Summary report of YSLME Ocean Color Workshop II (YOC-II)

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1. Meeting Report (Group photo)

Session 1: Organization of the meeting

[1] With welcome address representing the Nagasaki University, J. Ishizaka (host) opened meeting. He mentioned that, after long time discussions on this activity, the bio-optical data sharing by the experts of China, Korea and Japan is realized, which will lead us to a new phase of the regional Ocean Color (OC) - based monitoring.

[2] H. Kawamura presented the purpose of workshop. In this YSLME funded project, the regional experts/scientists are tasked to validate the regional OC algorithm with the shared in-situ bio-optical measurements. Actions from the YOC-I were all completed. In the YOC-II, validation results using the shared in situ measurements will be presented, and the final product/outcome of this activity will be discussed.

[3] The proposed agenda (ANNEX 1) was approved by the members. The list of participants is indicated in ANNEX 2.

Session 2: Present status of the bio-optical data sharing

[4] The bio-optical data submitted for the YOC database were briefly explained by the data holders. Since they were already presented in the YOC-I, the presentations were requested to be short for helping confirmation of the members.

[5] Y. Ahn presented the KORDI data obtained in the seas south and southwest of the Korean coasts. Above water downwelling irradiance Ed(0+) was measured by using ASD field Dual fiberoptics spectroradiometer. Lw was measured using above water spectroradiometer, which may be unique in our group. In the case of cloudiness>30%, the data were not submitted. Chl-a was measured using spectrophotometer, and CDOM 10cm optical tube (cell).

[6] J. Ishizaka explained the Japanese data taken by the Sekai Fisheries Institute and the Nagasaki University, which are distributed mostly in the East China Sea and the Kuroshio area. Mostly Case 1 waters, few stations in Case 2 waters. All data were included in the submitted data regardless of cloud condition. The parameter observations followed the JAXA protocol. For Chl-a measurements, they used flourimeters. Slight differences were in protocol between the Sekai and the Nagasaki.

[7] J. Tang - They adopted the above water measurements due to the high turbidity in the coastal seas. They used some techiques to remove the sky-light reflectance: 1) in clear water, using constant 0.026, which is little bit less then the recommended value of 0.028 in NASA protocols; and/or using 700~800nm singals to calculate the surface reflectance, then, used this value to visible bands; 2) in low- or medium-turbid water,with a constant 0.026 in calm conditions, or with 800~900 to check the singal to derive sky-light reflectance,and using the relation of Remote sensing reflectance with absorption coefficient in Red & NIR bands as:
Rrs(NIR1)/Rrs(NIR2)~aw(NIR2)/aw(NIR1), to re-confirm the surface reflectance correction.

[8] S. Kim– The submitted bio-optical measurements were mostly in the ECS. They have the rrs data, but they were not submitted to DB

[9] S. Yoo has presented his the measurements of parameters. They mostly followed the NASA protocol, but modified for SS and TSS. He has explained Chl-a, TSS (TSM), SS, CDOM sampling and analysis methods used.

[10] C. Chang explained on the design of YSLME common DB. This will be discussed later.

Session 3: Discussions

[11] Yoo - How should we include new data (e.g., absorption, back scattering, etc.) in the database? Need to agree on basic structure of DB.
Siswanto – He suggested inclusion of salinity and temperature with the submitted data.
Ahn – Inclusion of the back scattering data is good idea, but rare
Tang – The back scattering data from other people not reliable. Equipment might not be well-calibrated. Absorption data has too many errors among different groups on same sample.

Session 4: Results of examination/validation using the shared data

Information Exchange

Before starting the session, new information is exchanged.

[12] J. Tang mentioned on the new ocean color satellite in China. HY1B was launched in April 2007. The first image looked good. The recent Chl-a images have irregular stripes, which may be associated with the sensor drifting. The in-situ calibration cruise was in June 07. The optical measurements are 4% difference to MODIS aqua.

[13] Y. Ahn – GOCI will be launch in the later period of 2008, but possible delay of 6 months. Everything else is OK!

[14] H. Kawamura introduced the IOC/WESTPAC symposium in May 2008. The OC project of ORSP (Co-chairs Ishizaka and Ahn) has $5,000 mtg cost available.

Results of analysis

[15] Before the presentation, S. Yoo requested to discuss the following issues

Expected outputs after YOC-III
Selection of candidate algorithm
Harmonization of the shared data
- Differences in methods
- Spectral differences

Quality Control
Validation
Who do what?

[16] S. Kim showed a comparison between the monthly mean in situ and SeaWiFS Chl-a fields using the YOC shared Chl-a data. They tested regression analyses, which is not finished yet. No optical data used.

[17] J. Tang - Because of the limited time period after the data sharing, the analysis was incomplete and the results were not shown. His plan is: for Case 2 waters, to correct the SeaWifs data corresponding to the shared data.

[18] Ahn - Because of the limited time period after the data sharing, the analysis was incomplete and the results were not shown.

[19] E. Siswanto – Using the shared in-situ TSM and Chl-a, he compared them with the SeaWifs-derived normalized water leaving radiance. Since the shared TSM and Chl-a distribute in the whole sea area of ECS and the Yellow sea, it is possible to examine their relationships. The results suggested us that OC algorithm on the basis of these examinations may be one of the important outcomes from the YOC activities. He asked permission for presenting this result in "The Second APEC SAKE Workshop on Satellite Application on Fishery and coastal Ecosystem (SAFE)", which is held in November 2008 in Indonesia. The YOC members agreed to be co-authors of the presentation and permitted it. The abstract of presentation is in ANEX 3.

[20] A. Tanaka is developing a new type of the OC algorithm using Eu and Ed. It is just a stage of concept, and will be implemented for YOC-III.

[21] Summarizing the presentations in this session, 1) because of limited time after the data sharing (the middle of July), the members could not show results using the optical measurements. They are left for YOC-III. 2) Using the shared in situ TSM and Chl-a, E. Siswanto has shown the relationships between the in situ parameters and the SeaWiFS products, which can be one of the outcomes from the YOC activities.

Discussions

[22] In order to improve the shared database, future works were discussed and agreed:

Ahn – Add Rrs(670), Rrs(555) - 15 September
CDOM slope - 15 September
All need Ed(0+), Tempetarure, Salinity - 30 September
Kim – Add Rrs data - 31 October
YSLME Makes columns for CDOM(λ) and λ_0, Temperature, salinity in the common database– By YOC-III

[23] For the database improvement, Ishizaka will ensure the DB structure with YSLME

[24] Direction of analyses is discussed, and Final Products (YOC-III) are agreed

SeaWiFS nLw – TSM, Chl, CDOM - Kim, Siswanto, Sasaki, Ishizaka
Rrs – TSM, Chl, CDOM - Ahn, Tang, Yoo, Tanaka

DAY-2

[25] The chairman specially asked E. Siswanto, J. Tang and S. Yoo for giving additional presentations.

[26] Siswanto – Significant seasonal bias between the in-situ and SeaWifs Chl-a in summer is identified. The bias is found in the area off the mouth of Yangtze River. The bias is not related to localized high suspended sediments.

[27] Tang – Through discussions on CDOM measurements, he suggested to include λ_0. He further presented his plan of research and development using the shared data.

[28] Yoo discussed on the measurement protocols of chl-a, TSM, CDOM and SS. Regionally unified protocols of the in situ observations are needed for improvements of the regional OC skills. He suggest to form prototype protocol methods in future.

[29] Through the consultation with the members, Kawamura mentioned to have the YOC-III in Sendai in the beginning of January 2008 as planned.

[30] The meeting was closed as schedule at 12:00 a.m.

Photo of the YOC-II meeting participants. In front of the meeting building at 18:00 on 1th September 2007.

Action Items

Action 1: Members and YSLME improve the shared database

Ahn – Add Rrs(670), Rrs(555) - ***Due date: 15 September***

CDOM slope - ***Due date: 15 September***

All need Ed(0+), Tempetarure, Salinity - ***Due date: 30 September***

Kim – Add Rrs data - ***Due date: 31 October***

YSLME Makes columns for CDOM(λ) and λ_0, Temperature, salinity in the common database – ***By YOC-III***

Action 2: Ishizaka will ensure the DB structure with YSLME ***Due date: By YOC-III***

Action 3: Members study further for the YOC final outputs following the agreed directions below. ***Due date: YOC-III***

Direction 1: SeaWiFS nLw – TSM, Chl, CDOM - Kim, Siswanto, Sasaki, Ishizaka

Direction 2: Rrs – TSM, Chl, CDOM - Ahn, Tang, Yoo, Tanaka

Action 4: Kawamura fixes the YOC-III and circulates information ***Due date: 31 October***

ANNEX 1: Agenda

YSLME workshop "Regional Ocean Color Algorithm for the Yellow Sea (YOC) – II"

Date: 31 August, 1 and 2 September

Venue: Lecture Room No.3 (2nd floor), Faculty of Fisheries, Nagasaki University, Nagasaki, Japan

Preparatory meeting (19:00-20:30) on 31 August, 2007

Kawamura, Ishizaka, Ahn, Yoo, Kim, Chang, Tang, Tanaka

The members are requested to convene in the lobby of Comfort Hotel Nagasaki at 18:30

YOC-II meeting on 1-2 September 2007

Since it takes about 30-40 minutes from the hotel to the Nagasaki University by the streetcar, the members are requested to convene in the hotel lobby at 8:45.

DAY-1 (1 September 2007)

I . Morning Session (9:30 - 1230, Break at 11:00)

1. Organization of the Meeting

1.1 Opening and remarks

Welcome address (ISHIZAKA)

Local logistics (ISHIZAKA)

1.2 Purpose of workshop (KAWAMURA)

1.3 Adoption of the Agenda

2. Present status of the bio-optical data shearing

Presentations on the submitted data are briefly explained by the data holder. Each 15-minutes.

Presenters: AHN, ISHIZAKA, TANG, YOO, KIM

3. Discussions

CHANG: "Preliminary version of the common database"

Discussions are invited for forming a common database and future data shearing (Brain storming).

LUNCH (1230 – 14:00)

II. Afternoon Session (1400 - 1730, Break at 1530)

4. Results of examination/validation using the sheared data

Presentations and associated discussions are the main part of YOC-II

China (TANG), Korea (AHN, KIM, YOO),

Japan (ISHIZAKA)

EKO: "Comparison between in situ total suspended matter, chlorophyll and SeaWiFS data"

TANAKA: "Attempt to develop algorithm using difference between Ed and Eu"

Reception party (19:00-) ***All the participants and local staffs are invited***

DAY-2 (2 September 2007)

I . Morning Session (9:30 - 1230, Break at 11:00)

1. Summary of the presented results

2. Future plans

3. Closing

ANNEX 2:

Participant of YSLME workshop "Regional Ocean Color Algorithm for the Yellow Sea – II"

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ANNEX 3

Application of ocean color remote sensing for monitoring and mapping total suspended matter: A case study in the East China Sea

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Keywords: *satellite, sediment load, normalized-water leaving radiance, river discharge*

Abstract

The Asia's longest Yangtze River, as the main source of freshwater discharge into the East China Sea (ECS), one of the most productive waters in the world's ocean, has been undergoing long-term ecosystem modifications due to anthropogenic perturbations such as dam constructions. The most observable impact of dam constructions is the long-term reducing in sediment load from Yangtze River (e.g., *Yang et al*., 2006) that in turn will influence further biogeochemical processes in the ECS (e.g., *Jiao et al*., 2007).

It is thus crucial to routinely monitor temporal variation and map spatial extent of biogeochemical variable than can be directly influenced by changes in sediment load, such as total suspended matter (TSM). Ship-borne TSM observation however is not feasible especially when deals with high spatial and temporal resolutions. Satellite remote sensing has been proved as a powerful tool for monitoring marine and coastal environments due to its synoptic observation capability. Therefore, based on the bio-optical datasets shared by the Yellow Sea Large Marine Ecosystem (YSLME) Project, we investigate the relationship between TSM and SeaWiFS normalized water leaving radiance 555 (hereinafter referred to as nlw 555), the radiance band that can be obviously enhanced from the water with high TSM.

With the use of exponential function, nlw 555 could significantly explain variability of TSM by about 79% (p<0.0001), which was much better than the variability that could be explained by SeaWiFS TSM standard algorithm. The nlw 555 and thus TSM in the northwestern ECS has tended to decrease within the SeaWiFS mission period (1997 – present). To some degree, such a decreasing in nlw 555 might reflect the decreasing in sediment load from Yangtze River. Sediment plume also varied spatially associated with prevailing monsoon wind systems. This study shows the potency of using ocean color data to monitor and map TSM, the variability of which was largely influenced by sediment load from the river discharge.

Acknowledgement

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