

Precipitation and Wind Speed Observation in the Blizzard by the Doppler Weather Radar at Syowa Station, Antarctica

Hiroyuki Konishi¹, Katsushi Iwamoto², Naohiko Hirasawa³ and Yasushi Fujiyoshi⁴

¹Osaka Kyoiku University, ²City of Monbetsu, ³National Institute of Polar Research and ⁴Hokkaido University

Introduction

Precipitation and Wind Speed Observation by the X-band Doppler Weather Radar was carried out for almost two years (from March 2021 to November 2022) at Syowa Station, Antarctica. It is the first time to use the X-band Doppler weather radar at Syowa Station, which can measure the wind speed in the Blizzard. The precipitation weather radar (no Doppler function) operated at Syowa Station is since 1988-1989. The purpose of this paper is to clarify the amount of the precipitation and the kinematic structure of the blizzard invaded at Syowa Station.

Instruments

The radar using this observation was remodeled the marine radar to rotate vertically for observing the vertical section (NNE-SSW) along the main direction of the wind at Syowa Station. The schematic diagram of the radar is shown in Figure 1.

The radar measured the radar reflectivity (Z), Doppler velocity (V), Spectrum width (W) with high speed 24 rpm every 3.57m range up to 10km, every 0.176degree elevation angle. The beam width of along the rotation beam is 20 degree.

Result

The radar was constructed January 2021 and operated continuously for 21 months from March 2021 to November 2022. From the radar data, the amount of the precipitation was estimated whole a year and the wind speed fluctuation along the blizzard was analyzed. The example of the Z-R relation is shown in Figure 2 and the vertical wind speed in the blizzard is shown in Figure 3.

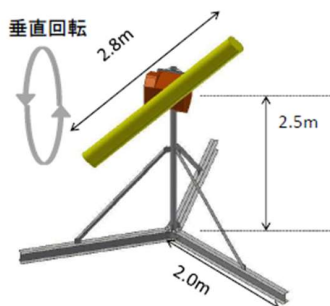


Fig.1. Schematic diagram of the X-band radar.

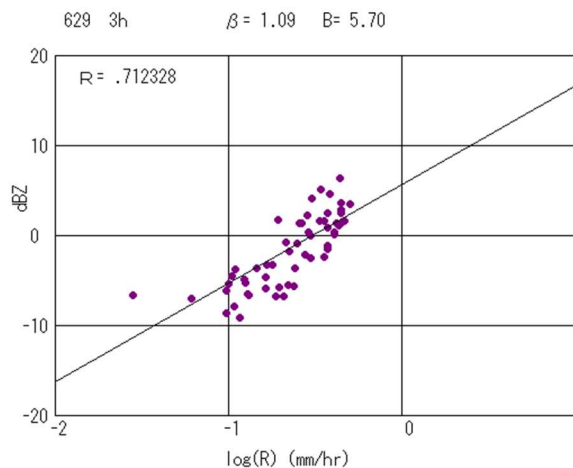


Fig.2. An example of the Z-R relation observed at 0300, 29 June 2022.

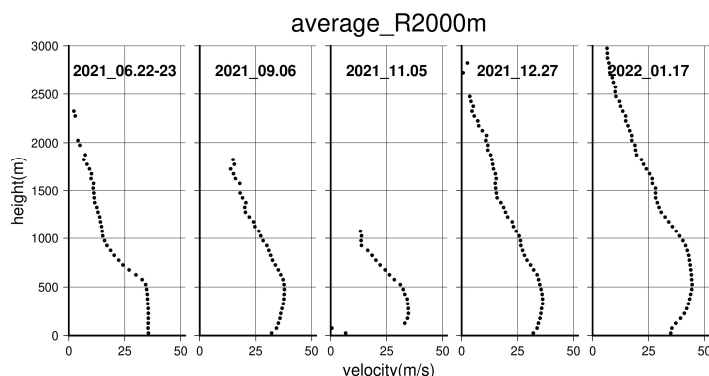


Fig.3. Five examples of the wind speed of vertical section in the blizzard.