



RECORD OF EVENTS ASSOCIATED WITH THE CHICXULUB ASTEROID IMPACT IN A DEEP-MARINE TROPICAL SECTION: EVIDENCE FROM GORGONILLA ISLAND, COLOMBIAN PACIFIC

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The Cretaceous-Paleogene (K/Pg; 66 Ma) transition witnessed the extinction of ~75% of species as a result of planetary-scale climatic changes and eventual worldwide ecological collapse. Chicxulub asteroid impact (CAI) is widely considered to be the driver of the K/Pg event with extensive evidence found around the globe, especially in North America and the Caribbean. CAI data from intermediate sections in the tropics, however, are practically non-existent. Here, we report new data from a 2 cm normally-graded spherule-rich layer (SRL) composed of extraordinarily well-preserved glassy microtektites and microkrystites that represent the most pristine CAI ejecta deposits known to date. The detailed sedimentological analysis allows the reconstruction of the timing and the sequence of events triggered by the CAI during the first hours of the Paleogene in the Tropical Pacific. Considering the paleo-distance from Gorgonilla Island to the Yucatan crater (~3000 km), we have established the arrival time of the seismic waves derived from the mega-earthquakes produced by the impact: P waves arrived ~6-10 min after the CAI, while the S and Rayleigh waves reached Gorgonilla ~12 to 15 min after the collision. Calculating the travel time through the atmosphere, the size of the spherules, and the settling time through the water column (~2 km deep), we estimate that it took ~15 min for the spherules to reach the Pacific Ocean surface, ~ 5 to 6 hours for the coarser fraction to arrive at the seafloor, and ~ 8 to 48 hours for the finest fractions to settle after the impact. These calculations imply that the spherules were deposited after the arrival of the seismic waves and explain the gradation of the SRL. Our analyses suggest that SRL is a dual-layer that represents ~36,000 tons of spherules per km² as a consequence of the impact. The study of these pristine deposits holds key information to better understand the effects and processes from the CAI in the tropics.



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