

GOESR3 Periodic Reporting

Reporting Period: January 2018 – June 2018 (2nd half of FY17 funding cycle)

Team Lead: Pettersen/Kulie

Team Members: Wagner/Heidinger/Walter/Wazong/Beachler

Project Title: An Enhanced Lake-Effect Snow Nowcasting Tool Using Synergistic GOES-R, NEXRAD, and Ground-Based Snowfall Microphysics Observations

Project Number: 480

Executive Summary

We are working to develop an enhanced Lake Effect Snow (LES) now-casting tool using products from the current GOES-16 observations. This product is in development with National Weather Service (NWS) offices in the Great Lakes Region and aims to improve forecasts of LES events through cultivating better estimates of radar and satellite derived snow accumulations.

Progress toward FY17 Milestones

Towards our Year 1 goals, we have achieved the following:

- Continued regular meetings with NOAA GOES-16 collaborators, Drs. Andy Heidinger and Andi Walter. Drs. Claire Pettersen and Tim Wagner worked with preliminary GOES-16 algorithm products of cloud effective radius, cloud liquid water path, and cloud optical depth.
- Drs. Pettersen and Wagner used preliminary retrievals around the NWS MQT area to identify specific CLAVRX and GOES-16 products to use in analyses going forward. These products have been communicated to the greater team and are being incorporated into the regular satellite products.
- Drs. Pettersen and Mark Kulie deployed snow accumulation equipment to the NWS Marquette, Michigan site. A Pluvio and Parsivel were installed prior to the 2017 – 2018 winter. Additionally, a network of Pluvios was installed in a 15 km radius area around the NWS MQT office. These Pluvios can help augment data for the 2017 – 2018 winter season.
- Drs. Pettersen and Kulie updated and maintained PIP and MRR instrumentation. Additionally, quality control measures were applied to create final products through June of 2018.
- Dr. Wagner has made comparisons of the particle size distribution, PIP snow rates, and Z to S analyses from both the MRR and the NEXRAD for specific snow types (see below figure).
- Dr. Pettersen finished a draft of a manuscript highlighting 4 winters of ground-based observations of snow at the NWS MQT office. This will be submitted to JAMC in September 2018.

Plans for Next Reporting Period

- GOES-16 algorithm products of cloud effective radius, cloud liquid water path, and cloud optical depth will be automatically created for the Great Lakes region, pushed to our servers, and archived and combined with snow accumulation analyses. Additionally, we have added some products from the retrieval and specific band channels to guide quality control and analyses.
- In addition to the case-cased PIP/Z to S comparisons, we are now doing a broader snow type study based on criteria that emerged from the JAMC manuscript analyses. These are showing promising results.
- Two journal articles focused on the Marquette, MI enhanced snow observations are currently in preparation. Dr. Pettersen will be submitting to JAMC in September 2018. Dr. Kulie will be submitting an additional manuscript (BAMS or MWR) before the next reporting period.

Additional Information

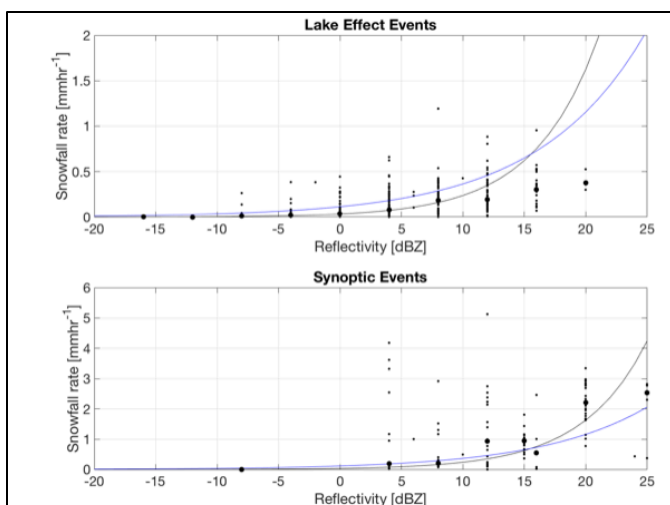
1. Interaction with operational partners – Dr. Kulie visited the NWS Marquette, MI office in spring, 2018 to preform data backups, and undeploy several Pluvios. Dr. Pettersen is now the NASA PI of the PIP instrument and will continue to work with both NASA and the PIP at NWS MQT going forward.

2. Conference/workshop participation – Dr. Pettersen gave a presentation on the 4 winters of data from the enhanced observation suite at NWS MQT at the AMS Cloud Physics meeting in Vancouver, BC in July 2018. (Title: A Composite Analysis of Snowfall Modes from Four Winter Seasons in Marquette, Michigan). Dr. Kulie presented work at the Annual AMS meeting in Austin, TX in January, 2018 (Title: Profiling Radar and Snow Microphysical Properties from Extended Ground Observations in the Upper Great Lakes)

3. Outside project publicity –

4. Journal articles –

Key Graphics



Z to S snow rate comparisons from the NEXRAD88 and the MRR with PIP retrievals of snowfall for select LES and synoptic events.

— NEXRAD88 ($S = (Z/75)^{0.5}$)
— MRR ($S = (Z/56)^{0.833}$)
• PIP

08/31/2018

GOES-R3 Status Report Template

NESDIS STAR GOES-R