

The Enigmatic Deep Structure and Margins of the Demerara Plateau: the MARGATS Cruise Seismic Data together with Dredges, Kinematic Reconstructions and Magnetic Data Reveal a Complex and Polyphased Magmatic History

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ABSTRACT

Many transform margins have associated intermediate depth marginal plateaus, which are commonly located between two oceanic basins. The Demerara plateau is located offshore Surinam and French Guiana. Plate kinematic reconstructions show that the plateau is located between the central and equatorial Atlantic in a position conjugate to the Guinean Plateau. In the fall of 2016, the MARGATS cruise acquired geophysical data along the 400 km wide Demerara plateau. This cruise is part of a program dedicated to the deep geological investigations of the margin, including the Demerara plateau, following the GUYAPLAC (2003), IGUANES (2013) and DRADEM (2016) cruises. The aim of MARGATS was to image the internal structure of the Demerara plateau and its different margins using coincident deep penetrating wide angle refraction and Multi Channel reflection Seismic (MCS) methods. During the MARGATS experiment 171 Ocean Bottom Seismometers (OBS) were deployed distributed along 4 wide-angle lines. Along each wide angle line we also recorded coincident MCS data using a 3 km-long 480 channels streamer. The dataset was completed by three MCS lines along the eastern part of the Demerara plateau. MCS MAR007 line which is coincident with line OBS MAR-3 was extended on land by a set of 13 land stations deployed along the Maroni River. This line, together with MCS MAR001 and the coincident OBS MAR-1 line reveal the highly homogeneous deep structure of the internal part of the plateau. MCS MAR005 line, which is coincident with OBS MAR-2, MCS MAR006 line coincident with OBS MAR-4, MCS MAR002, MCS MAR003 and MCS MAR004 help to elucidate the structural complexity of the northern transform margin and the eastern divergent margin of the plateau. These new datasets are highly complementary to the DRADEM dredges results which provide evidences of mid Jurassic volcanic rocks along the plateau and huge vertical displacements along the transform margin. A compilation of magnetic data from the MARGATS and 3 previous cruises shows high amplitude magnetic anomalies along the plateau thereby strengthening the hypothesis of an volcanic origin of at least part of the structure. These results together with the wide-angle and MCS results allow to interpret the plateau as the remains of a amazingly thick Jurassic volcanic divergent margin in the southern part of the Central Atlantic ocean. This margin broke again during the Cretaceous opening of the Equatorial Atlantic ocean as an highly oblique margin to the north and a divergent margin to the east. This meeting will be a great opportunity to reveal the exceptional quality of the seismic data after the initial processing steps and the subsequent results.