

*UW Graduate Climate Conference 2006:  
abstract for presentation*

The partition of heat transport in a simple coupled  
climate model

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Dynamical heat transports in the atmosphere and ocean play a central role in the climate system by greatly reducing the pole-to-equator temperature difference. However, the mechanisms that set the partition of heat transport between the two fluids are not well understood. We seek a better understanding of this partition in order to make sense of the widely varying climate states of the Earth's past. Since the oceans are set in motion by the wind stress, it seems reasonable that the surface wind should play an important role in any theory of the partition.

I will describe a very simple, zonally averaged atmospheric model with eddy processes parameterized according to a mixing length theory for potential vorticity. This model is simple to solve and obeys global momentum and energy constraints; and yet it is capable of reproducing many of the gross features of the general circulation, including the surface wind pattern. This simplest of GCMs is coupled to an equally simplified ocean model via the surface wind stress and the heating. We will look at equilibrium solutions of this coupled model and try to glean some insight into the partition problem. In particular, we find that the atmospheric heat flux dominates over the oceanic flux in mid-latitudes due to its much more intense residual overturning circulation.

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