Using Sr/Nd isotopic ratios to determine sediment sources in the Burdekin Falls Dam, Queensland, Australia.

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Situated in Northern Queensland, Australia the Burdekin River Catchment is one of the largest catchments in the state and as such, impacts significantly upon the Great Barrier Reef shelf system in terms of water, sediment and nutrient exports. Due to the seasonal nature of rainfall in the region, these impacts are highly episodic. In 1987 the Burdekin Falls Dam was constructed to provide a storage reservoir for irrigation downstream. The reservoir was expected to act as a sediment trap and to clarify each year during the dry season, however it fills and overflows during wet-season flow events, which carry large amounts of fine suspended particulate matter, and suffers from persistent turbidity (>45NTU in the dry season).

To investigate the source of sediment entering and persisting in the reservoir we are examining sediment mineralogy, trace elements and isotopic signatures ($^{87}Sr/^{86}Sr$, with $^{144}Nd/^{143}Nd$ results pending) in benthic and suspended sediment samples collected from each of the Burdekin Dam's two major sub-catchments and the reservoir. Mineralogical data indicates that the high turbidity relates to fine clay minerals generally <10μm in size (kaolinite, smectite, illite/muscovite) and that the mineralogy of sediments from the two main inflowing rivers is similar and representative of catchment geology.

Using integrated ICP-MS and TIMS techniques we have measured the trace element and radiogenic isotope signatures of a number of sediment samples. $^{87}Sr/^{86}Sr$ ratios of benthic sediments from the Suttor/Belyando catchment are characterised by lower Sr concentrations and higher $^{87}Sr/^{86}Sr$ ratios in contrast to the higher Sr concentrations and lower $^{87}Sr/^{86}Sr$ ratios in Upper Burdekin sediments. Reservoir sediments fall along a linear mixing line between the two catchment end-member compositions but lie closer to that for the Burdekin river sediments. Our data indicates that material from the Burdekin River dominates deposition within the impoundment, and may indicate that it is the Suttor/Belyando catchment clay fraction that contributes most to the turbidity associated with the dam reservoir.