# Oligotrophic seawater Pb response to daily timescale dust storms

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Seawater concentrations and isotopic compositions of Pb serve as tracers of anthropogenic and terrigenous inputs to the oceans. However, the impact of short-term (daily) dust storms on the oceanic water column is poorly constrained due to the typically low sampling temporal resolution in open ocean environments. The Gulf of Aqaba (GoA), northern Red Sea, is a deep oligotrophic water body surrounded by hyper-arid deserts with no major tributaries, and hence receives limited terrigenous input, except for frequent dust storms. The GoA is highly accessible and therefore provides the opportunity to study the dynamics of seawater Pb chemistry across abrupt and short environmental perturbations. Here, we report a highly resolved time series of vertical profiles of dissolved Pb concentrations and isotopic compositions across daily-timescale dust storm events that occurred during 2017 - 2018.

The impact of high dust loads on the water column chemistry varies with storm provenance, magnitude and length. The dissolved Pb composition reflects a binary mixing between two end members: anthropogenic dust and seafloor carbonate sediments, with approximately 40 – 94% of GoA seawater Pb originating from anthropogenic sources. Dust storms impose a strong perturbation of seawater Pb towards the anthropogenic end member (>80%). We identified vertical shifts of Pb peaks in the water column, on a daily-weekly timescale, reflecting a two-stage dissolution mechanism of the settling particulates in response to dust storms. The first stage displays rapid leaching of the coating of settling dust particles, followed by a second stage of gradual dissolution of the mineral phase. The combined results provide insights into the impact of short-term dust storms on trace element cycling in the oceanic water column and the dynamics of seawater leaching of settling particulates.