



GHRC Dataset Assessment

Deborah Smith

2016 GHRC User Working Group Meeting
Sept 20-21, 2016



Key Data Holdings

Current

| Data Collection | Description |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lightning observations from space | Daytime and nighttime observations of cloud-to-ground and intra-cloud lightning from NASA's Lightning Imaging Sensor (TRMM) and Optical Transient Detector (Microlab1) |
| DISCOVER MEaSURES | Atmospheric and ocean products derived from satellite microwave radiometer measurements and delivered as a package of inter-related geophysical parameters, including: <ul style="list-style-type: none">● sea surface wind speeds● atmospheric water vapor● cloud liquid water● rain rates |
| Hurricane Science field campaigns | Airborne and ground-based observations of tropical cyclones and cyclogenesis collected during a series of campaigns from 1998 to the present |
| GPM Ground Validation experiments | Precipitation datasets from ground and airborne instruments supporting physical validation of satellite-based precipitation retrieval algorithms, from targeted field observations in different precipitation regimes (2010-2015). |

Future

| Dataset | Description |
|-----------------------------------|-------------------------------------------------------------------------------------------|
| Lightning observations from space | LIS on International Space Station: a second LIS instrument to be deployed on ISS in 2016 |

| Category | Program Type | Examples |
|-----------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------|
| Hurricane/ Tropical Cyclone | Field campaigns | HS3, GRIP, CAMEX-3/4, NAMMA |
| | Satellite rain products | TRMM TCPF |
| Satellite Microwave | MEaSURES Radiometer | SSM/I and SSMIS Merged Ocean Winds and TPW RASI |
| | Sounders | MSU, AMSU |
| Lightning | Satellite sensors Ground measurements Airborne measurements | TRMM and ISS LIS OTD, LDAR, Conductivity probes, spectrometers |
| Precipitation Validation | Airborne measurements Ground measurements | OLYMPEX, IFLOODS, IPHEX, GCPEX, MC3E, LPVEx, disdrometer |
| Operational/ Applications | LANCE | AMSR2 |

Data Proposed in 2015

assessed in 2015 as **High Priority**

| Dataset | Category | Added in 2016? | Plans |
|-----------------------------------------------|------------------------|------------------|---------------------------------|
| TRMM/GPM Trop Cyclone Precip Feature | Hurricane Science | Yes | |
| Trop Cyclone Cold Wake Database | Hurricane Science | No | On hold, reconsider? |
| World Wide Lightning Location Network (WWLLN) | Lightning Science | Selected Subsets | |
| TRMM/GPM Flood Maps | Precipitation Research | Selected Subsets | Consider adding rest of dataset |
| Very High Resolution Lightning Climatology | Lightning Science | Yes | |

Atmospheric-related Hazards (A) and Hydrology (H) Dataset Category List

- ✓ Tropical cyclones / Hurricanes (A and H)
- Tornadoes (A)
- Polar lows / Snowstorms / Severe storms (A and H)
- ✓ Floods / Extreme rain (A and H)
- Heat waves / Excessive temperatures (A)
- ✓ Wind events (gap winds - what about downdrafts, mountain winds? (A)
- Drought / Soil moisture (H)
- Surface Water in Lakes and Rivers (H)
- ✓ Lightning (A)
- Monsoons (H)
- Smoke / Haze / Ash plumes / Dust storms (A)

**Many hazards in this list are not represented by GHRC data products.
Which should be?**

WHAT

SMAP Ocean Winds

SMAP has an L-band radiometer and although intended for soil moisture study, algorithms have been developed to extract ocean wind speeds.

WHO

Currently produced and distributed by Remote Sensing Systems with funding from NASA. Contact: Thomas Meissner

WHY

SMAP's unique capability to retrieve winds in extreme storms, even under rainy conditions makes this product useful for hurricane study. The dataset would fit the GHRC mission.

WHERE

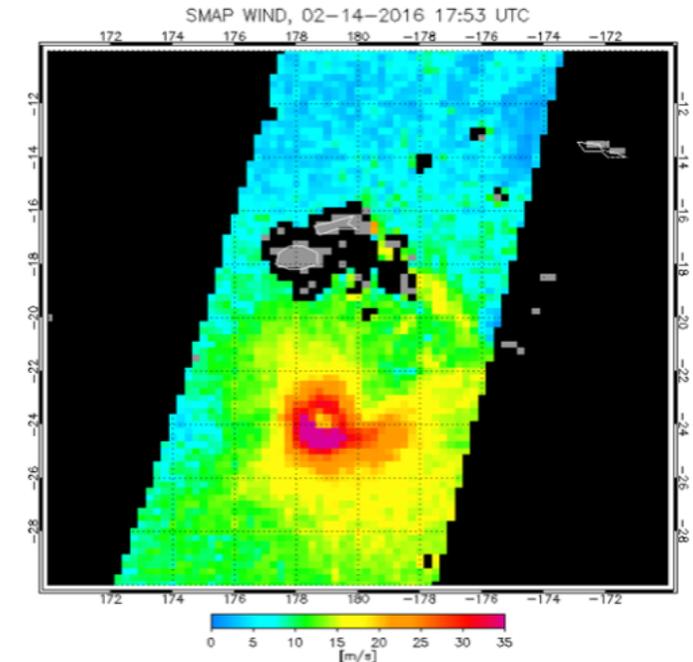
Remote Sensing Systems

To explore data, see

www.remss.com/missions/smap/winds

QUALITY

Preliminary Dataset: Some validation - comparisons with Rapidscat, ASCAT and SFMR winds



WHAT

TMI V7 Ocean Products

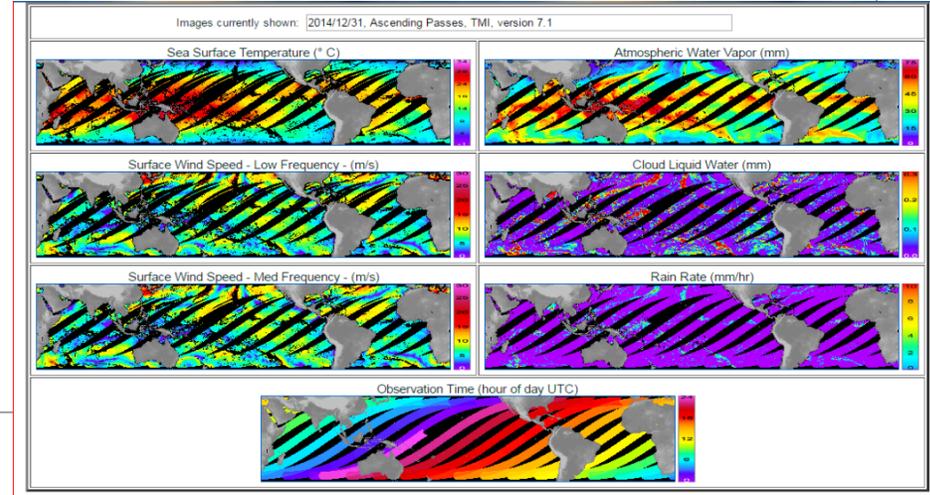
The TMI L2C data at GHRC are an old version. After the TRMM mission ended, all TMI data were reprocessed to V7 algorithm to match SSMI/SSMIS, AMSR-E, AMSR2, GMI and WindSat radiometer data. Bring the gridded map data to GHRC instead of the Level 2C swath data.

WHY

Update TMI data to match the SSMI/SSMIS data already distributed. Complete dataset: 1997 to end 2014. Fits with existing MEaSUREs data product.

WHO

Gridded Binary V7 data currently produced and distributed by Remote Sensing Systems with past funding from NASA. Contact: Frank Wentz



WHERE

Data currently distributed by RSS. To explore, see www.remss.com/missions/tmiTMI | [Remote Sensing Systems](http://www.remss.com/missions/tmiTMI)

QUALITY

Mature Dataset: Validation paper published, see Wentz, F. J., 2015, A 17-Year Climate Record of Environmental Parameters Derived from the Tropical Rainfall Measuring Mission (TRMM) Microwave Imager, Journal of Climate, 28, 6882-6902.

WHAT

TCIS Cyclone Information System Archive and Tools

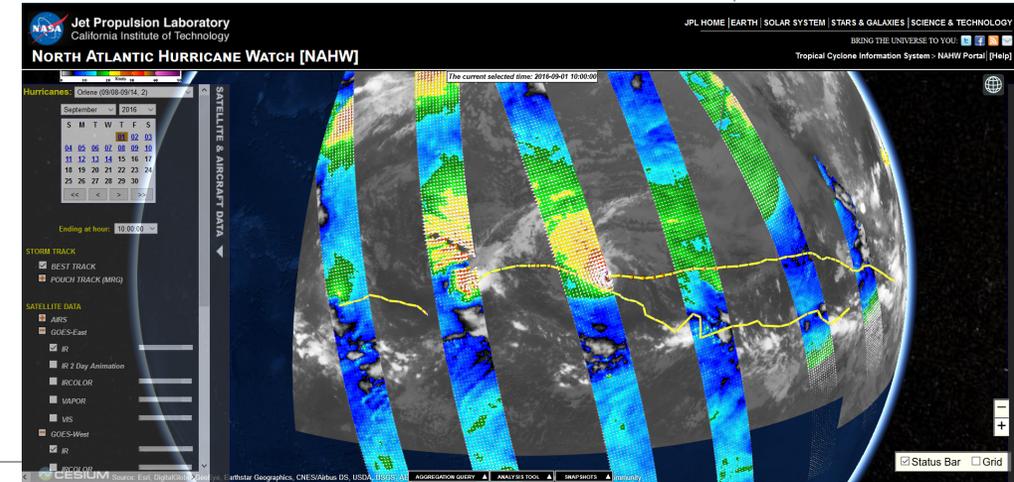
The TCIS is a visual display and statistical analysis package of services for online use of satellite, model, and airborne data. It consists of 2 components: 1) a 12-year (1999-2010) global archive of multi-satellite hurricane observations, and 2) an interactive NRT portal tailored for use with the GRIP and HS3 campaigns.

WHY

TCIS needs further work, including the addition of more data into the archive and the development of new tools and capabilities. The hurricane focus and inclusion of air campaign data makes it a suitable match for GHRC mission. There is no funding for further development.

WHO

The TCIS is currently operating on JPL. Development occurred with funding from NASA. Contact: Svetla Hristova-Veleva



WHERE

To explore the TCIS data and environment, see <http://tropicalcyclone.jpl.nasa.gov/>

QUALITY

Difficult to determine: Some data in the archive have been validated, others are NRT products.

WHAT

Radiometer Brightness Temperatures

Intercalibrated Satellite Microwave TBs are an essential climate variable that currently are located in a variety of places, including NOAA, NASA and private company web sites. There is no one data center for microwave brightness temperatures. Instruments include SSM/I, SSMIS, TMI, GMI, AMSR, AMSR-E, AMSR2, WndSat.

WHO

Intercalibrated TBs are at Remote Sensing Systems. Some instrument data are available on request, some are not. SSMIS data are also at NOAA. Contact: Frank Wentz

WHY

Microwave brightness temperature are used to study hurricane eyewalls and therefore would fit the GHRC mission. Would be a valuable addition to TCIS archive and tool.

WHERE

Some files available from Remote Sensing Systems and NOAA with limited accessibility.
www.remss.com

QUALITY

Mature Datasets: RSS has intercalibrated all satellite microwave radiometers using one algorithm and approach

SWOT - Surface Water Ocean Topography mission

- SWOT was included in 2015 UWG recommendations
- To launch in 2021
- Imperative to be working on it now as preparation is well underway
- Planned products include **pass-based lake and river levels** and 21-day averaged levels for each. These products would be very suitable for GHRC
- **AirSWOT - a field campaign for SWOT** to operate before and after launch. GHRC has the experience to handle this data
- SWOT early-adopters were selected in 2016 and started meeting. We plan to participate and encourage **value-added application products** to be archived at GHRC
-

Upcoming Convective Processes Air Campaign (CPEX)

- ROSES Call A.23 Weather and Atmospheric Dynamics in Section 2.4 describes the Field Campaign to study Convective Processes (CPEX). This field campaign will occur in 2017.
- Convective processes are critical to the development of severe weather, they are also important in the resulting vertical transport of heat and moisture and to the cloud and radiation feedbacks that have a large impact on the climate system
- CPEX will study the organization and disruption of convective activity in the tropics. A four-week experiment to take place during June and July 2017 in St. Croix, U.S. Virgin Islands.
- DC-8 aircraft flying a coherent Doppler wind LIDAR, a Doppler radar, and dropsondes to provide a broader picture of the tropospheric environment.

- **Enhance the GHRC web site** to highlight the submission process for data producers
- **Attend Science Team meetings** in lightning, hurricane, rain, satellite applications, severe weather and develop relationships with scientists in order to anticipate and meet their data needs
- **Attend AGU and AMS conferences**, with focus on participating in sessions and townhall events and connecting with scientists when GHRC-appropriate datasets are presented
- **Examine NASA ROSES call** (Feb) yearly to look for potential datasets and to connect with submitting scientists so they include plans for GHRC archival in their proposal
- **Increase visibility and knowledge of GHRC** and our mission through social media, web site, exhibits, conferences, linkedIn group, earthdata.nasa.gov, etc.

- **Develop relationships** with scientists in key data categories and encourage them to use GHRC and archive their data with us
- **Enhance science content** of web pages, topic primers, and dataset documentation
- **Produce more micro articles and data recipes** with focus on users of many levels, high school through post-grad.
- **Learn more about existing data users** and how they use the web page, the tools and the documentation.
- **Demonstrate use of data products** to enhance understanding
- **Assist with improving data publication process**

| GHRC Staff Scientist | Areas of Concentration | Contact Information |
|----------------------|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Kaylin Bugbee | Hydrology Rain/Flooding Dust Metadata | Kbugbee@itsc.uah.edu 256-961-7486 |
| Leigh Sinclair | Lightning Ground instruments Real-Time Data Data Handling Tools Data formats | Lsinclair@itsc.uah.edu 256-961-7406 |
| Deborah Smith | Satellite Microwave Sensors Hurricanes Ocean Winds and Water Vapor Sea Surface Temperatures User Documentation | Dsmith@itsc.uah.edu 256-716-8189 |
| Amanda Weigel | Severe weather Disasters Data Recipes GIS | Aweigel@itsc.uah.edu 256-961-7604 |



Questions

What do you think is the priority for each of the proposed data products?

Do you have any additional data product suggestions?

What hazard data categories should we pursue?

2016 GHRC User Working Group Meeting
Sept 20-21, 2016

