



New geological insights on fluid related systems on the Nile Deep Sea Fan and Calabrian Arc accretionary prism from the HERMES-Medeco2 expedition

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During the Medeco Leg 2 expedition (November 2007, part of the European HERMES project), detailed investigations were undertaken of two main sites of seabed seepage on the Nile deep sea fan, previously explored *in-situ* during Nautinil (2003) and Bionil (2006) cruises (Bayon et al., 2007; Huguen et al., 2007). Mud volcanoes on the Calabrian Arc accretionary prism, discovered by OGS (Ceramicola et al. 2006), were also explored.

We report here on the main results derived from systematic ROV video observations, near-seabed multibeam (micro-bathymetric and backscatter) data and geothermal measurements collected on a) two pockmark fields and b) the Menes mud volcano caldera complex, located respectively in water depths of 1700 m and 3000 m on the continental slope off northern Egypt. Within the pockmark areas active fluid vents are

associated with fields of authigenic carbonates; some of them appear fractured. Within the Menes caldera, a geothermal corer deployed on the Cheops and Chefren mud volcanoes penetrated several hundred metres below seabed through 'brine sediments' (450 m below seabed on the Cheops cone) and indicate relatively high temperatures, constant with depth (up to 63°C within Chefren). The presence of very active gas chimneys is confirmed by *in situ* observations showing a ~200 m wide brine lake on top of Chefren, and tens of small (1 to 3 metres in diameter on average) jacuzzi-like pools on top of Cheops. Multibeam micro-bathymetric data (DTM at 1 m), as well as backscatter maps and ship-borne Chirp profiles, indicate an obvious tectonic control of the mud cone emplacement. On the Calabrian Arc, investigations were made of two mud volcanic structures, Pythagoras and the Madonna dello Ionio. Geothermal measurements show the three mud volcanoes comprising the Madonna to have much higher gradients than adjacent areas. ROV explorations encountered and sampled a few small centres of recent extrusion of anoxic mud, indicating a low level of present activity following the earlier extrusion of widespread mud breccias.

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References

Bayon, G., Loncke, L., Dupré, S., Caprais, J.-C., Ducassou, E., Duperron, S., Etoubleau, J., Foucher, J.-P., Fouquet, Y., Gontharet, S., Henderson, G.M., Huguen, C., Klaucke, I., Mascle, A., Migeon, S., Olu-Le Roy, K., Ondréas, H., Pierre, C., Sibuet, M., Stadnitskaia, A. and Woodside, J., M., 2007. Fluid seepage on an unstable margin: The case of the Centre Nile fan. Submitted to Marine Geology, Special ESF Issue (July 2007).

Ceramicola, S., Praeg, D. & the OGS Explora Scientific Party, 2006. Mud volcanoes discovered on the Calabrian Arc: preliminary results from the HERMES-HYDRAMED IONIO 2005 campaign. CIESM Workshop Monographs, n. 29, p. 35-39.

Huguen, C., Foucher, J.-P., Mascle, J., Ondréas, H., Thouement, M., Gontharet, S., Stadnitskaia, A., Pierre, C., Bayon, G., Loncke, L., Boetius, A., Bouloubassi, I., De Lange, G., Fouquet, Y., Woodside J., M. and the NAUTINIL Scientific Party, 2007. The Western Nile Margin Fluid seepage features: “in situ” observations of the Menes caldera (NAUTINIL Expedition, 2003). Submitted to Marine Geology, Special ESF Issue (July 2007).