

Temporal variation in major ion concentrations and $^{87}\text{Sr}/^{86}\text{Sr}$ of headwaters of the Godavari River draining basalt, India

HISHAMUNDA VALENS¹, RAMANANDA CHAKRABARTI¹

¹Indian Institute of science, Bangalore, India
(hishamundav@iisc.ac.in; ramananda@iisc.ac.in)

The Godavari River is the largest river in peninsular India and drains the Deccan basalts in the upper 700 km of its course. To investigate seasonal variability in river water chemistry due to chemical weathering of basalt, a bi-weekly sampling of the Godavari River water was performed in the upper reaches from October 2017 till December 2018. In addition, groundwater samples, bed rocks, as well as rare carbonate nodules found within the riverbed were also analysed. Major and trace element concentrations were determined using a Quadrupole-ICPMS (X series II) and $^{87}\text{Sr}/^{86}\text{Sr}$ was measured using TIMS (Triton Plus), both at the Centre for Earth Sciences, IISc. The large variability in major ion concentrations of the river waters was recorded in pre-monsoonal samples, which suggests possible input of groundwater to the river. The river water samples show limited variations in $^{87}\text{Sr}/^{86}\text{Sr}$ (0.709746 to 0.710091) which overlaps with the $^{87}\text{Sr}/^{86}\text{Sr}$ of groundwater (0.709660 to 0.710150). Basalts and bulk carbonate nodules show more radiogenic values but leached carbonates show $^{87}\text{Sr}/^{86}\text{Sr}$ which overlap with the river water. Although these carbonates have Sr isotopic signature similar to that of river water, their cation concentration ratios are very different and mixing calculations show that their contribution to the river water chemistry is minor (less than 0.1 wt%). Cation concentration ratios of the river water can be explained by contribution from groundwater during the dry seasons and possible contributions from secondary minerals like zeolites previously reported in Nashik. Selective weathering of pyroxene and plagioclase in basalts could also explain some of the variability in these river water samples.