

The variation in mineral fraction corresponding to Iceberg collapse obtained by X ray powdered diffraction method at MIS104

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The climate change in the period that the ice sheets appeared and then developed in the northern hemisphere was unknown in many respects. However, the development and collapse of the continental ice sheets are considered to be closely related to climate change. We have researched that how the relationship of ice sheet collapse and deep water circulation at thousands of years scale varied with the development of the ice sheet by comparing ice rafted debris (IRD) count and rock magnetic records in the marine sediment core drilled in the North Atlantic Ocean. The records in the sediment core around marine isotope stage (MIS) 100 in which the continental ice sheet is considered to have greatly developed have been reported (Ohno et al, 2016).

In our earlier study, IRD count and rock magnetic analysis in MIS 104 (2.58 - 2.62 Ma) before MIS100 have been reported (Makio et al., JpGU 2015), but minerals constituting the sediments in MIS 104 have not been mentioned. Minerals in the sediment provide us useful information such as the origin of continental ice sheets and the carbonates constituting marine plankton shells. Therefore, we estimated the relative amount and/or the weight ratio of minerals in the sediment samples by the X-ray diffraction (XRD) decomposition method.

The samples used in this study are in a sediment core drilled at Integrated Ocean Drilling Program (IODP) Site U1314 off southern Iceland. This sea area is a flow channel of the North Atlantic Deep water formed in the northern part of Iceland, and the deep water transports basaltic clusters around Iceland. The sediment samples corresponding to around MIS 104 (2.58 - 2.62 Ma) were collected at intervals of about 4 cm (about 200 - 400 years). For XRD measurements, a standard sample, zincite (ZnO), was added in a fixed percentage (5 wt%) to the sediment sample, and then they were mixed and homogenized with an agate mortar. XRD measurements were performed by the step scan method using a RIGAKU X-ray Diffractometer RINT 2100V. The XRD data obtained were decomposed into each component (intensity (area) of each elementary peak) by the XRD decomposition method (profile fitting method) using the program software MacDiff (Petschick, 2000).

The relative fluctuation records of each mineral were reconstructed during MIS 104. Especially, minerals which are suggestive of continental origin, such as quartz, mica, feldspar, showed a sharp increase at the term of the IRD events. On the other hand, calcite gradually increased and decreased over the glacial - interglacial period. The results obtained in this experiment supported the results of IRD count and rock magnetic measurements in MIS104 in our previous study.

Keywords: Ice Rafted Debris, Rock magnetism, X ray powdered diffraction method