Strontium and oxygen isotopic evidence for global cooling during the final assembly of the supercontinent Pangea

Yan Chen*[1], Weiping Zeng[1,2], Michael Joachimski[3], Paul Wignall[4], James Ogg[1,5,6], Haishui Jiang†[1], Muhui Zhang[1], and Xulong Lai[1]

[1]China University of Geosciences [Wuhan] – China
[2]Huanggang Normal University – China
[3]Friedrich-Alexander Universität Erlangen-Nürnberg – Germany
[4]University of Leeds – United Kingdom
[5]Purdue University [West Lafayette] – United States
[6]Chengdu University of Technology – China

Abstract

The Norian stage (Late Triassic) has long been regarded as an interval of stable climates, but this substantial period (> 20 Myr) has received little study. Here oxygen and strontium isotopes have been measured on conodont apatite from the open-marine shelf succession at the Xiquelin Section (Baoshan terrane, Yunnan Province, China). The δ18Oapatite values translate into low to middle latitude sea surface temperature of 22 to 35∘C and indicate cooling from the *Mockina bidentata* to *Parvigondolella andrusovi* conodont Zone during the Sevatian Substage. This temperature change in the eastern Tethys is also seen in the western Tethys, and the west Pangean margin, suggesting that the W3 warming (from Trotter et al. 2015) and post-W3 cooling during the middle-late Norian was a global event. Estimated sea surface temperature (SST) peak at 35∘C at the base of the *M. bidentata* Zone and show a rapid _˜12∘C cooling to 22∘C during the *M. bidentata* Zone, associated with a decrease in 87Sr/86Sr. This is followed by a brief temperature and 87Sr/86Sr rebound, and then a second pulse of gradual cooling from 29∘C to _˜25∘C, associated with another decrease of 87Sr/86Sr values from the uppermost *M. bidentata* to the *P. andrusovi* Zone. The SST and 87Sr/86Sr records we present here indicate that post-W3 cooling coincided with an enhanced non-radiogenic strontium input that may have resulted from weathering of mafic and ultramafic rocks obducted during the closure of the Paleo-Tethys Ocean.

Keywords: Norian, Oxygen isotopes, Strontium isotopes, Conodont, Climate cooling, Paleo, Tethys

*Speaker
†Corresponding author: jiangliuis@163.com