**國立中央大學大氣物理研究所書報討論**

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**Moisture and Energy Transports by Tropical Convection:**

**Contrast between Deep and Shallow Modes**

**Abstract**

In this thesis, we identified dominant modes of tropical convection and examined their roles in transporting moisture and energy in a climatological sense. Four types of convection are identified in the Tropics based on the ERA-interim reanalysis data. The first two types have a two-layer, baroclinic structure, with air converging into the convective center at low levels and diverging aloft; while the other two types have a three-layer, baroclinic structure, with air converging (or diverging) at midlevels and diverging (or converging) at lower and upper levels. The roles of different types of convection in transporting atmospheric column moisture and moist static energy (MSE) are further examined. We find that the first two types of convection with a two-layer, baroclinic structure exhibit distinct tendencies between moisture and MSE transports. That is, although both types of convection tend to moisten the atmospheric column, they often show opposite results in transporting MSE. A top-heavy convection exports the column MSE, resulting in a stabilization of the atmosphere; while a bottom-heavy convection imports the column MSE, resulting in a destabilization of the atmosphere. In contrast, the two types of convection with three-layer, baroclinic structure show a consistent tendency between moisture and MSE transports. The convection with air converging at midlevels exports both the column moisture and MSE, resulting in a quick stabilization of the atmosphere, and the convection with air diverging at midlevels imports both the column moisture and MSE, resulting in a rapid destabilization of the atmosphere. Finally, we analyze the contribution of precipitation in moisture budget and examine the types of precipitation in the tropical convection zone for these four convective structures.

**關鍵字**

Energy budgets 能量收支

Baroclinic mode 斜壓模