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Rifting at the junction of Central and Equatorial Atlantic: impact on the stratigraphic evolution of the passive margins of the Guiana Shield

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We analysed and compared the evolution of the passive margins of the Guiana Shield using subsurface data. These margins are located at the junction of the Central and Equatorial Atlantic rifting and, as a consequence, show very diachronous although dependent east-west evolutions. At the centre of the area, the Demerara plateau separates (i) the Guiana/Suriname basin to the West, resulting from the Central Atlantic rifting and developing upon a late Jurassic oceanic crust, from (ii) to the west the Foz d'Amazonas basin, resulting from the Equatorial Atlantic rifting and developing upon a Late-Early Cretaceous (Late Albian) oceanic crust.
(i) The margins underwent first, at the location of the Demerara plateau, a lithospheric stretching during the Central Atlantic rifting accommodated by east dipping crustal faults. The space available created was filled by thick syn-rift deposits topped by the unconformity corresponding to the Central Atlantic Break Up taking place west of the plateau. (ii) From Late Jurassic to Early Cretaceous, depocenters migrated westward, i.e. toward central Atlantic passive margin segments that were then undergoing post break-up thermal subsidence. (iii) During the Early Cretaceous, the Equatorial Atlantic rift propagated to the east of the Demerara Plateau, separating it from the African lithosphere and initiating the formation of the Foz d'Amazonas basin. Locally, some jurassic faults were reactivated, but the most of the crustal stretching was accommodated by east dipping faults. Major depocenters therefore migrated east of the plateau, in this newly created space available for sedimentation and later, after the Equatorial Break-Up, on the Equatorial Atlantic passive margin segments. (iv) Since Late Cretaceous, major depocenters were located on the passive margin segments on both side of the plateau, these segments being at different stages of thermal evolution. (iv) Finally, during latest Cretaceous and Cenozoic, i.e. after the thermal relaxation of the margin segments, sediment distribution has been mainly controlled by continental drainages with major river systems delivering sediments to the Guiana Shield margins at different times: the Berbice River during Santonien-Maastrichtian and the Orinoco since Late Oligocene-Early Miocene to the Guiana/Suriname basin; the Amazon River since the Late Miocene to the Foz d'Amazonas basin.
In addition to this diachronous and complex three dimensional evolution of the stretching of the lithosphere (rifting and thermal subsidence), margin segments show major differences: the necking zones are generally narrower along the Foz d'Amazonas segments than along Guyana/Suriname segments, the continental and oceanic crust are thinner, as well as the syn-rift wedges, and the continental slopes are steeper. The higher obliquity of the equatorial segments with respect to the rifting direction could explain theses difference.
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