

The Juvenile Lu-Hf crustal signature from the detrital zircons from Mesoarchean Keonjhar Quartzite: Implications for the early Archean continental crust and geodynamics

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U-Pb and Lu-Hf compositions from detrital zircon in Meso-Neoproterozoic siliciclastic successions provide a robust database for distinguishing the relative proportion of juvenile and recycled plutons in the upper crust that constitute the provenance for such sediments. Lu-Hf composition from recently dated 3.0 Ga Keonjhar Quartzites [1] of the Singhbhum craton in eastern India record detrital zircons from upper continental crust older than 3.0 Ga and reveal the proportion of juvenile/recycled crust in the Paleoproterozoic Singhbhum craton and explore the implications for early Archean geodynamics.

The detrital zircons from Keonjhar Quartzite reveal LA-ICPMS U-Pb depositional ages 3.00 to 3.2 Ga with initial ratios $^{176}\text{Hf}/^{177}\text{Hf}=0.28089$ and $^{176}\text{Lu}/^{177}\text{Hf}=0.0013$. The strong superchondritic ϵ_{Hf} values (+1 to +8.75) suggests a predominantly juvenile granitic source. The Hf signature suggests radiogenic characteristic of depleted mantle source, a typical behaviour of I-type granite that largely form in island arc type accretionary settings [2]. The detrital zircon Lu-Hf data favour juvenile granitoid plutons in the early Archean craton and suggests the onset of accretionary geodynamic setting prior to 3 Ga [3].

[1] Mukhopadhyay, J., Crowley, Q., Ghosh, S., Ghosh, G., Chakrabarti, K., Misra, B., Bose, S., 2014. Oxygenation of the Archean atmosphere: New paleosol constraints from eastern India. *Geology* **42**, 923-926. [2] Gardiner, N. J., Kirkland, C. L., Kranendonk, M. J. V., 2016. The Juvenile Hafnium Isotope Signal as a Record of Supercontinent Cycles: *Science Reports* 6:38503. DOI: 10.1038/srep38503. [3] Patchett, P.J., Kouvo, O., Hedge, C.E., Tatumoto, M., 1981. Evolution of continental crust and mantle heterogeneity: evidence from Hf isotopes. *Contributions to Mineralogy and Petrology* **78**, 279-297.