

Timing of the Great Ordovician Biodiversification Event – new zircon U-Pb ID-TIMS dates (Precordillera, Argentina)

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The Great Ordovician Biodiversification Event (GOBE) was fundamental for present-day biodiversity¹. This phenomenon has commonly been treated as a single, protracted global radiation event, spanning ~40 Ma, during which marine diversity tripled². However, the collective evidence suggests that biodiversification may more likely be related to local–regional “hotspot activity”, giving rise to diversity bursts that are disparate in space and time³. The ability to differentiate between local or global, fast or slow radiation critically relies on a precise temporal framework and an extensive paleontological database. Here we provide high precision Chemical Abrasion – Thermal Ionisation Mass Spectrometry U-Pb zircon dates from biostratigraphically well constrained bentonites in the Precordillera of Argentina. Northwest Argentina preserves ample evidence for extensive intrusive and extrusive igneous activity of the Famatina Arc at around 470 Ma⁴, which provided the volcanic ashes dispersed in the coeval carbonate Ordovician sediments from the Precordillera. Our study focuses on strata deposited during the Floian–Darrwilian interval. Zircon grains extracted from those arc-related bentonites are deemed the best candidates to create a precise timeline for the latest Early through Middle Ordovician, thus providing temporal constraints on a critical phase of the GOBE. Evaluating if a single long, or multiple short radiation event(s) took place may only become apparent once a sufficiently high precision geochronological framework is established.

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