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Chapter 1

The Cretaceous/Paleogene boundary deposits on Gorgonilla Island

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Abstract

A ~20 mm thick spherule bed representing Chicxulub impact ejecta deposits and marking the Cretaceous/Paleogene (K/Pg) boundary was recently discovered on Gorgonilla Island (Gorgona National Natural Park, Pacific of Colombia). This discovery represents the first confirmed record of the K/Pg event in Colombia, South America and the eastern Pacific Ocean. The deposit consists of extraordinarily well-preserved glass spherules (microtektites and microkrystites) reaching 1.1 mm in diameter. Importantly, the Gorgonilla spherule bed is unique relative to other K/Pg boundary sites in that up to 90% of the spherules are intact and not devitrified, and

the bed is virtually devoid of lithic fragments and microfossils. The spherules were deposited in a deep marine environment, possibly below the calcite compensation depth. The preservation, normal size–gradation, presence of fine textures within the spherules, and absence of bioturbation or traction transport indicate that the Gorgonilla spherules settled within a water column with minimal disturbance. Thus, the spherule bed may represent one of the first parautochthonous primary deposits of the Chicxulub impact known to date. $^{40}\text{Ar}/^{39}\text{Ar}$ dating and micropaleontological analysis reveal that the Gorgonilla spherule bed resulted from the Chicxulub impact. Intense soft–sediment deformation and bed disruption in Maastrichtian sediments of the Gorgonilla Island K/Pg section provide evidence for seismic activity triggered by the Chicxulub bolide impact, 66 million years ago. It is also notable that the basal deposits of the Danian in the Colombian locality present the first evidence of a recovery vegetation, characterized by ferns from a tropical habitat, shortly following the end–Cretaceous event.