

## HIGH RESOLUTION BATHYMETRY OF THE MEDITERRANEAN OFF NORTHERN ISRAEL

A.R. Sade<sup>4</sup>\*, J.K. Hall<sup>1</sup>, A. Golan<sup>2</sup>, G. Amit<sup>2</sup>, L. Gur-Arieh<sup>3</sup>, G. Tibor<sup>2</sup>, Z. Ben-Avraham<sup>4</sup>, C. Hübscher<sup>5</sup>, E. Ben-Dor<sup>4</sup>

<sup>1</sup> Geological Survey of Israel, Jerusalem, Israel - portolan@smile.net.il

<sup>2</sup> Israel Oceanographic & Limnological Research Ltd., Haifa, Israel

<sup>3</sup> Survey of Israel, Tel Aviv, Israel

<sup>4</sup> Tel Aviv University, Ramat Aviv, Israel

<sup>5</sup> Institut für Geophysik, Universität Hamburg, Germany

### Abstract

A new poster, based upon high resolution multibeam sonar surveys, shows the bathymetry of the Mediterranean continental shelf and slope off northern Israel. The image reveals in detail many features of the offshore. On land, hill shading of an orthophoto image allows visual continuity between the terrestrial and submarine morphology. The posterscale is 1:50,000.

*Keywords* : *Bathymetry, Continental Margin, Eastern Mediterranean, Levantine Basin, Swath Mapping.*

The bathymetry of the Mediterranean off northern Israel is shown in this poster at 1:50,000 scale. The offshore is based upon over 850million soundings from multibeam sonars. Water depths from about 8 m to over 900 m result were mapped by the Israel National Bathymetric Survey, a joint undertaking of the Geological Survey of Israel (GSI), the Israel Oceanographic & Limnological Research Ltd. (IOLR), and the Survey of Israel (SOI). The survey was carried out between 2001 and 2006 by the IOLR's 48' vessel R/V Etziona using a Kongsberg Simrad EM1002 multibeam sonar. The EM1002 has 111 2° beams operating at 96 kHz spread over an arc of up to 150°, giving maximum swath coverage of up to 7.4 times the water depth. The survey involved some 4,218 km of track.

Further offshore F.S. Meteor Cruise 52/2 in 2002 obtained partial coverage in deeper waters with an Atlas Hydrosweep system operating 60 beams at 12 kHz over a 90° arc. Additional data was available in detailed (5 m) contour maps of the landing of the SEA ME WE 2 fiberoptic cable extending from Ayia Napa, Cyprus, to Nahariya in Israel. Ifremer's vessel N.O. L'Atalante surveyed this route in 1992 with a Simrad EM12D system. Other holes were interpolated using soundings from the 1970s reconnaissance work of the GSI. The vertical exaggeration of the gridded bathymetric data is 6 times.

On land Global Mapper software used the Survey of Israel's 4 m Digital Terrain Model (DTM) to shade their 1 m orthophoto. The illumination is from the northwest (N315°E) at 45° altitude with a vertical exaggeration of 2. Image scale is 1:50,000 on the Universal Transverse Mercator (UTM) Projection (Zone 36), with WGS-84 datum.

The image shows the sweep of the northern Israel coast from HaHotrim in the south to Rosh Haniqra in the north. The low-lying Zevulun Valley and its extension, Haifa Bay, separate the western promontory of Mount Carmel, cut by numerous ravines, from the Coastal Plain of the western Galilee. This coastal plain is crossed by a number of rivers whose continuations can be seen in the offshore.

The continental margin off northern Israel shows the interplay between past global sea-level changes, long-shore sedimentation, and tectonics. The coastline is paralleled by a number of carbonate-cemented quartzsandstone (kurkar) ridges. In the north these rise above sea-level and form eight small islands. In deeper waters there are several raised platforms, some exhibiting curving dune-like bedforms, perhaps of current or eolian origin. The shelf-break occurs at around 100 m depth, and beyond this many canyons carry sediment out to the deep sea. The prominent Carmel Nose is an extension of Mount Carmel across the shelf. The Western Galilee is cut by a number of E-W trending faults. Offshore these define a series of raised and sunken blocks, and appear to provide preferential courses for the rivers as they breach the kurkar ridge system. A number of straight or curvilinear trends appear to result from tectonic activity, and may be related to normal faulting. Opposite Haifa Bay, in water depths of 30 m, a broken-up area called the "Brittle Sheet" was mapped, and may also have a tectonic origin. In the far north, the steep Akhziv Canyon cuts deep into the continental margin. The entire shelf and slope is marked by numerous shallow pits and slightly raised mounds.