ESRF	**Experiment title:** Decomposing the anisotropy of the magnetic susceptibility signal of Oman serpentinites by texture analysis	**Experiment number**: ES890
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Report:

The aim of our proposal was the quantitative decomposition of the magnetic susceptibility signal of the bulk rock into the contributions by the different mineral phases of samples from the Oman ophiolite. Measurements of the anisotropy of the magnetic susceptibility (AMS) are typically used to describe the magnetic fabric of the rocks yielding high anisotropies and high susceptibilities. As AMS is a bulk sample method, the contributions of the different portions of the single mineral phases cannot be distinguished. Modeling the AMS of the rocks from crystallographic preferred orientations (CPO) of the different contributing mineral phases based on single crystal magnetic susceptibilities can be used to deconvolute the contribution of each phase (Kuehn et al., 2019). In this case, the AMS of the single phases is correlated with the development of oceanic crust with regard to depth and time. Therefore, we measured the CPO of serpentinite samples, for which, due to the mineralogical composition of the samples, with fine-grained, OH-rich sheet silicates, synchrotron diffraction is the only diffraction method suitable (Kühn et al. 2021).

Diffraction experiments of 37 samples were conducted at the beam line ID22. A transmissional setup with a rotational stage suitable for our sample holder, and a 2D image plate detector were used. For the texture measurements the samples were rotated around a vertical axis with a rotational step of 5° within a range of 180° resulting in 36 measurement steps. To avoid detector overflow but also to gain enough counts, 20 single images per measurement step were collected and summed up. Exposure time per frame was set to 0.26 s for most of the samples. We used a beam energy of 70 keV with a beam size of 1x1 mm and a sample detector distance of 1600 mm. This allowed us to measure full patterns even of minerals with high d-values.
To ensure that we consider possible heterogeneities of the natural material and to improve statistical data representation especially of the mineral phases of low portion, we run up to 20 texture measurements per sample at different height positions along the cylinder axis.
In addition to the serpentinite samples we measured several clay samples, which will help to make a correlation between Fe-content and magnetic susceptibility for sheet silicates and their anisotropy.

Data analysis is basically performed using the Rietveld-based code MAUD (Lutterotti et al., 1997) and the Matlab toolbox Mtex (Hielscher & Schaeben, 2008). In addition, we created a Matlab script during our beam time, to directly use (00l) ring intensities to construct pole figures of sheet silicates, which allows to save time for samples with not overlapping (00l) rings. This method is tested against our conventional approach with few selected samples.

All scheduled samples could be measured during the proposed beam time. However, the quantitative texture analyses by means of MAUD are very time consuming, and we are still processing the data. Based on the texture results, the anisotropy of the magnetic susceptibility will be calculated and compared with the measured properties of the samples.

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