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# Magnetic fabric of brittle fault rocks

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The anisotropy of magnetic susceptibility (AMS) has been recognized as a highly sensitive indicator of rock fabric and is widely employed in the field of structural geology. Brittle faults are often characterized by fault breccia and gouge, fault rocks with clast-in-matrix textures. A noteworthy property of both gouge and breccia is the often observed presence of a fabric that is defined by the preferred orientation of clasts and grains in the matrix. In the very fine-grained gouge and in the matrix of the breccia the fabric is not visible in the field or in thin sections but can probably be detected by AMS analyses.

For the present study different kinds of brittle fault rocks have been sampled on two faults with known tectonic settings, in order to allow for a structural interpretation of the measured AMS signal. The measurements were carried out with an AGICO MFK1-FA Kappabridge and a CS4 furnace apparatus at the Institute of Geology, University of Innsbruck.
Fault gouge was sampled on the Naif fault located in the Southern Alps, E of Meran, South Tyrol, Italy. Along this fault the Permian Granodiorite overthrusts the Southalpine basement and its Permomesozoic cover. The Neoalpine thrust fault is characterised by a wide cataclastic zone and an up to 1 m thick fault gouge. The gouge was sampled using paleomagnetic sample boxes. Heating experiments indicate that the magnetic fabric is dominated by paramagnetic minerals (>95%). The samples provide a magnetic susceptibility in the range of +10*E-5 [SI]. The K-min axis of the magnetic ellipsoid corresponds approximately to the pol of the fault plane measured in the field. However the whole magnetic ellipsoid shows a variation in the inclination compared to the structural data.
Fine-grained ultracataclasites were sampled on the Assergi fault, located in the Abruzzi Apennines, NE of L'Aquila, Italy. This normal fault was active in historical time and crosscuts limestones as well as talus deposits. An up to 20 cm thick fine-grained ultracataclastic layer occurs on the fault and was sampled for the present study. The fault rocks build up by limestones are diamagnetic and characterized by a very weak, negative magnetic susceptibility (in the order of -0.1*E-5 [SI]), resulting in quite imprecise AMS measurements. The polymict fault rocks formed within the talus deposits on the other hand provide a magnetic susceptibility in the range of +10*E-5 [SI]. The degree of AMS (P) is quite low in all these samples, but nevertheless the magnetic K-max axes correspond approximately to the pol of the fault plan, indicating probably an inverse magnetic fabric. The lineation observed in the field is not reflected by the magnetic fabric; K-int and K-min mostly show a girdle distribution retracing the orientation of the fault plane.

These are preliminary results of an ongoing study. More sites will be analysed and additional measurements (e.g. low temperature measurements, high-field AMS, lithological and textural analyses) have to be performed. However, already these preliminary results indicate, that AMS can be used to identify rock fabric in different kinds of brittle fault rocks.