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Structural geology of the Bhagirathi section of the Higher Himalayan Shear Zone with special reference to back-thrusting

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Fieldwork in the Bhagirathi section of the Higher Himalayan Shear Zone (HHSZ) reveals the following first order structural geology: (i) ubiquitous top-to-S/SW sense of ductile shearing, as a delayed product of India-Asia collision; (ii) extensional ductile top-to-N/NE shearing confined in two zones: (a) from south to Sainj to nearly up to Bhatwari- designated as the 'South Tibetan Detachment System-Lower' (STDSL), and (b) from Martoli Fault in the north up to $\sim$ 5 km south to Jhala- designated as the 'South Tibetan Detachment System-Upper' (STDSU); and (iii) a top-to-N/NE sense of back-thrusting throughout the HHSZ including the STDSL and the STDSU. The ductile shears in the field are documented mainly by the S-C fabrics. On the other hand, the brittle shears were deciphered from prominent duplexes and thrust slices. To our knowledge this is the first report of development of back thrusting throughout the HHSZ, and the second report of the STDSL in the western Indian Himalaya, after the Sutlej section reported by Mukherjee and Koyi (Int J Earth Sci, 2010). Development of two detachments in this section of the HHSZ could be explained by shifting channel flow as proposed by Mukherjee, Koyi and Talbot (Int J Earth Sci, in press), even if the timing of ductile shearing within these two strands of detachment has remained unknown. The present work reviews genesis of back-thrusting and judges whether channel flow or critical taper model suits extrusion mechanism of the HHSZ.