

Variability of predictability limits in the Northern Hemisphere stratosphere during recent winters

Tomoko Ichimaru[1]; # Toshihiko Hirooka[1]; Hitoshi Mukougawa[2]

[1] Dpt Earth Planetary Sci., Kyushu Univ.; [2] DPRI, Kyoto Univ.

<http://fx.geo.kyushu-u.ac.jp/>

The predictability in the Northern Hemisphere stratosphere during recent winters from 2001 to 2006 is investigated by the use of ensemble one-month forecast data operationally produced by the Japan Meteorological Agency (JMA), along with the JMA stratospheric assimilated data. In this study, each predictable limit is estimated by a root-mean-square error (RMSE) and an anomaly correlation (AC) in the ensemble-mean geopotential height field on 10 hPa. Winter time stratospheric circulations are generally classified into disturbed and undisturbed phases which are caused by intermittent planetary wave activity. During the disturbed phases, typically in the case of the occurrence of sudden warming events, the RMSE tends to become large while the AC to become low with lead time. The resultant predictability limits widely vary from five to twenty days depending on the cases. However, the results of the two methods show similar tendencies each other. It is also found that the growth of the forecast error is equally brought about by the poor predictability of the behavior of both planetary-wave and zonal-mean fields. On the other hand, as for undisturbed phases with weak planetary wave activity, the predictability limits based on the RMSE become extremely long, while those based on the AC are almost as same as the sudden warming cases. This means that the pattern is less predictable even if the RMSE is small. Such situation is typically seen in the recovery periods of the polar vortex after the occurrence of sudden warming events.