

The impact of assimilation of PANSY radar observation at Syowa station on atmospheric circulation reproduction in reanalysis data

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The Antarctic is one of the regions with a relatively lower density in the global observing network. In recent decades, satellite observations with higher resolution and frequency contribute to the improvement of the reproducibility of atmospheric circulations in the reanalysis data. However, the assimilation of satellite data over the Antarctica and Southern Ocean is difficult due to surface emissivity issues (e.g., sea-ice, snow), causing the large biases only at the surface but also through the troposphere in the reanalysis data. Previous investigations revealed that the Southern Ocean and Antarctic radiosonde observations reduced uncertainties and errors at initial atmospheric conditions, improving atmospheric circulations performance over the Southern Hemisphere.

In this study, using the Atmospheric General Circulation Model for the Earth Simulator with the Local Ensemble Transform Kalman Filter and an ensemble data assimilation system, we investigated the impact of PANSY radar data on atmospheric circulation reproduction over the Southern Hemisphere in the reanalysis data. Our observing system experiments, which assimilates PANSY data above 300hPa, have shown that PANSY data improved major atmospheric parameters (e.g., temperature, wind speed) at Syowa stations. In addition, PANSY data improved the low-pressure system position, which is located near Syowa station on 25 December 2017.

Acknowledgements

This work was supported by a JSPS Overseas Research Fellowship, JSPS KAKENHI (20H04963, 19K14802, 18H05053).