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Sources and composition of water-soluble trace elements in aerosols over the Benguela and Peruvian Oxygen Minimum Zones

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Atmospheric deposition of trace elements and nutrients are crucial determinants of ocean biogeochemistry, providing a direct supply of essential macro- and micronutrients to surface seawaters. However, very few direct measurements exist to quantify aerosol trace element and nutrient input to remote oceanic regions. Fe is known to limit primary production across the Equatorial Pacific and thus a critical question with respect to the potential future expansion of the ETSP OMZ is to what extent Fe supply from atmospheric deposition and lateral advection fuel primary production in this region. To address this we collected 42 high volume aerosol samples on recent cruises in the South Atlantic (GEOTRACES section GA08 November 2015), and the Equatorial Pacific (SFB cruise M136/7 June 2017). We will present the results from leaching experiments conducted with these samples, which were designed to simulate the release of trace elements and nutrients into seawater following deposition into the surface ocean. Aerosol filters were leached in ultrapure water for a duration of 1 h and the leachates were analysed via ICP-MS (Element XR) for trace element determination and nutrient analyser (QuAatro AutoAnalyser) for macronutrient analysis. Analysed trace elements included Al, Cd, Co, Cu, Fe, Pb, Mg, Mn, Ni, Th, Sn, Ti, U and Zn, and macronutrients included phosphorous, nitrate+nitrite and ammonia. These data represent some of the first observations of aerosol trace metal and nutrient inputs into these remote, under sampled, yet biogeochemically critical oceanographic systems.

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