Global Climate Dynamics, Summer term 2016
Tom Goren / Johannes Quaas

UNIVERSITÄT LEIPZIG

Exercises series 4
Due 25 May 2016

1. Wind fields

(a) Plot and discuss the vertical-meridional distribution of the zonal mean zonal wind for climatological summer, winter, and annual means[1]!

(b) Analyse the vertical gradient of the zonal mean zonal wind [m s^{-1} km^{-1}] !

(c) Analyse the vertical-meridional distribution of the zonal mean meridional [m s^{-1}] and vertical winds[2] [hPa day^{-1}]!

(d) Analyse the stream function[3] [Mt s^{-1}] !

2. Kinetic energy

(a) Plot and discuss the vertical-zonal-temporal average of the zonal wind, $[\bar{u}]$, and the temporal and zonal standard deviations for the zonal and meridional winds, $\overline{\left[\sqrt{u'^2}\right]}$, $\overline{\left[\sqrt{u^{*2}}\right]}$, and $\overline{\left[\sqrt{v'^2}\right]}$, $\overline{\left[\sqrt{v^{*2}}\right]}$, respectively[4]!

(b) Analyse the vertical-meridional distribution of the specific kinetic energy of the zonal-temporal mean flow, and of the stationary and transient eddies!

1 File /home_local/quaas/data/ERA_U_zonmean_mean.nc
2 File /home_local/quaas/data/ERA_V_zonmean_mean.nc and ERA_W_zonmean_mean.nc
3 Use the CDO command mastrfu, and consider for the units that the pressure height is in hPa, not in Pa.
4 Use the files ERA_U_dp50.nc and ERA_V_dp50.nc on levels equidistant in pressure (Δp = 50 hPa). The surface pressure is given in the file ERA__Interim__SP__GDS0_SFC_123__1.5x1.5__198901-200712.nc