

Methane concentration measurements of the Dome Fuji ice core using Continuous Flow Analysis system

Ikumi Oyabu¹, Miho Arai^{1,4,5}, *Kenji Kawamura^{1,2,3}, Kyotaro Kitamura¹, Jun Ogata¹, Kumiko Goto-Azuma^{1,2}

1. National Institute of Polar Research, Research Organization of Information and Systems, 2. SOKENDAI (The Graduate University of Advanced Studies), 3. JAMSTEC, 4. Yamagata University, 5. Weathernews Inc.

At the National Institute of Polar Research (NIPR), Continuous Flow Analyses (CFA) system has been developed. In addition to the measurements of melt water (e.g. water isotopes, micro-particles and major ions), the enclosed air is extracted from the water stream and measured for methane (CH₄) concentration by a customized Cavity Ring-Down Spectrometer (CRDS) (Picarro G2301). The CFA system provides data at much higher resolution than classic discrete measurements, which can improve our knowledge and understanding of past climatic variations.

The CH₄ concentration measured by CFA is affected by several factors, impacting precision, accuracy and resolution. The factors include dissolution of CH₄ in meltwater and its imperfect extraction, sample mixing and smoothing in sample lines, and contamination by room air intrusion into the system at the interface between ice samples. The magnitudes of these effects have been investigated, and the data are corrected accordingly. Here, we report the results of various tests for assessing the performance of our CFA for CH₄ measurement. Furthermore, the results of the measurement campaigns of the Dome Fuji ice core, covering the 8.2-kyr cooling event and a part of the last deglaciation, will also be presented.

Keywords: Continuous Flow Analysis, Ice core, CH₄, Dome Fuji