
A Southern Hemisphere Chronostratigraphic Framework for the Pliensbachian–Toarcian

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Abstract

Lower Jurassic sedimentary successions from the Neuquén Basin, Argentina are unique in the abundance of radiometrically datable material (ash-beds) present, which can be tied to bio- and chemostratigraphic (carbon-isotope) zonations. Here, we present newly integrated carbon-isotope and Hg/TOC data from three localities in Argentina (Arroyo Lapa, Arroyo Serrucho/Las Overas and Chacay Melehue) to generate a biostratigraphically calibrated composite carbon-isotope curve and geochronological framework for the Pliensbachian–Toarcian transition in South America. Using a Bayesian framework we present an age-depth model for this composite record and estimate the age and duration of key intervals extending from the Latest Pliensbachian carbon-isotope excursion (CIE) through the Early Toarcian negative CIE associated with the Toarcian Oceanic Anoxic Event (T-OAE). This geochronological framework is subsequently combined with a statistical analysis of all available Karoo and Ferrar Large Igneous Province (LIP) radioisotopic ages to create a timeline of the key events in the Pliensbachian–Toarcian and their association with emplacement of intrusive and extrusive igneous rocks of the Karoo and Ferrar LIPs.

Keywords: Pliensbachian–Toarcian, Carbon Isotope Excursions, Early Jurassic, Large Igneous Province, Geochronology

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