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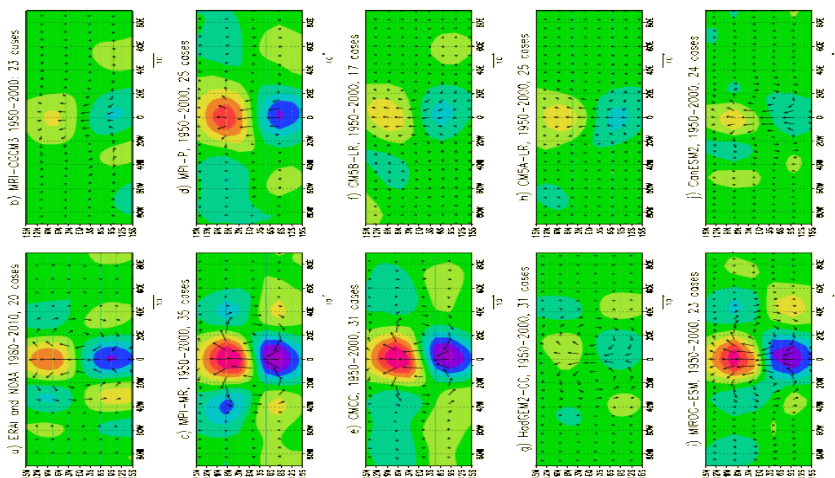
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F. Lott (LMD)**Equatorial waves in some CMIP5 coupled models (with stratosphere)**

F. Lott , P. Maury (LMD, Paris)

The Kelvin and the Rossby Gravity Waves (RGWs) packets that dominate the day to day variability in the low equatorial stratosphere (50hPa) are analyzed in 7 ESMs that participate to CMIP5 and that include a well resolved stratosphere. The results are compared to ERAI. Two models are also used to quantify better (i) the impact of the QBO on these waves (MPI-P and MPI-MR), and (ii) the impact of convection (IPSL-CM5A and CM5B).



Drawing 1: Structure caractéristique des ondes de Rossby gravité équatoriale dans la basse stratosphère de 9 modèles participant à CMIP5

In the stratosphere all models present quite coherent Kelvin waves and RGWs packets, which is good think since these waves dominate the day to day variability in the low stratosphere. The errors on these freely propagating waves seem therefore less pronounced then the differences seen by others on the convectively coupled waves in the troposphere. The difference between the models nevertheless stay very large, the models with a QBO have more pronounced waves, and

represent better their life-cycle (this is particularly true for the RGWs). The sensitivity to the convection of the rather slow waves analysed here is not as pronounced as was found in the past for may be faster waves, but is nevertheless confirmed when we look at the same model with two drastically different convection parameterization. In the same spirit, the sensitivity of the RGWs to the QBO is confirmed by comparing almost the same model runs, one with a QBO and one without. Having a QBO nevertheless does not guarantee that the waves are realistic in all respects, as shows for instance the Temperature signature due to the RGWs in the UKMO model. There also seems to have an issue when the resolution changes drastically, the MRI model behaving quite differently from the other models when it comes to the simulations of these equatorial waves.

1. Lott, F. and 10 co-authors, Kelvin and Rossby gravity waves in the lower stratosphere of some CMIP5 models, In preparation.
2. Maury, P. , F. Lott, L. Guez, and J.-P. Duvel, 2011: Tropical variability and stratospheric equatorial waves in the IPSLCM5 model, *Climate Dynamics*, 31 Dec. 2011, 11-14. DOI 10.1007/s00382-011-1273-0.
3. Lott, F., J. Kuttippurath, and F. Vial, A Climatology of the Gravest Waves in the Equatorial Lower and Middle Stratosphere: Method and comparison between the ERA-40 re-analysis and the LMDz-GCM, *Journal of the Atmospheric Sciences*, 66, 1327-1346, 2009.