

CSPP Geo

Jessica Braun

Direct Broadcast Polar Orbiter Workshop

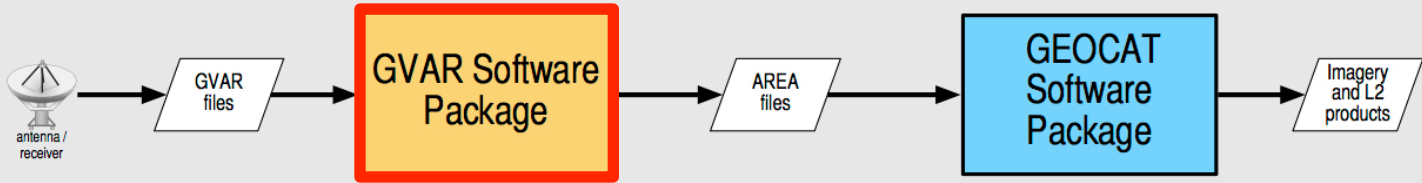
University of Puerto Rico at Mayagüez

April 28, 2016

CSPP Geo Project

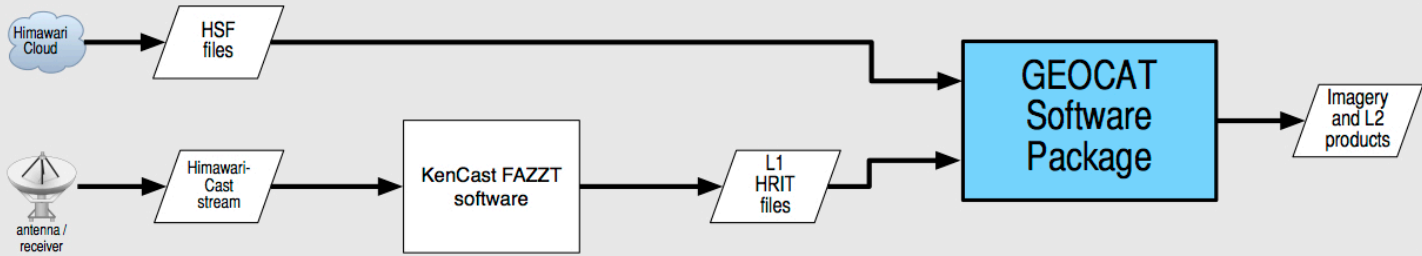
- Collection of software to allow Direct Broadcast users to process data from geostationary satellites
- Freely available
- Current Satellite support
 - GOES-13 (GOES-East)
 - GOES-15 (GOES-West)
- Future Support
 - GOES-14 (On orbit storage)
 - GOES-R
 - Himawari

GOES Imager

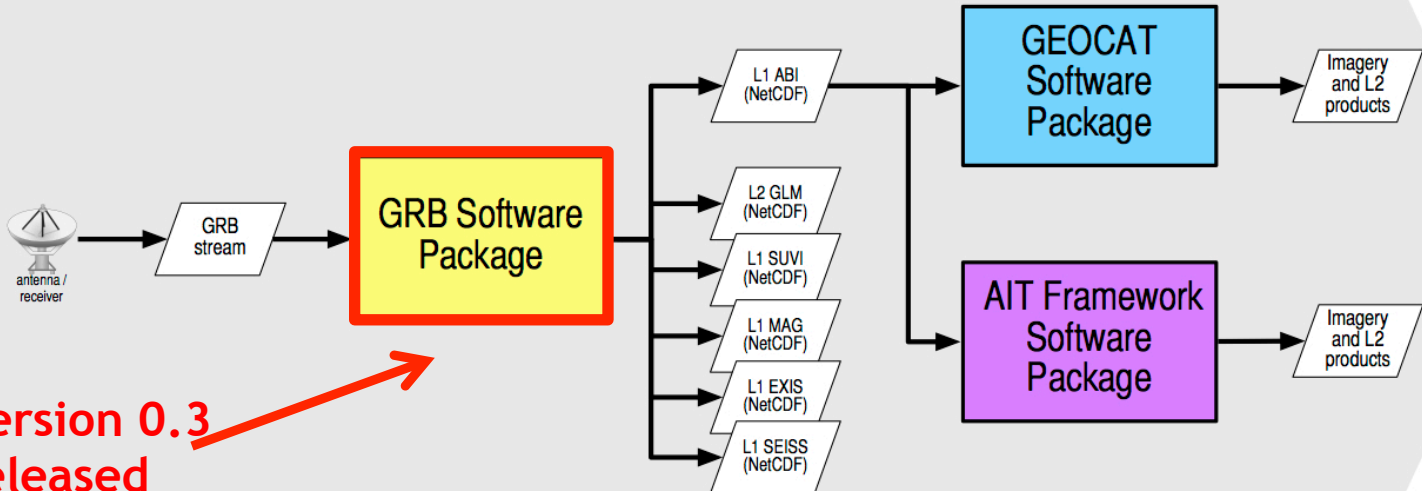


Version 1.0 released

Himawari AHI



GOES-R



Version 0.3 released

CSPP Geo GVAR

- Version 1.0 released
- Allows users to process current operational GOES
- Input is GVAR (GOES VARIable) data and index files
 - Real-time
 - Archive (NOAA CLASS)
- Output is AREA files, which can be used as input into future GEOCAT release

CSPP Geo GRB

- Ingests raw GRB (GOES Re-Broadcast) stream, extracts payloads from packets, and constructs datasets
- Supports all GOES-R instruments
 - ABI (16 channel Imager)
 - GLM (Lightning Mapper)
 - SUVI (Solar Telescope)
 - EXIS (UV and X-Ray Sensor)
 - MAG (Magnetometer)
 - SEISS (proton, electron, ion flux sensor suite)
- Utilizing output from Ground System tests and Harris GRB Simulator

CSPP Geo GRB

- Data will be processed at ground segment to L1 (L2 for GLM)
- Products are packetized and rebroadcast from GOES-R
- More information on the NOAA GRB web site:
<http://www.goes-r.gov/users/grb.html>
- “Minor Detail” - Location of GOES-R undetermined at this time
 - Current launch date: October 13, 2016

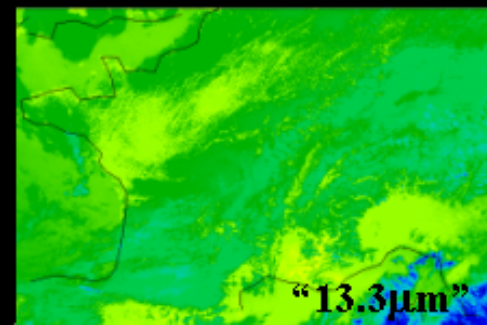
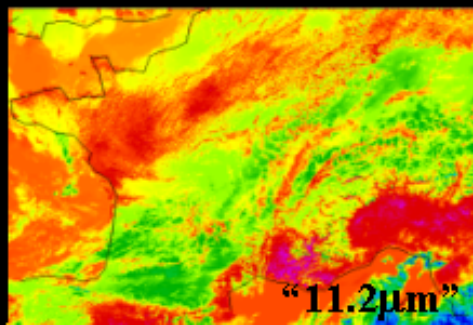
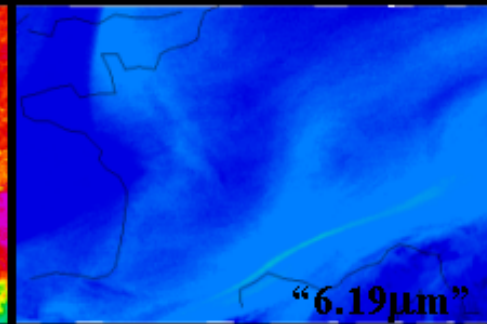
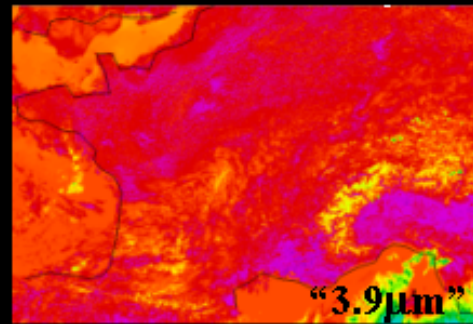
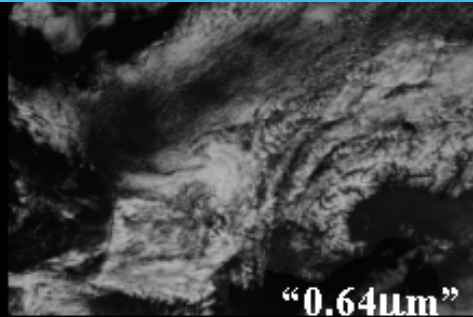
Current GOES vs GOES-R

	GOES Variable (GVAR)	GOES Rebroadcast (GRB)
Full Disk Image	30 Minutes	5 Minutes (Mode 4) 15 min (Mode 3)
Other Modes	Rapid Scan, Super Rapid Scan	3000 km X 5000 km (CONUS: 5 minute) 1000 km X 1000 km (Mesoscale: 30 seconds)
Polarization	Linear	Dual Circular Polarized
Receiver Center Frequency	1685.7 MHz (L-Band)	1686.6 MHz (L-Band)
Data Compression	None	Lossless Compression
Data Rate	2.11 Mbps	31 Mbps
Antenna Coverage	Earth Coverage to 5°	Earth Coverage to 5°
Data Sources	Imager (5 bands), Sounder, Magnetometer	ABI (16 bands), GLM, SUVI, MAG
Space Weather	None	~2 Mbps
Lightning Data	None	~0.5 Mbps

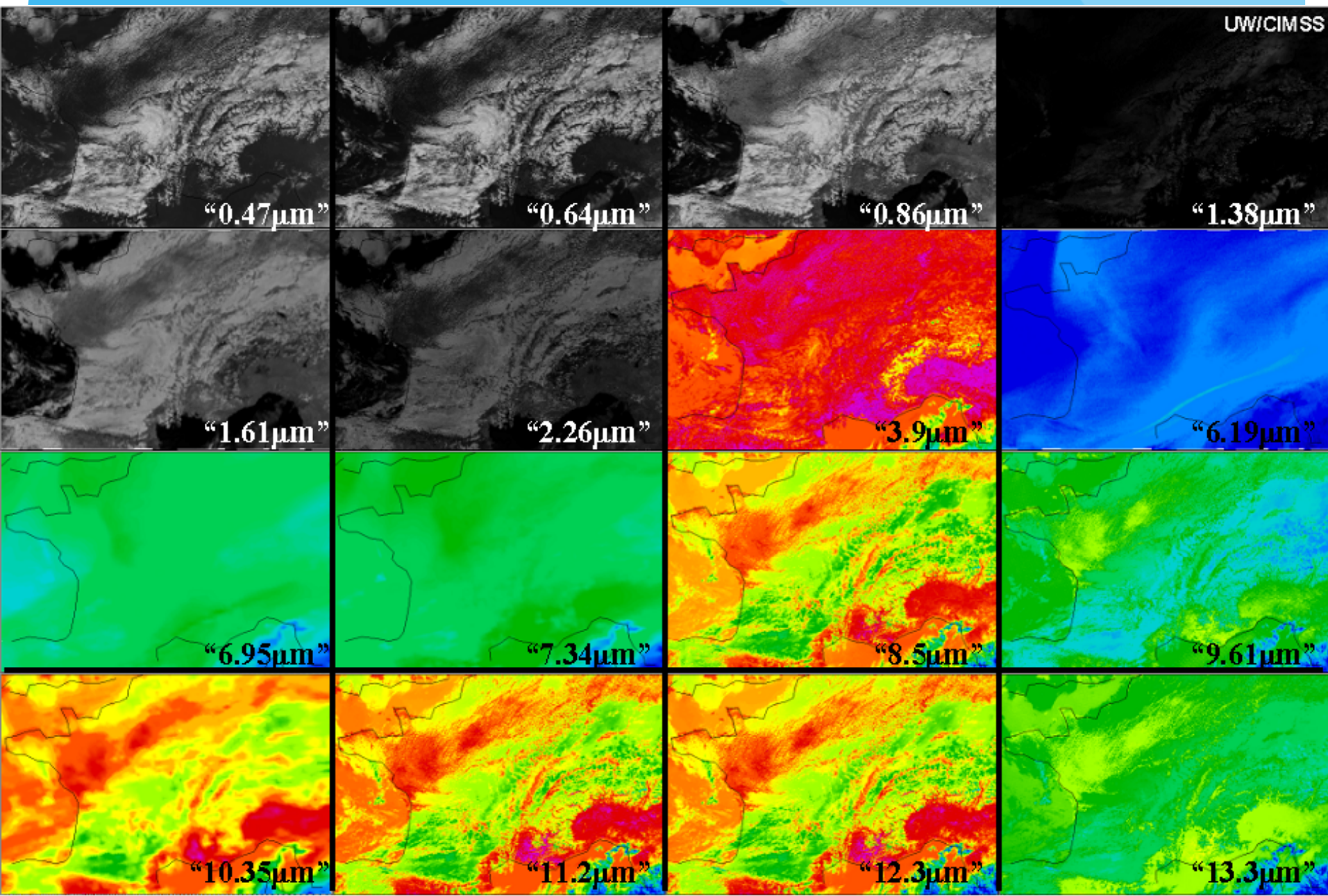
	ABI	Current GOES Imager
Spectral Coverage	16 bands	5 bands
Spatial Resolution		
0.64 μm Visible	0.5 km	~ 1 km
Other visible/near-IR	1.0 km	n/a
Bands (>2 μm)	2 km	~ 4 km
Spatial Coverage		
Full Disk	4 per hour	Scheduled (3 hrly)
CONUS	12 per hour	~4 per hour
Mesoscale	Every 30 sec	n/a

Graphics: goes-r.gov

Current GOES

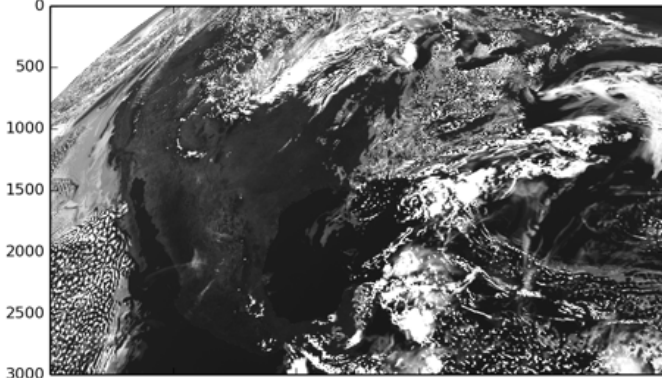


GOES-R

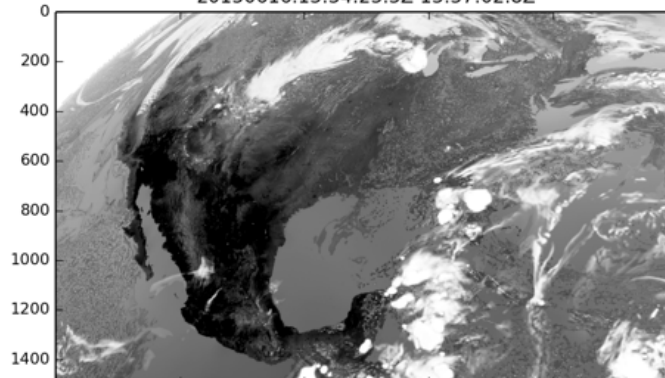


CSPP Geo GRB: Simulated ABI

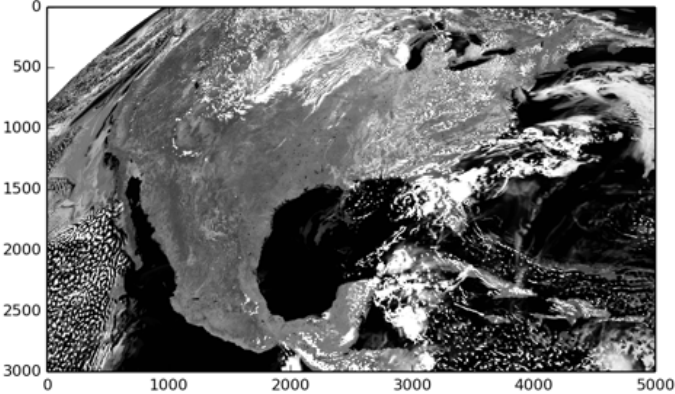
CONUS 1km at nadir
G16 ABI L1b Radiances Ch 1
20150616.13:34:23.3Z-13:37:01.6Z



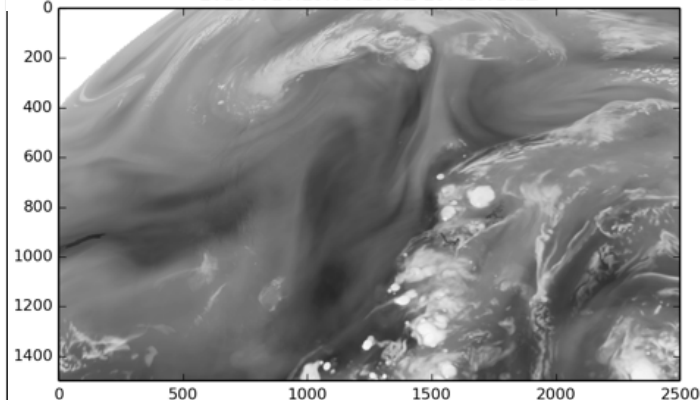
CONUS 2km at nadir
G16 ABI L1b Radiances Ch 7
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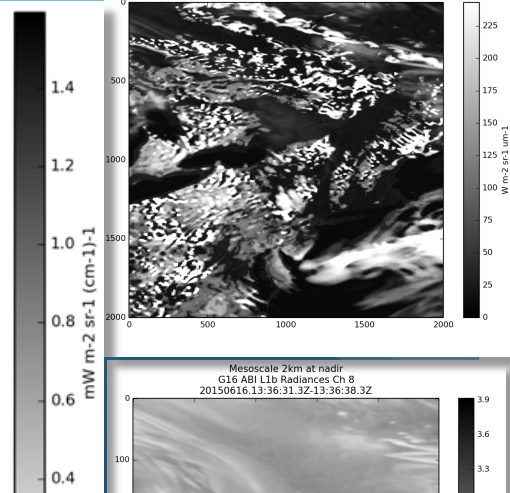
CONUS 1km at nadir
G16 ABI L1b Radiances Ch 3
20150616.13:39:23.3Z-13:42:01.5Z



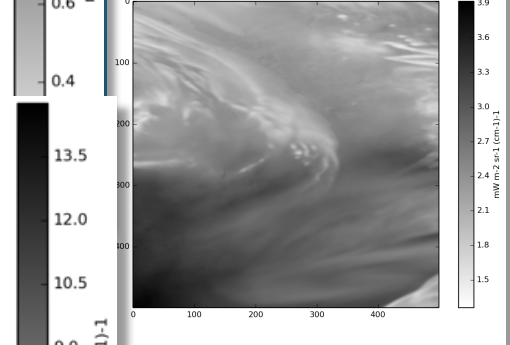
CONUS 2km at nadir
G16 ABI L1b Radiances Ch 9
20150616.13:39:23.3Z-13:42:02.1Z



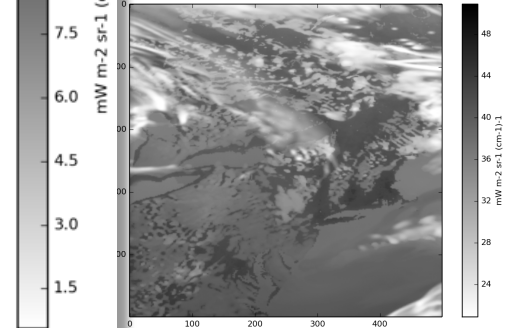
Mesoscale 0.5km at nadir
G16 ABI L1b Radiances Ch 2
20150616.13:36:31.3Z-13:36:38.3Z



Mesoscale 2km at nadir
G16 ABI L1b Radiances Ch 8
20150616.13:36:31.3Z-13:36:38.3Z

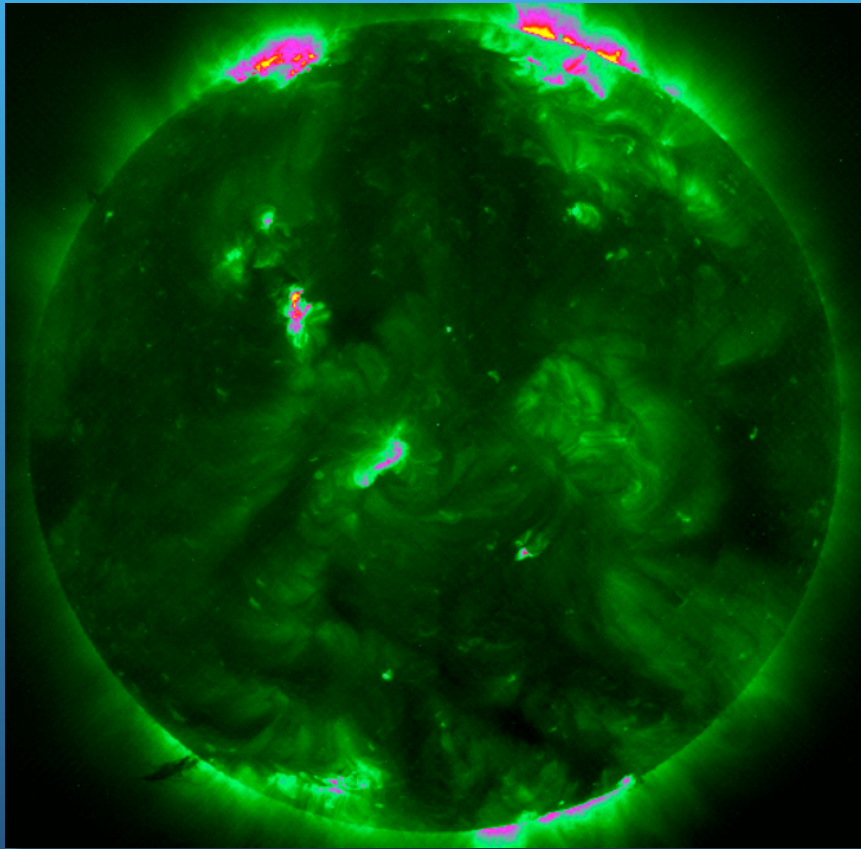


Mesoscale 2km at nadir
G16 ABI L1b Radiances Ch 12
20150616.13:36:31.3Z-13:36:38.8Z

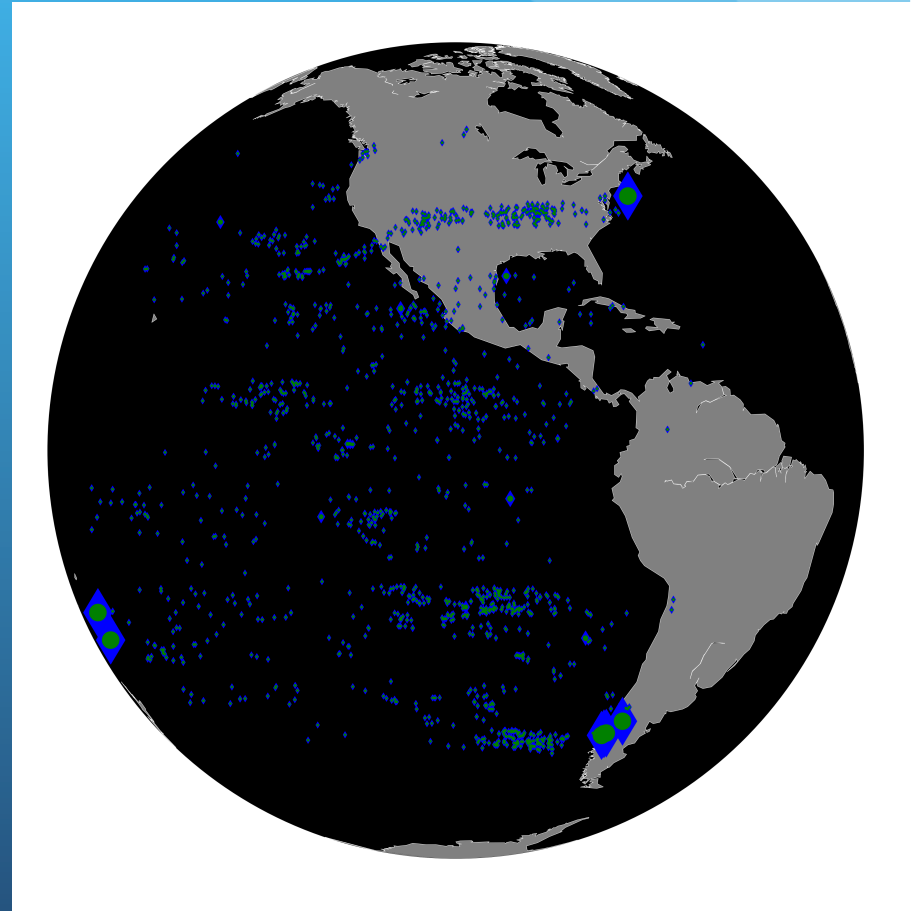


CSPP Geo GRB

Simulated SUVI



Simulated GLM



CSPP Geo GEOCAT

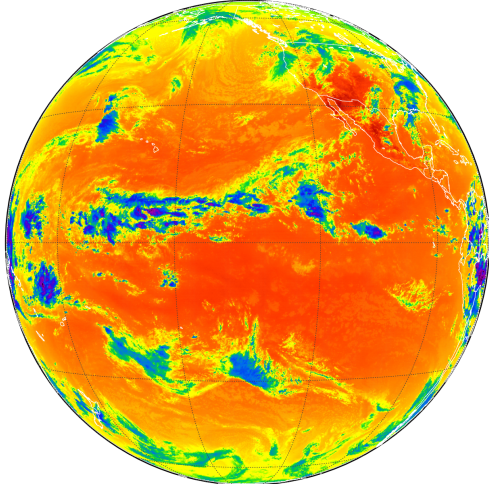
- GEOCAT - an algorithm testbed that runs research versions of GOES-R algorithms
- Will support:
 - GVAR (current GOES) - Late Spring 2016
 - GRB (GOES-R) - Fall 2016
- Creates L1 and L2 products

Initial GEOCAT Products

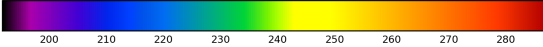
product	algorithm	maintainer
0.65 um reflectance	GEOCAT L1	GEOCAT team
3.9 um reflectance	GEOCAT L1	GEOCAT team
3.9 um brightness temperature	GEOCAT L1	GEOCAT team
6.7 um brightness temperature	GEOCAT L1	GEOCAT team
11.0 um brightness temperature	GEOCAT L1	GEOCAT team
13.3 um brightness temperature	GEOCAT L1	GEOCAT team
Cloud mask	Cloud mask	A Heidinger
Cloud phase	Cloud type	M Pavolonis
Cloud type	Cloud type	M Pavolonis
Cloud top height	Cloud height	S Wanzong
Cloud top temperature	Cloud height	S Wanzong
Cloud top pressure	Cloud height	S Wanzong
Cloud 11 um emissivity	Cloud height	S Wanzong
Cloud visible optical depth	DCOMP / NCOMP	A Walther / P Heck
Cloud effective radius	DCOMP / NCOMP	A Walther / P Heck
Cloud liquid water path	DCOMP / NCOMP	A Walther / P Heck
Cloud ice water path	DCOMP / NCOMP	A Walther / P Heck
Probability of Marginal Visual Flight Rules (MVFR)	Fog	M Pavolonis
Probability of Instrument Flight Rules (IFR)	Fog	M Pavolonis
Probability of Low Instrument Flight Rules (LIFR)	Fog	M Pavolonis
Low cloud geometric thickness	Fog	M Pavolonis

CSPP Geo GEOCAT L1

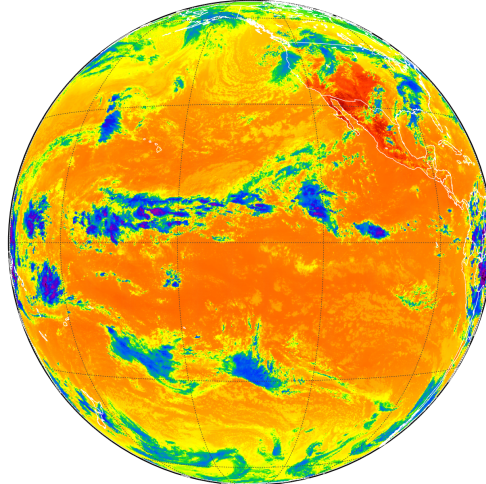
geocatL1.GOES-15.2015096.210000.hdf



GOES-15 Channel-6 (13.35µm) Brightness Temperature (K)



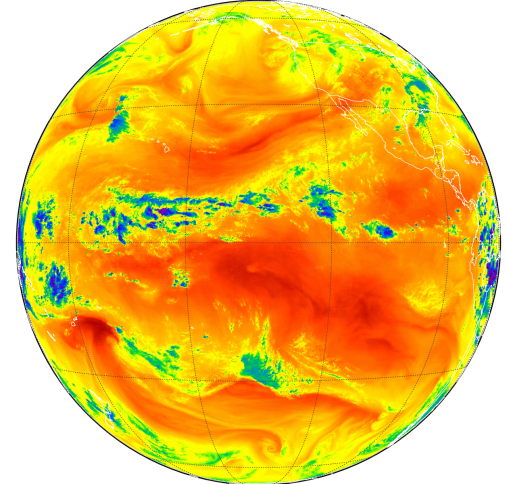
geocatL1.GOES-15.2015096.210000.hdf



GOES-15 Channel-4 (10.70µm) Brightness Temperature (K)



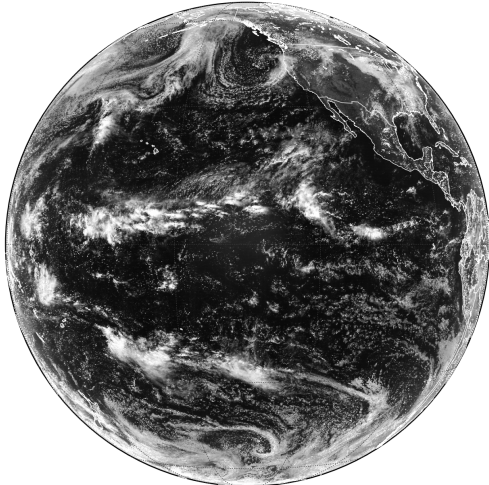
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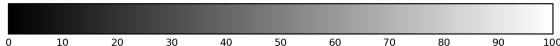
GOES-15 Channel-3 (6.55µm) Brightness Temperature (K)



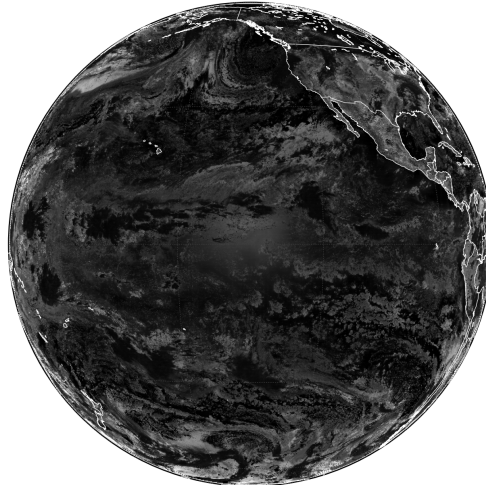
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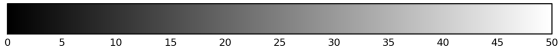
GOES-15 Channel-1 (3.90µm) Reflectance



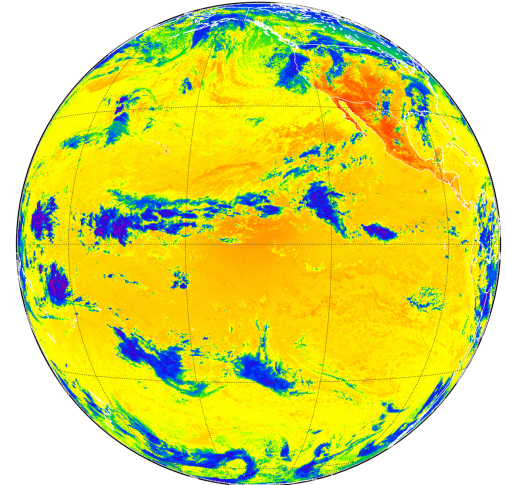
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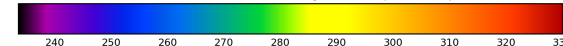
GOES-15 Channel-2 (3.90µm) Reflectance



geocatL1.GOES-15.2015096.210000.hdf

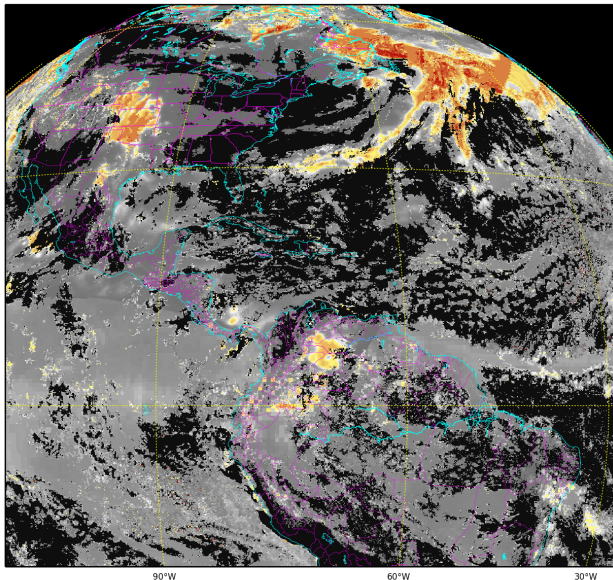


GOES-15 Channel-2 (3.90µm) Brightness Temperature (K)

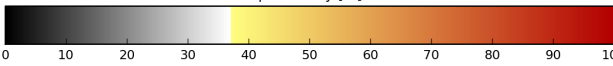


CSPP Geo GEOCAT L2

GOES-13 Imager, goesr fog IFR Fog Probability
2015-05-23 17:15z

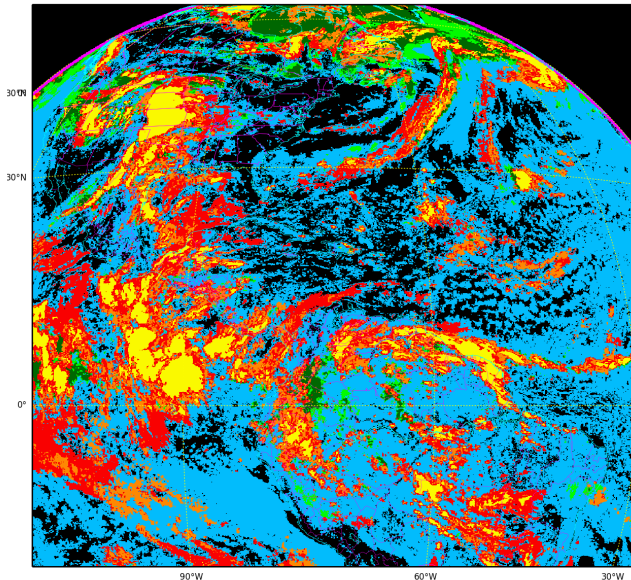


probability [%]



CSPP Geo GEO

GOES-13 Imager, Cloud Type
2015-05-23 17:15z

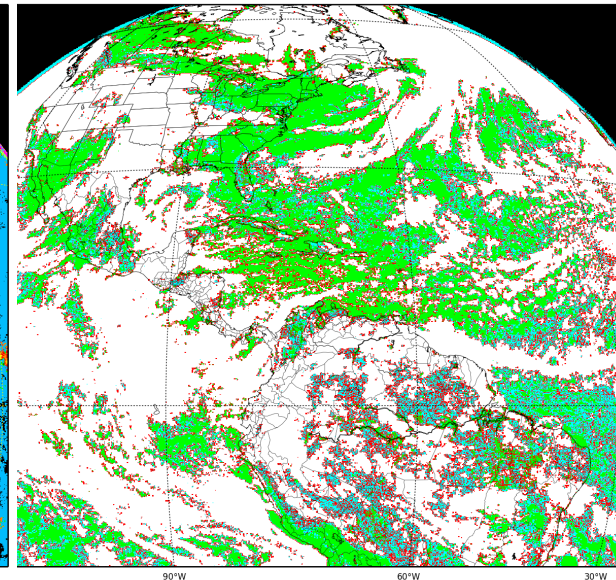


cloud type

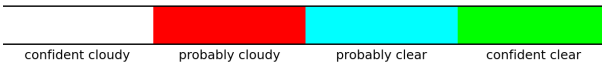


CSPP Geo GEO

GOES-13 Imager, Cloud Mask
2015-05-23 17:15z



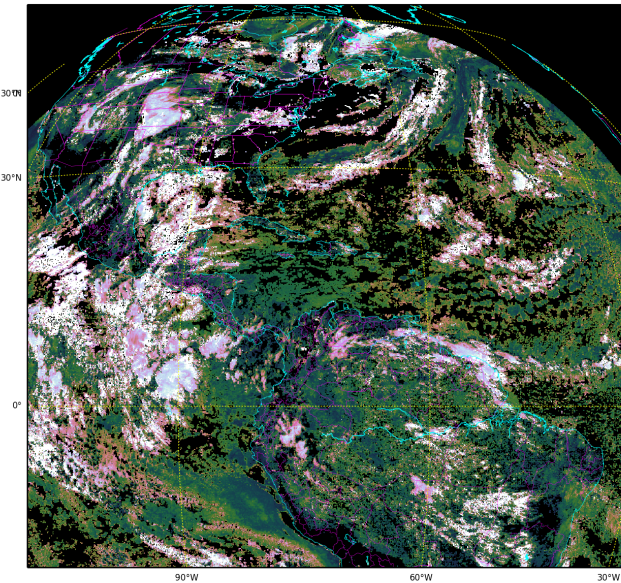
cloud mask



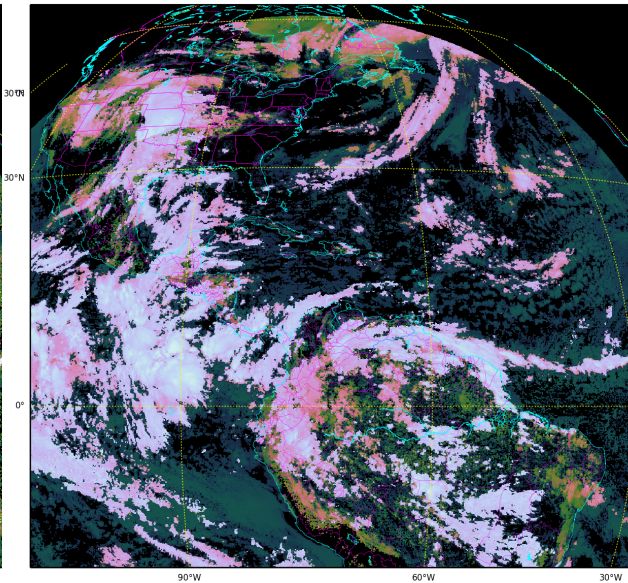
CSPP Geo GEO

CSPP Geo GEOCAT L2

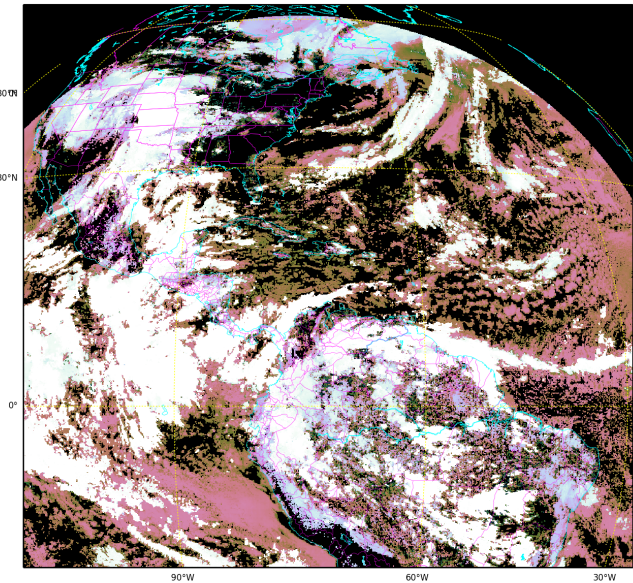
GOES-13 Imager, DCOMP mode 3 Cloud Particle Effective Radius
2015-05-23 17:15z



GOES-13 Imager, ACHA mode 7 GOES Cloud Top Pressure
2015-05-23 17:15z



GOES-13 Imager, ACHA mode 7 GOES Cloud Top Height
2015-05-23 17:15z



effective radius [μm]

pressure [hPa]

height [m]

0 4 8 12 16 20 24 28 32 36

0 150 300 450 600 750 900 1050

10^2 10^3 10^4

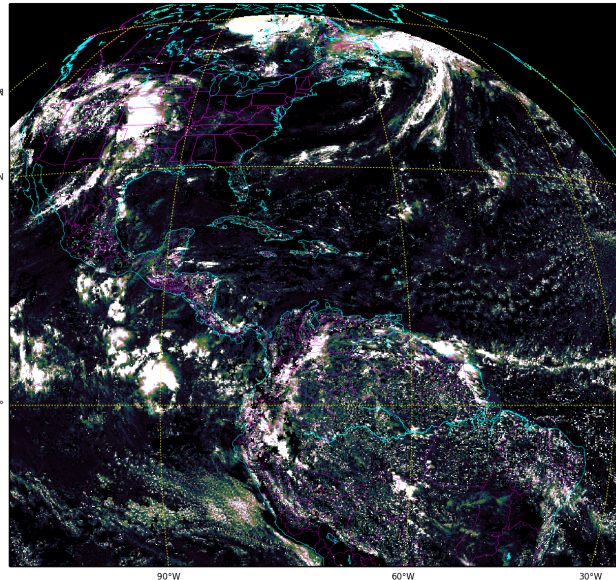
CSPP L2

CSPP Geo GE

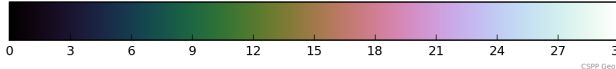
CSPP Geo GE

CSPP Geo GEOCAT L2

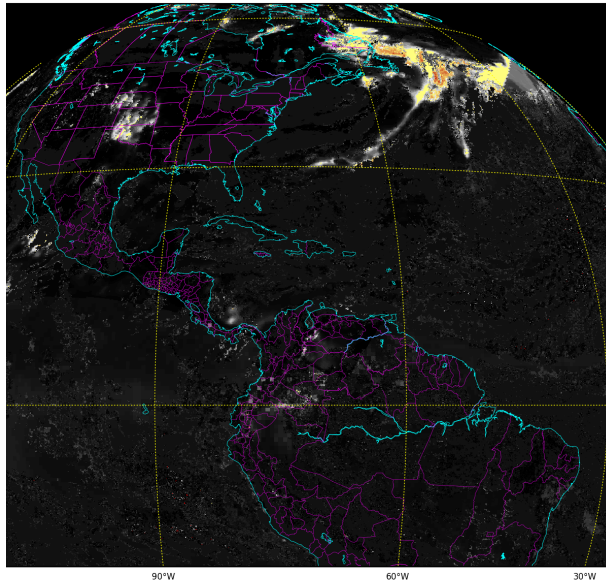
GOES-13 Imager, DCOMP mode 3 Cloud Optical Depth (visible)
2015-05-23 17:15z



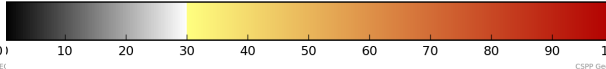
optical depth



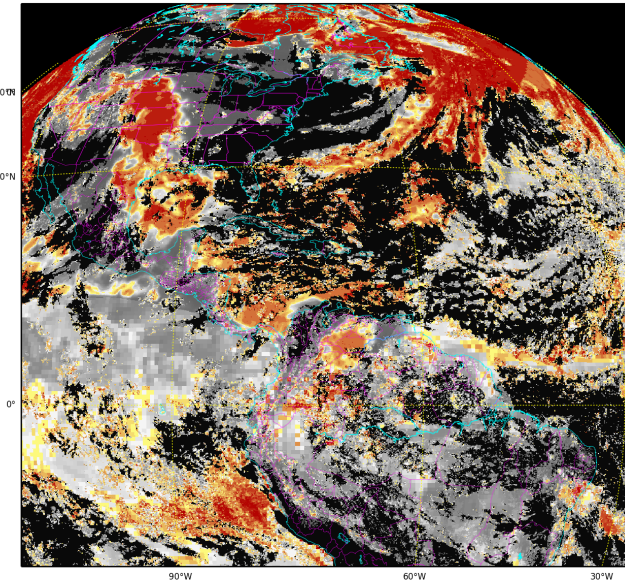
GOES-13 Imager, goesr fog LIFR Fog Probability
2015-05-23 17:15z



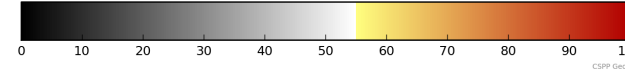
probability [%]



GOES-13 Imager, goesr fog MVFR Fog Probability
2015-05-23 17:15z



probability [%]



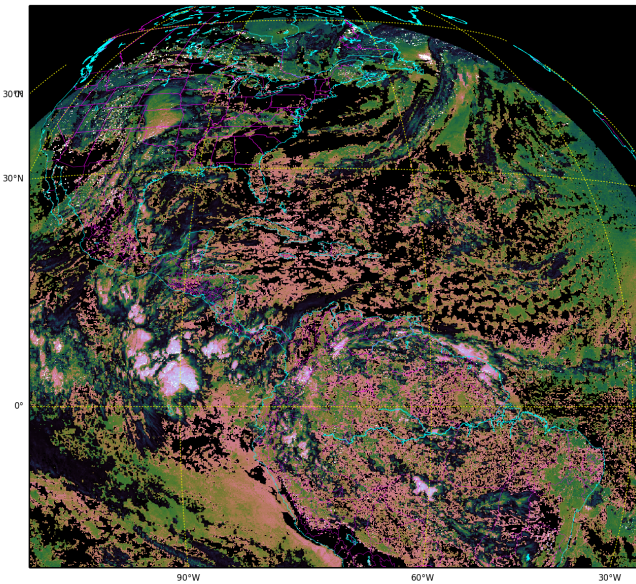
CSPP Geo GEO

CSPP Geo GEO

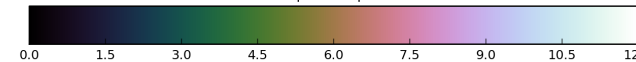
CSPP Geo GEO

CSPP Geo GEOCAT L2

GOES-13 Imager, ACHA mode 7 GOES Cloud Optical Depth (visible)
2015-05-23 17:15z

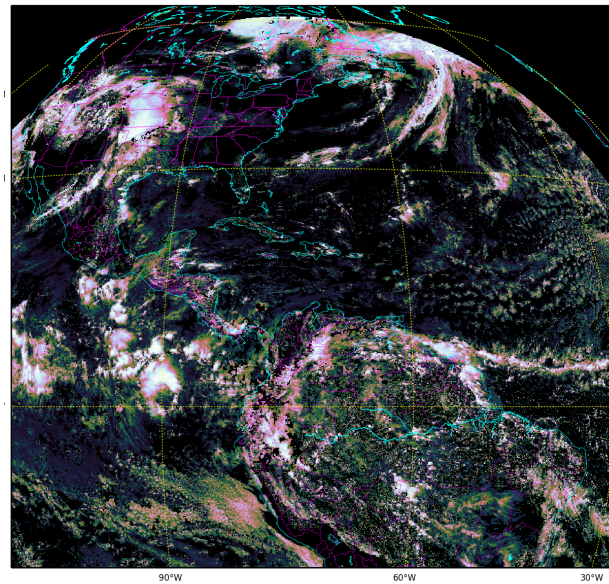


optical depth

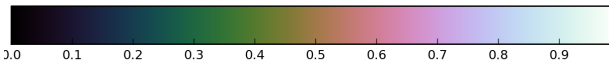


CSPP Geo GEOCAT

GOES-13 Imager, DCOMP mode 3 Cloud Albedo
2015-05-23 17:15z

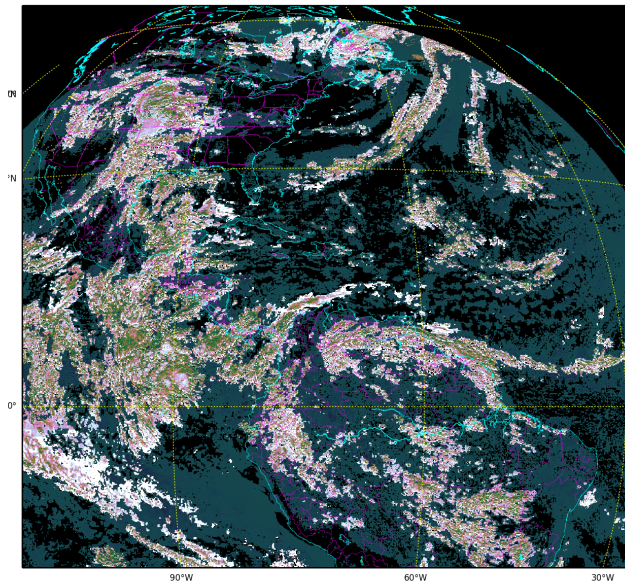


albedo

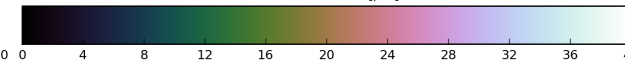


CSPP Geo GE

GOES-13 Imager, ACHA mode 7 GOES Cloud Particle Effective Radius
2015-05-23 17:15z



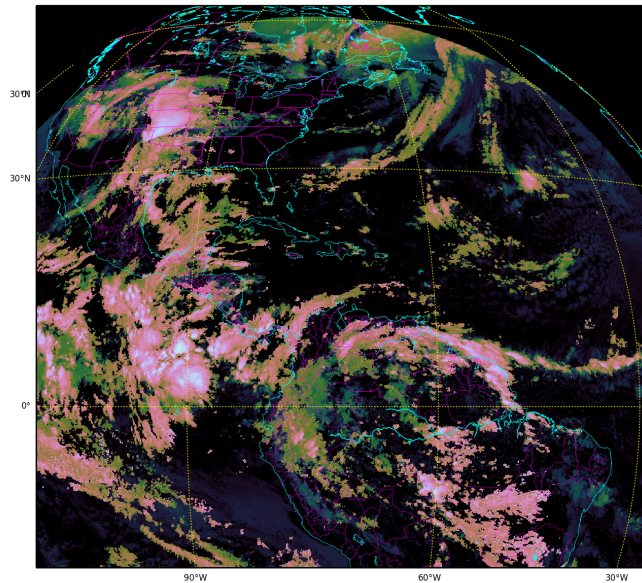
effective radius [μm]



CSPP Geo GEOCAT

CSPP Geo GEOCAT L2

GOES-13 Imager, ACHA mode 7 (GOES Cloud Top Temperature)
2015-05-23 17:15z

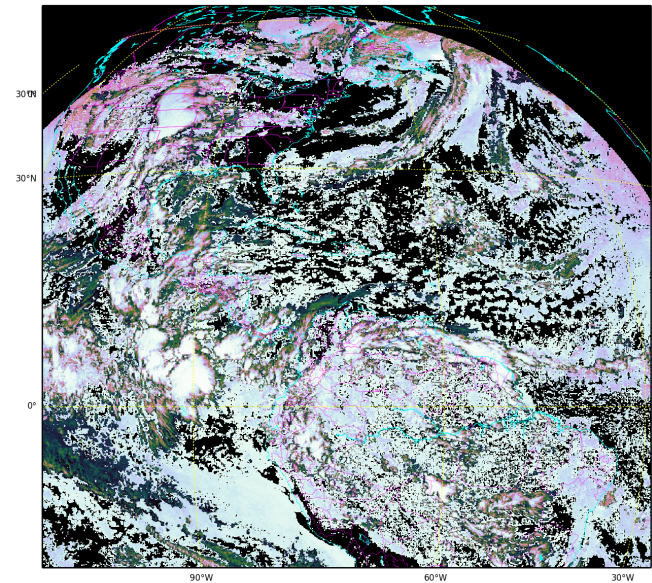


temperature [K]

180 195 210 225 240 255 270 285

CSPP Geo GEOCAT v1.0beta

GOES-13 Imager, ACHA mode 7 (GOES Cloud Emissivity)
2015-05-23 17:15z



emissivity [%]

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

CSPP Geo GEOCAT v1.0beta

CSPP Geo Contact

- <http://cimss.ssec.wisc.edu/csppgeo/>
- Email: csppgeo.issues@ssec.wisc.edu
- Email: jessica.braun@ssec.wisc.edu

CSPP Geo is freely available!