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Mud volcanoes and pockmarks mapped with the AUV Aster^X offshore Egypt

S. Dupré (1,2), G. Buffet (3), J. Mascle (3), J.-P. Foucher (1), A. Boetius (4), J. Woodside (2), C. Marfia (5) and the Aster^X AUV Team (5)

(1) Ifremer, Géosciences Marines, Plouzané, France, (2) Faculty of Earth and Life Sciences, Vrije Universiteit, Amsterdam, The Netherlands, (3) Géosciences Azur, Villefranche/Mer, France, (4) Max Planck Institute for Marine Microbiology, Bremen, Germany, (5) Ifremer/GENAVIR, La Seyne/Mer, France (stephanie.dupre@falw.vu.nl / Fax: +31 205987370 / Phone: +31 2059899541)

Two mud volcanoes and a field of pockmarks were mapped in water depths of 1000-1700 m on the Egyptian continental slope with the Ifremer AUV Aster^X during the BioNil expedition of R/V Meteor in October 2006. High resolution swath bathymetry and backscatter imagery were acquired with the AUV-borne multibeam echosounder Simrad EM2000 (CNRS/Géosciences Azur) operating at a frequency of 200 kHz. With a beam spread angle of 120°, Aster^X was navigated at 50 to 70 m above the seafloor, and survey lines were spaced 150 or 200 m respectively, thus allowing for a full seabed mapping coverage. A total of 22 km^2 seafloor surface was covered in about 40 hours survey at an average speed of $\sim$1kn.

Based on previously collected surface echo-sounding data (FANIL 2000, Loncke et *al.*, 2004) and side scan sonar backscatter imagery records (MIMES 2004, Dupré et *al.*, 2005), restricted targets were selected for detailed investigation. Newly mapped areas include the Amon and Isis mud volcanoes in the eastern region of the Nile deep-sea fan and a field of pockmarks in the central part. A 200 m wide zone of chaotic seafloor topography associated with recent mud eruption, and an older mud body covered with carbonate crusts at the south-western edge of Amon are displayed by the new data. Two secondary mud eruption centres were discovered on Isis, in addition to the main one previously identified at the centre.

A GIS-based software, MIMOSA (©Ifremer), was used for dive preparation and real time supervision. Two acoustics systems were installed on the ship, the GAPS sys-

tem (IXSEA) for vehicle positioning and the MATS (SERCEL) system for acoustic telemetry during the dives. Following the transfer of the raw data shortly after the recovery on deck of the AUV, processing of the collected data led in a couple of hours to 2m DTMs using the CARAIBES software ©Ifremer.

The resolution of the final DTM bathymetry grids reaches 50 cm. Reflectivity seafloor mosaics from Aster^X, when compared to DTS-1 EdgeTech side-scan sonar records (75 kHz) aid identification of distinct successive stages in mud volcano formation (Dupré et *al.*, 2006). The acquisition of high resolution seafloor bathymetry and acoustic imagery maps fills the gap in scale between the mother ship multibeam data and *in situ* and video observations from submersibles and ROV.

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