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Fluid migration patterns along the Demerara plateau, French Guiana transform margin

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Transform margins present a very steep ocean-continent boundary inherited from the vertical transform fault along which opening occurred. This is expressed on bathymetry by important bathymetric gradients (in average greater than 20°) along the continental slope. These margins usually have trapped organic matter during rifting. However, the geometry of syn- and post-rift sequences differs from that of passive margins, and this has consequences on fluid overpressure and fluid releasing schemes.

The Demerara plateau located offshore French Guiana has been surveyed in 2003 (GUYAPLAC cruise, part of the french EXTRAPLAC program) using multibeam bathymetry and imagery (EM12), 6 traces seismic data and 3-5 kHz echosounding. The analysis of this dataset has revealed a giant pock-mark field (150 km^2 in area), that evidence active seepage processes on the seafloor. These pock-mark fields have been observed above a polygonal faulting interval, which, in places, is remobilized by slumping processes (affecting the last 500 m of the sedimentary cover). The sedimentary unit deformed by polygonal faulting overlies itself the black shales and the deeper Albian unconformity and older sediments, probably allowing fluid migration from depth. The association of slumping and fluid-escape structures suggests that fluid overpressure can be a key factor in the dynamics of this system (see Vendeville et al., this session). The seaward tilting of the margin and the cropping out of the stratigraphic horizons along the continental slope seem to strongly control fluid migration pathways to the surface. We present a tentative fluid migration model for the French Guiana margin.