MECHANISMS OF DOLOMITIZATION OF THE LOWER TRIASSIC ANSHUN FORMATION OF THE YANGTZE PLATFORM: A CASE FOR REGIONAL HIGH TEMPERATURE DOLOMITIZATION IN THE NANPANJIANG BASIN, SOUTH CHINA

HILBERT, Arianna[1], SAXBY, Justice[1], TESAURO, Josephine[2], LEDBETTER FERRILL, Nathaniel[2], LI, Xiaowei[3], RASBURY, E. Troy[4], HENKES, Gregory[4], WOOTON, Kathleen[4], LEHRMANN, Daniel[2] and LUCZAJ, John[1], (1)Department of Natural & Applied Sciences, University of Wisconsin - Green Bay, Green Bay, WI 54311, (2)Geosciences Department, Trinity University, San Antonio, TX 78212, (3)Geological Sciences, Stanford University, 450 Serra Mall, Stanford, CA 94305, (4)Department of Geosciences, Stony Brook University, Stony Brook, NY 11794

The Lower Triassic Anshun Fm. (Olenekian Stage) is a widespread, several hundred-meter thick peritidal dolostone that includes oolitic, peloidal, and carbonate mudstone facies with abundant fenestral pores, and desiccation cracks. The Anshun Fm. is the most widely dolomitized unit on the Yangtze Platform. Methods included petrographic analysis to construct a paragenetic sequence, fluid-inclusion microthermometry on dolomite crystals, clumped isotopes, C and O stable isotopes, $^{87}Sr/^{86}Sr$, and LA-ICP-MS U-Pb geochronology and REE mapping.

Dolomite crystal sizes range from ~10 µm to mm-scale, with variable preservation of depositional fabrics. Saddle dolomite fills some pores and surrounds breccia clasts. Late calcite fills pores and fractures. Fluid-inclusion homogenization temperatures suggest dolomitization occurred mainly between 100°C to 155°C, with values up to 180°C. Salinities range from 12 to 16 wt. % (NaCl), which is significantly higher than average seawater.

Replacive dolomite $\delta^{18}O$ values range from -7.36‰ to -0.75‰ $_{(VPDB)}$, and $\delta^{13}C$ values range from 0.75‰ to 4.00‰ $_{(VPDB)}$. Vein calcite $\delta^{18}O$ values range from -18.44‰ to -11.65‰ $_{(VPDB)}$ and $\delta^{13}C$ values range from -6.05‰ to +3.44‰ $_{(VPDB)}$. Estimates for initial $\delta^{18}O$ values of diagenetic fluids were made using temperatures from fluid inclusions, and carbonate clumped isotope (Δ_{47}) measurements. For dolomite, calculated initial $\delta^{18}O_{(SMOW)}$ compositions for H_2O yielded values of +5.2 to +13.2‰, indicating an evaporated fluid source. $^{87}Sr/^{86}Sr$ values range between 0.707836 to 0.708464, values consistent with Early to Middle Triassic seawater.

LA-ICP-MS mapping and selection of pixels based on criteria (Drost et al., 2018) in Iolite4 yield variable results for U-Pb ages and REE patterns in different mineral phases. Some replacive dolomite showed a negative Ce anomaly consistent with a seawater source, whereas others showed a flat “shale-type” signal. Replacive dolomite U-Pb age dates range from Jurassic to Late Cretaceous, followed by mid to late Cenozoic calcite veins. Dolomitization likely began during the Triassic, possibly from reflux dolomitization. Additional dolomite replacement and cementation continued with burial at higher temperatures into the Late Cretaceous, followed by fracturing, calcite precipitation, and stylolitization.