# Geochemistry and petrogenesis of the Ossipee Ring Complex, a model for magmatism in the Younger White Mountain igneous province, northeastern USA

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The Ossipee ring complex is a member of the ca. 120 Ma Younger White Mountain magma series. The Ossipees are a classic example of a ring-dike complex. An almost complete outer ring consists of porphyritic quartz syenite and subporphyritic granite. Porphyritic (feldspar phenocrysts) basalts and rhyolites are abundant within the ring structure. The basalts represent the only significant occurrence of mafic volcanics in the White Mountain Province. Alkali granite was emplaced as a sheet under the volcanic pile. Geophysical data indicate that gabbros and diorites are abundant in the conduit that fed the Ossipee magmatism.

The basalts are divisible into three groups: nepheline-normative and high-Ti and low-Ti quartz-normative. Crustal contamination played a role in the evolution of the latter two groups. Evolution of the basalts was controlled by plagioclase fractionation. The rhyolites are divisible into several geochemical groups, and differentiation within each group was controlled by feldspar fractionation.

Phase equilibria considerations indicate that the nepheline-normative basalts were erupted directly to the surface from deep levels in the crust (or upper mantle) while the quartz-normative basalts and rhyolites evolved at intermediate depths before their eruption. This difference in evolution is reflected in the isotopic systematics which show significant crustal contamination for the quartz-normative basalts and rhyolites. Comparisons with other plutons in the White Mountains and time correlative Monteregian Hills province of southern Quebec demonstrate how these differences in evolutionary history effect, and are reflected in, the isotopic and trace element systematics of the various plutons.