

ENVIRONMENTS AND TIMING OF DOLOMITIZATION AND CARBONATE DIAGENESIS IN THE TRIASSIC YANGTZE PLATFORM IN THE NANPANJIANG BASIN, SOUTH CHINA

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The Yangtze Platform contains a dolomitized interior, undolomitized margin, and partially dolomitized slope. Dolomite replaces micrite, grains, and early cement. Vugs and fractures are filled with saddle dolomite. Later fractures are filled with calcite.

Dolomite stable isotope values comprise $\delta^{18}\text{O}$ -7.7 to 0.8‰ (VPDB) and $\delta^{13}\text{C}$ 0.77 to 4.0‰ (VPDB). Vein calcite shows $\delta^{18}\text{O}$ -18.4 to -5.2‰ and $\delta^{13}\text{C}$ -6.1 to 3.4‰. $^{87}\text{Sr}/^{86}\text{Sr}$ from fourteen dolomite samples ranges from 0.707677 to 0.708601, consistent with Triassic seawater values, with the exception of elevated $^{87}\text{Sr}/^{86}\text{Sr}$ in 3 samples.

Elemental and isotope data was gathered using LA-ICPMS. The data was processed as 2D maps in Lolite4 according to the procedures of Drost et al., 2018.

Replacement dolomite has average values of Fe 2092 ppm, Mn 384 ppm, Sr 336 ppm, U 4.5 ppm, and Th 1.3 ppm. A sample from slope facies with elevated U and low Th produced a $\text{U}^{238}/^{206}\text{Pb}$ date of 139.28 ± 4.21 Ma. The REE signature is similar to seawater with a negative Ce anomaly, suggesting dolomitization occurred in a rock-dominated system. Another replacement dolomite sample with Th 1.1 ppm and a REE plot with a flat “clay” signature yielded a less well constrained age of 208.7 ± 22.6 Ma. We speculate that fluid influx from basin siliciclastic sediments altered the geochemistry in this sample.

Saddle dolomite has average values of Fe 980 ppm, Mn 170 ppm, Sr 458 ppm, U 0.84 ppm, and Th 0.05 ppm. The REE plot also demonstrates a relatively flat “clay” signature as well as negative Tb and Tm anomalies. Due to the extremely low U content of the sample, saddle dolomite did not yield well constrained $\text{U}^{238}/^{206}\text{Pb}$ dates.

Calcite fracture fills have average values of Fe 246 ppm, Mn 143 ppm, Sr 452 ppm, U 0.51 ppm, and Th 0.07 ppm. REE plots appears to show a signature similar to a seawater signature or a relatively flat “clay” signature with negative Tb and Tm anomalies. One sample with relatively high U (1.03 ppm) and low Th (0.13 ppm) yielded a relatively well constrained $^{238}\text{U}/^{206}\text{Pb}$ date of 25.81 ± 13.58 Ma.

Age dates indicate replacement dolomitization during Late Triassic to Cretaceous burial, and are consistent with fluid inclusion and clumped isotope geothermometry indicating elevated temperature on burial (90-185 °C). Age dates of calcite are consistent with Neogene uplift and the lower temperature geothermometry in calcite phases.