

RCL	Kinematics and Dynamics of Active Rifting of the Northern and Central Red Sea	
	Robert Reilinger, MIT	
	7/1/2003 – 5/31/2006	EAR 03-05480
<p>This project involves using the Global Positioning System (GPS) to measure directly active rifting of the Red Sea. This will require making repeat GPS-survey observations and operating continuously recording (CGPS) stations for at least 3 years. Therefore our present accomplishments are from the analysis of prior data, and from initial planning activities.</p> <p>Scientific and logistical accomplishments:</p> <ul style="list-style-type: none"> • Compiled, processed, and analyzed GPS data to constrain overall Africa (Nubia) and Arabia plate motion (McClusky et al., 2003). These results provide broad-scale constraints on plate motions and provide the ‘framework’ for monitoring spreading in the Red Sea. • Compiled, processed, and analyzed GPS survey data from the Sinai Peninsula and the Levant region in collaboration with our partners at the National Research Institute for Astronomy and Geophysics (NRIAG), Helwan, Cairo, Egypt. These results suggest that the Sinai Peninsula and Levant region are moving coherently relative to the Nubian plate. This result has a direct effect on slip rates along the Dead Sea fault and the Gulf of Suez, and consequently for the seismic hazards associated with these structures. A paper is in preparation (Mahmoud et al., 2003). • Completed a draft agreement with NRIAG for GPS work along the Red Sea. • Hosted a visit to MIT for Dr. Salah Mahmoud, Head of GPS-Tectonics Group at NRIAG. • Purchased GPS equipment for installation in Egypt, Eritrea, and Saudi Arabia, and are working on acquiring necessary US export licenses. • Planning (December 2003) a working visit to Saudi Arabia to identify locations for CGPS stations and to set GPS survey points. • Planning (February 2004) a working visit to Eritrea and Egypt to identify locations for CGPS stations and to set GPS survey points. 		
<p>References:</p> <p>McClusky, S., R. Reilinger, S. Mahmoud, D. Ben Sari, and A. Tealeb, GPS constraints on Africa (Nubia) and Arabia plate motion, <i>Geophys. J. Int.</i>, 155, 126-138, 2003.</p> <p>Mahmoud, S., S. McClusky, R. Reilinger, and A. Tealeb, GPS constraints on motion of the Sinai peninsula and Levant Micro-plate: Implications for Tectonics and Earthquake hazards of the Eastern Mediterranean Region, <i>J. Geophys. Res.</i>, in preparation, 2003.</p>		

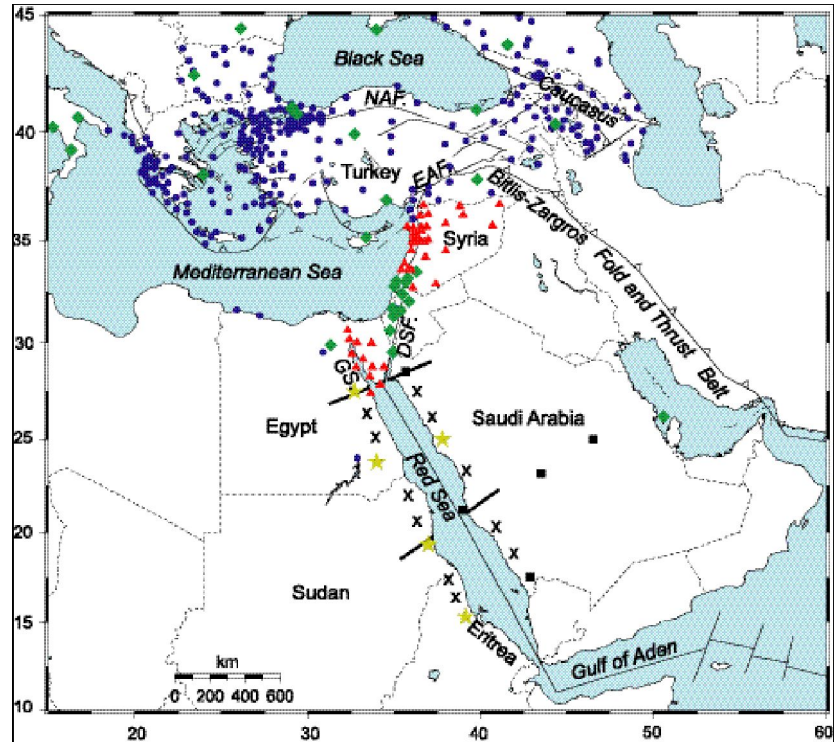


Figure 1. Locations of existing, planned, and proposed GPS stations in the Red Sea/Eastern Mediterranean region; (a) IGS CGPS (continuous) stations (green diamonds), (b) planned CPGS stations in Saudi Arabia (black squares), (c) proposed Red Sea / Gulf of Suez CGPS stations (yellow stars), (d) Eastern Mediterranean crustal deformation network SGPS (survey) stations (blue circles), (e) Syrian and Sinai SGPS stations (red triangles). (f) proposed Red Sea / Gulf of Suez SGPS stations (black X's). Heavy black lines show the proposed rift margin profiles containing 20 SGPS sites each.

Saudi Arabia Permanent GPS Network

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During Reilinger's visit to KACST the group and others from KACST worked on updating and installing new GPS stations for the Red Sea Expansion Project. The project looks at continental drift, specifically; Asia and Africa. Arabia, as the southwest corner of Asia, is moving away from Africa in two motions: translation and rotation counter-clockwise. These motions are believed to cause earthquakes within Arabia and regions around it.

Purpose:

- Upgrade communications systems on GPS stations installed 03/2002 in An Namas and Halit Ammar, Saudi Arabia.
- Install GPS continuous tracking systems at the Solar Village SLR station (~45 km NW of Riyadh) and at a site ~60 km E of Jeddah, Saudi Arabia.

All systems are located in secure KACST observatory facilities.

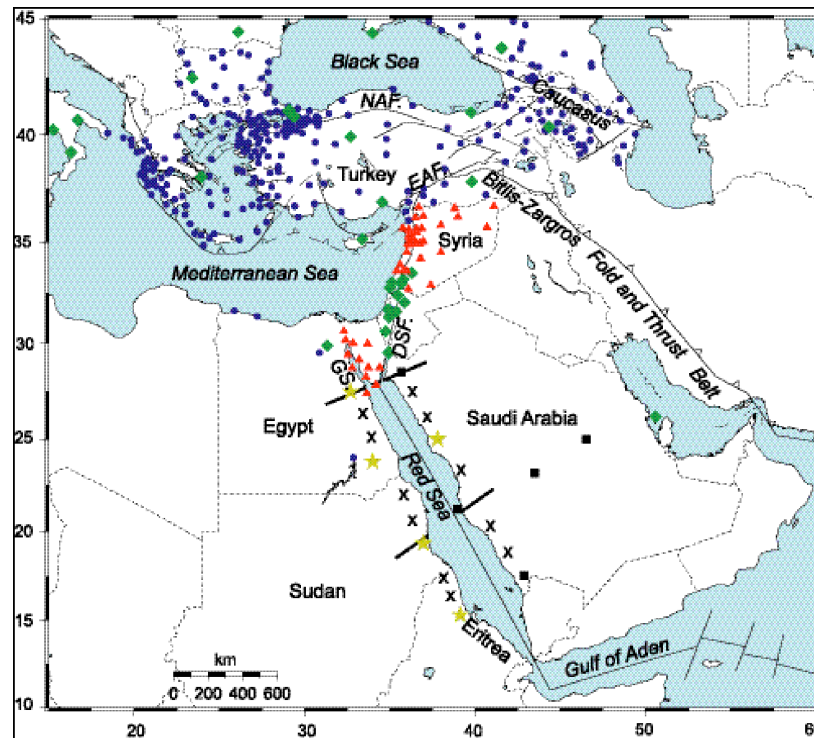


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