Mechanisms of active faulting, uplifted coral reefs, and earthquake segmentation along the Red Sea coastal area north of Quseir, Egypt: Preliminary results from the first field season

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The Red Sea coast north of Quseir is part of the straight coastal segment that is generally characterized as seismically inactive. However, during a 2009 preliminary field trip and a 2010 two-week geological field mapping course, we found plenty of evidence for Plio-/Pleistocene vertical coastal uplift, likely due to earthquake-related coastal and offshore faulting. Our field area exposes a spectacular section of a tectonically uplifted, amagmatic sedimentary sequence, which formed due to passive-margin-related rifting of the Red Sea: the Mesozoic and Tertiary sedimentary units that fill the 10-km wide coastal strip, are perfectly exposed as tilted fault blocks. Pliocene marine deposits emerged recently due to sealevel-drop and earthquake-related uplift.

The presence of up to five distinct Pleistocene coral terraces imply that at least some of the coastal uplift was seismogenic. These findings imply long recurrence intervals for active faults in the Quseir area. Our mapping also revealed that left-steps in at least one of the major N-S-striking faults are accommodated by flower structures. Presumably, some of the seaward-dipping, N-S-striking normal faults are active today, despite the lack of recent instrumental seismicity, which implies long recurrence intervals. These findings differ from previously published results for the adjacent Quseir-Umm-Gheig subbasin area, were E-W-striking strike-slip faults were mapped to offset the N-S-striking faults, and had been inferred as earthquake-generating faults by El-Wahed et al. (2010; Lithosphere). Based on our initial mapping, we postulate that the large rift-parallel normal faults are seismogenic. In the future we hope to determine the role of left-steps and other cross structures in controlling earthquake segmentation along this portion of the Red Sea coast.

We summarized our geological mapping on a high-resolution Quickbird Image, and are currently working on drainage network analysis to deduce the relationship between vertical deformation, jointing, and the formation of wadis, folded surfaces, and terraces. We thank Sohag University for providing generous logistical support, field vehicles and drivers, but regret that we were not able to continue field mapping for general political reasons. We thank the University of Munich's Office of International Affairs for financial support.