

MECHANISMS FOR DOLOMITIZATION OF THE TRIASSIC YANGTZE PLATFORM IN THE NANPANJIANG BASIN, SOUTH CHINA

LEDBETTER FERRILL, Nathaniel¹, TESAURO, Josephine¹, HILBERT, Arianna², SAXBY, Justice², LI, Xiaowei³, WOOTON, Kathleen⁴, RASBURY, E. Troy⁴, HENKES, Gregory⁴, LUCZAJ, John² and LEHRMANN, Daniel¹, (1)Geosciences Department, Trinity University, San Antonio, TX 78212, (2)Department of Natural & Applied Sciences, University of Wisconsin - Green Bay, Green Bay, WI 54311, (3)Geological Sciences, Stanford University, 450 Serra Mall, Stanford, CA 94305, (4)Department of Geosciences, Stony Brook University, Stony Brook, NY 11794

Triassic strata of the Yangtze Platform contain a dolomitized interior, undolomitized margin, and partially dolomitized slope. Anhydrous dolomite replaces micrite, grains, and sparry calcite. Euhedral dolomite cement lines depositional cavities. Vugs and fractures contain saddle dolomite, while later fractures are filled with calcite. Stylolites crosscut fractures and dolomite phases.

Stable isotopes in dolomite show $\delta^{18}\text{O}$ values ranging from -7.7‰ to 0.8‰ (VPDB) and $\delta^{13}\text{C}$ values ranging from 0.77‰ to 4.0‰ (VPDB). Vein calcite values range from $\delta^{18}\text{O}$ -18.4‰ to -5.2‰ and $\delta^{13}\text{C}$ -6.1 to 3.4‰. $^{87}\text{Sr}/^{86}\text{Sr}$ values from 14 dolomite samples range from 0.707677 to 0.708601 with the exception of elevated $^{87}\text{Sr}/^{86}\text{Sr}$ in 3 samples.

Burial history predicts a maximum temperature of 180°C at 5 km depth at the base of the platform and a maximum temperature of 96°C at 2.2 km at the top of the platform using regional stratal thickness and a thermal gradient of 30°C/km.

Average homogenization temperatures (T_h) and freezing point depressions ($T_{m,ice}$) from 10 primary fluid inclusion assemblages from dolomite crystals in the platform interior, slope, and basin indicate entrapment of saline brines (9.5 to 15 wt. % NaCl) over temperatures of 113-150°C. Carbonate clumped isotope (Δ_{47}) measurements on 3 dolomite samples yielded temperatures from 93-185°C, whereas 2 measurements of later calcite veins yielded temperatures of 94-98°C.

$^{87}\text{Sr}/^{86}\text{Sr}$ ratios of dolomite are consistent with modified seawater including radiogenic contribution of hydrothermal fluids. The range in $\delta^{18}\text{O}$ within dolomite is consistent with enrichment by evaporative concentration of seawater, but also includes values consistent with high temperature fluids.

The spatial distribution of dolomite indicates marine cementation of the margin prevented permeation of dolomitizing fluids. Hypersaline reflux dolomitization remains a possibility for platform interior, but the partial dolomitization of the slope and basin carbonates and geothermometry are more consistent with late hydrothermal dolomitization. The late diagenetic stage, presence of saddle dolomite, and geothermometry from over 90 to 185°C point to burial dolomitization. The great spatial variability of dolomite temperatures indicates localized invasion of hydrothermal fluids along faults and fractures.