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TITLE: Identification of source lithology at south segment of Kamchatka subduction zone

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ABSTRACT BODY: Kamchatka peninsula (Russia) is an island-arc with a complex geological history and structure. It has three distinct volcanic fronts, the origin of which is still debated. Moreover, a junction with the Aleutian Arc (at ~56°N) complicates the understanding of geodynamics at the region. However, the south part (from ~53°N) of Kamchatka peninsula is thought to be a “textbook case” of subduction zone with relatively rapid (over 8 cm/yr) near-normal convergence and a steep (over 50°) angle of subduction. Kamchatka is unusual in the world because its volcanoes contain a significant amount of primitive high MgO lavas that are rich in olivine crystals. Furthermore, high precision contents of Ni, Ca, and Mn can help to constrain the source lithology. Straub et al. (2008) reported high Ni contents on olivines from a limited number of samples from the Mexican Volcanic Front, and concluded that pyroxenite melting was important. Portnyagin et al. (2009) reported high precision Ni, Ca, and Mn contents of olivines from a wide range of volcanoes from Kamchatka, and similarly concluded that pyroxenite melting is widespread. We have extended the work of Portnyagin et al. (2009) by analyzing olivine phenocrysts from volcanoes in the southernmost Kamchatka peninsula. Our work confirms that there are regional variations in olivine phenocryst composition that likely arises from variations in pyroxenite composition, the amount of peridotite melt that mixes with pyroxenite melts, and a variable role played by magnetite fractionation. We conclude that pyroxenite melting is likely to be important in subduction zones world-wide, but its significance has been underestimated because of the general rarity of olivine-bearing high MgO lavas.

KEYWORDS: [1025] GEOCHEMISTRY / Composition of the mantle, [1037] GEOCHEMISTRY / Magma genesis and partial melting, [1031] GEOCHEMISTRY / Subduction zone processes, [8413] VOLCANOLOGY / Subduction zone processes.

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