

Form 3

Annual Report

LaMer, Ehime University

Date (27 , 2 , 2018)

To Director of LaMer

Principle Investigator:

Affiliation Ocean University of China, OUC

Position Professor

Name in print Huiwang Gao

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Include the report on the result of the project/meeting in a separate sheet.

1. Project / Meeting title

Analytical solution of nitracline with the evolution of subsurface chlorophyll maximum in stratified water columns

2. Members of project / meeting

Name	Affiliation	Position	Contribution part
PI Huiwang Gao	Ocean University of China, OUC	Professor	Important idea; Make plan; PPT preparation and presentation.
Members Gong Xiang	Ocean University of China, OUC	Postdoctor	Data processing; Paper work
Wensheng Jiang	Ocean University of China, OUC	Professor	Beneficial discussion
Emmanuel Boss	School of Marine Sciences, University of Maine	Professor	Beneficial discussion
LaMer Faculty member in charge Xinyu Guo	Ehime University	Professor	Beneficial discussion

Title

Analytical solution of nitracline with the evolution of subsurface chlorophyll maximum in stratified water columns

Members' names and affiliations

Name	Institution and Department	Employment position	E-mail
Gong Xiang	Ocean University of China	Postdoctor	Gongxiang@ouc.edu.cn
Wensheng Jiang	Ocean University of China	Professor	wsjiang@ouc.edu.cn
Emmanuel Boss	School of Marine Sciences, University of Maine	Professor	emmanuel.boss@maine.edu

Aim

This project aims to improve the studies of vertical distribution of Chl and nutrients in the Northwest Pacific, and the analytical solution of nitracline may contribute to the development of marine ecosystem models. Also to promote cooperation and students exchange between the College of Environmental Science and Engineering (CESE) of OUC and the Center for Marine Environmental Studies (CMES) of Ehime University.

Procedure

The principal investigator (PI) made an oral presentation “Analytical solution of nitracline with the evolution of subsurface chlorophyll maximum in stratified water columns” to the colleagues at CEMS. Afterwards, the PI visited the laboratory of CMES and discussed the idea about marine ecosystem dynamics with Prof. Xinyu Guo and other scholars. Based on these discussions from July 23 to 30, I understand the study areas on each side (CESE at OUC and CMES at Ehime University) are well overlapped. We have reached an agreement that we will continue to carry out further research between CMES and CESE by joint project, joint publication and student exchanges.

Results

The oral presentation showed our recent studies including:

1. The derived analytical solutions of a specified nutrient–phytoplankton model.
2. The analytical solution shows that the nitracline depth is deeper than the depth of the subsurface chlorophyll maximum layer (SCML), shoaling with an increase in the light attenuation coefficient and with a decrease in surface light intensity.
3. The derived equations of the nitracline in relation to the SCML provide further insight into the important role of the nitracline in marine pelagic ecosystems.

Publication/conference presentation

In 2017, we had two joint papers between CESE and CMES published by JGR: Oceans in 2017 and Biogeosciences in 2018 partly due to the beneficial discussions supported by LaMer project. I hope we will have more scientific benefit in 2019.

1. Yu Y, Gao H, Shi J, Guo X, Liu G. Diurnal Forcing Induces Variations in Seasonal Temperature and its Rectification Mechanism in the Eastern Shelf Seas of China. *Journal of Geophysical Research: Oceans*, 2017.
2. Zhang C, Gao H, Yao X, Shi Z, Shi J, Meng L, Guo X. Phytoplankton growth response to Asian dust addition in the northwest Pacific Ocean versus the Yellow Sea. *Biogeosciences*, 2018, 15(3): 749.

Oral presentation (LaMer):

Title: Analytical solution of the nitracline with the evolution of subsurface chlorophyll maximum in stratified water columns.

Lecturer: Huiwang Gao.

Time: July 24, 2017.

Location: CEMS, Ehime University.

Please refer to the following paper:

Gong X, Jiang W, Wang L, Gao H, Boss E, Yao X, Kao S, Shi J. Analytical solution of the nitracline with the evolution of subsurface chlorophyll maximum in stratified water columns. *Biogeosciences*, 2017, 14(9): 2371.

Perspectives in future

We will investigate the promotion effect of Asian dust on phytoplankton growth and potential dissolved organic phosphorus (DOP) utilization in the South China Sea, while dust deposition is an important nutrient source to the South China Sea. However, there are few *in situ* experiments were conducted on phytoplankton response to the deposition. Meanwhile, we will enhance the cooperation researches and exchanges of faculties and students between the CESE of Ocean University of China and CEMS of Ehime University.