

Current status of LODEWAVE (L_Ong-Duration balloon Experiment of gravity WAVE over Antarctica)

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Atmospheric gravity waves carry out momentum transport in the atmosphere and play an important role in determining temperature and material distribution through driving the meridional circulation. However, its spatial scale ranges from several kilometers to several 1000 kilometers, and its time scale ranges from several minutes to several 10 of hours few of hours, which makes it difficult to capture the whole feature of gravity waves with any of the latest observations and models. The first Mesosphere-Stratosphere-Troposphere (MST)/ Incoherent Scatter (IS) radar in the Antarctic, PANSY, which was installed at Syowa Station in 2011, can directly estimate the momentum flux of gravity waves in all frequency bands by observing 3-dimensional winds with high precision and high resolution. On the other hand, the super pressure (SP) balloon observation proposed in this paper can also estimate momentum transport due to gravity waves in all frequency bands, and its horizontal distribution is also clarified. We will carry out this SP balloon observation in the Antarctic where the observational constraint on the momentum transport due to gravity waves is especially insufficient. By combining it with the PANSY observation, the 3-dimensional picture of momentum transport due to gravity waves is acquired, which contributes to the improvement of the future prediction by the climate model. It also contributes to the improvement of the short-term weather forecast by providing temperature and wind information to the meteorological bureau in near real time.

We have performed a test production of SP balloon and onboard instruments during FY 2019 (Fig. 1). The further development and test of the SP balloon and onboard instruments will be carried out in FY 2020. In the first half of FY 2021, a domestic balloon experiment will be carried out at Taiki Aerospace Research Field in Hokkaido. In the latter half of FY 2021, 3 SP balloon observations will be carried out at Syowa Station in the Antarctic. By developing the SP balloon and onboard instruments which are light and small enough to ease the restrictions of the Civil Aeronautics Act, we aim to establish a regular observation system in the Antarctic.

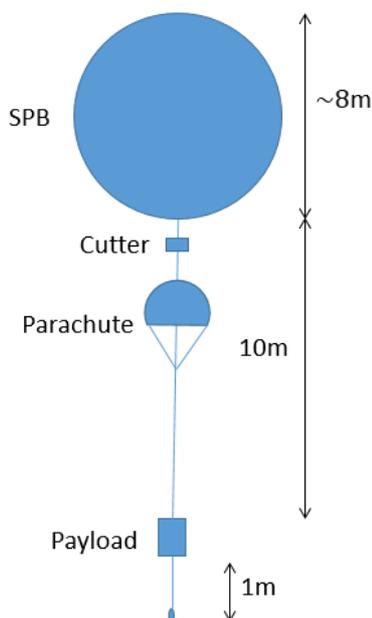


Figure 1. Overall configuration of SPB system.