

## **In-situ U-TH-Pb Microprobe Dating of Authigenic Monazite and Xenotime in the Potsdam Sandstone, Eastern New York: A New Approach to Dating Hydrothermal Fluid Flow and Dolomitization**

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Upper Cambrian – middle Ordovician Beekmantown Group carbonates of eastern New York are extensively dolomitized. Fluid inclusion and stable isotope data from exposures near Ticonderoga, New York indicate dolomitization occurred at temperatures locally exceeding 200°C and involved high-salinity fluids typical of those implicated in the development of HTD carbonate reservoirs and MVT mineralization. This carbonate sequence is underlain by quartz sandstone and arkose of the Potsdam Sandstone, which non-conformably overlies Proterozoic basement. The arkoses of the Potsdam have undergone diagenetic alteration that includes dissolution of labile minerals (e.g. ilmenite, plagioclase, garnet, hornblende and biotite are nearly completely dissolved) and precipitation of Fe-chlorite, quartz, K-feldspar and anatase cements. Bulk chemical analyses suggest that the diagenetic alteration resulted in export of Mg<sup>2+</sup> from the sandstones. High initial permeability in the sandstones, and availability of fault conduits allowed the Mg<sup>2+</sup>-rich fluids exported from the basal sandstones to dolomitize the overlying carbonate sequence. Authigenic monazite overgrowths on detrital monazite grains, and authigenic xenotime overgrowths on zircon are abundant and well developed in the arkosic facies of the basal Potsdam Sandstone in the Ticonderoga area. Petrographic study demonstrates that monazite and xenotime overgrowths formed contemporaneously with other diagenetic phases during burial alteration and export of magnesium. Preliminary electron microprobe U-Pb-Th chemical dating of monazite overgrowths constrains authigenic monazite growth to the early Paleozoic, possibly pre-dating the medial-late Ordovician Taconic Orogeny. Additional data will document the timing of monazite and xenotime growth, and provide insights into the timing of hydrothermal dolomitization in eastern New York State.