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Sm-Nd isotopic systematics in whole rocks of the Kathmandu and Nawakot Complexes, central Nepal

K.K. Acharya (1), M. Thöni (2) and B. Grasemann (1)

(1) Department of Geodynamics & Sedimentology, Structural Processes Group, University of Vienna, Vienna, Austria (2) Department of Lithospheric Research, University of Vienna, Vienna, Austria

In central Nepal, the Kathmandu Complex comprising rocks of the Higher Himalayan Crystalline, overlying lower metamorphic grade rocks of the Nawakot Complex (Lesser Himalaya) are separated by the Main Central Thrust (MCT). This rock sequence, which is sometimes combined in the 'Kathmandu Nappe', have been folded to form the NW-SE trending, essentially upright Mahabharat Synform. The MCT separates the two units but the exact location of the MCT is a matter of controversy in this area. In combination with geological and structural mapping, whole rock Sm-Nd isotopic analysis was carried out for thirteen samples collected from different parts of the area. Among these samples, six are phyllites from the Robang formation of the Nawakot Complex, two amphibolites from the Robang Formation, two highly deformed phyllites from the MCT zone, two schists of the Raduwa Formation of the Kathmandu Complex and one sample is Higher Himalayan gneiss.

All of the six samples collected from the Robang Formation show very similar $^{147}Sm/^{144}Nd$ ratios between 0.10 and 0.12, indicating typical continental crustal signature with a homogenous source. Measured ε (0) Nd values show a rather narrow range between -20.8 to -25.2 and Depleted Mantle (DM) model ages range from 2.1 to 2.4 Ga. Two amphibolite samples from two different areas of the Robang Formation show similar and somewhat higher $^{147}Sm/^{144}Nd$ ratios (0.14 and 0.13) than the phyllites and strongly negative ε (0) Nd values of -12.6 and -13.9. Although it is proven that these two amphibloite bodies are of the same origin and derived from the same protolith, their origin can not be confirmed by this analysis alone. The rocks could be de-

rived from sedimentary material (marl meatsediments) but could be of igneous origin where the primary chemical composition was completely changed during the metamorphism or metamorphic alteration. Two schists from the Higher Himalaya show ε (0) Nd of -12.5 and -13.2 and DM model ages of 1.7 and 1.9 Ga respectively. None of these samples showed evidence of partial melting. The measured Sm-Nd isotopic characteristics are considered to be representative for the sedimentary protolith. The results support a homogenized sedimentary source comparable to the Lesser Himalyan phyllite, but both samples show negative Nd values and model ages are different compared to the Lesser Himalayan rocks. One sample of Higher Himalayan gneiss showed an ε (0) Nd value of -6.3 and a DM model age of 1.8 Ga. The ^{147}Sm/^{144}Nd ratio is lower (0.15) than that of mantle value (0.22) but higher than that of typical crustal material (0.11). This is probably due to the influence fractionation of REE during melt formation from crustal sources. Two samples collected from the MCT zone show ε (0) Nd values of -15.2 and -16.3 with DM model ages of 2.1 and 2.2 Ga, respectively. The area shows ε (0) Nd values higher than that of Higher Himalayan schist and lower than that of Lesser Himalayan phyllite.

The analyses show a clear linear array of the data points from the different units in a ^{143}Nd/^{144}Nd $v.$ ^{147}Sm/^{144}Nd isochron plot with lowest values in the Lesser Himalayan phyllite and highest values in the Higher Himalayan gneiss while ε (0) Nd values show a marked difference with Lesser Himalayan rocks ranging at -20 or higher, while Higher Himalayan rocks range at about -13 in schist and at about -6 in gneiss.