Geophysical Research Abstracts
Vol. 20, EGU2018-6397, 2018
EGU General Assembly 2018

Meso-Cenozoic source-to-sink systems in northern South America and its Atlantic margins deciphered from continental-scale paleogeographic maps

Flora Bajolet (1), Dominique Chardon (1), Delphine Rouby (1), Massimo Dall'Asta (2), Artiom Loparev (1), Renaud Couëffé (3), and Jean-Yves Roig (3)

(1) Géosciences Environnement Toulouse (GET), UMR 5563, Observatoire Midi-Pyrénées, Toulouse, France (flora.bajolet@get.omp.eu), (2) Total Exploration-Recherche, Pau, France, (3) BRGM - Georesources Division, Orléans, France

Our work aims at setting the evolving boundary conditions of erosion and sediment transfer, transit, and onshore-offshore accumulations on northern South America and along its Atlantic margins. Since the Early Mesozoic, the source-to-sink system evolved under the interplay of four main processes: (i) volcanism and arc building along the proto-Andes, (ii) long-term dynamics of the Amazon intracratonic basin, (iii) rifting and relaxation of the Atlantic margins, (iv) building of the Andes.

We synthetized available information from geological maps and the literature regarding tectonics, plate kinematics, magmatism, stratigraphy, sedimentology (including paleoenvironments and currents) and thermochronology to produce paleogeographic maps at key periods. These maps illustrates the tectonic and kinematic framework of continental areas under erosion (sources), by-pass and accumulation (sinks) over the Amazonian craton, its adjacent regions and along its Atlantic margins.

At the end of the Permian, topographic remnants of Hercynian orogeny are subjected to erosion producing a widespread cratonic area of continental sedimentation on both the future South America and Northwestern Africa. At ca. 200Ma, the very-long wavelength doming associated with the emplacement of the Central Atlantic Magmatic Province (CAMP) shifts areas of sedimentation outside the CAMP domain, except in the Central Atlantic rift system. Part of the sediments is also routed to back-arc extensional basins of the Andes.

During the earliest Cretaceous and post-rift stage in Central Atlantic, rifting spreads in South Atlantic by opening continental basins in the Borborema province. At that time, northern South America undergoes erosion/by-passing, whereas a large intracratonic continental basin develops in northwestern Africa. This situation changed in the late Lower Cretaceous, during Equatorial Atlantic rifting, while sedimentation resumes over northern South America.

The present day distribution of sources and sinks start to establish during Late Cretaceous and Paleogene, as the early stages of Andean orogeny provide clastic fluxes to foreland basin(s) through a vast northeastward flowing drainage systems. A concurrent westward-flowing drainage also contributed to those basins from cratonic areas that were likely uplifted along an Atlantic marginal upwarp.

From Late Miocene onward, Andean orogeny drove the establishment of the Amazon drainage system connecting the foreland basin to the Atlantic margin across the upwarp. The maps further allow assessing the relative impact of (i) ongoing Pacific subduction, (ii) Atlantic rifting and its aftermath, and (iii) Atlantic slab retreat from under the Caribbean domain on the distribution and activity of onshore/offshore sedimentary basins. We also use stratigraphic and thermochronology data to assess denudation / burial / vertical motions due to sediment transfers and lithosphere-asthenosphere interactions.

Our study ultimately aims at linking the sediment routing system to long-wavelength deformation of northern South America under the influence of mountain building, intracratonic geodynamics, divergent margin systems and mantle dynamics.