Research to Operations Activities Supporting Hydrometeorological Events

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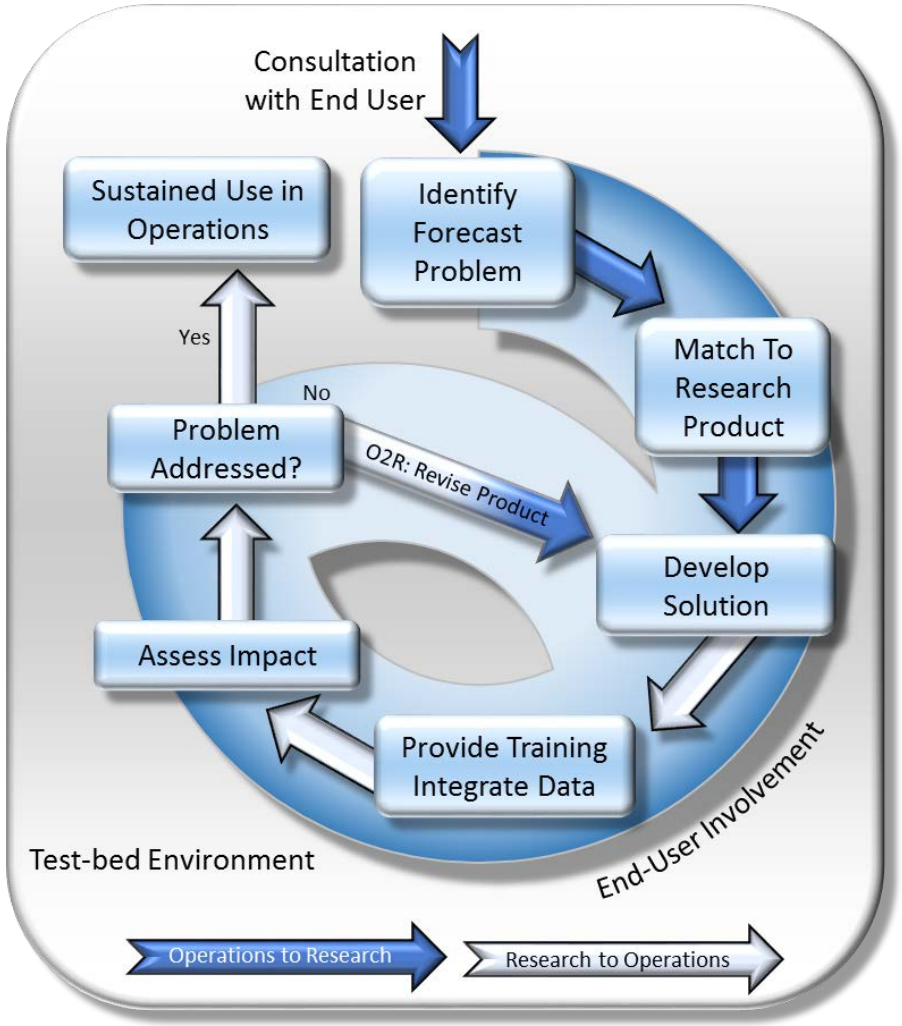
Transitioning Research to Operations

- Many satellite missions and supporting scientists develop products useful in weather forecasting and disaster response
- We often hear of a need to “bridge” between scientists and end users to ensure that products from various missions are used effectively.
- NASA has a long-standing project that has demonstrated success in this area through a process that includes:
  - Interactive partnerships with end users
  - Identifying products to meet their needs
  - Integration of those products
  - Sharing relevant training
  - Iterating through this process until the final product is a good fit to resolve their needs
- We use this presentation to talk about NASA mission data and applications that have been integrated into end-user decision making.



SPORT

NASA

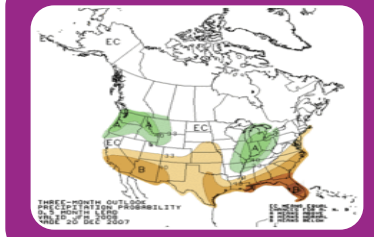
Mission Application Focus Areas

Extreme Events and Disasters

- Landslides
- Floods
- Tropical cyclones
- Re-insurance

Water Resources and Agriculture

- Famine Early Warning System
- Drought
- Water Resource management
- Agriculture



Weather, Climate & Land Surface Modeling

- Numerical Weather Prediction
- Land System Modeling
- Global Climate Modeling

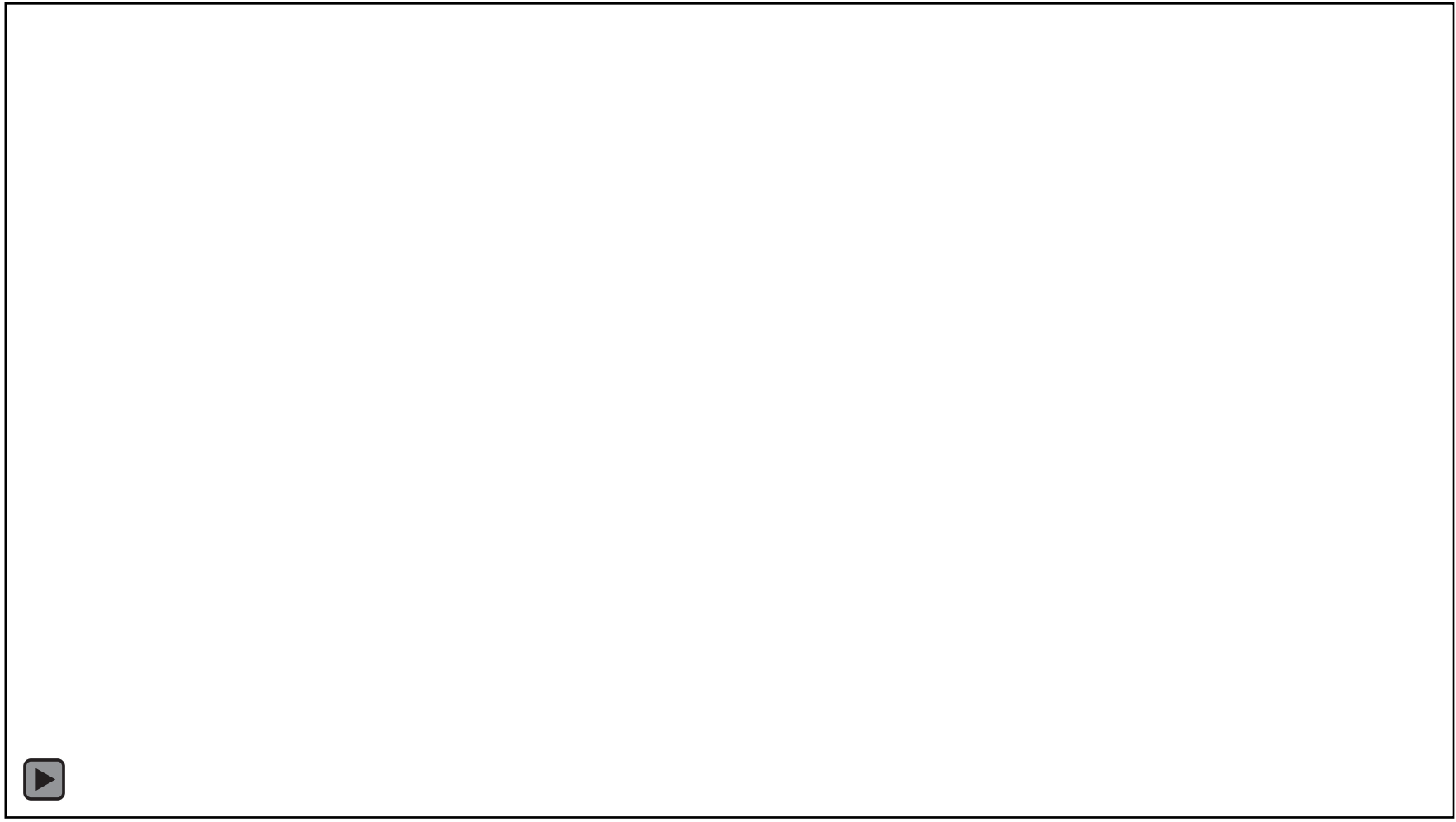
Public Health and Ecology

- Disease tracking
- Animal migration
- Food Security

Global Precipitation Measurement (GPM) Mission

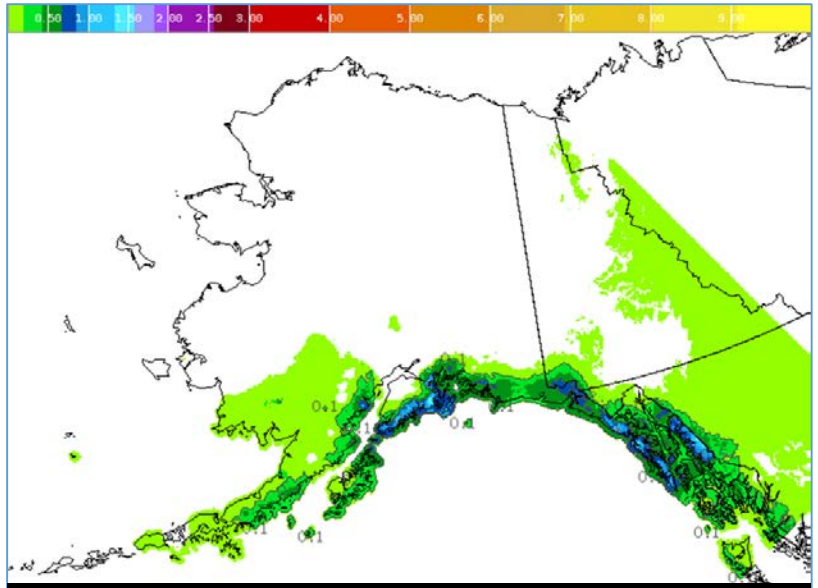
- The GPM Core satellite and other passive microwave missions provide information necessary for creating 30-minute global estimates of rain and snowfall rates.

- Rain and snowfall rates are provided by the Integrated Multi-satellitE Retrievals for GPM (IMERG) product.

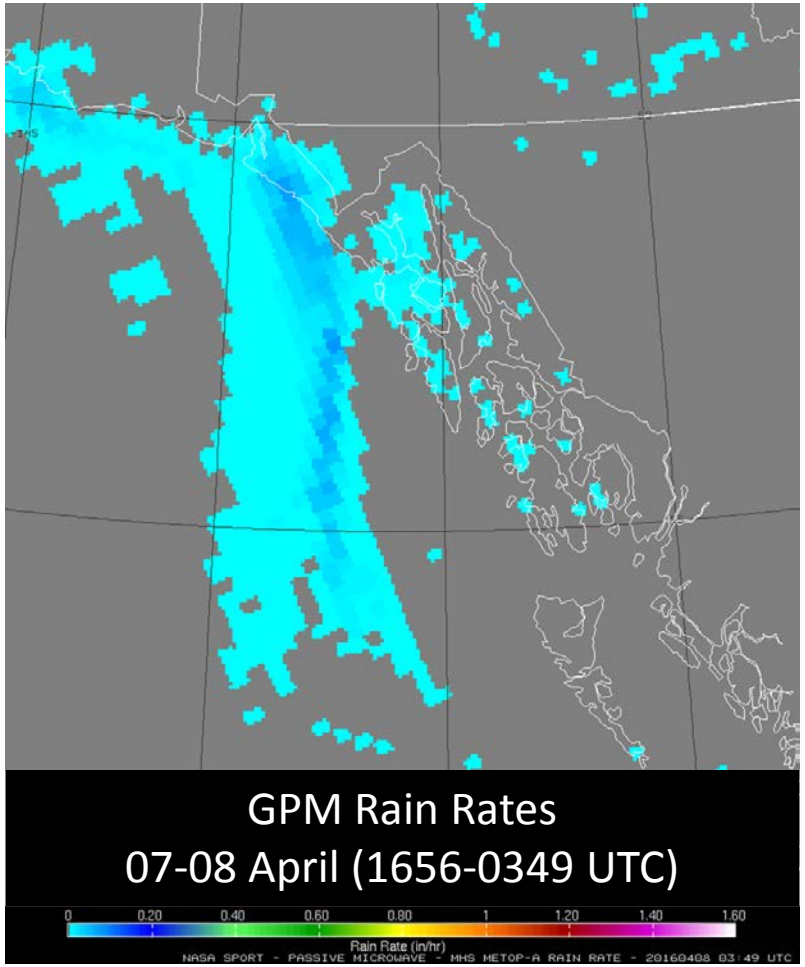


GPM Applications: Monitoring Precipitation Rates

- GPM/IMERG data have proven helpful in weather forecasting and analysis of heavy precipitation events, especially in remote or data-sparse areas.



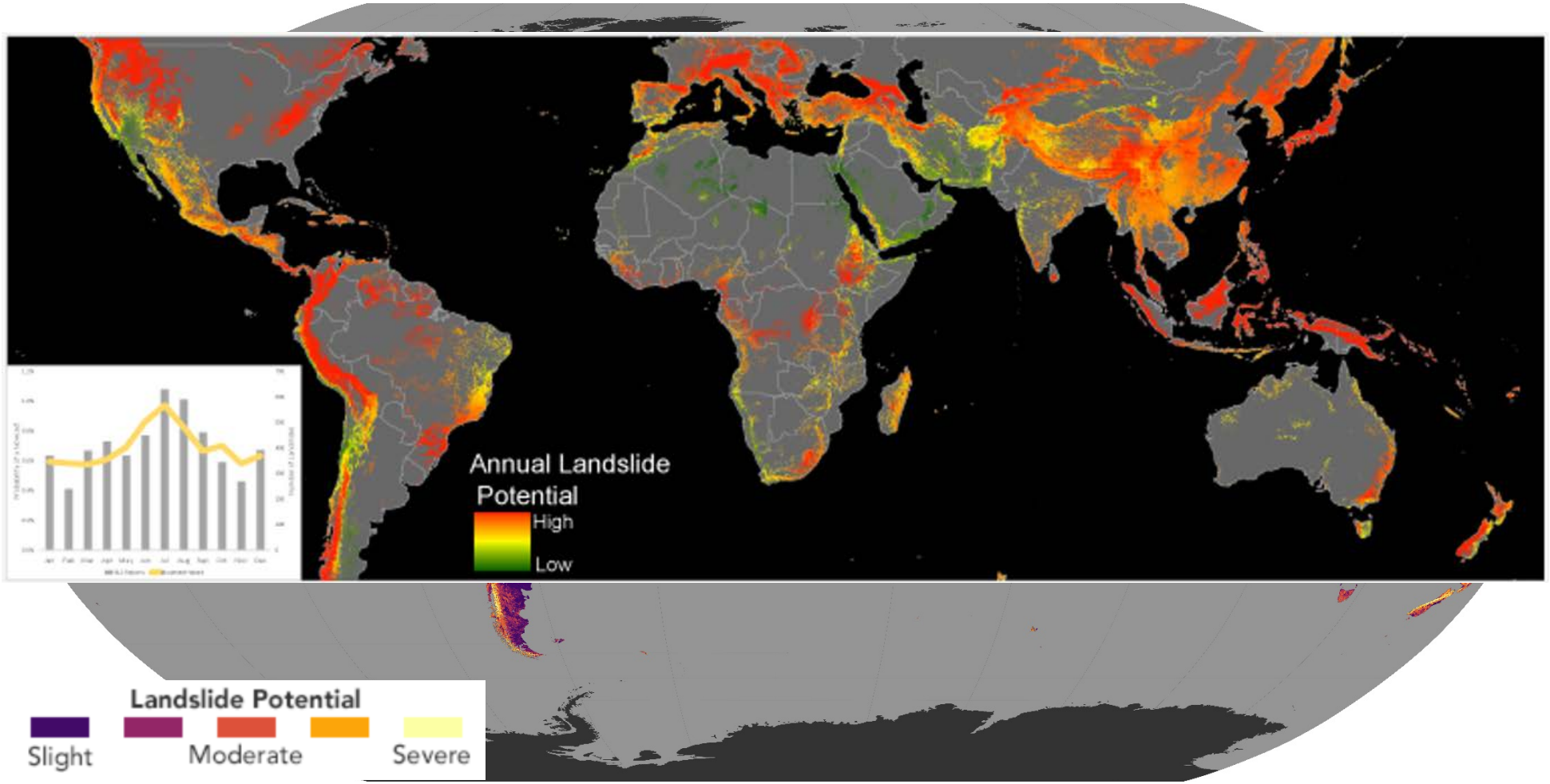
24-hr Accumulation
07 April 2016



GPM Rain Rates
07-08 April (1656-0349 UTC)

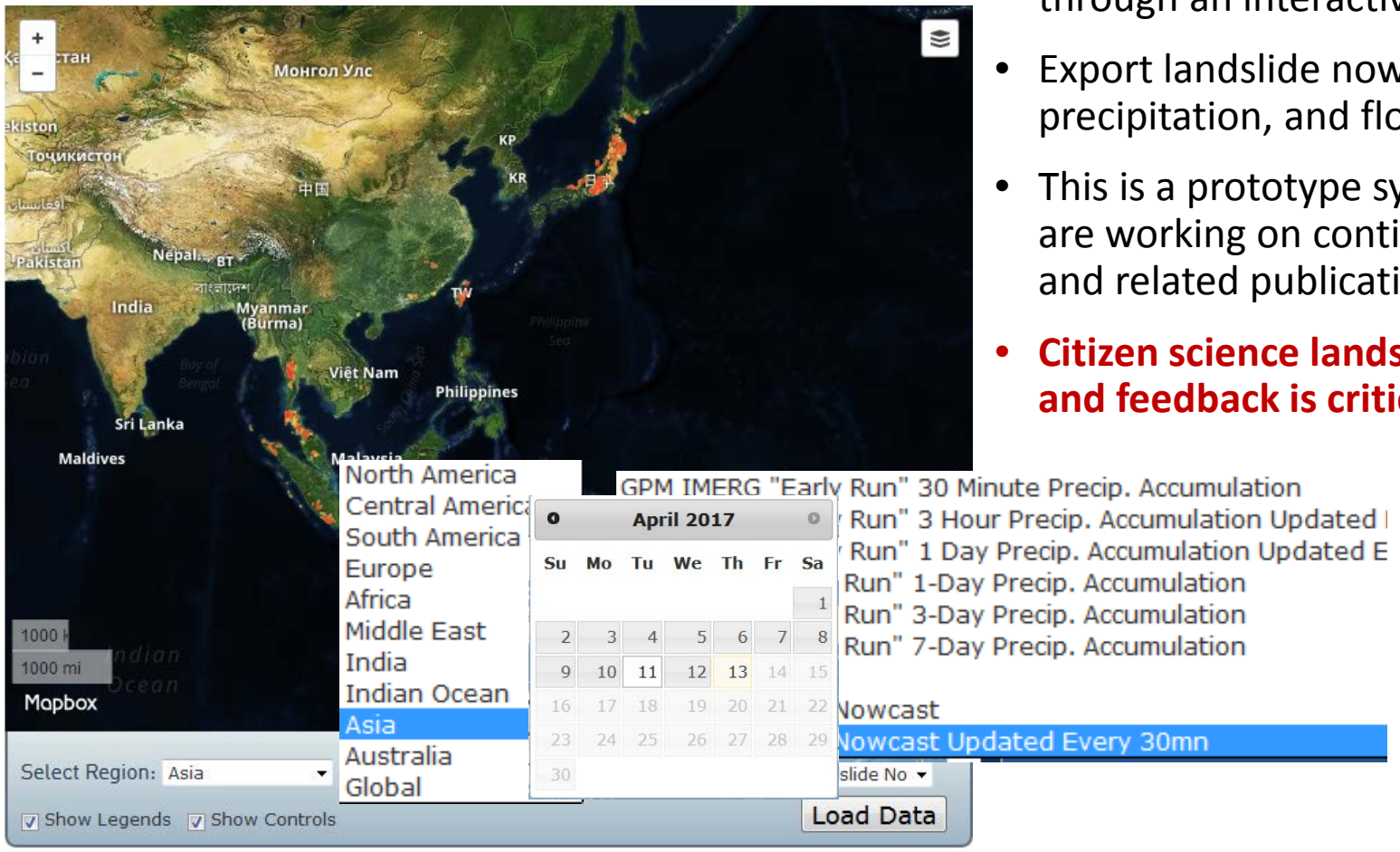
GPM Applications: Landslide Potential

- GPM/IMERG data can be combined with known topography and hazard areas to help with the monitoring and prediction of dangerous landslides



GPM Applications: Landslide Potential

https://pmm.nasa.gov/precip-apps



- Landside risks can be accessed through an interactive, online viewer
- Export landslide nowcasts, IMERG precipitation, and flood nowcast
- This is a prototype system and we are working on continued validation and related publication.
- **Citizen science landslide reporting and feedback is critical!**

Soil Moisture Active Passive (SMAP) Mission

- The SMAP mission helps to measure soil moisture to help with monitoring drought, wet soils likely to flood or erode with contributions to a landslide, freeze/thaw, and other factors.
- Global mapping of soil moisture can be integrated within forecast models to provide analysis tools and improved hydrological and weather predictions.
- SMAP data and model integrations have been used to assess flood risk, monitor drought, and assist with mitigation strategies for these hazards.

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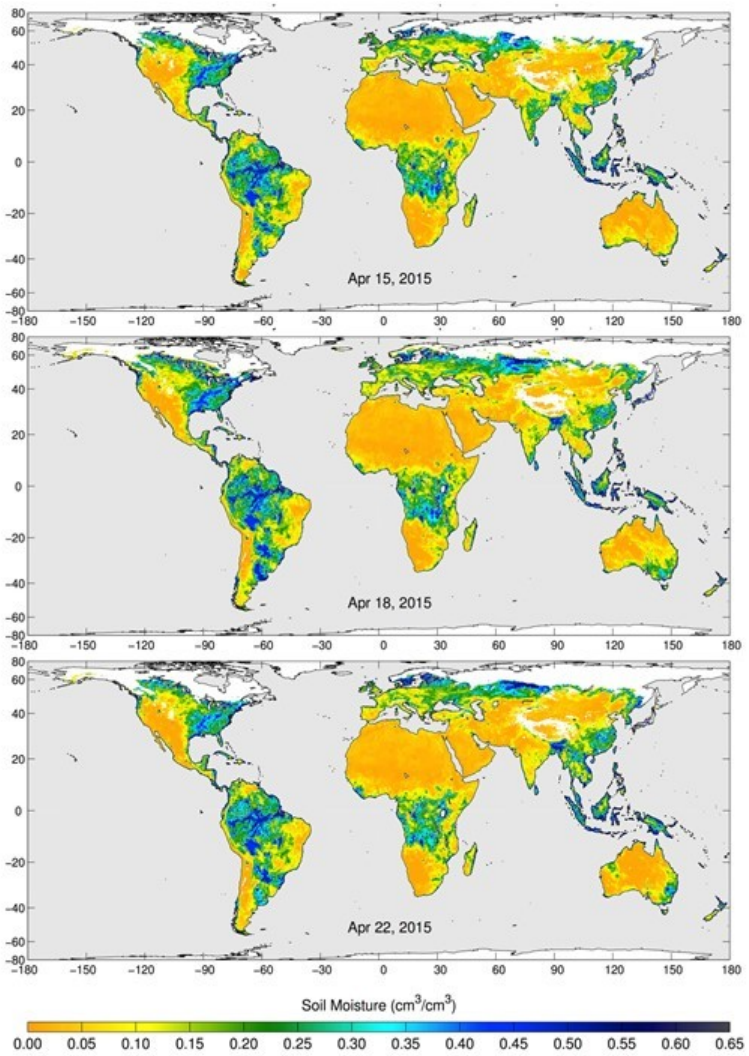

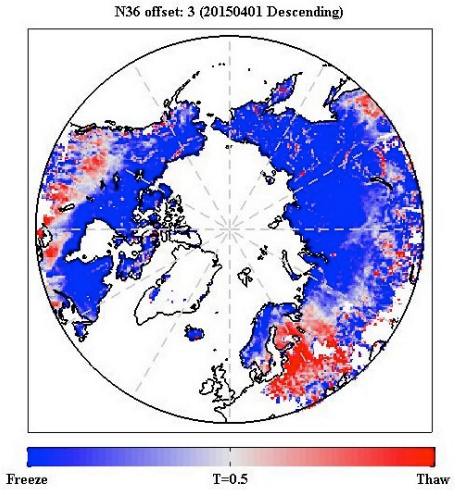

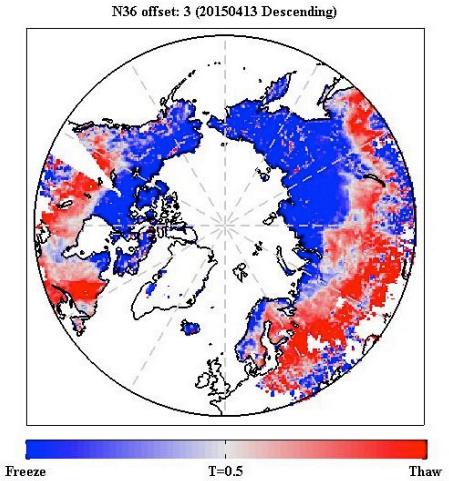

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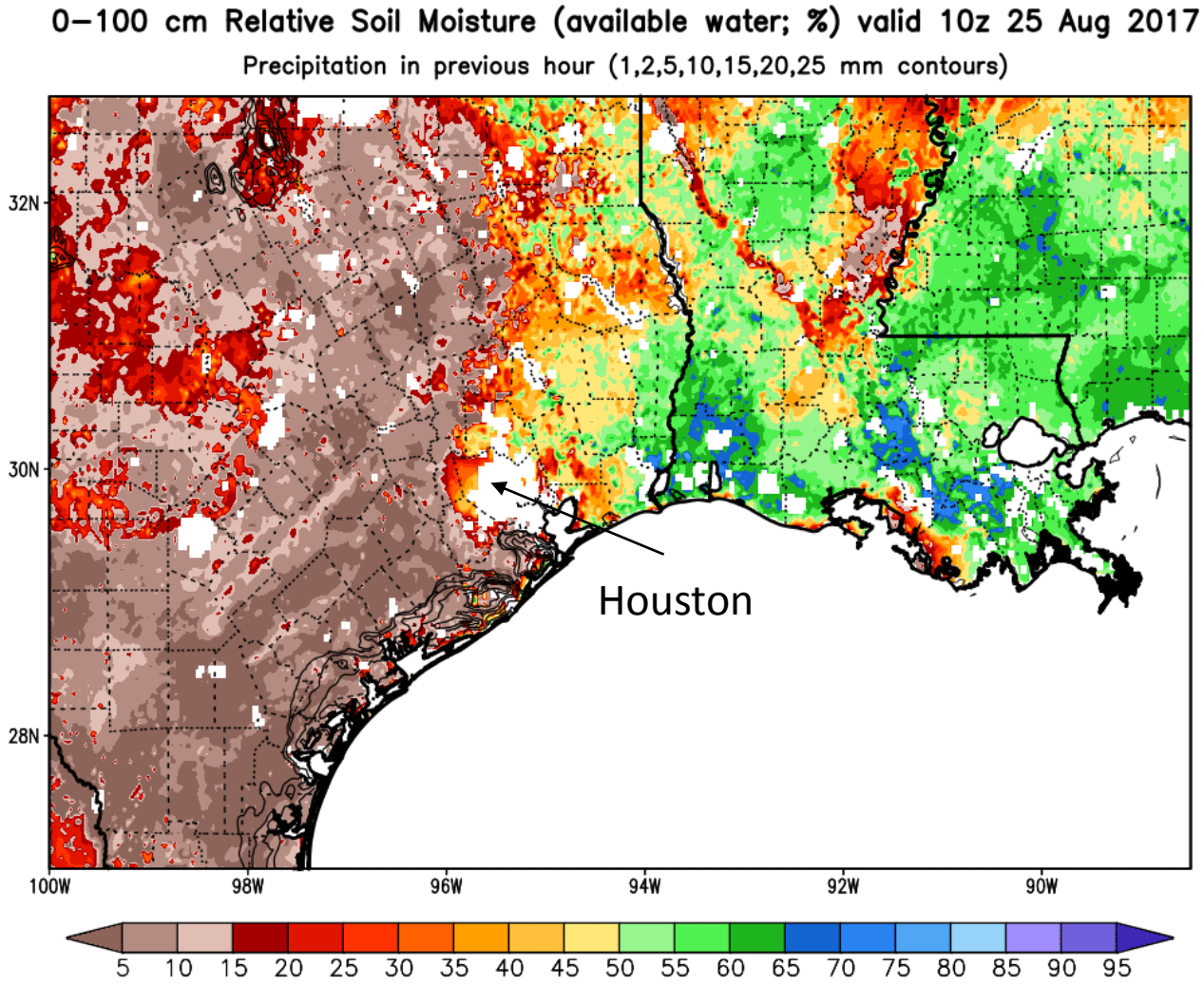
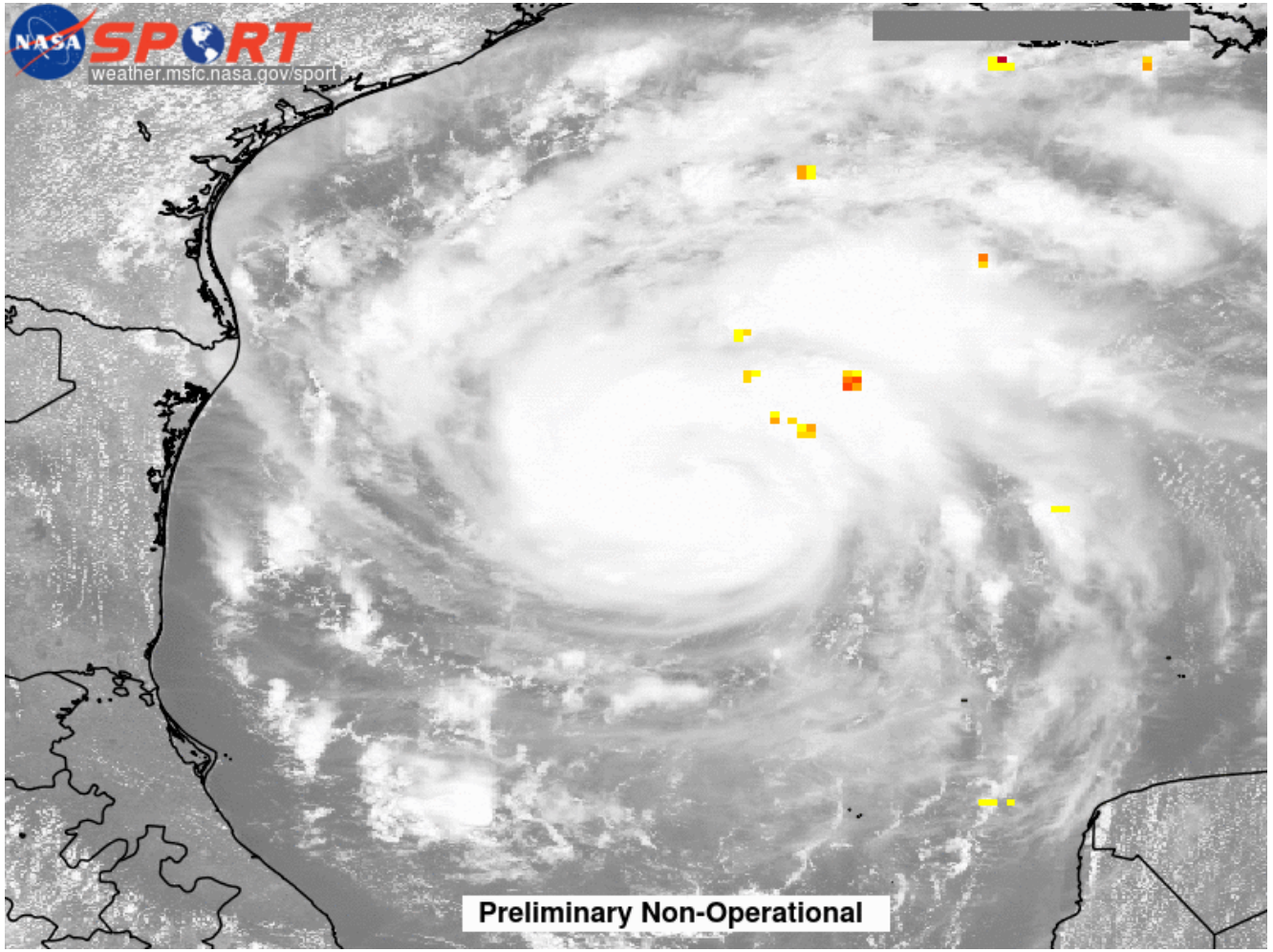
Integration into Land Surface Models



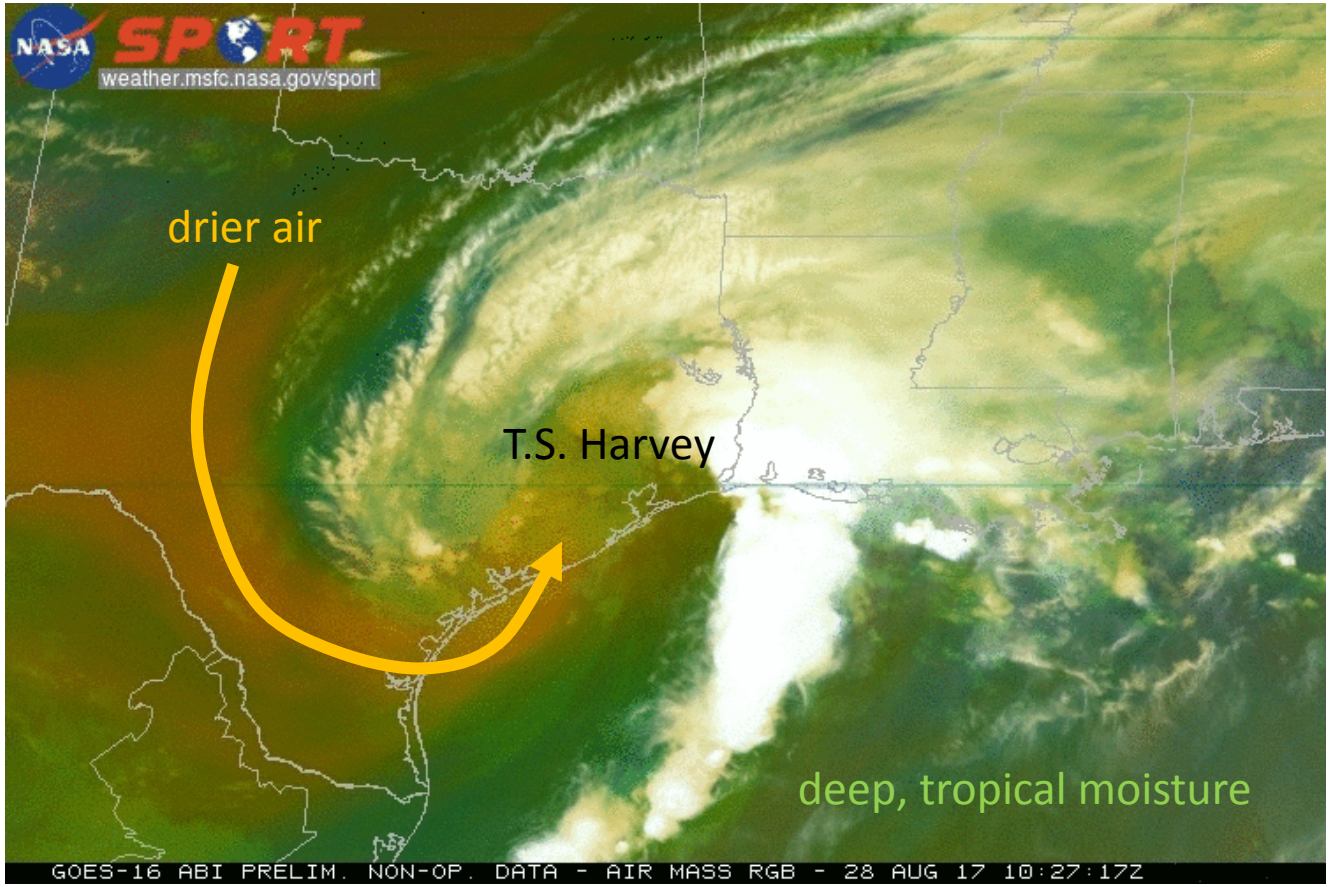
- Soil moisture and precipitation products can be integrated into land surface models to create value added products useful in weather analysis and disaster scenarios
- Here, we integrate radar-estimated rainfall and SMAP soil moisture to track wet soils and floods that result from record setting rainfall of Hurricane Harvey
- Information can also be used to understand impacts to agriculture (flooded fields), be considered for landslide risk, and other topics.

GOES-16 Applications



- The recently launched GOES-16 satellite offers unique opportunities to observe hazardous weather, including new lightning observations.
- Many efforts within NOAA, in partnership with NASA, have focused on training forecasters for use of this new satellite and new capabilities.
- In addition to lightning data, new sensing capabilities of GOES-16 can also produce multi-spectral composites that help to identify hazardous weather conditions

GOES-16 Applications



- As an example, multi-spectral imaging from GOES-16 can be combined to reveal key weather features.
- Here, Hurricane Harvey decays in Texas (a tropical storm in this image) as much drier air wraps around the western side of the cyclone.
- Drier air can be seen here in shades of orange by compositing various bands of GOES-16 to help identify these features along with clouds associated with the storm.