



Seismoturbidites in the Gulf of Aqaba during the past 500 years

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ABSTRACT

The Gulf of Aqaba, 180 km-long and approximately 15 km-wide, is located at the southernmost part of the left-lateral strike slip Dead Sea Fault (DSF). It is characterized by three pull-apart basins accommodating trans-tensional motion. Although paleoseismic data about the past devastating earthquakes on-shore DSF are available, our knowledge remains limited in the Gulf of Aqaba region. To improve our knowledge on the location and geometry of active faults in the region, its overall tectonics and its seismic history, a research project was initiated (i.e. Interdisciplinary earthquake hazard research in Gulf of Aqaba and Strait of Tiran – GAST Project). Within the scope of GAST project, we collected 23 short cores from the gulf to investigate sedimentary traces of past earthquakes in the region. 18 cores with lengths between 35 and 107 cm were scanned by ITRAX micro-XRF scanner at a resolution of 0.5 mm. Radiographic imaging was carried out on 4 cm-wide and 0.5 cm-thick u-channels, which allows better evaluation of sedimentary structures. The radiographic images reveal that primary sedimentary structures are totally destroyed by extensive bioturbation, preventing us from using soft sediment deformations as a tool to detect past earthquakes. Turbidites, on the other hand, are clearly seen in the radiographs since they are suddenly deposited and thus not affected by bioturbation. In the radiographic images, the lower parts of the turbidites appear coarse-grained and laminated with finer and more homogeneous deposits on top. The turbidites also show up as distinct anomalies along geochemical profiles that reflect the ratio of terrestrial-origin elements (i.e. K, Ti, Fe, Zn, Zr, Rb) to carbonate-related elements (i.e. Ca and Sr). These geochemical anomalies confirm sudden deposition of turbiditic clastic sediments without almost any bio/geochemical contribution from the water column. Inter-basin stratigraphical correlation reveals the turbidites triggered by the 1995 Mw7.3 earthquake, which occurred in the central part of the Gulf, and also turbidites triggered by two older events, of which one is likely the 1588 earthquake.

Keywords: Marine paleoseismology, ITRAX micro-XRF scanning, U-channel radiography, Bioturbation.