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Proposal of balloon-borne ozone, water vapor, and aerosol measurements coordinated with PANSY at Syowa Station

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Upper troposphere and lower stratosphere (UTLS) in the winter polar region have a characteristic structure of temperature and minor constituents, which is clearly different from that in the midlatitude and summer polar region. Especially, disappearance of tropopause inversion layer (TIL) in the winter Antarctic could have a significant impact on the stratosphere-troposphere exchange (STE) across the Antarctic tropopause. In order to quantitatively evaluate the Antarctic STE and the effect of TIL disappearance, we propose simultaneous balloon-borne measurements of ozone, water vapor, and aerosol coordinated with high-resolution wind measurements by the PANSY radar at Syowa Station. Understanding of formation and disappearance mechanisms of the TIL and quantitative estimates of material exchange across the polar vortex edge are also our targets. These observations and research will contribute to further understanding of climate change in the polar region including the Antarctic ozone hole and improvement of its future projection.

Keywords: ozone, water vapor, aerosol, tropopause, Antarctica, PANSY