Comparison of the cloud properties of five modern reanalysis with satellite based products in the TTL

Soheil Salimi[1], Bernard Legras[1] and Silvia Bucci[1]

[1] *Laboratoire de Météorologie Dynamique/IPSL, CNRS/PSL-Univ./Sorbonne-Univ./Ecole Polytechnique, Paris, France*

We compare the cloud distribution and radiative heating rate properties of five modern reanalyses (MERRA-2, JRA-55, CFSR, ERA-Interim, ERA5) in the Tropical Tropopause Layer with satellite products derived from CALIPSO and CLOUDSAT. The reanalyses display a large dispersion of cloud properties, none of them being close to the observations although ERA5, on the overall is the most consistent. The ERA5 cloud distribution shows a smaller and lower mean cover of high clouds than the ERA-Interim although it also has much more vigorous penetrating convection at tropopause level. MERRA-2 is at odd with other reanalysis and the FLXHR satellite product regarding cloud radiative heating by exhibiting a strong cloud long wave radiative cooling in the TTL which is due to an excess of ice at the main cloud outflow level