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CONVECTIVE ORGANIZATION, CLOUDS AND ITCZS

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en salle Joël Noilhan

Résumé :

In this talk I will show how different diabatic effects in the atmosphere can substantially affect the structure of zonal-mean precipitation and the intertropical convergence zone (ITCZ) in aquaplanet experiments. In the first part of the talk I will show how atmospheric cloud-radiative effects (ACRE) affects the tropical zonal-mean precipitation in a developmental version of the new GFDL atmosphere model. The results suggest that longwave and shortwave ACRE have an opposite effect, with the longwave ACRE pulling the ITCZ towards the equator and the shortwave ACRE pushing it away from the equator. The mechanism by which the ACRE affects the ITCZ position involves changes in the meridional heating gradient by the ACREs. The altered heating gradients change the strength of the atmospheric overturning circulation and thereby affect the zonal-mean meridional advection of low-level moist static energy. This change in zonal-mean meridional advection then alters the distribution of low-level moist static energy and thereby the distribution of convection and precipitation. However, not only diabatic changes in the meridional direction can alter the zonal-mean precipitation but also changes in purely zonal direction as I will show in the second part of the talk. We performed simulations in which we impose zonally varying evaporation patterns that force convection into desired zonal patterns in the IPSL model version 5A-MR and found that substantially change the mean-meridional circulation and the entire ITCZ structure. This occurs because more organized convection draws a larger fraction of moisture in zonal direction, thus reducing the net moisture convergence in meridional direction leading to a wider ITCZ.

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