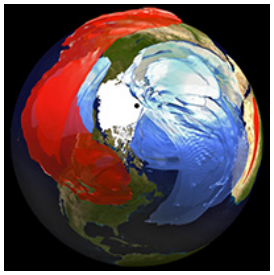

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Investigation of ECMWF IFS Arctic winter 2015/16 lowermost stratosphere moist bias using airborne limb-imaging infrared observations

Wednesday, 20 November 2019 14:30 (30 minutes)

The ECMWF IFS (European Centre for Medium-Range Weather Forecasts –Integrated Forecasting System) and other numerical weather prediction models are known to be affected by a moist bias in the polar lowermost stratosphere. This results in an overestimation of long wave cooling and therefore to a cold bias. We use airborne GLORIA (Gimballed Limb Observer for Radiance Imaging of the Atmosphere) observations during the PGS (POLSTRACC/GW-LCYLCE-II/SALSA) campaign to quantify the moist bias in IFS data under Arctic winter conditions. For this purpose, we analyze GLORIA data and corresponding high resolution (TCo1279L137) IFS analysis and short-term forecast data associated with 5 research flights in the region around Scandinavia and Greenland from January to March 2016. Using vertical cross-sections of gas-phase water vapour measured by GLORIA and ECMWF data, we identify air masses associated with polar sub-vortex region and correlate the GLORIA observations with IFS analysis and forecast data. We diagnose a systematic moist bias by up to ˜50 % at potential vorticity levels between about 6 to 10 PVU and peaking typically around measured water vapour mixing ratios of ˜5 ppmv. Sensitivity runs involving finer time steps, lower horizontal resolution and higher/lower vertical resolution hardly affect the comparison and suggest that the initial conditions play an important role in the short-term forecasts.

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