

**Geochemical and stable Ca and radiogenic Sr isotopic composition of the Godavari River draining the Deccan basalts**

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To investigate congruent versus incongruent weathering of basalt we utilized calcium isotopes in association with  $^{87}\text{Sr}/^{86}\text{Sr}$  and major ion chemistry of Godavari River in India. Water samples were collected during different seasons in 2017 from the upper 500 km course of the river where it drains the Deccan Basalts. Cation concentrations were measured using a quadrupole ICPMS (Thermo X- Series II) and Ca isotopes using double-spike TIMS (Thermo Triton Plus), both at the Centre for Earth Sciences in IISc, Bangalore. The water samples exhibit large variability in  $\delta^{44/40}\text{Ca}_{\text{SRM915a}}$  from  $0.66\pm 0.09\text{‰}$  to  $1.62\pm 0.1\text{‰}$  during pre-monsoon and from  $0.56\pm 0.09\text{‰}$  to  $1.28\pm 0.08\text{‰}$  during monsoon. The  $\delta^{44/40}\text{Ca}_{\text{SRM915a}}$  values show a positive correlation with Sr/Ca ( $\mu\text{mol}/\text{mmol}$ ) ratios, the latter values increasing from 1.5 in upstream samples to 7 in midstream samples. The  $\delta^{44/40}\text{Ca}_{\text{SRM915a}}$  values ( $0.56\pm 0.09\text{‰}$  to  $0.89\pm 0.11$ ) and Sr/Ca molar ratios (1.5 to 2.05) of upstream samples reflect incongruent weathering of Ca-bearing minerals in basalts ( $\sim 0.9\text{‰}$ ). The high  $\delta^{44/40}\text{Ca}_{\text{SRM915a}}$  values can be explained by congruent weathering of minerals in basalt followed by precipitation of secondary calcite and/or clay, both of which preferentially take up  $^{40}\text{Ca}$  from the water. Carbonate precipitation may be particularly important in large reservoirs (e.g., Paithan Dam) along the course of the Godavari River. The  $^{87}\text{Sr}/^{86}\text{Sr}$  values in these water samples range from  $0.708807\pm 3$  to  $0.710188\pm 8$  during pre-monsoon and from  $0.709320\pm 7$  to  $0.710109\pm 9$  during monsoon. The negative correlation between  $\delta^{44/40}\text{Ca}_{\text{SRM915a}}$  and  $^{87}\text{Sr}/^{86}\text{Sr}$  possibly reflects weathering of silicates versus carbonate.