

# AN INTEGRATED ANALYSIS OF THE NILE CONTINENTAL MARGIN: FROM THE MOHO TO BEGGIATO A SP

Jean Mascle \* and The Nile Margin Program Team

Laboratoire Géosciences-Azur, BP 48, 06235, Villefranche sur Mer, France - mascle@geoazur.obs-vlfr.fr

## Abstract

Less than 10 years ago the Egyptian continental margin off Nile delta was an almost unknown margin segment, only investigated, along its uppermost continental slope and shelf, by oil/gas companies, and crossed in its deepest part by sparse data. In the frame of the French margin program the marine team of Geosciences-Azur has initiated, in late 1998, a systematic study of this area with the aims to better image and understand the various tectonic, sedimentary, geochemical and environmental processes which have shaped this margin segment and are still operating on the sea floor.

*Keywords* : *Continental Slope, Nile, Eastern Mediterranean.*

An initial survey, Prised 2, in 1998, provided the first detailed swath bathymetric maps based on data recorded by an EM12D swath system, of the Nile deep sea fan, huge sedimentary construction which results from the deposition, through Plio-Quaternary times, of thick clastics transported by the Nile, the world's longest river [1-2]. After Prised 2, 8 successive marine geophysical/geological/biological cruises have been carried out between 2000 and 2006.

In 2000 Fanil cruise operating an EM300 swath system, was chiefly devoted to investigations of active sedimentary processes (turbidites, instabilities), salt gravity tectonics, and allowed to discover many fluid-releasing features such as pockmarks, gas chimneys, and at the foot of the continental slope tens of mud cone and mud calderas. The data completed the systematic morphological mapping of the Nile margin [3-5].

In 2002, a MCS survey, Medisis, has recorded using a long offset digital streamer (4.5 km) and an array of 10 air guns, about 2000 km of regional lines; these data have imaged the deep geological structures of different morphological provinces up to depth of 25 km [6]. Interpretation of the data and modelling of gravity anomalies, support that the deep fan is built on a stretched continental crust covered by an excess of 12 km of sediment, including thick Messinian evaporites which may locally reach up to 3 km in thickness.

In 2004 Simed cruise has completed the systematic swath bathymetry, gravity and magnetic mappings of large areas of the margin now almost entirely covered from water depth between 600 meters to the deep abyssal plain (circa 3100 meters). The same year a short cruise, Vanil, recovered 11 giant Calypso cores for a total sedimentary section up to 350 meters completing a set of 60 Kullenberg cores previously obtained.

In 2003 the first step of the ESF Euromargins Mediflux program cooperation between German, Dutch and French institutes, has led to the Nautinil cruise using the scientific submersible le Nautil. 19 deep dives were performed on several fluid vents to investigate their activities and study their impacts on the deep sea geological and biological environments. Spectacular observations and sampling of active vents where brines and fluids are mixed were made on a deep mud caldera (3000 m water depth), upper slope gas bubbling chimneys were sampled and a few pockmarks were visited. In 2004 the Dutch Mimes survey provided near bottom sonar records on gas chimneys and some of the pockmarks, and demonstrated the presence of active gas plumes in the sea water. Bionil, conducted on the German RV Meteor has chiefly been devoted to in situ geochemical, microbiological and biological sampling using an ROV on targets mapped in details using an AUV equipped with a swath bathymetry system.

We present here the main results of the different surveys, made in an interdisciplinary approach, on the Nile continental margin.

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