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Evidence for a second impactor at the K-Pg Boundary in Baja California, Mexico

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Controversies remain regarding the trigger, or triggers, of the Cretaceous/Paleogene Mass Extinction. The Chicxulub Impact and the Deccan Volcanism are the main candidates, but discussions about the timing of these events and the magnitude of their effects on the biota are ongoing. Data collected around the globe suggests that profound alterations in the biosphere occurred at this interval, and locations in the Northeastern Atlantic margin and the Gulf of Mexico show evidences of tsunamis and mass waste deposits directly associated with the Chicxulub Impact. Close to El Rosario, Baja California, an enigmatic stratigraphic succession spanning this interval occurs. The succession is distinct from the normal submarine slope deposits in this region and consists of (1) 30 m thick muddy debrites, rich in terrestrial material including fossilized tree trunks up to 2m long and with evidence of exposure to fires, glassy tektites and a horizon rich in gastropods, bivalves, and fragments of corals; (2) an up to 20 m thick coarse grained tuffaceous interval, andesitic in composition, within a channel-like geometry cutting into the debrites, with lapilli (ranging from 1 to 15 cm in size) in discrete sets, fossilized tree trunks close to the base, tektites and shocked quartz; and (3) muddy debrites interbedded with tuffaceous lenses that become less frequent up section. This succession sits between hemipelagic slope deposits, with an abrupt basal contact onto Upper Maastrichtian mudstones and a gradational top, which represents a stabilisation and return to the typical sedimentation environment, with Danian fauna and flora. We believe unit 1 represents material transported onto the slope by the seismic activity caused by the impact of a bolide, which destabilised the coastal region. The tuffaceous channelized unit has been dated (SHRIMP U-Pb in zircons), and its age is indistinguishable from the proposed ages for the K-Pg Boundary. No volcanic activity of this age has been reported in the surrounding areas, either in the Peninsular Ranges or the Sonora Desert, and the presence of shocked quartz and tektites in this unit compels us to believe that its origin is related to ejecta material from an impact. The distance of these thick and coarse grained deposits from the Chicxulub Impact site (c.2000 km) suggests that these deposits are not related to the Chicxulub Impactor, and therefore may have been generated by a different impact of a geologically similar age, but more proximal to this area. The occurrence of multiple impactors is not uncommon, and should be considered a possibility for the K-Pg Boundary.