Geophysical Research Abstracts
Vol. 13, EGU2011-10307-1, 2011
EGU General Assembly 2011

Pan-African exhumation mechanisms

Tamer Abu-Alam (1), Kurt Stüwe (1), and Khalid Kadi (2)

(1) Institut für Erdwissenschaften, Universität Graz, Universitätsplatz 2, A-8010 Graz, Austria, (2) Saudi Geological Survey, Medina Road, P.O. Box 54141, Jeddah 21514, Saudi Arabia

Towards the end of the Pan-African tectonic evolution, one of the largest Proterozoic shear zone systems on Earth - Najd Fault System – exhumed a series of basement domes within the Arabian-Nubian Shield. The Najd Fault System is about 2000 km long and 400 km wide and strikes NW-SE from Egypt across Sinai into Saudi Arabia. More than 20 basement complexes exhumed along its length is several tens of km long. Curiously the exhumation processes vary between the few basement domes that have been studied so far: Those in the Eastern Desert of Egypt exhumed as extensional core complexes, while the Feiran complex of Sinai exhumed in a transpressive setting.

We aim to study a representative suite of basement complexes from the entire Najd Fault System in order to understand the overall process that controls the exhumation of the basement complexes. We shall test three hypotheses that can explain the different mechanisms in different regions: (a) The basement complexes may be in different orientations relative to the principal stresses of the Najd Fault System. This will be tested using structural mapping in the field. (b) Different basement complexes may be exhumed from different depths so that different vertical normal stresses cause a reversal of the second and third largest principal stress. This will be tested by determining metamorphic formation pressures and constructing metamorphic P-T paths. (c) Different complexes may have been exhumed at slightly different times reflecting a change in the stress regime towards the end of the Pan-African. This will be tested using geochronology.

In order to test these three hypotheses we will study three basement complexes within Saudi Arabia which have not been studied: The Qazaz, the Hamadat and the Wajiyah metamorphic complex. Our choice of complexes is based on geological features allowing the testing of our working hypotheses and on their logistical accessibility.