Dynamics of dissolved ε_{Hf} in the Indian Ocean waters

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Hf isotopic compositions (ε_{Hf}) were measured in water columns of the northern Indian Ocean; the Arabian Sea (AS), the Bay of Bengal (BoB), the Andaman Sea and the North-East (N-E) Indian Ocean (IO), for the first time, to determine its sources and to track the various water masses present in these basins. In the AS water column, ε_{Hf} varies from -10.74 to +2.14. Surface waters in the northen AS are unradiogenic in ε_{Hf} compared to southern AS, indicating the continental input such as from the Himalayan rivers. However, ε_{Hf} varies with a narrow range of -2.16 to 2.14 in the intermediate to bottom waters of the AS, signifying that, the north Atlantic deep waters (NADW) and Antarctica bottom waters (AABW) controls of these waters.

Deep and bottom waters of Andaman Sea with high radiogenic ε_{Hf}, are influenced by the input from local volcanics. Deep and bottom waters in the BoB are characterised by moderately less radiogenic Hf, probably due to leaching of sediment discharged from the G-B system. The intermediate waters of the BoB are radiogenic in Hf, similar to those of the Andaman Sea which indicates the supply of the intermediate water from the Andaman to the Eastern BoB. In the N-E Indian Ocean waters, ε_{Hf} varies from -10.35 to +7.78. Surface waters of the IO have quite less radiogenic Hf, which is possibly resulting from the dissolution of unradiogenic Hf from the sediments delivered from the G-B system in the north and dust deposition from Australian deserts in the southern IO. However, the deep and bottom waters from the IO display a ranges of 0.32 to 4.96 and -0.56 to +3.95, respectively, close to the NADW and AABW ε_{Hf} values reported in the Atlantic Ocean, which indicate that, the NADW and AABW regulate the deep and bottom waters in the Indian Ocean.

This study, for the fist time observed very less radiogenic Nd in the surface waters of the Indian Ocean regulated by continental inputs. However, the dissolved ε_{Hf} in the deep and bottom waters of the IO are controlled by the NADW and AABW water masses along with leaching of sediments.