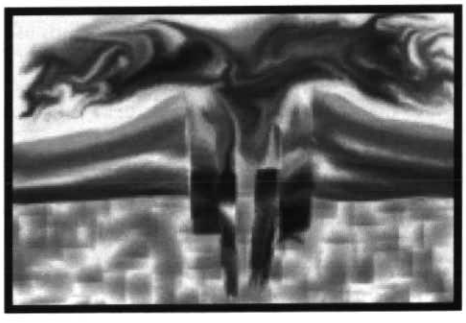
SERIES



A New Series on the Igneous Rock Associations of Canada

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The Volcanology and Igneous Petrology Division of the Geological Association of Canada is sponsoring a series of papers in *Geoscience Canada* on Igneous Rock Associations of Canada. The series is intended to provide informative articles on the diverse types of volcanic and intrusive igneous rocks to be found in Canada and to summarize modern interpretations of how different rock associations have evolved.

Igneous rocks form in response to large-scale tectonic processes. They require a delicate balance of temperature and pressure conditions such that pre-existing rocks of the upper mantle or crust can melt, a process that may be aided by addition of volatiles. The resulting magma requires a pressure gradient (usually buoyancy) and pathways in order to rise to higher levels in the crust or to be extruded. Although some igneous rock appear to be distinctive of the Archean, in general the conditions for the formation of particular igneous rocks associations have reoccurred many times in different places throughout the history of the Earth. In Canada, we are fortunate in having outcrops of rocks formed at a wide range of levels in the crust, aiding the interpretation of entire igneous systems.

The evolution of magmas is a consequence of some fundamental principles of physics and chemistry. This evolution can be interpreted from an understanding of the processes of crystallization, the partitioning of elements between solid and fluid phases during partial melting and crystallization, the solubility of volatile phases, and the physics of magma chambers and magma pathways. Studies of mineralogy, petrology, geochemistry and structural setting of both active volcanoes and more commonly of crystallized igneous rocks, together with laboratory experiments and modelling, are the principal methods used to understand magma evolution.

Igneous rocks are of course fundamental to all geology: without them, there would be no detritus to form sedimentary rocks and no protolith for metamorphic rocks. Even fossils are preserved in the weathering products of igneous rocks. Most ore deposits are a result either of direct igneous processes, or of fluids resulting from the crystallization of magmas, or of hydrothermal circulation driven by heat produced by magmatism. An understanding of igneous rock associations is thus important to the mineral industry. Igneous rocks are also important sources of aggregates and industrial minerals. In the far west of Canada, volcanic eruption is a potential geological hazard.

The papers in this series will deal with the principal associations of volcanic and intrusive igneous rock types and with topical issues in volcanology and igneous petrology. The first two papers in the series, by Ben Kennedy and John Stix, deal with the evolution of calderas in large volcanic centres. The study of recent calderas requires working outside Canada, but they are major structural and volcanological features of many ancient volcanic sequences and are commonly associated with mineralization. The next papers in the series will also cover volcanological topics. In all, about ten papers are currently identified for the series, but more would be welcomed.

Papers for the series should deal with an igneous rock association or a general issue in volcanology or igneous petrology. Each should summarize both the characteristics and the current interpretation of the genesis of the rocks. It should emphasize the current state of knowledge, avoiding lengthy historical review. Where possible, type examples from Canada should be presented. Illustrations should be of a high quality and the bibliography carefully selected to allow the general reader to follow up with the most useful and comprehensive literature. As with all *Geoscience Canada* articles, the papers should be aimed at a general geological audience and jargon should be avoided. Papers should normally not exceed 10 printed pages in length.

If you have any questions, or wish to contribute to the series as an author or co-author, please contact Georgia Pe-Piper, the series editor, at gpiper@smu.ca or Godfrey Nowlan, Editor, *Geoscience Canada*.