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Holocene sediment transfer in Godavari River: Inferences from mineral magnetic studies

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Being one of the largest drainage basins in Core Monsoonal Zone (CMZ) the sediment transfer from continental region to oceanic sink in Godavari Drainage Basin (GDB) is mainly governed by Indian Summer Monsoon (ISM) precipitation. We conduct high resolution mineral magnetic analysis including thermo-magnetic studies on ¹⁴C dated Holocene sediments from sediment core (CY) recovered from Godavari delta region. High χ_{lf} , χ_{ARM} , SIRM with Curie temperatures for titanomagnetites during 2.5 to 2 cal ka BP with decreasing upwards trend indicate higher supply from Deccan basaltic source gradually reduced with appearance of hematites depicting prevalence of warm arid climates although the effect of artificial dams cannot be ruled out. The period during 8.5 to 7.9 cal Ka BP shows high χ_{ARM} values without much alteration to χ_{lf} and SIRM suggesting uniform SD magnetite along with high sand-mud ratio further indicate higher influx of Deccan source.

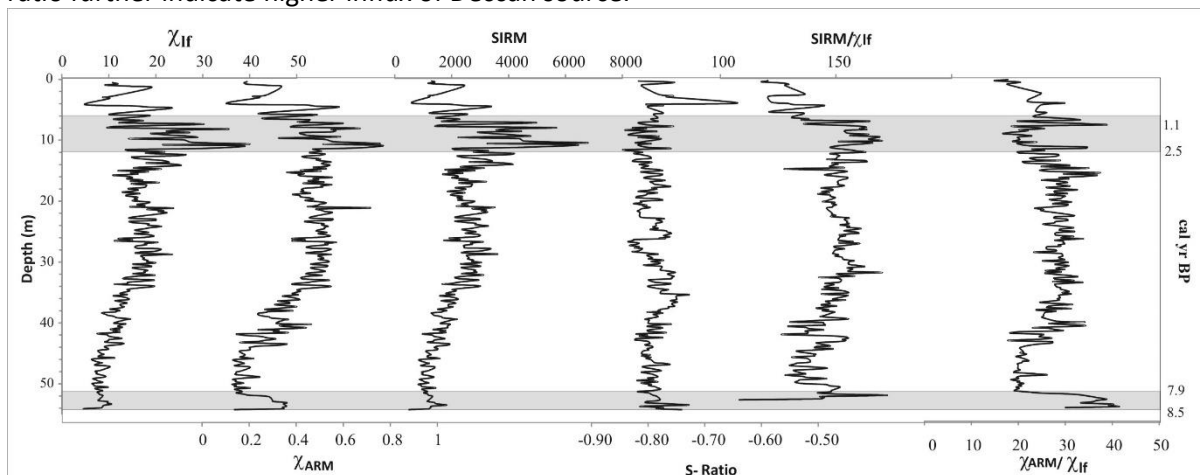


Figure 1: Downcore variation in Mineral magnetic parameters in Godavari delta core (CY)

Nageshwar Rao et al [1] inferred higher sediment supply as a results of rapid delta progradation linked to probable climatic amelioration after the 4.2–4.1 cal ky BP resulting arid events and deforestation owing to increased sedentary agriculture in central and south India.

The mineral magnetic studies carried out on recent sediments from GDB shows predominant SD magnetite over entire stretch of floodplain sediments [2]. Based on this we infer that the Deccan basaltic source was dominant in western Bay of Bengal for period of 2 to 2.5 ka BP apparently due to spatial variability in the ISM intensity which results in relatively higher influx of Deccan Basaltic source compared to the quartzo-feldspathic sources of Precambrian granitic gneisses and Gondwana sediments within the delta region.

References:

- [1] Nageswara Rao et al (2015) in 'Palaeogeography, Palaeoclimatology, Palaeoecology' 440:213–233.
- [2] Kulkarni Y R, Sangode S J, Meshram D C, Patil S K and Dutt, Y (2014) Jour. Geol. Soc. India 83:376-384.

