

## ***Interactive comment on “Acrylic acid and related dimethylated sulfur compounds in the Bohai and Yellow Seas during summer and winter” by Xi Wu et al.***

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Review of BG-2019-172 by Wu et al. This paper describes the DMS/P and AA surface ocean cycling in the Bohai and Yellow Seas during winter and summer. The authors also measured depth profiles and porewater concentrations, as well as performed incubation experiments to derive production/degradation rates. This paper contains valuable data, but only a small amount of new science. By now, the community has a generally good understanding of DMS dynamics and the controlling factors. We know that phytoplankton, bacteria, and environmental parameters influence DMS/P cycling (and related compounds). Nonetheless, it appears that the authors did not measure

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phytoplankton or bacterial parameters. They attempt to explain processes without measuring the parameters involved. This paper is generally more suited to a journal like *ESSD*.

We found phytoplankton and bacterial data of these two cruises in two published papers (Liang et al., 2019; Zhang 2018). We will explore how these parameters influence DMS/P cycling in revised manuscript. In addition, our study proved other sources of AA (e.g. terrestrial inputs from rivers and production from DMSPp) in surface seawater through on-deck incubation experiments. Although some observations and studies on the distributions of DMS and DMSP in the Bohai Sea and the Yellow Sea have been conducted (Li et al., 2016; Yang et al., 2014; 2015), the study aiming at winter has not been reported as well as the relationship between AA and DMS/P, which could reflect if temperature was a key controlling factor on biogenic sulfur cycling. Furthermore, our study was the first time to collect AA samples in porewater in Chinese marginal seas, although more work needs to be done to further understand the source and fate of AA in marine sediments. We will strength these particularities of our study in Section 1.

Specific comments: 1. The English throughout the entire manuscript needs to be slightly revised. Overall, the language is fine, but there are still many mistakes.

Thanks for your suggestions. We will check the entire manuscript to polish it and correct mistakes.

2. Section 2.3 Were there particulate measurements of anything (no filtering to measure total DMS/P, etc.)? Did you measure duplicates or triplicates? How exactly was precision and the limit of detection determined?

We measured total DMSP (DMSPt, no filtering) and dissolved DMSP (DMSPd, filtering with 0.7  $\mu\text{m}$  GF/F). We did not measure particulate DMSP (DMSPp) directly, but DMSPp can be calculated using DMSPt minus DMSPd. Duplicates were measured. According to Kiene and Service (1991), precision was determined as following: DMS standards prepared in glycol were compared to DMSP standards which were

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treated with base to produce DMS. This comparison between the two different standards showed agreement to within 5%. For typical water volumes analyzed (2 ml), this method gave detection limits for DMS of 0.05-0.5 nmol L<sup>-1</sup>. The limit of detection (LOD) may be expressed as:  $LOD = 3 * s / m$ .  $s$  is the standard deviation of low concentration samples and  $m$  is the slope of the calibration curve.

3. Section 2.3 Were nutrients measured? Phytoplankton pigments or flow cytometry?

Nutrients were measured. We will add analytical procedures in Section 2.3 and discuss how nutrients affect the distributions of DMS/P and AA in section 3. Utermöhl method was used for phytoplankton counting in Zhang's thesis (2018).

4. Section 3.5 Were bacterial parameters measured? Why not? Did you see evidence of first order rates? Did you discover something new with the incubation experiments?

We are sorry for not measuring the bacterial parameters, but we find a published paper (Liang et al., 2019) discussing the bacterial parameters of the same cruises. We will use this data to support our experiments and cite this paper in revised manuscript. In our published paper (Wu et al., 2015) which studied the acrylic acid (AA) degradation in details, we did incubation experiments for 8h and sampled every 2h. We found that AA degraded quickly in first 2h and the degradation rates reduced gradually, the loss curves fit the first-order equation. Kiene (1996) also demonstrated that apparent first order rate constants ( $k$ ) for the loss of DMSPd were estimated by plotting the natural log of the DMSPd concentration vs time. Besides the DMSPd degradation experiments, we carried out the AA biological and photochemical degradation experiments simultaneously. We found the total consumption (biological + photochemical) rates of AA were always higher than the production rates of AA from DMSPd at different stations during these two cruises, which provided evidence for other sources of AA in this study area.

The following references are added.

Liang, J., Liu, J., Wang, X., Lin, H., Liu, J., Zhou, S., Sun, H., and Zhang, X.-H.:

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Spatiotemporal dynamics of free-living and particle-associated *Vibrio* communities in the northern Chinese marginal seas, *Appl. Environ. Microbiol.*, 85, e00217-00219, 2019. Zhang, D.: The study of phytoplankton and biosilicon in the Yellow Sea and the Bohai Sea (in Chinese with English abstract), MS thesis, 天津大学天津大学科学与技术学院, Tianjin, China, 2018.

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