

Chemical composition and their characteristics of shallow ice cores drilled at Dome Fuji, East Antarctica

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Ice core samples contain a variety of information of the history of the earth, including climate change in the past. In particular, Dome Fuji, being situated at the highest point of an inner land of East Antarctica, is one of the best drilling locations for procuring to reconstruct past climates and environments. Around this region, several series of ice cores have been obtained and chemical characteristics have been examined (e.g., Kamiyama *et al.*, 1989).

We have performed precise measurements of anions and cations for samples from the Dome Fuji ice core drilled in 2001 at depths from 7.7m to 88.7m, corresponding to the ages over the past 2000 years, to investigate the outline of ion balance and its basic geochemical implications.

The ice core samples were drilled and cut into pieces around 2.5-4 cm in length along the depth direction; the temporal resolution corresponds to around 0.8 years. We obtained ~2300 samples and analyzed 10 anions and 5 cations, using an ion chromatograph. The concentration level of each ion is from 10 to 300-400 $\mu\text{g/L}$ for most samples. As shown in Fig. 1, the average of chemical composition is clearly different from that of seawater. Therefore, it is considered that most of the precipitation at Dome Fuji is not subject to sea salts. This confirms the observation by Kamiyama *et al.* (1989). On the other hand, several peaks have been found in the depth profiles of chloride and sodium ions. For those samples exhibiting chloride and sodium peaks, the concentrations of these two ions correlate with each other and the abundance ratio of sodium to chloride is similar to that of sea salt. This implies that the climatic condition around Antarctica suddenly changed at the times corresponding to the chloride (sodium) peaks in the ice core and that precipitation with abundant sea salt component was introduced to the inner site of Antarctica. For other ions, such as sulfate and nitrate, no significant correlations have been observed, even though several peaks were found in their depth profiles. Therefore, the peaks of these ions can be regarded to reflect not sea salts but some geological or stratospheric events.

In this talk, we will report the details of the analyses by ion chromatography and the ion balance. We will also present new results of chemical analyses for the samples from the Dome Fuji 2010 ice core for comparison with those for the Dome Fuji 2001 ice core.

References

Kamiyama, K. *et al.*, (1989), Atmospheric and Depositional Environments Traced From Unique Chemical Compositions of the Snow Over an Inland High Plateau, Antarctica. *Journal of Geophysical Research*, 94, D15, 18515-18519.

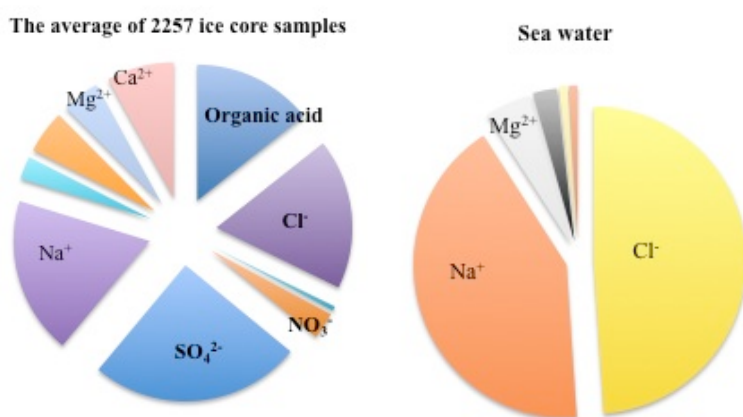


Fig.1 Ion balance of DF2001 ice core samples and seawater