Geophysical Research Abstracts
Vol. 18, EGU2016-17359, 2016
EGU General Assembly 2016

AMS as a technique for investigating the propagation direction of vein fluids

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An approximately co-planar relationship between mineral orientations and magnetic fabric has been frequently employed when studying petrofabrics, most notably planar silicates in mafic intrusives. In this study this relationship is exploited with respect to mineralising veins, using anisotropy of magnetic susceptibility (AMS) to investigate whether magnetic fabrics could reveal the direction of fluid propagation. As mineralising fluids propagate in the crust they cause a hydrothermal overprinting of the existing petrofabric. If this overprinting is random, or too weak and thus swamped by the existing signal AMS will not be able to determine any interpretable signal across the vein; however, if this overprinting is a considerable systematic alteration then AMS will identify an imbrication of AMS tensors approaching veins. The South Munster basin of southwest Ireland is a sedimentary deposit of Devonian-Carboniferous age, within which lie the fluvial sediments north of the town of Allihies which are pervaded by copper bearing lodes likely exolved from the underlying marine strata. Analysis of samples from six locations across these veins was used to construct a picture of the AMS as it changes across a mineralised system. Systematic changes across each system are often subtle and interrupted by stronger signals, especially foliation as a result of regional scale low grade compression. However changes in tensor orientation and shape are both observed in instances which could be consistent with a directional overprint caused by the vein.