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Geochemical characterization of modern aeolian dust deposited over North Eastern Arabian Sea.

Suresh Karunanithi (1), Ashwini Kumar (1), and Waliur Rahman (2)

(1) Geological Oceanography Division, National Institute of Oceanography, Panaji, Goa-403004, India, India (geosureshh@gmail.com), (2) National Centre for Polar and Ocean Research, Headland Sada, Vasco-da-Gama, Goa-403 804, India

The Arabian Sea (AS), one of the most biologically productive oceanic regions, receive significant amount of aeolian dust from surrounding arid/semi-arid regions under favourable meteorological conditions [1]. Apart from wind driven coastal upwelling during summer monsoon [2] and convective mixing in winter period [3], atmospheric dust deposition is an important driver for phytoplankton productivity in the AS from daily to seasonal time scale [4]. In order to assess the impact of dust deposition to the biogeochemistry of the Arabian Sea, it is very important to identify the sources of transported dust. This can be done by simultaneous characterization of both sources emitting dust and the dust at receptor region. Here we present geochemical characteristics (mineralogy and radiogenic isotopes of Sr and Nd) of aeolian dust collected at a coastal location in North Eastern Arabian Sea (NEAS).

Twelve aerosol samples were collected, during dusty period, at Goa, 15.4^{o}N, 73.8^{o}E, spanning over different seasons. In addition, several surface sediment samples were collected from source regions (Thar Desert, Oman coast and Iran coast) and analysed to constrain sources of collected dust. Clay mineralogy of dust extracted from filters and sediment samples were analysed using XRD. For isotopic analyses, about 10-20 cm^2 of filter was leached with ultrapure Milli-Q water to remove sea-salt Sr and subsequently leached with sodium acetate buffered acetic acid solution (pH = 5) to remove carbonate content. The remaining silicate fraction was dissolved using mixture of HF-HNO_3 acids. Also, $\sim$ 50 mg of clay fraction (less than 2 μm) of sediment samples were completely dissolved using HF-HNO_3 acid. Isotopic composition (Sr and Nd) of sediment clay and aeolian dust silicate fraction were measured using MC-ICP-MS (Thermo Scientific, Neptune Plus).

Illite and chlorite are major clay minerals found in all dust samples followed by smectite which is an indicative of dust from arid/semi-arid region of South-West Asia [5]. Few dust samples have high abundance of palygorskite with palygorskite to illite ratio averaging around 2 which is comparable to that of Arabian Peninsula sediments [6]. The $^{87}Sr/^{86}Sr$ and ε_{Nd} values, (measured in silicate fraction) for collected dust, shows a large variation (range: 0.705 to 0.732 and -7.2 to -18.1) suggesting multiple sources contributing to dust reaching at NEAS. Satellite images along with back-trajectories were used to link the different characteristics isotopic signature of dust to varying sources such as the Arabian Peninsula, Indus delta, Makran coast, and Helmand basin. These isotopic signatures are well supported by distinct mineralogical composition of dust derived from different source regions.

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