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Integrated bio- and carbon-isotope stratigraphy as a tool to unravel the timing and causes of the end-Triassic extinction in Tethyan carbonate platforms

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We present a detailed bio- and carbon-isotope stratigraphy of three southern Tethyan carbonate platform sections, Mt. Messapion (Greece), Valle Agricola and Mt. Sparagio (southern Italy) across the Triassic/Jurassic boundary (TJB). In these sections, carbonate platform sedimentation persists across the TJB with no compelling evidence of a significant hiatus, thus potentially preserving the most detailed record of the end-Triassic extinction (ETE) in shallow tropical ecosystems. As such, these records differ from the classical sections of the northern Tethyan Realm (i.e., Northern Calcareous Alps, NCA, Austria and Lombardy Basin, northern Italy), where the extinction of carbonate platform assemblages coincides with a facies change and to the demise of the carbonate platform.

In the studied sections, the ETE is documented by the disappearance of megalodontid bivalves and involutinid benthic foraminifera, i.e. the typical aragonitic Dachstein-type biota, within a positive $\delta^{13}C_{carb}$ excursion, and few meters below a positive peak that, according to our study, correlates with the P1 peak documented in the Malanotte Fm of the Lombardy Basin. By contrast, the extinction of the Dachstein-type biota in the NCA and Lombardy Basin coincides with a negative carbon-isotope excursion (CIE) that is generally correlated to the initial CIE of the reference sections.

The bio- and carbon-isotope correlation performed in this study implies that extinctions in southern Tethys postdated the initial CIE, and thus are delayed compared to the NCA and Lombardy Basin. We contend that this level represents the true extinction of the Dachstein-type biota, while the disappearance in sections at the northern Tethyan margin represents a pseudoextinction coinciding with the demise of the carbonate platform. As a consequence, sea-level changes and the perturbation of the carbon cycle recorded by the Initial CIE are excluded as possible killing mechanisms of the Dachstein-type biota at a global scale.