Zircon and whole-rock Hf isotope constraints on the petrogenesis of Transhimalayan plutonic rocks

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Hf isotopes of whole-rock (WR) samples and their zircon separates can be used in much the same way as Nd isotopes. Moreover, *in situ* zircon Hf isotopes, combining U-Pb ages, often record "hidden" information that allows more detailed studies of the petrogenetic processes. This study reports Hf isotope data from principal Transhimalayan intrusions, which include Jurassic, Cretaceous and Paleogene I-type Gangdese batholiths, resulting from Neotethyan subduction prior to the India-Asia collision. Major conclusions are reached: (1) There are significant variations in Hf isotopes of magmatic zircons, up to ~15 ε-units in some samples, suggesting magma mixing and/or magma-source isotopic heterogeneity to be common features; (2) A "hidden" DM (depleted mantle) component, with ε_{Hf}(T~80Ma) values to +19.8, is identified in the Gangdese magmatic zircons. This DM-type component has never been revealed by any WR isotope analysis (WR-ε_{Hf}(T): -0.1 to +13.5); (3) According to the linear correlation between the Gangdese WR Hf and Nd isotope ratios, this DM endmember has an equivalent ε_{Nd}(T~80Ma) value of ca. +8 and thus shows an affinity to the India rather than Pacific DM source involved in the petrogenesis.

Figure 1. Hf isotopes of zircons and host rocks from the Gangdese batholiths, southern Tibet.