**Differentiation of the simplest magmatic body, a thick flood-basalt flow**

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The differentiation of magma rising toward Earth’s surface has been the main process of differentiating the planet. This differentiation takes place in magma chambers that are not accessible to direct observation, other than through seismic tomography. As a result, our understanding of magmatic differentiation is based on interpreting ancient “fossilized magma chambers,” and the proposed mechanisms are open to endless debate and constitute a large part of the petrologic literature. A thick flood-basalt flow, however, is a body of magma that is extremely simple — a thick sheet with known boundary conditions. In this talk we will see that basaltic magma in such a flow is capable of differentiating to diorite and granite through crystal-mush compaction and liquid immiscibility. Unlike, proposed differentiation processes based on interpreting ancient plutonic magma chambers, processes occurring in a flood-basalt flow can be quantitatively confirmed through chemical and textural analysis. The important conclusion will be that, if these processes operate in a lava flow cooling rapidly on the surface of the Earth (<100 years), they must occur in plutonic bodies that cool over thousands of years.

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Ph.D. Department of Mineralogy and Petrology, University of Cambridge, 1963.  
1963-1970 Assistant Professor, McGill University, Montreal.  
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**Areas of interest:** Precambrian anorthosite complexes; Alkaline igneous rock associations; Experimental petrology dealing with liquid immiscibility; Textural analysis of basaltic rocks.  
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**Books:**

Principles of Igneous and Metamorphic Petrology, Philpotts and Ague, Cambridge University Press, 3rd ed. 2022.  
Earth Materials, Klein and Philpotts, Cambridge University Press, 2nd ed. 2016.  
Petrography of Igneous and Metamorphic Rocks, Prentice Hall,1990, Waveland Press, 2000.