Atmos. Chem. Phys. Discuss., 8, S5955–S5957, 2008
www.atmos-chem-phys-discuss.net/8/S5955/2008/

Atmospheric Chemistry and Physics Discussions

ACPD

8, S5955–S5957, 2008

Interactive Comment

Interactive comment on "Open ocean DMS air/sea fluxes over the eastern South Pacific Ocean" *by* C. A. Marandino et al.

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Received and published: 14 August 2008

This article describes a month-long measurement of the dimethylsulfide (DMS) air-sea flux and transfer coefficient over the Eastern South Pacific Ocean. The gas transfer coefficient for DMS depended linearly on wind speed. The range of wind speeds was from 1 to 9 m/s.

The DMS gas transfer results are of significant interest due to a relatively high solubility of this gas. Extreme situations are useful for validation of theoretical models; the case with DMS does not seem to be an exception. A linear dependence of the air-sea transfer coefficient on wind speed for this gas appears to differ from the quadratic and cubic wind speed dependence that have been found for less soluble gases such as CO2 or dual tracers.

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According to the existing parameterizations for the bubble-mediated transport (e.g., Woolf, 1997), for more soluble gases the relative contribution of the interfacial gas transfer component is higher. In the range of wind speeds from 1 to 9 m/s, the bubble-mediated component of the DMS gas transfer is not expected to be significant compared to the interfacial component. The interfacial gas transfer coefficient has a tendency to obey a close to linear dependence on wind speed, which is consistent with the DMS results presented in the Marandino et al. (2008) Figure 7.

There is some difference in the wind speed dependence of the Knor-06 data with other DMS data sets (BIO, H04, Phase I) in Figure 7. According to Marandino et al. (2008), the difference in sea surface temperature among these cruises cannot explain the difference in the gas transfer coefficient. Other possible causes of the difference, which are not mentioned in Marandino et al. (2008), are as follows: effect of surfactants, diurnal cycling, wave age dependence, and different experimental setups.

The effect of surfactants is expected to be most pronounced under low wind speed conditions (Asher et al., 2003). The analysis of graphs in Figure 7, however, reveals that under low wind speed conditions the difference among different data sets practically ceases. This may be the result of averaging over different zones of biological activity. In order to differentiate between low and high concentrations of surfactants, it would be appealing to bin by wind speed the Knor-06 data separately for high (equatorial upwelling, subpolar water, and coastal waters off Chile) and low (the gyre region) bio-productivity zones.

Similar to possible surfactant effects, the diurnal cycling is most pronounced under low wind speed conditions (Soloviev and Lukas, 2006). Thus, the diurnal cycling also could not explain differences among different DMS data sets in Figure 7.

The dependence of the gas transfer coefficient on wave age seems to be the only remaining explanation for the difference between the different data sets in Figure 7 (of course, provided that the observed differences among different data sets are not a

ACPD

8, S5955–S5957, 2008

Interactive Comment

result of somewhat different measurement methods). A dependence of the interfacial component of gas transfer on wave age follows from the Soloviev (2007) model. Verification of this hypothesis would, however, require collecting data on the stage of surface wave development.

Finally, it should be noted that a realistic parameterization for the DMS exchange should also account for the concentration difference at the air-side of the interface (which is negligible for most of the other gases less soluble than DMS). To the best of my knowledge, such parameterization has not yet been developed.

Undoubtedly, the paper of Marandino et al. (2008) is an important contribution to the problem of air-sea gas transfer.

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 12081, 2008.