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Gross Moist Stability Assessment during TOGA COARE: Various Interpretations of Gross Moist Stability

Abstract

The Gross Moist Stability (GMS) is a special physical quantity that can characterize the evolution of convection associated with large scale circulation, which can be defined as the transportation of moist static energy (MSE) per unit intensity of convection. For GMS application, two quantities are introduced, called the drying efficiency and the critical GMS. The drying efficiency determines amplifying phase/decaying phase of the convection development accompany with top heavy/bottom heavy structure. In addition, the critical GMS is a quasi-time independent quantity which represents the effect from diabatic forcing.

The TOGA COARE data are used in this study to investigate the convective amplification/decay mechanism. By conducting the composite analysis, the authors illustrate the convective amplification/decay through the transport of MSE via the top heavy/bottom heavy structure using horizontal and vertical component of GMS. Furthermore, the authors show the characteristic GMS can be interpreted as (i) the critical GMS, (ii) the GMS of maximum precipitation and (iii) combination of different feedback process. And these concepts can summarize the convective life cycle on the GMS plane, as the rapid fluctuation along the quasi-time independent characteristic GMS line.

Keywords

Moist Static Energy (溼靜能)

Gross Moist Stability (粗溼穩定度)

Reference

Inoue, K., and L. E. Back, 2015: Gross Moist Stability Assessment during TOGA COARE: Various Interpretations of Gross Moist Stability. *J. Atmos. Sci.*, **72**, 4148–4166, <https://doi.org/10.1175/JAS-D-15-0092.1>.