

## INTRODUCTION

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Geological study of the Adirondacks began in the 1830s with the forays of Ebenezer Emmons, under the aegis of the New York State Geological Survey. Scientific research has continued unabated, and in recent years, great strides have been made in unraveling the complexities of the plate tectonic history, bedrock geology, glacial processes, and soil/water systems. Much of this research has been spurred by economic and environmental concerns, but in the main, the Adirondacks are studied because they are fundamentally interesting, as a geological terrain set in a landscape of preserved, 'forever wild' ecosystems.

This issue of the *Adirondack Journal of Environmental Studies* gathers our current knowledge of the geology of the Adirondacks with the goal of informing a broader public audience. The papers summarize historical and current work, calling upon the accumulated studies of many excellent geoscientists who have worked in the Adirondacks for nearly two centuries. The first article in this issue, authored by James McLelland, places the Adirondacks in a regional context and reviews the plate tectonic history of the Grenville Province, that vast sweep of North American continental crust of which the Adirondacks are but a small fragment. The paper by Chiarenzelli and Selleck explores the bedrock geology of the region, which is dominated by igneous and metamorphic rocks 1.4 to 1.0 billion years of age. Also described in that article are the younger (but still quite ancient) Paleozoic rocks found in and around the Adirondack region.

William Peck provides a review of the history of geological studies of the Adirondacks. Peck describes how the study of our local rocks has always been framed within the broader scientific community and how new technologies provide opportunities to answer old questions. Robert Darling and William Peck then describe how we have come to know the temperatures and pressures experienced by the metamorphic rocks of the region; fundamental knowledge that guides meaningful reconstruction of the

plate tectonic setting of the region during the plate collision events that built the ancient mountain belt known as the Grenville Orogen.

Although mining activity is currently very limited in the region, the Adirondacks were a major source of iron ore until the 1970s. Papers by Marian Lupulescu (with co-authors Chiarenzelli and Jared Singer) and William Kelly explore, respectively, the origin of rare earth element and garnet deposits in the Adirondacks. The utilization of both natural materials is increasing in today's technological-based economy and the discovery of new and old resources of paramount importance.

David Valentino, with co-authors Joshua Valentino and Jeffrey Chiarenzelli, reviews the complex array of fracture and fault systems within the Adirondacks and how those systems help to shape the rugged landscapes of our mountains. The importance of the Pleistocene glaciers and the immediate post-glacial history of the region are developed by David Franzi and co-authors (Ridge, Pair, DeSimone, Rayburn, and Barclay). Glacial erosion helped to shape the bedrock 'skeleton' that undergirds Adirondack topography, but sediment deposited as the glaciers receded makes up the 'skin' that covers much of the region.

Richard April, Michele Hluchy, and Diane Keller then summarize recent work on Adirondack soils. The mineralogy and chemistry of these soil systems is of paramount importance to understanding the impact of acid precipitation and the recovery of ecosystems as acid input is reduced. Kevin MacKenzie describes modern landslides, the products of steep slopes and local soil saturation due to Hurricane Irene and numerous older precipitation events in the High Peaks region. The "slides" provide not only an unparalleled window into the geology of the High Peaks but also a cautionary note for developed areas within the park.

We hope that this issue will find broad readership and urge readers to take advantage of the references provided by the authors. The Adirondacks are a gem, indeed, and appreciation of their special character is only enhanced by greater scientific understanding.

Finally, we recognize and celebrate the many important contributions made by James M. McLelland, Dana Professor of Geology Emeritus, Colgate University. Jim's work was groundbreaking, and his many publications have guided the studies of many other scientists over the last four decades. Jim also served as a gracious and generous mentor for younger geologists and continues to be a source of inspiration and new ideas. Jim, many thanks for all you have done to help us understand the Adirondacks and inspire new generations of researchers.