Fe isotope compositions of 1.85 Ga Flin Flon paleosol, Canada

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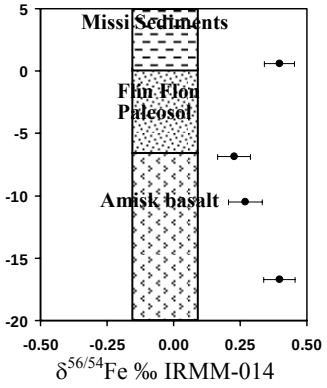
The ~ 1.85 Ga old Flin Flon paleosols – youngest among the Paleoproterozoic preserve evidences such as Ce anomalies [1] and complete Fe, Mn retention [2] indicating high atmospheric oxygen levels. In this work we carried out Fe isotope analysis on Nu (HR) MC-ICP-MS at LAM-MC-ICP-MS laboratory, NGRI to look for evidences of Fe mobilization. We have analzyed paleosol samples along with those overlying as well as underlying the profile (Fig. 1). The samples have been analyzed in sample-standard bracketing mode using IRMM-014 as the standard.



The paleosol samples from the top of Flin Flon profile yield δ^{56}Fe values close to 0 ‰ IRMM-014, while the sample overlying the paleosol profile and those underlying it are enriched in heavier Fe isotope (δ^{56}Fe > 0.2 ‰). Signifcantly, no fractionation in Fe isotopes is observed within the paleosol profile. It may be noted here that all the pre-1.85 Ga paleosols such as Mt. Roe (~2.7 Ga), Cooper Lake (~2.45 Ga) and Gaborone (~2.25 Ga) show enrichment of heavier Fe isotopes towards the top of the profile resulting in δ^{56}Fe values of ~ 1 ‰ due to the preferential loss of ^{54}Fe during anoxic weathering. Such absence of fractionation in Flin Flon paleosols indicates complete oxidation of iron corroborating with other geochemial evidences. Further detailed Fe isotope analysis in the entire paleosol profile is under progress.

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Mafic crustal exhumation below Jabera-Damoh region of Vindhyan basin (India) and thermo-tectonic evolution

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Vindhyan basin, which is one of the largest intra-cratonic late Proterozoic basins, lies just north of the SONATA rift zone which virtually divides the Indian subcontinent into two parts. Due to lack of geophysical information, depositional and evolutionary history of this basin has been relatively less understood. Our detailed gravity investigations, covering 40 gravity bases and 1500 data points around Jabera-Damoh region of this basin, together with available geological and geophysical information[1,2], indicate almost total absence of granitic-gneissic crust from a large part of Jabera basin and its surrounding areas due to lower crustal exhumation, which brought high velocity mafic crust to significantly shallow levels. Maximum thickness of granitic–gneissic rocks appears to be less than 4 km. The entire region seems to have been uplifting, deforming and eroding since early Proterozoic period, followed subsequently by crustal extension and rifting during mid Proterozoics. In this region, sedimentation possibly started around this period and continued till the end of Proterozoic era. It further appears that during early to mid Proterozoic period, a major thermal anomaly may have persisted below this region, which was possibly geotectonically active even before the evolution of SONATA rift zone.

References

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