

## Report for the year 2015 and future activities

### **SOLAS China**

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*Please note that this report has two parts!*

**Part 1:** reporting of activities in the period of January 2015 – December 2015

**Part 2:** reporting on planned activities for 2016 to 2018/19.

*The information provided will be used for reporting, fundraising, networking and strategic development. In particular, **in 2016 SOLAS will develop its Implementation Plan, which will be largely based on the information from part 2 of the national reports, as well as input from international SOLAS initiatives and activities.** This info will be crucial in order to draft a realistic Implementation Plan representative of SOLAS, internationally.*

**IMPORTANT:** *May we remind you that this report should reflect the efforts of the SOLAS community in the entire country you are representing (all universities, institutes, lab, units, groups)!*

### **PART 1 - Activities from January 2015 to December 2015**

#### **1. Scientific highlight**

*Describe one scientific highlight with a title, text (max. 200 words), a figure with legend and full references. Please focus on a result that would not have happened without SOLAS, and we are most interested in international collaboration.*

The concentration, size distribution, and formation of dimethylaminium (DMA<sup>+</sup>) and trimethylaminium (TMA<sup>+</sup>) ions in atmospheric particles were studied during a cruise campaign over the Yellow Sea and the Bohai Sea of China in May 2012. The concentrations of DMA<sup>+</sup> and TMA<sup>+</sup> in PM<sub>11</sub> were  $4.4 \pm 3.7$  and  $7.2 \pm 7.1$  nmol m<sup>-3</sup>, respectively. The two ions had a good correlation ( $R^2=0.86$ ), and both had a moderately good correlation with chlorophyll a fluorescence ( $R^2=0.66-0.67$ ). The observed concentrations were from 1-3 orders of magnitude higher than the concentrations reported in other marine atmospheres. The high concentrations of DMA<sup>+</sup> and TMA<sup>+</sup> observed in the marine atmosphere were probably associated with local biogenic activity instead of the long-range transport of these species from adjacent continents. The calculated mole ratios of (DMA<sup>+</sup> + TMA<sup>+</sup>) to NH<sub>4</sub><sup>+</sup> in different-sized particles over the seas indicated that (DMA<sup>+</sup> + TMA<sup>+</sup>) most likely played an important role in neutralizing acidic species in particles less than 0.43 μm but not in particles of other sizes. Size distributions of DMA<sup>+</sup> and TMA<sup>+</sup> in the marine and coastal atmospheres were analysed and the results showed a multiple contributors to the observed concentrations of the two ions over the seas.

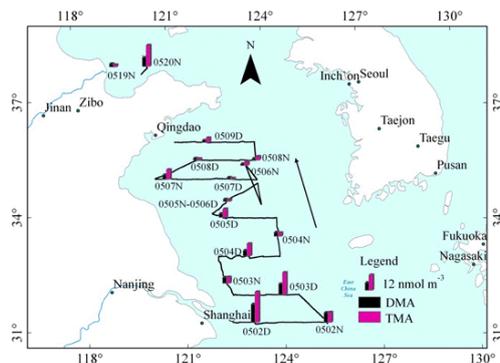


Fig. 1 Distribution of DMA<sup>+</sup> and TMA<sup>+</sup> in PM<sub>11</sub> measured over the Yellow Sea and Bohai Sea in May of 2012.

## 2. Activities/main accomplishments in 2015 (projects, field campaigns, events, model and data intercomparisons, capacity building, international collaborations, contributions to int. assessments such as IPCC, interactions with policy makers or socio-economics circles, etc.)

### 2.1 Cruise and field experiment

- A cruise campaign was conducted in March-April 2015 from the marginal seas of China to the Northwest Pacific Ocean to study N cycling in relation to atmospheric deposition.
- Two surface ocean buoys monitoring both pCO<sub>2</sub> and pH have been operating since 2012, deployed at the seasonal hypoxia zone off in the East China off the Changjiang estuary (buoy 1) and on the mid-shelf of the East China Sea (buoy 2).
- A cruise was conducted on the northern South China Sea shelf in July-August 2015 to study the carbon and nutrient dynamics in the Pearl River plume.

### 2.2 SOLAS-Endorsed Project: CHOICE-C renewed

CHOICE-C (Carbon cycling in China Seas-budget, controls and ocean acidification) project was renewed by the Ministry of Science and Technology (MOST) of China for another 5 years from January 2015 to December 2019. This renewed project is termed as CHOICE-C II with a budget of 25 million CNY. Through comparative study of carbon cycling in River-Dominated-Ocean-Margins (RioMars, the northern South China Sea shelf being a case) and the Ocean-Dominated-Ocean-Margin (OceMars, the South China Sea basin being a case), CHOICE-C II is focusing on the carbon cycle in South China Sea in terms of its budget, controls and global implications.

### 2.3 Infrastructure

A new research vessel with the capacity of SOLAS and trace metal researches under construction.

A 78-m long new research vessel of Xiamen University started its construction in March 2015 and is expected to be in commissioning late 2016.

### 2.4 Workshop organized

The Second Xiamen Symposium on Marine Environmental Sciences (2nd XMAS), January 7-9, 2015, Xiamen, China

CHOICE-C II kick-off Meeting, September 18-20, 2015, Xiamen, China.

### 2.5 International interactions and collaborations

- Minhan Dai, Diagnosing CO<sub>2</sub> fluxes in Ocean-dominated margins (OceMar): coupling the physical dynamics and biogeochemistry, The 2nd Open Science Symposium on Western Pacific Ocean Circulation and Climate (OSS 2015), October 25-29, 2015, Busan, South Korea (Plenary talk)
- Minhan Dai, Diagnosing the CO<sub>2</sub> fluxes in the land-ocean interface: coupling the

physical dynamics and biogeochemistry, ECSA 55-Unbounded boundaries and shifting baselines: Estuaries and coastal seas in a rapidly changing world, September 6-9, London, UK (Keynote speech)

## 2.6 Human dimensions (outreach, capacity building, public engagement etc.)

- The OA-ICC Training Course on Best Practices in Ocean Acidification Research took place in Xiamen, October 19-23, 2015. The course was organized by the Ocean Acidification International Coordination Centre (OA-ICC) of the International Atomic Energy Agency (IAEA), coordinated by Drs. Lisa Robbins (US Geological Survey) and Minhan Dai, and was hosted by the State Key Laboratory of Marine Environmental Science (Xiamen University).
- The 4th Xiamen University Ocean Sciences Open House was held on November 15, 2015, Zhou-Long-Quan Building, Xiang'An Campus, Xiamen University, China

## 3. Top 5 publications in 2015 (only PUBLISHED articles) and if any weblinks to models, datasets, products, etc.

For journal articles please follow the proposed format:

Author list (surname and initials, one space but no full stops between initials), year of publication, article title, full title of journal (*italics*), volume, page numbers, DOI.

- 1) Hu, Q.J., Yu, P.R., Zhu, Y.J., Li, K., Gao, H.W., Yao, X.H. 2015. Concentration, Size Distribution, and Formation of Trimethylammonium and Dimethylammonium Ions in Atmospheric Particles over Marginal Seas of China. *Journal of the Atmospheric Sciences*, 72(9), 3487-3498, DOI: 10.1175/JAS-D-14-0393.1.
- 2) Bai, Y., Cai, W.-J., He, X.Q., Zhai, W.D., Pan, D.L., Dai, M.H., Yu, P.S. 2015. A mechanistic semi-analytical method for remotely sensing sea surface  $p\text{CO}_2$  in river-dominated coastal oceans: A case study from the East China Sea. *Journal of Geophysical Research: Oceans*, 120, 2331-2349.
- 3) Guo, X.H., Zhai, W.D., Dai, M.H., Zhang, C., Bai, Y., Xu, Y., Li, Q., Wang, G.Z. 2015. Air-sea  $\text{CO}_2$  fluxes in the East China Sea based on multiple-year underway observations. *Biogeosciences*, 12, 5495-5514.
- 4) Yang, G-P, Zhang, S, Zhang, H., Yang, J., Liu, C-Y. 2015. Distribution of biogenic sulfur in the Bohai Sea and northern Yellow Sea and its contribution to atmospheric sulphate aerosol in the late fall. *Marine Chemistry*, 169, 23-32.
- 5) Cai, P.H., Zhao, D.C., Wang, L., Huang, B.Q., Dai, M.H. 2015. Role of particle stock and phytoplankton community structure in regulating particulate organic carbon export in a large marginal sea. *Journal of Geophysical Research-Oceans*, 20, 2063-2095.

## PART 2 - Planned activities from 2016 to 2018/19

### 1. Planned major field studies and collaborative laboratory and modelling studies, national and international (incl. all information possible, dates, locations, teams, work, etc.)

A campaign will be performed in summer 2016 to study atmospheric chemistry and physics related to super green tide in the Yellow Sea.

A cruise will be conducted in the Luzon Strait and the northern South China Sea (SCS) basin to study the influence of the north Pacific deep water inflow on the carbon dynamics of the upper ocean of the SCS.

A cruise will be conducted in the South China Sea basin in Winter 2016 to make comparative study of the carbon cycle in the RioMar and OcéMar.

China Ocean Observation Initiative is being launched in 2016-2017.

**2. Events like conferences, workshops, meetings, schools, capacity building etc. (incl. all information possible)**

- (1) AOGS Annual Assembly, Beijing, July 31-August 5, 2016.
- (2) International SOLAS SSC meeting, Qingdao, China, October 23-26, 2016.
- (3) Future SOLAS Symposium, Qingdao, China, October 26-28, 2016.
- (4) CHOICE-C II mid-term review meeting, Guangzhou (Nansha), China May 28-30, 2016.
- (5) Ocean Acidification research in China: an international workshop, Shanghai, China, April 28-29, 2016.
- (6) The third Xiamen Symposium on Marine Environmental Sciences (3rd XMAS) will be held in Xiamen, January 9-11, 2017.

**3. Funded national and international projects / activities underway (if possible please list in order of importance and indicate to which part(s) of the SOLAS 2015-2025 science plan the activity topics relate – including the themes on ‘SOLAS science and society’ and ‘Geoengineering’)**

CHOICE-C (Carbon cycling in China Seas-budget, controls and ocean acidification) project was renewed by the Ministry of Science and Technology (MOST) of China for another 5 years from January 2015 to December 2019. This renewed project is termed as CHOICE-C II with a budget of 25 million CNY. Through comparative study of carbon cycling in River-Dominated-Ocean-Margins (RioMars, the northern South China Sea shelf being a case) and the Ocean-Dominated-Ocean-Margin (OceMars, the South China Sea basin being a case), CHOICE-C II is focusing on the carbon cycle in South China Sea in terms of its budget, controls and global implications. It is related to Theme 1: Greenhouse gases and the oceans of the SOLAS 2015-2025 science plan.

**4. Plans / ideas for future projects, programmes, proposals national or international etc. (please precise to which funding agencies and a timing for submission is any)**

China-SOLAS is seeking sponsorship of Chinese National Committee for Future Earth (CNC-FE), which was established in March 2014.

**5. Engagements with other international projects, organisations, programmes etc.**

The State Key Laboratory of Marine Environmental Science (Xiamen University) was invited to participate in the IAEA interregional project “Supporting a Global Ocean Acidification Observing Network towards Increased Involvement of Developing States”.

**Comments**

