Fine structure of a precipitation event associated with a synoptic-scale disturbance at Syowa Station, Antarctica

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We may somehow think of a blizzard event as a combination of strong winds, precipitation, and blowing snow continuing at the same time. Those who are familiar with the effects of synoptic-scale disturbances in Antarctica may be further compounding this with a warming event. We conducted X-band precipitation radar observations at Syowa Station in 2021-22 to assess year-round precipitation in Antarctica. One of the most notable Antarctic precipitation is a large amount of precipitation in a short period of time associated with a synoptic-scale disturbance. In the course of this study, the initial question of strong winds, precipitation, blowing snow, and warming was answered. This presentation will discuss these phenomena based on one case study.

Figure 1 shows time series of the observation data. A synoptic-scale disturbance affected Syowa Station from September 4 to 8 (see cloud distribution in Fig. 1a), during which wind speeds were continuously strong (Fig. 1c). Precipitatoin did not occur throughout the period of strong wind speeds, with the main precipitation occurring on four separate occasions. The surface pressure rose synchronously with the effects of the synoptic-scale disturbance, and there was also a brief period of pressure drop. The strongest precipitation occurred shortly thereafter. In addition, temperatures increased during this short-term pressure drop. These indicate that the meso-scale atmospheric circulation systems embedded in the synoptic-scale disturbance was closely related to the intensity and presence or absence of precipitation.

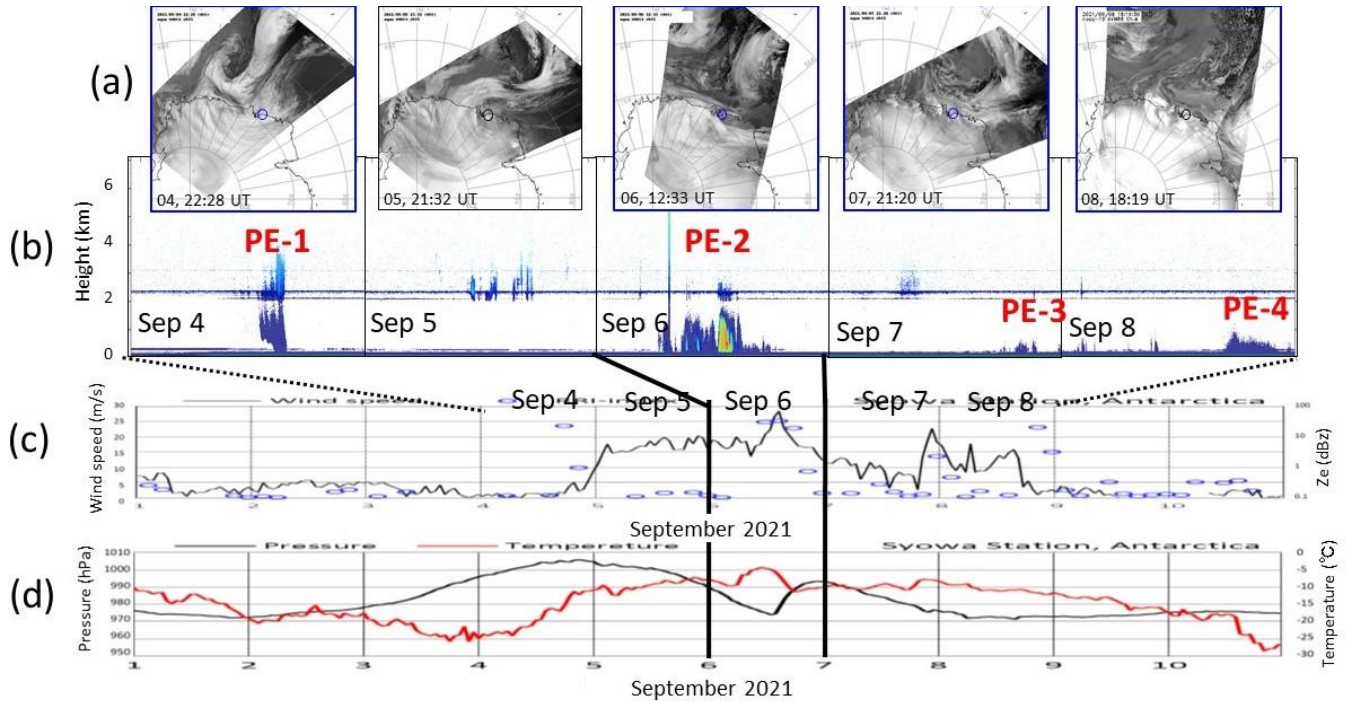

Figure 1. Time series of observational data during a precipitation event at Syowa Station, Antarctica, associated with a synoptic-scale disturbance from September 4 to 8, 2021. (a) Satellite cloud distribution (IR images), (b) a time-height section of the radar echo intensity, (c) surface precipitation intensity (blue open circles) derived from the radar data and wind speed, (d) surface pressure (black line) and air temperature (red line) are shown. (a) and (b) cover from September 4 to 8, 2021 and (c) and (d) from September 1 to 10.