



Palynology across the pristine spherule layer marking the Cretaceous-Paleogene boundary at Gorgonilla Island, Colombia

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A few cm thick spherule bed representing Chicxulub impact ejecta deposits and marking the Cretaceous-Paleogene (K-Pg) boundary was recently discovered on the Gorgonilla Island, Colombia. The deposit consists of extraordinarily well preserved glass spherules reaching 1-3 mm in diameter. Importantly, the Gorgonilla spherule bed is unique with respect 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. $^{40}\text{Ar}/^{39}\text{Ar}$ dating and micropaleontological analysis reveal that the Gorgonilla spherule bed was a result of the Chicxulub impact (the weighted mean of all plateau ages is $66.051 \pm 0.031/0.054$ Ma).

The vegetation recovery is represented by fern spores, more specifically by ground fern taxa such as Gleicheniaceae and Dictyophyllum, together with abundant occurrence of the aquatic fern Azolla. These interestingly co-occur with fungal spores and hyphae. A so-called fern-spike has previously been described from New Zealand K/Pg boundary clay coincident with the iridium-enriched layer and interpreted as a response to short term darkness. The genus Azolla consistently characterizes warm-climate lacustrine environments and ranges of many Azolla species span the K/Pg boundary at other sites. The identification in Colombia of Azolla microspores and massulae directly above the K/Pg boundary at the Gorgonilla locality shows their potential to endure altered environmental conditions.