



The Najd Fault System of Saudi Arabia

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The Najd Fault System of the Arabian-Nubian Shield is considered to be the largest Proterozoic Shear zone system on Earth. The shear zone was active during the late stages of the Pan African evolution and is known to be responsible for the exhumation of fragments of juvenile Proterozoic continental crust that form a series of basement domes across the shield areas of Egypt and Saudi Arabia. A three year research project funded by the Austrian Science Fund (FWF) and supported by the Saudi Geological Survey (SGS) has focused on structural mapping, petrology and geochronology of the shear zone system in order to constrain age and mechanisms of exhumation of the domes – with focus on the Saudi Arabian side of the Red Sea.

We recognise important differences in comparison with the basement domes in the Eastern desert of Egypt. In particular, high grade metamorphic rocks are not exclusively confined to basement domes surrounded by shear zones, but also occur within shear zones themselves. Moreover, we recognise both exhumation in extensional and in transpressive regimes to be responsible for exhumation of high grade metamorphic rocks in different parts of the shield. We suggest that these apparent structural differences between different sub-regions of the shield largely reflect different timing of activity of various branches of the Najd Fault System.

In order to tackle the ill-resolved timing of the Najd Fault System, zircon geochronology is performed on intrusive rocks with different cross cutting relationships to the shear zone. We are able to constrain an age between 580 Ma and 605 Ma for one of the major branches of the shear zone, namely the Ajjaj shear zone. In our contribution we present a strain map for the shield as well as early geochronological data for selected shear zone branches.