Soluble trace metals in aerosols over the tropical south east Pacific offshore of Peru

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Abstract

Bulk aerosol samples collected during cruise M91 of FS Meteor off the coast of Peru in December 2012 were analysed for their soluble trace metal (Fe, Al, Mn, Ti, Zn, V, Ni, Cu, Co, Cd, Pb, Th) and major ion (including NO3− and NH4+) content. These data are among the first recorded for trace metals in this relatively poorly studied region of the global marine atmosphere. To the north of ~ 13° S, the concentrations of several elements (Fe, Ti, Zn, V, Ni, Pb) appear to be related to distance from the coast. At the south of the transect (~ 15–16° S), elevated concentrations of Fe, Cu, Co and Ni were observed. These may be related to the activities of the large smelting facilities in the south of Peru or northern Chile. Calculated dry deposition fluxes (3370–17 800 and 16–107 nmol m−2 d−1 for inorganic nitrogen and soluble Fe respectively) indicated that atmospheric input to the waters of the Peru upwelling system contains an excess of Fe over N, with respect to phytoplankton requirements. This may be significant as primary production in these waters has been reported to be limited by Fe availability, but atmospheric deposition is unlikely to be the dominant source of Fe to the system.

1 Figures