Geophysical Research Abstracts, Vol. 7, 07332, 2005
SRef-ID: 1607-7962/gra/EGU05-A-07332

Active brine seepage on the Nile Deep Sea Fan: “in situ” dive observations on mud mounds in Menes Caldera (NAUTINIL Cruise, 2003)

C. Huguen (1), J.P. Foucher (2), J. Mascle (1), H. Ondreas(2), M. Thouement(2), L. Loncke(3) and the NAUTINIL Scientific Party

(1) Géosciences Azur, Observatoire Océanologique, BP48, 06235 Villefranche/Mer, France, (2) DRO/GM Ifremer BP 70, 29280 Plouzané, France, (3) UPJV Faculté des Sciences, Laboratoire Sciences de la Terre, 33 rue St Leu, 80000 Amiens, France (Caroline.Huguen@geoazur.obs-vlfr.fr / +33 493763766)

Based on “in situ” observations made during the NAUTINIL cruise (September-October 2003) as part of the Euromargins MEDIFLUX program, we present a detailed analysis of fluid-escape geological structures of the Nile Deep Sea Fan (NDSF). We focus on the western province where multibeam data show a broad area with numerous mud cones, 300-900 meters wide and several tens of meters high.

The studied area is the Menes Caldera, a sub-circular foundered portion of the sea floor, about 8 km in diameter, bounded by steep 50-60 meters high walls, and lying at about 3020 m water depth.

Detailed investigations have been conducted from the submersible NAUTILE on three of the most prominent cones occurring within MENES Caldera: CHEOPS, CHEFREN and MYKERYNOS. Unlike mud volcanoes commonly detected over active margins (Huguen et al., 2004), these features are not characterized, on backscatter records, by highly reflective patches (Loncke et al., 2004); they however show stronger acoustic backscatter signature than the surrounding seafloor; this was considered as indicative of probable active fluid venting, recent mud flows and/or diagenetic carbonate crusts.

During the NAUTINIL expedition, the two first exploratory dives allowed to identify the most active areas in term of fluid-brine seepage; these are located at the top of the observed mud cones; complementary dives were then dedicated to detailed studies, including “in situ” sampling and various physical and chemical measurements.

This presentation illustrates occurrences of: **(1)** active brine seeps, **(2)** diagenetic carbonate crusts, **(3)**, recent or ancient mud flows and, **(4)** associated fauna and bacterial mats.

Major results relate to the presence, on two of the mud mounds, of massive active brine/mud expulsions over areas reaching 300m in diameter. On the two mud mounds, a concentric zonation of the fluid activity has been observed, including a central domain characterized by dark brine/mud mixture emission vents, and peripheral overflows of almost transparent brines. The brine overflows form sub-circular brine lakes around the mud mounds summits. Large surfaces of the brines exposed at the seafloor are covered by whitish bacterial mats. Filamentous bacterial mats are carried down the slopes of the mounds by the brine/mud overflows. Outside the central active areas, the outer slopes are characterized by a gently sloping, uniformly ochre, seafloor. Thin carbonate pavements associated with tube worms and gastropods locally occur close to the active area.

Huguen C., Mascle J., Chaumillon E., Kopf A., Woodside J. and Zitter T, 2004. « Structural setting and Tectonic control on Mud Volcanoes : Evidences from the Central and Eastern Mediterranean Ridge from geophysical data», *Marine Geology* 209, 1-4, 245-263.

Loncke, L., Mascle J., and Fanil scientific party, 2004. Mud volcanoes, gas chimneys, pockmarks and mounds in the Nile deep sea fan (Eastern Mediterranean): geophysical evidences: Marine and Petroleum Geology, v. 21 (6), p. 669-689.