Geophysical Research Abstracts
Vol. 14, EGU2012-5684, 2012
EGU General Assembly 2012

Trapezoid-shaped mineral grains in micro-scale from the Higher Himalayan Shear Zone, Sutlej section, Indian Himalaya: their morphometry and tectonic implications

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Trapezoid-shaped micas are reported in micro-scale from the Sutlej section of the Higher Himalayan Shear Zone (HHSZ), India, and are interpreted to be the products of an up-dip top-to-SW sense of brittle shearing along pre-existing NE dipping ductile shear C-planes. These trapezoids have their longest margins dipping towards NE, or alternately, the enveloping lines of the stacks of trapezoids are parallel to the C-planes. While intra-grain slips along cleavage planes assist their thrusting, the surrounding (quartzofeldspathic) minerals tend to prevent the shear movement. The cleavages of the trapezoids are parallel to their longest margins. These cleavages, the longest margins and the asymmetry of an aggregate of trapezoids as a whole are reliable brittle shear sense indicators. The trapezoid-shaped micas underwent brittle ductile deformation at $\sim$ 8-15 km depth. None of the non-genetic interlinked morphological parameters- ratios, local orientations and internal angles- can alone define the trapezium morphologies wholly. Wide ranges of these parameters give a first order morphological constrain of the studied trapezoids. Dynamic recrystallization of unequal intensities at the trapezoid margins denote a non-uniform tendency of the rocks not to strain harden. Trails of minerals, if any, at the corners of the trapezoids, that define the P- and the Y-planes, have their origins in breakage from those trapezoids. Research on their 3D-shapes, occurrence in other shear zones, and genesis of these trapezoids remain expected.