Item 5.1.5 of the Provisional Agenda

PROGRESS REPORT ON
SOUTH CHINA SEA FLUVIAL SEDIMENTS AND ENVIRONMENTAL CHANGES
(May 2015–April 2017)

In accordance with Terms of Reference of IOC Sub-Commission for the Western Pacific, the report is provided to facilitate the consideration by the Sub-Commission on the progress made on the WESTPAC project on South China Sea Fluvial Sediments and Environmental Changes (WESTPAC-FluSed).

The Sub-Commission is invited to discuss about the progress made over the past intersessional period, provide directives and advice on its future development, and further identify resources and national commitments to its implementation in the region.
I. Project

1. South China Sea Fluvial Sediments and Environmental Changes (FluSed)

II. Project objectives and expected outputs/outcomes

2. Scientific objectives include: (1) to investigate fluvial sediment source-to-sink process in the South China Sea; (2) to reconstruct time series variation of sediment transport and deposition in the past; (3) to evaluate environmental change and human activity influences on fluvial sediments in the South China Sea.

3. Expected outcomes include: (1) synthesizing physical and chemical weathering of lands surrounding the South China Sea and its controlling mechanism; (2) recognizing source-to-sink transport patterns of fluvial sediments from past and current scenarios in the South China Sea in order to predict future trends; (3) understanding influences of environmental change and human activity on formation, transport, and deposition of fluvial sediments; (4) strengthening collaboration and young talents training on related disciplines of ocean and Earth sciences among participating western Pacific countries.

III. Principal Investigator (Chairperson) and Project Steering Group

4. Principal Investigator: Dr. Zhifei Liu (Tongji University, China).

5. Program Steering Group:

   Cambodia: Dr. Sunleang Srey (Ministry of Environment)
   China: Dr. Zhifei Liu (Tongji University)
   Indonesia: Dr. Wahyoe S. Hantoro (Indonesian Institute of Sciences)
   Malaysia: Dr. Edlic Sathiamurthy (University Malaysia Terengganu)
   Philippines: Dr. Fernando P. Siringan (University of the Philippines)
   Singapore: Dr. Xianfeng Wang (Nanyang Technological University)
   Thailand: Dr. Penjai Sompongchaiyakul (Chulalongkorn University)
   Vietnam: Dr. Hoang Van Long (Hanoi University of Mining and Geology)

IV. Terms of Reference of the Project Steering Group

1. The Steering Group shall consist of all member countries of WESTPAC interested to participate.
2. Each participating country, through its IOC National Focal Point, shall designate one member with the related scientific experience in consultation with the Principal Investigator.
3. The Steering Group shall review the regional concerns, identify the project requirements, and promote efficient implementation to achieve the project objectives.
4. The Steering Group members may organize individual national study (data collection, comparison, etc.) and cooperate among participating countries in terms of the program objectives.
5. The Steering Group shall ensure effective interaction and communication with WESTPAC and other intergovernmental and non-governmental organizations, and report on the IOC WESTPAC sessions.

V. Activities carried out and/or to be carried out during the last intersessional period (May 2015 – April 2017)

6. Activities of the WESTPAC-FluSed project during the period of May 2015 to April 2017 include: international workshop organization, fieldwork and research cooperation, bilateral scientific visits, and master and PhD programs.
1. International workshop organization

7. Two international workshops were organized during the intersessional period, including the eighth FluSed international workshop being successfully organized in October 2015 and the ninth international workshop being held in November 2016.

8. (1) “Eighth International Workshop on the Fluvial Sediment Supply to the South China Sea” was held during 29‒31 October 2015 in the Hanoi University of Mining and Geology (Hanoi, hosted by Dr. Hoang Van Long) (Figure 1). Thirty-five participants from 8 countries joined the workshop, including 1 from Indonesia, 4 from Philippines, 2 from Thailand, 1 from Malaysia, 4 from China, 1 from Singapore, 1 from France, about 21 from Vietnam. Total 20 oral presentations were given during the two-day scientific program on various topics of fluvial sediments in the South China Sea and surrounding drainage basins. The topics mainly include: fluvial sediment discharge estimation, coastline change and sea-level variation, tectonic evolution, quantitative determination of clay-sized sediments, and late Quaternary paleo environmental study in the South China Sea. One-day field excursion was organized in the following day to visit the Red River system and delta region of Haiphong.

9. (2) “Ninth International Workshop on the Fluvial Sediment Supply to the South China Sea” was organized during 24‒26 November 2016 in the Chulalongkorn University (Bangkok, hosted by Dr. Penjai Somponchayerakul) (Figure 2). Thirty-seven participants from 7 countries joined the workshop, including 1 from Indonesia, 4 from Philippines, 2 from Vietnam, 4 from Malaysia, 7 from China, 2 from Singapore, 2 from USA, and about 15 from Thailand. Total 25 oral presentations were given during the two-day scientific program on various topics of fluvial sediments in the South China Sea and surrounding drainage basins. The topics mainly include: weathering and erosion in river drainage basins, sediment source-to-sink linkages, sea level changes and sequence stratigraphy in shelf and slope regions, deep-water sedimentation, tectonic and magmatic evolution, and paleoceanography and paleoclimatology. One-day field excursion was organized in the following day to visit the geological features along the East coast of the Gulf of Thailand.
2. Fieldwork and research cooperation

10. Two fieldworks to collect samples were carried out. Scientific cooperation on ocean drilling proposal on Sunda Shelf was conducted through co-organizing two international workshops. Some cooperated scientific results were published.

11. **Two sampling fieldworks** were carried in Vietnam and Indonesia, respectively. The sampling fieldwork in Vietnam (the Ba river basin) is to collect Miocene-Pliocene sedimentary rocks and modern river sediments during 31 October to 5 November 2015 (Figure 3, left) in order to understand the chemical weathering process in South Central Vietnam. The study is a cooperation between Tongji University, Hanoi University of Mining and Geology, and Institute of Marine Geology and Geophysics (VAST). The sampling fieldwork in Indonesia, cooperated between Tongji University and Indonesian Institute of Sciences, was conducted in Natuna during 31 May to 3 June 2016 (Figure 3, right), to collect granitic rocks to study the tectonic history related to the evolution of southern South China Sea.
12. **(2) Scientific cooperation on the ocean drilling proposal on the Sunda Shelf through co-organizing two international workshops.** The first and second “International Workshop on Scientific Drilling in the Sunda Shelf” were held in Jogyakarta (Indonesia) during 25-27 November 2015 and in Shanghai (China) during 11-13 July 2016, respectively (Figure 4). The objectives were to discuss the scientific strategy of proposal for drilling in the Sunda Shelf. The key members of our FluSed project attended and contributed to the two workshops. The drilling proposal was successfully submitted on 30 September 2016.
13. **(3) Publications**: A review article titled “Source-to-sink transport processes of fluvial sediments in the South China Sea” was published in Earth-Science Reviews (Figure 5). The publication synthesized all data produced from previous years and reported the transport processes both on basis of surface samples and sedimentary cores. This is the first review article on this topic and will greatly contribute the scientific community.

14. There are also several other publications and manuscripts being published and under reviews. The list includes (incomplete):


3. Bilateral scientific visits

15. Three bilateral scientific visits were regularly organized to strengthen the collaboration among the participating member countries.

16. (1) Dr. Edlic Sathiamurthy and his student (Kong Yee Hui) from University Malaysia Terengganu visited Tongji University during 2 October to 12 December 2015 (Figure 6). This visit was to learn and to be trained for seismic data processing and interpretation for Kong Yee Hui. The visitor works on the computer working station with helps of various professors in the Tongji University.

Figure 6. Scientific visit of Dr. Edlic Sathiamurthy from University Malaysia Terengganu in Tongji University during 2 October to 12 December 2015.

17. (2) Prof. Wahyoe Soepri Hantoro and his three colleagues from Research Center for Geotechnology of Indonesian Institute of Sciences visited Tongji University during July and August 2016 (Figure 7). The visit was to exchange their scientific knowledge in marine geology and to analysis samples for clay mineralogy. His colleagues were trained to analysis clay minerals using XRD and detailed laboratory procedures.
Figure 7. Prof. Wahyoe Soepri Hantoro and his colleagues from Indonesian Institute of Sciences visited Tongji University during July and August 2016.

18. **(3) Assoc. Prof. Kelsie Dadd from Macquarie University (Australia)** visited Tongji University during July 2016 for cooperating the study on the South China Sea evolution. She joined the seminar and discussion on topics of the fluvial sediments.

Figure 8. Assoc. Prof. Kelsie Dadd from Macquarie University worked in laboratory of Tongji University during July 2016.

4. **Master and PhD programs**

19. Total nine graduate students from Vietnam, Thailand, and Malaysia registered can currently study in Tongji University (Figures 9-10). Among them, four are master students and five are PhD students, majoring in Ocean Science and Geophysics, respectively.
VI. Problems encountered and actions to be considered by the 11th Intergovernmental Session, tentatively scheduled for April 21-23, 2017, Qingdao, China

20. Many scientific activities of the WESTPAC-FluSed project were well organized during the period of May 2015 to May 2017, and all participating countries joined them, either by attending international workshops, joining river sampling fieldworks, sending young scientist training, or participating in bilateral visits. These activities indicate a very successful project, and partial objectives of the project were obtained as indicated in the project’s publication. However, the funding of the project is still a problem, although the project leader has tried his best to find the national support for the study. If a similar funding source is available from all participating countries, the project will be more productive in the next two years.

21. All the participating countries, via their representatives in the project steering group, agree to renew the project by the next two years, i.e. May 2017 to May 2019, with the continuous objectives and outcomes of the project, to be considered by the 11th Intergovernmental Session.
## VII. Workplan and Budget for May 2017 – May 2019

<table>
<thead>
<tr>
<th>Project</th>
<th>Activities</th>
<th>Objectives</th>
<th>Expected outputs /outcomes</th>
<th>Date and place</th>
<th>Funding Required</th>
<th>Other sources (i.e. from national or international)</th>
<th>Remark</th>
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<tr>
<td></td>
<td>2. 10th FluSed workshop</td>
<td>Exchange of scientific results</td>
<td>Strengthen collaboration: joint writing manuscripts, data comparison, further cooperation discussion.</td>
<td>November 2017, Singapore</td>
<td>US$20K</td>
<td>US$15K (China) US$5K (local host)</td>
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<td></td>
<td>4. Research cruise</td>
<td>Hydrodynamic data and sediment collection</td>
<td>Case study of shelf in NW South China Sea: shallow seismic dataset, surface and suspended sediments; sediment gravity cores, and hydrological data.</td>
<td>Aug. 2018, Gulf of Tokin</td>
<td>US$60K (China) US$60K (others)</td>
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<tr>
<td></td>
<td>5. 11th FluSed workshop</td>
<td>Exchange of scientific results</td>
<td>Strengthen collaboration: joint writing manuscripts, data comparison, further cooperation discussion.</td>
<td>Nov. 2018, Shanghai, China</td>
<td>US$20K</td>
<td>US$20K (China)</td>
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<td>TOTAL</td>
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<td></td>
<td></td>
<td></td>
<td>US$40K</td>
<td>US$180K</td>
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