

Fabric tensor and its application to magnetic fabric of sediments and dikes

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Anisotropy of magnetic susceptibility (AMS) is a proxy for determining the preferred orientation of magnetic minerals. Given that fabric of magnetic minerals, such as magnetite, is coaxial to the alignment of rock-forming minerals, this technique is the easiest and quickest technique used to reconstruct paleo-flow directions of sediments and magmatic dikes. This consideration results from the mathematical framework on AMS by Owens (1975): bulk anisotropy of magnetic susceptibility depends on an angular density distribution of uniaxial grains of anisotropic susceptibility. However, the grain-size dependence and characterization of angular distribution have not been described in the framework, yielding the non-coaxiality to prevent the estimation of paleo-flow direction. For example, Kon et al (2017) found inverse magnetic fabric of AMS in tsunami deposits. This is a natural example for the non-coaxiality that AMS minimum axis is coaxial to the alignment of fine grained magnetites. In this presentation, we introduce the concept of fabric tensor and explain such discrepancy by fabric tensor and also stereology. This understanding will help to estimate paleo-flow directions of sediments and also magmatic dikes.