The occurrence and origin of ring schlieren in the South Mountain Batholith, Nova Scotia

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Ring schlieren are alternating melanocratic and leucocratic bands in granites forming open to closed, nested, circular to elliptical, concentric to eccentric, prolate to oblate structures with cross-cutting relationships indicating younging direction toward the centre. The late Devonian South Mountain Batholith (SMB) underlies much of the southern mainland of Nova Scotia and, along a coastal transect between Aspotogan Point and Portuguese Cove, is host to 161 ring schlieren structures. Measured features include location, number of rings, length, width, aspect ratio, orientation, presence or absence of xenoliths, and regional foliation in the peraluminous granitoid host. Image analysis of vertical photographs provides field data verification or correction. For each structure, the melanocratic sharp contact of the outer ring with the granitoid host grades into a leucocratic interior. Outer ring long axes lengths range from 0.14 m to 17.12 m, and short axes range from 0.15 m to 5.07 m. Aspect ratio varies between 1.24 and 1.92 for the 20 single-ring structures, and between 1.04 and 2.41 for the 141 multi-ring structures. Rare three-dimensional exposures reveal a vertical cylindrical nature of these ring schlieren structures. The ring schlieren map pattern in the SMB shows a clustered distribution. Groups of rings occur near Aspotogan Point (n = 7), near Peggys Cove (n = 81), near West Dover (n = 13) near Prospect (n =5) and near Pennant Point (n =41). Within the study area, isolated rings are rare, although 12 do occur. The ring schlieren structures, which are nested vertical pipe-like features in three dimensions, cut flow foliations in the host granite and therefore, represent late features in the crystallization of the batholith. One working hypothesis is that ring schlieren form by ascending bubble trains created by the degassing of magma at greater depths.

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