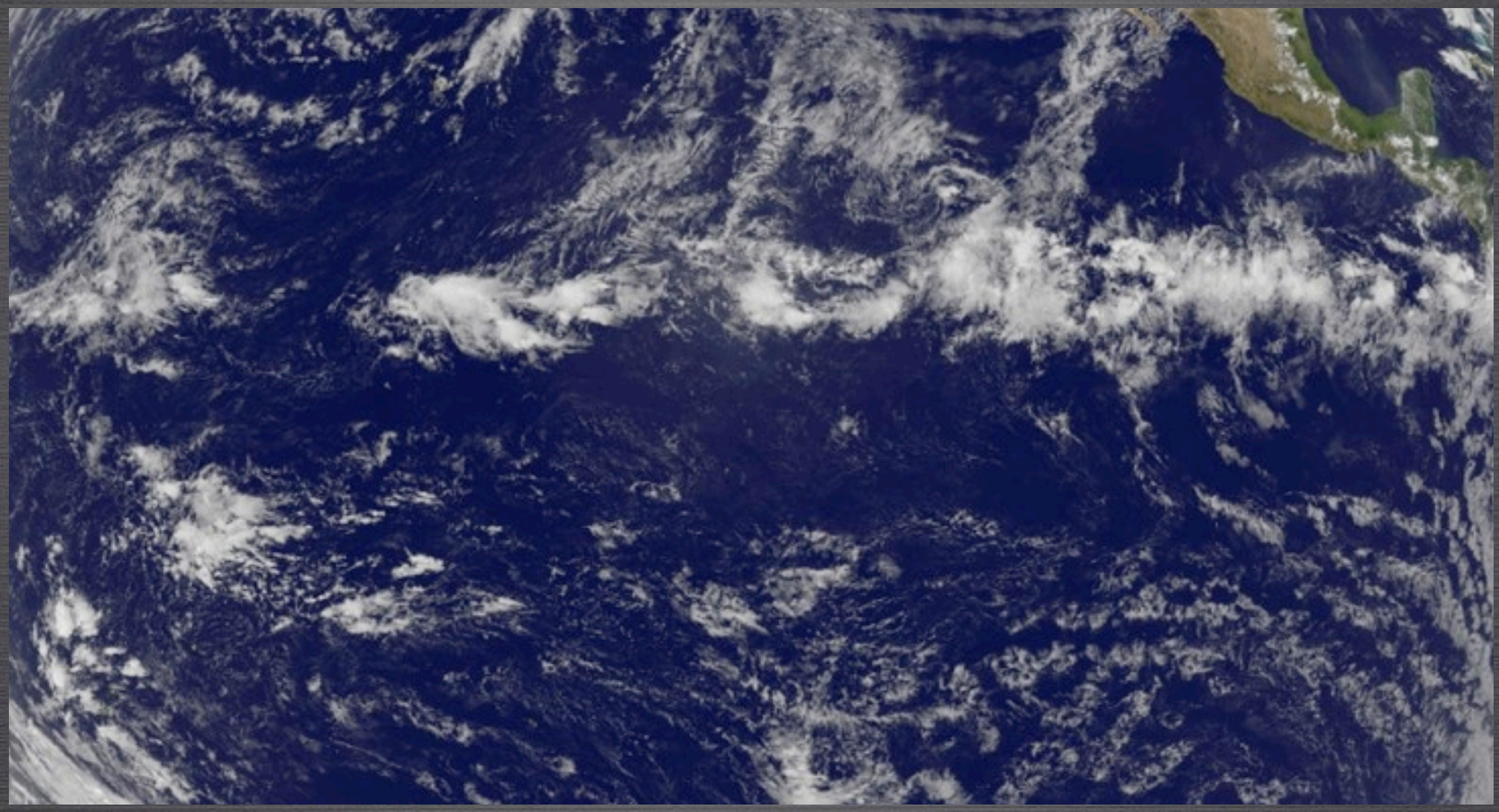


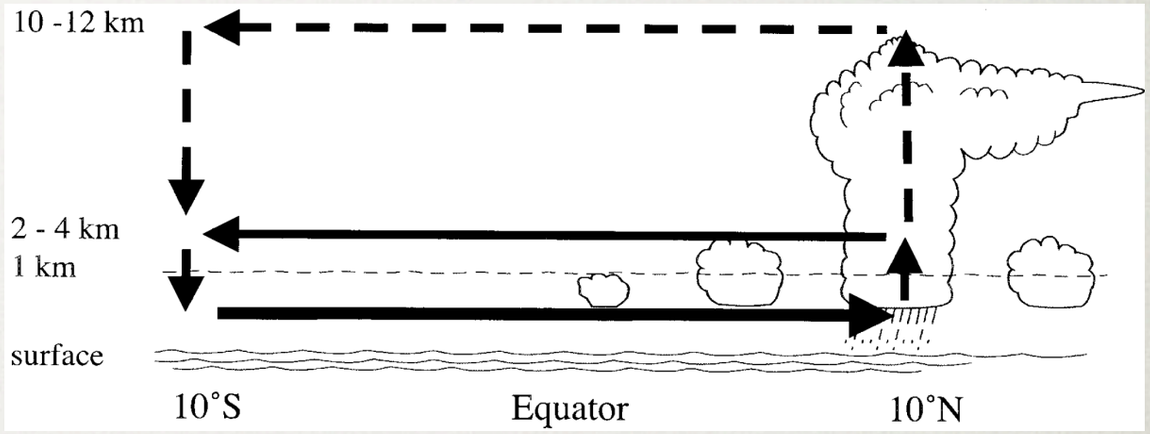
The Intertropical Convergence Zone in the Eastern Pacific

Alex O. Gonzalez

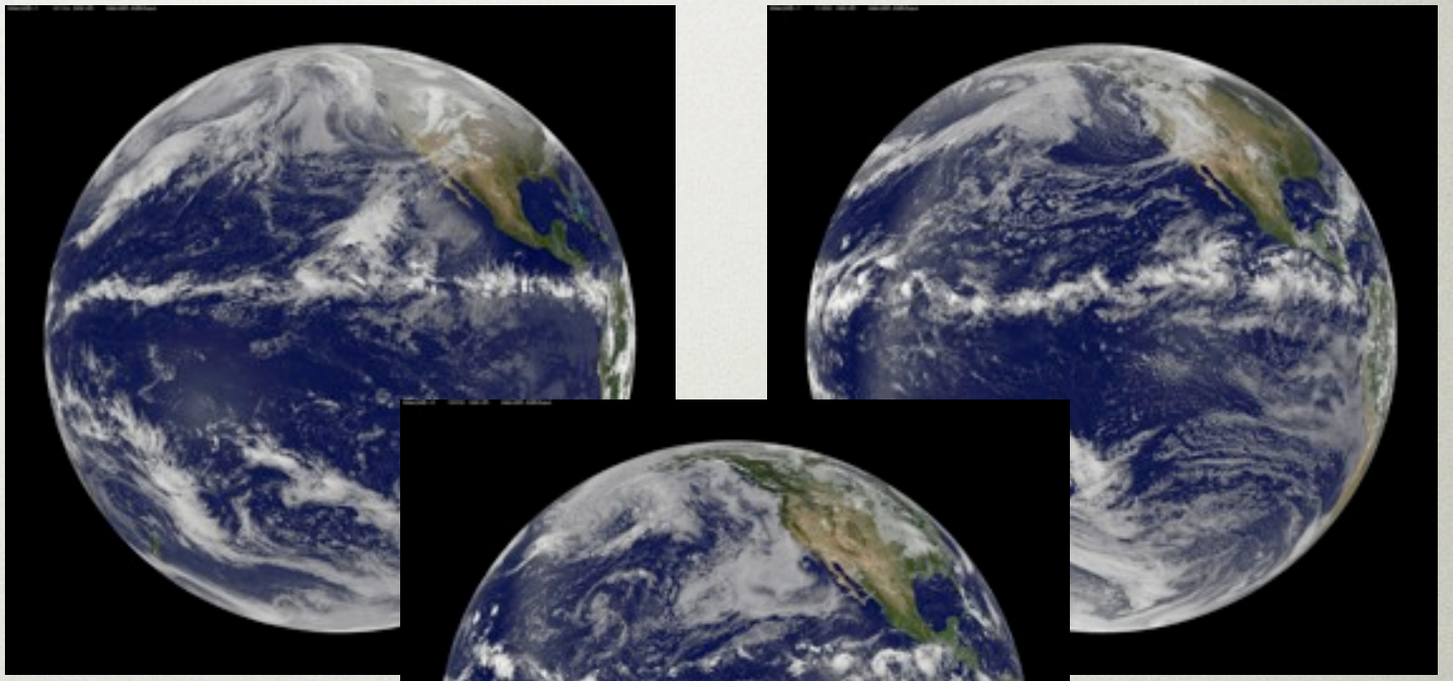
What's the ITCZ? Who cares?

My research projects

- Bimodal structure of circulations and convection



- Thin, zonally-elongated bands of convection and Ekman pumping at the top of the boundary layer

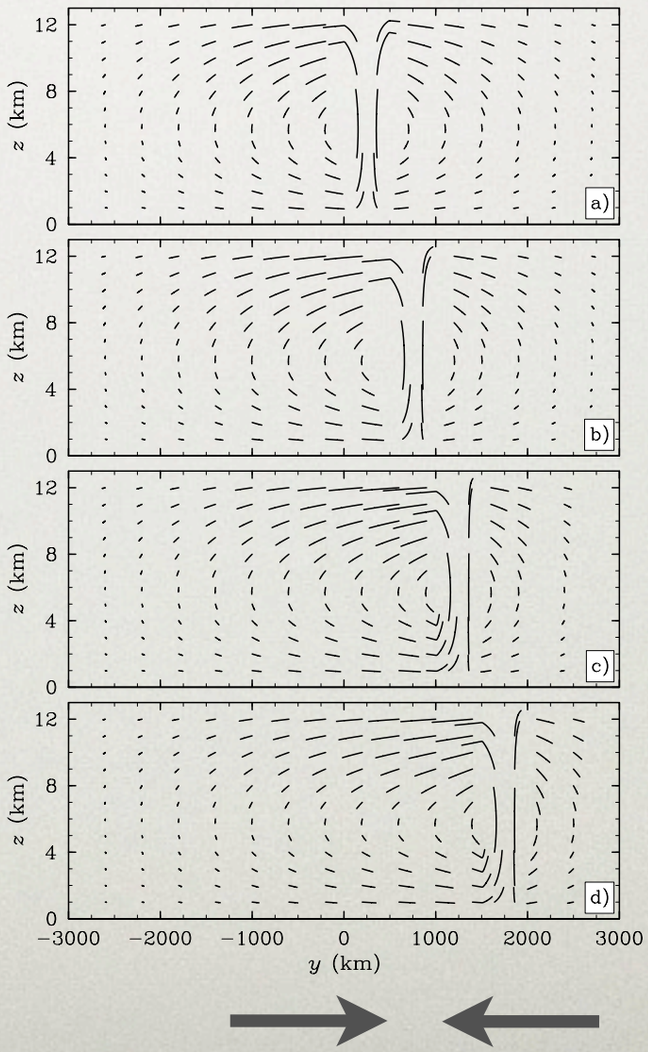


- ITCZ breakdown due to instabilities in the zonal winds

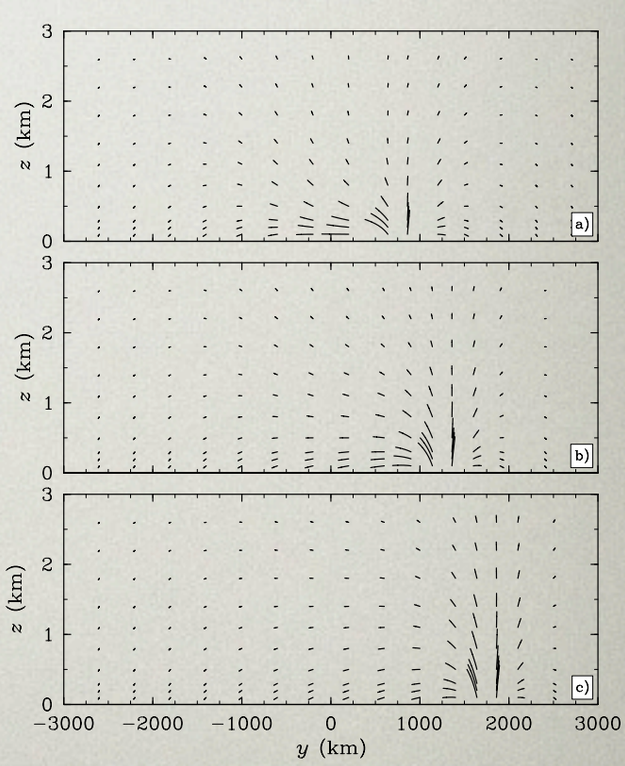
Deep and shallow circulations

- The traditional Hadley circulation is an overturning circulation driven by diabatic heating in the ITCZ and subsidence across the equator with divergence near the tropopause
  - Transports mass, momentum, and converts energy
- Zhang et al. (2004) observed an overturning circulation in the East Pacific with rising motion in the ITCZ and subsidence across the equator with divergence around 2-4 km
  - Nolan et al. (2007) suggested that this shallow circulation is a vital component to the tropical moisture budget

DEEP HADLEY

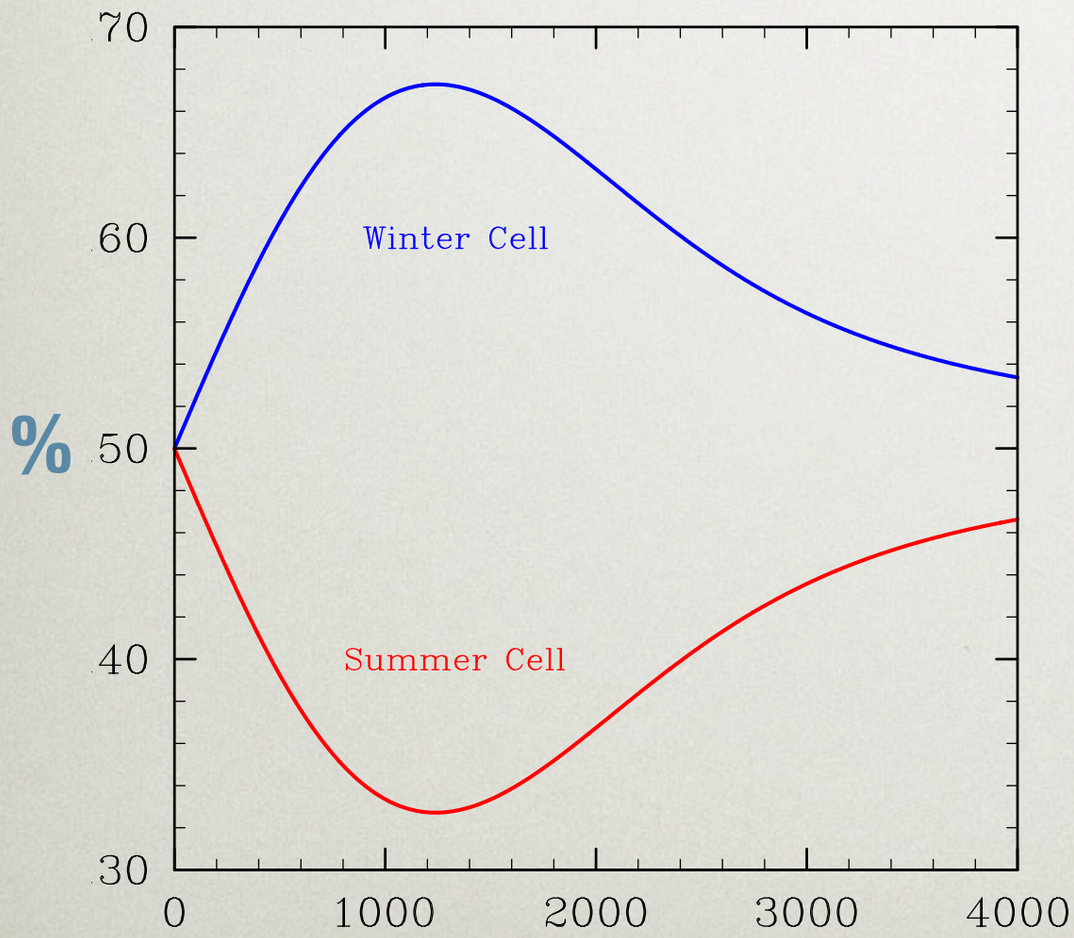


SHALLOW HADLEY

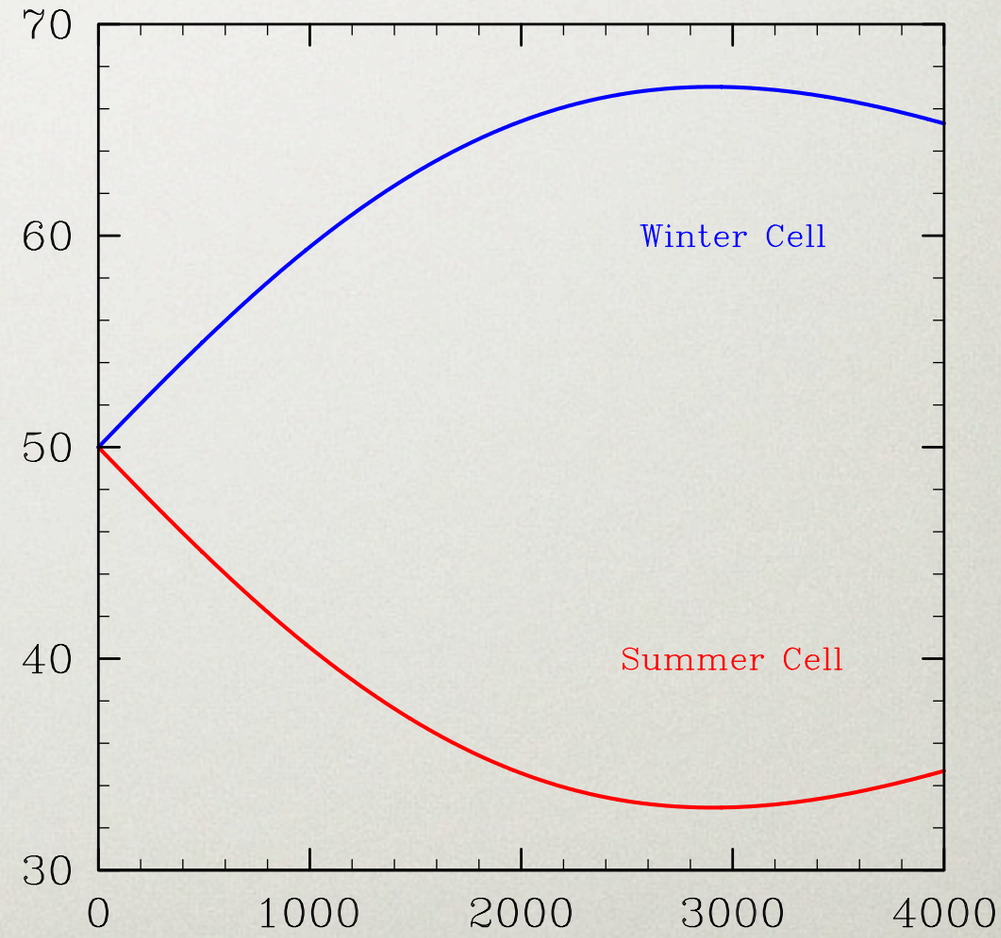


Asymmetry of Hadley cells

DEEP HADLEY

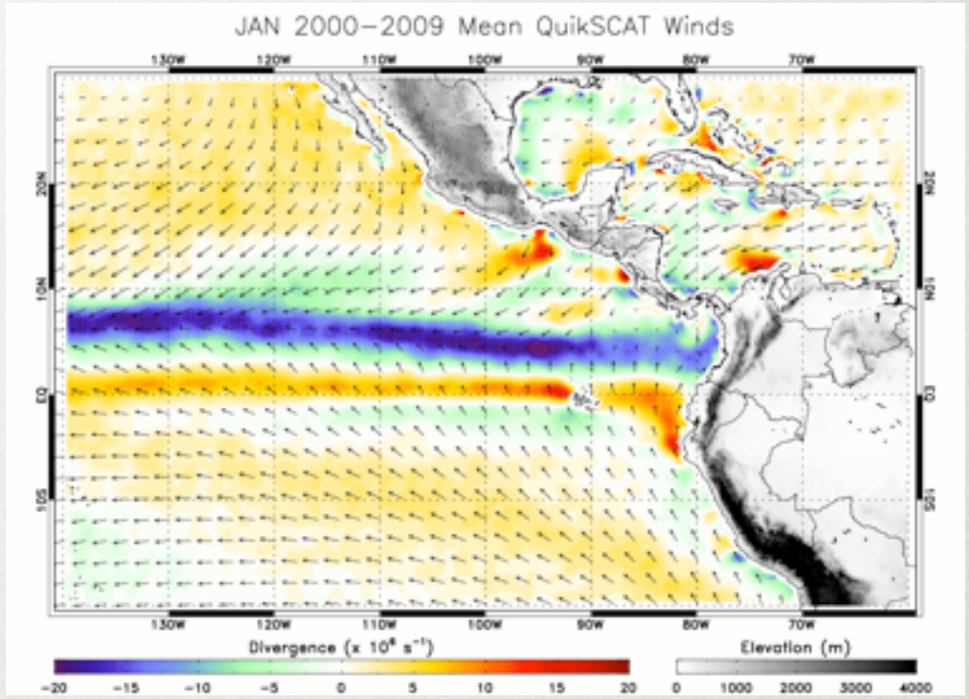


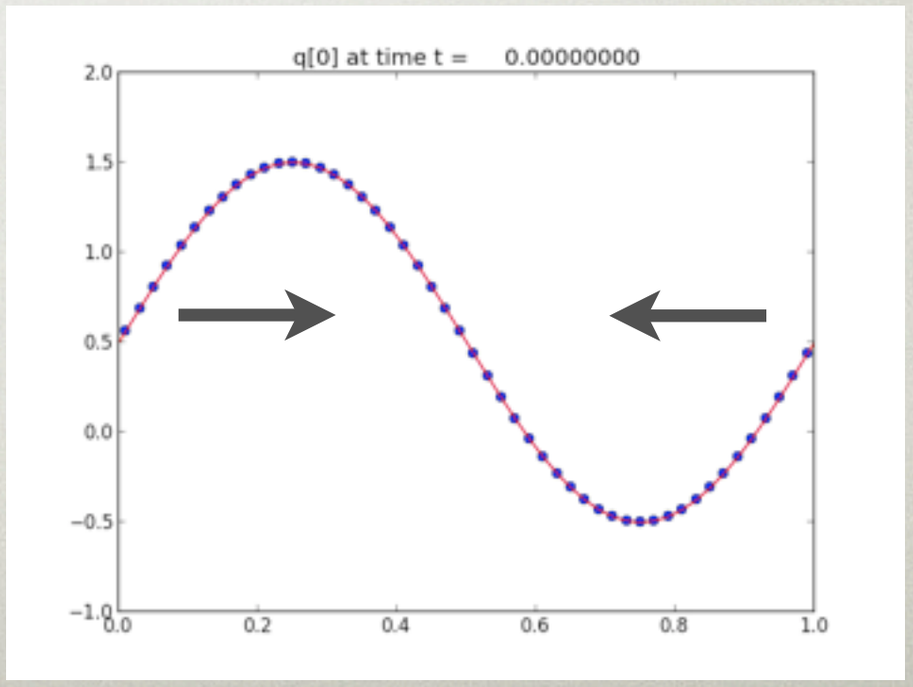
SHALLOW HADLEY



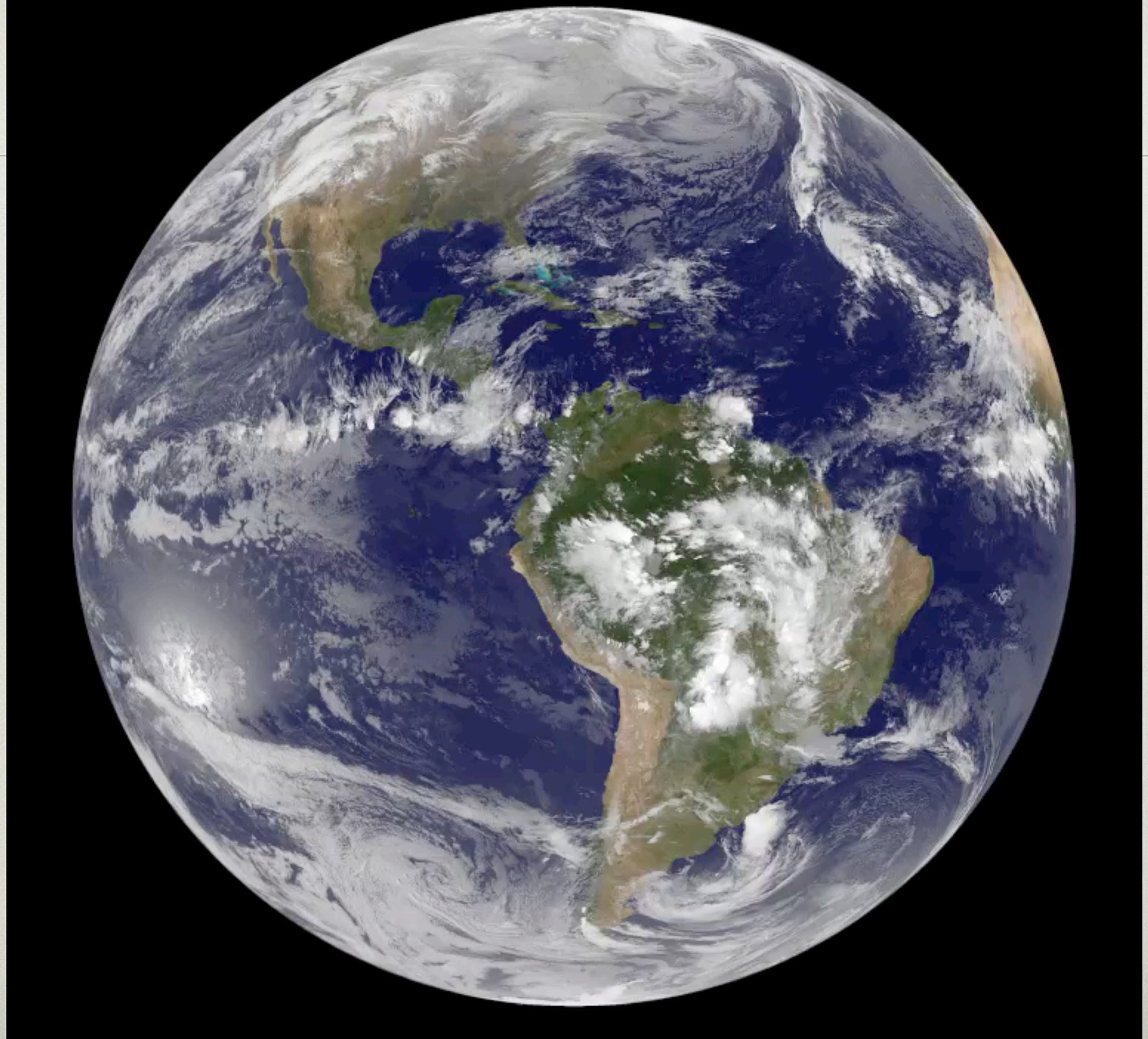
Thinning of the ITCZ

- The ITCZ boundary layer is a region of significant meridional convergence and large meridional winds
- The boundary layer equations have an embedded Burgers' equation (Burgers 1948)
  - Advection of the divergent component of the meridional winds
- Result: Broad convergence region thins out over time leading to a thin ITCZ





NOAA GOES 13 121130 2345 UTC NASA GSFC GOES Project



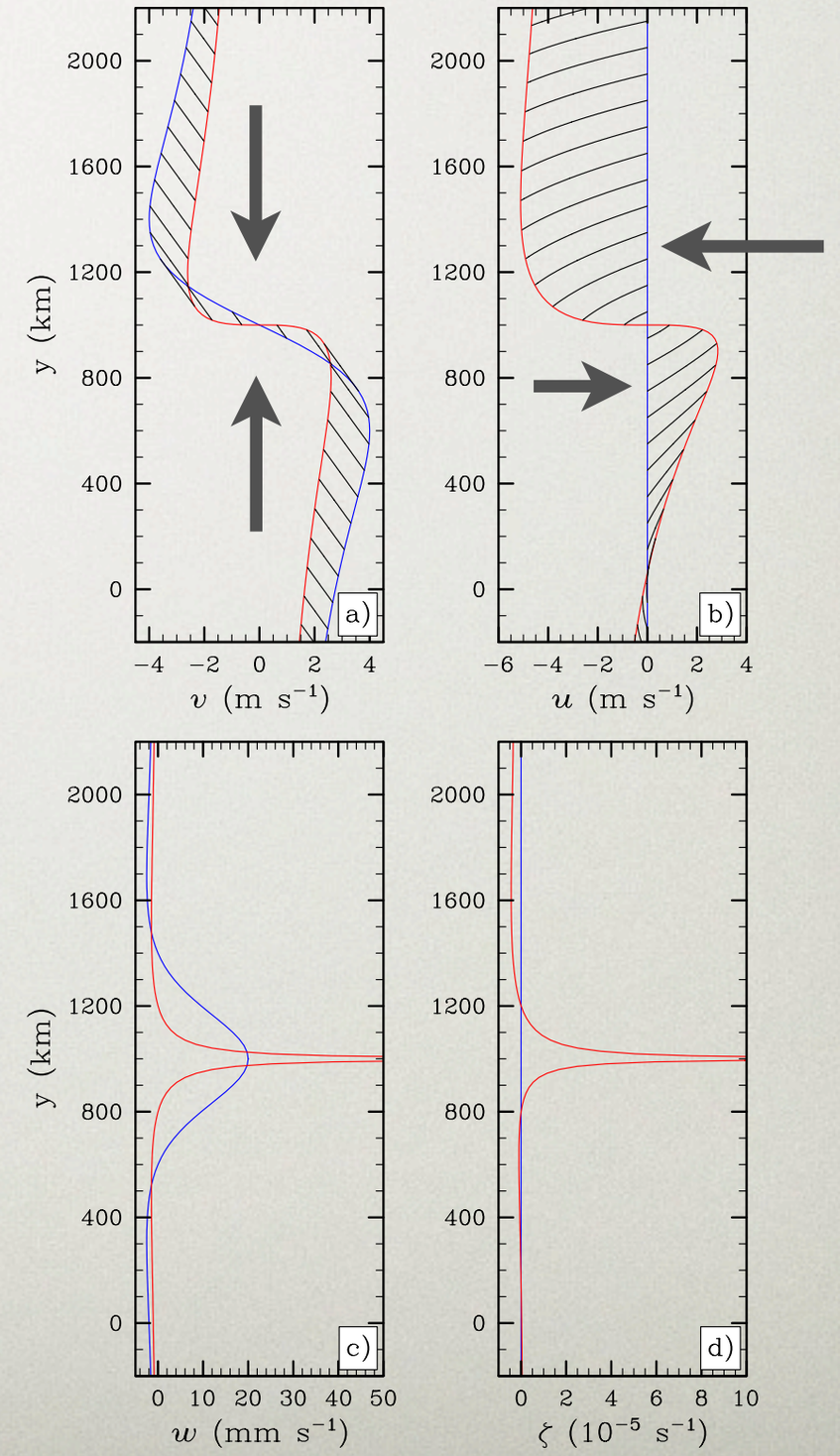
Model of shock-like ITCZ

- Initial fields (blue) plotted along with fields just before shock (red) for zonal winds, meridional winds, Ekman pumping, and relative vorticity

- Black lines indicate the temporal and spatial change in particular field

- More complex numerical model is in the works to simulate thinning process of the ITCZ

- More observations needed: 10 minute observations of ship data during EPIC are to be used



THE END!

- Bimodal circulations plot from Zhang et al. (2004)
- Satellite Imagery and video from the NASA GOES Project
- Brian McNoldy provided divergence plots
- SeaWinds on QuikSCAT Level 3 Daily Gridded Ocean Wind Vectors provided by PO.DAAC at the NASA Jet Propulsion Laboratory
- Numerical simulation of Burgers' equation from CLAWPACK website
- All other plots produced by Alex Gonzalez