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Numerical analyses of water content and melting regimes in the NE Japan arc

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Melting and seismic structure beneath the northeast Japan arc considering upon the uncertainties of H_2O content is modeled to estimate the relation between melting region and H_2O content, and restrict water content distributed in mantle wedge. This model results show that increasing water content, a weak melting starts to occur beyond C_{H2O} = 0.07 wt%, and the calculated P-wave and S-wave velocity structures between C_{H2O} = 0.10 wt% and 0.40 wt% can explain tomographic low velocity zones. The distribution of melt production rate (C_{H2O} = 0.15 wt%) shows that all three mechanism (Flux, decompression, and compression melting) are necessary to explain volcanic activity at back arc, volcanic front, and intermediate region in the Northeast Japan arc. In the case of C_{H2O} = 0.15-0.34 wt%, the model results of volcanic eruption rate can explain observed across-arc features in terms of relative intensities (i.e., spatial location and pattern). Considering into the comparison with tomographic data, melting mechanism, and the comparison with volcanic eruption data, this model results for C_{H2O} = 0.15-0.34 wt% can explain volcanic activity in the Northeast Japan arc.

Keywords: water, melting, subduction zone