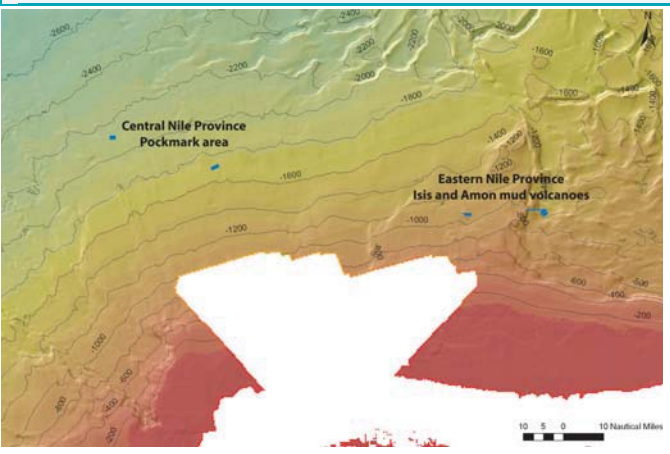
Cruise news

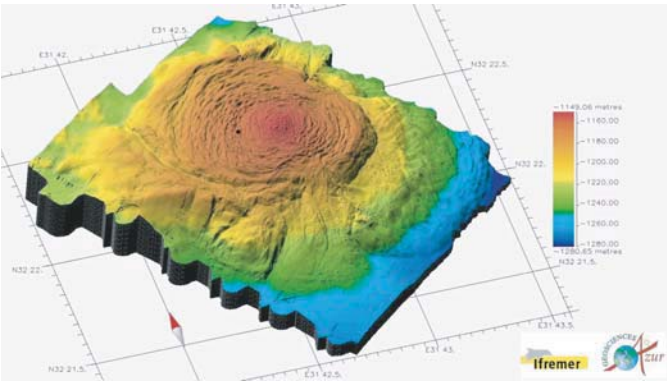
During the first BIONIL leg aboard the German research vessel RV *Meteor* (21 October - 6 November 2006; PI Antje Boetius, MPI) six dives of the Ifremer AUV (Autonomous Underwater Vehicle) *Aster*^{X} were performed at active seep sites on the Nile deep-sea fan. One of the goals was to obtain near-bottom high resolution bathymetry and backscatter images to better understand the geological setting of fluid seepage. The AUV was operated in two different configurations: high resolution swath bathymetry using a SIMRAD EM2000 multibeam echosounder (provided by Géosciences-Azur) and gas detection, using a SIMRAD EK60 fishery echosounder (Ifremer).

The AUV's main characteristics are the following: a weight of 800kg, autonomy with payload of 35 km, maximum working depth 2500m, and a survey speed of between 1 to 3.5 knots. The AUV back section contains all the basic vehicle equipment (thruster, doppler velocity loch, two localization beacons, GPS, and radio antenna for surface telemetry). The middle section (main hull) contains all the electronic systems, alongside eight lithium Ion batteries and one safety lead battery. The front section (right side of the picture) is mainly dedicated to external payload systems such as transducers.

The SIMRAD EM2000 multibeam echosounder, operated at 200 kHz, includes 3 components: a processor unit (integrated into main hull and linked to the payload control computer through the vehicle network), an emitter and a receiver (both installed in the front section). The receiver comprises 111 individual receivers arranged over a 120° angle. The AUV is capable of flying at a fixed distance above the seafloor, so mapping coverage is function of the selected altitude. During BIONIL, the AUV operated at 50 to 70 m altitude, allowing a swath width of 150-200 m.

AUV surveys cold seep sites on the Nile Fan





During BIONIL, five AUV dives were performed using the swath bathymetry configuration and one using the gas detection sensor. Bathymetric and backscatter data were processed using Ifremer's CARAIBES software. Amazingly, less than 2 hours after recovery of the AUV, a rough grid was available with a 2m spacing and could be used immediately to guide ROV dives. Backscatter maps could also be displayed.

During BIONIL, the ASTER^X AUV travelled almost 140km during 41 hours of operation time, demonstrating its capacity to dive regularly and deliver excellent scientific data, including gas detection. Near-bottom AUV bathymetric surveys allow scientists to fill the difficult gap of observations between data recorded from surface (swath data) and in situ visual or video observations from submersibles and/or ROV.

The high resolution AUV data are now being reprocessed and relocated to obtain DTMs at 1 metre, and, where required, at 50cm spacing. These maps collected over three targets areas on the Nile continental margin will be available to plan further ROV dives and sampling operations for the HERMES 'MEDECO' expedition, scheduled for September-October 2007 aboard the RV *Pourquoi pas?*.

Left, top: Shaded morpho-bathymetric map showing the BIONIL study area. Blue patches show locations of the 6 AUV dives (3 on Amon and Isis gas chimneys on the eastern Nile continental slope, at 1000-1200m depth, and 3 others on the so-called pockmark central province at 1600-2150m depth). Map courtesy MediMap Group, Loubrieu, B. & Mascle, J., 2005.

Bottom: 3D view of Amon mud volcano on the eastern Nile continental slope (data processing by Georges Buffet/Geosciences Azur).