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# Experimental determination of the nature and magnitude of atmospheric transformations of P speciation in Saharan Dust caused by pH and ionic strength changes.

Michael Krom (1), Antony Stockdale (1), Zongbo Shi (2), Liane Benning (1), Julie Calkins (1), and Rob Mortimer (1)

(1) Leeds, Earth and Biosphere, School of earth and Environment, Leeds, United Kingdom (m.d.krom@leeds.ac.uk), (2) Birmingham, School of Geography, Earth and Environmental Sciences, Birmingham, United KIngdom

Saharan dust and other aerosols are an important external source of P which can increase the rate of some key biogeochemical processes such as carbon uptake in offshore oceanic areas. This is particularly important in those areas which are unequivocally P limited such as the Mediterranean Sea. In a recent study Nenes et al. (2011) suggested that acid processes in the atmosphere increased the proportion of bioavailable P which reaches the photic zone. They proposed that particles can undergo several cycles of condensation and evaporation before being removed from the atmosphere. The condensation leads to formation of cloud droplets with relatively high pH and low ionic strength and evaporation usually result in wet aerosol with lower pH and higher ionic strength. In the current experimental study we mimic this atmospheric cycling process showing the potential mutual dependence of Fe and P on such cloud/aerosol cycling reactions. The rate of conversion of the total inorganic P species (TIP, principally apatite and Fe-bound P) in the pH range 2-6 has been determined for Saharan dust and PM-10 fractionated Saharan dust precursors. The conversion to bioavailable labile P (LIP) is rapid (within minutes to 1h for pH < 5). The final fraction of TIP converted depends on the pH involved; at pH = 2 all TIP is converted to LIP while at higher pH, a much smaller fraction of the TIP is converted. Increased ionic strength (up to 2M ammonium sulphate or sodium chloride) has a relatively minor effect on both the rate and the final LIP released. These results are being incorporated into cloud and global climate models to quantify the global importance of atmospheric cycling on the bioavailable P flux to the ocean.