Developing Integrated Satellite and Gauge-Radar-Satellite-Model Fused Precipitation Estimates for Real-time Weather, Hydrometeorology and Hazards Monitoring

Principal Investigators: Pingping Xie (NWS-CPC), Robert Joyce (Innovim, LLC), Mike Bodner (NWS-WPC), Robert Cifelli (NOAA-ESRL-HMT), Hugh Cobb (NWS-NHC), Jessica Schauer (NWS-NHC), Victor Murphy (NWS-SR), David Brown (NESDIS-NCDC), Jon Gottschalck (NWS-CPC), Limin Zhao (NESDIS-OSPO)

Abstract

In this project, we propose to take full advantage of the GOES-R observations to develop two sets of CMORPH based high-quality, temporally / spatially high-resolution multi-sensor regional precipitation products for improved operational applications in weather, climate and water resources monitoring and prediction. Specifically, we will:

a) Develop GOES-R enhanced regional CMORPH multi-satellite estimates of 15-min precipitation on a 2kmx2km grid over the western hemisphere produced at four incremental near real time latencies of 15 min, 1, 3, and 18 hours;
b) Combine the regional CMORPH with gauge measurements, radar estimates and numerical model forecasts to produce a multi-sensor fused quantitative precipitation estimates (QPE) over CONUS and its adjacent regions with refined accuracy; and
c) Perform evaluations of the new GOES-R enhanced precipitation products and construct real-time processing systems to ensure effective transition of the new developments into improved applications for NOAA operations and services.

Two major deliverables of this proposed project are:

a) GOES-R enhanced regional CMORPH produced on a time / space resolution of 15-min / 2-km over the future GOES-R domain (130oW-30oW;60oS-60oN) updated consecutively at four latencies of 15-min, 1, 3, and 18 hours; and
b) Hourly precipitation QPE on a 2kmx2km spatial resolution covering CONUS and adjacent regions (135oW-45oW; 10oN-60oN) constructed through data fusion of gauge measurements, radar estimates, regional CMORPH and numerical model forecasts).

Information derived from GOES-R observations will play an indispensable role in the development of new CMORPH based precipitation products proposed in this project. GOES-R precipitation estimates, generated at an extremely fine time/space resolution and at a very short latency, will serve as the backbone of the regional CMORPH. In constructing the multi-sensor QPE, GOES-R enhanced regional CMORPH will be used i) as a reference to adjust the range dependent bias in radar fields; ii) as the first guess of the final fused analysis; and iii) to expand the precipitation estimation coverage several hundred miles beyond the radar coverage.

The project will be carried out through close collaborations with other GOES-R PIs to take advantage of their achievements in GOES-R based precipitation estimation, and with the end users of the new precipitation products at several NOAA centers to ensure improved operational applications.