

A Useful Thermodynamic Framework for the Diagnostic of Tropical Climate variability

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ABSTRACT

A moist thermodynamic framework for tropical climate studies is constructed based on a primitive equation model which includes the momentum, hydrostatic, continuity, temperature and moisture equations. It represents a useful framework for the diagnosis of tropical variability in regions dominated by cumulus convection of various types, including cumulonimbus (typically having a top-heavy heating structure associated with heavy rainfall), congestus (typically having a bottom-heavy heating structure associated with light rainfall) and trade cumulus (generally accompanied by a low-level ascending topped by an inversion layer due to descending above with virtually no rainfall). Some preliminary results are presented, focusing on modeling the time-mean tropical climate, along with some applications to accounting for changes of climate variability associated with global warming.

Keywords: moist thermodynamic framework, climate variability