surface ocean solas lower atmosphere study

Report for the year 2016 and future activities

SOLAS *Taiwan*

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PART 1 - Activities from January 2016 to Jan/Feb 2017

1. Scientific highlight

pH is an important property of seawater because it affects a wide range of chemical and biogeochemical processes in the ocean, such as chemical reactions, equilibrium conditions, and biological toxicity. More importantly, with growing concern over ocean acidification, the effect of a pH decrease is essential to consider at the present time. Conventionally, pH measurement is generally recommended that seawater samples should be collected directly into 10 cm path-length optical cells and then analyzed onboard as soon as possible after sampling. However, there are an increasing number of occasions when seawater pH samples may need to be preserved and stored for later analysis in land-based laboratories. For instance, due to space limitations on research vessels, particularly small boats, the apparatus for pH measurements cannot be installed onboard. Furthermore, due to increased needs in ocean acidification studies, water samples are often collected by researchers with various backgrounds and shipped to laboratories with appropriate expertise to be analyzed. Therefore, it is important to evaluate the effect of sample storage on pH measurements by comparing pH values measured immediately onboard with those measured later in the shore-based laboratory.

In this study, a comparison experiment between field and laboratory pH measurements was conducted on a total of 88 seawater samples collected on the East China Sea shelf during 16-29 July 2014. The results show that although pH directly measured onboard was statistically higher than the pH later measured onshore with an average residual of 0.0052±0.0057, after correcting for the perturbation caused by the addition of the $HgCl_2$ solution, the observed difference was within the uncertainty in pH measurement. Therefore, our result suggests that, similar to total alkalinity and dissolved inorganic carbon determinations, seawater samples can be stored for pH analysis with a precision that is comparable to the uncertainty of onboard measurement for a period of at least 20 days.

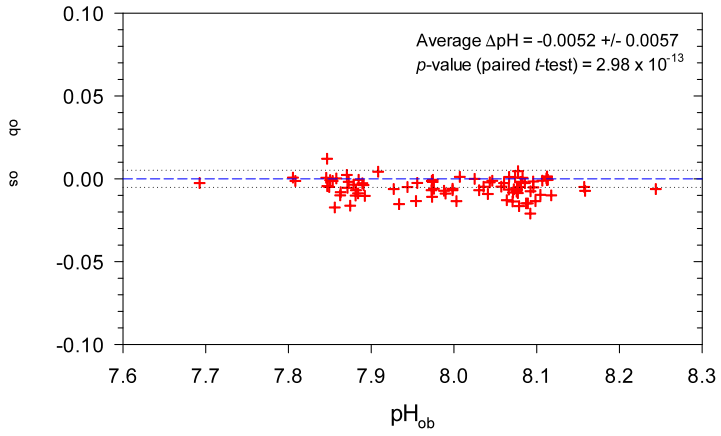

Figure 1. Difference between the onshore measured pH (pH_{os}) and the onboard measured pH (pH_{ob}) as a function of pH_{ob}.

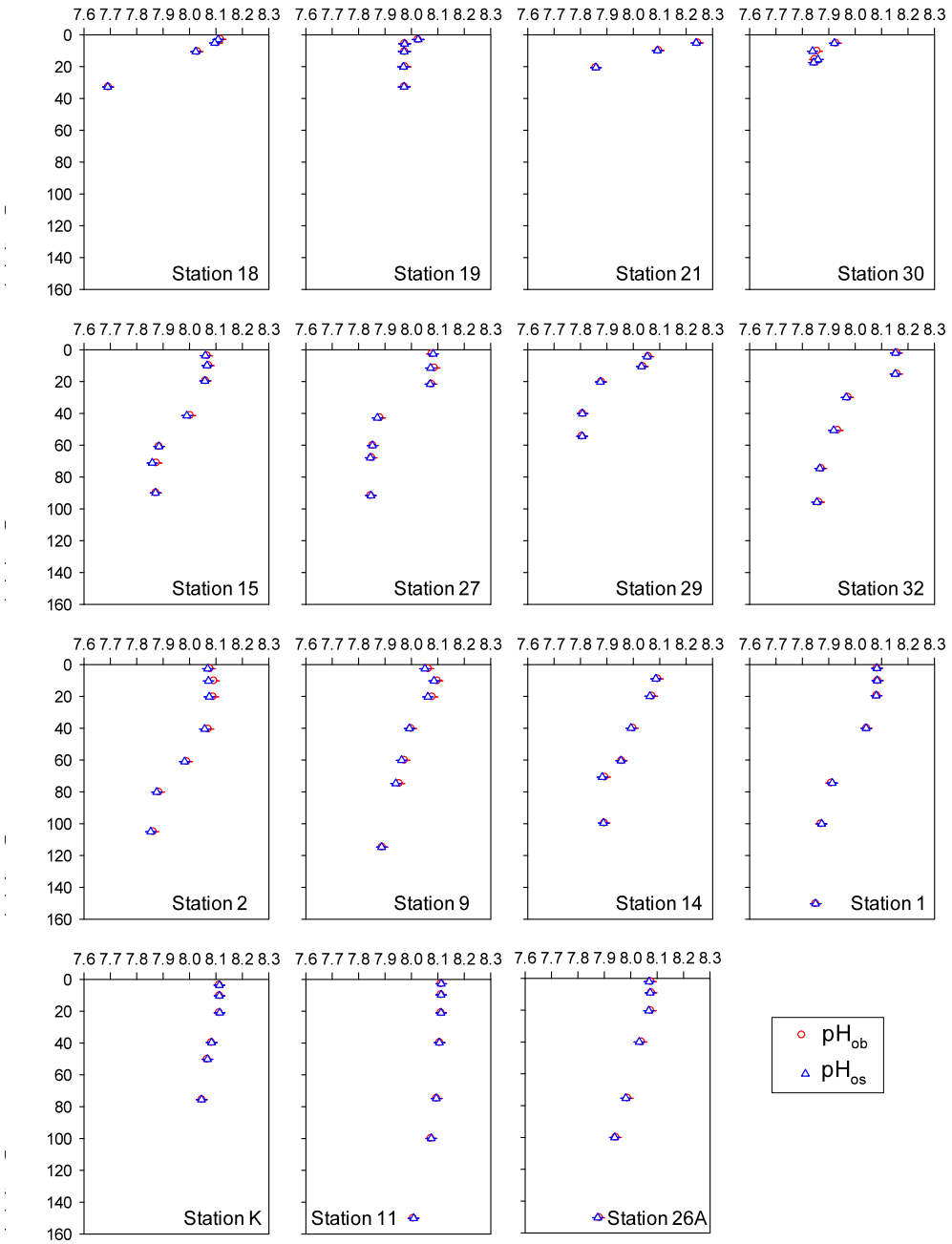

Figure 2. Depth distributions of onboard and onshore measured pH at 15 hydrographic stations on the East China Sea shelf.

Citation: Chou, W.-C., Gong, G.-C., Yang, C.-Y., Chuang, K.-Y., 2016. A comparison between field and laboratory pH measurements for seawater on the East China Sea shelf, Limnology and Oceanography: Methods, 14, 315-322. doi: 10.1002/lom3.10091

2. Activities/main accomplishments in 2016 (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.)

Two SOLAS-related integrated projects were funded by the Ministry of Science and Technology of Taiwan in 2016: (1) Effects of Global Change on Ocean Biogeochemistry and Ecosystems in the Seas surrounding Taiwan in the Northwest Pacific; and (2) Impacts of Typhoons And Internal Waves on Biogeochemical Processes in the Northern South China Sea.

Convening a SOLAS-related session "Effects of Global Change on Marine Biogeochemistry and Ecosystem in Marginal Seas" in the AOGS 13th Annual Meeting 2016, Beijing, China, 31 July-5 August 2016.

3. Top 5 publications in 2016 (only PUBLISHED articles) and if any, weblinks to models, datasets, products, etc.

Chen, T.-Y., Tai, J.-H., Ko, C.-Y., Chen, C.-C., Hsieh, C.-H., Jiao, N.-Z., Liu, H.-B., Shiah, F.-K. 2016. Nutrient pulses driven by internal solitary waves enhance heterotrophic bacteria growth in the South China Sea. Environmental Microbiology, 12, 4312-4323. doi: 10.1111/1462-2920.13273.

Chou, W.-C., Gong, G.-C., Yang, C.-Y., Chuang, K.-Y., 2016. A comparison between field and laboratory pH measurements for seawater on the East China Sea shelf, Limnology and Oceanography: Methods, 14, 315-322. doi: 10.1002/lom3.10091.

Hung, C.-C., Chen, Y.-F., Hsu, S.-C., Wang, K., Chen, J.-F., Burdige, D.J., 2016. Using rare earth elements to constrain particulate organic carbon flux in the East China Sea. Scientific Reports, 6:33880, doi: 10.1038/srep33880.

Tseng, H.-C., Chen, C.-T.A., Borges, A.V., DelValls, T.A., Chang, Y.-C., 2016. Methane in the South China Sea and the Western Philippine Sea. Continental Shelf Research, 135, 23-34.

Tseng, H.-C., Chen, C.-T.A, Borges, A.V., DelValls, T.A., Lai, C.M., Chen, T.Y., 2016. Distributions and sea-to-air fluxes of nitrous oxide in the South China Sea and the West Philippines Sea. Deep Sea Research Part I, 115, 131–144, doi:10.1016/j.dsr.2016.06.006.

4. Did you engage any stakeholders/societal partners/external research users in order to co-produce knowledge in 2016? If yes, who? How did you engage?

No

PART 2 - Planned activities from 2017/2018 and 2019

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

One cruise of 10 days is planned to survey the East China Sea in summer of 2017.

One cruise of 6 days is planned to survey the northern South China Sea in summer of 2017.

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

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 and

Organisation (downloadable from the SOLAS website) the activity topics relate – including the core themes and the cross cutting ones)
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)
5. Engagements with other international projects, organisations, programmes etc.

Comments