Intrusion Level of the Musquodoboit Batholith in Nova Scotia, Canada—a Case Study[1]

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The post-orogenic Musquodoboit Batholith of Nova Scotia consists predominantly of biotite-muscovite monzogranite. Electron microprobe analyses of relatively coarse-grained muscovite and biotite from 12 monzogranite samples show a narrow and moderate compositional range in terms of the Si concertrations and X_{Fe} values, respectively (mean Si = 3.059 pfu and X_{Fe} = 0.53-0.78 for muscovite, and means Si = 2.682 pfu and X_{Fe} = 0.63-0.89 for biotite). We applied two thermodynamically based methods to determine the pressure under which muscovite crystallized and, thus, to determine the level of the granitic intrusion. Both methods, the calculation of a P-T pseudo-section and the calculation of the equilibrium 3 Mg-Al-celadonite (in postassic white mica) = 3 quartz + 2 K-feldspar (in alkali feldspar) + 1 phlogopite (in biotite) + 2 H_2O, yield similar results of 4.2 ± 0.5 kbar. The corresponding depth of about 15 km is consistent with our view that coarse-grained muscovite is the product of crystallization from a granitic melt.

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