

## ***Interactive comment on “Assessing the potential for DMS enrichment at the sea-surface and its influence on air–sea flux” by C. F. Walker et al.***

**Anonymous Referee #1**

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In comparison with the surface seawater, the sea-surface microlayer has so far received little attention as regards the distribution of DMS and its influence on the sea-to-air flux. This manuscript presents valuable data to test the potential for near-surface processes to influence air–sea DMS exchange using a novel combination of direct sampling of the SSM and SSS, and EC measurement of air–sea DMS flux. The data appeared to be informative, the overall presentation is well structured and clear, the language is precise. Some important results were obtained. I recommend that the manuscript would be accepted for publication after minor revision. The authors may consider the following points during the revision. 1. For the methodology, what is the precision for the continuous DMS measurements using an atmospheric pressure chemical ionization mass spectrometer equipped with a porous membrane equilibrator? 2. Gas phase DMS was cryogenically concentrated on 60/80 Tenax TA in a 1/8”

C1

Restek Sulfinert-treated stainless steel trap at -20°C. Usually, the dry ice-ethanol liquid at -78°C or liquid nitrogen liquid at -190°C were used to trap DMS more efficiently. According to my previous studies, the temperature of -20°C is not low enough to trap all the DMS. 3. In section 3.5 DMS production rates in the SSM, the authors assumed that other DMS loss terms (photolysis, bacterial oxidation and vertical diffusion to sub-surface water) were negligible. However, it should be pointed out, that this hypothesis might produce some bias because the photochemical oxidation rates and bacterial oxidation rates of DMS are also main sinks in actual oceans. The authors need to point out how this affects the results. 4. In section 4 Discussion. In this study, DMS did not show any gradient in near-surface waters (see Fig. 4). This result is a little strange. Please explain this point using chlorophyll-a and phytoplankton species data. Did chlorophyll-a distribute uniformly as well in the near-surface waters? 5. "Furthermore, the presence of surfactants may have suppressed ventilation across the air–sea interface (Salter et al., 2011) under these conditions, leading to accumulation of DMS in the SSM". Please add data or references to support the presence of surfactants in the microlayer.

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C2