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Magnetic fabrics in amphibolites

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Magnetic fabrics are used as indicators for mineral fabrics and thus tectonic settings. In particular, the maximum and minimum magnetic susceptibilities are often taken as representation of the direction of macroscopic lineation and pole to foliation of a rock, respectively. In rocks consisting mainly of amphiboles, the paramagnetic fabric is controlled by the preferential orientation of the amphibole crystals. These crystals normally have their c-axis aligned with lineation, however, the maximum susceptibility is parallel to the crystallographic b-axis, leading to more complicated relationships between the orientations of the magnetic fabric and mineral fabric. Here we describe magnetic fabrics in two amphibolites, both deformed and containing $\sim$70 % hornblende. Both amphibolites possess significant magnetic anisotropy with the minimum susceptibility normal to foliation. However, maximum susceptibility and lineation are parallel in one amphibolite, whereas they deviate in the other. Numerical models, which simulate the magnetic anisotropy based on the measured crystallographic preferred orientation (CPO) of hornblende and single crystal anisotropy, can reproduce the observed magnetic fabrics in these samples. Furthermore, synthetic models help explain for which types of CPO the magnetic and mineral lineations are parallel to each other, and when they are not aligned to one another. The results presented here will help in future interpretation of mineral fabrics in amphibole-bearing rocks.