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Slab related fluid in mantle wedge

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Recycled volatiles in mantle wedge is a factor controlling rheological properties of mantle minerals. Beneath the continental active margin or island arc, aqueous fluid derived from a subducted slab ascends into the mantle wedge. Partial melting in the mantle wedge produces hydrous melt when the aqueous fluid reaches the region with the solidus temperature of hydrous peridotite. The melt is extracted upwards from the partial melting zone, ascending through the mantle wedge, engendering subduction-related volcanism if melt segregation occurred. Part of the melt should remain in the mantle wedge as hydrous intergranular components or hydrous melt inclusions.

Here we report noble gas isotopic compositions of the hydrous melt inclusions in mantle xenoliths from Far Eastern Russia. The results are interpreted as involvement of air-saturated water. Far Eastern Russia was an active margin of the Eurasian continent in the Mesozoic to Paleogene Period. It is most likely that the hydrous melt inclusions displaying atmospheric noble gas characteristics were derived from the subducted slab.

Keywords: mantle wedge, mantle xenolith, peridotite, melt inclusion, slab, noble gases