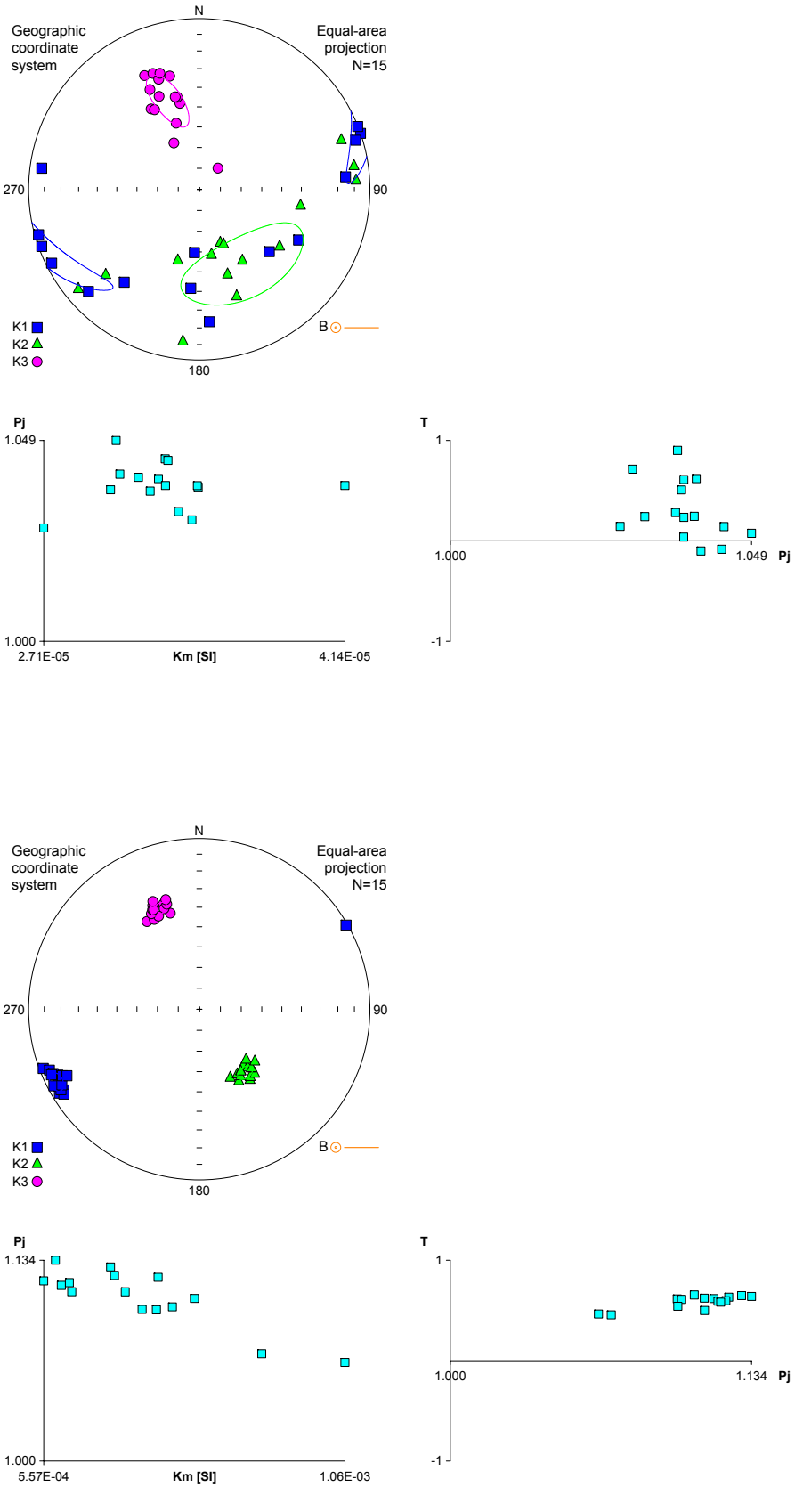
Improved texture analyses of weakly deformed rocks by means of thermal enhancement of magnetic fabrics

Anisotropy of magnetic susceptibility (AMS) is a powerful technique for the investigation of regional deformation patterns. The magnetic anisotropy of rocks arises not only from the shape and crystalline orientation of magnetic minerals but also from the alignment of magnetic domains within ferromagnetic grains. If the AMS is carried by diamagnetic and paramagnetic minerals, rocks are often not accessible for usual magnetic fabric measurements, because the differences between the directional susceptibility values are below the significance limits of the instruments. In a similar approach as HIRT AND GEHRING (1991) and TRINDADE ET AL. (2001) on metamorphic and magmatic rocks, we applied thermal enhancement of the magnetic fabrics on selected sedimentary rocks from the Eastern Alps. Heating at 600°C during 2 hours was expected to initiate new magnetite growth, which should occur mainly along preferred planar elements (in this case: cleavage, fractures or sedimentary planes). After heating, the mean magnetic susceptibility of the samples increased significantly, but similarity of the directional characteristics before and after heating indicated, that the original fabric was preserved. Thermal enhancement of the magnetic fabric provides a possibility to study textures of virtually non-magnetic material, such as carbonate rocks from the Northern Calcareous Alps. The study was funded by the Austrian Academy of Sciences (ÖAW) in the frame of the Geophysics of the Earth's Crust Programme.



Anisotropy of magnetic susceptibility before (top) and after thermal treatment (bottom).