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Multidisciplinary scientific program of investigation of the structure and evolution of the Demerara marginal plateau

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Mercier de Lépinay et al. published in 2016 an updated inventory of transform passive margins in the world. This inventory shows that those margins represent 30% of continental passive margins and a cumulative length of 16% of non-convergent margins. It also highlights the fact that many submarine plateaus prolong transform continental margins, systematically at the junction of oceanic domains of different ages. In the world, we identified twenty of those continental submarine plateaus (Falklands, Voring, Demerara, Tasman, etc). Those marginal plateaus systematically experiment two phases of deformation: a first extensional phase and a second transform phase that allows the individualization of those submarine reliefs appearing on bathymetry as seaward continental-like salients. The understanding of the origin, nature, evolution of those marginal plateaus has many scientific and economic issues.

The Demerara marginal plateau located off French Guiana and Surinam belongs to this category of submarine provinces. The French part of this plateau has been the locus of a first investigation in 2003 in the framework of the GUYAPLAC cruise dedicated to support French submissions about extension of the limit of the continental shelf beyond 200 nautical miles. This cruise was the starting point of a scientific program dedicated to geological investigations of the Demerara plateau that was sustained by different cruises and collaborations (1) IGUANES (2013) that completed the mapping of this plateau including off Surinam, allowed to better understand the segmentation of the Northern edge of this plateau, and to evidence the combined importance of contourite and mass-wasting processes in the recent sedimentary evolution of this domain, (2) Collaboration with TOTAL (Mercier de Lépinay's PhD thesis) that allowed to better qualify the two main phases of structural evolution of the plateau respectively during Jurassic times for its Western border, Cretaceous times for its Northern and Eastern border (2) DRADEM (2016) (see poster session) that better mapped the continental slope domain of the transform margin north of the Demerara plateau and was dedicated to the dredging of rocks outcropping on the continental slope, suspected to be Cretaceous in age and older, (3) MARGATS (2016) (see poster session) that was dedicated to the better understanding of the internal structure of the plateau and its different margins using multi-channels seismic and refraction methods.

The combination of all those experiments allow us to paint an integrated portrait of the Demerara marginal plateau – that may be very useful in understanding the processes involved (1) in the individualization of such plateaus (volcanism, heritages, kinematics, ...) (2) in their evolution (subsidence, mass-wasting processes, domains of deep-sea current acceleration). In the future, those scientific advances may allow to better define the natural resources associated with such marginal domains.