

An introduction to the penetrators for Antarctic regions.

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Properly setting up observational instruments and taking high-quality observation data is a fundamental challenge in natural science. This problem is particularly acute in Antarctica, a vast and harsh environment. Active areas such as glaciers are often unmanned places where it is difficult to install observation instruments while they become targets for observation. Penetrators could be a solution to the dilemma. Penetrators can install instruments by high-speed impact from the aerial vehicle into the ground, allowing safe and extensive observation networks to be established even in hazardous areas¹. The penetrator system makes constructing observation networks more safely and cheaply possible². We developed Antarctic penetrators for decades (Fig.1). The 64th Japanese Antarctic Research Expedition (JARE-64) conducted some penetrator tests as 1st year of a three-year project (Development of Antarctic Observation Penetrators and Intensive Observation in the Shirase Glacier and Surrounding Area). We have tested the dropping of dummy penetrators from a crewed helicopter (Fig.2), the observation of onboard seismometer and infrasound sensors, and the communication of observation data from Antarctica to Japan. This presentation will briefly overview the Antarctic penetrator, the tests conducted by the JARE 64 penetrator team, and the results.

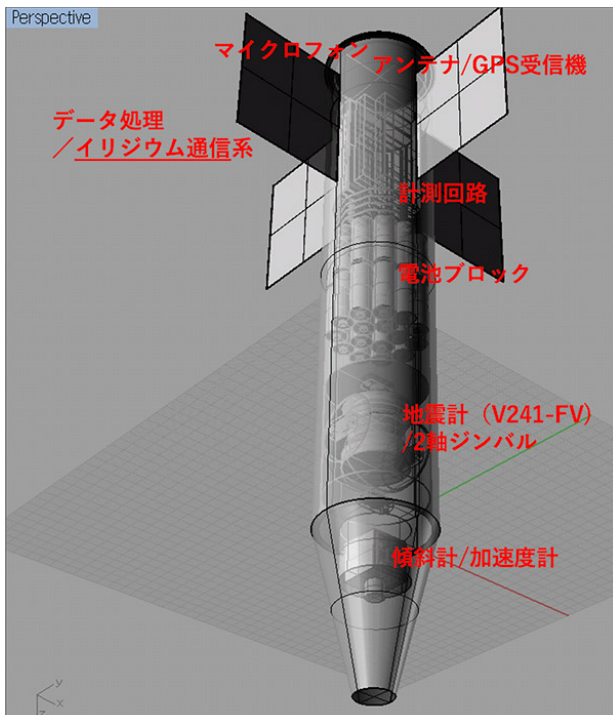


Figure 1. Antarctic penetrator with the instrumental package.



Figure 2. The dummy penetrator dropped from 75 m height in Antarctica.

References

- 1) Lorenz., R. D. 2011 Planetary penetrators: Their origins, history and future. *Advances in Space Research*, 48(3), 403-431.
- 2) Shirai et al., 2017. Development of penetrator probe for volcano monitoring deployed from unmanned aerial vehicle, International Association of Volcanology and Chemistry of the Earth's Interior, Abstract.