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Biogeosciences Discussions

Interactive comment on "Soluble trace metals in aerosols over the tropical south east Pacific offshore of Peru" *by* A. R. Baker et al.

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Reviewer's Comments: This manuscript reports data from aerosol samples collected offshore of Peru during 2012. Both bulk and soluble aerosol fractions are reported for Fe, Al, Mn, Ti, Zn, V, Ni, Cu, Co, Cd, Pb and Th as well as N concentrations in the forms of nitrate and ammonium. The dataset is particularly valuable because of the location which is largely undersampled and where aerosol dry deposition flux is poorly understood. The manuscript is well prepared, well written and well conceived. The research group has vast experience in these sorts of studies and it shows. The methods are well established and adequate precautionary measures were employed to reduce contamination risks.

Response: We thank the reviewer for these comments.

Reviewer's Comments: I would have liked to have seen a parallel comparison of the ammonium acetate leach with another solution (UHP or seawater).

Response: We assume that this comment relates to the uncertainty surrounding the results obtained using different leaching procedures to study soluble aerosol trace metals and we agree with the reviewer that this is an important issue. However, we are not able to perform comparative leaching studies on the samples reported in this manuscript. In the circumstances we do not feel that we can do more than draw the readers' attention to the work of Morton et al. (2013), where such a direct comparison has been made.

Reviewer's Comments: I would also like to see a comparison of their dry deposition flux estimates with other observations (IODP in the region?), not just models, if available.

Response: We have located only one non-model-based estimate of dust flux to this region, which comes from IODP site 1237 (∼16°S 76°W). Fe accumulation rate at the site has been estimated to be ∼ 400 mg m-2 yr-1 (Saukel, 2011), equivalent to ∼1.1 mg m-2 d-1. Our estimates of soluble Fe dry deposition during M91 represent approximately 0.1-0.5% of the total Fe accumulation rate at site 1237. Two factors complicate a direct comparison of these two estimates however. We have no information concerning the fractional solubility of aerosol Fe in this region, although analysis of Saharan dust relatively close to source regions over the Atlantic suggests that fractional solubility can be as low as 0.1-4% (Baker et al., 2006; Sholkovitz et al., 2012). Also, the deposition estimate from the IODP core integrates atmospheric inputs over much longer timescales than those of our samples. Given these caveats, the comparison between the two deposition estimates does not seem unreasonable. We will add this comparison, and the caveats associated with it, to the manuscript.

References: Baker, A. R., Jickells, T. D., Witt, M., and Linge, K. L.: Trends in the solubility of iron, aluminium, manganese and phosphorus in aerosol collected over the Atlantic Ocean, Marine Chemistry, 98, 43-58, 2006.

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Sholkovitz, E. R., Sedwick, P. N., Church, T. M., Baker, A. R., and Powell, C. F.: Fractional solubility of aerosol iron: Synthesis of a global-scale data set, Geochimica et Cosmochimica Acta, 89, 173-189, 10.1016/j.gca.2012.04.022 2012.

Interactive comment on Biogeosciences Discuss., 12, 17219, 2015.