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Title: Precipitation Type form PMW observations: Addressing Uncertainties Through Bayesian Deep Learning

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Abstract: Satellite-borne passive microwave (PMW) radiometers and the associated research on their precipitation retrievals deliver a highly accurate understanding of global total precipitation. Still, at regional scales PMW precipitation retrievals are prone to large systematic errors due to their limited ability to accurately relate changes in surface precipitation to the changes in radiometric signatures induced by varying cloud microphysics. A key role in generating accurate estimates of precipitation at regional and sub -regional scales is seen in proper classification of precipitation type, convective vs. stratiform. This work presents a study on using a Bayesian Deep Learning to deliver accurate classification of precipitation type and its uncertainty. Specifically, it adopts a Bayesian form of Residual Networks (ResNet) architectures to extract the information from PMW observations vectors and identify the structural differences of cloud systems while providing, per pixel, classification uncertainty estimates. Additionally, the model offers quantitative insight on the origin of the output uncertainty. Reported accuracy exceeds 90%.

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