



GWSAS and the use of CSPP Geo in Supporting Operations at NWS

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SSEC/CIMSS/UW-Madison

CSPP Users' Group Meeting

20 May 2026

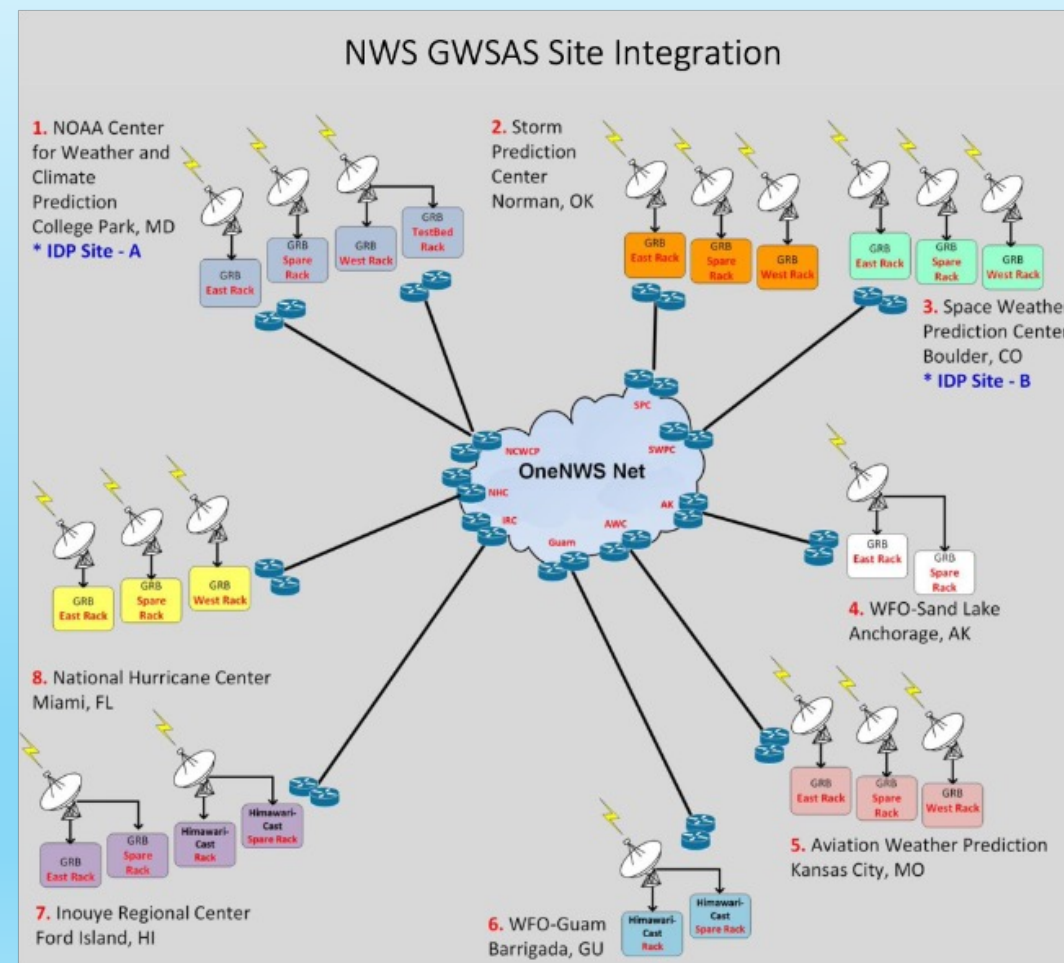


Outline

- Overview of GWSAS
- SSEC's role in supporting the NWS GWSAS project
- GWSAS Processing Components
- Evolution of GWSAS processing
- GWSAS User Examples
- Summary
- Questions

Geostationary Weather Satellite Antenna System (GWSAS)

- Network of antenna installed at 8 different National Weather Service (NWS) Sites.
- Antennas ingest and process data from GOES-R and Himawari-8/9 satellites.
 - 41 GRB servers across 7 sites.
 - 9 AHI servers across 2 sites.
- Systems provide data to AWIPS (Advanced Weather Interactive Process System), the core processing, display communication system at NWS.





GWSAS Sites

	NWS Office	Location	GRB/HRB Systems*	
			GRB	HRB
1	Weather Forecast Office (WFO) Sand Lake	Fairbanks, AK	4	
2	Aviation Weather Center (AWC)	Kansas City, MO	6	
3	National Hurricane Center (NHC)	Miami, FL	6	
4	Pacific Region Headquarters (IRC)	Honolulu, HI	4	5
5	Space Weather Prediction Center (SWPC)	Boulder, CO	6	
6	Storm Prediction Center (SPC)	Norman, OK	6	
7	NOAA Center for Weather and Climate Prediction (NCWCP)	College Park, MD	9	
8	Weather Forecast Office (WFO), Guam	Barrigada, GU		4

*As of 2025 GWSAS hardware has moved to virtual machines



SSEC GWSAS Support

- SSEC contract support started in 2019.
- SSEC was funded to:
 - Develop an end-to-end system for processing and distribution of GOES-R Level 1 (L2+ for GLM) products and Level 1 Himawari AHI HimawariCast.
 - Data must be delivered via the Local Data Manager (LDM) utility in a format able to be ingested by NWS AWIPS – Sectorized Cloud and Moisture Imagery (SCMI).
 - Provide Installation Procedures.
 - Support the GWSAS Tier 2 team as a Tier 3 8x5 support team.
 - Train the Tier 2 team on the processing suite.
- Contract was renewed in July 2024 for up to an additional 5 years.



SSEC GWSAS Support

- As a Tier 3 support team, SSEC:
 - Provides updated software and procedures to Tier 2.
 - Supports Tier 2 with troubleshooting and resolution of any issues reported by Tier 2 or downstream users.
 - Updates main installation procedures as needed.
 - New feature creation.
- SSEC GWSAS supports CSPP Geo
 - Assist and support investigation and testing of issues reported and/or found related to the GOES-R GRB data stream by comparing with GWSAS systems.
 - SSEC GWSAS team is a key contributor to the CSPP Geo team when patches are required for the GRB software due to any change to the ground system that impacts GRB.



SSEC GWSAS Personnel

- Graeme Martin – Principal Investigator
- Jessica Braun – Project Manager
- Denny Hackel – Primary Support and Development
- Douglas Schumacher – Primary Support and Development
- Tommy Jasmin – GRB support and development
- Ray Garcia – AXI-Tools, Himawari support, technical support
- David Hoese* – AXI-Tools
- Alan DeSmet* – GRB support and development

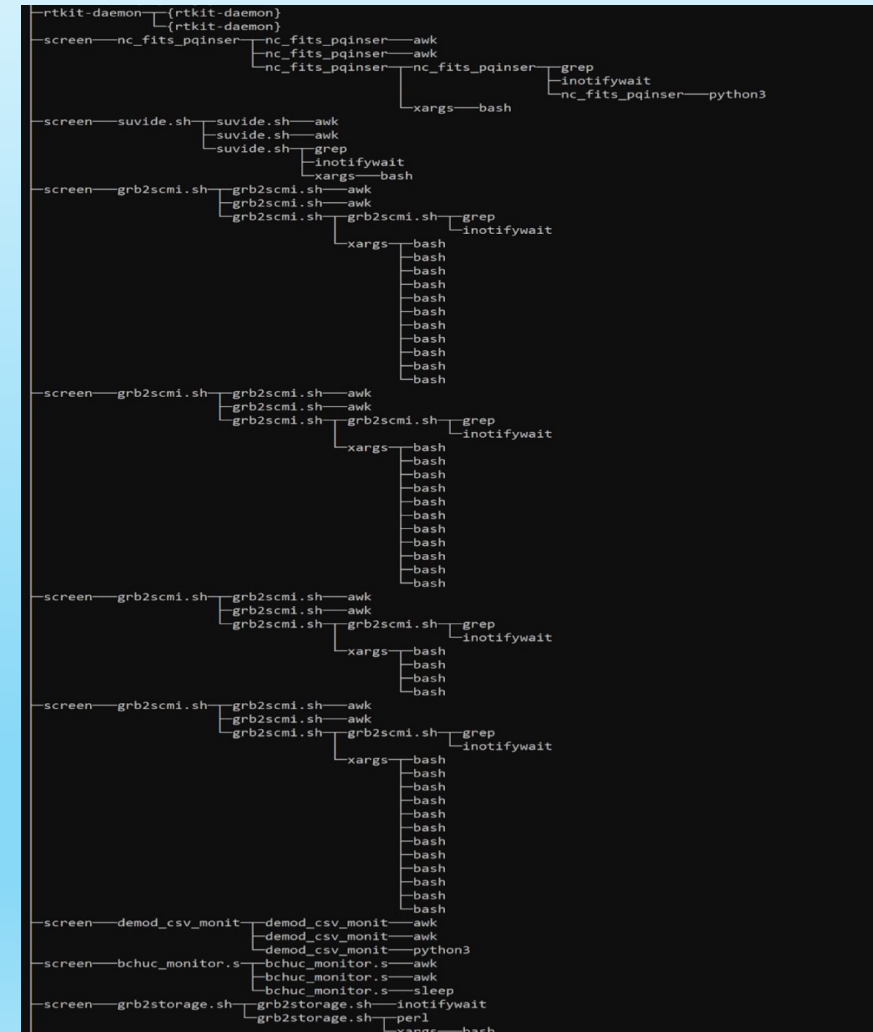
All also CSPP Geo Team Members!

Core to the GWSAS project

*Part time GWSAS Support

GWSAS Components

- CSPP Geo software
 - GRB
 - AXI-Tools (SCMI Tile generation)
- Custom glue code
 - Scripts that manage and maintain the end to end processing of Level 1 through SCMI tiles, rotate logs, manage system storage, archive products, etc.
 - Separate glue code for ABI and AHI processing.
- Installation Procedures
 - Lists necessary prerequisites which consist of system configuration (accounts, directories, storage), necessary packages installed by system administrators, and assumptions (existing GRB multicast feed).
 - Provides step by step instructions for installation of CSPP Geo software, "glue code", and verification steps.



Samples GWSAS Processing Tree



GWSAS Components

- Custom Environment Setting Script allows Tier 3 team to cater to each site's needs:
 - Activating creation of tiles for AWIPS.
 - Log retention.
 - Site specific multi-cast feed addresses.
 - GOES-R SUVI FITS creation.
- Catered for ABI and AHI.

```
export GRB_OUTPUT=/data/output-csppv1.0
export GRB_PRODUCTS=$GRB_OUTPUT/product
export GRB_STORAGE=/arch/data
export DAYS_OLD=2

export CSPP_LOG_DIR=/arch/misc/var/log
export CSPP_LOCK_DIR=/arch/misc/var/lock
test -d "$CSPP_LOG_DIR" || mkdir -p "$CSPP_LOG_DIR"
test -d "$CSPP_LOCK_DIR" || mkdir -p "$CSPP_LOCK_DIR"

export AXI_TOOLS=/opt/axi-tools
export CSPP_GEO_GRB_HOME=/opt/cspp-geo-grb-1.0

export SCMI_ENV=OR

export LDM_CHANNEL=EXP # chai will accept EXP or SPARE
export DELIVERY=pqinsert
export LDM_PQ=/usr1/ldm/var/queues/ldm.pq
export PQINSERT=/usr1/ldm/bin/pqinsert
export NCPUS=12
export PATH=$PATH:/usr/local/bin

export ABI_OMIT_PQINSERT=no
export ABI_OMIT_FITS=no
export ABI_OMIT_SCMI=no
export ABI_OMIT_GRB_STORAGE=no
export ABI_OMIT_DEMOD=no
export ABI_OMIT_BCHUC=no

export MCAST_GROUP=224.70.14.21
export MCAST_INTERFACE=10.70.14.224
export BASE_BCHUC=/opt/nws_glue/abi/diag
export GRB200_CSV=$CSPP_LOG_DIR/grb200.log
export GRB200_PRIOR_CSV_FMT=$CSPP_LOG_DIR/grb200.log-%Y%m%d.gz
export BCHUC_THRESHOLD=1000
export FLAGGED_LOG_FMT=/arch/misc/var/rfi_logs/grb200-BCHUC-%Y%m%d.log
export BCHUC_MONITOR_LOG=$CSPP_LOG_DIR/bchuc_monitor.log
export RFI_SLEEP_TIME=300
export PLFPS_THRESHOLD=267

INSTALL_CSPP=(
  "cspp-geo-grb-1.0.14.tar.gz"
)
INSTALL_CSPP_BASE_URL="ftp://ftp.ssec.wisc.edu/pub/CSPP/hidden/GEO/GRB/v1_0/"
INSTALL_CSPP_CHKSUM=(
  "cspp-geo-grb-1.0.14.tar.gz.shal"
)

INSTALL_CSPP_PATCH="cspp-geo-grb-1.0.28-patch.tar.gz"
INSTALL_CSPP_PATCH_CHKSUM="cspp-geo-grb-1.0.28-patch.tar.gz.shal"
INSTALL_CSPP_PATCH_SCRIPT="install-1.0.28-patch.bash"

INSTALL_AXI=(
  "axi-tools-r20191031.tar.bz2"
  "axi-tools-patch-r20191031b.tar.gz"
)
INSTALL_AXI_BASE_URL="ftp://ftp.ssec.wisc.edu/pub/sift/dist/util/"
INSTALL_AXI_CHKSUM=(
  "axi-tools-r20191031.tar.bz2.shal"
  "axi-tools-patch-r20191031b.tar.gz.shal"
)
```



Evolution of GWSAS Processing

- Original design required system administrators to install CSPP Geo software, glue code, and set up cron tabs for automation clean up and maintenance of storage and log files.
- In 2024 SSEC completed development of an automated install script and updated procedure that:
 - Verifies prerequisites.
 - Downloads and installs the latest version of CSPP Geo GRB and AXI-Tools.
 - Downloads and installs glue code (completes E2E processing, sets up cron, automatic restarts upon reboot, etc)
 - Still includes customizable environment file for each site that can be customized for each site before the installation starts.



Evolution of GWSAS Processing

- Automated installation benefits:
 - Reduces installation burden and allows quicker deployment across all GWSAS systems.
 - Prevents mistakes across a large number of systems where an installation step can be easily missed or performed incorrectly.
 - Reduction in time spent testing minor updates and changes due to:
 - Updates to glue code
 - Updates to GRB or AXI-Tools software
 - Adaptability with GWSAS system changes, hardware refreshes.
- Tier 2, the GWSAS project manager and Team Lead greatly appreciated the improvement during the planned GWSAS server refresh in 2024.



CSPP Geo AXI-Tools 2.0

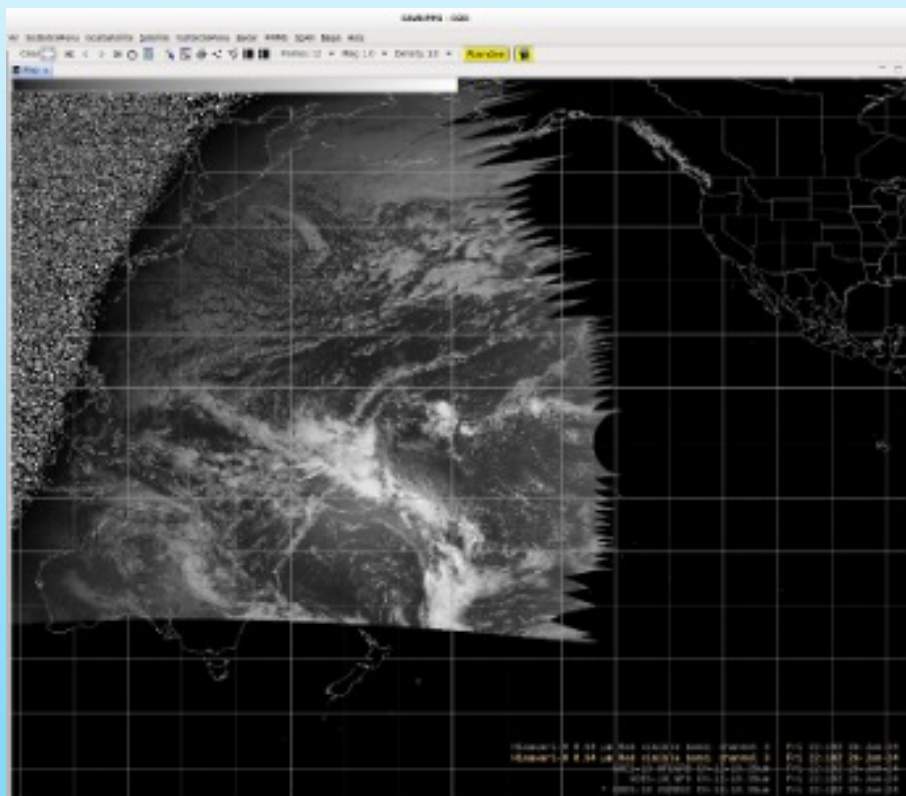
- The GWSAS team discussed a need for an update to the existing version of AXI-Tools.
 - Original version was built before the creation of SatPy.
 - Current needs of AXI-Tools has changed over time and contained redundant features now found in other packages (AIT Framework CMI generation).
 - Not as easy to add new satellites, features.
- Due to the requirements for creation of Sectorized Cloud and Moisture Imagery (SCMI) tiles for use in NWS AWIPS, the UW GWSAS team decided to work with CSPP Geo team on an updated version.



AXI-Tools Version 2.0

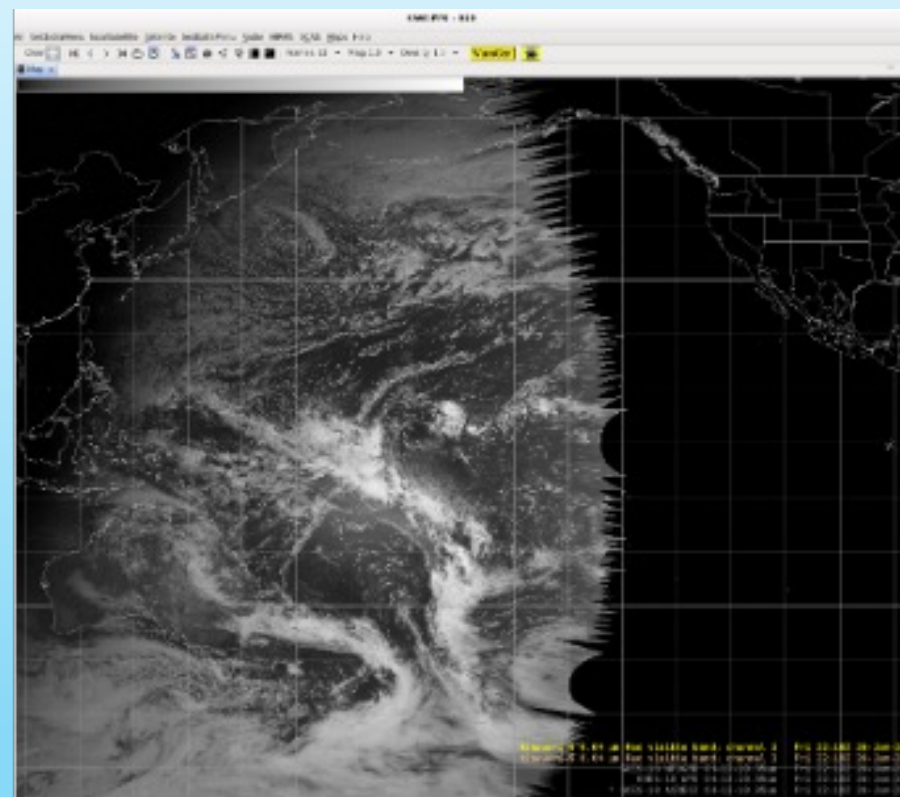
- Version 2.0 includes:
 - Rewrite to use open-source SatPy backend
 - Updated command line interface
 - Additional changes to improve compliancy with AWIPS attribute requirements
- Release arriving Q3 2026 on CSPP Geo website
- For questions on AXI-Tools, contact the CSPP Geo team:
cspggeos.issues@ssec.wisc.edu

Benefits of GWSAS Processing Pago Pago



Satellite Broadcast Network (SBN)

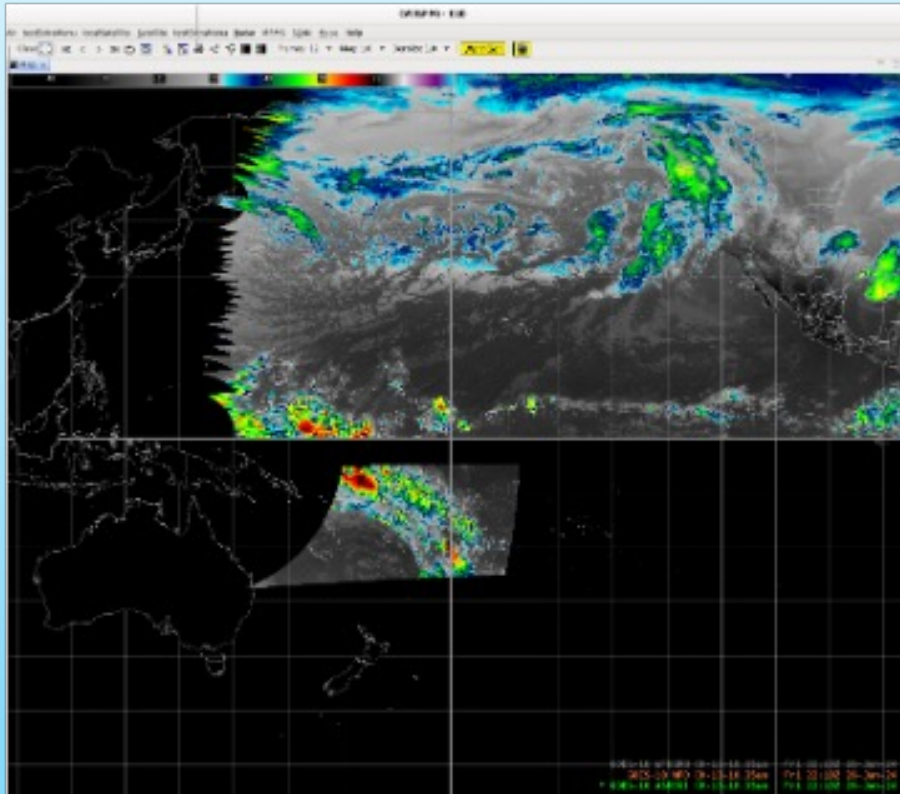
- *Clipped to the northern hemisphere, and a small sector (of ONLY band 13) covering their region*



GRB / CSPP Geo

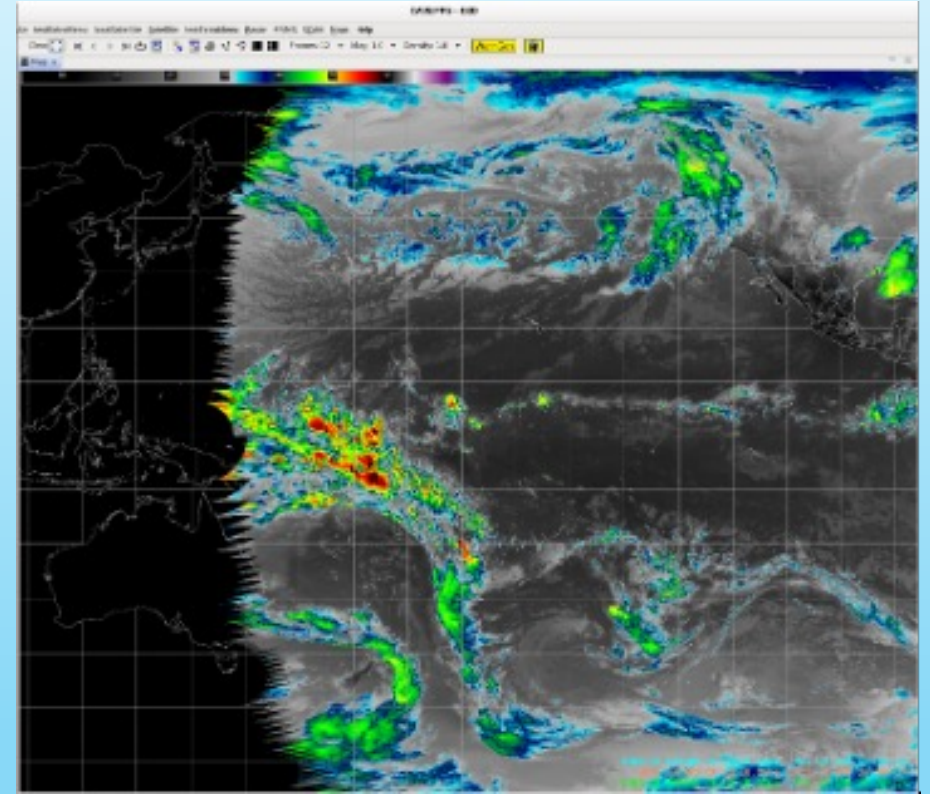
- *All 16 ABI bands, full disk. PPG heavily leverages this feed as virtually their only southern hemisphere GOES-18 data*

Benefits of GWSAS Processing Pago Pago



Himawari Cloud Data

- *High resolution tiles, which cover their immediate domain*



HimawariCast / CSPP Geo

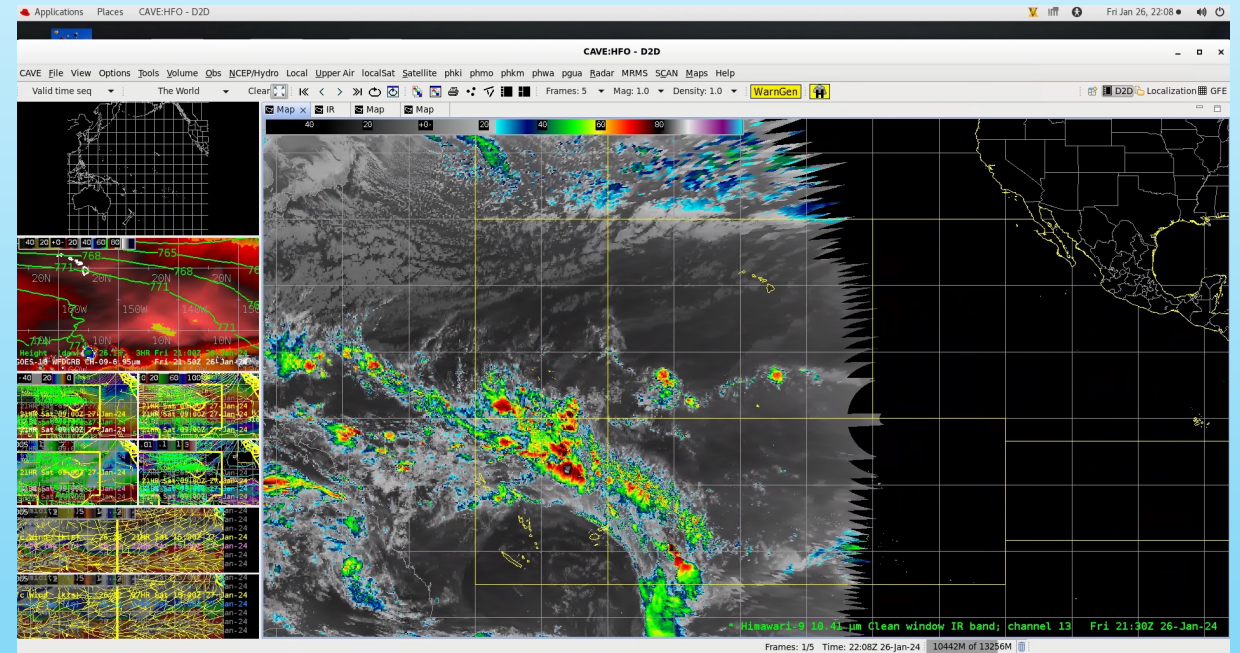
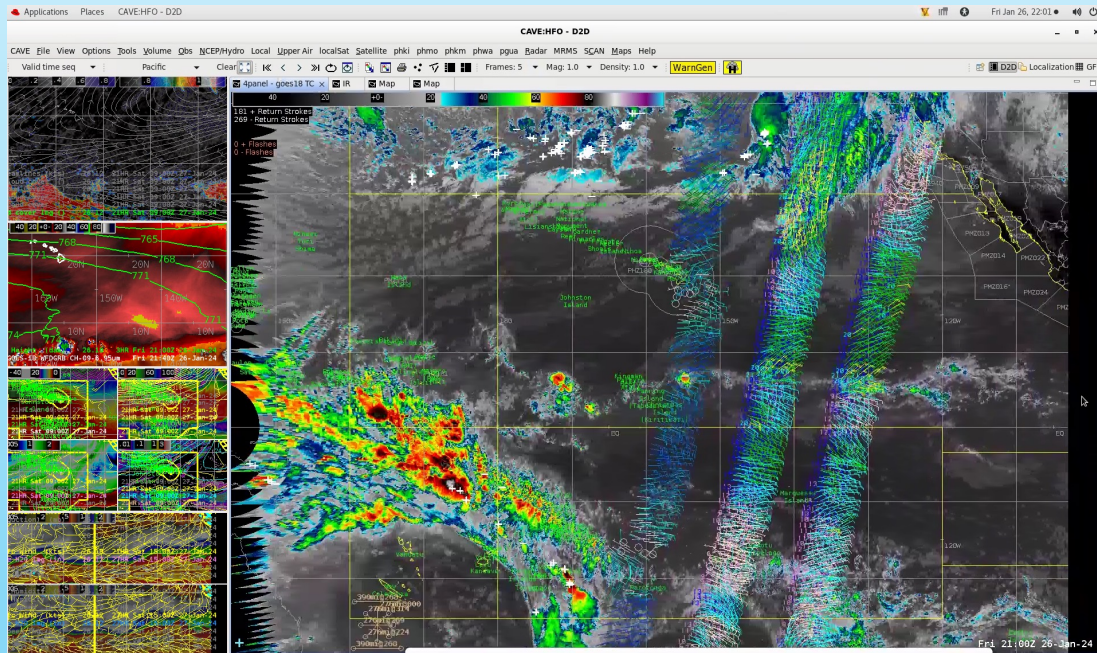
- *Though slightly lower resolution - provides an essential glimpse of what's happening with any storm systems to their south and west.*



Benefits of GWSAS Processing Hawaii Forecast Office

GOES-West

Himawari-9



GRB data is used at the HFO and co-located Central Pacific Hurricane Center for higher resolution full disk monitoring.

HFO uses HimawariCast for its full disk coverage to, among other things, monitor distant systems that could have swell or marine or other impacts

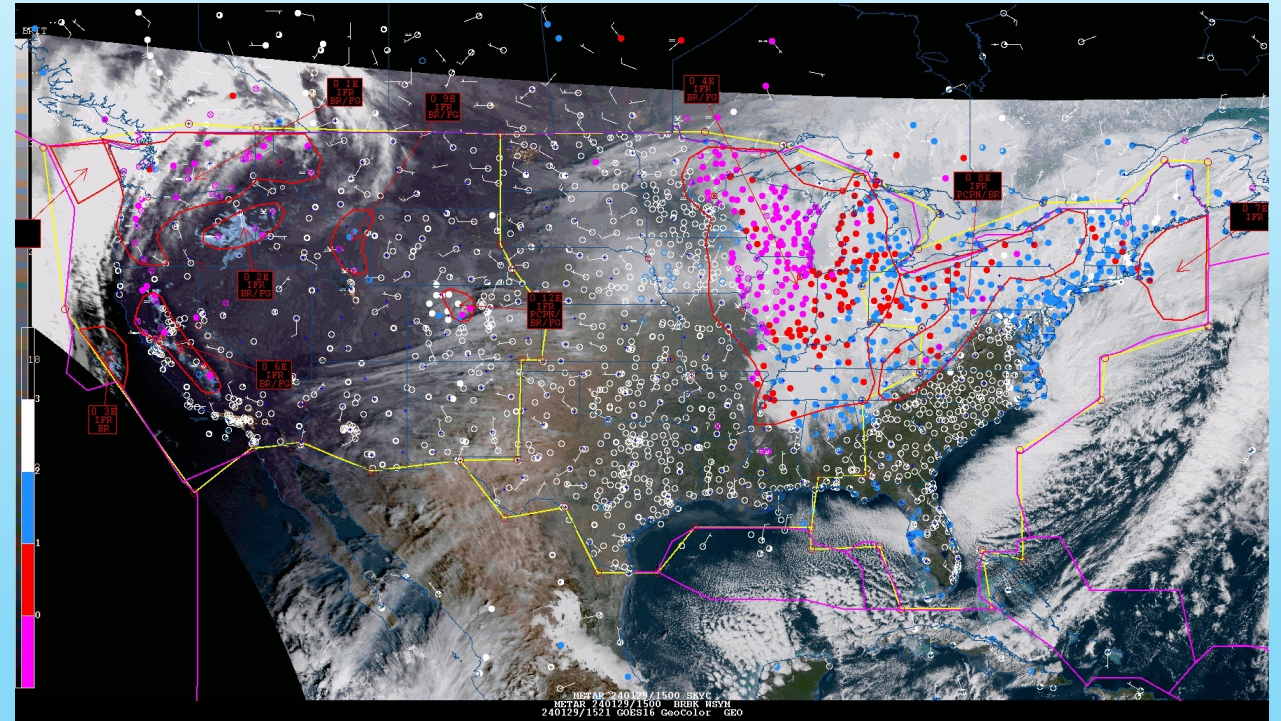


Benefits of GWSAS Processing NWS – Aviation Weather Service

Courtesy Amanda Terborg:

“GeoColor imagery, built off of GRB imagery, overlaid with METAR flight category observations, IFR G-AIRMETs (ceiling and visibility forecasts) and AWC's forecast regions.”

This is heavily used at the Ceiling and Visibility desk at AWC.”





Summary

- The SSEC GWSAS team successfully developed an end-to-end processing chain utilized at 8 different NWS offices that have direct broadcast antennas for geostationary data from the GOES-R satellite series and Himawari-8/9.
- Close collaboration with the CSPP Geo team has benefited the GWSAS project.
- CSPP Geo software packages have been very robust and stable for operational processing for almost 7 years and counting!
- The value of local direct broadcast antennas provides significant value to the NWS offices, especially if upstream outages occurred which impacted their other sources of data.



Thank you!

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