

Sr isotope variations in the Upper Triassic succession at Pizzo Mondello, western Sicily, Italy

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The Norian stage in the Late Triassic is exceptionally long (23 Myr) and was subdivided into three substages: the Lacinian, Alaiunian, and Sevatian. In order to infer the Norian environmental changes in the western Tethys Ocean, the stratigraphic variations of $^{87}\text{Sr}/^{86}\text{Sr}$ in the Upper Triassic limestone succession in Sicily were examined. The Pizzo Mondello section studied here mainly consists of a pelagic carbonate sequence of the Scillato Formation, and ranges in age from Tuvallian (late Carnian) to Rhaetian. The Scillato Formation represents a deep-water pelagic facies deposited along the Sicilian Basin in the western Tethys Ocean.

We selected fine-grained limestone samples from both the microfacies of lime-mudstone and wackestone to approximate the primary $^{87}\text{Sr}/^{86}\text{Sr}$ signature of the limestone beds. The $^{87}\text{Sr}/^{86}\text{Sr}$ values are relatively constant in the Tuvallian and Lacinian (early Norian). However, the remarkable rise in $^{87}\text{Sr}/^{86}\text{Sr}$ occurred across the Lacinian–Alaiunian (early–middle Norian) transition. Variations in $^{87}\text{Sr}/^{86}\text{Sr}$ values show an increasing trend in $^{87}\text{Sr}/^{86}\text{Sr}$ from 0.7077 at the base of Lacinian to 0.7080 in the Sevatian (late Norian). In the Sevatian, the $^{87}\text{Sr}/^{86}\text{Sr}$ ratios display a sudden negative excursion toward lower values and show a relatively quick recovery to pre-excursion $^{87}\text{Sr}/^{86}\text{Sr}$ ratios.

Korte et al. (2003) suggested that the rise in the $^{87}\text{Sr}/^{86}\text{Sr}$ values from the middle Carnian to the late Norian coincide with the Cimmerian orogeny. Our new $^{87}\text{Sr}/^{86}\text{Sr}$ data from the Pizzo Mondello section reveal a comparable trend, with a sharp increase in $^{87}\text{Sr}/^{86}\text{Sr}$ within the Alaiunian, suggesting the rapid uplift and erosion in the Cimmerian Mountains at this time. The cause of the $^{87}\text{Sr}/^{86}\text{Sr}$ excursion in the Sevatian remains uncertain. However, the biostratigraphic record of conodonts suggests that a morphological evolution towards platform-less elements occurred with the beginning of the Sr-isotope excursion.

Keywords: Norman, Tethys, Cimmerian Mountains