

**MARGINS Rupturing of Continental Lithosphere Initiative Update:  
Northern and Central Red Sea/Gulf of Suez Region**

As we are all aware, the January 2000 MARGINS Theoretical and Experimental Institute and workshop on “RUPTURING OF THE CONTINENTAL LITHOSPHERE (RCL)” in Snowbird, Utah, formulated a science plan for the focused investigation of faulting, strain partitioning, and magma emplacement at sites of active continental rifting where there is a transition to initial seafloor spreading. The two focus sites chosen for these investigations were the Gulf of California and the central/northern Red Sea. In turn, an organizational meeting for the Red Sea component of RCL was held during March 17-23, 2001, in Sharm el-Sheikh on the Egyptian Sinai Peninsula. The first-order objective of this meeting was to provide a forum where the logistical requirements of working in the various countries bordering the Red Sea region could be discussed and US researchers could meet and explore possible scientific collaborations, as they relate to the MARGINS objectives, with scientists from Egypt, The Sudan, Jordan, Eritrea and Saudi Arabia. It has always been clear that the success of the RCL Red Sea initiative can only be achieved with active collaboration from scientists from these countries. The failure of the Saudis to participate in the Sharm el-Sheikh meeting seriously questioned the future of the Red Sea RCL initiative.

As a direct follow up of the Sharm el-Sheikh meeting, the MARGINS Office negotiated for many months the visit of a small delegation (comprising Bilal Haq, James Cochran and myself) to visit Saudi universities and institutes to: 1) Introduce the MARGINS program to Saudi researchers, 2) discuss and formulate ways in which U.S. and Saudi researchers can collaborate and extend the excellent work already completed or currently being undertaken towards an understanding of the geological and tectonic development of the Red Sea region, and 3) define the logistical requirements of working in Saudi, both onshore and offshore, and access to Saudi geological and geophysical information. During 31 August-5 September, the U.S. delegation met with researchers and representatives of the Saudi Geological Survey (Jeddah), the King Fahd University of Petroleum and Minerals (Dharan), the King Saud University (Riyadh) and the USGS Mission (Jeddah). **It gives me great pleasure to announce that we do indeed have a viable RCL program in the Red Sea** - the Saudis were very receptive to the MARGINS RCL initiative and keen to participate, especially since the initiative was only in the early stages of proposal preparation, which allows full participation of Saudi researchers in the planning process.

Perhaps most importantly, the Saudi Geological Survey (SGS) has offered to act as the point-of-contact between the MARGINS Office and U.S. researchers to contribute or facilitate invitations for visas, field logistics and work permits for onshore and offshore surveys. This is in addition to involving its researchers in MARGINS collaborative proposals. The Saudi Geological Survey (<http://www.sgs.org.sa>) was established as an independent entity attached to the Ministry of Petroleum and Mineral Resources in 1999. The main activities of the

survey are to undertake: 1) Ground geologic surveys (geologic, geophysical, and geochemical) of the Arabian shield, Phanerozoic cover rocks, and basaltic lava fields (harrats), and to produce maps, and topographic maps at various scales, 2) aerial surveys and to prepare aerial and satellite photographs of specific areas, 3) marine geologic surveys that will result in the preparation of maps for islands and coastal plains along the territorial borders of the Kingdom, and 4) technical studies, independently or jointly, with companies, institutions, or academic scientific and research centers, and provide consulting services to the government and private sectors. The MARGINS RCL initiative thus falls clearly under the mandate of the SGS. Further and in a gesture of goodwill, the SGS has made available a series of 1:250,000 geological maps of the coastal plain, escarpment and shield along the Red Sea in addition to aerial photographs, topographic and road maps to help with MARGINS proposal planning. SGS would also help facilitate communication between U.S. and Saudi researchers in addition to helping to host future MARGINS workshops in Jeddah. By government decree, SGS will be the repository for all Earth scientific data within the Kingdom and will make available these data to the community (note that there are no restrictions concerning access to Saudi potential field data).

Discussed with the Saudis were the recommendations from the Sharm el-Sheikh workshop, specifically the need to focus resources and expertise in order to address fundamental questions concerning how the continental lithosphere deforms during extension and ultimately breakup. Geophysical work should focus on a series of broad transects through different segments of the Red Sea system. One transect should be in the Gulf of Suez, which represents the continental rift stage, building on an already funded NSF-EAR seismic experiment. Interest was expressed in extending this transect into Saudi Arabia. The second transect should likely concentrate on the central Red Sea. Given that this second transect should focus on the transit from rifting to drifting, preliminary discussions with the Saudis has helped locate a general region between Yanbu and Jeddah, although as always, the actual site locations will be driven by proposal excellence. Our discussions also addressed the variety of ways with which to address the MARGINS RCL questions, such as: 1) For the upper crust, field mapping in the Gulf of Suez and its margins with surface onshore mapping of the coastal plain, gravity and magnetics and reflection seismics for water covered regions, 2) for the lower crust, refraction seismics, and 3) for the lithospheric mantle, tomography and heat flow. Seismicity and neotectonic studies, including GPS, gives a snapshot of crustal velocities and deformation at the present time. In order to engage Saudis and other collaborators in the central Red Sea transect, this RCL component will likely require a 12 month preparation time.

Our meeting with the SGS and Saudi universities has presented the U.S. Earth scientific community with an unprecedented opportunity to reopen research initiatives in the Red Sea region, in general, and in Saudi Arabia, in particular. Our next step is to prepare a Memorandum of Understanding between the SGS and the MARGINS Office in order to document the successful discussions and negotiations in Jeddah last week. In addition, a delegation also needs to return to Cairo to define an Egyptian point-of-contact in order to secure

the necessary approvals and permissions to work in Egypt. The fact that this is not in place, however, should not hamper proposal preparations for the NSF-MARGINS 1 Nov., 2001 deadline. The MARGINS Office has a list of potential Saudi researchers interested in sharing their ideas and collaborating with their U.S. counterparts. While preparing proposals, either for the 1 November 2001 or 2002 deadline, please keep in mind the extreme importance of involving collaborators from the countries that you are proposing to work in. This involvement can be in the form of travel costs etc. for field participation (but not salaries), including funds for researchers, postdocs and students to spend time working in the U.S. (or vice versa), and funds for equipment. Good luck with your proposals.

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(9 September, 2001)