Quick Guide

Why is the Total Precipitable Water (TPW) product important?

The TPW product is useful for following rapidly evolving events (i.e., convective) since it is available at high time resolution. Monitoring moisture gradients and time trends in clear sky regions.

How is the TPW product made?

Radiance values from GOES-16 ABI bands 8-16 provide temperature and moisture data. GFS used as first guess due to limited vertical resolution from ABI IR measurements. Regression provides relationship between observations and GFS first guess.

Total Precipitable Water (TPW) at 1812 UTC, 12 June 2017
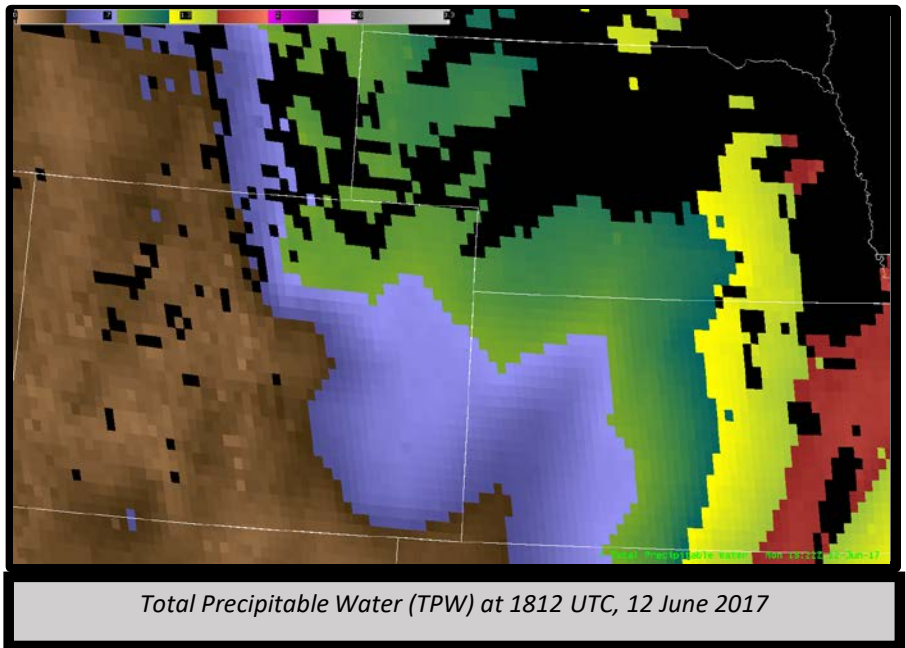
Time resolution	Spatial resolution	Moisture Variables
15 minutes (Full Disk) 5 minutes (CONUS) 1 minute (Mesoscale)	~10 km	Total precipitable water vapor (in)

Default color table (inches)
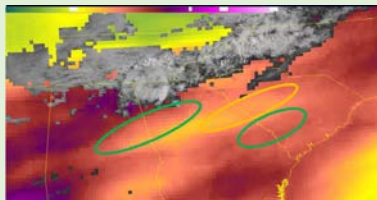

Feel free to modify color table or range based on location and season

## Impact on Operations

Applications:

- **Convective events**
- **Flood events**
- **Atmospheric Rivers**
- **Mesoscale analysis:**
  - **Surface boundaries / frontal zones**
  - **Areas of enhanced moisture**
- **Verify model moisture fields**
- **Identify moisture gradients between RAOB sites, use in conjunction with RAOB data**

Generally speaking, this product is better for short fuse / mesoscale events while TPW products that make use of polar orbiting satellites are better for long fuse / synoptic scale events.
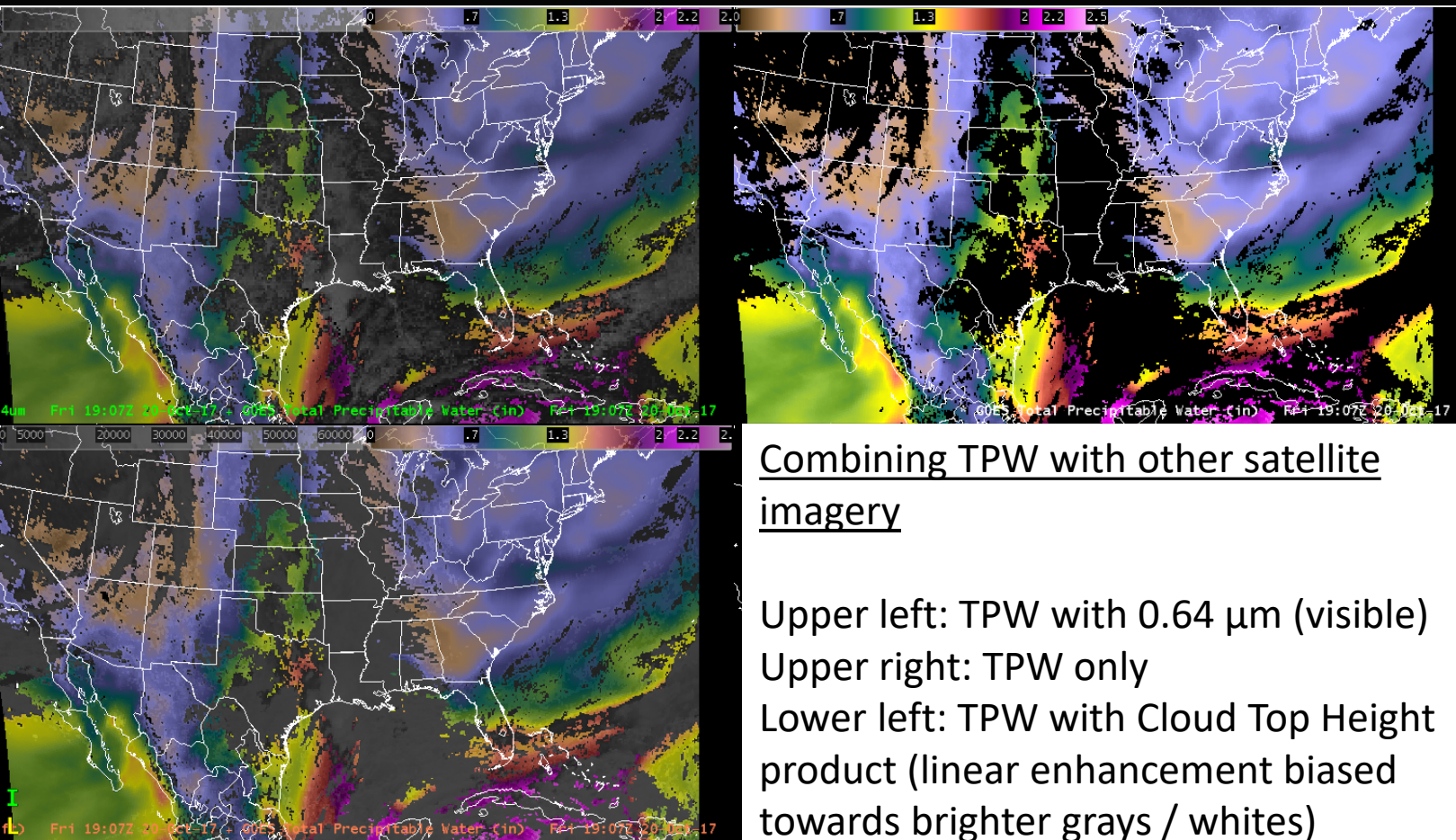
Limitations

Missing data in cloudy regions: Retrievals are only made in clear sky conditions. Cloudy regions will have missing data.

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Updated 3/6/2018
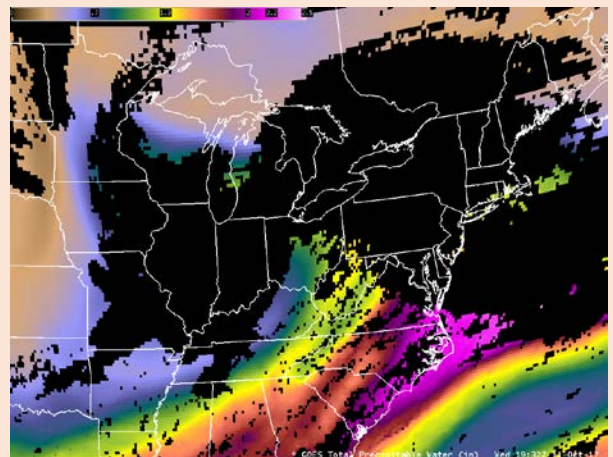
Combining TPW with other satellite imagery

Upper left: TPW with 0.64 µm (visible)
Upper right: TPW only
Lower left: TPW with Cloud Top Height product (linear enhancement biased towards brighter grays / whites)

TPW product at 1907 UTC, 20 October 2017.

Since the TPW product cannot make retrievals through clouds we end up with imagery that appears in the upper right panel above (missing values over clouds). An alternative display is to combine TPW with either the visible band during daytime (upper left) or the Cloud Top Height baseline product (lower left) anytime. These image combinations provide information on where clouds are so you're not looking at missing data TPW values. Experiment with the alpha values to bias the TPW imagery with the combined images for optimal display. A linear color table is applied to the cloud top height product and then adjusted towards brighter gray and white colors to make low clouds appear brighter than the default color table.

Lee, Y.-K., Z. Li, J. Li, and T.J. Schmit, 2014: Evaluation of the GOES-R LAP Retrieval Algorithm using the GOES-13 Sounder. J. Atmos. Ocean. Technol.., 31, 3–19. http://doi.org/10.1175/JTECH-D-13-00028.1

Resources

Quick Brief
http://rammb.cira.colostate.edu/training/visit/quick_briefs/tpw_baseline/

GOES-R Legacy Atmospheric Profiles Student Guide
http://rammb.cira.colostate.edu/training/visit/training_sessions/goes_r_legacy_atmospheric_profiles/

Hyperlinks not available when viewing material in AIR Tool