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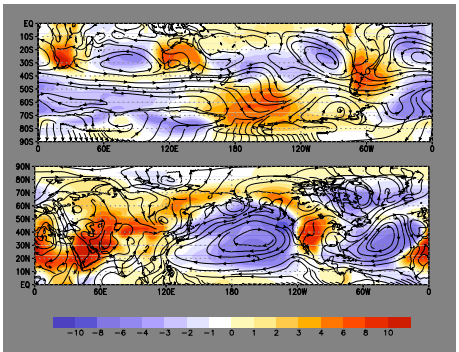
Background

e summertime subtropical circulation can be loosely characterized as a sequence rmal cyclonic flows located predominantly over land and anticyclones located minantly over ocean. The nic flows over land are often lated with regions of heavy ɔitation which can be labeled as oons. The subtropical rclones are characterized by vely dry sinking air and are often npanied by vast regions of marine cumulus clouds. As with the American monsoon and eastern c anticyclone, subtropical rclones are almost always found west of monsoon lows. Given the mity of these two features, it is priate to study the monsoon and rclone as a single dynamical n.

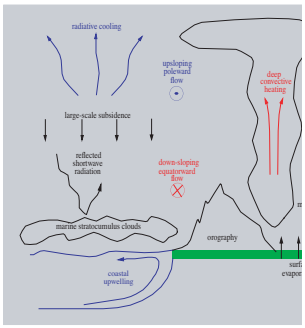


Deviation from the zonal mean temperature anomalies at 850 hPa and streamlines also at 850 hPa.

the figure shows, monsoon-anticyclone systems can be seen straddling the west of South America, Australia, North America, and Africa.

Purpose and Scope

The overall goal of this study is to quantify feedback mechanisms found the South American climate system by perturbing either the model physic boundary conditions. In order to isolate the fundamental mechanisms con the monsoon-anticyclone system, we begin the study by using idealized boundary conditions to simulate a prototypical monsoon-anticyclone pair. These initial experiments are atmosphere-only experiments with fixed SST. By better understanding the relationship between the fundamental components of the South American climate system, we will be able to better understand the mechanisms that lead to variability in that climate system.



The figure to the right summarizes this rather complex, and possibly highly coupled, system. Convective heating forces moisture convergence over the and leads to the generation of a low-level cyclone. The relatively cool ocean west of the monsoon forces sinking motion. The geostrophically balanced meriodial wind is equatorward and forces coastal upwelling that further co SST and may lead to the presence or enhancement of marine stratocumulus presence of the stratocumulus and the relatively dry air aloft both tend to fu cool the air column and force additional sinking motion.

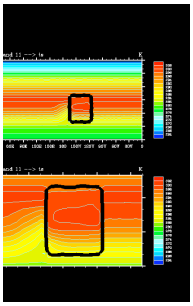
Experimental Setup

present results from three atmosphere-only integrations:

Aqua Planet with zonal symmetric SST

Land Mass with same SST and an idealized land mass included

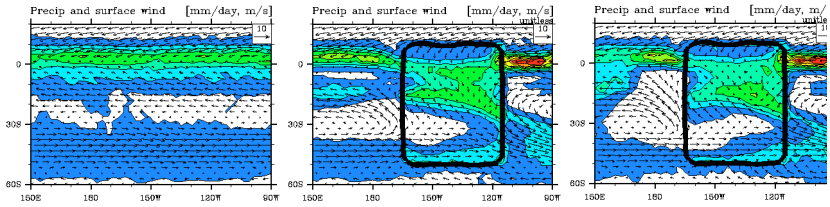
Coastal SST Anomaly that includes a negative SST anomaly along the west coast of the land mass.



The figure (left) shows the surface temperature (shading) for the Coastal SST Anomaly experiment. The land mass is shown by the thick black line. The bottom part is a close-up of the region of interest.

All forcings are consistent with the Southern Hemisphere summertime conditions. We integrated each of these simulations for 500 model days after spinup. The SST and incident solar radiation are held constant during the integration; these are perpetual season simulations.The ground wetness is held fixed to prevent excessive drying of the soil.

Results



Conclusions