\circ$. It was suggested that logical explanation should be clearly justified in the project document on the extension.

Development of high-resolution models in sub- domains

12. The meeting recognized the need to develop high-resolution models in a couple of selected sub-domains, which include the Gulf of Thailand, Eastern Peninsular Malaysia and the South of Java Island and/or west of Sumatra. . It was suggested that 2-4 km resolution probably serve well the needs, subject to further investigation. The meeting expressed its great appreciation to FIO for providing forcing, boundary conditions via downloadable website with username and password.

Model Validation

13. It is acknowledged that data collection for model validation and initial conditions is very crucial for the success of the project. All party agreed to secure funding for joint-cruises in the second phase as well as explore other possibility to collect relevant data. Dr Fadzil highlighted the upcoming joint FIO-Malaysian cruise will be in late September 2012 and two more planned in 2013. He added that his group is exploring the possibility of installing shallow-water mooring at the oil platform. Dr Somkiat confirmed one joint FIO-Thailand cruise in 2013. He pointed out that Thailand was in the process of installing 13 HF radar stations along the Gulf of Thailand and the data can be used to validate the model.
14. Prof Fangli informed that currently SST and Argo buoys data are assimilated to the OFDS system by nudging method which costs about 10% of additional computational resource. He planned to use ensemble Kalman filter which is a better method but costs about 8-10 times higher computational resource compared with nudging. Therefore ensemble Kalman filter will only be used for larger domain while nudging method or objective interpolation will be used for sub-domains.

OFDS Web Portal

15. It was noted that the URL of the OFDS system is not easily searchable from search engines such as Google. (Using combination of words such as “WESTPAC ocean forecasting system” or “MASNUM ocean forecasting system” does not direct to the OFS website). Prof Fredolin requested that model forcing and boundary conditions are provided, and could be downloaded from the OFDS website with user registration and password. Data should be in netcdf format. Suggestion was also made to add more value to the website by providing online analysis tools e.g. OPeNDAP, LAS. Statistics of visitors should also be recorded.

Scientific Focus of OFS

16. The following scientific issues were suggested for further investigation in the second phase of the project, including:

- Water exchange between the Gulf of Thailand and the South China Sea
- Compensation bottom current in the Gulf of Thailand in SW monsoon
- Role of diluted water from the inner Gulf of Thailand and the Mekong River
- Trend of surface wave heights and its effects on coastal erosion
- Water exchange through straits
- Relationship between upwelling and fishery
- Connection between model forecasted results and ecosystem e.g. coral reef
- East Malaysia bottom water and mixing
- Eddy generation and mechanism
- Particle tracking e.g. oil spill

17. Mr Wenxi noted that the proposed topics fell into two broad categories with one on scientific issues and the other on the applications of OFS which is needed to address societal issues. It was generally agreed that with limited time frame of the project (2 years), the priority should be given to those issues directly related to model development, while applications will be dealt with at the next stage. It was suggested that the research priority and long term goals should be clearly and logically outlined in the project document.

Outreach

18. In view of the importance to raise the awareness on the OFS, it was suggested that outreach materials should primarily target two levels, scientists and governments. At scientific level, it can be in the form of brochures which provide details of OFS including its visions, long-term goals of the system, current status and societal issues. For government, it should communicate via national committee with emphasis more on the societal issues such as disaster warning.

4. CLOSURE

19. The meeting concluded that all issues should be drafted into the project document with additional timeline. The document should be ready within one month. The chair thanked all participants for their inputs, Prof. Fangli and his institute for excellent hospitality provided for this workshop.

20. The meeting was closed at 17:00pm, 23 July 2012.

ANNEX I

Third IOC/WESTPAC Workshop on Ocean Forecasting Demonstration System (OFDS) -Project Planning Meeting for the Second Phase of IOC/WESTPAC-SEAGOOS Ocean Forecasting System-

Qingdao, China, 23 July 2012

MEETING AGENDA

- 0830-0845: Registration
- 0845-0900: Open Ceremony chaired by Mr Wenxi Zhu
- 0900-1200: Chaired by Prof. Fredolin Tangang
- 0900-0930: Prof. Fredolin Tangang (Project Leader), OFDS Current Progress: What's achieved & what's not
- 0930-1000: Dr Somkiat, The Thailand component of the project: progress, obstacles and planning for the second phase
- 1000-1030: Prof. Fredolin Tangang/Dr Mohd Fadzil, The Malaysian component of the project: progress, obstacles and planning for the second phase
- 1030-1045: Tea Break
- 1045-1115: Prof. Fangli Qiao, The Chinese component of the project: progress, obstacles and planning for the second phase
- 1115-1200: Open discussion on the Progress, Obstacles and Lessons Learnt for the First Phase Implementation of OFDS (a rapporteur to record outputs)
- 1200-1330: Lunch
- 1330-1700: Chaired by Prof. Somkiat
- 1330-1350: Prof. Park KS, Introduction to Korea Operational Oceanographic System (KOOS)
- 1350-1410: Dr. Anna, the upwelling simulation off Java and model development plan of Indonesia
- 1410-1500: Other presentations if have, and open discussion on the future plans for the Second Phase Implementation of OFS

- 1500-1520: Tea Break
- 1520-1700: Continue discussion
- 1700-1710: Summary by Prof. Fredolin Tangang
- 1710-1720: Closing remarks by Prof. Somkiat
- 1720-1730: Closing remarks by Mr Wenxi Zhu

ANNEX II

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Qingdao, China, 23 July 2012

LIST OF PARTICIPANTS

China

Fangli Qiao
First Institute of Oceanography
China

Changsui Xia
First Institute of Oceanography
China

Feng Shan
First Institute of Oceanography
China

Xianyao Chen
First Institute of Oceanography
China

Haixing Liu
First Institute of Oceanography
China

Lin Zhou
First Institute of Oceanography
China

Malaysia

Dr. Fredolin Tangang
Professor & Head
Research Centre for Tropical Climate
Change System (IKLIM)
Faculty of Science and Technology
The National University of Malaysia
43600 Bangi Selangor
Malaysia
Tel: +603-89213826 / +6019-2718986

Fax: +603-89253357
Email: ftangang@gmail.com

Mohd Fadzil Mohd Akhir
University Malaysia Terengganu
Malaysia

Thailand

Dr. Somkiat Khokiattiwong
Chairperson of UNESCO/IOC-WESTPAC
Head of Oceanography and Marine
Environment
Phuket Marine Biological Center
Department of Marine and Coastal Resources
51 Sakdhidej Rd., Phuket 83000
Thailand

Tel: +66 76 391128
Fax: +66 76 391127
Email: skhokiattiwong@gmail.com

Dr. Pramot Sojisuporn
Chulalongkorn University
Bangkok
Thailand

Tel:
Fax:
Email:

Dr. Patama Singhruck
Chulalongkorn University
Bangkok
Thailand

Tel:
Fax:
Email: Patama.S@chula.ac.th

Dr. Anukul Buranapratheprat
Burapa University
Chonburi
Thailand
Tel:
Fax:
Email:

**UNESCO-IOC Regional Office for the
Western Pacific (WESTPAC)**

Mr. Wenxi Zhu
Head & Programme Specialist
IOC Regional Office for the Western Pacific
(WESTPAC)
Intergovernmental Oceanographic
Commission of UNESCO
Tel: +66 21411287
Fax: +66 21439245
Email: w.zhu@unesco.org

Observers:

Sythuon Sao
Pannasatra University of Cambodia
Cambodia

Rita Tisiana Dwi Kuswardani (Anna)
Agency for Marine and Fisheries Research
and Development
Indonesia

Park Kwang Soon
Korea Institute of Ocean Science and
Technology
Republic of Korea

Jae-Il Kwon
Korea Institute of Ocean Science and
Technology
Republic of Korea

Jung Woon, Choi
Korea Institute of Ocean Science and
Technology
Republic of Korea

Kyoung-ho Cho
Korea Institute of Ocean Science and
Technology
Republic of Korea

Ki-cheon Jun
Korea Institute of Ocean Science and
Technology
Republic of Korea

Ngo Manh Tien
Institute of Oceanography
Vietnam

Tran Van Chung
Institute of Oceanography
Vietnam

Nguyen Huu Huan
Institute of Oceanography
Vietnam

