

The MIRROR cruise (2011) : Deep crustal structure of the Moroccan Atlantic Margin from wide-angle and reflection seismic data

F. Klingelhoefer (1), D. Aslanian (1), M. Sahabi (2), M. Moulin (3), P. Schnurle (1), K. Berglar (4), Y. Biari (2) A. Feld (1), D. Graindorge (5), C. Corela (3), K. Mehdi (2), F. Salhi (2), J. Perrot (5), J. Ribeiro (3) and C. Reichert (4)

(1) Ifremer, REM-GM, Plouzané, France (fklingel@ifremer.fr)

(2) University of El Jadida, El Jadida, Morocco

(3) University of Lisbon, Lisbon, Portugal

(4) Bundesanstalt fuer Geowissenschaften und Rohstoffe (BGR), Hannover, Germany

(5) IUEM, University of Brest, France

The study of conjugate margins is important to test different hypotheses of rifting and initial opening of an ocean. In this scope, seven wide-angle seismic data were acquired on the Moroccan Atlantic margin (at the latitudes between 32° and 33° N) together with coincident deep frequency reflection seismic data during the MIRROR cruise in May and June 2011. Two of the profiles are located perpendicular and five parallel to the margin. The main profile represents the conjugate to an existing wide-angle seismic profile on the continental margin of Nova Scotia. The seismic profiles are between 130 and 260 km in length and between 28 and 13 ocean-bottom seismometers were deployed on each one. One profile was extended on land by 15 landstations in order to better image the zone continental thinning. A 4.5 km digital streamer and a 7200 cu inch tuned airgun array were used for the acquisition of the seismic data. Additionally magnetic, bathymetric and high resolution seismic data were acquired in the study region.

Preliminary results from tomographic inversion of the first arrivals from the ocean-bottom seismometer data image the zone of crustal thinning from about 25 km to 6 km in the basin along about 70 kilometers of the profiles which are located perpendicular to the margin. The oceanic crust can be divided into 2 regions, based on the lower crustal velocities. Upper mantle velocities are about 8.0 km/s.

The coincident reflection seismic data show the fine basement and sedimentary structures including salt tectonics in the basin. The comparative study of the two conjugate profiles on the Moroccan and Nova Scotia margin will give new insights into the original opening of the Atlantic ocean. Further work on this data set will include forward modelling of the wide-angle seismic data, gravity and magnetic modelling.