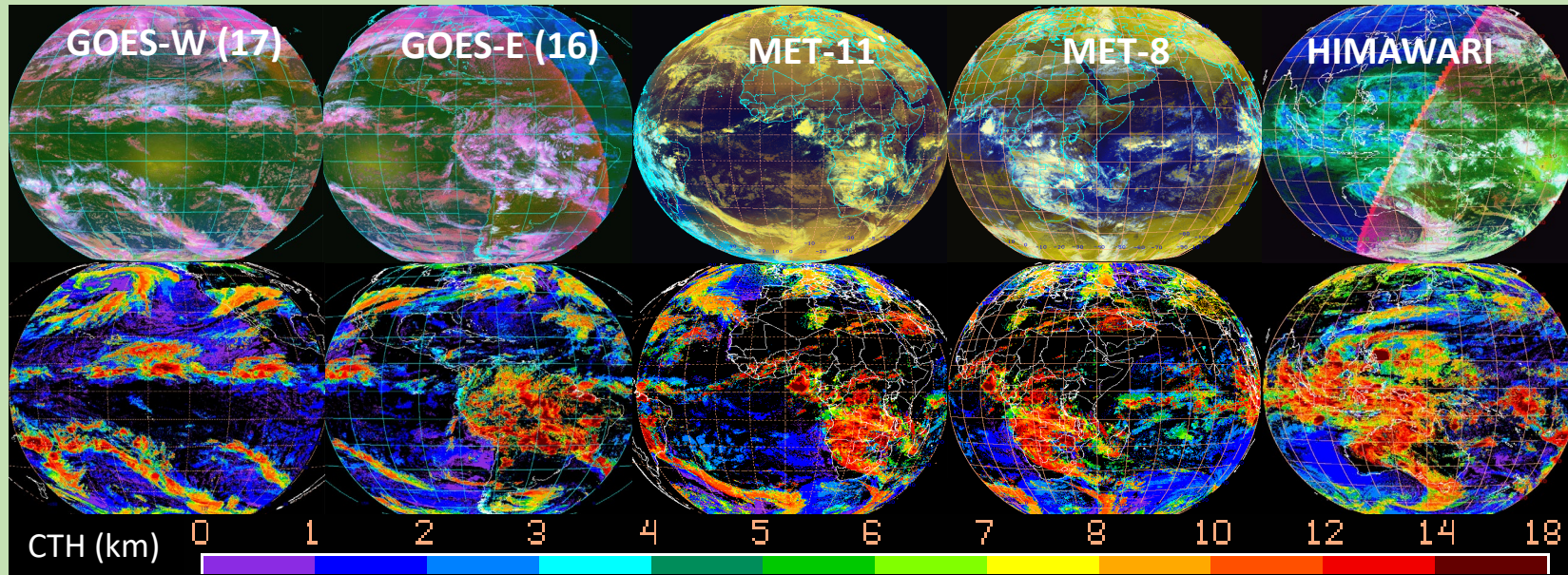


The Satellite CLOud and Radiative Property retrieval System (SatCORPS)



Derived Cloud Properties

- Cloud Mask, Phase
- Cloud Optical Depth, COD
- Droplet/crystal effective radius
- Liquid/Ice Water Path, LWP, IWP
- Cloud Top Temperature, Heigt
- Cloud Thickness / Bottom Height

Aviation Weather Products

- Cloud Ceilings
- Airframe Icing
- Hazardous convection, OT's
- HIWC icing

<https://satcorps.larc.nasa.gov>

Global analyses of clouds for weather and climate from meteorological satellite imagers

- GEO constellation (5)
- Terra & Aqua MODIS
- S-NPP & NOAA-20 VIIRS
- AVHRR

New datasets in development

- 3-km gridded global composite from all satellites (30-60 min)
- Regional atmospheric thermodynamics and winds from hyperspectral infrared satellite imagers (sounders)

Contact: William.L.Smith@nasa.gov



Novel Research to Improve Satellite Data Products and their Utility

Data Fusion

Develop and apply parameterizations of cloud vertical structure from active sensors, MWR, and cloud models.

- Cloud water content diagnoses consistent with model parameters (assimilation of mass fields)
- Icing diagnoses embedded in deep cloud systems

Combine METAR with satellite data over the U.S.

- Improved high resolution cloud ceiling analyses

Combine VIS/IR with lightning data

- Improves ident of hazardous convection signatures

Textural information

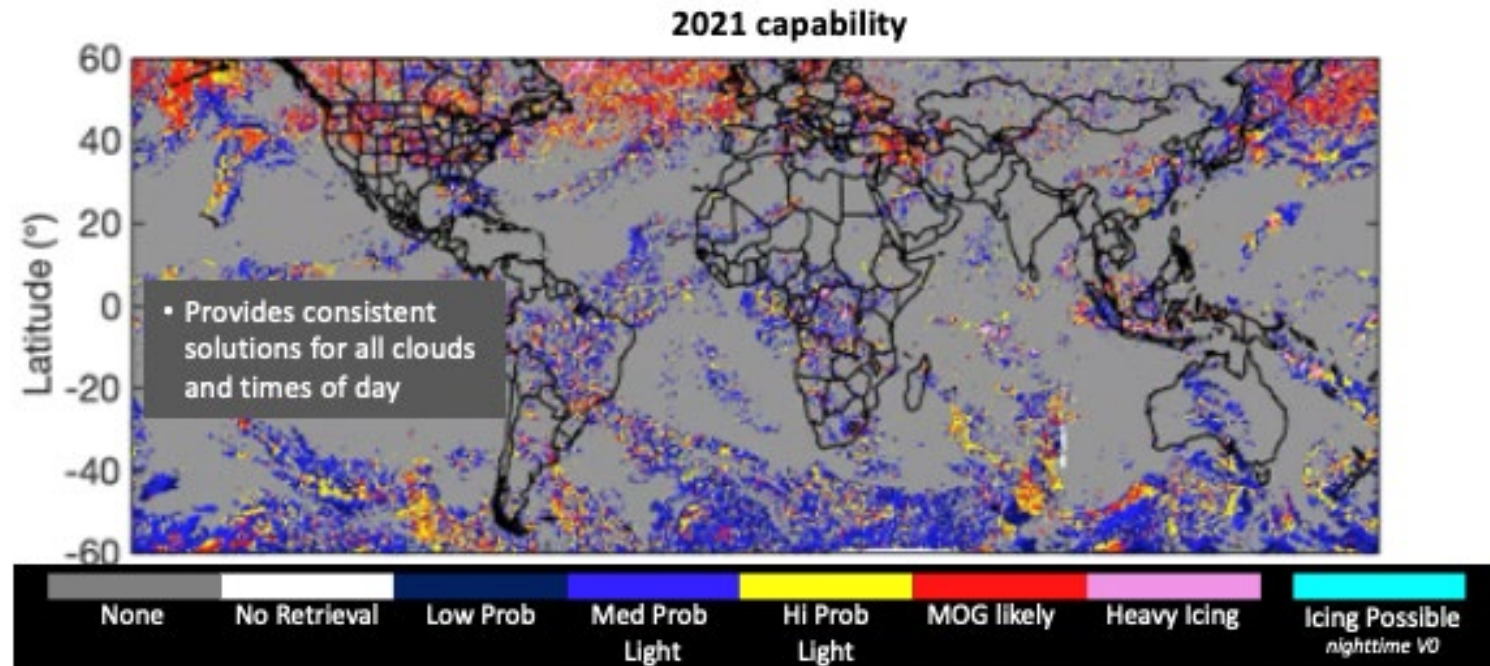
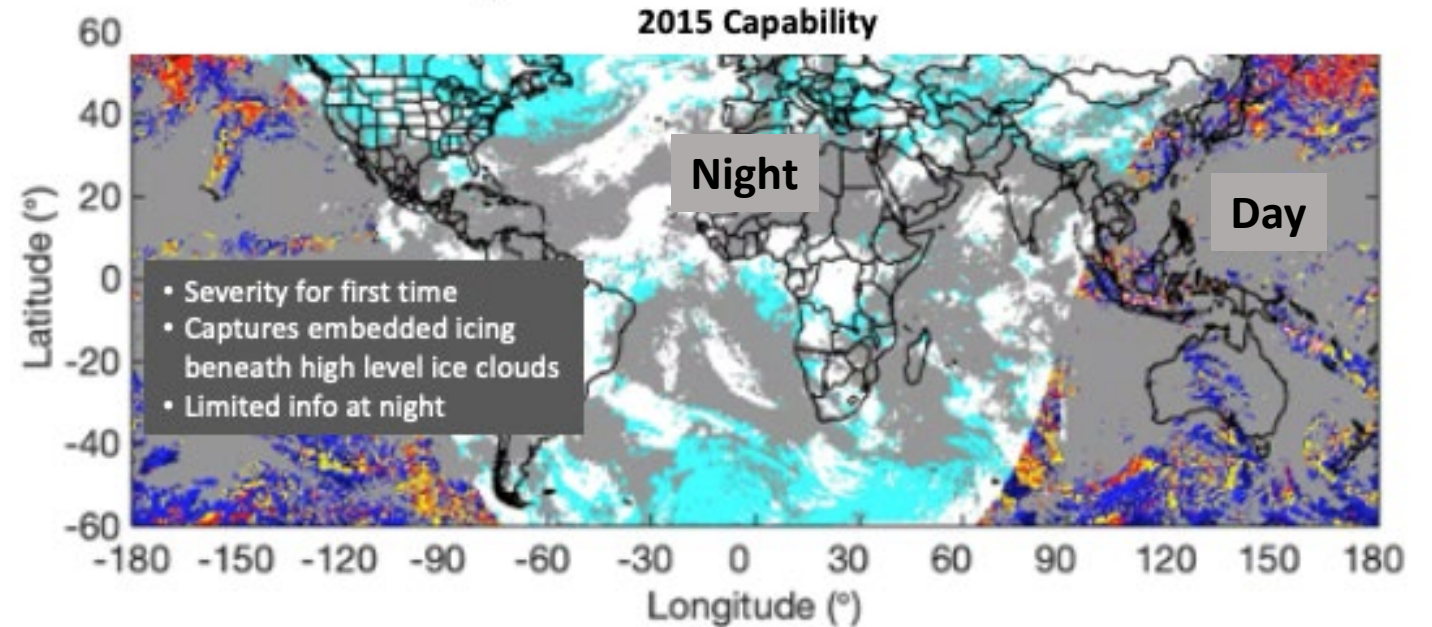
- Hazardous Convection
- Improved interpretation of derived products

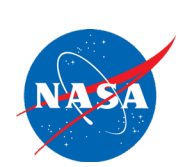
Machine learning

Neural networks and other methods improve

- cloud analyses in the more challenging conditions (e.g. in the presence of thin cirrus and multi-layered clouds, over snow and ice, nighttime)
- nighttime cloud analyses and consistency with daytime analyses
- detection of hazardous convection signatures, HIWC

Satellite Icing Product for FAA AWRP and NOAA NWS





Geostationary Satellite Sounder Pathfinder Project for 4-D Atmospheric Thermodynamics and Winds

Objectives

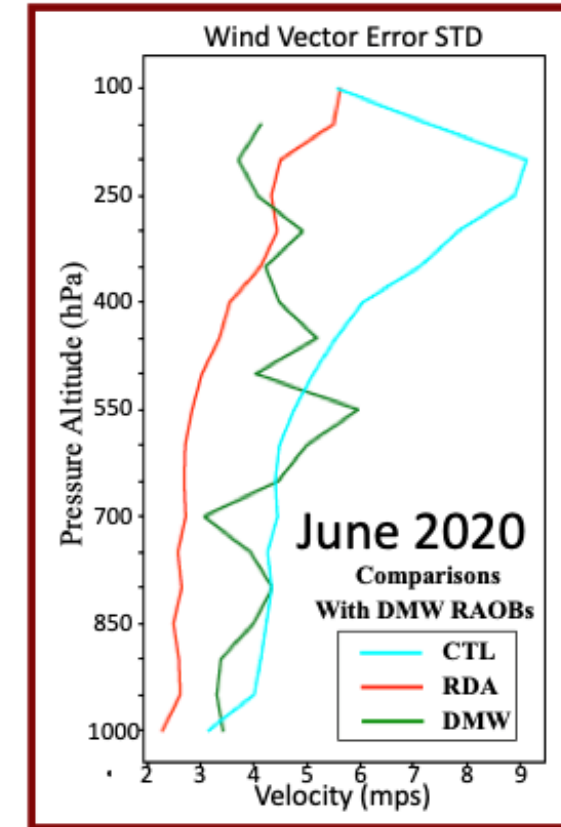
Implement a satellite retrieval and data assimilation capability within the NASA SatCORPS to produce high space/time resolution vertical profiles of atmospheric thermodynamics and winds

- System developed in partnership with HU and UW
- Exploits full information content in hyperspectral radiances from CrIS and IASI (hyperspectral sensors on LEOsats, soon GEOsats)
- Operational centers are not fully exploiting these data leading to limited impacts of the satellite observations in NWP

Research plans

Evaluate impact of satellite thermodynamics profile assimilation on

- Wind analyses and forecasts (impressive results so far)
- Severe weather forecasting
- Cloud & icing analyses and forecasts
- Sustainable aviation operations



Assimilation of satellite sounding fusion data (RDA) significantly improves vertical wind profile accuracies compared to current models (CTL) and atmospheric motion tracking methods (DMW).