

## **In-situ dating of metamorphism in Adirondack anorthosite**

**WILLIAM H. PECK<sup>1,\*†</sup>, BRUCE W. SELLECK<sup>1</sup>, SEAN P. REGAN<sup>2</sup>, GRACEANN E. HOWARD<sup>1</sup>,  
AND OLEG O. KOZEL<sup>1</sup>**

<sup>1</sup>Department of Geology, Colgate University, Hamilton, New York 13346, U.S.A.

<sup>2</sup>Eastern Geology and Paleoclimate Center, U.S. Geological Survey, P.O. Box 628, Montpelier, Vermont 05602, U.S.A.

### **ABSTRACT**

The 3000 km<sup>2</sup> Marcy anorthosite massif dominates the Adirondack Highlands (Grenville Province, New York). The Marcy massif was metamorphosed to granulite facies conditions, in places preserving igneous textures with metamorphic coronas and is most deformed near its margins. Historically, the relationship between anorthosite emplacement and metamorphism has been controversial, and many workers have argued that anorthosite emplacement coincided with metamorphism. Valley and O’Neil (1982) proposed that high-pressure metamorphic mineral assemblages in the anorthosite could not reflect the same event that formed wollastonite skarns adjacent to anorthosite, which have low  $\delta^{18}\text{O}$  and formed in the presence of meteoric water during shallow emplacement. This study presents new in-situ geochronology that constrains the timing of metamorphic mineral growth in Adirondack anorthosite to 1050–1035 Ma. The Zr source for metamorphic zircon growth was the breakdown of hemoilmenite and is texturally linked to high-pressure mineral assemblages. These data are consistent with previously determined ca. 1155 Ma magmatic ages and later granulite facies metamorphism during the 1090–1020 Ma Ottawan phase of the Grenvillian orogeny.

**Keywords:** Adirondack Mountains, granulite facies, zircon, corona, Grenville province, anorthosite; Isotopes, Minerals, and Petrology: Honoring John Valley