

A SMALL STRATOSPHERIC GRAB-SAMPLER AND ITS
GROUND SUPPORT SYSTEM FOR ANTARCTIC
EXPERIMENTS (ABSTRACT)

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In order to measure the concentrations of various minor constituents and their isotopic ratios in the stratosphere over Antarctica, a simple grab sampling system was newly developed. The sampling system was designed to be launched by a small number of personnel under severe experimental conditions. Special attention was paid to minimize the contamination of sample air, as well as to allow easy handling of the system. The sampler consisted mainly of a 15 l sample container with electromagnetic and manual valves, control electronics for executing the air sampling procedures and sending the position and status information of the sampler to the ground station, batteries and transmitter. All these parts were assembled in an aluminum frame gondola with a shock absorbing system for landing on sea ice. The sampler was equipped with a turn-over mechanism of the gondola to minimize contamination from materials in the gondola, as well as with a GPS receiver and a Rawinsonde for its tracking. Total weight of the sampler was about 11 kg.

The sampler was designed to launch using a 4.5-kg rubber balloon because of its easy handling and inflation operation compared with a plastic one. A cross parachute was used for its stable descending characteristics so that the shock absorber functioned properly at landing. To receive, display and store the position and status data of the sampling system at the ground station, a simple data acquisition system, with a portable receiver, a demodulator and a microcomputer, was also developed. A new gas handling system and procedures were prepared to simplify the injection of He gas into the balloon and the measurement of its lift. For recovery, two helicopters and conventional beacon searching systems were used; they were confirmed to work well in the recovery tests of the JARE 36th operations.

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