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A combined vibroseis/explosive near-vertical reflection profile across the Dead Sea Transform (project DESIRE)

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The GeoForschungsZentrum (GFZ) Potsdam, Germany, in co-operation with the Tel Aviv University and the Dead Sea Research Centre Tel Aviv, Israel, the Natural Resources Authority Amman, Jordan, and the An-Najah National University Nablus, Palestine, has conducted integrated seismic reflection and refraction measurements across the Dead Sea Rift/Dead Sea Transform Fault (area of the southern Dead Sea Basin) along a W-E traverse in Israel and Jordan. This campaign is part of an international and multidisciplinary research programme to study the lithospheric structure and the role of the Dead Sea transform fault in the evolution and geodynamics of this region (project DESIRE; DEad Sea Integrated REsearch). The integrated research efforts include, apart from the seismics, many other geoscientific studies such as seismology, electromagnetics, gravity, magnetics, geology, tectonics, remote sensing and GPS surveying. It is the continuation of the experiment DESERT which was successfully carried out some years ago about 100 km further to the south.

The aims of DESIRE are: (1) to determine the structure of the Dead Sea Transform (DST) in the region of the southern Dead Sea basin, which is the largest and deepest pull-apart basin along the DST; (2) to compare and contrast the southern Dead Sea basin with the region where the older DESERT profile crossed the DST at a location

in the Arava valley where the dynamics and structure are controlled by a relatively simple shear zone, and (3) test whether whole-scale crustal extension (especially fault-perpendicular extension) is important or not.

The technical concept for the near-vertical reflection (NVR) seismic survey of DESIRE consists of high-fold vibroseismics on the Israeli side and medium-fold low-charge explosive seismics on the Jordan side, both designed to image the entire crust, including the crust-mantle boundary. The reflection traverse, measured in March/April 2006, starts about 5 km E of Be'er Sheva/Israel at the northern end of the Negev desert, crosses the Arava valley and the Dead Sea via the Lhisan peninsula (the 'deepest point on earth') and ends about 15 km NW of Karak/Jordan in the highlands. It runs at a latitude of about 31˚15' N with a total length of about 100 km along existing tracks and roads in a 'crooked-line' manner.

A detailed overview about the seismic processing of the NVR data is given, including the extensive effort on noise suppression (traffic and cultural noise; surface-, shear wave and air blast attenuation; vibroseis (sub)harmonics suppression; ...), on spectral balancing, velocity analyses and residual static corrections. The latest stacked and migrated sections are presented and will be compared and combined with the results of the other geophysical experiments (wide-angle seismics, magnetotellurics, ...) that have been measured along the same profile.