

Homework 5
Due 24 May 2017

Problem 1 Eddy transport

The northward transport of sensible heat is $c_p vT$. Recall that the zonal-temporal mean transport can be decomposed into mean circulation, stationary eddies, and transient eddies:

$$c_p [\overline{vT}] = c_p [\bar{v}] [\bar{T}] + c_p [\bar{v}'\bar{T}'] + c_p [\overline{v'T'}] \quad (1)$$

Use the data in `/home_local/jmuelmenstaedt/vT.nc` to plot the three terms on the right-hand side of (1) in the p - ϕ plane. *Note that the most efficient way to perform this calculation is probably to use cdo commands such as `timmean`, `zonmean`, and `mul`.* Explain the features.

Problem 2 Tropical circulation revisited

- (a) Last week, you plotted the annual-mean mass streamfunction. As we know from lecture, the Hadley circulation has a strong seasonal cycle. Using the files `/home_local/jmuelmenstaedt/ERA_jja.nc` and `ERA_djf.nc`, plot the contours of the streamfunction for DJF and JJA.
- (b) `ERA_jja.nc` and `ERA_djf.nc` also contain the fractional cloudiness. Overlay the cloud cover as a heat map.
- (c) Plot the geographic distribution of convective precipitation in `/home_local/jmuelmenstaedt/ERA_jja_pr.nc` and `ERA_djf_pr.nc`. Explain the features of the seasonal cycle.