



Was a global Carnian Pluvial Event responsible for the origin of the dinosaurs?

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The Late Triassic Period was a pivotal time in Earth history during a hothouse world with high atmospheric CO₂, and included the origin of many animal groups that dominated ecosystems for the rest of the Mesozoic. One sudden climate event during this time that has received renewed attention is the Carnian Pluvial Event (CPE) (or Humid Phase/Wet Intermezzo), which some recent authors suggest was responsible for the origin and early diversification of dinosaurs. The CPE began during the middle Julian (>231 Ma), and is associated with warming, increased precipitation, perturbation of the carbon cycle, enhanced weathering, and disruption of the carbonate factory. Most of this evidence comes from marine sections in the Tethys region, so the global extent of the CPE is poorly supported. Furthermore, precise and accurate absolute age constraints for key CPE sections are lacking. To help rectify this situation, we present new multiproxy paleoenvironmental evidence from Carnian lacustrine strata in Argentina (~45°S paleolatitude) calibrated by a new high-precision U-Pb CA-TIMS zircon age from an interbedded tuff. These data (sedimentology, clay mineralogy, carbon and oxygen stable isotopes from carbonates and organic matter, and fossils) indicate that the middle Carnian portion of the section possessed particularly warm and wet conditions associated with a dynamic carbon cycle, consistent with the effects and timing of the CPE. Furthermore, these strata also contain fossil evidence for the presence of early dinosaurs or their closest relatives. Nonetheless, the global evidence for dinosaur origins at the CPE remains weak given that all unambiguous dinosaur fossils either post-date the event or are poorly dated. Resolving these issues will require more detailed paleoenvironmental proxy data from many sequences outside of the Tethys, and more precise geochronology for both Tethyan marine successions and dinosaur-bearing strata worldwide.