

# Intercomparison of dynamical fields in the middle atmosphere revealed in global reanalyses

Toshihiko Hirooka<sup>1</sup> and Yoshio Kawatani<sup>2</sup>

<sup>1</sup> Department of Earth and Planetary Sciences, Kyushu University, Fukuoka, 819-0395, Japan

<sup>2</sup> Japan Agency for Marine-Earth Science and Technology, Yokohama, 236-0001, Japan

Various global atmospheric reanalysis data are used for studies of large-scale atmospheric phenomena. In this study, we compare dynamical fields revealed in various reanalyses, i.e., ERA-Interim, JRA-55, MERRA, MERRA-2, along with JRA-55c which is a reanalysis assimilating conventional meteorological observations only. Here, we use monthly averaged zonal-mean zonal wind and temperature data up to 0.1 hPa for all the reanalyses. We also use Aura Microwave Limb Sounder (MLS) observations for comparison. It is found that differences of the zonal wind among the reanalyses are generally largest in the tropical region and meridionally symmetric with respect to the equator, which increase with height and maximize at the highest level of the analysis, i.e., 0.1 hPa. On the other hand, the temperature field is found to show a feature of increasing differences with height, which have relatively small latitudinal dependence, as seen in Figure 1. The difference between the two fields is mainly due to relatively small constrains of the thermal wind balance near the equator. In the presentation, temporal changes of the differences will be also discussed.

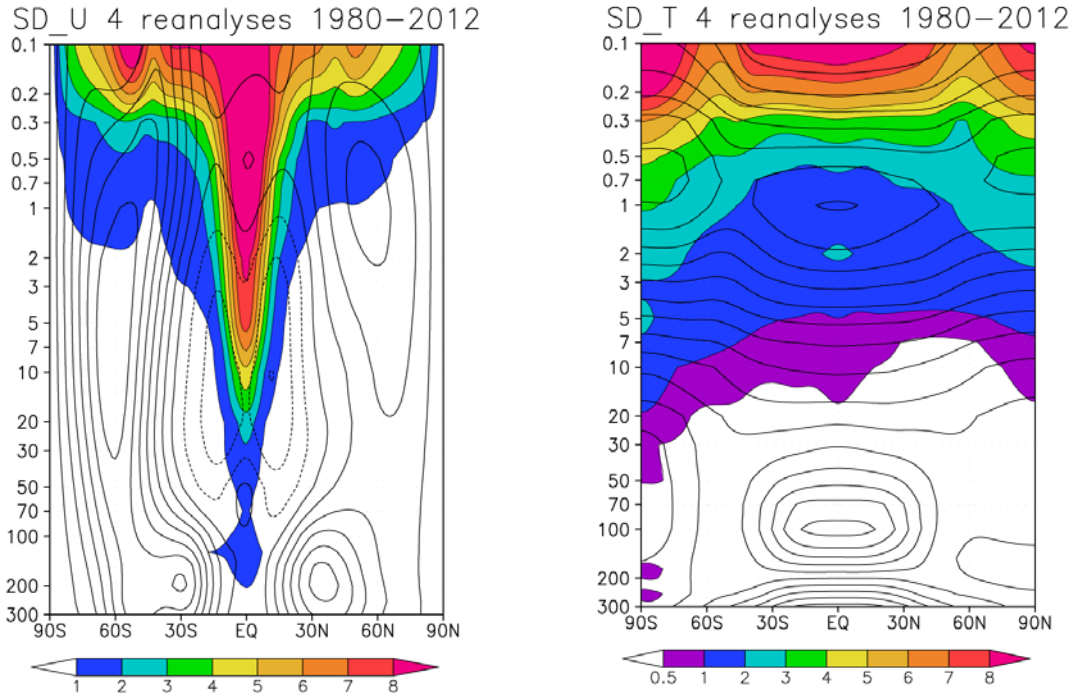


Figure 1. Meridional distributions of the standard deviation for monthly averaged (left) zonal-mean zonal winds ( $\text{ms}^{-1}$ ) and (right) zonal mean temperatures (K) among the four reanalyses, i.e., ERA-I, JRA-55, MERRA, MERRA-2, for the period from January 1980 to December 2012, along with averaged climatological structures.