Transition to Operations Plans for GPM Datasets

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1. SHORT-TERM PREDICTION RESEARCH AND TRANSITION (SPoRT) CENTER

- Founded in 2002 at the National Space Science Technology Center at Marshall Space Flight Center in Huntsville, AL
- Focused on transitioning unique NASA and NOAA observations and research capabilities to the operational weather community to improve short-term weather forecasts on a regional and local scale
- NASA directed funding; NOAA funding from Proving Grounds (PG)
- Demonstrate capabilities experimental products to weather applications and societal benefit to prepare forecasters for the use of data from next generation of operational satellites
- Objective of this poster is to highlight SPoRT's research to operations (R2O) paradigm and provide examples of work done by the team with legacy instruments relevant to GPM in order to promote collaborations with groups developing GPM products

2. SPoRT PARADIGM

- Develop and demonstrate new products in a "test bed" environment and involve end user in the entire transition process
- Work with select offices with forecast challenges that match products
- Format experimental products into end user's decision support system to have greatest chance for full integration into operations
- SPoRT is a community leader for development of AWIPS II plug-ins to display satellite data
- Perform targeted product assessments to solicit feedback from forecasters on product utility

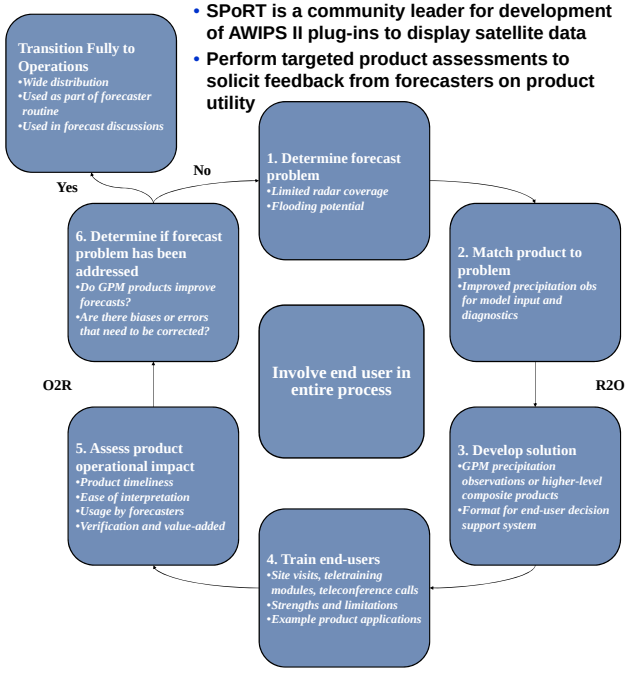

Figure 1. Paradigm of the research to operations (R2O) and operations to research (O2R) circle that SPoRT uses to interactively collaborate with operational end-users

3. PAST PRECIPITATION DATASET TRANSITIONS

- SPoRT has developed in-house products/capabilities using passive microwave imagery and retrieved precipitation products but also has aided in transition of products developed by other research teams
- Similar evaluations and use cases can be pursued with new capabilities available from GPM sensors (e.g. DPR from space) or products

3.1. NASA Land Information System (LIS)

- SPoRT transitions real-time, regional soil moisture and temperature analyses to operational forecasters for situational awareness (e.g., drought/flood, heat) and local modeling (e.g., convective initiation)
- Forcing land surface models (LSM) with large-scale model precipitation rarely accounts for local variations (see Fig. 2a)
- For CONUS, radar and gauge analysis products force the LSM
- Outside CONUS satellite precipitation estimates from the CPC Morphing (CMORPH) product are to capture higher resolution features (see Fig. 2b)
- Plan to use the IMERG product to get around limitations in CMORPH: product latency (about 2 days), domain (±50°N), and quality loss outside the tropics (snow on the ground is detected as convective clouds)

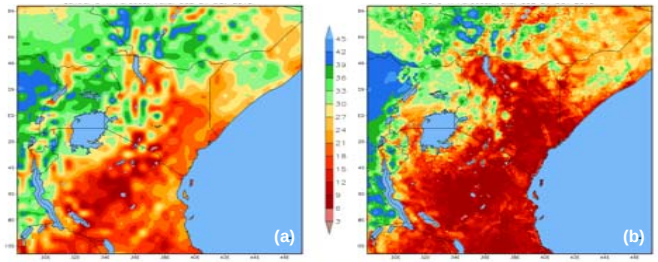

*Figure 2. 0-10 cm volumetric soil moisture (m3/m3*100) valid at 0000 UTC 31 October 2013 for operational 4-km East Africa LIS domain for (a) precipitation forcing from a large-scale model and (b) precipitation forcing using CMORPH. Note the finer scale soil moisture details that are captured in the LIS run forced with the 0.08° CMORPH data*

3.2. NESDIS GOES-R PG Quantitative Precipitation Estimate (QPE)

- NESDIS produces a QPE product using IR data from GOES and MW data from TRMM and MHS to demonstrate baseline GOES-R QPE product
- SPoRT obtains this product from NESDIS in real-time and disseminates to select partner offices via LDM connections with NWS regional HQs
- Targeted evaluation with Alaska and Puerto Rico WFOs from 6/2013 to 9/2013 determine impact in areas with poor radar coverage (Fig. 3)
- Forecasters completed online surveys answering specific questions on the product utility to their forecast process (78 surveys completed; Fig. 4)

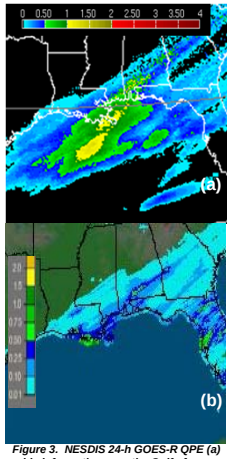

Figure 3. NESDIS 24-h GOES-R QPE (a) adds information over the Gulf of Mexico over 24-h AHPC Stage III (b) while retaining bands of precipitation over Southern Alabama

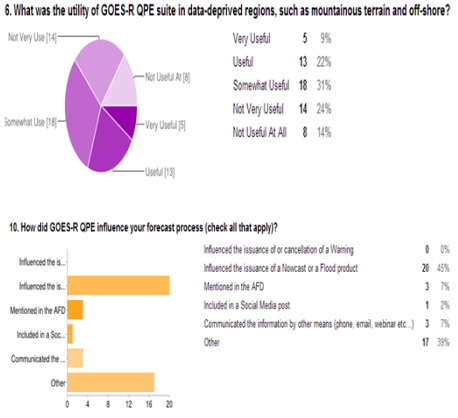

Figure 4. Sample survey results obtained from Google Analytics for NESDIS GOES-R QPE Assessment in Alaska and Puerto Rico. In total, forecasters responded to a series of 11 questions related to the product performance and utility in operations. To see the full survey results, go to http://weather.msfc.nasa.gov/sport/survey/summary/

3.3. NRL Passive Microwave Imagery and Rain Rates

- Naval Research Lab (NRL) produces a suite of real-time imagery and rain rates products from SSMI/S and AMSR-2
- SPoRT obtains these datasets from NRL in real-time and reformats the data for ingest into N-AWIPS for dissemination to partners at the National Hurricane Center and Weather Prediction Center (Fig. 5)
- Aids forecasters in identifying structures of a tropical system that might be obstructed by thick cirrus and the precipitation patterns within

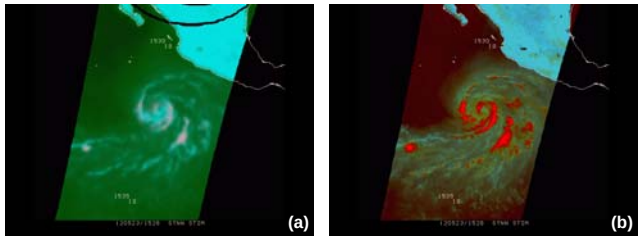

Figure 5. Multispectral (RGB) imagery for the (a) 37 GHz and (b) 91 GHz channels from DMSP SSMI/S for Tropical Storm Bud at 1528 UTC on 23 April 2012 depicting information about cloud features around the storm. In the 37 GHz RGB, light blue areas denote deep clouds and pink areas denote active convection. In the 91 GHz RGB, bright red areas denote deep convection.

3.4. Disaster Applications

- SPoRT currently serves NASA imagery from Landsat (Fig. 6), ASTER, MODIS, to study changes in land characteristics associated with tornadoes, fires, and floods to help assess coverage of damage to aid response and recovery
- Accumulated precipitation products from GPM could be used with this recovery data to help understand why these events occurred and to strategize ways to prevent them from occurring in the future

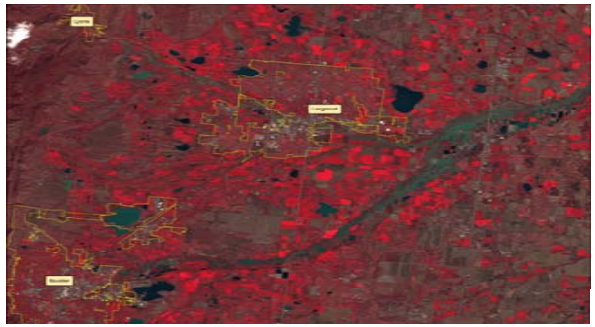

Figure 6. False color image from Landsat 8 from 17 September 2013 over showing extent of flood waters associated with extreme rainfall event in the Boulder and Longmont, Colorado areas. The turquoise coloration denotes water areas where streams and rivers have overflowed into the surrounding areas.

4. WAYS TO COLLABORATE WITH SPoRT

- Every three years (next opportunity in 2016), NASA solicited ROSES proposals for researchers with experimental products to work with SPoRT to transition to operations
- PIs can include SPoRT researchers as Co-Is on proposals
- SPoRT can facilitate putting data into end-user decision support system, managing real-time data flow, developing training, and conducting surveys if product developer has ongoing collaboration with end-user
- Operational forecast entities can participate with SPoRT through in-kind contributions involving evaluating a product and providing feedback in the form of blog posts and surveys