

Taguchi, M., 2015: On the asymmetry of forecast errors in the Northern winter stratosphere between vortex weakening and strengthening conditions. *J. Meteor. Soc. Japan*, **93**, 443-457.

<https://doi.org/10.2151/jmsj.2015-029>

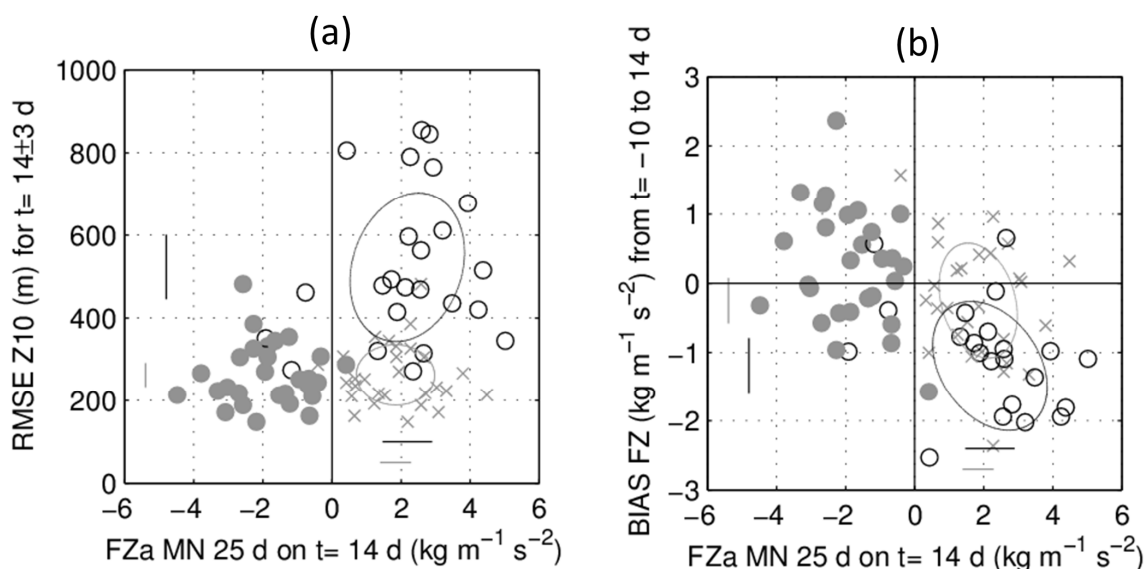


Figure 1. (a) Scatter plot between anomalous FZ (vertical component of the Eliassen-Palm flux) of waves 1-3 in 40-90°N, 100 hPa for the JRA-55 data, and RMSE of Z10 poleward of 20°N. Two subsets of the hindcast data initialized during Northern winter are used: closed and open circles denote results for the vortex strengthening and weakening conditions, respectively. Crosses are mirror images of the closed circles. FZ plots 25-day averages up to the forecast day 14. RMSE is averaged for one week around the forecast day 14. Panel (b) is similar, but plots the bias in the 25-day averaged FZ for the y-axis. Horizontal and vertical lines denote 95 confidence intervals. Ellipses denote representative distributions.

- The asymmetry of forecast errors in the Northern winter stratosphere between vortex weakening and strengthening conditions, suggested from previous studies, is investigated.
- One-month hindcast data of the Japan Meteorological Agency are compared to the JRA-55 reanalysis data. The vortex weakening and strengthening conditions are defined in the Polar-Jet Oscillation framework using an empirical orthogonal function analysis of JRA-55 polar stratospheric temperatures.
- Results demonstrate that forecast errors in the stratosphere are larger for the vortex weakening conditions than for the strengthening conditions (Fig. 1a). It is also shown that forecast errors in the planetary wave forcing in the upper troposphere are responsible for this feature. Namely, it is more difficult to forecast planetary wave amplification leading to the vortex weakening conditions than wave attenuation to the vortex strengthening conditions (Fig. 1b).
- Major stratospheric sudden warming events and vortex intensification events also exhibit similar asymmetry in forecast errors.