MMM SEMINAR SERIES

Dependence of the Ice Water Content and Snowfall Rate on Temperature, Globally: Comparison of In-Situ Observations, Satellite Active Remote Sensing Retrievals and Global Climate Model Simulations

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Cloud ice microphysical properties measured or estimated from in-situ aircraft observations are compared to global climate models and satellite active remote sensor retrievals. Two large data sets, with direct measurements of the ice water content (IWC) and encompassing data from polar to tropical regions, are combined to yield a large database of in-situ measurements. The intention of this study is to identify strengths and weaknesses of the various methods used to derive ice cloud microphysical properties.

The in-situ data are measured with total water hygrometers, condensed water probes, and particle spectrometers. Data from polar, midlatitude and tropical locations are included. The satellite data are retrieved from CloudSat/CALIPSO (2C-ICE, 2C-SNOW-PROFILE), and GPM (Level2A). Although the 2C-ICE retrieval is for IWC, we developed a method to simulate the IWC to get snowfall rates (S). The GPM retrievals are for snowfall rate only. Model results are derived using the Community Atmosphere Model (CAM5) and the UK Met Office Unified Model.

The retrievals and model results are related to the in-situ observations using temperature, and partitioned by geographical region. Specific variables compared between the in-situ observations, models and retrievals are the IWC and S. The retrieved IWCs are reasonably close in value to the in-situ observations whereas the models are relatively low. Differences between the in-situ IWCs and those from the other methods are compounded when S is considered, leading to model snowfall rates that are considerably lower than the in-situ data. Anomalous trends with temperature are noted in some instances.

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Thursday, 19 May 2016, 3:30 PM
Refreshments 3:15 PM
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