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Field- and Frequency-Dependent Anisotropy of Magnetic Susceptibility: Deeper Insight into Rock Fabric
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Theory of the Anisotropy of Magnetic Susceptibility (AMS) of rocks is based on the assumption of the linear relationship between magnetization and magnetizing field, resulting in field-independent susceptibility. However, pyrrhotite, hematite and titanomagnetite may show significant variation of susceptibility with field. Three methods were developed for the determination of the field-independent and field-dependent AMS components, all based on standard measurement of the AMS in variable fields within the Rayleigh Law range. The former component basically reflects the magnetic sub-fabrics of mafic silicates and pure magnetite, while the latter component is controlled by the pyrrhotite, hematite or titanomagnetite sub-fabric. Examples are shown of separation of individual magnetic sub-fabrics in some ultramafic rocks.

In some geological processes, such as very low-grade metamorphism, new very fine- grained magnetic minerals may originate. Their fabric can be investigated by means of the frequency-dependent magnetic susceptibility and its anisotropy, which is in environmental science and palaeoclimatology traditionally interpreted as resulting from interplay between superparamagnetic (SP) and stable single domain (SSD) or even multidomain (MD) particles. Through standard AMS measurement at different frequencies, the contribution of SP particles to the whole-rock AMS can be evaluated; appropriate method and program were developed. Various rocks, soils and ceramics, showing frequency-dependent AMS, were investigated. Attempts are made of their fabric interpretation.

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