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CONSTRUCTING CONTINENTAL CRUST: TRACKING PETROGENESIS OF GRANITIC BATHOLITHS OF THE OSLO RIFT, NORWAY

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Granitoids compose ~86% of the Earth's upper crust. Integrating petrographic and geochemical studies of granitic batholiths and their crystal cargoes has the potential to unravel the processes through which granitoid magmatism contributes to upper crustal growth.

The Permo-Carboniferous Oslo Rift (OR) in southeastern Norway contains ~63,000km^3 of chemically diverse magmatic rocks, including two batholiths: the Drammen (1,811km^3) and the Finnemarka (336km^3). These batholiths are predominantly composed of quartz, alkali feldspar, plagioclase, biotite (variably chloritized) and amphibole with minor titanite, apatite, and zircon. The petrogenesis of these granitoid magmas will be investigated using their crystal's chemical stratigraphy as 1) a tracer of magmatic source and 2) the nature of the magmatic system in which they crystallized (open vs. closed).

Feldspars analyzed to date include sanidine (n=304) and albite (n=155), with relatively minor oligoclase (n=77) and anorthoclase (n=34). Preliminary measurements (n=167) of titanite reveal a strong (n=155) crustal-derived signature ($Ti^{4+}/(Al+Fe^{3+}) < 9$) and a less prominent (n=12) mantle-derived signature ($Ti^{4+}/(Al+Fe^{3+}) > 9$). From biotites (n=108), wt.% FeO and MgO abundances are consistent with a mixed mantle-crust derived (3 < wt.% MgO < 13) source (n=74), with significantly fewer mantle-derived (wt.% MgO > 13) biotites (n=34). From amphibole analyses (n=131), wt.% TiO_2 and Al_2O_3 are consistent with crustal-derived ($Al_2O_3 < 11$) amphibole (n=128) and a lack of mantle-derived ($Al_2O_3 > 11$) amphibole (n=3). This is also consistent with inferences from Si and Al cation proportions in the sampled amphiboles, where Al < 0.5 is crustal-derived (n=128) and Al > 0.5 is mantle-derived (n=3).

Preliminary data indicates the role of both crustal and mantle-derived sources during the petrogenesis of the OR granitic batholiths. Future analyses will involve bulk rock chemical, Sr-Nd-Pb isotopic, and *in-situ* trace element characterization of phases sampled to date. Feldspar crystals will also be characterized for their Sr-isotopic signatures. Through a comprehensive geochemical evaluation of these batholiths, and their crystal populations, the magmatic processes involved in the petrogenesis of granitoid rocks will be investigated.

Session No. 154--Booth# 73

T153. Geochemical and Petrologic Forensics in the study of Earth's Magmatism: A Tribute to the Distinguished Career of Jon Davidson (1959–2016) (Posters)
Monday, 23 October 2017: 9:00 AM-6:30 PM

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