High Resolution Continuous Flow Analysis System developed at the Ice Core Research Center, National Institute of Polar Research

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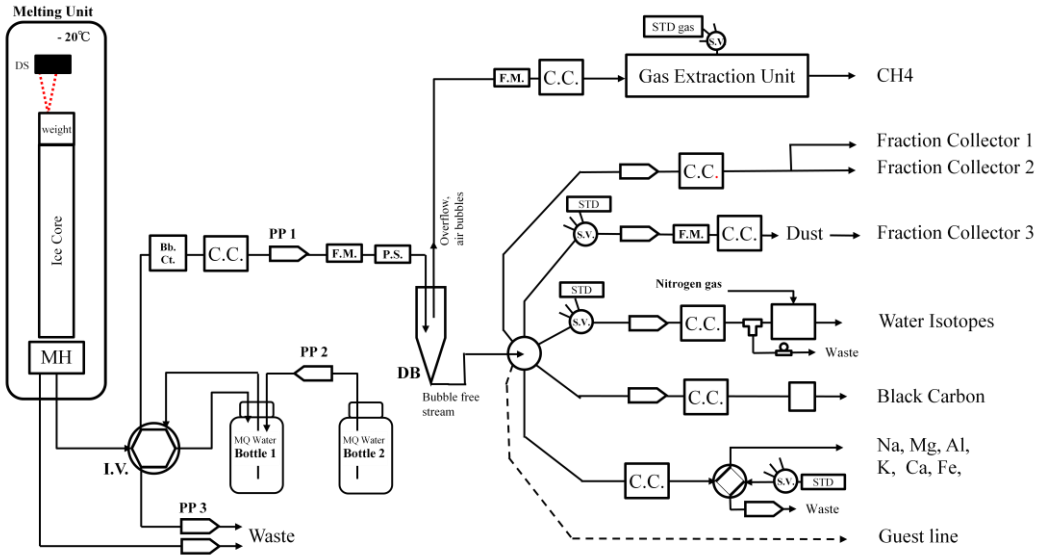
In the last decades, Continuous Flow Analysis (CFA) technology for ice core analysis has been developed to reconstruct the past changes of the climate system with greater sample throughput and much higher depth resolution (1, 2). The system developed at the National Institute of Polar Research generates a continuous stream of melt water and air bubbles. As shown in Figure1 water and air are separated in two steps. The first separation occurs in a sealed main degassing unit to provide a bubble-free water stream and an overflow containing air bubbles. The water stream offers a continuous determination of dust size distribution and concentration (Abakus, Markus Klotz GmbH), stable water isotope ratios (Picarro L2130), electrolytic conductivity (Amber Sciences), black carbon (SP2, Droplet Measurement Technologies), and chemical impurities (7700 ICP-MS, Agilent), as well as discrete samples collected with fraction collectors (FC204, Gilson) at variable depth intervals for further analyses. The air bubbles of the overflow stream are extracted to analyze methane mixing ratios (Picarro G2301) (3).



DS: Displacement Sensor, MH: Melthead, I.V.: Injection Valve, S.V.: Selection Valve, Bb.Ct.: Bubble Counter, C.C.: Conductivity Cell, PP: Peristaltic Pump, F.M.: Flow Meter, P.S.: Pressure Sensor, DB: Water/Gas separation sealed unit.

Figure1. ICRC/NIPR CFA system schematic diagram

To demonstrate the performance of our system, we will present the data obtained from continuous analyses of a shallow core drilled at Dome Fuji, East Antarctica, for the depth interval between 112.6m and 96.8m.

References

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