Geophysical Research Abstracts
Vol. 14, EGU2012-9928-1, 2012
EGU General Assembly 2012

Tectonic escape of the Caribbean plate since the Paleocene: a consequence of the Chicxulub meteor impact?

C. Rangin (1), J. Martinez-Reyes (2), A. Crespy (1), and T.A.C Zitter (1)

(1) CEREGE, CNRS UMR7330, EGERIE, Europole de l'Arbois, BP80, Aix-en-Provence, cedex 4, France, (2) UNAM, Centro de Geociencias, Blvd Juriquilla, Queretao, 76230, Mexico

The debate for Pacific exotic origin versus in situ inter American plate Atlantic origin of the Caribbean plate is active in the scientific community since decades. Independently of the origin of this plate, its fast motion towards the east at a present rate of 2cm/yr is accepted to have been initiated during the early-most Cenozoic.

The Paleocene is a key period in the global evolution of Central America mainly marked also by the Chicxulub multiring meteor impact in Yucatan. We question here the genetic relationship between this impact event and the incipient tectonic escape of the Caribbean plate.

The mostly recent published models suggest this impact has affected the whole crust down to the Moho, the upper mantle being rapidly and considerably uplifted. The crust was then fragmented 600km at least from the point of impact, and large circular depressions were rapidly filled by clastic sediments from Cantarell to Western Cuba via Chiapas and Belize. North of the impact, the whole Gulf of Mexico was affected by mass gravity sliding, initiated also during the Paleocene in Texas, remaining active in this basin up to present time.

South of the impact, in the Caribbean plate, the Yucatan basin was rapidly opened, indicating a fast escape of the crustal material towards the unique free boundary, the paleo-Antilles subduction zone. Shear waves velocity data below the Caribbean plate suggest this crustal tectonic escape was enhanced by the fast eastward flowing mantle supporting a fragmented and stretched crust.

The proposed model suggests Chicxulub impact (but also the hypothetic Beata impact) have fragmented brittle crust, then easily drifted towards the east. This could explain the Paleogene evolution of the Caribbean plate largely stretched during its early evolution.

Geologically, this evolution could explain the absence of evident Paleogene oblique subduction along the Caribbean plate northern and southern margins, marked only by Mid Cretaceous dragged volcanic complexes, but also the relatively recent motion along the Cayman Fault zone (Miocene instead of Eocene).

These results are part of a cooperative research-industry programm conducted by CEREGE/EGERIE, Aix-en-Provence and GeoAzur, Nice, with Frontier Basin study group, TOTAL S.A., Paris.