

Stable strontium isotopic composition ($\delta^{88/86}\text{Sr}$) of depth-bound water samples from the Bay of Bengal measured using double spike TIMS

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The Bay of Bengal (BoB) receives large fluxes of fresh water from the Ganges-Brahmaputra-Irrawaddy rivers and is stratified. Radiogenic Sr ($^{87}\text{Sr}/^{86}\text{Sr}$) isotopic measurements of water samples collected from the BoB have revealed the presence of submarine groundwater discharge (SGD) derived radiogenic $^{87}\text{Sr}/^{86}\text{Sr}$ from the Bengal Basin to the BoB at 100 m depths [1], which has important implications for the seawater $^{87}\text{Sr}/^{86}\text{Sr}$ evolution over time. Here we investigate the stable Sr isotopic composition ($\delta^{88/86}\text{Sr}$) of BoB water samples collected from different depths. Recent advances in mass spectrometry allow measurements of variations in $^{88}\text{Sr}/^{86}\text{Sr}$ ($\delta^{88/86}\text{Sr}$) in natural samples using a double Spike TIMS (DS TIMS) technique (Krabbenhoft et al., 2009; 2010). We adapted a similar method but used a new ^{87}Sr - ^{84}Sr double spike that was prepared gravimetrically by mixing ^{84}Sr and ^{87}Sr single spikes. The $\delta^{88/86}\text{Sr}$ values, reported relative to NIST SRM 987, were determined for BoB water samples collected from 0 m and 100 m from multiple locations and included samples with radiogenic $^{87}\text{Sr}/^{86}\text{Sr}$ compositions and high salinity that provided evidence of saline SGD into the BoB [1]. Strontium from the sample-DS mix was separated from the sample matrix using ion exchange chromatography (Eichrom Sr-Spec resin) and the purified Sr was loaded on single zone-refined Re filaments using phosphoric acid along with a Ta-oxide activator and were analyzed using a thermal ionization mass spectrometer (TIMS, Thermo Triton Plus) at the Centre for Earth Sciences, IISc Bangalore. The NIST SRM-987 standard was measured along with a pure Sr ICPMS standard in multiple sessions and the long-term external reproducibility of $\delta^{88/86}\text{Sr}$ is better than 0.05‰. The $\delta^{88/86}\text{Sr}$ values of the BoB water samples from multiple depths showed limited variation between 0.37‰ to 0.41‰ with internal 2SD ranging between 0.03‰-0.05‰. The mean BoB $\delta^{88/86}\text{Sr}$ value is ~0.38‰ (2SD = 0.02‰) which overlaps with reported compositions of global seawater samples and suggests a constant $\delta^{88/86}\text{Sr}$ for modern seawater.

[1] Chakrabarti et al., 2018, *Scientific Reports*. 8:4383, DOI:10.1038/s41598-018-22299-5