



Sediment routing systems of cratonic domains to their margins from accumulation histories and continental paleogeography at geological time-scales: the Equatorial Atlantic margins of the West African and Guyana Shields.

Artiom Loparev (1), Delphine Rouby (1), Dominique Chardon (1), Jing Ye (1), Flora Bajolet (1), Masimo Dall'Asta (2), Fabien Paquet (3), François Guillocheau (4), Cécile Robin (4), Damien Huyghe (1), Laure Guérit (1), and Sébastien Castelltort (5)

(1) GET (CNRS/IRD/UPS), Observatoire Midi Pyrénées, Toulouse, France (artiom.loparev@get.omp.eu), (2) Total E & P (CSTJF) Pau, France, (3) BRGM (Bureau de Recherche Géologique et Minière), Orléans, France, (4) Géoscience Rennes (CNRS), Université Rennes 1, (5) Department of Earth Sciences, University of Geneva, Switzerland

The objective of this work is to establish the sediment routing systems of the West African and Guyana Shields to the rift and passive margin basins of the Equatorial Atlantic at geological time scales (since 200 Ma). These margins, alternating transform and divergent segments, show a strong structural variability in the margin width, continental geology and relief, drainage networks and subsidence/accumulation patterns. We analyze these systems combining onshore geology and geomorphology as well as offshore sub-surface data. We quantify accumulation histories in the passive margin basins histories taking into account the whole depositional system (from the shoreline to the most distal deposits onto the oceanic crust). We correct these from remaining porosity and in-situ production (mainly carbonates) and compute uncertainties related to depth conversion, absolute age attribution from biostratigraphy as well as porosity and in-situ production corrections. We verify that the observed trends in accumulation rates are robust despite the saddle effect related to the increase in temporal resolution with time. We compare accumulation histories to paleo-geographic maps of sources and sinks established at continent scale. These maps, spanning the continental domain of West African and Guyana Shields and their offshore basins since 200 Ma, give the framework of the evolution of the sediment routing system through time.

Along the African margin, we defined the stratigraphic architectures of the 3 sub-basins (Sierra Leone/Liberia, Ivory Coast, and Ghana/Togo/Benin) to establish their post break-up accumulation (since ca.100 Ma). Accumulation rates are significantly higher during (i) the Cenomanian that may be related to the erosion of Equatorial Atlantic rift-shoulders, (ii) the Maastrichtian that may be related to either the tectonic inversion of western Africa at the time or a change in the erosion capacity in the continental drainage area driven by climate change and (iii) the Oligocene that marks a major drainage reorganization in West Africa following the rise of the Hoggar and a major sea-level fall in Rupelian (ca.30 Ma).

Along the conjugate South American margin, we are currently defining the stratigraphic architectures of 2 sub-basins (Guyana/Suriname to the West and Foz d'Amazonas to the East) that will allow for establishing their accumulation histories. The long term stratigraphic trends of those basins shows : (i) the Central Atlantic rifting in the Guyana/Suriname basin (165 – 156 Ma) and the Equatorial Atlantic rifting ([U+F07E] 100 Ma) in the Foz d'Amazonas basin; (ii) massive syn-rift deposits in the western Guyana/Suriname; (iii) a progressive decrease of the clastic input during most of the Paleogene allowing for carbonate platform deposits followed by (iv) a major clastic accumulation in the Foz d'Amazonas basin since the Upper Miocene resulting from a major drainage reorganization on the Guyana Shield during the Neogene (drainage inversion toward the Atlantic).