Large field impressed anisotropy of magnetic susceptibility (AMS) in metamorphic volcanoclastic rocks from the western Central Pamir with ilmeno-hematite as the main magnetic carrier.

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Field impressed AMS fabric, although it has been recognized for a very long time, has been the subject of very few publications in the paleomagnetic literature. This effect has been mainly described in samples with magnetite as a main magnetic carrier. This fabric is usually of low magnitude and observed mainly in nearly isotropic rock after application of static AF demagnetization or after acquisition of an isothermal remanent magnetization (IRM). Forty four paleomagnetic sites have been sampled in a >2 km thick sequence of Cretaceous volcano-clastic rocks from the western Central Pamir mountain (Tajikistan). These rocks present a medium grade level of metamorphism characterized by fine grained recrystallisation of biotite. The magnetic properties are very homogeneous across the sequence. Bulk magnetic susceptibilities vary between 150-250 μ SI. The AMS magnetic fabrics correspond to triaxial tensors with a well defined foliation plane and a steeply dipping magnetic lineation. The degree of anisotropy varies between 1.03 and 1.2. This fabric was likely acquired during the deformation associated with the emplacement of Middle Miocene gneiss domes. SEM/EDS data indicate that the main iron oxide mineral is hematite with up to 15% of ilmenite in solid solutions. This is in agreement with unblocking temperatures of SIRM around 630 °C, lower than the one of pure hematite. One of the most surprising magnetic characteristics of these rocks is the effect of strong-field remanent magnetizations upon the AMS. During the acquisition of an Isothermal Remanent Magnetization (IRM), the initial AMS is progressively obliterated by a new AMS fabric. The field-impressed AMS is characterized by a decrease of the magnetic susceptibility along the direction of the IRM and an increase in magnetic susceptibility in the orthogonal plane. The field-impressed AMS is thus mainly oblate with a degree of anisotropy usually between 1.2 and 1.4. As far as we know, such a strong effect has never been reported. In sandstone with detrital hematite as the main carrier, the degree of the induced AMS fabric is less than 1.02 suggesting that the ilmenite content in the
metamorphic hematite is the main cause of the large observed field induced fabric in these rocks.

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