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CLOUDS, WATER VAPOR AND JET SHIFTS IN CMIP5 AQUAPLANET SIMULATIONS

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en salle de conférences Joël Noilhan

Résumé :

I will present recent work on how clouds and water vapor radiatively impact the response of the large-scale atmospheric circulation to global warming. Specifically, I will be looking at the aquaplanet fixed-SST simulations with the CMIP5 atmosphere models MPI-ESM and IPSL-CM5A. Using the cloud and water-vapor locking method, the simulations show that clouds and water vapor impact the thermodynamical state of the atmosphere by creating meridional and vertical temperature gradients in the upper troposphere and lower stratosphere (UTLS). Through their influence on tropical stabilitity and the height of the extratropical tropopause, these gradients affect the location of the subtropical Hadley cell edge and the mid-latitude jet. As a result, clouds amplify the poleward jet shift under global warming whereas water vapor opposes it. An analysis of the model spread in the UTLS temperature response suggests that the 2 degree model spread in the jet shift that is found in the CMIP5 aquaplanet ensemble is, at least partly, caused by model spread in the changes of clouds and water vapor in the UTLS region.