

## Post-accretionary Extensional Fault-zone Evolution in Ablah Group Volcanosedimentary Sequence, Western Arabian Shield

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### ABSTRACT

The N-oriented Ablah Basin, in northwestern Asir tectonic terrane in Arabia, is affiliated to the marine post-accretionary depositional basins (MPADBs) of the Arabian-Nubian Shield (ANS). In this basin, a sequence of interbedded sandstone (grading into siltstone)-mudstone-dolostone was deposited synchronized and almost immediately after the Nabitah Orogeny (680-640Ma). This sequence is intercalated with rhyolite that is persistent along strike for distances up to hundreds of meters. The whole succession displays amazing post-accretionary structures produced by an earlier E-W shortening event and encompassing shear zones and shear zone-related folds, and thrusts and thrust-related folds, as well as other transpressive structures. Besides, E-W (to ENE-WSW) striking extensional normal faults are observed. The faults formed during a latest N-S (to NNW-SSE) lengthening event affected the entire Ablah Basin near the end of the Neoproterozoic. The present study highlights results obtained from outcrop investigations of these extensional faults that dip towards the S (to SSE) direction and vary in extension from few millimeters to several meters. Remarkable competence contrast between sandstone, mudstone, dolostone and rhyolites resulted in more complicated fault zones because of the development of secondary localized zones and segmentation-induced fault boudins and host rock lenses. Faults show geometries varying from simple fault cores to complicated fault cores showing a variety of principal deformation elements, such as clay-rich gouge, clay smear, and secondary quartz and carbonate veinlets. Other elements including fault splays, overlapped structures, segmented linkages and slip zones with fault-parallel fabrics are also detectable inside fault cores. Slip zones accommodate the bulk of slip within fault cores. It is suggested that the extensional faults evolved under imposed stress by linkage of pre-existing fractures initiated and nucleated during the earlier E-W shortening event, post-dating the final assembly and suturing between Eastern and Western Gondwana.

Keywords: Ablah Group, Arabian-Nubian Shield, Volcanosedimentary Sequence, East and West Gondwana, Accretion