Introduction to the WFO Honolulu/CPHC Satellite Program

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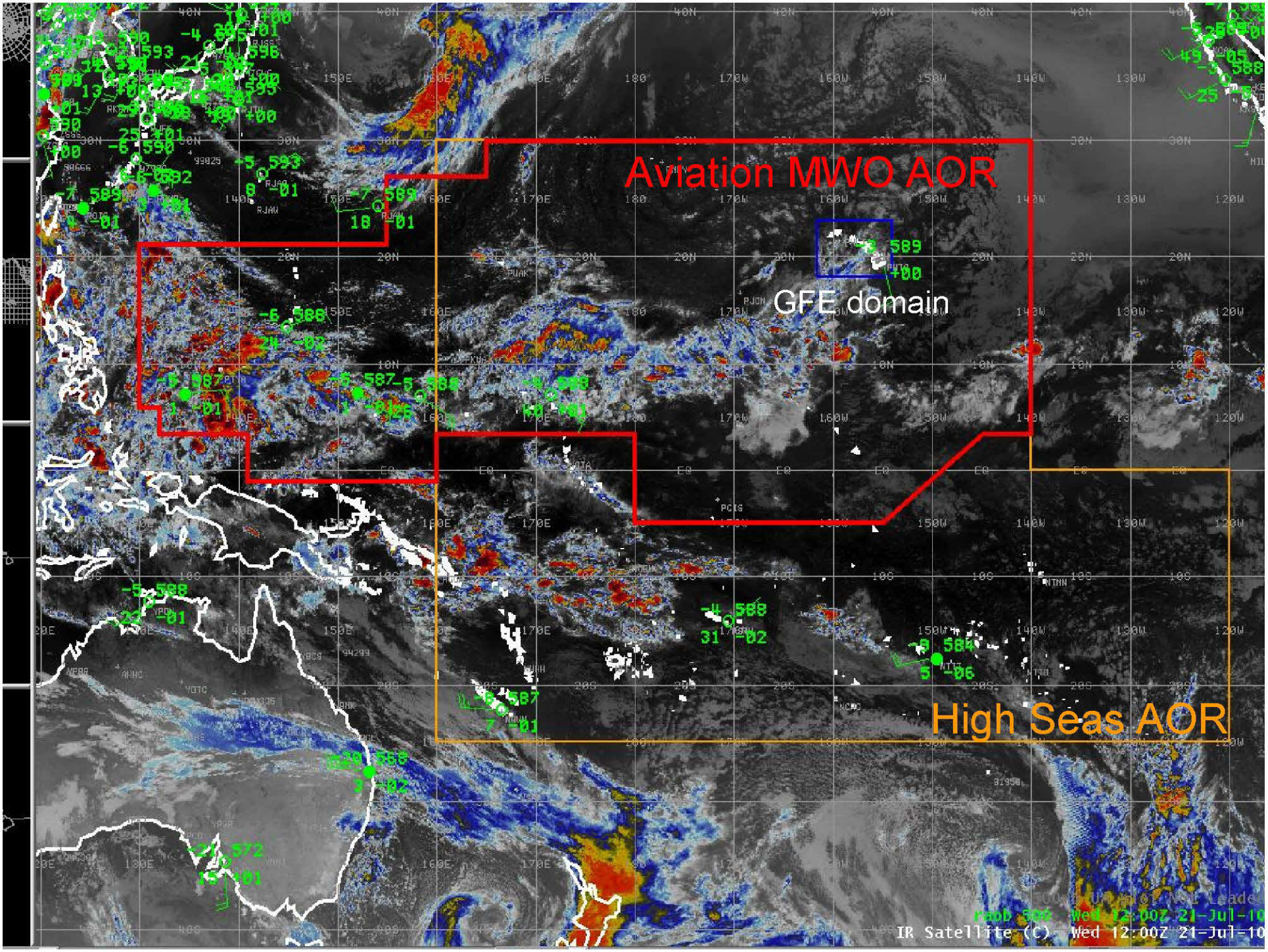
CPHC/WFO Honolulu National Center Programs

- We cover a vast, primarily oceanic region
- National Center programs:
  - Central Pacific Hurricane Center
  - Dvorak analyses to support CPHC and other RSMC's
  - National center aviation (SIGMETs, AIRMETs, Area Forecast)
  - National center marine (High seas & Offshore Waters)
  - National center convective (Severe thunderstorm & tornado watches)
  - Backup responsibilities for OPC, TPC, AWC

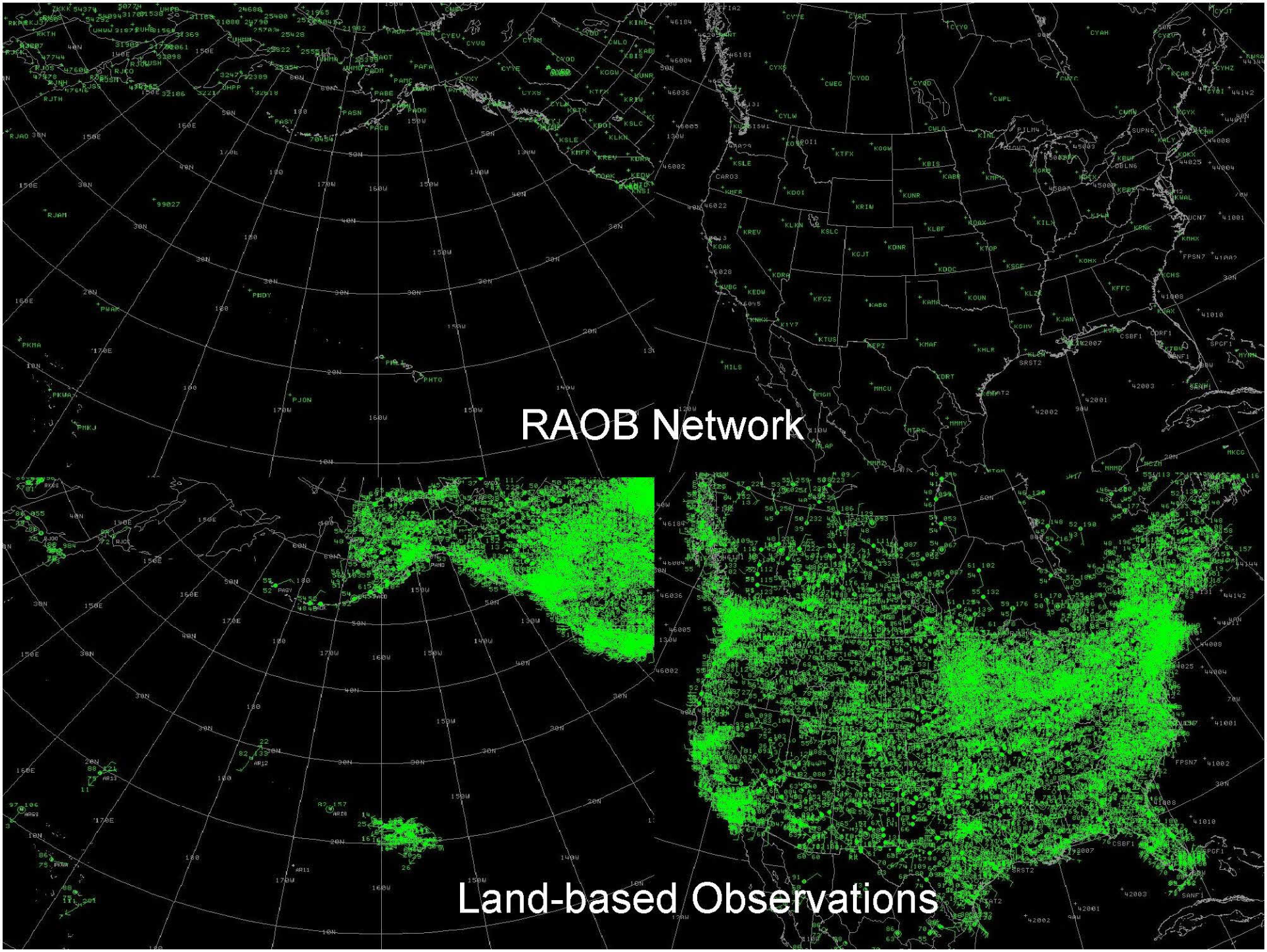

Aviation MWO AOR
GFE domain
High Seas AOR
IR Satellite (C) Wed 12:00Z 21-Jul-10

CPHC/WFO Honolulu
Local programs

- Public forecasts & warnings for Hawaii
- Local aviation (TAFs), including Midway & Pago Pago
- Local marine (Coastal waters forecast & warnings)
- Fire weather forecasts & warnings
- Backup responsibilities for WFO Guam & WSO Pago Pago

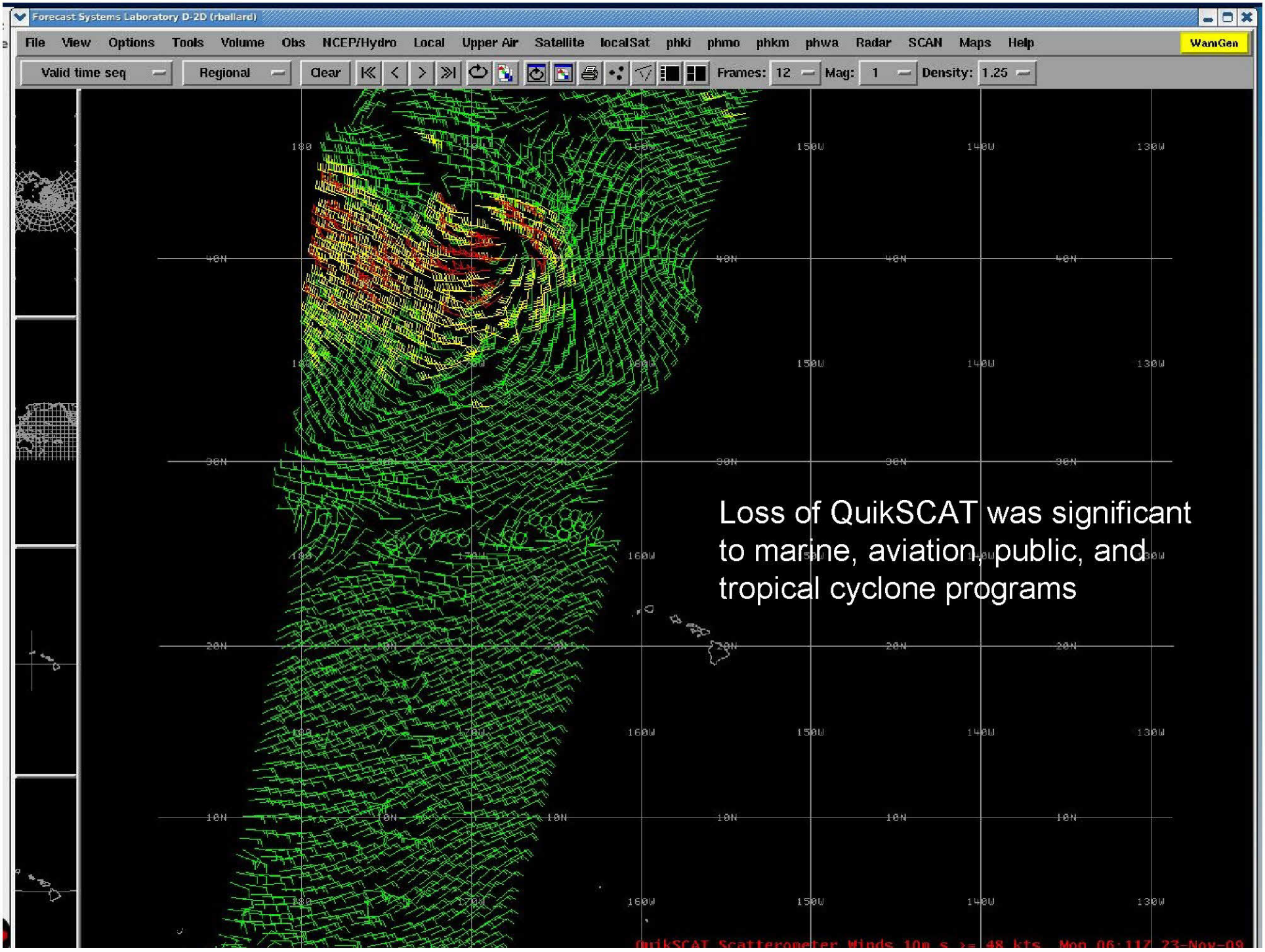
Current satellite products/concerns

- Geostationary satellite data is vital for maintaining continuous weather watch over these areas
  - GOES-West, MTSAT, Fengyun
- Very few sources of *in situ* data
  - Limited surface obs & even fewer RAOBs
  - Some aircraft data (ACARS/AMDAR)
  - Very sparse radar coverage—no radar "network"
  - Insufficient real time lightning data
- ***TC recon flights only for systems threatening the main Hawaiian Islands (if enough lead time!)***


RAOB Network
Land-based Observations

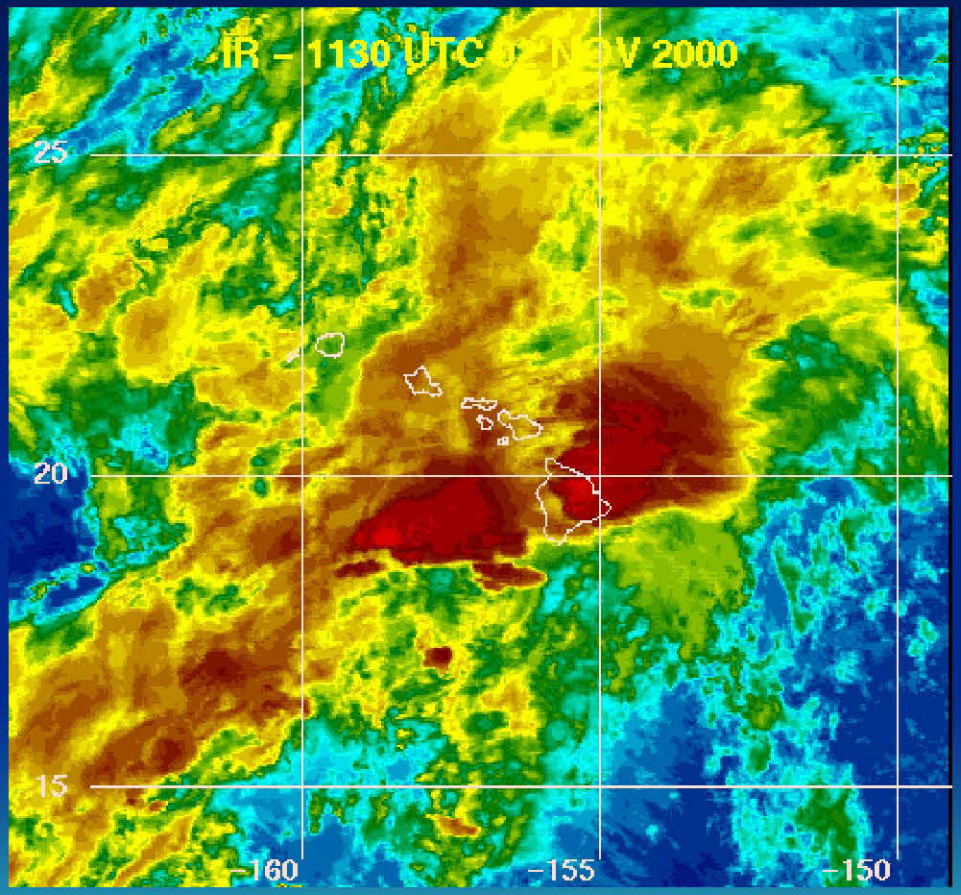
Satellite data

- Helps to ease the data void
- Any way that we can utilize satellite data to replace “standard” data sets is important
  - Satellite sounder data
  - Satellite cloud/atmospheric motion tracking
  - Microwave data


Forecast Systems Laboratory D-2D (rballard)
File View Options Tools Volume Obs NCEP/Hydro Local Upper Air Satellite localSat phki phmo phkm phwa Radar SCAN Maps Help
WarnGen
Valid time seq
Regional
Clear
Frames: 12
Mag: 1
Density: 1.25
Loss of QuikSCAT was significant to marine, aviation, public, and tropical cyclone programs
QuikSCAT Scatterometer Winds 10m s >= 48 kts Mon 06:11Z 23-Nov-09

Thunderstorms vs. layered clouds

- Large areas of layered clouds can hide embedded convection
  - Hazard to aviation
- "Benign" zones of convergence can be the focus for future convection
  - Can result in extreme rainfall (e.g., remnants of Paul in 2000)



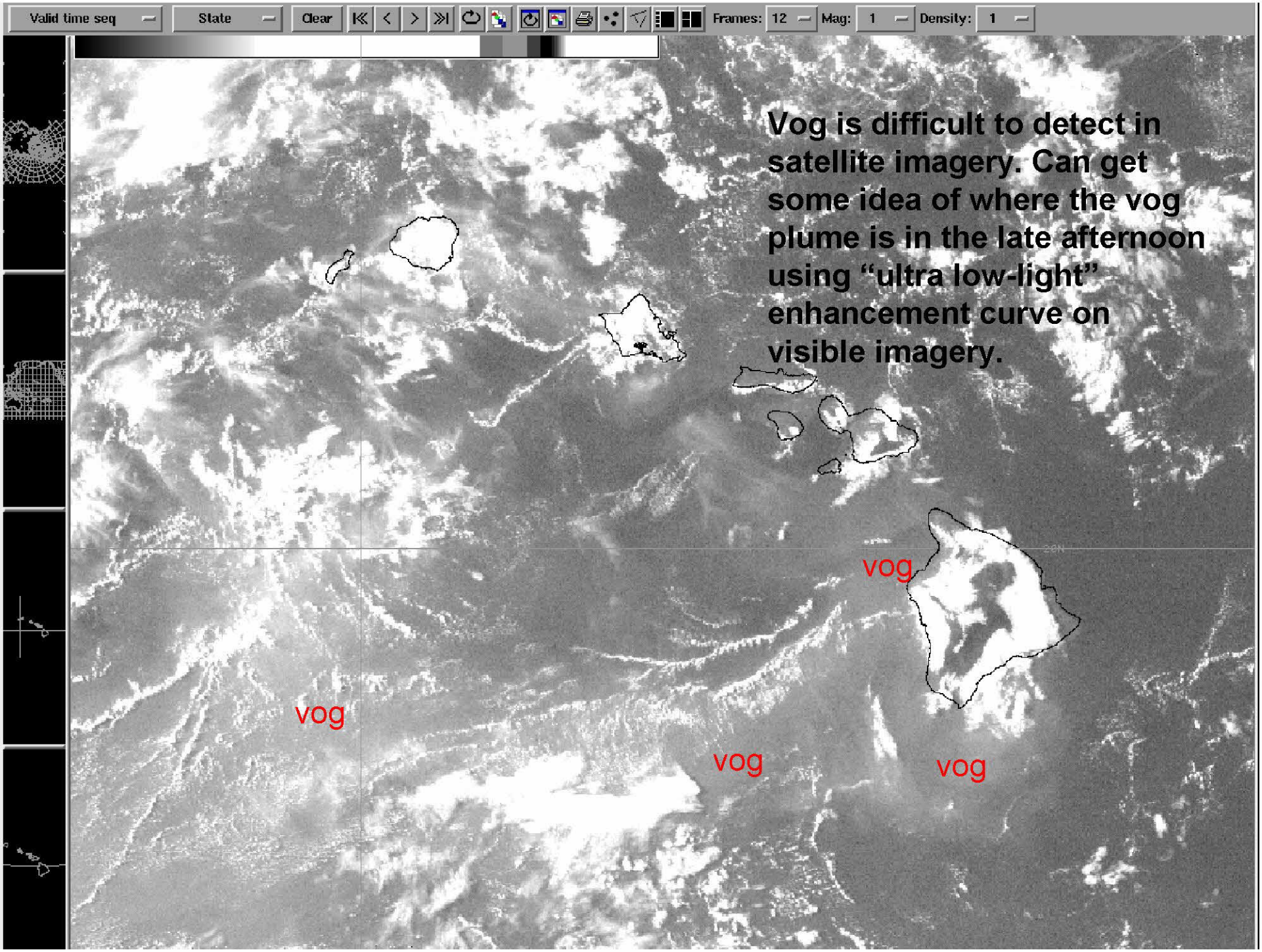
Forecast challenges

- Flooding rains can come solely from warm-top convection (Kodama & Businger 1998)
  - Oahu New Year's Eve flood Dec. 31, 1987-Jan. 1, 1988
- Need ability to track low cloud features through large areas of layered cloud (something similar to 37 GHz?)

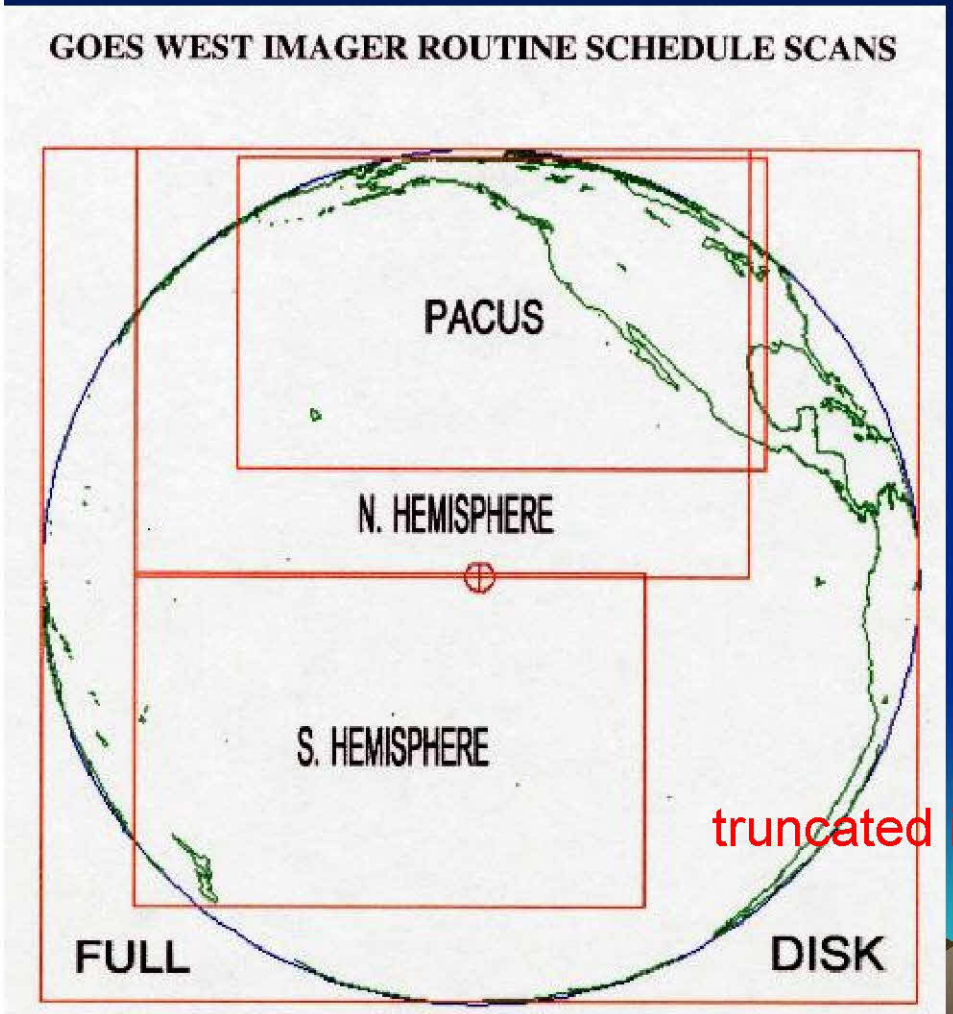
Forecast challenge: Vog tracking

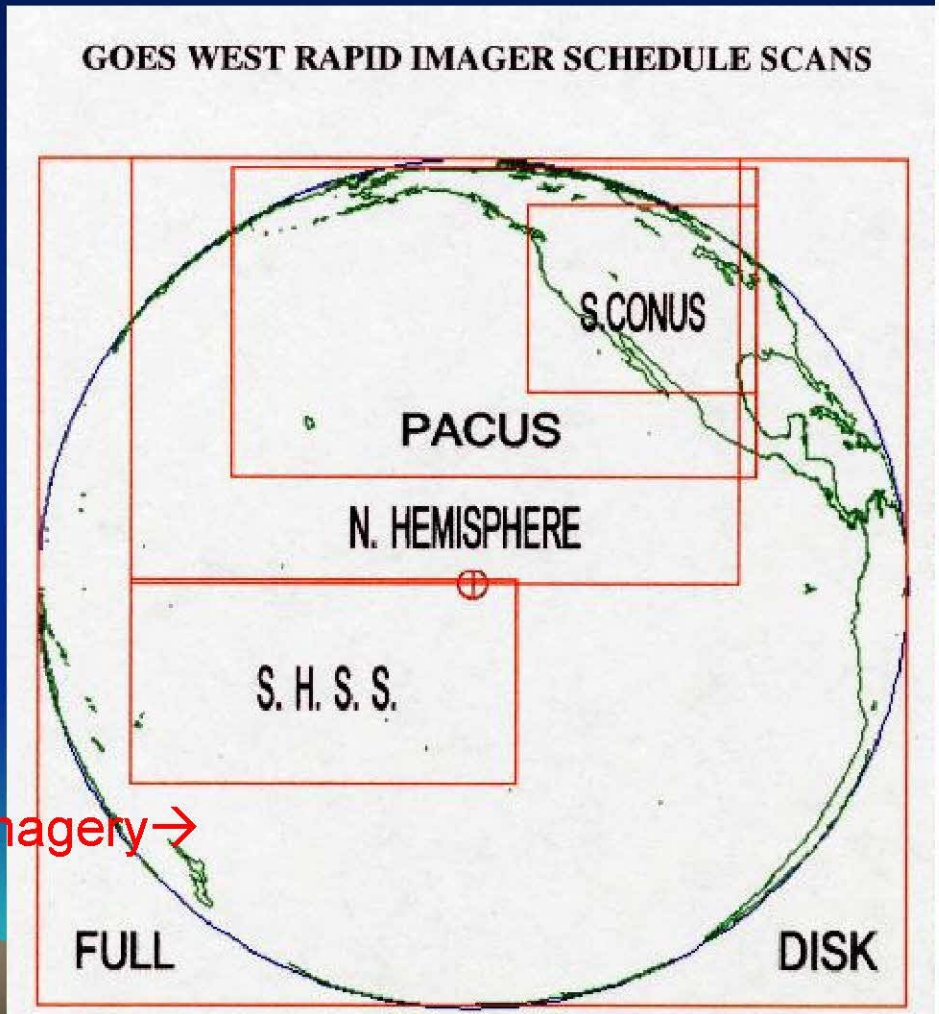
"Vog poses a health hazard by aggravating preexisting respiratory ailments, and acid rain damages crops and can leach lead into household water supplies."

- USGS website


Valid time seq
State
Clear
Frames: 12
Mag: 1
Density: 1
Vog is difficult to detect in satellite imagery. Can get some idea of where the vog plume is in the late afternoon using “ultra low-light” enhancement curve on visible imagery.
vog
vog
vog
vog

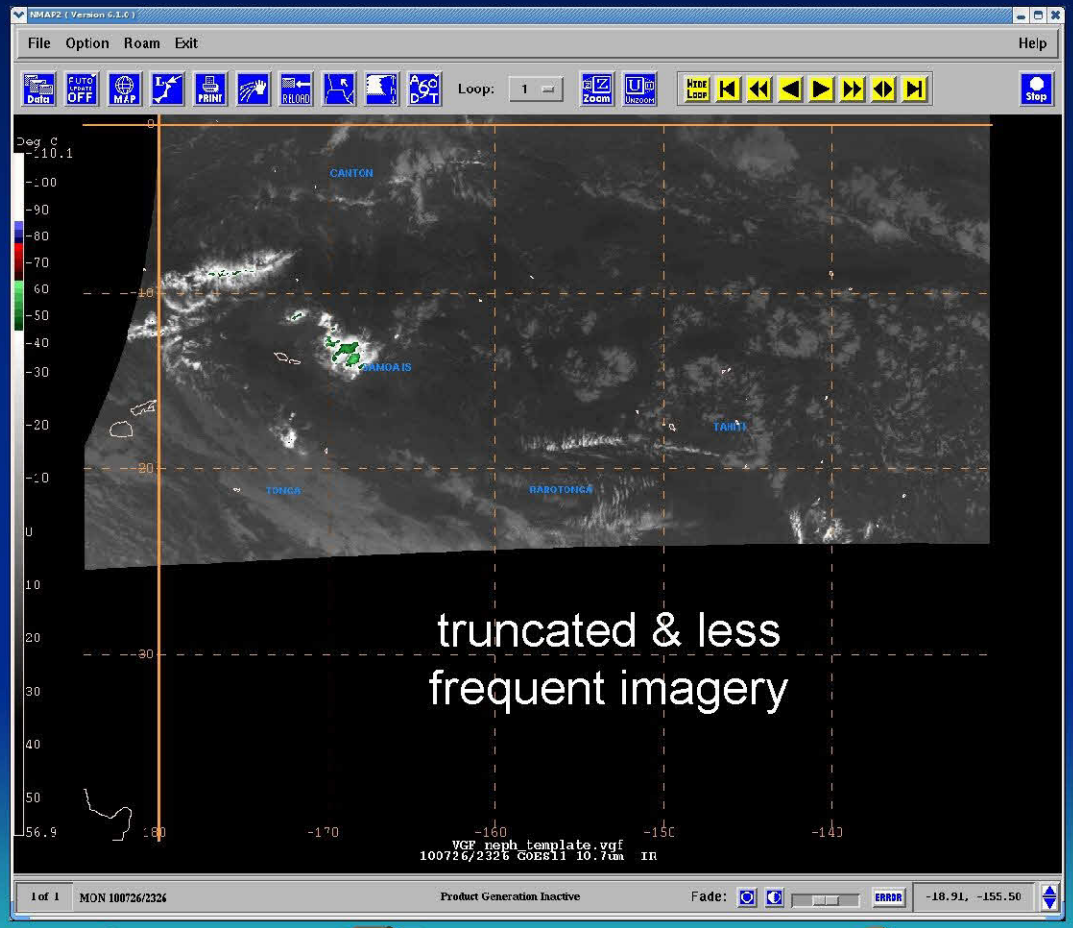
Rapid Scan Compromise





truncated imagery→

Rapid Scan Compromise
"Southern Hemisphere Small Sector"



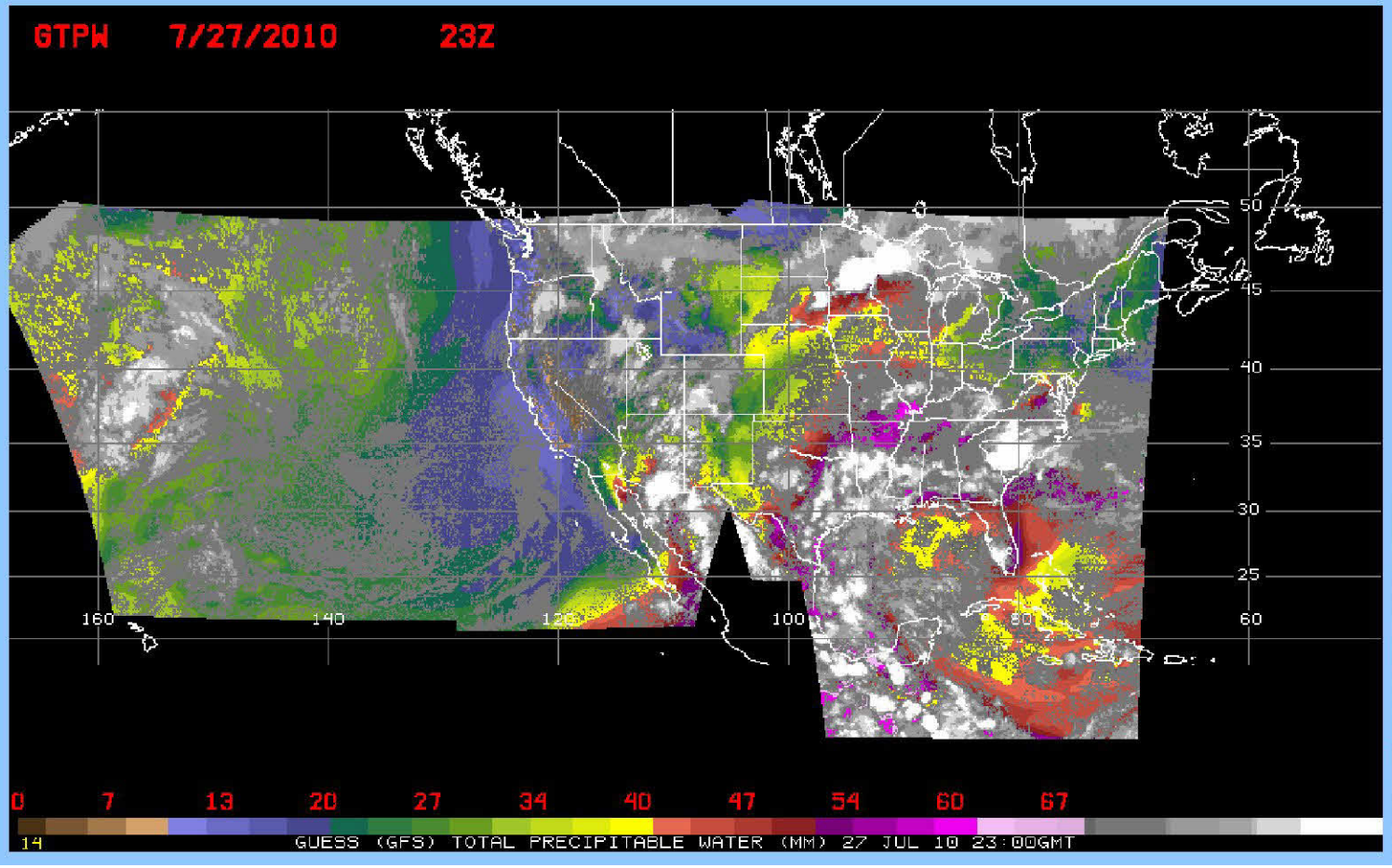
- Passes diminish from every 30 min to once per hour (& smaller sector)
- ***Must wait nearly 90 minutes after full disk for next image over Samoa (e.g., 03z→0422z)***

WFO Honolulu/CPHC concerns

- Sounder scan strategy offers limited coverage over Hawaii

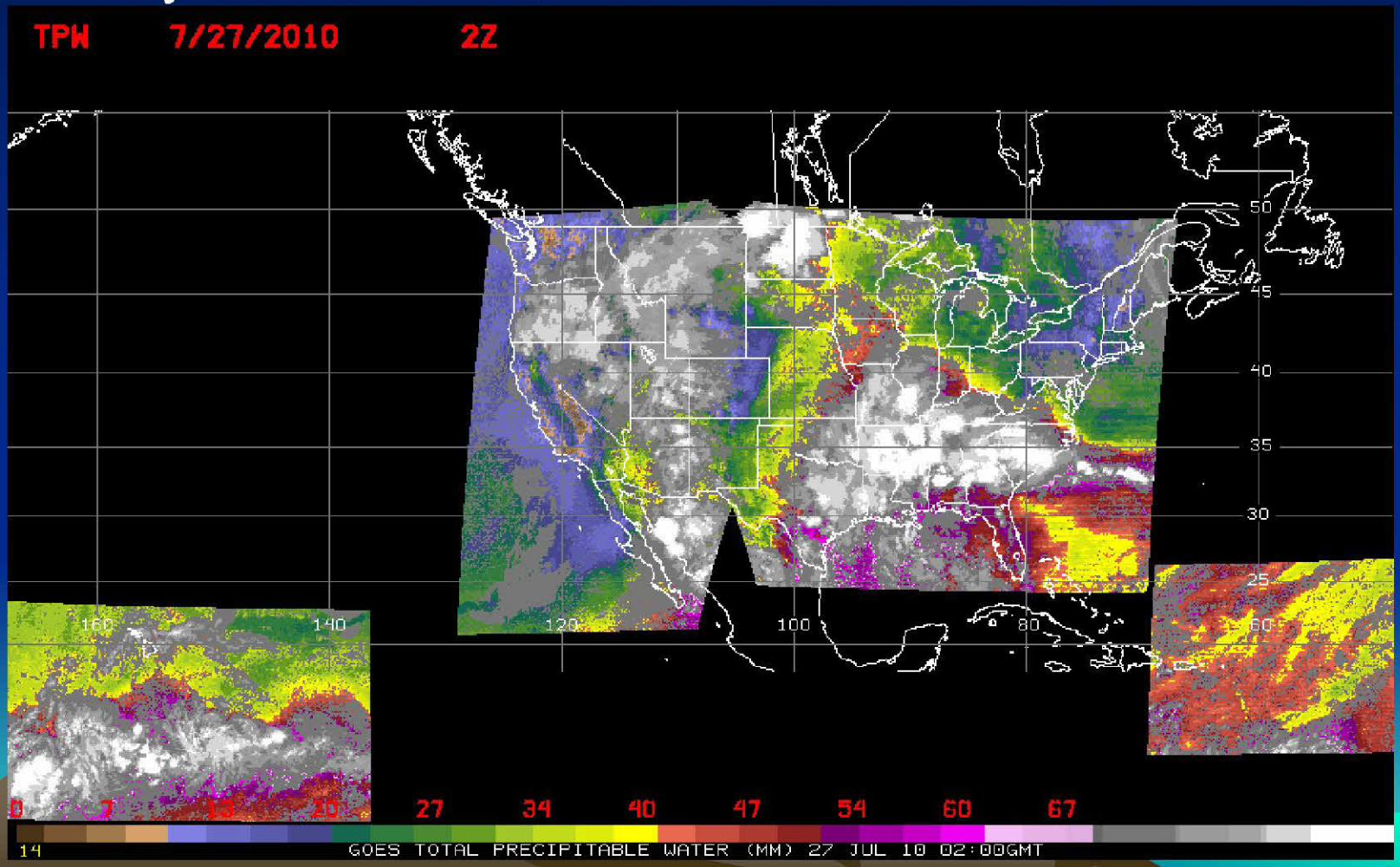
Sounder Derived Product Imagery - Guess Total Precipitable Water

24 Hour Sounder DPI Archive



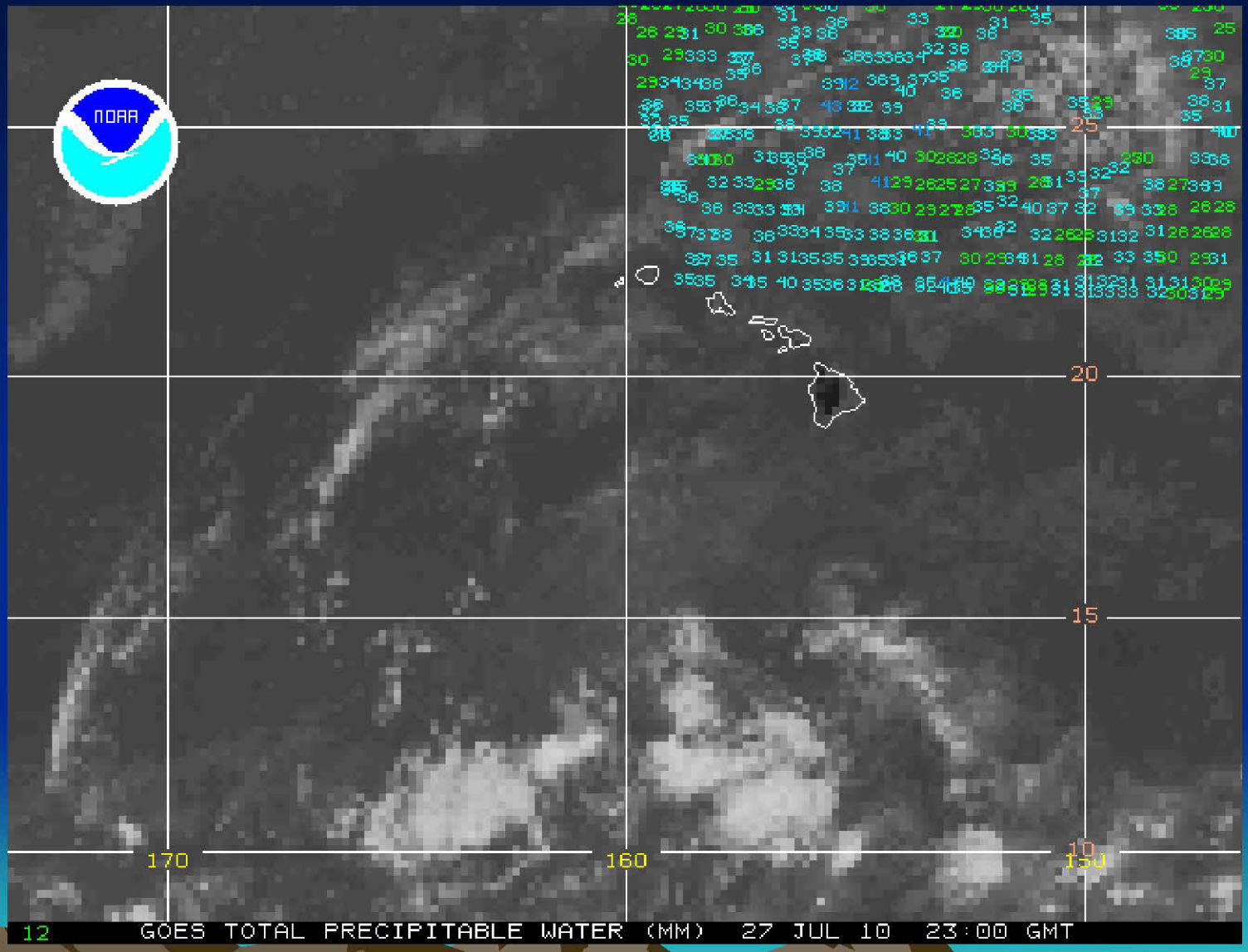
GOES Sounder Derived Product Imagery

- Hawaii: 02z, 03z, 08z, 09z, 14z, 15z, 20z, 21z
- Very useful data, not available in our AWIPS?



http://www.star.nesdis.noaa.gov/smcd/opdb/goes/dpi/html23L/sdpiimg023l.html

GOES Sounding Fields



http://www.star.nesdis.noaa.gov/smcd/opdb/goes/soundings/html/fields23L.html

WFO Honolulu/CPHC Concerns (cont.)

- Ability to compare current satellite imagery & animation with model initializations
  - "Does the model have a clue?" Specifically:
    - Feature placement
    - Feature movement
    - Feature size & shape
    - Feature intensity
    - Intensity trends
  - Often the higher resolution models do the worst with these elements!

WFO Honolulu/CPHC "Wish List" Ideas

- Higher resolution IR imagery to support precipitation analysis
- At least hourly sounder data covering Hawaii
- Something similar to 37 GHz & 85 GHz microwave data with geostationary coverage
- Derived omega field from ΔT in IR
- Full basin, real-time, high detection efficiency lightning detection
- Altimetry for sea heights? Scatterometer for ocean surface winds?

Questions?

Mahalo to our staff for their input & ideas!