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Title: "Explaining Satellite Passive Microwave Rainfall Biases Over Land via Large-scale Environment"

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Short Abstract:

Satellite microwave rainfall retrievals currently base their land algorithms on an observed mean relationship between high frequency brightness temperature depression and rainfall rate. Sensitivity of the retrieval to changes in the amount of ice in the cloud relative to rainfall results in biases of rainfall estimates whenever a non-typical cloud structure is observed. To address these biases, we use the ERA-Interim dataset to investigate how the environmental conditions preceding the storm development relate to this ice vs. rainfall relationship. In the first part of the study, variables such as CAPE, wind shear, and vertical humidity profiles are found to be capable of predicting this ratio and removing up to 30% of the rainfall bias over regions of the Amazon and central-west Africa. These regional differences are shown to correspond well with a map of TRMM radar to radiometer biases of rainfall. They are also aligned with differences between mean reflectivity profiles of raining systems and level of convective organization in the two regions. Using these findings, in the second part of the study, we seek for improvement in the GPROF rainfall estimates in reference to ground observations over the south-east US. The Multi Radar/Multi Sensor (MRMS) ground network is utilized to address sensitivity of the satellite retrieval to its a priori database structure. Analyses are expected to reveal environmental conditions related to the differences in rain rate distributions of spaceborne and ground estimates. In addition, the links between the environment and convective regimes are expected to help the rainfall estimates when only GOES observations are available.

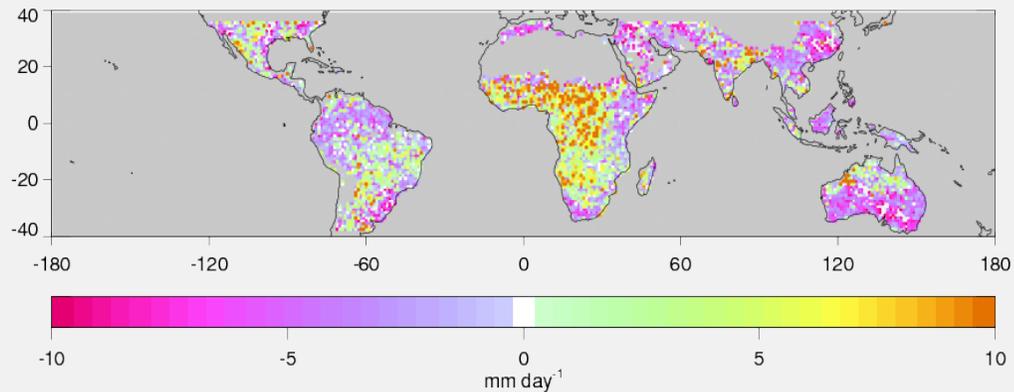
# Explaining Satellite Passive Microwave Rainfall Biases Over Land via Large-scale Environment



Veljko Petković and Christian Kummerow



Differences between TRMM's PR and TMI daily rain rates



Reveiling the links between:

- Regional Biases of GPROF and Ice-to-Rain Ratio
- Ice-to-Rain Ratio and Precipitation Regime
- Precipitation Regime and Large-scale Environment