Trace element in chromites of komatiites from the Archean Gorumahisani greenstone belt, Singhbhum craton (India)

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Komatiites and komatiitic basalts of the early Archean Gorumahishani greenstone belt in the Singhbhum craton (eastern India) contain ferrianchromite, chromian-magnetite and ilmenite as accessory phases along with minor sulfides (chalcopyrite, pentlandite, cobaltian-millerite and pyrrhotite). The komatiitic rocks exhibit cumulate, chevron, platy and random spinifex zone and grade to komatiitic basalts [1, 2, 3]. The entire komatiitic sequence is metamorphosed to greenschist to greenschist-amphibolite transition facies and shows evidence of extensive hydrothermal alteration. In the lower part of the sequence, in the cumulate zone, serpentine is the dominant phase along with tremolite and magnesite. Chromites in the cumulate zone are extensively altered, however, relatively Cr-rich cores, are present in some grains showing Al-depleted ferrianchromite and Cr-magnetite rims at the outer part of the grains. Trace elements in zoned chromites show depletion of Sc, Ga, Zn, Co and V with enrichment of Ni, Ti and Mn in the ferrianchromite/Cr-magnetite rim relative to the Cr-rich core. The Cr-rich cores have Sc≈11-18 ppm, Ga≈79-190 ppm, Zn≈61338-82978 ppm, Co≈5528-6243 ppm, V≈4562-5373 ppm, Ni≈1598-4142 ppm, Ti≈2013-2809 ppm and Mn≈36982-41828 ppm. Ilmenites occur in minor amounts in the upper part of the sequence. Isolated ferrianchromite/Cr-magnetite grains in the cumulate zone and Cr-magnetites (Cr_2O_3 ≈1-4%) in the spinifex zone have lower Ga and higher Ni concentrations, smilar to the rims of the zoned chromites, whereas, concentrations of other trace elements are relatively lower than in the zoned chromites. Higher concentrations of Sr, Nb and traces of REE in the outer rims and overall trace element distributions in the zoned chromites indicate a strong role for H_2O and CO_2-rich hydrothermal fluids in alteration of chromites in the komatiitic suite. [1] Chaudhuri et al. (2015) J Afr Earth Sci, 101, 135-147. [2] Yadav et al. (2015) Indian J Geosci, 69 (1), 1-12. [3] Chaudhuri et al. (2017) Precamb Res, (298), 385-402.