

# **Weathering of equatorial juvenile arcs during Pangea reorganization - a significant contributor to the Sr isotope evolution of seawater**

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Global seawater Sr isotopes are impacted by silicate weathering. However, the questions regarding the juvenile Sr input remain unclear. During the Triassic Pangea reorganization, active arcs are mainly concentrated in three geographical regions (i.e., Paleo-Asian, Tethyan and Circum-Pacific). Despite this, the greatest impact will be felt primarily in regions near the tropics (i.e., Tethyan arcs). Here we investigate whether rapidly weathering and isotopically juvenile, tropical arcs like our main study region in Borneo-Sumatra, with a substantial volume of Pangean juvenile terranes could exert significant control over the Triassic seawater  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio.

This study provides the first precise understanding — including timing, location, and function — of how seawater Sr isotopes coupled with magmatism in the circum-ancient Tethys Ocean as Pangea reorganized during the Triassic. This study finds that the global decline in the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio of seawater until a minimum at ~225 Ma aligns with juvenile magmatic additions ( $225 \pm 15$  Ma) in the external portions (Borneo and Sumatra) of the southeast Tethysides. Whole-rock  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios, determined from zircon  $\epsilon_{\text{Hf}}(t)$  values from Triassic granitoids, show that the interior (Peninsular Malaysia) is substantially more radiogenic (~0.7091-0.7114; mid-50%) than the exterior (~0.7057-0.7089; mid-50%). Prolonged juvenile magmatic flare-up along the Tethyside exterior, coupled with the influence of an equatorial climate, indicates that it was a significant contributor to isotopically juvenile seawater Sr flux along the equatorial margins of Pangea. Our suggested model provides a simple basis for unraveling the enigma of the magmatic coupling effect on ancient marine Sr isotopes.