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Great Himalayan orogenic channel: its structure and tectonic patterns

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Geodynamic evolution of central parts of the Himalayan Metamorphic Belt (HMB), known as the Higher Himalayan Crystalline (HHC) Belt in the NW Himalaya, has recently been modeled within an orogenic channel, which is characterized by (a) 15-20 km thick and NE-dipping folded slab that is bounded by the Main Central Thrust (MCT) at the base and the Zanskar Shear Zone (ZSZ) near the top, (b) noncoaxial top-to-SW overthrust-type distributed penetrative ductile shear zones across the slab, (c) inverted metamorphism with garnet- to kyanite-bearing rocks in the lower parts and surrounding the highest sillimanite-k-feldspar grade schist/gneiss, which have undergone peak metamorphism ~ 780 °C and 10 kb, (d) associated migmatite, in-situ leucogranite and emplaced granitoid sheets in the middle, (e) top-to-NE extensional ductile shearing within the ZSZ mainly and having normal metamorphic isograds near the top of the slab, and (f) differential exhumation phases. This slab-like Great Himalayan orogenic channel has been visualized as an enormously thick zone with the MCT as one, and the contact between the ZSZ and Tethyan Sedimentary Zone (TSZ) as the other wall and appears to have linked with the present-day zone of partially molten crust (PMC) of Tibet. It has undergoing 2-stage deformation and exhumation E=E1+E2 processes in the combined ductile shear and channel flow mode**.** Initially, most significant pervasive ductile shear fabric within the Higher Himalayan Shear Zone (HHSZ) during the E1 stage creates an overthrust top-to-the SW displacement sense, which is indicated by down-the-dip plunging lineation. This causes a syn- to post-metamorphic inversion with the disposition of highest metamorphic grades in the middle to upper parts, maximum migmatite development and the lower grade rocks in the basal parts. Laminar flow of rock material joins the ongoing top-to-the SW shearing during the superposed E2 phase and produces a zone within the channel near the top with an apparent top-to the-NE extensional shearing. Migmatite is also continuously generated during this phase of near-isothermal decompression to ~4 kb, which produces in situ granite between 46 Ma and 20 Ma, as is evident along the Bhagirathi Valley section. Granitic melts remain trapped within slab-like core of the channel till these are suddenly released from the chamber around 25-20 Ma**,** and emplaced near the upper channel wall due to an extensional shear zone and rheological variation with the overlying Tethyan sedimentary cover

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