



Characteristics of correlation between climate and environmental elements from past 700,000 years in Dome Fuji ice core, Antarctica

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Two deep ice cores (DF1: 2503m and DF2: 3035m) at Dome Fuji, Antarctica have the in-depth information of global environmental change from present to the past 700,000 years. We made the data set of major ion concentration, dust concentration and stable isotope ratio which were analyzed 10cm sample every 50cm from 2400m to 3035m using the DF2 core. The age of this depth was covered from 300,000 to 700,000 years before. Using the DF1 core, major chemical species were carried out using 7-10cm ice samples cut out of the 50 cm-long spaced from 0.5 to 2.5m. All data was averaged by every 5 m or every 1,000 years. The correlations between climate and environmental elements were calculated.

The indexes of climate and environment are the following elements; MSA^- , Cl^- , NO_3^- , SO_4^{2-} , H^+ (calculated from pH), Na^+ , NH_4^+ , K^+ , Mg^{2+} , Ca^{2+} , ss-Na^+ , nss-Cl^- , nss-SO_4^{2-} , nss-K^+ , nss-Mg^{2+} , nss-Ca^{2+} , δD , $\delta^{18}\text{O}$, d-excess, dust, pH and electrical conductivity. There is a feature in correlation respectively by the climatic stage. δD or $\delta^{18}\text{O}$ which becomes the index of the temperature and the environmental elements (for example, Na^+ and Mg^{2+}) indicate the strong negative correlation, but its degree is different depending on the climatic stages. In particular, environmental changes around Mid-Brunhes event (i.e. 430kyrBP) were examined.

Ice core drilling reached just near the bedrock in ice sheet. Liquid water which existed around the basal ice was soaked into the borehole. Its water was frozen and was picked up with drill machine. Characteristics of ion concentrations near the bedrock (i.e. from 3000m to 3035m) were reported.

There was no big change in $\delta^{18}\text{O}$, δD and d-excess profiles in deeper part. Dust and nssCa^{2+} concentrations did not show the conspicuous change between 3000m to 3034m. They became high concentrations under 3034m. The concentration of Na^+ , SO_4^{2-} , NO_3^- became small but Cl^- became large from 3020m to 3033.5m. The concentrations of all ion components were suddenly decreased from 30033.5m.

The borehole measurement was carried out in January 2011. The items of borehole measurements were; borehole diameter, ice temperature and liquid temperature, liquid pressure, inclination of vertical borehole. The interesting vertical profiles of ice temperature and borehole diameter were observed. We discuss the characteristics of basal ice and subglacial water.