# Subduction zone magmatism and mantle wedge structure of the Sengan region, Northeastern Japan

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It is very important to know physical and chemical condition of subduction zone mantle to investigate dynamic process in solid earth and evolution of the earth. Recently, 3D along-arc heterogeneous structure of about 50 km scale is found in the mantle wedge beneath the Northeastern Japan based on geological and seismological studies. Nature of this heterogeneous structure in the mantle wedge has not yet been clarified. The main purpose of this study is to investigate 3D thermal and compositional structure of source region of the arc magmas in the mantle wedge from volcanic rocks. Detailed examination of the spatial variation of composition and differentiation process of volcanic rocks were carried out with erupted materials sampled from 14 Quaternary volcanic bodies in the Sengan region, Northeastern Japan. In the Sengan region, three different fractionation trends are observed based on petrological study and thermodynamic calculation. The three different trends are, Al-enrichment / Fe-depleted trend, Al-depleted / Fe-enrichment trend, and Al-and Fe-depleted trend. Each trend reflects condition of differentiation process. Al-enrichment / Fe-depleted trend is a fractionation trend under dry and/or lower pressure condition and Al-enrichment / Fe-depleted trend is a fractionation under wet condition. It is suggested that compared to Al-enrichment / Fe deleted trend, Al- and Fe-depleted trend represents fractionation under dry, lower pressure and higher fO2 condition and/or mixing trend with the felsic magma. Primary melt composition is estimated in each volcano assuming the olivine maximum fractionation and olivine and plagioclase with An 90 fractionation. Equilibrium temperature, pressure and H2O content of the estimated primary melt with the mantle peridotite KLB-1 is estimated by thermodynamic calculation. In the central part of the Sengan region, equilibrium condition of estimated primary melt with mantle peridotite is about 1kbar and 1250˜1300C with H2O content of 0.7 wt %. These hydrous melt induce melting of lower crust. Mantle primary melt might undergo fractionation and mixing with the feisic melt at a shallower depth in the central part of the Sengan region. On outer rim of the region, equilibrium condition of estimated primary melt with mantle peridotite is 1.0˜1.5kbar and 1270˜1300C with H2O content of 0.1˜0.5 wt %. Observed variations of mantle condition do not show parallel or perpendicular distribution to the trench or depth of the Wadati-Benioff zone. It is suggested that heterogeneity of H2O content of both across arc and along arc direction exists in the mantle wedge beneath the Northeastern Japan.