Improving GOES-R Precipitation Products Associated with Deep Convective Systems by using NEXRAD Radar Network over the Continental U.S.

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Accomplishments thus far

- The new hybrid classification algorithm has been developed using both NEXRAD and GOES observations;
- Applied the new classification to precipitating and anvil clouds, and then compared with SCaMPR rainfall against Q2 radar rainfall in different cloud types;
- Analyzed the GOES optical depth and particle size over different regions of DCS, and found there are large differences in microphysical properties for different regions;
- Compared the aircraft in-situ measurements with NEXRAD observations during MC3E;
- Using CloudSat and CALIPSO datasets, DCS has been identified globally, its frequency of occurrences has been averaged to 5° × 5° grids, and the geographical distributions of DCS have been sorted by the averaged cloud top height of its convective core.

Accomplishments anticipated at end of Year 2

- Dr. Dong's Ph.D student, Ms. Ning Zhou, has been collecting the surface, satellite and aircraft data for MC3E IOP, and will compare the MODIS/GOES/GOES-R proxy cloud properties those have been used in NOAA GOES-R SCaMPR precipitation product.
- Dr. Dong's Ph.D student, Dr. Zhe Feng, is writing a paper related to continental DCS lifecycle, which will help us to understand the precipitation lifecycle.
- Dr. Dong has recruited one more MS student, starting this summer, to use NEXRAD Q2 products to evaluate the SCaMPR precipitation results over continental USA.
- Dr. Li's group will continuously provide MODIS/CloudSat/CALIPSO results for Dr. Dong to be used in Dr. Dong's hybrid classification algorithm. Eventually we will provide guidance for NOAA collaborator to improve the accurate estimation of precipitation of satellite products, such as SCaMPR.

Initial feedback from potential users

Dr. Bob Kuligowski from NOAA NESDIS is our collaborator for this funded project. Since last GOES-R3 meeting during Fall 2011, we have been working with Bob and trying to figure out how to solve the found problem: SCaMPR overestimated precipitation in anvil clouds but underestimated precipitation in raincore region.

What could be accomplished with a 3rd year of funding

Based on aircraft in-situ measurements during MC3E, the detailed microphysics of DCS, especially, in different regions of DCS (Convective core, stratiform, anvil, etc), have been analyzed. Though there is still very minimal information about convective core region due to the limitation of in-site measurements, the initial comparisons between the calculated reflectivity and the NEXRAD measurements have very good agreement, especially in the stratiform regions, which contributed the second most precipitation for such systems. We are working in depth to find out the similarities and differences among the different regions of such systems, and will provide the microphysical properties. The immediate outcome at the end of second year funding can provide guidance to improve the accurate estimation of precipitation of satellite products, such as SCaMPR. The second outcome with a 3rd year of funding will be to provide the guidance for improving the SCaMPR precipitation product over the entire continental USA, and modify its retrieval algorithm with Bob.