Evidence for Chicxulub impact seismicity at Gorgonilla Island K/Pg section, Pacific of Colombia

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The recent discovery of the first locality of the Cretaceous/Paleogene boundary in South America, on Gorgonilla Island, Pacific of Colombia (Bermudez et al., 2016), has allowed the identification of not only an exceptionally well preserved spherule-rich layer linked to the Chicxulub meteoritic impact, but also has revealed a series of fragile and ductile synsedimentary deformation structures, which are associated with the seismic shaking generated by the asteroid collision on the Yucatan Peninsula 66 Ma ago.

New biostratigraphic determinations, based on planktonic foraminifera, and $^{40}Ar/^{39}Ar$ dating from impact glass spherules, confirm that the Gorgonilla spherule layer represents para-autochthonous deposition and allow study of the effects of the Chicxulub event in sections located between 2000-3000 km of the impact epicenter.

Maastrichtian sediments underlying spherule deposit at Gorgonilla were affected by intense soft-sediment deformation and bed disruption and provide evidence for syndepositional microfaulting and faulting, injectites, hydroplastic mixed layers, pillar and flame structures, small-scale slumping, and fault-graded beds. There is no evidence of erosion, large-scale slope failure and platform collapse, or breccia with reworked fossils and lithologies of different ages, as commonly reported from proximal sections in the Gulf of Mexico and Caribbean ("K/T boundary cocktail" of Bralower et al., 1998). The deformation of the Maastrichtian sediments cannot be explained by differences in lithology between the Maastrichtian and Paleogene strata, local tectonism, or the paleogeographic setting, but must result from seismic activity triggered by Chicxulub bolide impact–related seismic shocking.

The presence of in-situ deformed sediments in northern South America strengthens the evidence that seismic shaking generated by the impact, and possible aftershocks, represents a major geological event that affected the uppermost Maastrichtian sediments in a vast region, where the seismic energy released was sufficient to affect localities more than 2000 km from the Chicxulub impact site.