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Petrological imaging of the Cordilleran lithosphere beneath Craven Lake, NCVP, BC, Canada: local evidence for a texturally diverse, hydrous lithosphere

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Peridotite and pyroxenite xenoliths from the glaciovolcanic Craven Lake center (Edwards et al., 2006) provide local evidence for a texturally diverse, hydrous lithosphere beneath the Stikine terrane, in the Canadian Cordilleran lithosphere. Although the xenolith suite is dominated by spinel lherzolite, websterite and Ol websterite xenoliths also occur. Veins of amphibole, with local apatite, have so far been found in one spinel lherzolite and one websterite xenolith. Although interstitial amphibole has been reported from at least two localities in the northern Cordillera, we believe that this is the first documented occurrence of an amphibole vein in lithospheric peridotite and pyroxenite. Textural analysis shows that the xenoliths from Craven Lake are on average finer grained ($\sim$2.0 mm) and less equigranular than xenolith suites from localities to the north (e.g. Harder and Russell, 2005) or to the south (e.g. Peslier et al., 2002). Clinopyroxene-orthopyroxene geothermometry of a peridotite sample indicates that the temperatures of equilibration (964-1022C at 0.1 GPa) are well within the established stability limits of amphibole at lithospheric pressures.

Observations on the Craven Lake suite have important implications for the petrology of the Cordilleran lithosphere. Textural observations confirm that the lithosphere beneath the accreted terranes in British Columbia is distinctly heterogeneous, which is consistent with at least local lithospheric variation that could be due in part to tectonism during Mesozoic terrane accretion. Documentation of veins of amphibole plus apatite in the Cordilleran lithosphere is consistent with the Francis and Ludden (1995) hypothesis that the veins could be lithospheric sources for volumetrically minor but spatially wide-spread nephelinite throughout the Canadian Cordilleran, which were remelted during Neogene to Recent, extension-related magmatism. The formation of the veins may be linked to Mesozoic subduction zone metasomatism of the Cordilleran lithosphere during subduction of the Farallon plate, which ended at approximately 40 Ma.

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