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Temperature predicted from quartz microstructures from the Main Boundary Thrust Zone, Dehradun-Mussourie region, western Himalaya

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The Main Boundary Thrust (MBT) zone near Sahansahi Ashram (Dehradun-Mussourie area) is a top-to-SW brittle shear zone along with prominent oversteps developed inside the black schistose very fine-grained low-grade metamorphosed rock. Sigmoid quartz veins defining the P-planes under an optical microscope reveal fracturing, deformation bands, sutured and serrated boundaries, zones of small new grains (nucleations) etc. These indicate a temperature of 280±30 0C. Some ductile deformations are evident from bulging, smaller recrystallized quartz grains along grain boundaries etc. Large quartz porphyroclasts show undulose extinction along with deformation bands and -lamellae, small bulges preferably at triple junctions and along old grain boundaries, inter-granular micro-cracks, sutured grain boundaries, and the top-to-S/SW shear. Bulging recrystallization indicates a temperature between $\sim$ 280-400 0C. In the same field of microscopic view, both the textures of higher- and lower temperatures are found in quartz aggregates. Very poorly developed rare 'core and mantle' like structures indicate peak deformation temperature approached the transition temperature ($\sim$ 400 0C) between 'bulging recrystallisation' and 'sub-grain rotation'. Thus, the MBT experienced a temperature up to 350-400 0C. Available data from the Western Lesser Himalaya indicates its temperature within 330-350 0C (e.g. Célérier et al., 2009a,b). We predict a higher probable range of temperatures from its sheared southern boundary (i.e. the MBT-zone).