CLOUD PRODUCTS FROM CSPP CLAVR-X

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The Sixth Asia/Oceania Meteorological Satellite Users' Conference
Tokyo - Japan, November 9-13, 2015

What is CSPP?

CIMSS / SSEC / UW-Madison, USA

CLAVR-x/CSPP gives access to the DB Community to the NOAA Enterprise Cloud Products that will be operational for JPSS-1 and GOES-R.

http://cimss.ssec.wisc.edu/cspp/

Community Satellite Processing Package

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The Community Satellite Processing Package (CSPP) supports the Direct Broadcast (DB) meteorological and environmental satellite community through the packaging and distribution of open source science software. CSPP supports DB users of both polar orbiting and geostationary satellite data processing and regional real-time applications through distribution of free open source software, and through training in local product applications. CSPP is funded through NOAA JPSS.

Suomi National Polar-orbiting Partnership (NPP) Products

CSPP software to support Suomi NPP:

- VIIRS, ATMS and CrIS calibration and geolocation software (Raw Data Records (RDRs) to Sensor Data Records (SDRs));
  Learn more ...
- VIIRS Environmental Data Records (EDRs), including a subset of Land, Ocean and Atmosphere Products;
  Learn more ...
- VIIRS, MODIS and AVHRR Imager reprojection software for the creation of GeoTIFFs and/or AWIPS NetCDF files;
  Learn more ...
- NOAA/NESDIS/STAR NOAA Unique CrIS/ATMS Processing System (NUCAPS) EDR Hyperspectral Sounding Retrieval Software;
  Learn more ...
- CrIS, AIRS and IASI University of Wisconsin dual regression single Field-of-View (FOV) Temperature, Moisture, Surface and Cloud Retrieval Environmental Data Record (EDR);
  Learn more ...
- S-NPP VIIRS, ATMS,CrIS and EOS Aqua and Terra HYDRA2 multispectral data analysis toolkit;
  Learn more ...
- NOAA/NESDIS/STAR Microwave Integrated Retrieval System (MIRS) supporting S-NPP ATMS, NOAA-18, 19 and Metop-A, B AMSU-A and MHS instruments;
  Learn more ...
- VIIRS Imagery Environmental Data Records (EDRs).
  Learn more ...
- VIIRS, MODIS and AVHRR (POES and Metop) Cloud and Land Surface Retrievals from CLAVR-x.
  Learn more ...
- International ATOVS Processing Package (IAPP) Retrieval Software, supporting POES and Metop HIRS, AMSU-A and MHS Instruments.
  Learn more ...
- NOAA/NESDIS/STAR ACSPO Advanced Clear-Sky Processor for Oceans software supporting VIIRS, AVHRR and MODIS imagers.
  Learn more ...
- Sounder Quicklook Software for display of NUCAPS, HSRTV, MIRS and IAPP Atmospheric Retrievals.
  Learn more ...

Coming Soon:

- CLAVR-x Update to the Cloud and Land Surface Retrieval (CLAVR-x) software.

For more information about Suomi NPP, please see:

- the JPSS website;
- the Suomi NPP website;
- the Suomi NPP document library.

What's New

- Polar2Grid Reprojection Software v2.0
- MIRS Microwave Retrieval Software v2.0
- Suomi-NPP SDR v2.1.1 Patch for CrIS
- Sounder Quicklook Software v1.0
- ACSPO SST Retrieval Software v1.0
- IAPP Retrieval Software v1.0
- NUCAPS CrIS/ATMS EDR Retrieval Software v1.0

Last updated *12-October-2015* . Contact us.

Global CSPP Registrants

More than 1100 people have registered since the first CSPP release in March 2012.

CLAVR-x Introduction

- CLAVR-x is the Clouds from AVHRR Extended Processing System.
- Run most of NOAA Enterprise Cloud Algorithms. CSPP gives access to DB community.
- Operational in NESDIS on AVHRR since 2002. Responsible for AVHRR and GOES cloud products.
- Serves as the PATMOS-x* climate data set processing system. Climate Data Records hosted at NCDC.
- This work funded by NOAA JPSS and GOES-R.

* *Andrew K. Heidinger, Michael J. Foster, Andi Walther, and Xuepeng (Tom) Zhao, 2014: The Pathfinder Atmospheres–Extended AVHRR Climate Dataset. Bull. Amer. Meteor. Soc., 95, 909–922.*

CLAVR-x in CSPP provides:

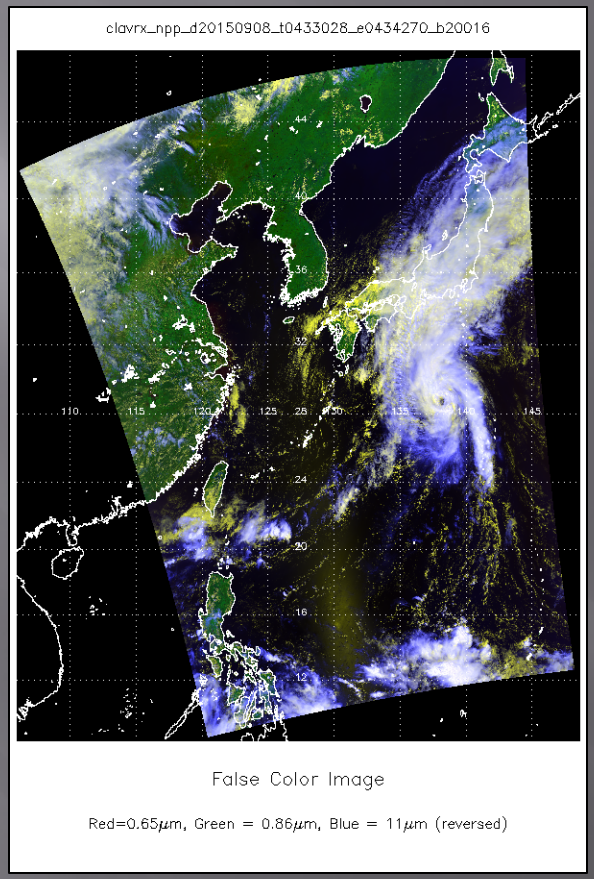
- NOAA/NESDIS Cloud Products (examples to be shown).
- Other NESDIS AVHRR Products (that we run on all sensors)
- Sensors supported by CLAVR-x in CSPP include: AVHRR, MODIS, and VIIRS.
- However, many other sensors and products can be generated by the CSPP CLAVR-x: GOES-IM, GOES-NOP, MSG/SEVIRI, MTSAT-1R/2, COMS, and AHI (some adjustments needed).

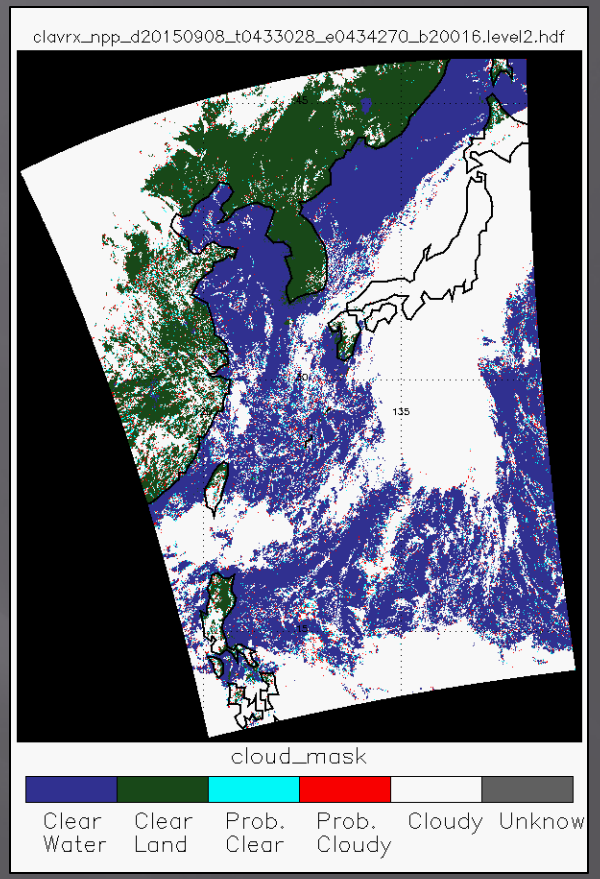
CLAVR-x Output

- Cloud: Mask, Probability, Phase, Type, Height, Pressure, Temperature, Emissivity, IR-Particle Size, Optical Depth, Particle Size, Ice/Liquid Water Path. Uncertainty Estimates.
- Surface: SST, TOC NDVI, Land Surface Temperature, Remote Sensing Reflectance (Oceanic Turbidity)
- Aerosol: Optical depths at 0.63, 0.86 and 1.6 μm.
- Fluxes: Solar Flux at Surface (Insolation) and Outgoing Longwave Radiation (OLR).
- Radiances: Calibrated Reflectance, Brightness Temperatures and some statistics useful for filtering products.

Cloud Detection

- Naïve Bayesian formulation also used (Heidinger et al., 2012).
- Determination of test thresholds accomplished through an analysis of CALIPSO data.
- Compared against PPS and MAIA masks in CREW and other analysis. See Jan Musial's EUMETSAT 2012 paper.





SNPP - VIIRS, TS Etau, September 8, 2015

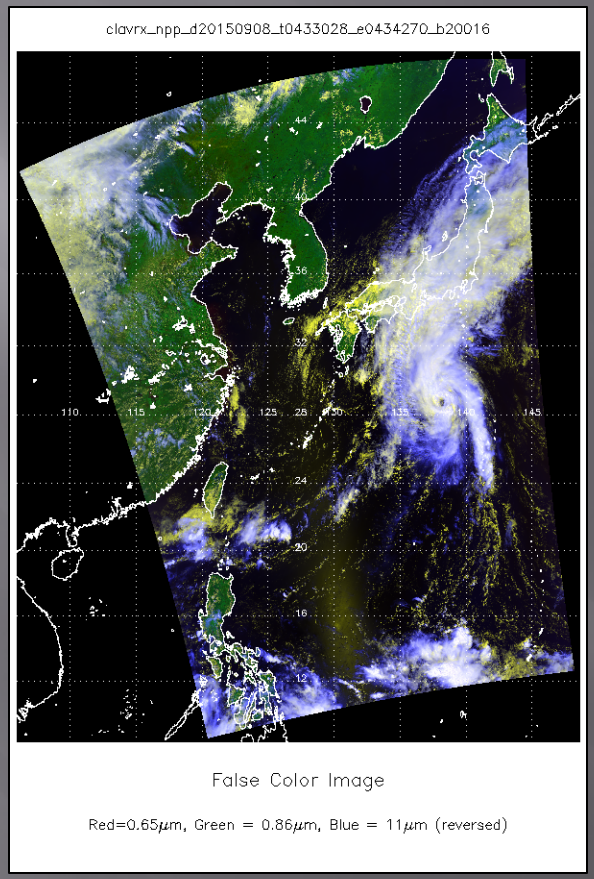
Heidinger, Andrew K.; Evan, Amato T.; Foster, Michael J. and Walther, Andi. A naive Bayesian cloud-detection scheme derived from CALIPSO and applied within PATMOS-x. Journal of Applied Meteorology and Climatology, Volume 51, Issue 6, 2012, 1129–1144.

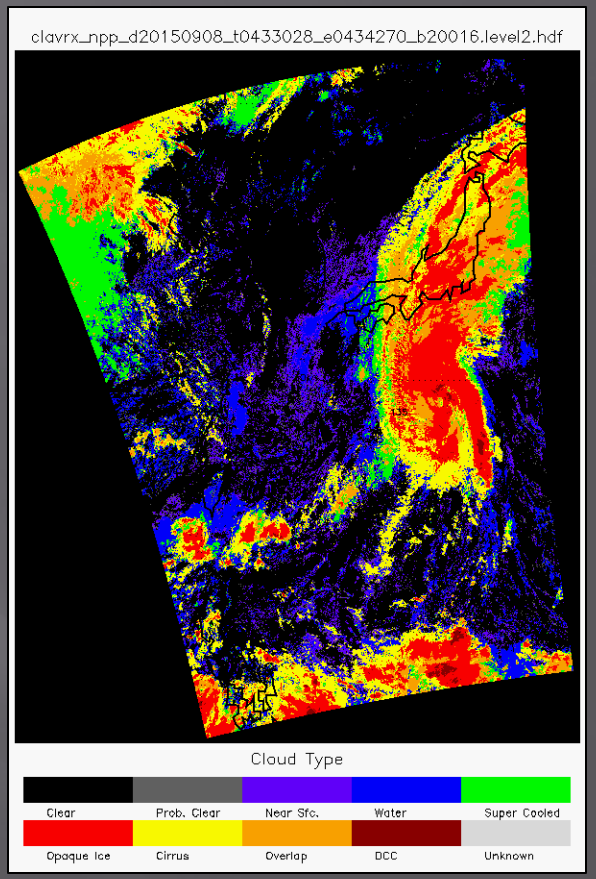
Cloud Type

- Derive 7 cloud types (less than PPS and MAIA)
- Algorithm is based on pre-AWG approach.
- Operates on all sensors.

Cloud Types :

1. Clear
2. Probably Clear
3. Near-surface cloud
4. Water cloud
5. Super Cooled Water
6. Opaque Ice
7. Cirrus
8. Overlapped Cirrus
9. Deep Convective
10. Unknown



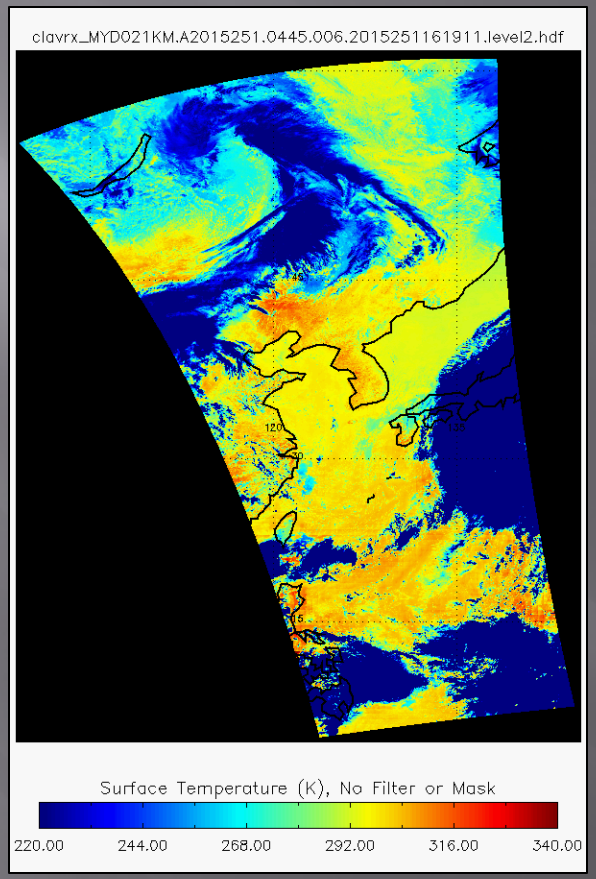


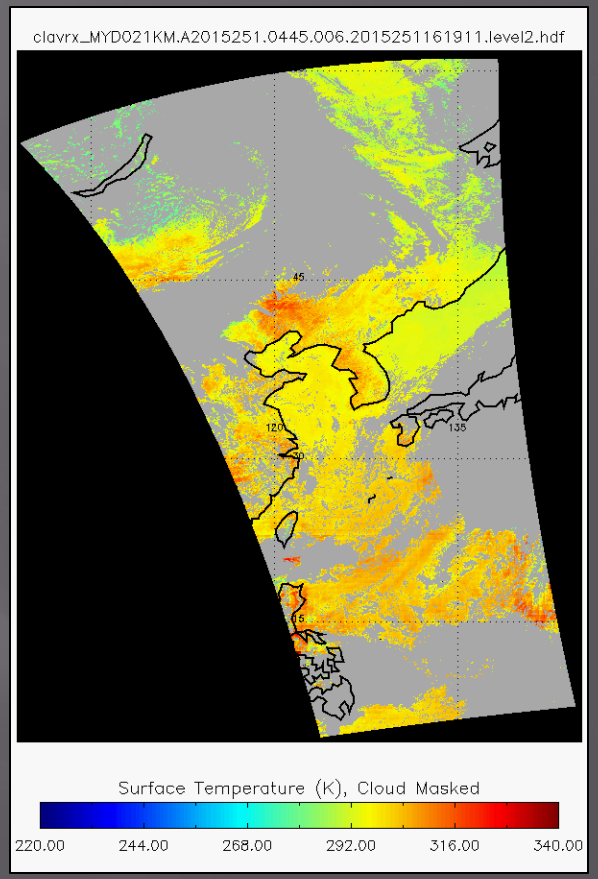
SNPP - VIIRS, TS Etau, September 8, 2015

Pavolonis, Michael J.; Heidinger, Andrew K. and Uttal, Taneil. Daytime global cloud typing from AVHRR and VIIRS: Algorithm description, validation, and comparisons. Journal of Applied Meteorology, Volume 44, Issue 6, 2005, pp.804-826.

Surface Temperature

- We run the NESDIS Single Channel Algorithm over land and a split-window NLSST over Ocean.
- Data is generated without regard to quality flags.
- Cloud Mask is available to filter data
- Users can also add filters using cloud probability and other metrics.



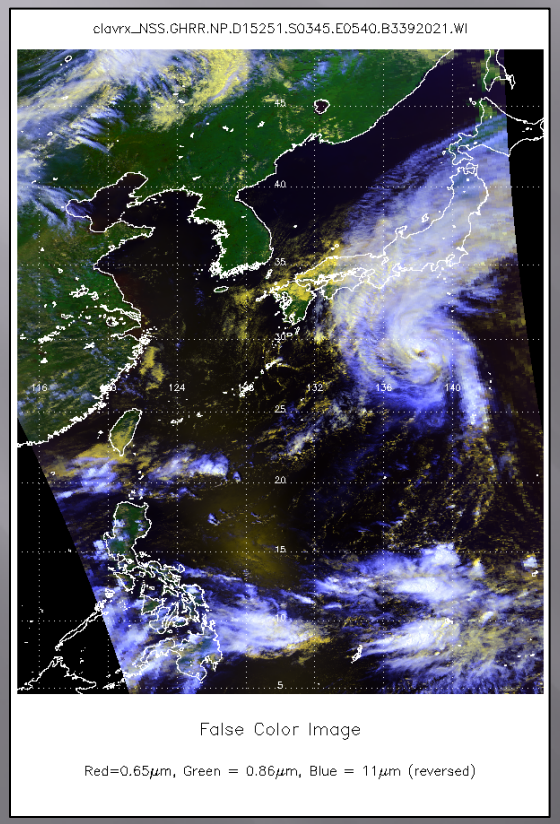


Aqua - MODIS, TS Etau, September 8, 2015

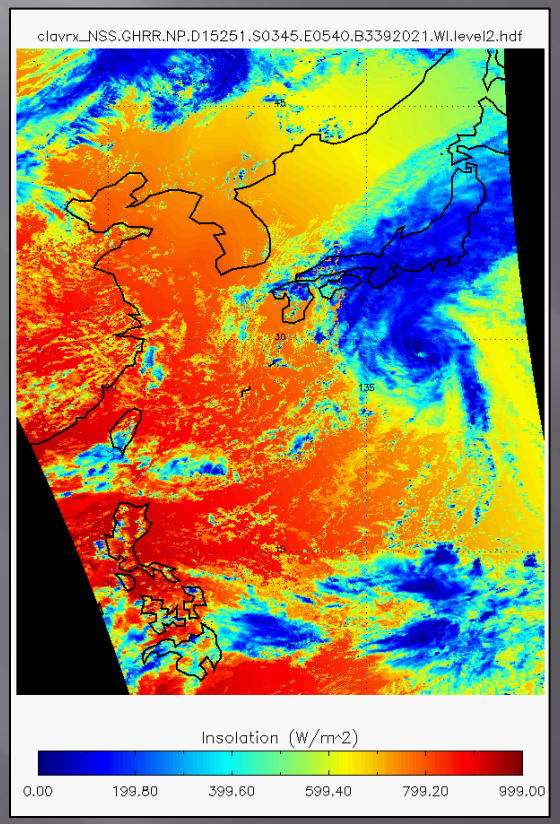
CLAVR-x Radiative Flux Products

Radiative flux algorithms are taken from PATMOS heritage (NESDIS Climate Project).

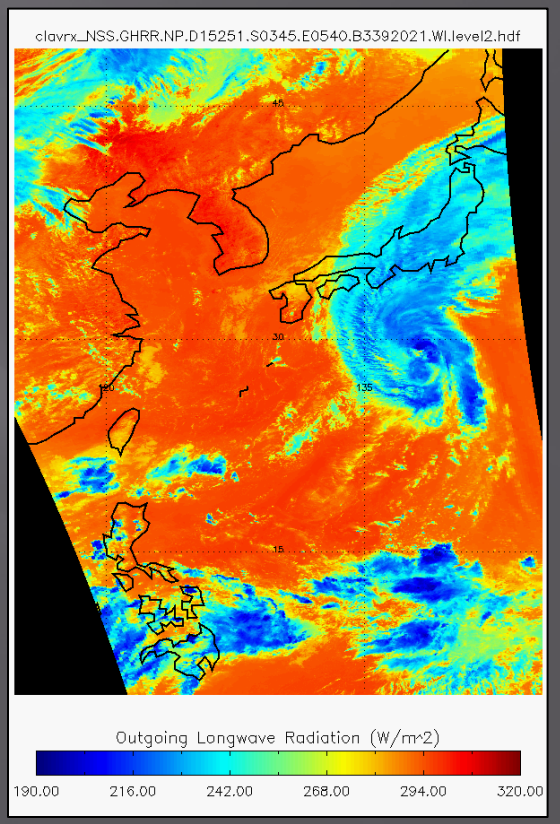
False Color Image (0.65, 0.86, 11μm)



Downward Solar Flux at Surface (W/m²)



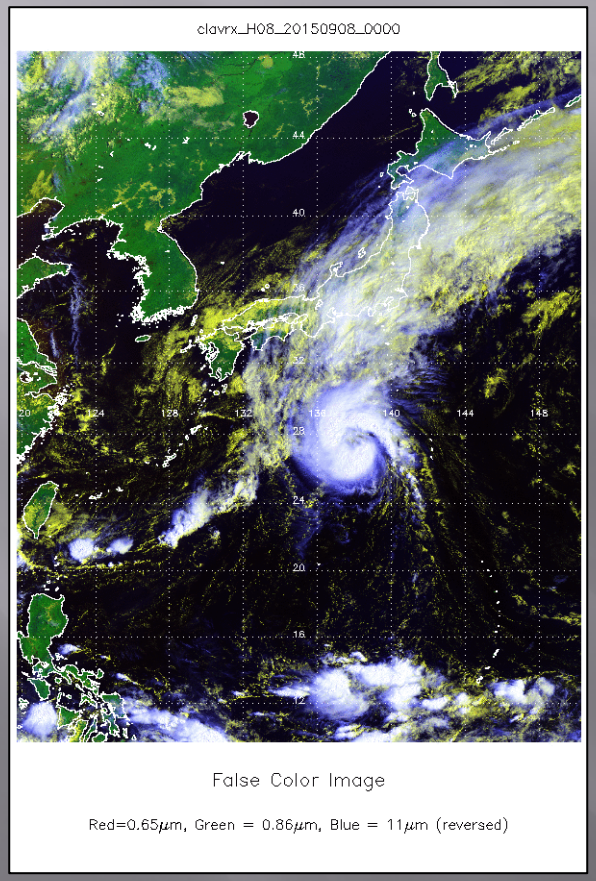
Upward Longwave Flux at TOA (W/m²)



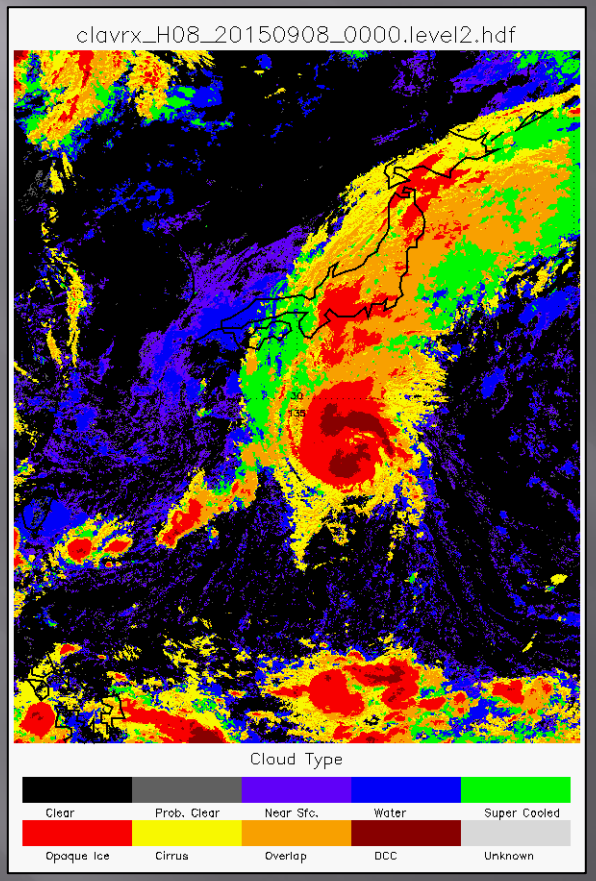
NOAA19 - AVHRR, TS Etau, September 8, 2015

CLAVR-x Cloud Products on AHI (1)

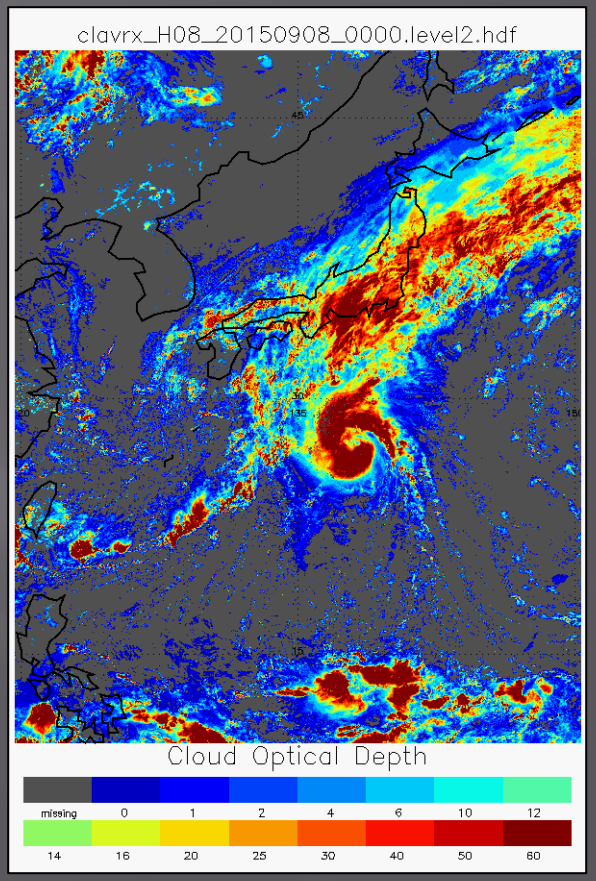
False Color Image
(0.65, 0.86, 11μm)



Cloud Type



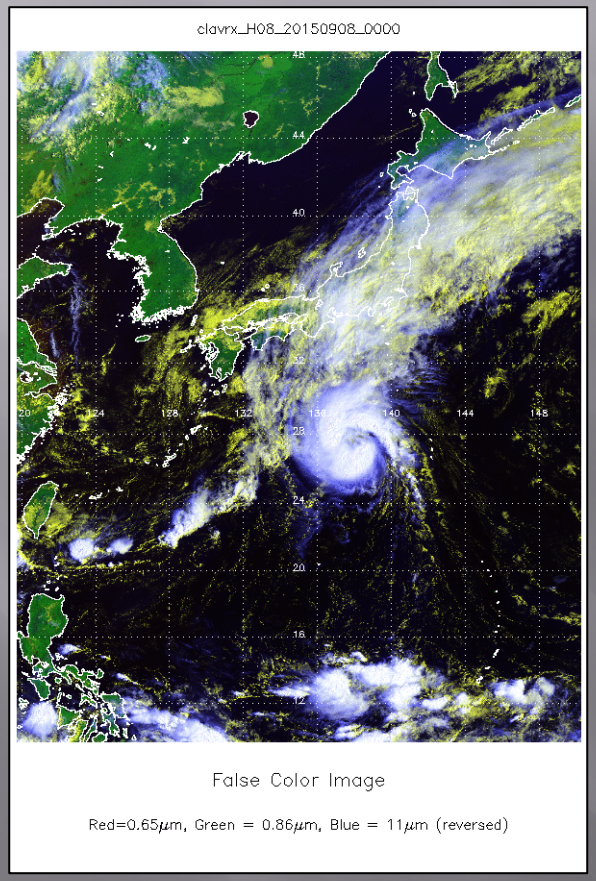
Cloud Optical Depth



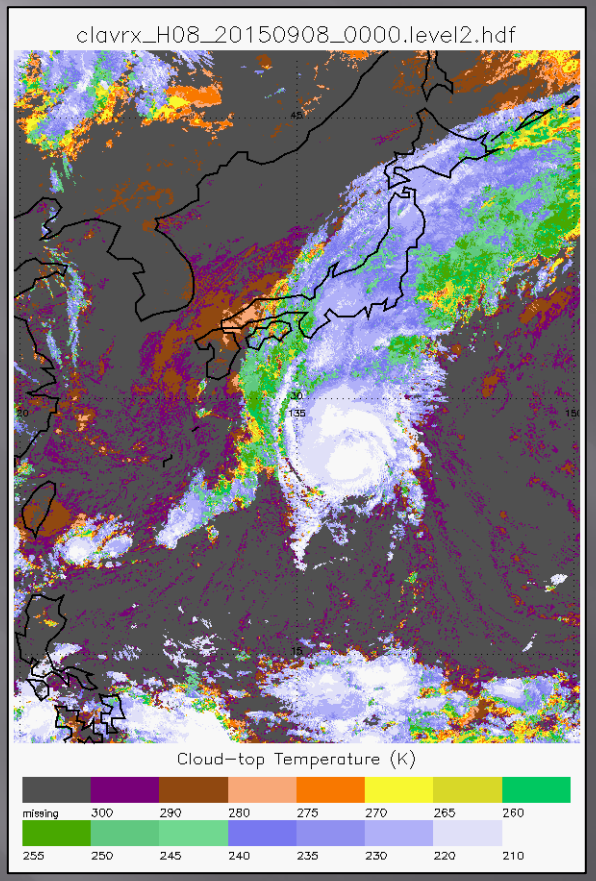
Himawari 8 - AHI, TS Etau, September 8, 2015

CLAVR-x Cloud Products on AHI (2)

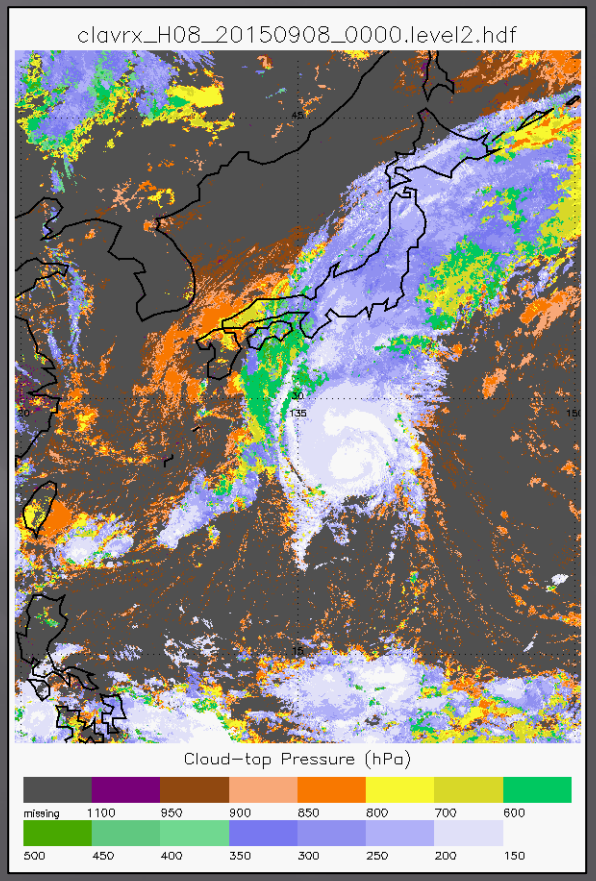
False Color Image (0.65, 0.86, 11μm)



Cloud Top Temperature



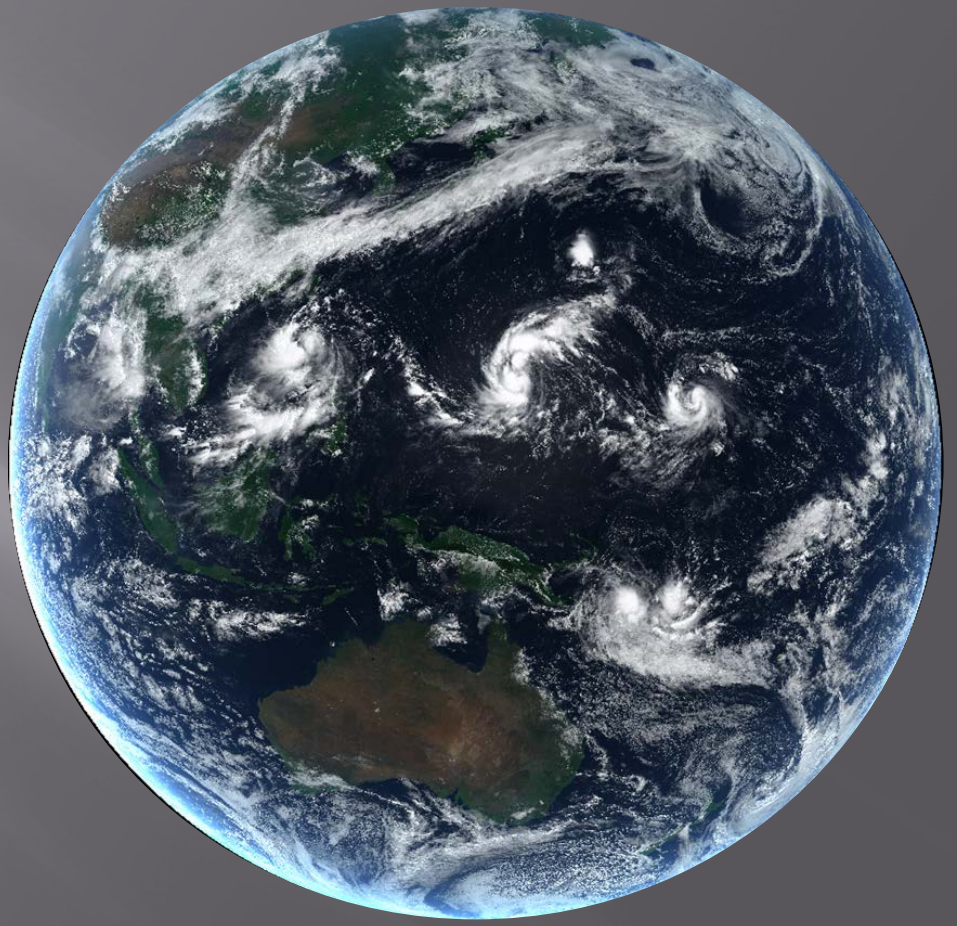
Cloud Top Pressure



Himawari 8 - AHI, TS Etau, September 8, 2015

CLAVR-x Future Changes

- Implement combined VIIRS + CrIS processing.
- Add support for GOES-R ABI, KMA AMI and CMA FY-3.
- Improve performance of cloud detection and optical depth over snow.
- Implement GSICS corrections automatically.



For any feedback or questions:
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