Heterogeneous dolomite recrystallization in the Marion Plateau: a multi-scale approach using red algae and matrix dolomite.

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Much debate exists concerning the extent to which early dolomite recrystallize and preserve the signature of their original environment (Land, 1992; Machel et al., 1993). Recent studies have showed the potential of clumped isotopes thermometry to evidence recrystallization (Winkelstern and Lohmann, 2016; Bergmann et al., 2018; Veillard et al., 2019). These studies show that dolomite recrystallization has the potential to change T(Δ_{47}), δ^{18}O, and δ^{13}C. Yet, early dolomites often are heterogeneous and little attention has been put on how these heterogeneities affect dolomite recrystallization. For example, early dolomites often contain fabric selective fossils in a fabric destructive matrix. These two components have different petrophysical characteristics such as crystal size, surface area and porosity. Here, we investigate the impact of heterogeneities on recrystallization with dolomite samples from the Marion Plateau (NE Australia). We systematically sampled well preserved dolomitized red algae and fabric destructive euhedral crystals in 15 dolomites. Results show that the red algae have higher T(Δ_{47}) and δ^{13}C values than the euhedral crystals of the matrix. There is no systematic change in δ^{18}O and all the dolomites are very Ca-rich. We interpret these results as the evidence that red algae are preferential spots for recrystallization via dissolution/re-precipitation due to their high surface area.