



中国科学院海洋研究所  
INSTITUTE OF OCEANOLOGY, CHINESE ACADEMY OF SCIENCES



## MEMORANDUM OF UNDERSTANDING

*between*

**Institute of Oceanology, Chinese Academy of Sciences,  
China**

*and*

**Instituto de Fomento Pesquero, Chile**

## **MEMORANDUM OF UNDERSTANDING**

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**Institute of Oceanology, Chinese Academy of Sciences, China**

**and**

**Instituto de Fomento Pesquero, Chile**

### **To Foster Collaborative Activities in Research of Harmful Algal Blooms and Environmental and Sanitary topics**

In 2016, the occurrence of large-scale harmful algal blooms (HABs) caused catastrophic economic losses to local fisheries communities' including heavy social and economic impacts as well as local salmon farming in Chile. The Instituto de Fomento Pesquero (IFOP) has been working on environmental and sanitary topics link to aquaculture including HABs. Dr. Donald M. Anderson, senior scientist in the Biology Department of the Woods Hole Oceanographic Institute (WHOI), USA and a world-recognized leading expert on the biology and ecology of harmful algal species, was invited to provide advice to the government and the salmon farming industry. The modified clay used in China as an HAB mitigation strategy was proposed as practical approach to mitigate HABs in coastal waters near the salmon farms. The salmon farmers affiliated with the Salmon Farmer's Association and corresponding government agencies were interested in the clay mitigation technique and planned a visit to China to learn more about the entire process. This opens a special opportunity to explore cooperative research between groups of the Oceanology Chinese Academy of Sciences (IOCAS) and IFOP.

The research group, led by the principle investigator - Prof. Zhiming Yu at the IOCAS, has been working on mitigation of HABs using modified clays since the 1990s. The integrated modified clay technique has been successfully applied to mitigate HABs during many important activities in China, such as emergency mitigation of cyanobacterial blooms in Xuanwu Lake in Nanjing in 2005, HABs in the waters of Olympic Sailing games in 2008 in Qingdao, HAB mitigation of picophytoplankton bloom in Beidaihe coastal waters etc.. Since 2014, the technique has been deployed as the first strategy to maintain the security of cooling water system for nuclear power plants. The technique was also recommended in the books of "Monitoring and Management Measures for the Offshore Harmful Algal Blooms" published by UNESCO/APEC.

During October 28<sup>th</sup> – November 2<sup>nd</sup> 2016, the Chile delegation (listed in attachment #1), led by Dr. Alfredo Tello Gildemeister of the Tecnological Salmon Institue was

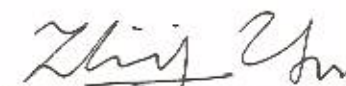
invited to visit IOCAS. During the trip, the Chile delegation observed the modified clay manufacturing site, special spray equipment, and a live dispersal demonstration for mitigation of HABs in Beihai and Fangchenggang cities. The latest experiences and research progress on mitigation of HABs were exchanged between the Chilean delegation and researchers of IOCAS. Furthermore, a cooperative program including different topics on HABs in coastal waters of both countries was discussed.

The two parties have co-operated on an informal basis to further these interests and now desire to record their mutual understanding in this regard. Hereby this record outlines their understanding as follows:

1. The members of the Chile delegation recognized that the integrated modified clay technique can be an effective technique to control and mitigate harmful algal blooms (HABs) caused by specific types of microalgae. The technique has the potential to be applied in mitigating HABs in coastal waters in Chile.
2. The research group led by Dr. Zhiming Yu is willing to carry out further research to test the efficiency of the technique to control and mitigate HABs caused by the endemic algal species, and will provide technical support to test the removal efficiency of the technique in small-scale local seawaters.
3. Both sides agree that they will seek to develop co-operative and collaborative activities in research, development, and technology transfer, in furtherance of their mutual interests in mitigation of harmful algal blooms (HABs).
4. Both sides agree to investigate the potential of jointly conducting a pilot-scale clay mitigation project in Chilean waters, recognizing that there are numerous issues to be resolved, including environmental and social concerns, funding, etc.
5. Both sides agree that they will seek to develop co-operative and collaborative activities in research in furtherance of their mutual interests in a better comprehension of HABs.

***NOW, THEREFORE***, the two parties do hereby record the understanding, as set out in this MoU and as endorsed in **Qingdao, China** on October 30<sup>th</sup>, 2016.

**On the behalf of Institute of Oceanology,  
Chinese Academy of Sciences**

  
Dr. Zhiming Yu

**Date: Oct. 30th, 2016**

**On the behalf of Instituto de Fomento  
Pesquero, Chile**

  
Dr. Leonardo Guzmán Méndez

**Date: Oct. 30th, 2016**



División de Investigación en Acuicultura  
Instituto de Fomento Pesquero



**MEMORÁNDUM/DIA/IFOP/2016/ 061**

**A** : Leonardo Núñez Montaner  
Director Ejecutivo

**DE** : Leonardo Guzmán Méndez  
Jefa División de Investigación en Acuicultura

**MATERIA** : Envía Convenio Institute of Oceanology, Chinese.

**FECHA** : Puerto Montt, 04 de noviembre de 2016

Adjunto remito a usted, original del Convenio suscrito con el Institute of Oceanology, Chinese Academy of Sciences, China y el Instituto de Fomento Pesquero, con ocasión de la gira tecnológica efectuada recientemente en esa oportunidad, gracias a la gentil invitación de SalmonChile a través del Instituto Tecnológico del Salmón.



LGM/cbs