Temporal Variation in $^{87}Sr/^{86}Sr$ and Sr content of the Ganga-Brahmaputra River System

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The Ganga-Brahmaputra River Systems make significant contribution to the dissolved Sr and $^{87}Sr/^{86}Sr$ budget of seawater. The Sr isotope composition of these river system are highly radiogenic with $^{87}Sr/^{86}Sr$ in the range of 0.720 to 0.850. These results and associated fluxes rely on a limited number of measurements. The annual fluxes of Sr and its average $^{87}Sr/^{86}Sr$ can be better constrained through frequent measurements over an annual cycle considering the temporal variation in runoff. Such a study will also provide better insight into the factors regulating dissolved Sr isotope composition through time. These include the lithology, contribution from various basins, runoff etc.

A systematic study has been initiated to track temporal variations in $^{87}Sr/^{86}Sr$ of dissolved Sr at selected sites of the Ganga-Brahmaputra system. The sites are Guwahati (Brahmaputra) and Allahabad after confluence of the Yamuna (Ganga). The Guwahati site almost represents the outflow of the Brahmaputra, Allahabad incorporates the contribution from the Himalaya and the Peninsular India. The samplings were done at biweekly interval. Preliminary results show significant variations in both $^{87}Sr/^{86}Sr$ and Sr content over ~10 months period. In the Ganga, Sr content and $^{87}Sr/^{86}Sr$ vary from 1061 to 3412 nM and from 0.71696 to 0.73001 respectively and in the Brahmaputra they range from 622 to 1246 nM and 0.71602 to 0.71800. Variations in Sr content and $^{87}Sr/^{86}Sr$ in the Ganga exhibit opposite trend attributable to two component mixing, one from the Himalaya and the other from Peninsular India. Lower Sr concentration with higher $^{87}Sr/^{86}Sr$ characterises the Himalayan component whereas higher Sr and lower $^{87}Sr/^{86}Sr$ is more typical of from the Peninsular India. In contrast, in the Brahmaputra, variation in Sr and its istope composition is a combined effect of runoff and lithology. One of the monsoon samples of the Brhamputra has high Sr content contributed by flash floods in the Tibet sub-basin.

Further work is underway to understand the causes of these variations and to estimate time averaged flux of Sr and its isotope composition from these systems.