



## **Slab roll-back and trench retreat as controlling factor for basin subsidence in southern Central America**

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Slab roll-back and trench retreat are important factors for basin subsidence, magma generation and volcanism in arc-trench systems. Based on the sedimentary and tectonic record of the southern Central American island-arc we conclude that repeated phases of slab roll-back and trench retreats occurred the arc-trench system since the Late Cretaceous. These trench retreats were most probably related to the subduction of oceanic plateaus and seamounts and effected both the fore-arc and back-arc evolution. We used numerical basin modelling techniques to analyse the burial history of fore-arc and back-arc basins in Central America and combined the results with field data of the sedimentological evolution of the basin-fills.

From the basin models, geohistory curves were extracted for the fore-arc and back-arc basins to derive the subsidence evolution. The Sandino Fore-arc Basin is characterized by low subsidence during the first 40 Myr. Since the Late Cretaceous the basin has a linear moderate subsidence with a phase of accelerated subsidence in the Oligocene. In the North and South Limón Back-arc Basin, subsidence started at approximately the same time as in the Sandino Fore-arc Basin. The North and South Limón Basins show a linear subsidence trend in the Paleocene and Eocene.

Evidence for trench retreats is given by pulses of uplift in the outer-arc area, followed by subsidence in both the fore-arc and back-arc basins. The first slab roll-back probably occurred during the Early Paleocene. This is indicated by the collapse of carbonate platforms, and the re-deposition of large carbonate blocks into deep-water turbidites. A new pulse of uplift or decreased subsidence, respectively during the Late Eocene is attributed to subduction of rough crust. A subsequent slab detachment and the establishment of a new subduction zone further westward was described by Walther et al. (2000). Strong uplift affected the entire fore-arc area, which led to the deposition of very coarse-grained deepwater channel-levee complexes in the Sandino Fore-arc Basin. The channel-fills are rich in reworked shallow-water carbonates that points to strong uplift of the inner fore-arc. A subsequent trench retreat is indicated by an increased subsidence during the Early Oligocene in the Sandino Fore-arc Basin and the collapse of the Barra Honda carbonate platform in North Costa Rica. Another trench retreat might have occurred in Miocene times (Cailleau and Oncken, 2008). A phase of higher subsidence from 18 to 13 Ma is documented in the geohistory curve of the North Limon Back-arc Basin. After a short pulse of uplift the subsidence increased to approx. 300 m/myr (Brandes et al., 2008).

### References:

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