(0.78–1.00 wt%), whereas those elsewhere may be zoned and have lower FeO (0.16–0.62 wt%) and MnO (0.56–1.00 wt%). Possible explanations for these observations are: 1. Small apatites are metamorphic and large apatites are magmatic, retaining their original textural differences, but fortuitously having nearly identical compositions – improbable. 2. Small metamorphic apatites and large magmatic apatites have equilibrated chemically, but not yet texturally – possible only if diffusional chemical exchange rates exceed recrystallization rates. 3. All 26 apatite grains are originally from Meguma Group, and some have coarsened during partial melting – if so, unless new phosphorus became available, some large apatite grains must have grown at the expense of other smaller apatite grains by Ostwald ripening. 4. Some apatite grains are metamorphic, others are Ostwald-ripened xenocrysts, and yet others may be magmatic – if so, on this centimetre scale, the country-rock composition dictates the apatite compositions.

Assimilation processes in the South Mountain Batholith: evidence from apatite

D. Barrie Clarke[1] and Anne Jähkel[2]
1. Department of Earth Sciences, Dalhousie University, Halifax, Nova Scotia B3H 3J5, Canada. <clarke@dal.ca> ¶ 2. Institut für Erd- und Umweltwissenschaften, University of Potsdam, 14476 Potsdam, Germany

All granites are contaminated. Assimilation of foreign material in granite magmas involves processes of dissolution, ion exchange, or melting of the solid components, and mixing of any new partial melt with the main magma. Each foreign mineral phase contains its own unique record of the assimilation process. Our investigation examines the assimilation record of apatite, compositionally and texturally, in one xenolith-bearing South Mountain Batholith granodiorite sample (P7G3), using backscattered electron (BSE) images, grey-scale cathodoluminescence (CL) images, and electron microprobe analyses. Observations come from 12 apatite grains in, and beside, a small Meguma Group xenolith, plus another 14 grains in the granodiorite. Texturally, grains in the interior of the xenolith are smaller (~100 μm) and anhedral to subhedral compared with those on the outer margin of the xenolith and in the granodiorite (up to 600 μm) and subhedral to euhedral. Compositionally, the xenolith apatite grains are generally unzoned and have slightly higher FeO (0.36–0.72 wt%) and MnO

Atlantic Geology, 2010, Volume 46, Number 1