



Permian–Triassic thermal anomaly of the active margin of South America as a result of plate kinematics reorganization

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From Permian to Triassic times, tectonic plate reorganization provoked Pangaea breakup, counterclockwise rotation of Gondwana, closing of the Paleo–Tethys Ocean and opening of the Neo–Tethys oceanic realm. Meanwhile, the switch from arc volcanism to widespread S–type magmatism along the western South American active margin around 275–265 Ma is symptomatic of the onset of a large–scale Permian–Triassic thermal anomaly (PTTA) affecting the whole margin. Here we report metamorphic and U–Pb geochronological results from the El Oro metamorphic complex in the forearc zone of southwestern Ecuador, which recorded the last step, at 230–225 Ma, of the PTTA. The change in the drift direction of Gondwana from north to east at ca. 270 Ma was related to plate reorganization and provoked the verticalization of the subducted Panthalassa slab. As the slab verticalized, strong heat advection produced a high heat flow beneath the active margin inducing the development of a huge thermal anomaly responsible for the PTTA, which lasted 30 Ma. This voluminous magmatic activity culminated at the Permian–Triassic boundary, and may have contributed to the degradation of life conditions on the Earth surface.