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Cold-seep-like macrofaunal communities in organic- and sulfide-rich sediments of the Congo deep-sea fan

Olu K[1], C Decker[1], L Pastor[1], J-C Caprais[1], A Khripounoff[1], M Morineaux[1], M Ain Baziz[1], L Menot[1], C Rabouille[2]

[1]IFREMER Centre Bretagne, Laboratoire Environnement Profond, BP70, 20280 Plouzané, France

[2]Laboratoire des Sciences du Climat et de l'Environnement, Université Paris-Saclay, Gif sur Yvette, France

Abstract

Methane-rich fluids arising from organic matter diagenesis in deep sediment layers sustain chemosynthesis-based ecosystems along continental margins. This type of cold seep develops on pockmarks along the Congo margin, where fluids migrate from deep-buried paleo-channels of the Congo River, acting as reservoirs. Similar ecosystems based on shallow methane production occur in the terminal lobes of the present-day Congo deep-sea fan, which is supplied by huge quantities of primarily terrestrial material carried by turbiditic currents along the 800 km channel, and deposited at depths of up to nearly 5000 m. In this paper, we explore the effect of this carbon enrichment of deep-sea sediments on benthic macrofauna, along the prograding lobes fed by the current active channel, and on older lobes receiving less turbiditic inputs. Macrofaunal communities were sampled using either USNEL cores on the channel levees, or ROV blade cores in the chemosynthesis-based habitats patchily distributed in the active lobe complex.

The exceptionally high organic content of the surface sediment in the active lobe complex was correlated with unusual densitiesof macrofauna for this depth, enhanced by a factor 7 to 8, compared with those of the older, abandoned lobe, whose sediment carbon content is still higher than in Angola Basin at same depth. Macrofaunal communities, dominated by cossurid polychaetes and tanaids were also more closely related to those colonizing low-flow cold seeps than those of