



## **Post-accretionary structures in the Pan-African central Allaqi-Heiani suture zone, southeastern Egypt**

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The Allaqi-Heiani suture is the western part of the main Allaqi-Heiani-Gerf-Onib-Sol Hamed-Yanbu suture that is exposed in southern Egypt, northern Sudan and western Saudi Arabia and represents one of the Neoproterozoic Pan-African ophiolite-decorated, arc-arc sutures in the Arabian-Nubian Shield (ANS). The Egyptian part of the suture extends for ca. 250 km from the north-trending Hamisana shear zone in the east to the Nile River in the west. It separates the ca. 750 Ma south Eastern Desert terrane in the north from the ca. 830-720 Ma Gabgaba terrane in the south. The suture zone is defined by a deformational belt made up of ophiolitic gabbros, serpentinites and mafic volcanics, which are imbricated with syn-tectonic granitoids and metasediments. The whole rock suite is intruded by post-tectonic granitoids and gabbros.

Detailed field mapping at a scale of 1: 50, 000 and structural studies indicate that the central part of the Allaqi-Heiani suture zone can be divided into three structural domains. Structural domain I is located in the western part of the study area and is characterized by the presence of WNW-ESE striking low angle thrusts that are associated with asymmetrical folds whose axial planes are parallel to these thrusts. Folds are verging towards SSW. Structural domain II is located in the central part of the study area and is characterized by the presence of very tight to isoclinal NNW-SSE oriented folds that are associated with transpressional faults. Structural domain III is located in the eastern part of the study area and is characterized by the presence of a series of NNW-SSE oriented parallel folds.

Structural analysis indicates that the area has undergone a poly-phase structural defor-

mation involving at least, two events. Each event has its own structural style and stress regime. The first (D1) was associated with an overall N-S or NNE-SSW shortening that produced SSW-verging folds and thrusts. The second event (D2) was associated with an overall ENE-WSW shortening, which produced NNW-SSE oriented folds in the central and eastern parts of the study area and reactivated the older thrusts with oblique-slip reverse fault movement. Continuous ENE-WSW shortening steepened the surfaces of the folded thrusts and ultimately squeezed the materials in between the two moving blocks towards north producing a positive flower structure and an escaped wedge-shaped area showing vertical foliations.

The tectonic evolution involves two episodes of collision; an early episode of collision between the south Eastern Desert terrane and the Gabgaba terrane along the Allaqi-Heiani suture after the consumption of an oceanic basin above a north-dipping subduction zone. The later episode of collision represents the collision of the ANS with the pre-Neoproterozoic continental blocks to the east (East Gondwana) and west (West Gondwana) at ca. 750-650 Ma, subsequent to the closure of the ensuing Mozambique Ocean. This collision deformed the ANS along north trending shortening zones and produced NW-SE oriented sinistral and NE-SW oriented dextral transpressional faults. The early episode of collision is related to the terrane accretion during the Pan-African orogeny, while the later phase is related to a post-Pan-African or Najd orogeny.