



**INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)**

**Eleventh Intergovernmental Session of the IOC
Sub-Commission for the Western Pacific (WESTPAC-XI)
Qingdao, China, 21-23 April 2017**

Item 6.2 of the Provisional Agenda

**WORKING GROUP PROPOSAL ON
A FRAMEWORK FOR COOPERATIVE STUDIES IN THE WESTERN PACIFIC
MARGINAL SEAS: ENERGY AND MATERIALS EXCHANGE
BETWEEN LAND AND OPEN OCEAN**

WESTPAC has been furthering himself as a key catalyst, advocate, coordinator and facilitator in the region to promote ocean knowledge, sustained observations and services for the improvement of ocean governance towards a healthy ocean and coasts for prosperity.

This action, among others, aims to encourage scientists in the region with strong willingness to lead regional efforts in addressing the most ocean-related compelling issues. Due to financial restrictions, WESTPAC may only be able to provide some “seed” fund, and/or assist in leveraging support/fund to catalyze/implement the adopted projects.

I. PROPOSED WORKING GROUP:

1. A framework for cooperative studies in the Western Pacific Marginal Seas: Energy and materials exchange between land and open ocean

II. PROPOSED WG CHAIR AND ITS MEMBERS:

Chair: Prof. Jing Zhang, Japan

Members: Prof. Takeshi Matsuno, Japan
Prof. Joji Ishizaka, Japan
Dr. Jae Hak Lee, Korea
Dr. Vyacheslav Lobanov, Russia
Prof. Meixun Zhao, China
Prof. Xiaopei Lin, China
Prof. Cesar Villanoy, Philippines

III. PROPOSED DURATION:

2. 4 years from 2017 to 2020

IV. JUSTIFICATIONS FOR THIS WORKING GROUP:

3. Marginal seas in the Western Pacific Ocean are located in the boundaries between the continents or islands and the open ocean. Under the enhancement of climate change, it is very important to understand what happens in the marginal seas and how energy and materials exchange between land and ocean through the marginal seas. Significant changes of the water cycle on land due to the changing climate, together with increasing human economic activities, will affect the ocean structure and ecosystem in the coastal area. The environmental changes of the marginal seas (including coast and shelf regions), strongly influence material transport and biological structure in the area. For example in the East China Sea, significant change in the fishing activity during the past half century have been caused not only by over-fishing but also environmental changes. By extension these changes may extend to the pelagic ocean, since marginal seas are a place of spawning and juvenile growth.

4. To progress and improve our knowledge on the marginal seas and to recognize their significance, an urgent task is to build up a framework to arrange the interdisciplinary and regional joint studies on the environment of the marginal seas. There are various issues that need to be resolved through cooperative studies, such as quantitative evaluation of water mixing, material transport and biological response, often controlled by a combination of physical and biogeochemical processes. Especially in the East China Sea, lack of evidence from field work, such as origin identification, parameterization and process explanation, limits the improvement of numerical experiments and modeling. Broad areas with rapid spatial-temporal changes with fluctuating hydrographic conditions, geographically surrounded by several countries with adjoining territories and EEZs, all enhance the difficulty of cruise design in the East China Sea and other marginal seas. Very few joint cruises had been conducted, e.g. MASFLEX (Marginal Sea Flux Experiment in the West Pacific, 1992-97).

5. In summary, the establishment of an international framework, of interdisciplinary and regional cooperative field studies is urgently required. This framework is expected to improve our common understanding about what happens in the marginal seas and subsequent impacts, through inter-comparing contemporaneous field experiments among various research groups and strengthening interdisciplinary projects, e.g. data-modeling synergy, physical bio-geochemical studies.

6. SCOR Working Group 129 (2006-2009), Deep Ocean Exchange with the Shelf (DOES), surveyed past studies and provided recommendations for future work on the exchange between the deep ocean and the shelf region. It recommended where and how the exchange between the shelf region and open sea should be investigated, and the East China Sea was one of the regions where studies had been progressed among world various marginal seas. In the East China Sea, various processes have been investigated, for example ocean currents with frontal eddies and transport of particles and spawning areas within an individual country's territory. However, environmental phenomena with rapid changes generally take place with the combination of multiple processes and beyond national boundaries. In this view, scientific understanding is still limited even in the East China Sea, for example, interaction between the Kuroshio and the shelf water should be examined quantitatively with a combination of physical and biogeochemical processes.

7. Furthermore, an international study of the marine biogeochemical cycle of trace elements and their isotopes (TEIs), GEOTRACES, takes interest in the theme "continental run off", the material transport from the land to the open ocean, particularly with understanding of geochemical TEIs. GEOTRACES was officially approved by SCOR in 2006. The primary objectives of GEOTRACES are to determine global oceanic distributions of selected TEIs and to evaluate the cycling of these TEIs, and thereby characterize the physical, chemical, and biological processes regulating their distributions. GEOTRACES expeditions in the world ocean basins began in 2010, and the program runs for at least a decade and involve more than 35 nations. Under this international framework, after five year preparation, a joint cruise by using two research vessels, Japanese Hakuho-maru and Chinese Dongfanghong2 were conducted in the East China Sea in the fall 2015, and two cross stations in the central shelf edge were included. Collaborating with Korean scientists, the Japanese expedition also covered the stations in the Korean EEZ. Because the observations during these cruises were focused more on the bio-geochemical TEIs rather than physical and biological studies, a series of research cruises in different seasons over wider areas with more countries involved are essential, but at this time there is no such plan.

8. Marginal seas in the western North Pacific and western boundary current area are rich in the variability of bottom character and bathymetry, constantly or intermittently exchanging energy and materials between land and open ocean. As these marginal seas play a decisive role in the sustainable development and environmental adaptation/protection facing the global/regional climate changes, it is urgently necessary to establish a framework for cooperative studies to improve our common understanding of status and impact of energy and materials exchange in marginal seas.

9. The previous/current cooperative studies are mostly based on the relationship between individual scientists' small groups, which limits the capacity of field observations spatially and temporally in the marginal sea area. It is necessary to establish a scientific working group under the rather formal-international framework of WESTPAC, where we can discuss and summarize our present understanding of the marginal seas in the Western Pacific, focusing on the field studies/investigations in such areas as recommended by SCOR WG 129. The international framework can enhance the visibility of national projects to acquire research funding, attract more young scientists to be involved, and enlarge the scientific community. This working group will encourage the related countries involved to design and plan joint cruises, strengthening the regional scientific communication network.

V. OBJECTIVES AND EXPECTED OUTPUTS/OUTCOMES:

10. Objectives of this Working Group are first to exchange information and knowledge on the phenomena in the individual marginal seas around various countries, and then discuss how common understanding of physical and bio-geochemical processes in the marginal seas can be achieved. International and interdisciplinary cooperative cruises are one of expected output of this WG. The most important objective is to design and mandate the cooperative research cruises to collect real data via field observations.

11. Capacity building occupies an important place in this working group. We will encourage early career scientists in the WESTPAC region to discuss the scientific cooperative research and organize their own communities, and expect they will commit to the joint oceanic research and observations necessary for the next decades.

12. In the first stage, 2017 and 2018, through discussion in repeated workshops, it is expected that international and interdisciplinary cooperative research groups would be established, not only within the working group members but also including the young generation. In the second stage, 2019 and 2020, the cooperative research groups established in the first stage, will individually start their activities, such as building up other cooperative research activates with increased funding, planning of cooperative cruises, and encouraging to hold workshops by early career scientists. We expect that cooperative research cruises will be carried out in the East China Sea and Okhotsk Sea during this stage. At the end, recommendations of the WG's activities will be published including a preliminary report of the cruises as well as the report of improved understanding on the role of the marginal seas based on summary of the workshops.

VI. TERMS OF REFERENCE OF THE WORKING GROUP:

1. COMPOSITION

13. The Working Group shall consist of all member states of WESTPAC who are interested in participating. Once the Principal Investigator (PI) is identified by the IOC Sub-Commission for the Western Pacific, he/she shall serve as the Chairperson of this Working Group. Each country, through its IOC National Focal Point, shall designate one or two members with expertise in physical and/or bio-geochemical processes in the marginal seas in consultation with the PI.

2. FUNCTIONS

14. The Working Group is established to share the scientific information and encourage possible cooperative research. The major mandate of this Working Group is to facilitate common understanding on the role of the marginal seas in WESTPAC region on the global environment.

15. The Group will carry out the following functions:

- 1) Provide opportunities to exchange scientific knowledge and information on the marine environment research in the marginal seas among experts of the member states;
- 2) Have a workshop once a year to share the result and the newest information in a timely fashion;
- 3) Provide recommendations for the international scientific community to promote international cooperative research;
- 4) Promote regional pilot projects during and after the workshop; and
- 5) Encouragement of early career scientists to partake in WG events, actively exchange ideas and build international cooperative communities.

VII. MAIN ACTIVITIES TO BE CARRIED OUT

16. A workshop will be held with not only the working group members but other participants who are interested in the cooperative research once a year. Through the discussion in the workshops,

several cooperative research groups will be organized. The research groups arrange individual cooperative research plans, and apply various research funds to carry out the research plan. The Working Group also provides opportunities to build up cooperative communities for early career scientists.

VII. PROPOSED WORK PLAN AND BUDGET FOR MAY 2017 - MAY 2019

Project	Activities	Objectives	Expected outputs/outcomes	Date and Place	Funding required	
					IOC	Other sources (i.e. from national/international sources)
WPMS	1st Workshop	Determine what kinds of knowledge we could share and what is important to establish common understanding, then expand members to participate in the next workshop. Survey and invite early career scientists who could build international cooperative communities	Clarify issues for common understanding on the marine environment in the marginal seas, and recommend possible cooperative research groups as well as early career groups	September 2017 in Fukuoka	8000 USD	Possible but not fixed
	2nd Workshop	Promote formation of sub-groups for cooperative researches and plan possible cooperative cruises. Provide an opportunity to encourage early career scientists to progress their relationship.	A few cooperative research groups start their activities and recommend cooperative cruises in the marginal seas. Framework by early career scientists starts for future cooperative researches.	September 2018 in Qingdao	8000 USD	Possible but not fixed