

Contrasting Crustal Evolution of Two Gneisses from Askot Klippe, Kumaun Himalaya, India

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Askot Klippe like the Almora Nappe was transported southwards during the Tertiary Himalayan orogeny from the Higher Himalaya and tectonically rests over sedimentaries with an underlying basal shear zone (Joshi,1999). Basal parts of the Klippe comprise Ramgarh Gneisses while metapelites of the Almora Group rest over the former with another thrust contact. Metamorphism in the pelites peaked with generation of K-feldspar- sillimanite gneisses with P-T of the rocks > 6.5kbar and > 771°C. Metapelitic gneisses in central parts of the Klippe chemically show syn-collisional tectonic setting while the signatures for the Ramgarh gneisses fall in both the Syn-COLG as well as VAG fields (Pearce et. al., 1984). Most of the pelitic gneisses fall in Syn-COLG field with one analysis of an intrusive granite plotting in WPG field, while the Ramgarh gneisses, yield mixed signatures and plot largely in the Syn-COLG and late- and post-collisional fields with a lone sample falling in VAG field (Harris et al.,1986). The Σ REE ranges from 121.88 to 265.53 in Ramgarh gneisses and 105.18 to 155.12 in Almora gneisses. The negative Eu anomaly in the Ramgarh gneisses indicate lesser plagioclase fractionation. In contrast the Eu anomaly in the Almora gneisses was likely controlled by feldspar crystallization in the restites during anatexis and movement of the melt a little away from restites (Rollinson, 1993). The variation in negative Eu anomaly spikes likely reflects various stages of the melt evolution. The unexpected increase in Rb/Sr ratio and decreasing Sr content in the Almora gneisses is likely due to fractional crystallization of the anatectic melt. The Rb/Sr ratio ~0.54 and Nb ~ 9 ppm is consistent with granodioritic composition of Ramgarh gneisses. Negative Sr anomaly indicates a distinctive mantle source/plagioclase fractionation. Chemical analyses for the Almora gneisses ratify the field observations and metamorphic studies in the area suggesting progressive metamorphism to K-feldspar-sillimanite zone and the attendant anatexis. Though classified as Island Arc type (Rao and Sharma, 2009), the Ramgarh gneisses need further investigation for a more definitive genesis.

[1] Joshi (1999) Mem.Gond.Res.Gr.Mem. **6**, **69-80**. [2] Pearce et al. (1984) J. Petrology **25**, **956-983**. [3] Rollinson H.R (1983) Mineral. Mag. **47**, **267-280**. [4] Valdiya, K.S (1980) WIHG **291**.