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Magnetic fabric of carbonatic (ultra)cataclasites

Hannah Pomella
University of Innsbruck, Institute of Geology, Innsbruck, Austria (hannah.pomella@uibk.ac.at)

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, fault rocks with clast-in-matrix textures. A noteworthy property of the breccia is the presence of a fabric defined by the preferred orientation of clasts and grains in the matrix. This fabric is often not visible in the field or in thin sections but can be detected by AMS analyses. For the present study carbonatic (ultra)cataclasites have been sampled on two faults with known tectonic settings, in order to allow for a structural interpretation of the measured AMS signal.

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 and dolomites as well as talus deposits. The fault zone is several meters wide and an up to 20 cm thick fine-grained ultracataclastic layer occurs on the main fault plane.
In the Mesozoic cover of the Italian Southern Alps a polyphase strike-slip fault zone was sampled, the Borcola Pass Fault Zone. The fault zone consists of a nearly 100m wide damage zone cut by secondary faults and reactivated pre-existing joints. The fault rock on the slip zones consist of cement-supported dolomitic cataclasites.

The fault rocks build up by carbonatic rocks are mostly diamagnetic and characterized by a very weak, negative magnetic susceptibility. Nevertheless, the magnetic fabrics measured are well in accordance with the structural field data. The magnetic foliation is well defined in nearly all the sites and fits perfectly the adjacent fault plane. The magnetic lineation on the other hand is not so clearly defined but the distribution of the measurements is comparable to the variation of the stria orientation observed in the field.