SHRIMP U-Pb zircon geochronology of the High Himalayan rocks in the Nyalam region, Tibet

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U-Pb age patterns of individual detrital zircons are a potentially powerful tool for constraining metasedimentary provenance. Each zircon grain has a characteristic age reflecting its genesis, and the overall population of detrital zircons represents the spectrum of primary zircon-bearing source rocks, including detritus derived from a number of sedimentary cycles (Cawood et al. 1999).

The complex of sillimanite-, kayanite- and garnet-bearing gneiss, calc-silicates and augen gneiss in Nyalam High Himalaya are intruded by granitoids. The garnet-sillimanite paragneisses have experienced an early Paleozoic metamorphism (Gehrel et al. 2003) and Tertiary metamorphism. The source of metasedimentary rocks of the Nyalam High Himalaya zone has been studied using SHRIMP ion microprobe at Beijing SHRIMP Lab, Chinese Academy of Geological Sciences.

SHRIMP U/Pb age data from the metasedimentary rocks of the High Himalayan terranes in South Tibet range from ca.23 Ma to 3221 Ma. The U-Pb data allow grouping of the zircons into five major age components with the exception of Cenozoic ages (**Figure 1**). (1) Archean grains with a maximium age frequency between 3221 and 2509 Ma, (2) Paleoproterozoic grains ranging from 2453 to 1631 Ma, (3) Mesoproterozoic to early Neoproterozoic grains ranging in age between 1530 Ma and 944 Ma, (4) Neoproterozoic grains ranging between 852 and 540 Ma, and (5) Pan-African ages (543-443 Ma).

Potential source regions for the detrital zircons occur within the Gondwana terranes: zircons of Archean age correspond to the age of rock unit formed during major a mgmatic and tectonothermal pulses in the Bhandara Craton or Singhbum craton, zircons with paleo-Mesoproterozoic ages reflect tectonic or magmatic events related to or older than the assembly of India (Catlos et al. 2002). Neoproterozoic zircons may have been derived from Lesser Himalayan rocks or the Indian craton (Myrow et al. 2003). Pan-African zircons are the Pan-African orogen event along the Himalayan orogenic belts. The U-Pb age data suggest the sedimentary sources of the studied gneisses in the northern part of the Indian plate.

During Late Precambrian and the Palaeozoic, the Gondwanian India bounded to the north by the Cimmerian Super terranes, was part of Gondwana and was separated from Eurasia by the Paleotethys Ocean. During the periods, the northern part of India was affected by a Pan-African event, Numerous granitic intrusions dated at around 500Ma are attributed to this event. The Pan-African event is marked by an unconformity between Ordovician continental conglometrates and the underlying Cambrian marine sediments (Zhu Tongxin et al. 2003). The Pan-African event form a wide belt stretching from the Alps over the Arabic peninsula, Africa, India, Australia and down to Antarctica. These evidences suggests the presence of the Pan-African orogenic event in the Himalaya. It is tempting to correlate the early Palaeozoic thermal event with a late extensional stage of the long-lasting Pan-African orogenic events, which ended with the formation of the Gondwana supercontinent.

The protolith age of the High Himalayan metamorphic rocks is generally regarded to be Precambrian to early Paleozoic. It seems plausible that the High Himalayan metamorphic rocks represent a minimum depositional rage at ~500 Ma. Our data show strong similarities to previously published spectra for the Greater Himalayan zone, Lesser Himalayan zone and Tethyan Himalayan zone (Parrish et al. 1996; DeCelles et al. 2000; Myrow et al. 2003). Detrital zircon spectra from the High Himalayan range is as young as 500 Ma, so the High Himalaya and Tethyan Himalaya were deposited contemporaneously.

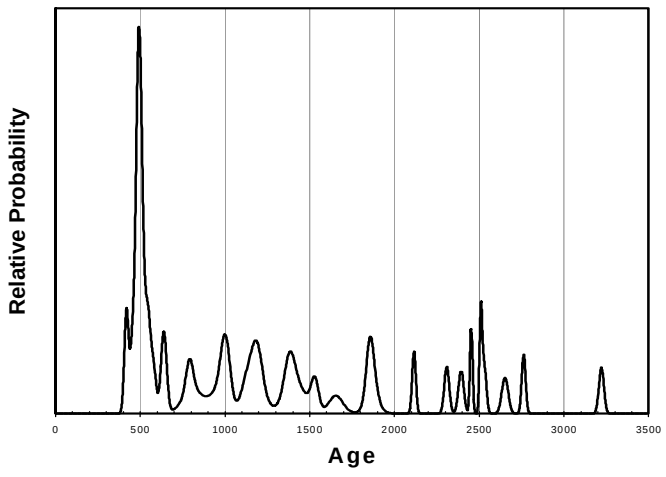

FIGURE 1. Detrital zircon age spectra from Nyalam High Himalaya (Sample NY93-1)

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