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Interactive comment on "Organic carbon and non-refractory aerosol over the remote Southeast Pacific: oceanic and combustion sources" *by* L. M. Shank et al.

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We agree with O'Dowd and Ceburnis (O&C) that more details on the operation and calibration of the AMS should be provided by Shank et al. for a better assessment of potential loss of organics associated with sea salt due to particle bounce from the vaporizer. In addition, the inclusion of mass spectra would provide information on the sources and composition of the organics that were sampled by Shank et al.

The bulk of the previously published papers referred to by O&C were based on measurements made from Mace Head, Ireland or on high latitude research cruises. These papers have provided evidence for an ocean-derived source of organic aerosol to the atmosphere that can be related to ocean biological productivity (a higher percent organic mass in the summer than in the winter). The Shank et al. measurements provide a view of ocean-derived aerosol in a different ocean basin under conditions of relatively low chlorophyll concentrations. The analysis presented in the Shank et al. paper illustrates the difficulty in attributing measured atmospheric organic aerosol to different sources. Sea salt aerosol obviously comes from the ocean but organic aerosol can be ocean derived or derived from continental sources, including combustion, transported long distances in the free troposphere, and mixed into the marine boundary layer (MBL) far from the original source. The relative mass concentrations of the aerosol chemical components in the MBL (e.g., sea salt, organic, and sulfate) are as variable as the sources that impact each ocean region (Quinn and Bates, 2005). The relative number concentrations of sea salt, organic, and sulfate-containing particles are largely unknown due to a lack of measurement capability. Yet aerosol chemical composition on a number, not mass, basis is required for assessing the sources controlling CCN number the oceans.

The Shank et al. paper will add to the limited data available that reveal information about the sources and composition of aerosol mass in the MBL. The authors use a suite of measurements to assess the source of measured organics and find a significant correlation between organic aerosol and tracers of combustion over the Southeast Pacific Ocean. This result shows that combustion emissions can impact regions assumed to be "remote marine" and illustrates the difficulty in identifying sources of organics to the MBL. Shank et al. acknowledge previously published evidence of ocean-derived aerosol and go to great lengths to put their data into this context. The paper should not be rejected because it reaches a different conclusion than previous publications. Hopefully, it will encourage additional measurements in a variety of ocean regions so that the end result is an improved understanding of the source and composition of ocean derived particles.

The source of organic aerosol in the MBL is still highly uncertain. Our understanding is not to the point where we can say the sources are the same throughout the MBL. We need to avoid overemphasizing a biogenic source of organics (as was done for DMS in the 1990's) to the exclusion of other sources and processes. We feel a revised version of the Shank et al. paper should be accepted in ACP. The comments by the three reviewers and O'Dowd and Ceburnis will further strengthen the paper.

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Quinn, P.K., and T.S. Bates (2005), Regional aerosol properties: Comparisons of boundary layer measurements from ACE 1, ACE 2, Aerosols99, INDOEX, ACE Asia, TARFOX, and NEAQS, J. Geophys. Res., 110(D14), D14202, doi: 10/1024/2004JD004755.

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