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Blueschists, fluid release and crustal flow; a Himalayan example

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Models of crustal collision and crustal flow assign fluids, which enhance flow an important role. An observation from the Kaghan valley, north of Naran, NE Pakistan corroborates these hypotheses. This area consists of three tectonic units: Lesser Himalaya, Higher Himalaya and a mélange unit below the Main Mantle thrust of the Kohistan arc. Around Naran the first two units exhibit remnants of a high-grade metamorphic evolution, while the metapelites in the mélange unit contain a low-grade high-pressure, low-temperature peak metamorphic signal. The Lesser Himalaya metapelitic units hold paragenesis with garnet and staurolite, typically indicating amphibolite facies conditions. Rocks of the Higher Himalaya contain eclogites and relics of UHP with coesite. Near Naran we recognized relics of Fe-Mg carpholite indicating blueschist metamorphic conditions in amphibolite grade rocks. There we observed first minute relics of carpholite. P-T estimates derived from the Si content of Phengite and x_{Mg} in carpholite indicate 12-14 kb at 325˚C. We assign these values to peak I conditions. In the same sample high sudeoite component in chlorite points to a pressure drop after peak conditions. Temperatures estimated with Raman graphite thermometry clearly indicate a significant rise of post peak I temperatures up to 500˚C. This is compatible with the amphibolite peak II. These blueschist metamorphic metapelites underwent dehydration when they were already integrated in the crust. The blueschist relics bearing amphibolitic rocks therefore evidence a deep-seated incorporation of water-rich meta-sediments and subsequent dehydration during crustal processes. Thus the fluids released from these rocks may contribute to crustal flow during continental collision.