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Educational, Scientific and  
Cultural Organization

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pour l'éducation  
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Организация  
Объединенных Наций по  
вопросам образования  
науки и культуры

- Intergovernmental  
Oceanographic  
Commission
- Commission  
océanographique  
intergouvernementale
- Comisión  
Oceanográfica  
Intergubernamental
- Межправительственная  
океанографическая  
комиссия

# ROLE OF WESTPAC ON MARINE SCIENCE AND CAPACITY BUILDING IN THE REGION

*Dr Somkiat Khokiattiwong, Chairperson  
IOC Sub-Commission for the Western Pacific (WESTPAC)  
Intergovernmental Oceanographic Commission, UNESCO  
IOC-XXVIII, 18-25 June 2015, Paris, France*

# IOC high-level objectives

- **Healthy ocean ecosystems** and sustained ecosystem services
- **Effective early warning systems and preparedness** for tsunamis and other ocean-related hazards
- **Increased resiliency to climate change** and variability and enhanced safety, efficiency and effectiveness of all ocean-based activities through scientifically-founded services, adaptation and mitigation strategies
- **Enhanced knowledge of emerging ocean science issues**



# IOC Sub-Commission for the Western Pacific and Adjacent Regions



# Programmatic areas and Priorities

## Ocean Observations and Services



## Marine Science and Applications



## Capacity Development



**Understanding Ocean processes and Climate**  
**Ensuring Marine Biodiversity and Sea Food Security**  
**Health of Ocean Ecosystems**

# Structure

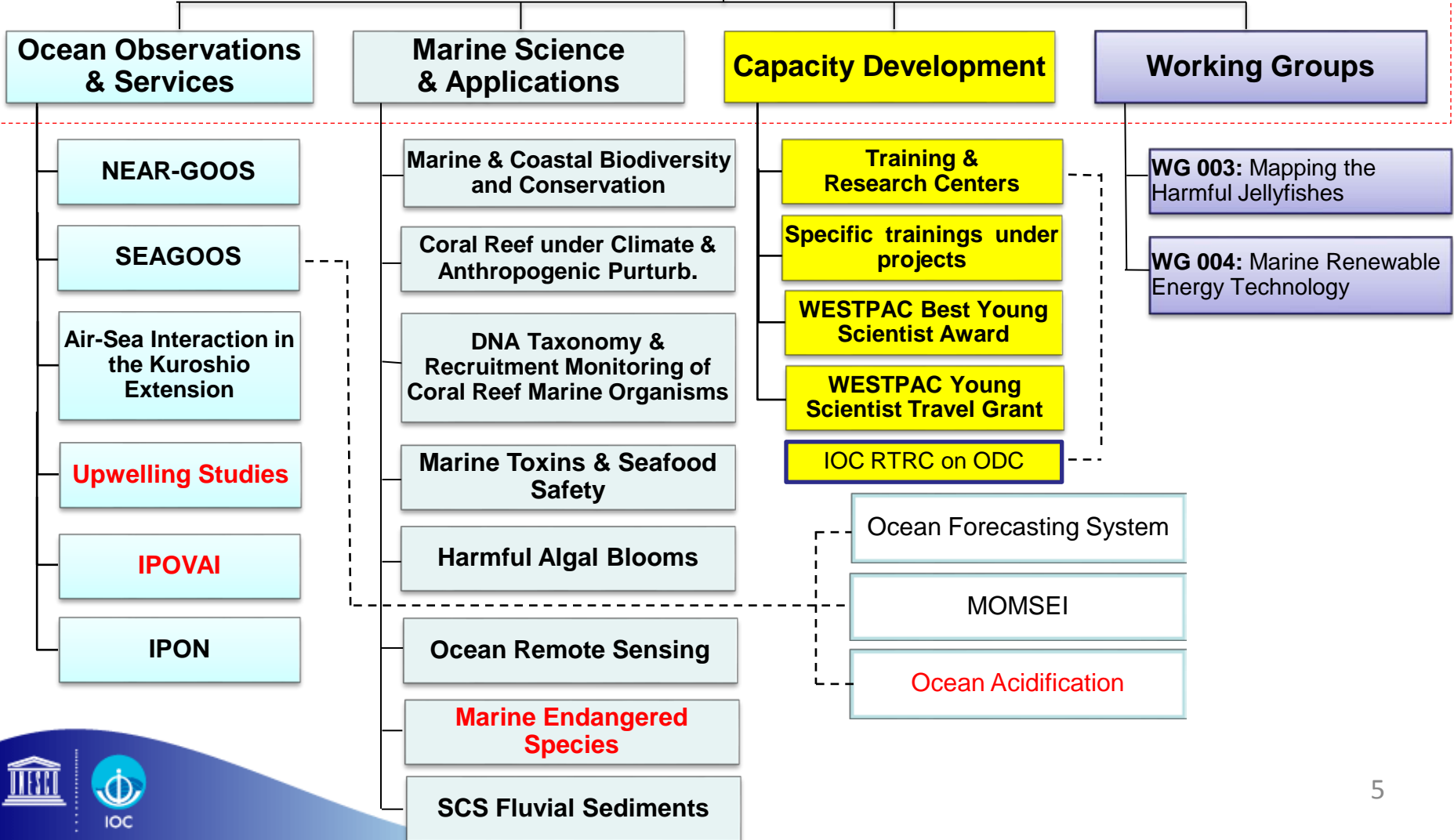
MAY 2015 – MAY 2017

WESTPAC Session

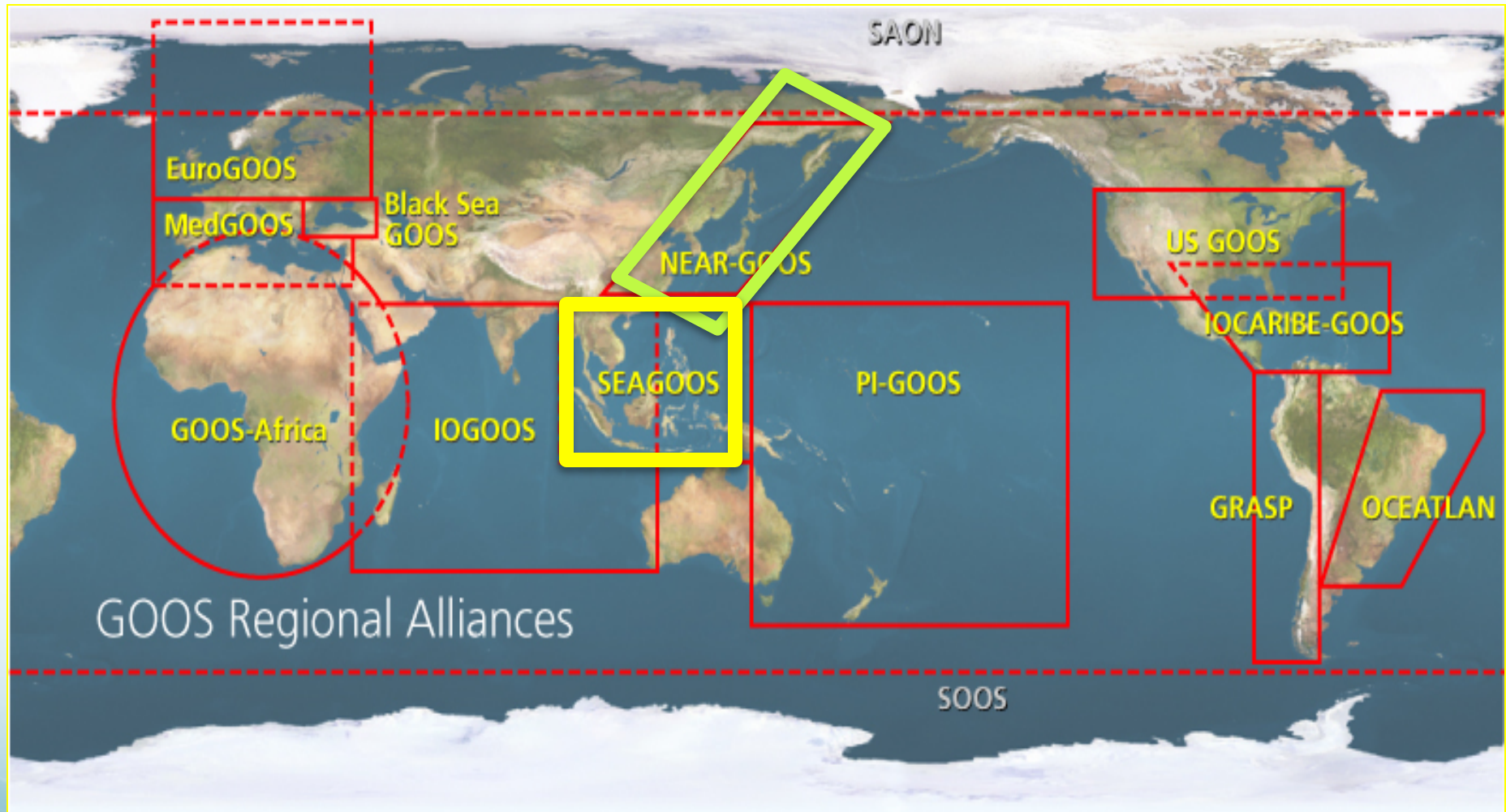
WESTPAC Office, Bangkok

WESTPAC Advisory Group

## WESTPAC International Scientific Symposia



# IOC GOOS Regional Alliances

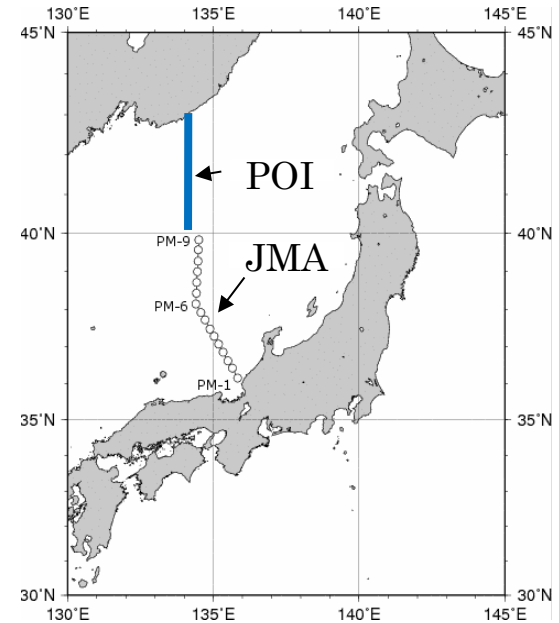
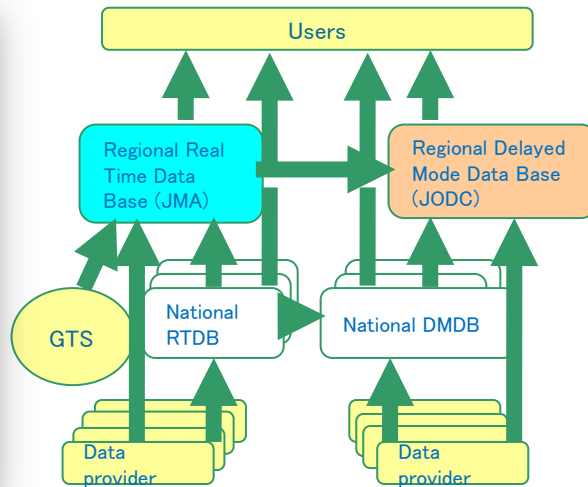
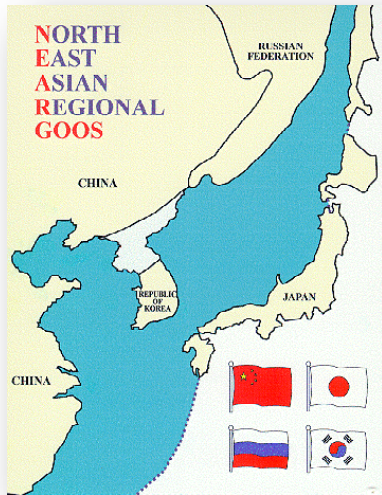


GOOS have come into being in February 1991

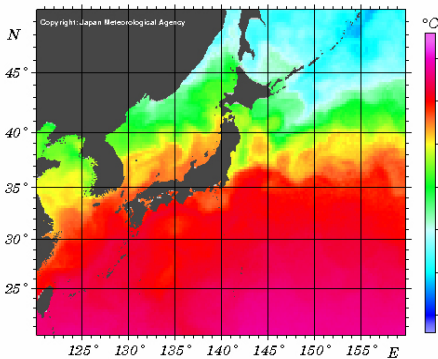
**Develop, strengthen  
sustainable ocean observations and services  
underpinning sustainable development**



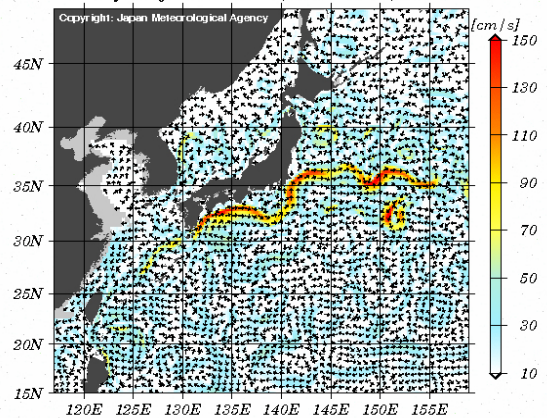
## Regional Data System and Services



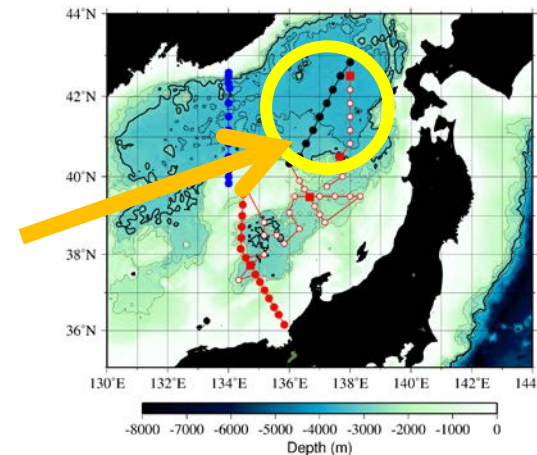
Daily Sea Surface Temperatures, October 24, 2013



Daily Surface Currents, October 24, 2013



## Cross-basin Ocean Climate Monitoring Section



<http://goos.kishou.go.jp/>  
<http://near-goos1.jodc.go.jp/>



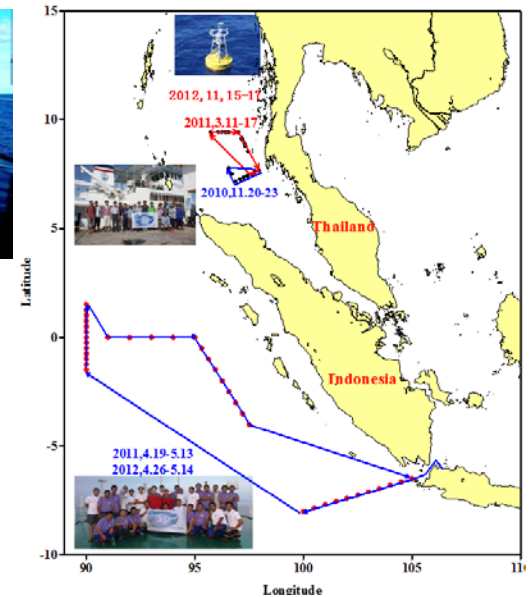
# South East Asian Global Ocean Observing system

## Monsoon Onset monitoring and its Social & Ecosystem Impact (MOMSEI)

Joint cruises and buoy deployment



Regional consultations



MOMSEI Summer School for young scientists



# South East Asian Global Ocean Observing system

## Ocean Forecasting Demonstration

UNESCO/IOC ODC Ocean Modeling Training at FIO, QingDao, China

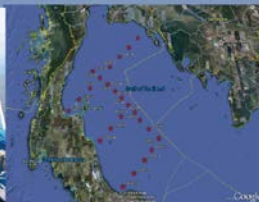


June 10-16, 2011



July 12-22, 2012

Joint Cruises between member countries



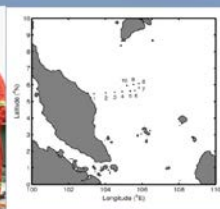
Meeting and workshops



Sep 30-Oct 1, 2010, Phuket

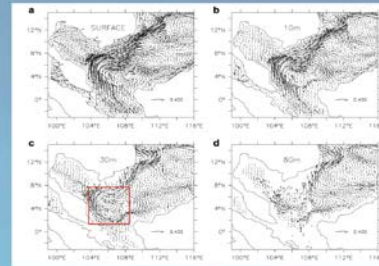


March 5-6, 2013, Jakarta

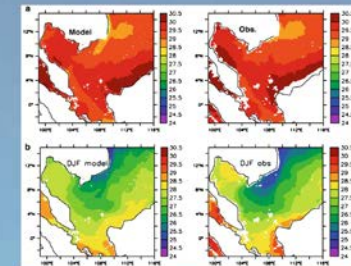


Sep 13-15, 2011, Joint Cruise between FIO, UKM & UMT

### Model Development



Tangang et al. 2011 (Ocean Dyn.)



Tangang et al. 2011 (Ocean Dyn.)

### OFS Website



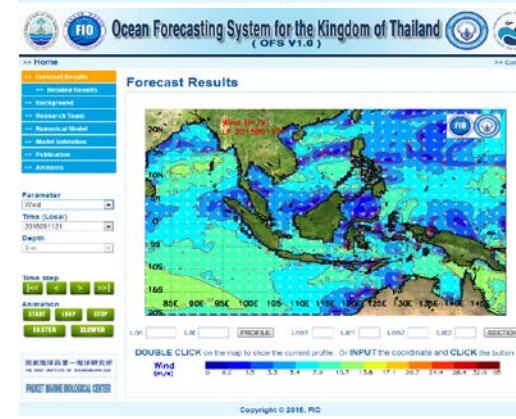
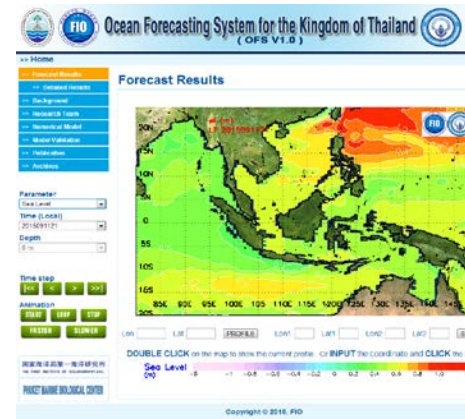
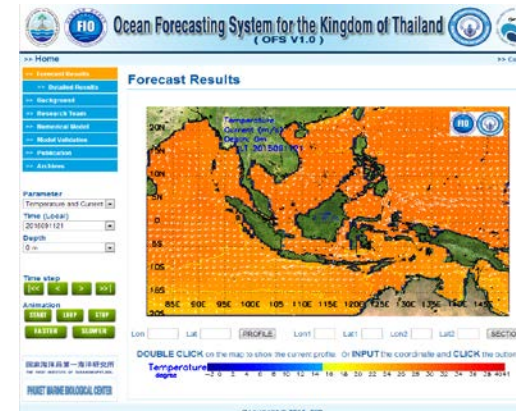
[http://221.0.186.5/IOC-WESTPAC\\_OFDS/](http://221.0.186.5/IOC-WESTPAC_OFDS/)

Future focus.

1. extension of OFS to the region of ((20S-20N, 80E-145E);
2. Development of Higher-Resolution OFS in Sub-domains
3. Engagement of operational agencies and Capacity Building

# Ocean Forecast System for the Southeast Asia Areas (OFS)

## Installation and operation in Thailand with strong technical support from FIO





# Ocean Forecasting System for the Kingdom of Thailand (OFS V1.0)



>> Home

>> Contact

>> Forecast Results

>> Background

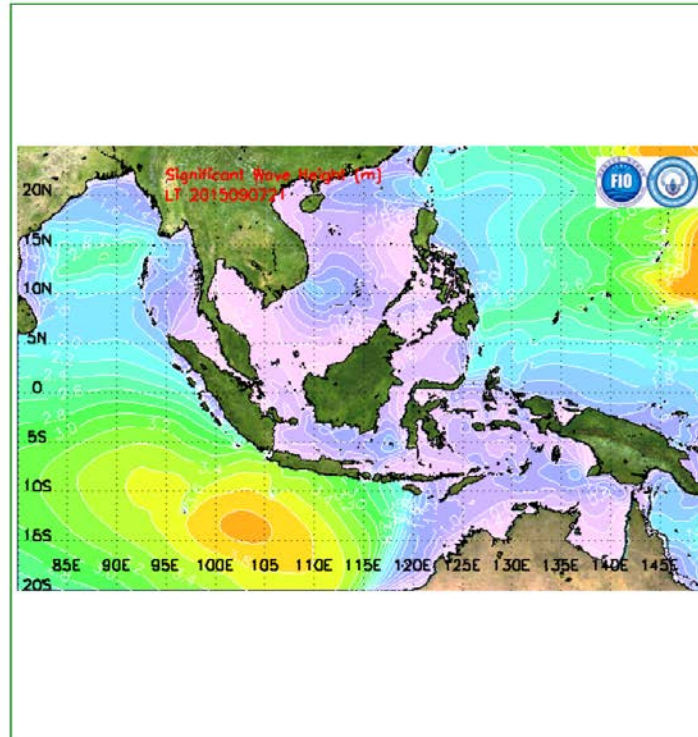
>> Research Team

>> Numerical Model

>> Model Validation

>> Publication

>> Archives



Latest Forecast

国家海洋局第一海洋研究所  
THE FIRST INSTITUTE OF OCEANOGRAPHY.SOA.

PHUKET MARINE BIOLOGICAL CENTER

## Message Board

[MORE](#)

>> The 7th Thailand-China joint workshop on ocean science and technology collaboration was held in Phang-nga, Thailand

During July 14-16, 2015, The 7th Thailand-China joint workshop on ocean science and technology collaboration was held in Phang-nga, Thailand.

>> Prof. Somkiat Khokiattiwong was selected as vice-chair of IOC in June, 2015 in Paris

Prof. Somkiat Khokiattiwong, one of the steering committee member of OFS and the chair of SEAGOOS, was elected as vice-chair of IOC during the 28th Session of the Assembly in June 2015.

>> Prof. Fangli Qiao received Wooster Award of PICES on Oct 20, 2014

At the 2014 PICES Annual Meeting in Yeosu, it was announced that Prof. Fangli Qiao (First Institute of Oceanography State Oceanic Administration, Qingdao) was the recipient of the 14th annual Wooster Award.

## Related Websites

>> [Intergovernmental Oceanographic Commission](#)

>> [IOC Sub-Commission for the Western Pacific \(WESTPAC\)](#)

# Regional Ocean Acidification Monitoring Network

## Objectives

- To establish a regional research and monitoring network on ocean acidification in the Western Pacific and adjacent regions, and
- To develop a regional program to monitor the impacts of ocean acidification on coral reef ecosystems.



# Marine Biodiversity and Ecosystems

## Harmful Algal Blooms

### Meetings



Busan, Korea, Mar 2011



Nha Trang, Vietnam, Mar 2012

### Training Courses



Kota Samarahan, Malaysia,  
March 2011



Nha Trang, Vietnam,  
March 2012

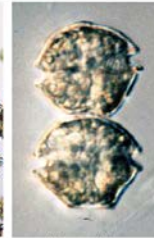
### HAB Species in the Western Pacific



*Gymnodinium catenatum*



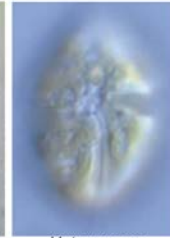
*Pyrodinium bahamense*



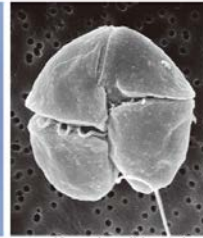
*Alexandrium catenella*



*Cochlodinium polykrikoides*



*Heterocapsa circularisquama*



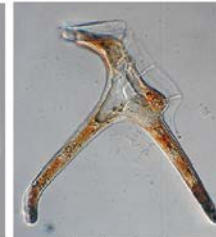
*Karenia mikimotoi*



*Dinophysis acuminata*



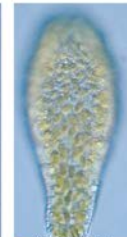
*Dinophysis fortii*



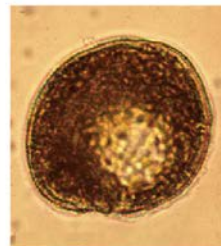
*Dinophysis miles*



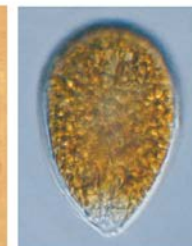
*Heterosigma akashiwo*



*Chattonella antiqua*



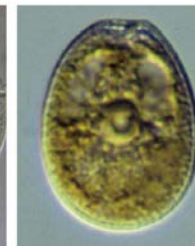
*Gambierdiscus toxicus*



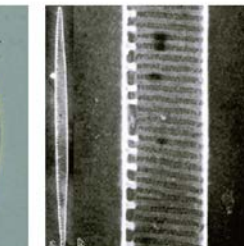
*Ostreopsis siamensis*



*Ostreopsis lenticularis*



*Prorocentrum lima*



*Pseudo-nitzschia delicatissima*

# Marine Biodiversity and Ecosystems

## Harmful Algal Blooms



↓ leader of HAB science in their home country



First WESTPAC Training Workshop on Red Tide  
"Taxonomy and Techniques for Red Tides Research"

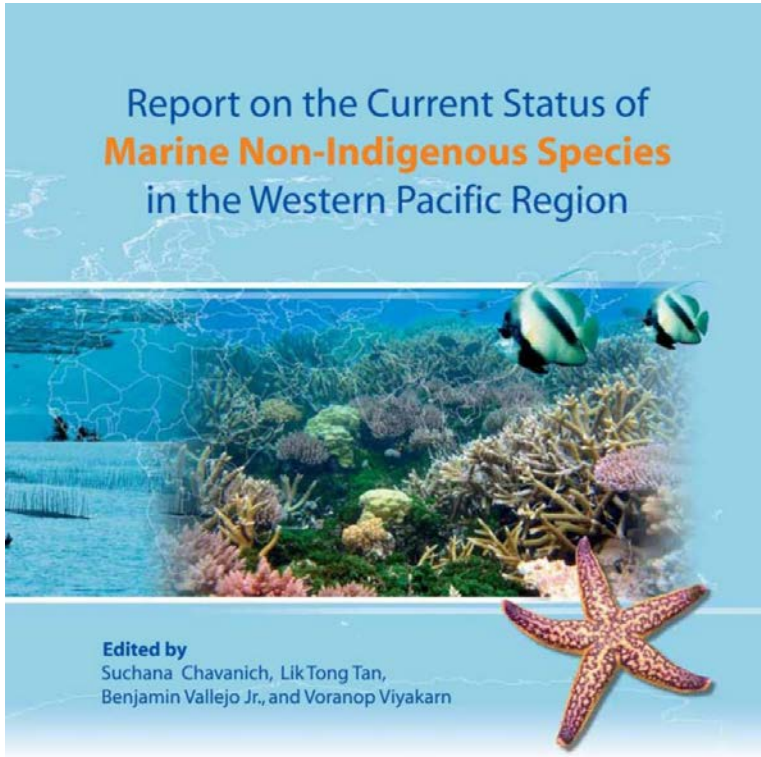
14 - 23 March 1985

Chulalongkorn University Bangkok

1985

# Marine Biodiversity and Ecosystems

## Marine Alien Species



Rapid Assessment Survey of Marine Alien Species

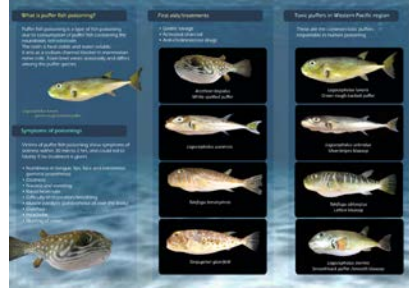


Scientific Workshops and Capacity Building



# Marine Biodiversity and Ecosystems

# Marine Toxins and Seafood Safety



Poster and brochure on common toxic puffers



Regional workshop on Toxic Marine Organisms, Singapore, 6-10 March 2013



Translation of the SPC/IRD Publication on Ciguatera into native languages



Training workshop on Immunological method for detection of domoic acid in plankton and shellfish”, Nha Trang, Vietnam, 19-22 Mar 2012



Regional Workshop on Toxic Marine Organisms, Nha Trang, Vietnam, 19-22 Dec. 2010



Training Workshop on Taxonomy and ecology of the diatom Pseudo-nitzschia, Kota Samarahan, Malaysia, 20-24 March 2011

# Marine Biodiversity and Ecosystems

## Coral Reef Restoration

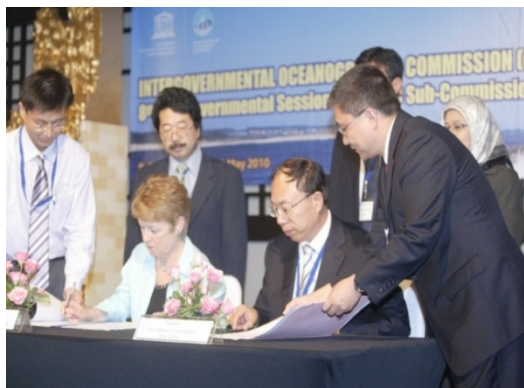


Trainings and studies on the impact of sediment on coral reefs

Field study on coral reef restoration techniques

## Capacity Development

# IOC Regional Network of Training and Research Centers



Signing on 11 May 2010



Inaugurating on 9 June 2011



First Regional Training on Ocean Models,  
10-16 June 2011



Second Regional Training on Ocean Dynamics,  
Qingdao, 16-22 July 2012

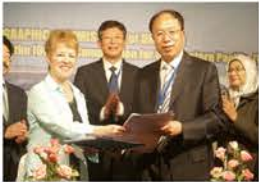
### To be established:

Regional T&R Center on  
Tropical Marine Biodiversity  
(Indonesia) ;

Regional T & R Center on  
Climate Change and Ocean  
Ecosystems (Thailand);



# Review of the past five years



Ceremony for signing agreement on the establishment of ODC  
May 11, 2010



Ceremony for launchment of ODC in FIO  
June 9, 2011



Ceremony for issuing Prof. Qiao a certification of the director of ODC  
May 10, 2012



During 2011 to 2015, the ODC center has organized five regular training courses with total 239 trainees from 32 countries.

## Proposed schedule and topics for next five years

- 2016 Ocean dynamics and multi-scales interaction
- 2017 Development of coupled regional ocean models
- 2018 Ocean forecast system
- 2019 Climate dynamics and air-sea interaction
- 2020 Development and application of coupled regional climate models



The first training course on ocean models  
Qingdao, China, June 10-16, 2011



The second training course on ocean dynamics  
Qingdao, China, July 16-22, 2012



The third training course on air-sea interaction and modeling  
Qingdao, China, August 12-23, 2013



The fourth training course on climate models  
Qingdao, China, November 3-14, 2014



The fifth training course on climate change  
Qingdao, China, September 7-18, 2015



# UNESCO/IOC-ODC Sixth Training Course on Ocean Dynamics and Multi-scales Interaction



*Sixth training course of UNESCO/IOC -ODC on Ocean Dynamics and Multi-scale Interaction, Qingdao, China, 05-16 September 2016*

**37 trainees from 16 countries attended.**

(Bangladesh, Cambodia, Ecuador, Ghana, India, Indonesia, Iran, Korea, Malaysia, Pakistan, Peru, Sudan, Thailand, Tunisia, Vietnam and China)

Qingdao, China, 05-16 Sep 2016

**Prof. Dongping Wang**

School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, NY, USA

**Dr. Xunqiang Yin**

The First Institute of Oceanography, State Oceanic Administration, China

**Prof. Fangli Qiao**

The First Institute of Oceanography, State Oceanic Administration, China

**Prof. Dejun Dai**

The First Institute of Oceanography, State Oceanic Administration, China

**Dr. Hongyu Ma**

The First Institute of Oceanography, State Oceanic Administration, China

**Prof. Quanan Zheng**

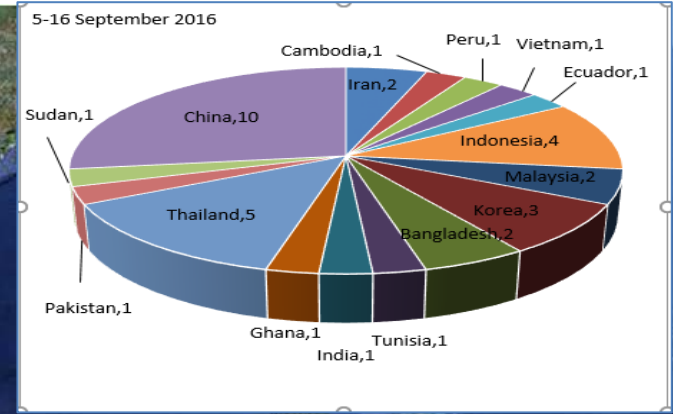
Department of Atmospheric and Oceanic Science  
University of Maryland, College Park, MD 20742, USA

**Dr. Lingling Xie**

Guangdong Key Lab. of Climate, Resource and Environment in  
Continental Shelf Sea and Deep Sea, Guangdong Ocean University,  
Zhanjiang, China

University of Maryland, College Park, MD 20742, USA

# ➤ Sixth training course of UNESCO/IOC –ODC on Ocean Dynamics and Multi-scale Interaction, Qingdao, China, 05-16 September 2016



**INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION**  
**COMMISSION OCEANOGRAPHIQUE INTERGOUVERNEMENTALE**  
**COMISSÃO OCEANOGRÁFICA INTERGOVERNAMENTAL**  
**МЕЖПРАВИТЕЛЬСТВЕННАЯ КОМПАНИЯ ОЦЕАНОГРАФИЧЕСКАЯ**  
**الاتحاد الدولي للمؤسسات الحكومية لعلوم المحيطات**

UNESCO/IOC/ODC  
 100, rue de la Conférence, 92000 Nanterre Cedex, France  
 Tel: +33 (0)1 47 37 61 00 Fax: +33 (0)1 47 37 61 01  
 Email: [info@iocommission.org](mailto:info@iocommission.org)

IOC Circular Letter No. 2534  
 (English only) WWWW/2016  
 18 August 2014

To: Official National Coordinating Bodies for Liaison with the IOC in the Western Pacific

CC: Permanent Designated Observers/Mission to UNESCO of IOC Member States in Western Pacific  
 National Commissioners for UNESCO of IOC Member States in Western Pacific  
 IOC and WESTPAC Officers  
 Other IOC Member States

Subject: WESTPAC Training Course on Climate Models – IOC Regional Training and Research Centre on Ocean Dynamics and Climate, Qingdao, China, 3-14 November 2014

Actions/covered: To nominate one or more participants to the Training Course, preferably no later than 15 September 2014

You may recall that in 2010 the Intergovernmental Oceanographic Commission (IOC) of UNESCO approved by resolution EC-XL/12 the establishment of a Regional Training and Research Centre on Ocean Dynamics and Climate (referred to as "IOC Centre") at the First Institute of Oceanography, State Oceanic Administration of China.

(Since its inauguration on 9 June 2011, the IOC Centre organized three training courses on: Ocean Models (10-15 June 2011), Ocean Dynamics (16-22 July 2012) and Air-Sea Interaction and Modelling (17-23 August 2013) in accordance with its establishment agreement and objectives.

"The objectives of the Centre shall be to enhance the regional research capacity and capability on ocean dynamics, air-sea interactions, climate change and numerical modeling through, among other, provision of regular training courses in English once a year to around 15-20 junior scientists and doctoral/master students mainly from the developing Member States of IOC in the Western Pacific"

I have the pleasure to inform you that the fourth training course at the IOC Centre is being scheduled from 3 to 14 November 2014 upon the kind invitation of the Government of China. It will focus on Climate Models. In light of the constructive suggestions and overwhelming interests received from the previous trainings, this training course will last for two weeks with the number of trainees limited to 30.

The training is designed to comprehensively introduce climate models, covering the numerical models of ocean, atmosphere, ice, land and global carbon. Six experienced experts in the field from different countries will be giving lectures as part of this training course. General information is provided in annex 1 to this letter. Updated information will be made available, in due course, at the WESTPAC website (<http://www.westpac.org>), and the website of the IOC Centre ([http://www.iocommission.org/training\\_center/index.htm](http://www.iocommission.org/training_center/index.htm)). The training course will be conducted in English.

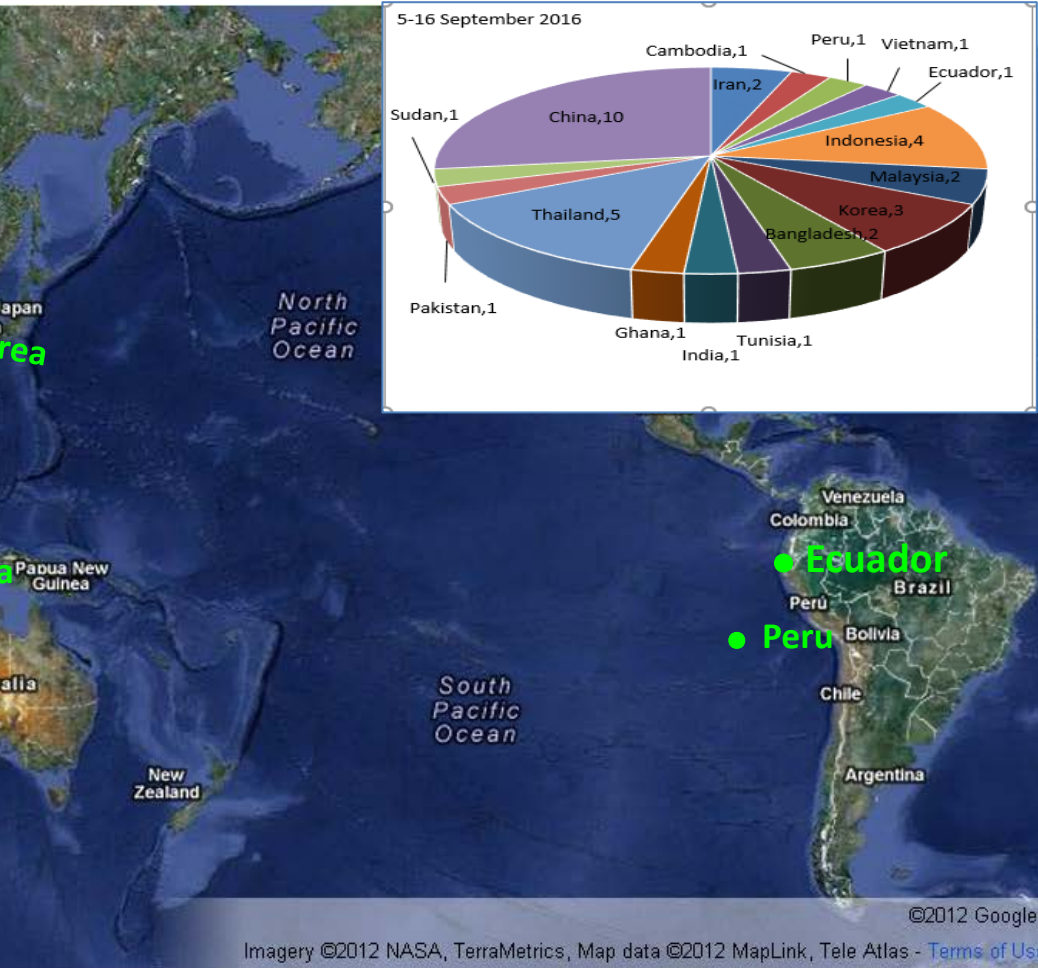
On behalf of IOC, I encourage you to nominate one or more qualified trainees to attend the fourth training course using the attached application form (Annex 2), noting that priority will be given to young scientists and junior technical staff who have experience in climate modeling or have master/doctoral degree in related fields. Some limited funding is available from the Centre to support participants from developing countries. A selection committee will be established for this purpose.

I would appreciate your assistance in providing detail of suitable trainees from your country by sending application forms duly completed to Dr Junping Yin from IOC and Mr Wenze Zhu, Head of UNESCO/IOC Regional Office for the Western Pacific (WESTPAC) as mentioned at the end of the attached general information, before 15 September 2014.

I take this opportunity to thank you once again for your cooperation and look forward to the active participation of suitable trainees from your country in the training course.

Yours sincerely,  
 Wendy Watson-Wright  
 Executive Secretary, IOC

Enclosures (2) 1. General Information on the Training Course  
 2. Application Form



- 2 weeks Training Course
- Trainee Report, Group Discussion and Report
- There were **37 trainees from 16 countries** attended

## Capacity Development

# IOC Regional Network of Training and Research Centers



Inaugurating on 9 June 2011

### UNESCO/IOC RTRC on Ocean Dynamics and Climate

Totally, ODC center has successfully organized 6 training courses with **274** trainees from **38** countries during 2011-2016, which have greatly enhanced the capacity building of IOC member states

**New RTRC was established in 2016:**

**Regional T&R Center on Tropical Marine Biodiversity (Indonesia)**

**To be established:**

**Regional T & R Center on Harmful Algal Blooms Studies (Malaysia)**

## Capacity Development

# Topic-specific trainings/summer school

### HARMFUL ALGAL BLOOMS



Biodiversity and taxonomy national training in Singapore, 18-22 Aug 2014



HABs and Biotoxins national training in Malaysia, 12-15 Aug 2014



Training course on recruitment monitoring of coral reef organisms, Nha Trang, 20-21 Apr 2014

### MARINE TOXINS & SEAFOOD SAFETY



Training workshop on ciguatera study, Tokyo, 5-6 Nov 2013

### CORAL REEF CONSERVATION & RESTORATION



Training course on taxonomy of soft corals, Phuket, 24-26 Sep 2013



3rd summer school on Resilience of coral reefs to the climate change, Nha Trang, 18-21 Apr 2014



## Capacity Development

# Topic-specific trainings/summer school

### OCEAN REMOTE SENSING



Training course on remote sensing for coastal habitat mapping, Nha Trang, 25-27 Apr 2014

### MOMSEI SUMMER SCHOOL



3<sup>rd</sup> Summer School, Aug 2012  
4<sup>th</sup> Summer School, Aug 2013  
5<sup>th</sup> Summer School, Jakarta, Sep 2014



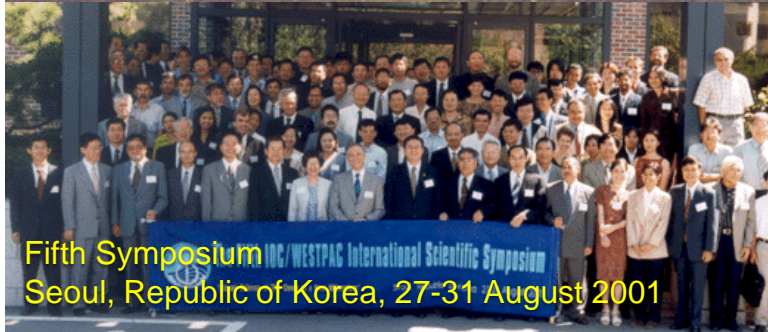
# IOC/WESTPAC International Scientific Symposia



Third Symposium  
Bali, Indonesia, 22-26 November 1994



Fourth Symposium  
Okinawa, Japan, 2-7 February 1998



Fifth Symposium IOC/WESTPAC International Scientific Symposium  
Seoul, Republic of Korea, 27-31 August 2001



Seventh Symposium  
Sabah, Malaysia, 21-25 May 2008



Sponsored by: Intergovernmental Oceanographic Commission  
State Oceanic Administration  
Laboratory-commissioned  
-4 Institute

Sixth Symposium  
Hangzhou, China, 19-23 April 2004



Eighth Symposium  
Busan, Republic of Korea, 28-31 March 2011



WESTPAC Outstanding Scientists Award



WESTPAC Best Young Scientists Award

WESTPAC

# Call for Proposals and Participation

10th WESTPAC International Scientific Symposium,  
17-20 April 2017, Qingdao, China

[IOCWESTPAC10.COM](http://IOCWESTPAC10.COM)



**WESTPAC**  
10th International Scientific Conference  
17-20 April 2017 Qingdao, China



# WESTPAC

## CHINA

State Oceanic Administration (SOA)  
First Institute of Oceanography (FIO)  
Third Institute of Oceanography (TIO)  
National Marine Data and Information Services (NMDIS)  
Institute of Oceanology  
Ocean University of China  
East China Normal University  
Tongji University  
South China Sea Institute of Oceanology (SCSIO)  
Zhejiang University

## KOREA, DPR

Department of International Relations,  
State Hydro-Meteorological Administration  
(SHMA)

## REP OF KOREA

Korea Institute of Ocean Science  
and Technology (KIOST)  
Korea Hydrographic and  
Oceanographic  
Administration (KHOA)  
National Fisheries Research and  
Development Institute (NFRDI)  
Seoul National University

## RUSSIA

V.I. Il'chev Pacific Oceanological  
Institute (POI), Russian Academy  
of Sciences, Far Eastern Branch

## PAKISTAN

National Institute of  
Oceanography

## IRAN

Iranian National Institute  
of Oceanography &  
Atmospheric Science

## INDIA

National Institute of  
Oceanography (NIO)

## BANGLADESH

Ministry of Foreign Affairs  
University of Chittagong

## KENYA

Kenya Meteorological Department

## SRI LANKA

National Aquatic Resources Research  
and Development Agency (NARA)

## THAILAND

Department of Marine and  
Coastal Resources (DMCR)  
Chulalongkorn University  
Phuket Marine Biological Center (PMBC)  
Burapha University  
National Science Museum

## MYANMAR

Department of Meteorology  
and Hydrology

## PHILIPPINES

University of the Philippines  
National Fisheries Research and Development Institute  
Mindanao State University

## JAPAN

Ministry of Education, Culture,  
Sports, Science and  
Technology (MEXT)  
The University of Tokyo  
Japan Agency for Marine-  
Earth Science and Technology  
(JAMSTEC)  
Japan Meteorological Agency (JMA)  
Japan Oceanographic Data Center (JODC)

## CAMBODIA

Ministry of Environment  
Royal University of  
Phnom Penh

## VIETNAM

Institute of Oceanography  
Marine Hydrometeorological Center  
Institute of Marine Environment and Resources

## INDONESIA

Indonesian Institute of Sciences (LIPI)  
Agency for the Assessment & Application of  
Technology (BPPT)  
Indonesian Geospatial Information Agency  
Bogor Agricultural University  
Agency of Marine and Fisheries Research &  
Development, MOMAF  
Institute Technology of Bandung  
Brawijaya University  
Hasanuddin University  
Institute for Marine Research and Observation

## SINGAPORE

National University of Singapore  
Nanyang Technological University

## AUSTRALIA

Australian Bureau of Meteorology

## MALAYSIA

National Oceanography Directorate (NOD),  
Ministry of Science, Technology and Innovation  
Universiti Malaysia Terengganu  
Universiti Kebangsaan Malaysia  
Universiti Sains Malaysia  
Universiti Malaysia Sarawak  
National University of Malaysia  
University of Malaya  
Universiti Malaysia Sabah  
Universiti Teknologi Malaysia



# UNESCO-ASEAN Cooperation Agreement

Framework Agreement for Cooperation

between

the United Nations Educational, Scientific  
and Cultural Organization  
(UNESCO)

and

the Association of Southeast Asian Nations  
(ASEAN)

UNESCO Headquarters  
17 December 2013



## Programme Area: Health of the coasts and ocean

**Objective:** To protect, restore and sustain the health and productivity of the coasts and ocean for prosperity in the ASEAN region

### Action:

1. Promote regional cooperation on **marine scientific research, observations (the South East Asian --Global Ocean Observing System), data management and services and capacity building** to underpin ASEAN's efforts in the protection, restoration and sustainability of the coasts and ocean;
2. Deploy efforts to **better understand the effects of climate change, including ocean acidification, on the vulnerable marine ecosystems**, particularly coral reefs and mangroves;
3. Strengthen general **science-based knowledge for ocean management**, including marine spatial planning;
4. Promote **integrated and sustained monitoring and warning systems** for natural hazards, particularly coastal and oceanic natural hazards in close coordination with other relevant organizations, using enhanced coastal and ocean networks, including education and training activities;
5. Support the development of the **global integrated assessment** of the state of the marine environment including socio-economic aspects by 2014;
6. Assist in the **capacity development of ASEAN Member States** on marine science, observations and services, through the **"UNESCO/IOC Regional Network of Training and Research Centers (RTRCs) on Marine Science"** and other available resources, to empower ASEAN Member States in the protection, and sustainable development of their coasts and ocean.





Thank You !