Support for GOES-R and Himawari-8 in CSPP Geo

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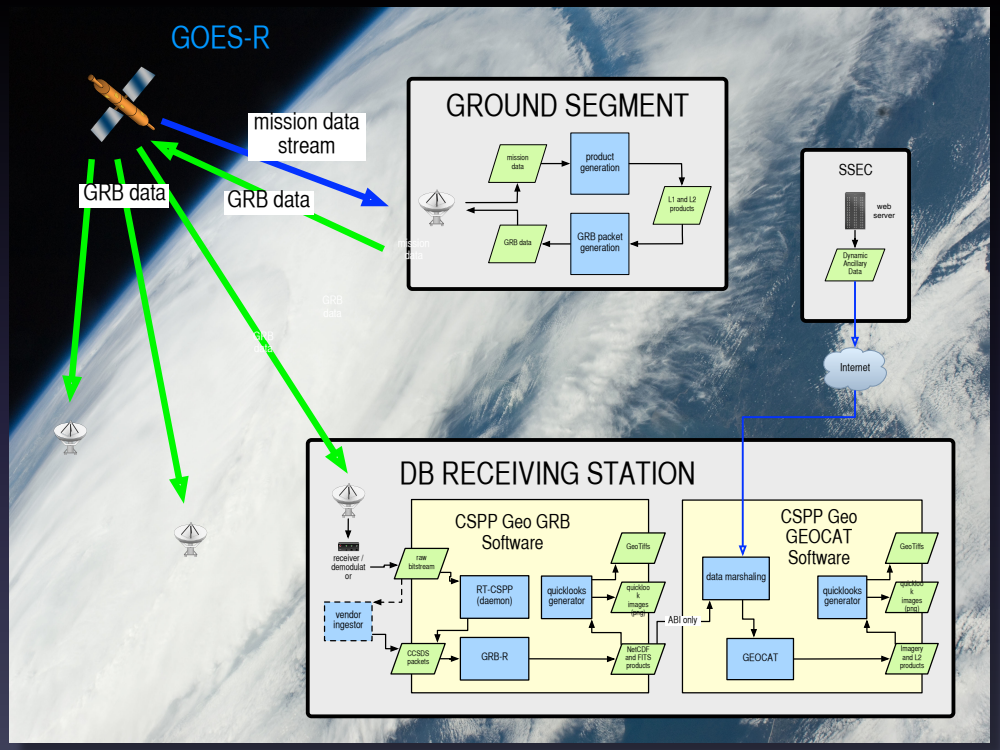
AMS 2016, New Orleans, LA
January 13, 2016

GOES Rebroadcast (GRB)

- GOES-R will have 6 instruments
- Data processed at ground segment to Level 1 (and to Level 2 for GLM)
- Products are packetized and bounced back off GOES-R
- Data is received by Direct Broadcast users
- More information on the NOAA GRB web site: http://www.goes-r.gov/users/grb.html



Current GOES vs future 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 5^0	Earth Coverage to 5^0
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

What will a Direct Broadcast user be able to do with GRB data?

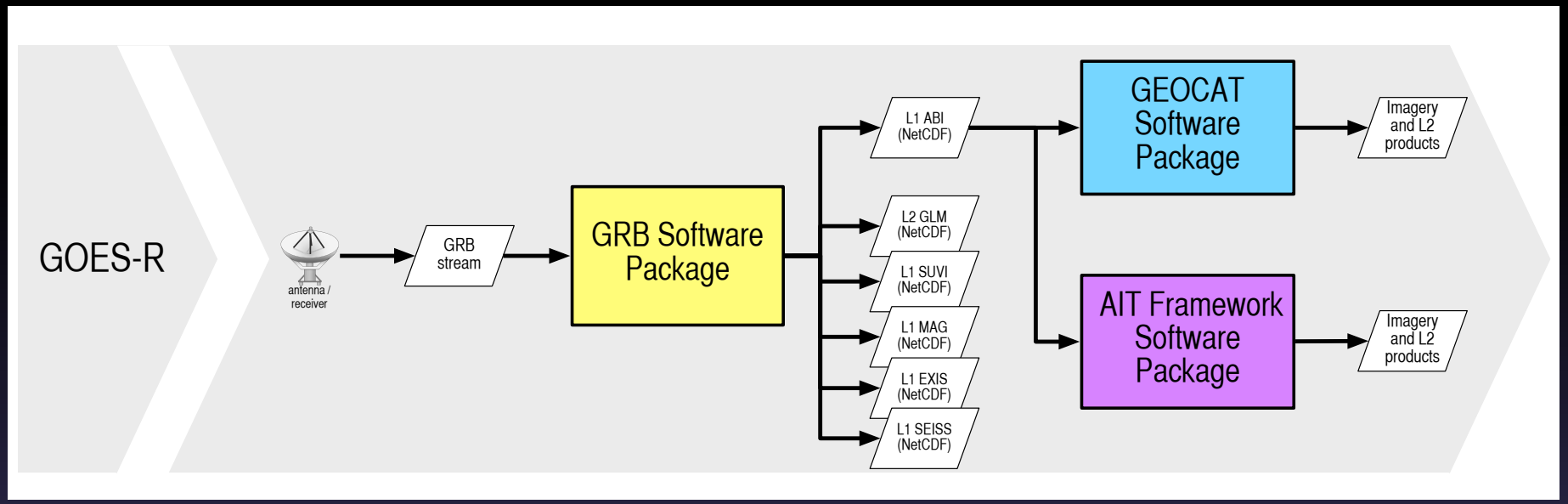
The CSPP Geo Project

- In 2014, started working on software to allow DB users to process data from geostationary satellites
  - Supported satellites: GOES-R, Himawari-8 and current GOES
- Funded by GOES-R Program Office and NOAA STAR
- Leverage L2 algorithms that were developed for GOES-R
- Similar approach to CSPP (Leo), but different challenges
- Serving users from the U.S. and international community and to support a wide range of applications

Software Packages

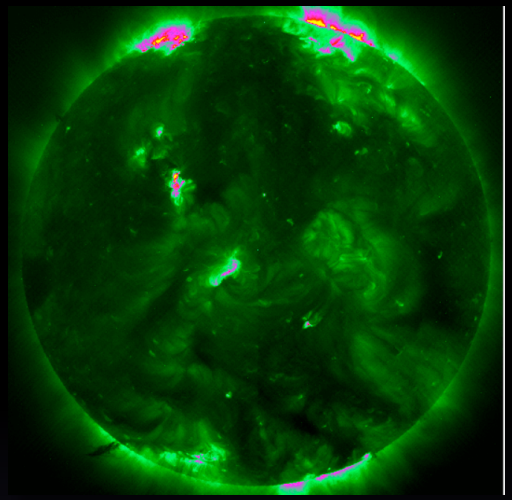
- CSPP Geo software is:
  - Freely available and free of charge
  - Distributed as binary packages for 64-bit CentOS6-compatible Linux
  - Distributed with all required 3rd party software bundled
  - Released with an optional test data package and self-test script
  - Capable of generating "quicklook" images from products

GOES-R support: GRB package



- GRB software ingests raw GRB stream, extracts payloads from packets and constructs datasets
- Primarily new Python code, NASA RT-STPS used for ingest
- As of version v0.3 all GOES-R instruments are supported
  - GRB v0.3 available for download at http://cimss.ssec.wisc.edu/csppgeo/
- Planning one more release before launch (1.0 beta)
- GRB V1.0 will be released after launch

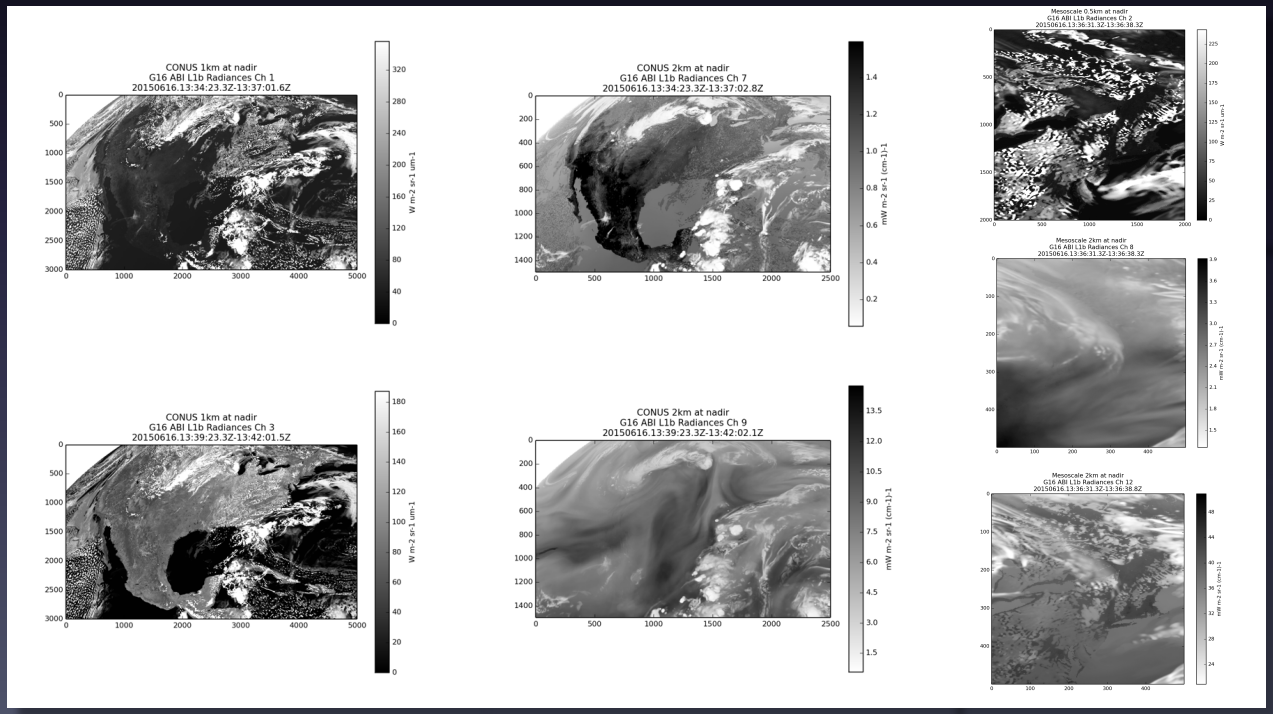
GRB v0.3 output



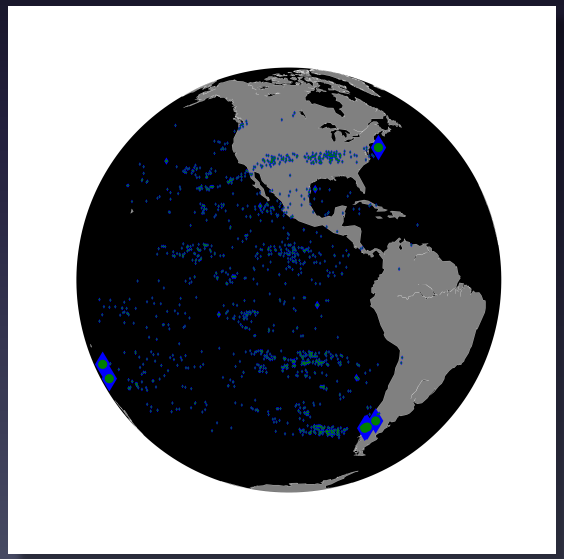
Simulated SUVI data

- Testing with output from tests of the ground system, and the Harris GRB simulator
- Software can generate "quicklook" images from ABI products

ABI quicklooks

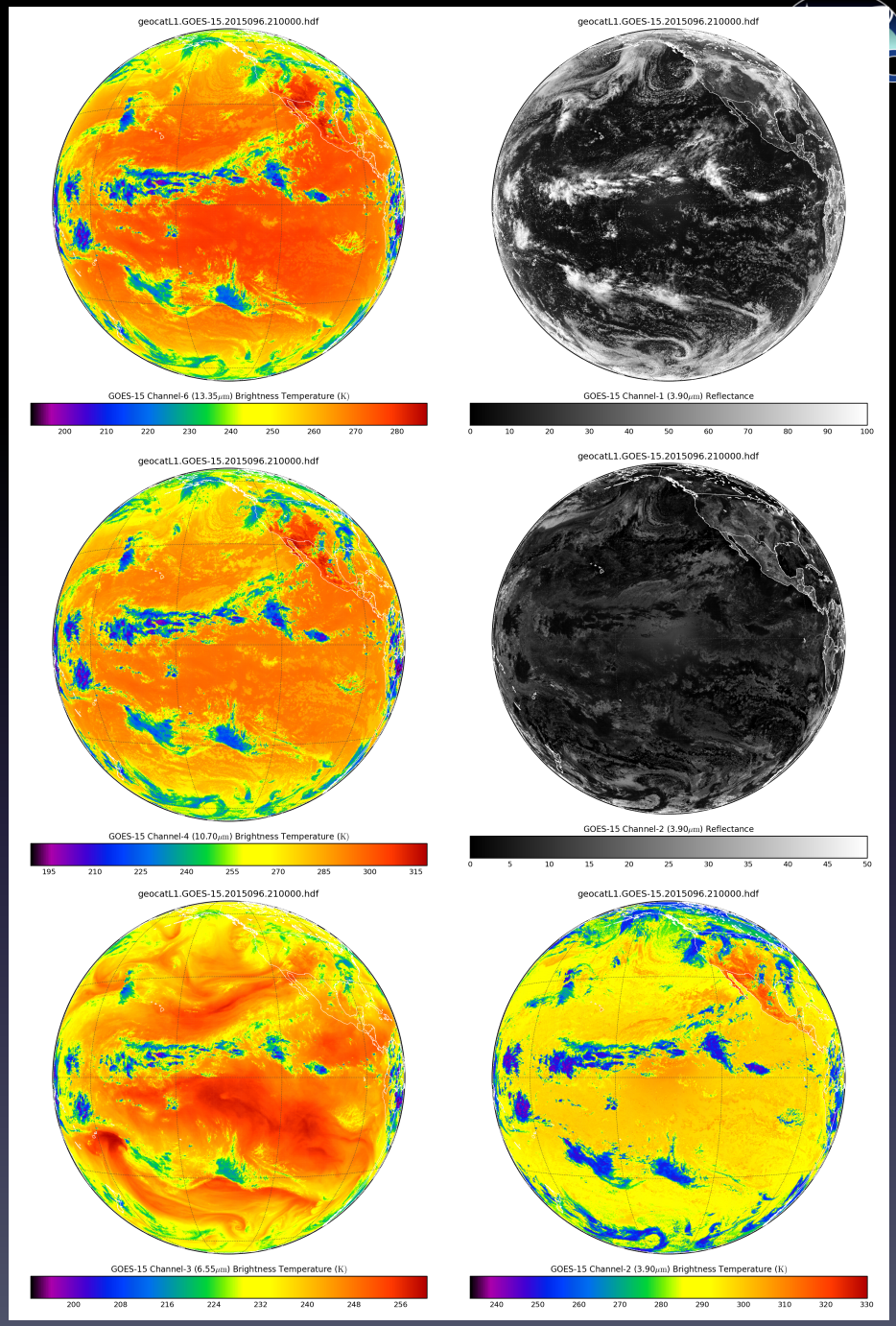


Simulated GLM data



GEOCAT Package

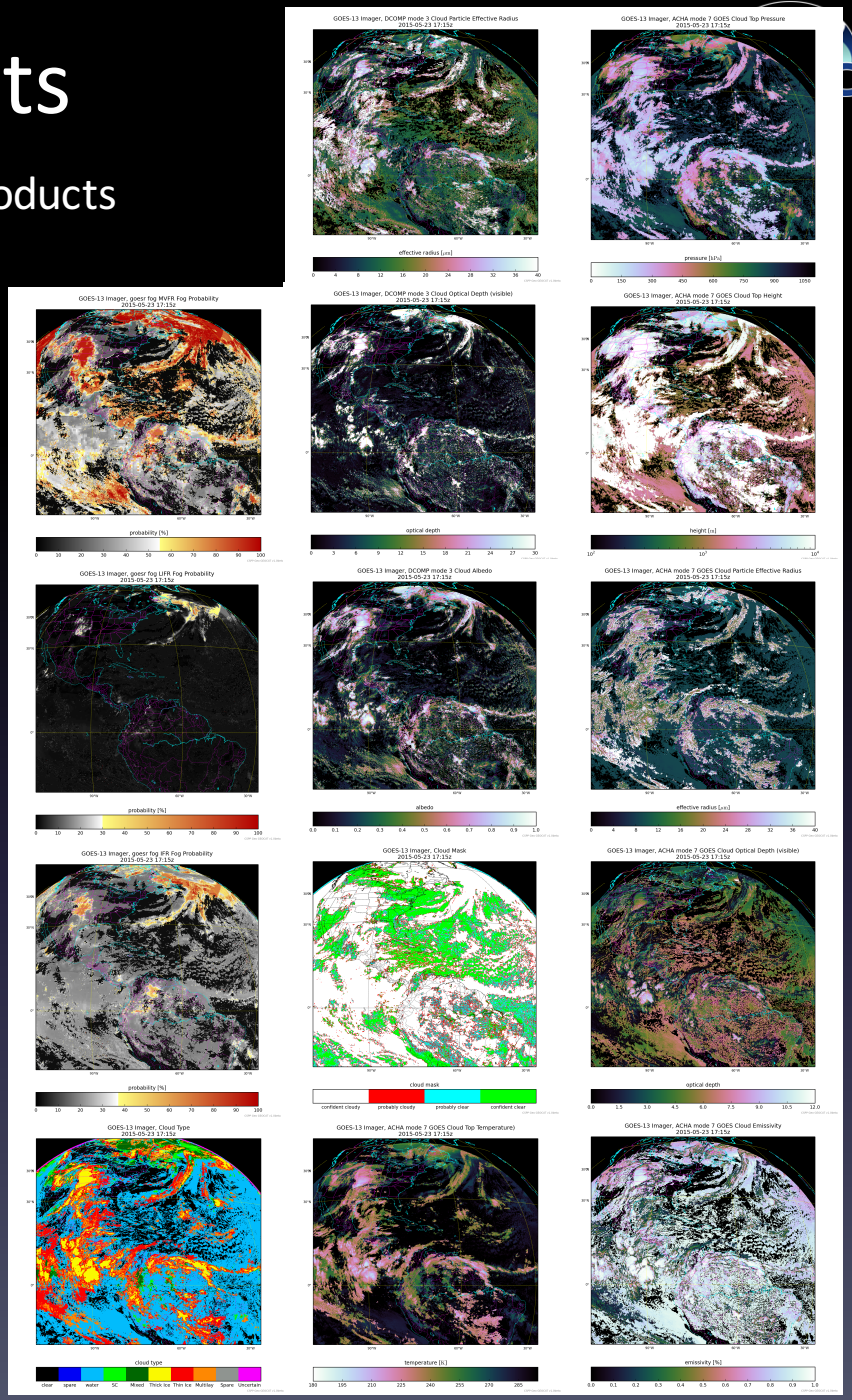
- GEOCAT
  - Algorithm testbed that runs research versions of GOES-R product algorithms
  - Processes data from multiple instruments
  - Generates L1 and L2 products
- Initial package will support current GOES
  - Beta currently being tested in-house
- Support for Himawari AHI to be added 2nd quarter 2016
- Support for GOES-R ABI to be added Summer 2016



GEOCAT L2 products

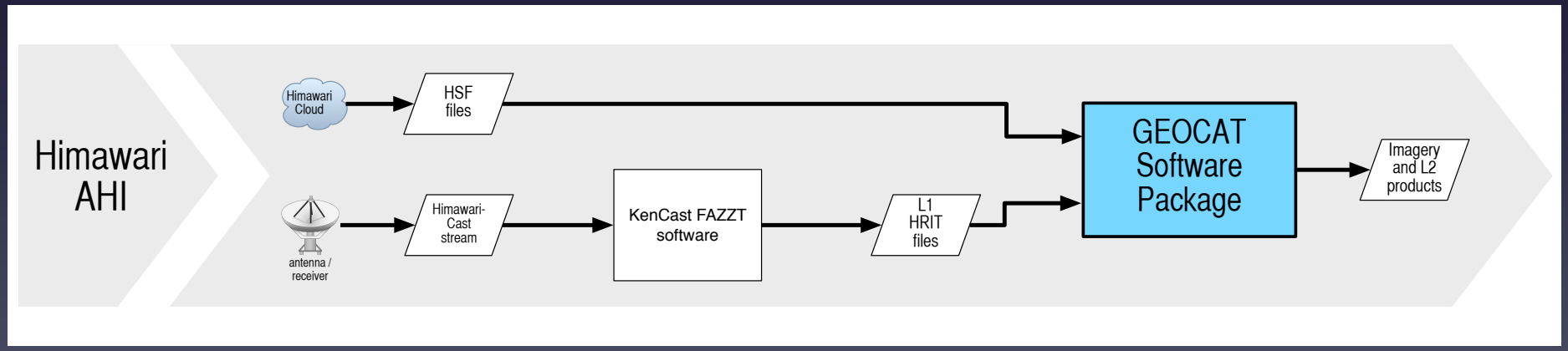
- Initial version will generate cloud and fog products

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



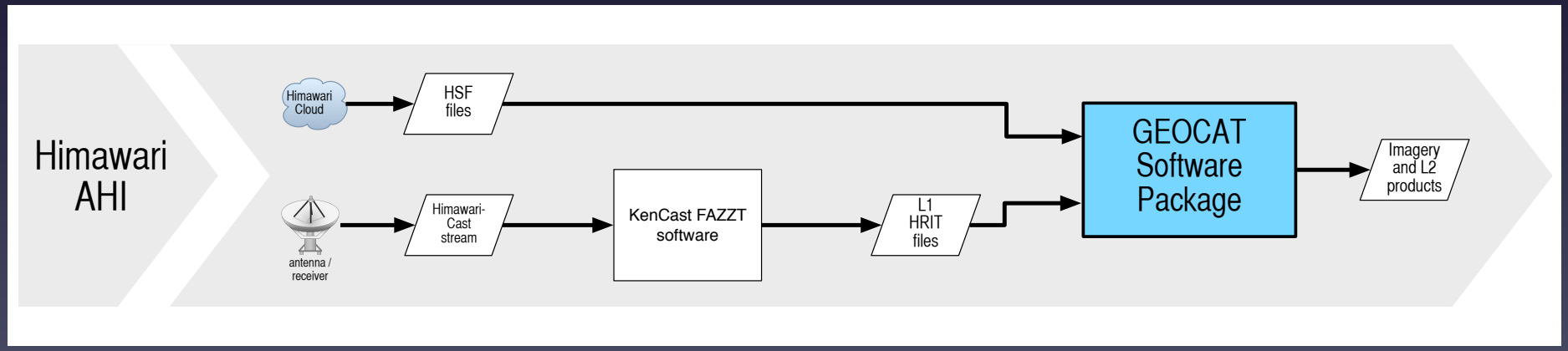
Himawari AHI data

- AHI data is distributed in multiple formats
  - HSF: full-res, distributed via the cloud, limited access
  - HimawariCast: reduced resolution, DB stream
- CSPP Geo software will support both
- Users must purchase proprietary software to decode the HimawariCast stream



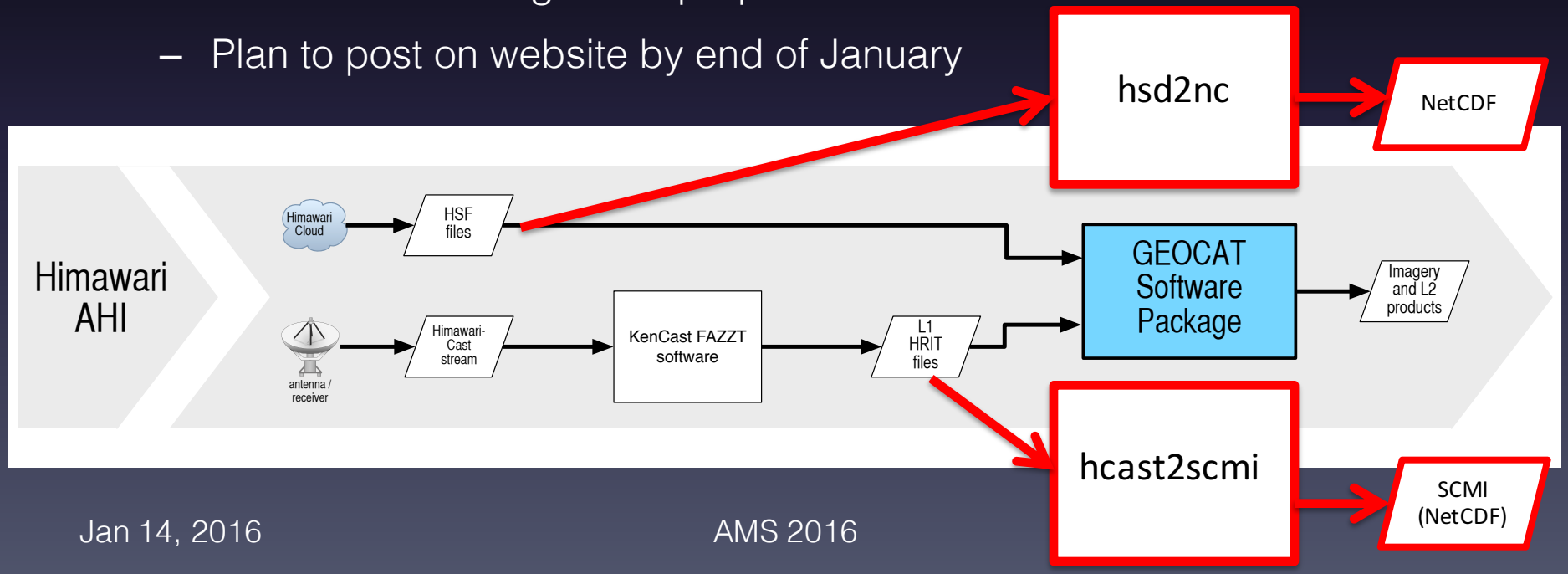
libHimawari

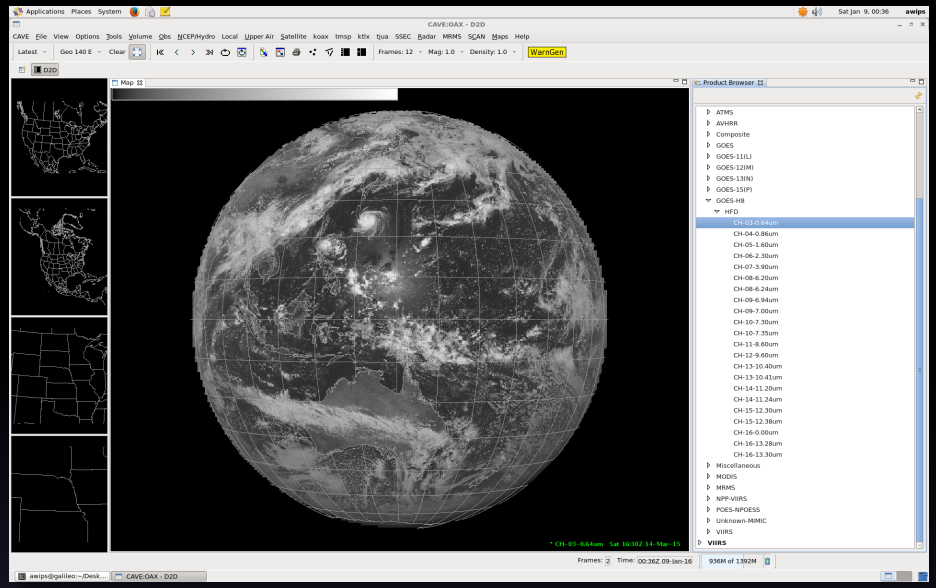
- Leveraging Himawari ingest library "libHimawari"
  - Developed at SSEC by Ray Garcia, with Scott Mindock and William Straka
  - Reads AHI data in HSF or HimawariCast format
  - Source is public: https://gitlab.ssec.wisc.edu/rayg/himawari



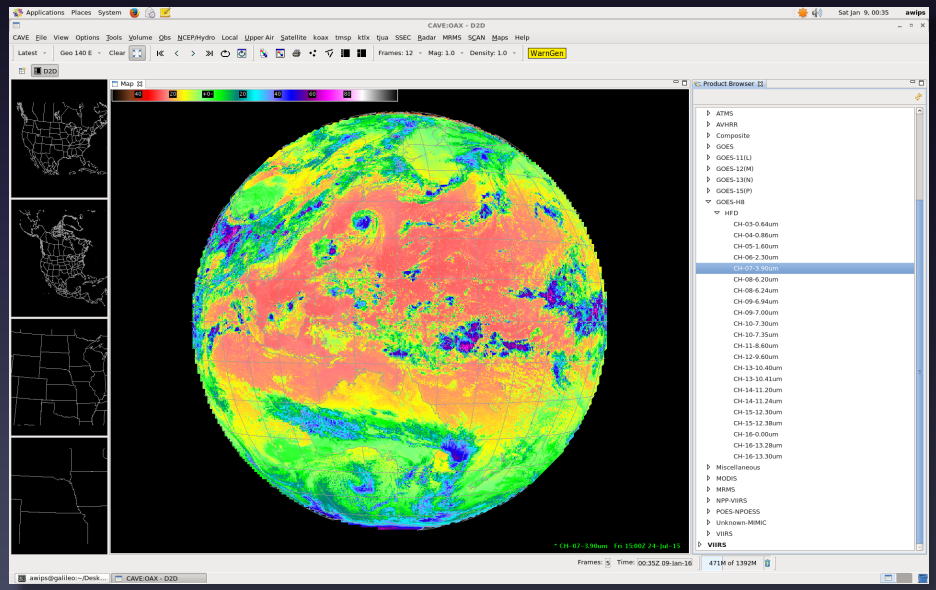
Himawari support

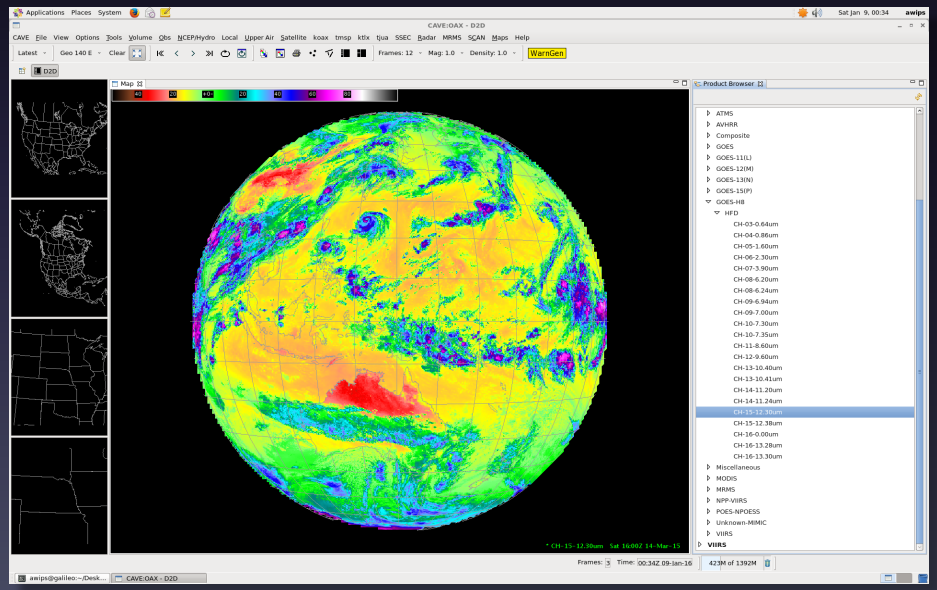
- Level 2 products will be generated by the future Geocat package
- Himawari data converters
  - HimawariCast to SCMI:
    - output is AWIPS-compatible NetCDF4
    - Successfully tested by NWS receiving station in Hawaii
  - HSF to NetCDF4: general purpose converter
  - Plan to post on website by end of January





HimawariCast data converted with HCast2SCMI and loaded in AWIPS2





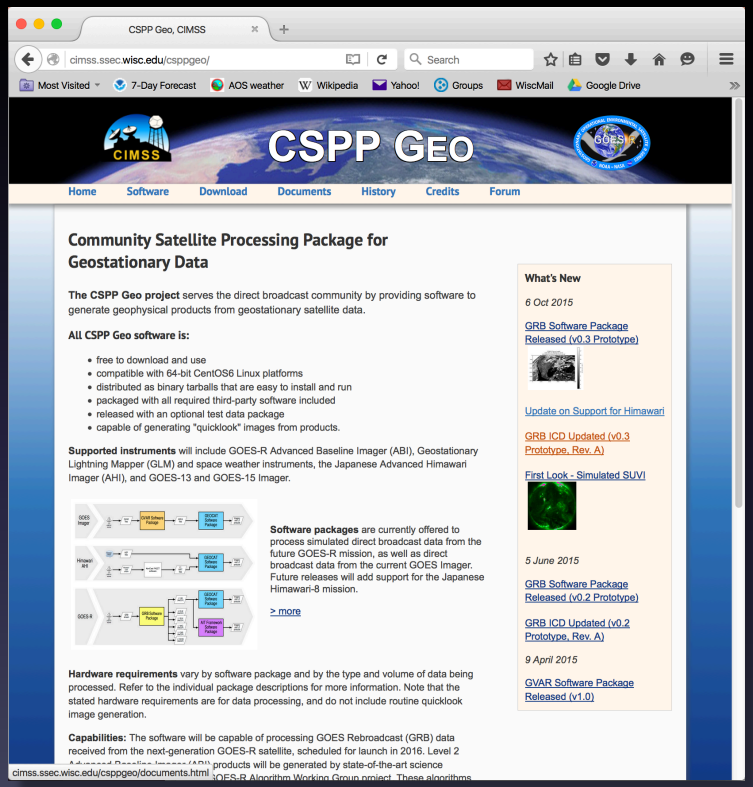
images: Jordan Gerth

Future Processing Packages

- AIT Framework
  - Developed by GOES-R Algorithm Integration Team
  - Most of the AWG algorithms run in the AIT framework
  - Planning to start integration into CSPP Geo in early 2016
- Standalone algorithms / other processing systems?

Thank you!

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



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