



Kinematic analysis of tectonic processes deduced from thermopaleomagnetic records

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Exhumation, tilting and block rotation are major tectonic processes during orogeny. An analysis of these processes using magnetic methods is attempted in this work. Thermopaleomagnetism assumes a continuous acquisition of remanence during cooling of a tectonic block. Changing rates of exhumation and tilting or block-rotation processes during the remanence acquisition leave a fingerprint in the magnetic record. Combined with age determination of remanence acquisition it provides a powerful method to analyze and quantify tectonic processes.

The method has been applied to the Tang Chu klippe, a tectonic klippe in Central Bhutan (Himalaya), as a test of feasibility. Magneto-mineralogical analyses reveal thermoremanent magnetization of pyrrhotite. Magnetic data of an 800 meter thick densely sampled profile (intervals of 10 meters) show a reversal pattern and systematic changes of inclination values. This points to a remanence acquisition during cooling combined with block tilting and is in accordance to the regional geologic setting. Numerical calculations show that the combined effects of exhumation and tilting have to be analyzed to quantify tectonic movements with the thermopaleomagnetic approach. The example of the Tang-Chu klippe indicates that the principle of thermopaleomagnetism can be applied in an orogenic system.