Geophysical Research Abstracts
Vol. 18, EGU2016-7226, 2016
EGU General Assembly 2016

Late Cretaceous – Paleogene forearc sedimentation and accretion of oceanic plateaus and seamounts along the Middle American convergent margin (Costa Rica)

Peter O. Baumgartner, Claudia Baumgartner-Mora, and Goran Andjic
Institut des Sciences de la Terre, Unversité de Lausanne, Lausanne, Switzerland (peter.baumgartner@unil.ch)

The Late Cretaceous-Paleogene sedimentation pattern in space and time along the Middle American convergent margin was controlled by the accretion of Pacific plateaus and seamounts. The accretion of more voluminous plateaus must have caused the temporary extinction of the arc and tectonic uplift, resulting in short lived episodes of both pelagic and neritic biogenic sedimentation. By the Late Eocene, shallow carbonate environments became widespread on a supposed mature arc edifice, that is so far only documented in arc-derived sediments.

In northern Costa Rica forearc sedimentation started during the Coniacian-Santonian on the Aptian-Turonian basement of the Manzanillo Terrane. The arrival and collision of the Nicoya Terrane (a CLIP-like, 139-83 Ma Pacific plateau) and the Santa Elena Terrane caused the extinction of the arc during late Campanian- Early Maastrichtian times, indicated by the change to pelagic limestone sedimentation (Piedras Blancas Formation) in deeper areas and shallow-water rudistid - Larger Benthic Foraminfera limestone on tectonically uplifted areas of all terranes. Arc-derived turbidite sedimentation resumed in the Late Maastrichtian and was again interrupted during the Late Paleocene – Early Eocene, perhaps due to the underplating of a yet unknown large seamount. The extinction of the arc resulted in the deposition of the siliceous pelagic Buenavista Formation, as well as the principally Thanetian Barra Honda carbonate platform on a deeply eroded structural high in the Tempisque area.

In southern Costa Rica the basement is thought to be the western edge of the CLIP. It is Santonian-Campanian in age and is only exposed in the southwestern corner of Herradura. Cretaceous arc-forearc sequences are unknown, except for the Maastrichtian-Paleocene Golfito Terrane in southeastern Costa Rica. The distribution and age of shallow/pelagic carbonates vs. arc-derived detrital sediments is controlled by the history of accretion of Galápagos hot spot-derived plateaus and seamounts. Scarce redeposited remnants of Campanian-Maastrichtian and Late Paleocene-Early Eocene shallow water limestones are associated either with shoals on oceanic seamounts such as the Tulín and Quepos Terranes, or on accreted and uplifted plateaus, such as the Inner Osa Igneous Complex. The latter was probably accreted during the Early Paleocene and partly uplifted and maintained in the photic zone during the Late Paleocene – Late Eocene, as indicated by shallow water material both in place (Burica Peninsula, western Panama) and resedimented in deep water hemipelagic series. The Paleocene-Middle Eocene period is punctuated by the accretion of large pieces of plateaus and oceanic islands that may have temporarily extinguished the arc in southern Costa Rica. Only distal (airborne and suspension) volcanic material is known from that time. By Late Eocene, arc-volcanic activity resumed. The accretion of small seamounts and mass wasting of earlier accreted material from the hanging wall created the Osa Mélange. It contains scarce remnants of the insular shallow water carbonates along with a big volume of arc-derived detritals, including upper Eocene shallow water resediments.