The South Tibetan Detachment between Karta and Tingri (South Tibet Himalaya)

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The South Tibetan Detachment System (STDS) represents a major geological structure within the Himalaya orogen (e.g. Burg et al., 1984; Burchfiel et al., 1992; Carosi et al., 1998; Hodges, 2000; Godin et al., 2001; Searle et al., 2003, Cottle et al., 2011). It can be traced for c.3000 Km along the entire length of the belt between the Zanksar region (NW India) to Arunachal Pradesh (NE India).

At the regional scale it is described as a network of Low Angle Normal Faults (LANF's) and/or Normal Sense Shear Zones (NSSZ's) separating Tethyan zone sediments in the north from medium-high grade metamorphic rocks including migmatites and granites of the Higher Himalayan Crystalline (HHC) series to south.

Different and contrasted architectures, strain features and kinematic characters are locally reported and regionally used as the base of various and debated tectonic models (e.g. Beamount et al., 2001; Webb et al., 2007 and references therein; Kellett and Grujic, 2012 and references therein).

Our study reports structural data collected during an 2005's expedition in Himalaya-Tibet with observation focused on an area between Karta and Tingri bounded by the Ama Drime Range to the est and the Rongbuck valley to the west.

Four structural logs separated by an along-strike distance of c.30 Km and an along-dip direction distance of c.22 Km were analysed with the aim to constrain fault zone pattern, strain distribution and fault-rock types.

In all analysed transects and studied sites, the STDS is formed by a footwall normal sense shear zone (South Tibetan shear zone) and an upper low angle brittle fault (Chomalonga detachment) in marked contrast with that described for the close Dzakaa Chu area (Cottle et al., 2007a).

The shear zone is represented by at least 1000 m thick zone of mylonites with diffuse lower boundary within the HHC series and comprising the entire and variable thickness of the North Col fm. (biotite-chlorite phyllites, metagreywacke, quartzites, impure marbles and calc-silicates). Strongly non-coaxial deformation with top-to-NE kinematics is testified by well developed kinematic indicators, asymmetric folds (up to hectometer-scale) and shear bands systems.

The upper low angle brittle fault consists of meter-thick cataclastic zone where R-types, P-foliation and asymmetric folds point to a top-to-NE sense of transport the same of the lower shear zone. Different kinds of fault rocks (crush breccia, black and green cataclasites and vein derived calc-mylonites) can be observed attesting a prolonged history and multistage reactivations.

Micro- and mesostructural features, leucogranites-fabrics relationships, metamorphic history and a revision of the available radiometric data allowed us to enlighten deformation history for hanging wall and footwall. Moreover, large scale geometry of the structures indicates that the lower shear zone as well as the upper brittle fault are folded by high amplitude (plurikilometer scale) dome and basins and overprinted by a system of N-S trending active normal fault (Molli et al., 2007; Kali et al., 2010 and and references therein).

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