

## Late Cretaceous tectonics in the northern Japan deduced by detrital heavy mineral provenance

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It has been recognized that the Yezo Group, which is distributed in the Hokkaido islands, northern Japan, is regarded as a Cretaceous deposit in forearc area. The provenance of the Yezo Group offers the information of the significant aspect of the magmatic arc system developed in Asian margin during Cretaceous period. In the Upper Cretaceous succession of the Yezo Group, clastic rocks yield abundant detrital chromian spinels with other heavy minerals such as garnet, tourmaline, clinopyroxene, orthopyroxene and hornblende. In these detrital heavy minerals, chromian spinel found in sediments has particular significance to basin analysis because detrital chromian spinel derived from mantle peridotites and primitive rocks is indicative of magmatic and tectonic evolution in the source area. This study aims to clarify the transition of tectonic setting of the Cretaceous magmatic arc on the basis of the chemistry of chromian spinels with other heavy mineral characteristics. Thus, the upper Cretaceous sediments in Teshio-Nakagawa area were selected for this purpose.

The detrital heavy minerals for analysis were prepared by heavy liquid separation. The number of grains analysed by EDS is 97 grains of the chromian spinel, 183 grains of the garnet and 132 grains of the tourmaline. The chemical composition of detrital garnets suggests that the source area was composed of metamorphic rocks reaching greenschist to granulite facies condition and contact metamorphic rocks. Chemical analysis of detrital tourmalines indicates the derivation from metasediment. Chemical composition of the chromian spinel can be classified into three main groups that are (1) low TiO<sub>2</sub> (<0.5wt.%) type, (2) high Cr# (Cr/Cr+Al) - high TiO<sub>2</sub> (>0.5wt.%) type and (3) especially high TiO<sub>2</sub> (>2.5wt.%) type. In particular, this study has focused on high Cr# and high TiO<sub>2</sub> type, which belong to the most major group of chromian spinels. It is not clear that where these type chromian spinels, implying the sediment supply from primitive volcanic rocks was delivered. In addition, melt inclusions, which were included in some detrital chromian spinels, suggest that their parental magma has basaltic-andesitic affinity. The discovery of chromian spinels with the melt inclusion and high Cr# - high TiO<sub>2</sub> wt.% chromian spinels support existence of primitive volcanic rocks, which had been formed at the onset of the Cretaceous volcanic arc.

Keywords: Cretaceous, Yezo Group, chemical composition, detrital chromian spinel, heavy mineral