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Mineral chemistry and U-Th-Pb monazite geochronology of metapelites from Lower Himalaya-Higher Himalaya interface, India

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Well-constrained geological, structural, geochemical and isotopic data from different parts of the Himalaya indicate the presence of four tectonic domains: a) the Sub-Himalayan Zone (SH); b) the Lower Himalaya (LH); c) The Higher Himalaya crystalline (HH) sequences and d) the Tethyan Himalaya (TH). The Lesser Himalayan rocks represent remnants of continental crust of Greater Indian. An event of high-temperature metamorphism of these rocks at $\sim$ 20 Ma is constrained from U-Pb zircons dates from leucogranites emplaced in HH rocks. However, the evidence for pre-Himalayan metamorphism about Proterozoic granite emplacement is not well documented from LH rocks. In this contribution, we present new mineral chemical and U-Th-Pb$_{total}$ geochronological data from monazites in mica-schists in LH-HH transect to document evidence of Proterozoic metamorphism in the Himalaya.

Mica schists interbedded with mafic schist/amphibolite is the dominant metasedimentary rocks in the Wangtu Gneissic complex, Sutlej river, Himachal Pradesh. Biotite + Muscovite $\pm$ Garnet $\pm$ Chlorite $\pm$Sillimanite are the dominant minerals in the metapelite. Quartz is the predominant leucocratic mineral present in the studied samples, although sodic plagioclase is present locally. The metapelites have a well-developed foliation defined by biotite and muscovite. The biotite in the metapelites changes composition from mg#=45-47 in the western part to mg#=65-70 in the eastern part near Wangtu Gneissic Complex. Accordingly, the Ti content in biotite implies an increase in temperature from$\sim$ 550^{O}C in the western part too $\sim$ 650^{O}C in the eastern part of the transect.

10-100 μm monazite grains are dispersed throughout the foliation. Most of the monazite grains show a wide variation in ThO_2content and exhibit patchy and sector zoning. In-situ U-Th-Pb total analysis of monazite exhibit two age cluster. 100 μm long monazite grains with the long axis oriented parallel to the biotite-muscovite foliation yield mean age 1300 $\pm$ 40 Ma. Smaller monazite grains, with elliptical boundary yield, mean age 474$\pm$40 Ma. The oldest age is correlated with the emplacement of Paleo/Mesoproterozoic granitic emplacement in the LHC-HHC interface. The Pan-African age is correlated with crustal assembly during Gondwanaland assembly.