國立中央大學大氣物理研究所書報討論

Date：2025/03/28

Location：S1-713

Speaker：Chi-Yang,Lin

Advisor：Prof. Jia-Yuh Yu

Robust and Nonrobust Impacts of Atmospheric Cloud-Radiative Interactions on the Tropical Circulation

Abstract

The influence of cloud-radiative interactions on tropical circulation is investigated using an aquaplanet model simulation with prescribed sea surface temperatures from global atmospheric models. By comparing simulations with and without cloud-radiative interactions, we assess their impact on the Hadley Cell.

When cloud-radiative interactions are included, we analyze their effects using several metrics, including ascent strength, ascent width, descent strength, descent width, Hadley Cell strength, Hadley Cell width, tropical mean precipitation, and peak precipitation. The Hadley Cell strengthens, tropical ascent becomes narrower and more intense, and subtropical descent expands. Additionally, tropical mean precipitation decreases, while peak precipitation increases. These effects are consistently observed across models and are linked to the energetic and mass constraints of the tropical atmosphere.

Keyword

Cloud radiative interaction

Atmospheric cloud radiative effect(ACRE)

Reference

Albern, N., Voigt, A., Buehler, S. A., & Grützun, V. (2018). Robust and nonrobust impacts of atmospheric cloud-radiative interactions on the tropical circulation and its response to surface warming. Geophysical Research Letters, 45, 8577–8585. https://doi.org/10.1029/2018GL079599