

Stratosphere-troposphere coupling: Predictability variation associated with stratospheric sudden warming eventsShigeo Yoden[†]; Shunsuke Noguchi; Masakazu Taguchi; Hitoshi Mukougawa; Toshihiko Hirooka[†] Kyoto University, JapanLeading author: yoden@kugi.kyoto-u.ac.jp

Intraseasonal and interannual variations in predictability of temperature inside the polar vortex in the northern hemisphere winter are investigated for seven winters of 2001/02 to 2007/8 by the use of operational one-month forecast data produced by the Japan Meteorological Agency (JMA). The ensemble one-month forecast is performed every Wednesday and Thursday from a control initial condition and several couples of perturbed conditions with both signs. In total, 26 or 50 ensemble members are taken for a week with a time-lagged (one-day) ensemble technique. The seven-winter period includes four major stratospheric sudden warmings (SSWs) and some minor ones, characterized by rapid increase of the polar temperature about several ten K within a couple of days. Several measures on the predictability based on the statistical moments of the histograms of ensemble forecasts are studied to characterize the predictability variations associated with dynamical conditions of the polar vortex, which are related to stratospheric sudden warming events or vortex intensification events. A predictability measure known as an ensemble spread undergoes large variability; it is relatively small after an SSW event for typically several weeks, whereas it is larger just before an SSW event. The occurrence of some SSW events (January, 2004 and February, 2008) is well predicted by a large part of the ensemble members with a lead time of one week or so, whereas that in some other cases is more difficult to predict. We also have some examples of the predictions of an SSW event but no realization in the real atmosphere: the real world is in the other tail of the probability distribution of the ensemble forecasts of an SSW event.