

651-2124-00:

Atmospheric General Circulation Dynamics (HW 3, due April 18):

1. **Hadley circulation.** Global warming will lead to an increased static stability (buoyancy frequency N) of the tropical atmosphere because the stratification is nearly moist adiabatic, and a moist adiabat at higher temperatures is associated with greater (dry) static stability. Discuss how that may affect the Hadley circulation. Consider two limiting cases:
 - (a) A Hadley circulation in the angular momentum–conserving limit with $Ro \rightarrow 1$ in the upper branch.
 - (b) A Hadley circulation in the eddy-driven limit with $Ro \rightarrow 0$ in the upper branch.

2. **Monsoons.** Discuss how global warming may affect Earth’s large-scale monsoons (especially the South Asian monsoon). In particular:
 - (a) How is monsoonal precipitation expected to change as the climate warms?
 - (b) Can you speculate how the monsoonal mass fluxes may change?
 - (c) What do mass flux changes imply about changes in zonal surface winds in the monsoon region?