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Phanerozoic burial, uplift and denudation of the Equatorial Atlantic margin of South America

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We have initiated a study aimed at understanding the history of burial, uplift and denudation of the South American Equatorial Atlantic Margin (SAEAM Uplift) including the Guiana Shield to provide a framework for investigating the hydrocarbon prospectivity of the offshore region. We report first results including observations from fieldwork at the northern and southern flank of the Guiana Shield. The study combines apatite fission-track analysis (AFTA) and vitrinite reflectance data from samples of outcrops and drillcores, sonic velocity data from drill holes and stratigraphic landscape analysis (mapping of peneplains) – all constrained by geological evidence, following the methods of Green et al. (2013). The study will thus combine the thermal history from AFTA data with the denudation history from stratigraphic landscape analysis to provide magnitudes and timing of vertical movements (Japsen et al. 2012, 2016).

Along the Atlantic margin of Suriname and French Guiana, tilted and truncated Lower Cretaceous strata rest on Precambrian basement (Sapin et al. 2016). Our AFTA data show that the basement underwent Mesozoic exhumation prior to deposition of the Lower Cretaceous cover. Sub-horizontal peneplains define the landscape of the Guiana Shield at elevations up to 500 m a.s.l. As these sub-horizontal peneplains truncate the tilted, sub-Cretaceous surface along the Atlantic margin, these peneplains were therefore formed and uplifted in post-Cretaceous time. This interpretation is in good agreement with our AFTA data that define Paleogene exhumation along the margin and with the results of Theveniaut and Freyssinet (2002) who used palaeomagnetic data to conclude that bauxitic surfaces across basement at up to 400 m a.s.l. on the Guiana Shield formed during the Palaeogene.

Integration of the results from AFTA with stratigraphic landscape analysis (currently in progress) and geological evidence will provide a robust reconstruction of the tectonic development of the onshore margin.

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