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Eu anomaly- reliability of the proxy in inferring source composition of clastic Sedimentary rocks: A case study from western Dharwar craton, Karnataka, India

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Use of trace and rare earth element concentration of terrigenous sedimentary rocks to deduce the composition of their source rocks in the hinterland is a very common and efficient practice. The results of geochemical analysis of the metaquartzarenites located at the basal part of Bababudan and Sigegudda belt, late Archean greenstone sequences of western Dharwar craton show that the sediments were most possibly supplied from Paleo to Mesoarchean granitoids of western Dharwar Craton. Rare earth element patterns of these basal quartzites display fractionated REE pattern in variable degree (La_N/Yb_N =1.47-10.63) with moderate to highly fractionated LREE (La_N/Sm_N=2.67-8.93) and nearly flat to slighly elevated HREE (Gd_N/ Yb_N=0.62-1.29) and a significant Eu negative anomaly (avg. Eu/Eu*=0.67). In general, presence of negative Eu anomaly in clastic rocks reflect the widespread occurrence of granitic rocks in the source area, which possess negative Eu anomaly. On the other hand, mechanical enrichment of zircon (having negative Eu anomaly, high HREE concentration and low La_N/Yb_N), if present, will hamper the whole REE pattern of the sediments and necessarily, do not actually mimic the source composition. Here, in our study, the Th/Sc vs Zr/Sc diagram show mineral Zircon has been concentrated by mechanical concentration in the sedimentary rocks. Few quartzite samples which have high Zr content typically exhibit low La_N/Yb_N values, reflecting pivotal role of mineral zircon in controlling the REE pattern of the sediments. Hence, in this case, we should be cautious in interpreting of the Eu negative anomaly of the basal quartzites for meticulously identifying their source rock composition. More geochemical and other analytical approaches are required in this regard.