NASA SPoRT OCONUS Collaborations

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OCONUS R2O Interchange Meeting

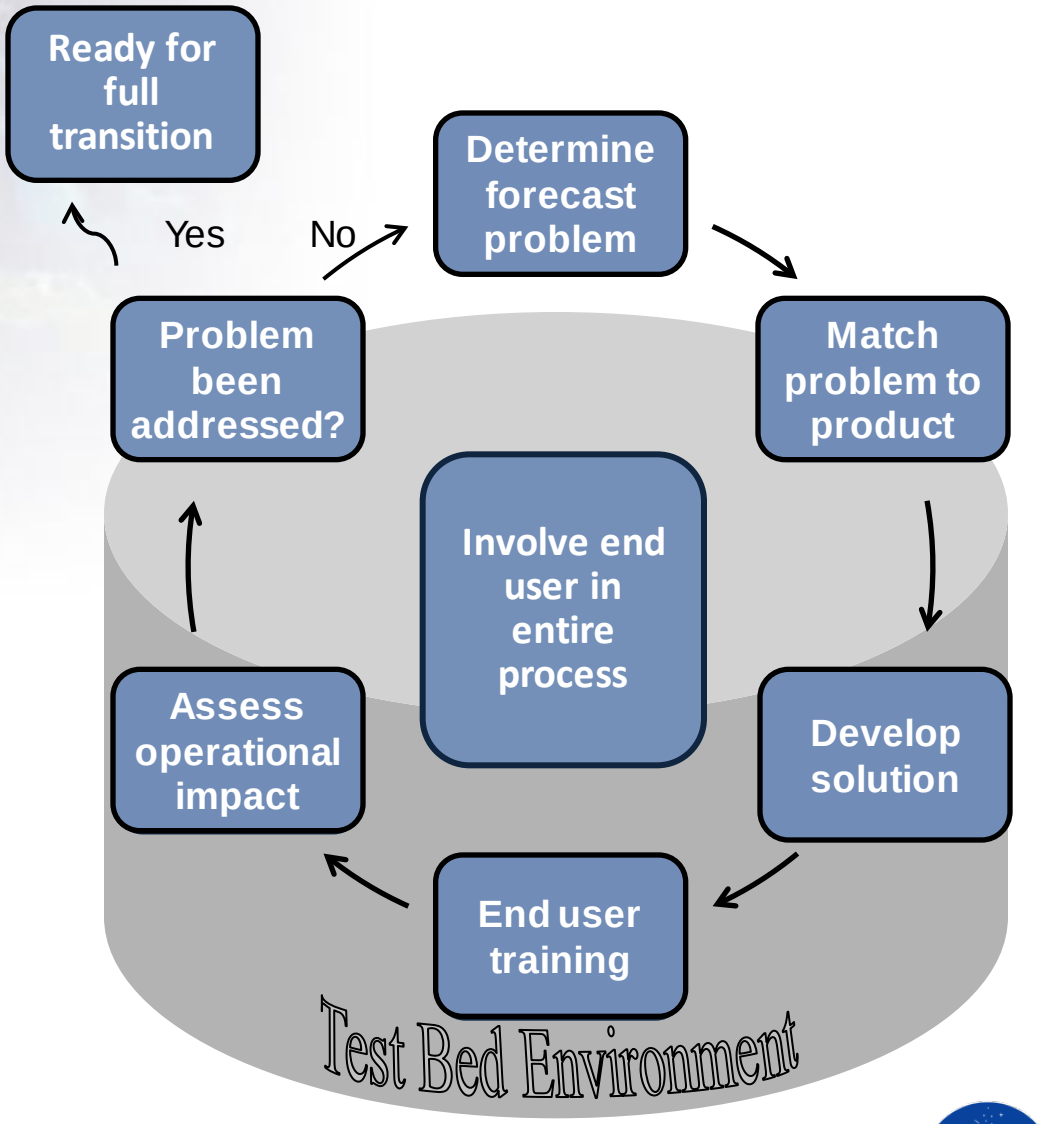
Honolulu, Hawaii

29 July – 1 August 2014

Transitioning Data to Operations

SPoRT paradigm

- Interactive partnership
- Integrate end user's decision support tools
- Create product training
- Perform product assessment
- Recognize OCONUS is not a carbon copy of CONUS!

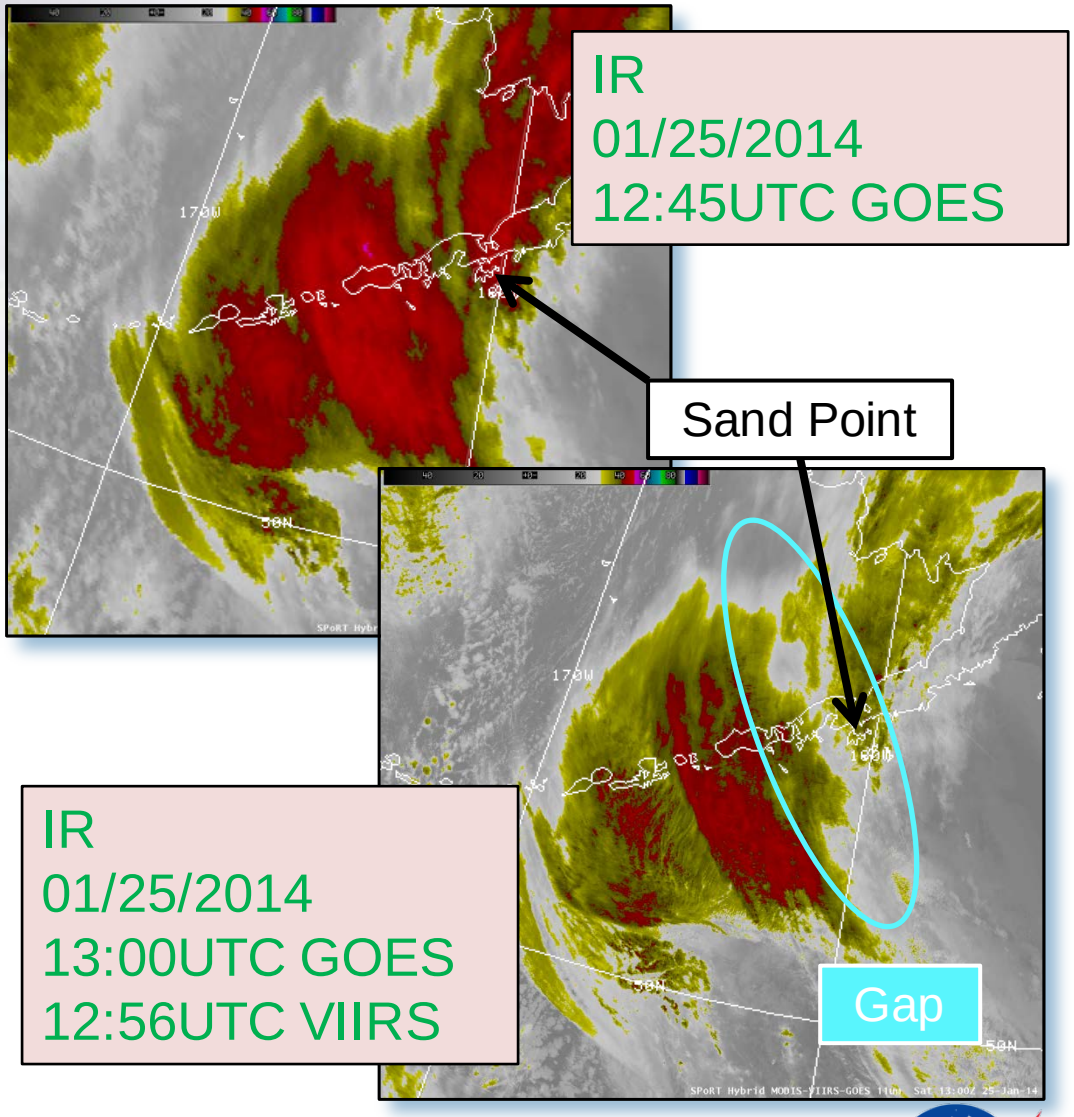


Alaska Region – Features

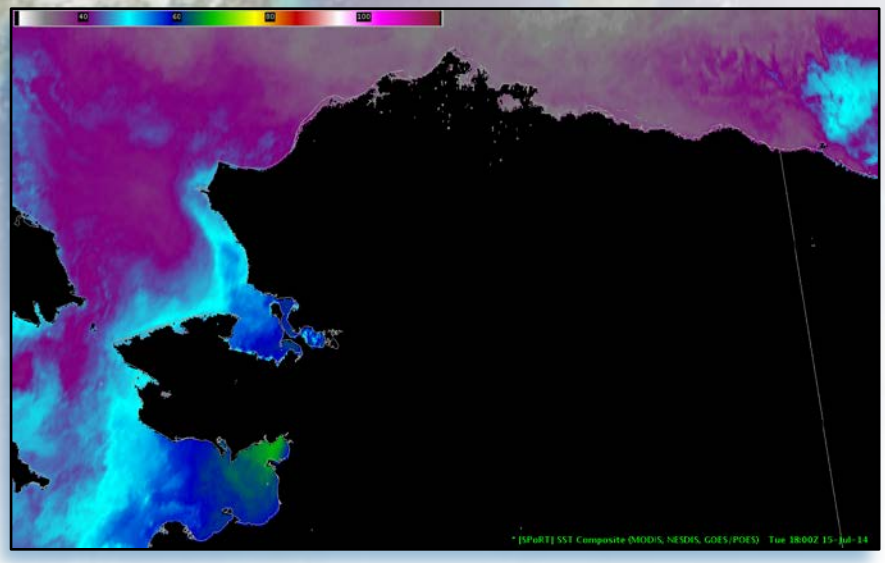
- Regional direct broadcast
- Partnership with University of Alaska Fairbanks and GINA
- More frequent polar overpasses
- Extreme cold can affect products
- Majority of offices are AWIPS II

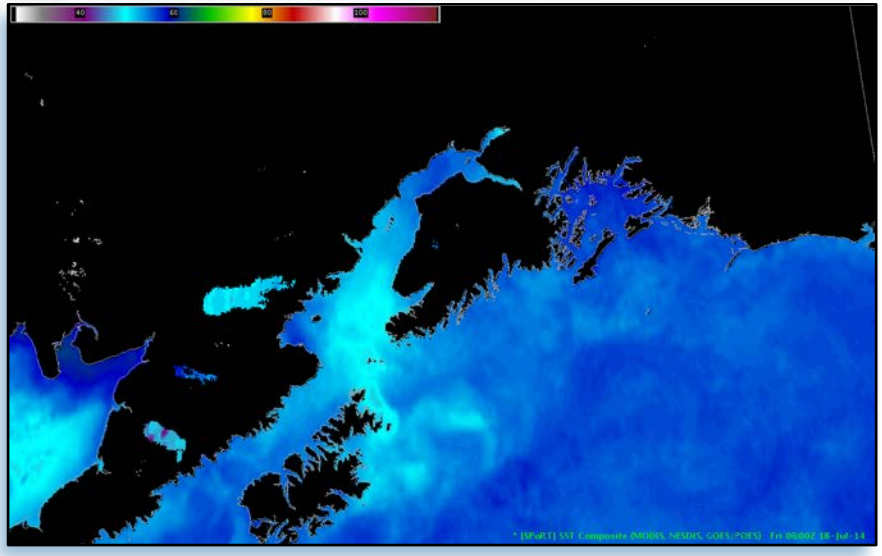
Alaska – Initial Collaboration

- Began in 2011
- Take advantage of polar data: More frequent overpasses and much better resolution
- GEO/LEO hybrid
  - Geostationary frequency
  - LEO resolution
- Partnership with GINA producing products locally



Alaska – Sea Surface Temperature





- Uses lower res NESDIS data and 1 km MODIS
- VIIRS soon to be integrated
- Used at the Alaska Sea Ice Desk
- Transition has led up to 60% reduction in time to create SST chart!

Alaska – RGBs for Aviation/Cloud

(Alaska leading OCONUS effort with RGBs)

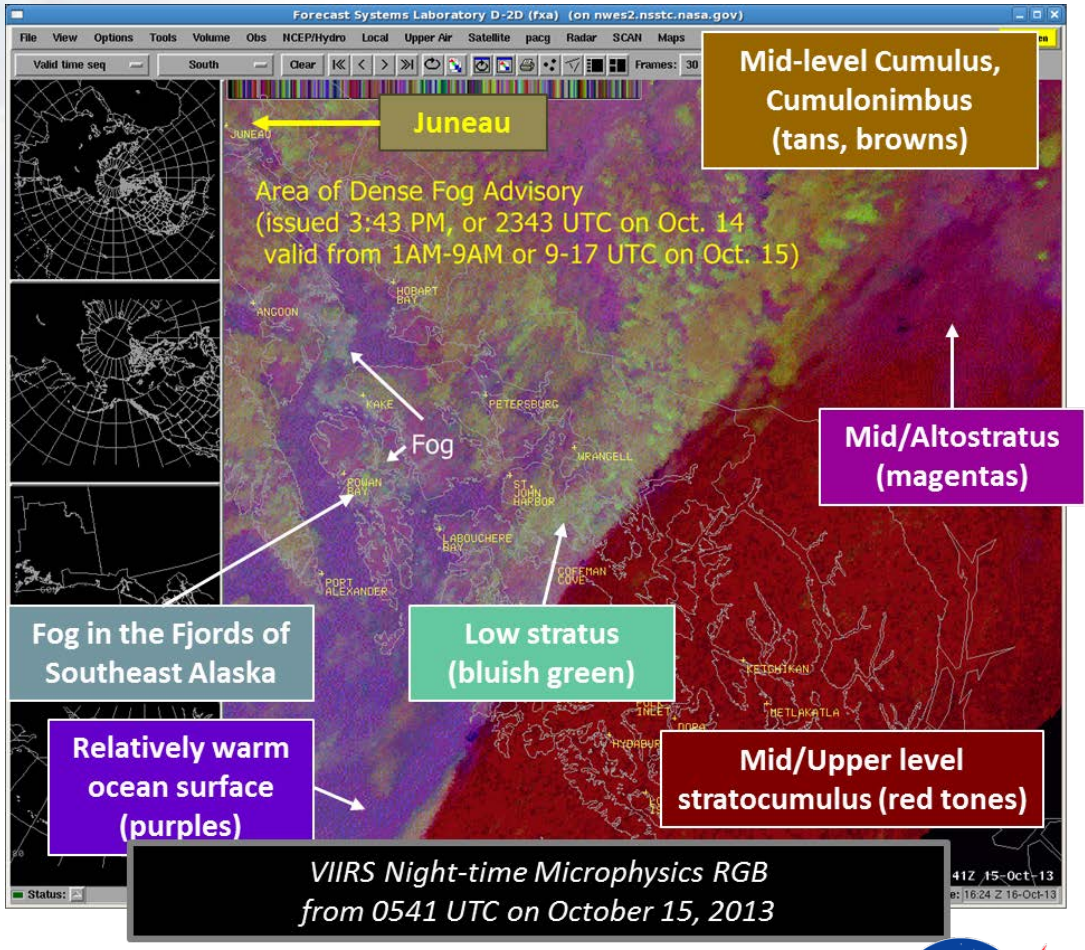
Nighttime Microphysics RGB

- EUMETSAT standard used on SEVIRI data

– 12.0µm-10.8µm (optical depth)
– 10.8µm-3.7µm* (particle size & phase)
– 10.8µm (thermal)

***Note: The 3.9µm channel can be "noisy" when less than -20C**

- Applied to efficiently analyze clouds for aviation issues, in particular differentiation of fog from low stratus
- AK users assessed impact during winter of 2013/2014

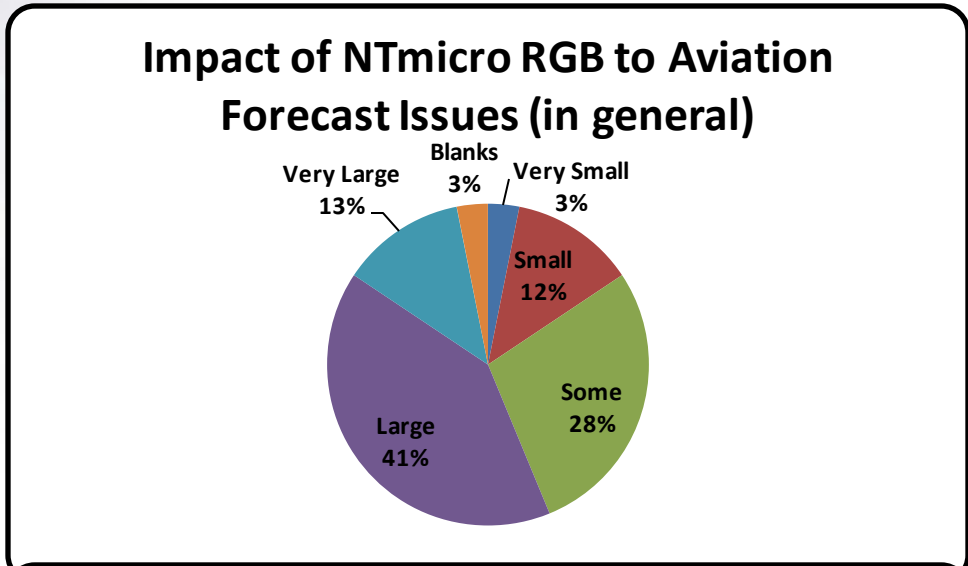


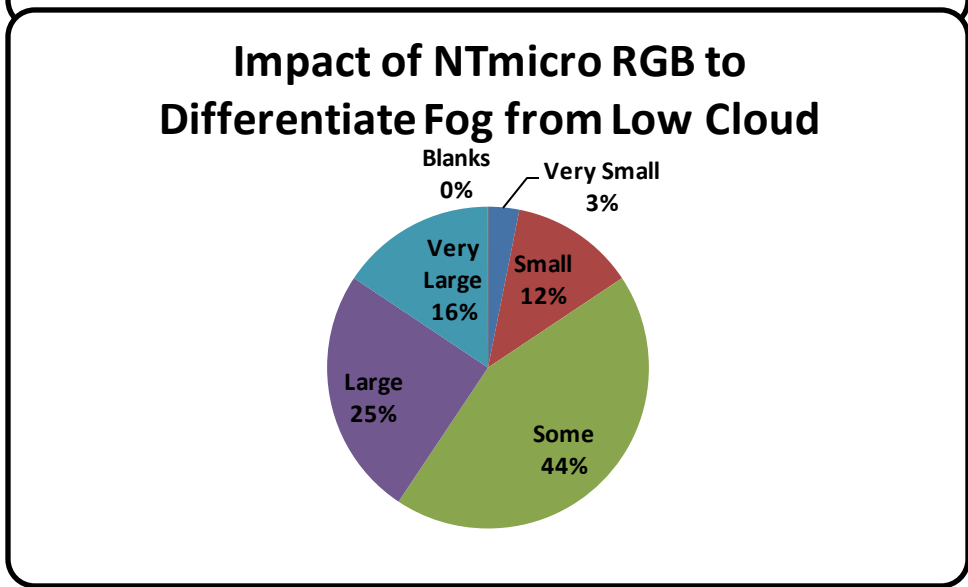
Alaska – High Latitude RGB Use

(Nighttime Microphysics and DNB compared to traditional 11-3.9µ)

Assessment Results -NtMicro

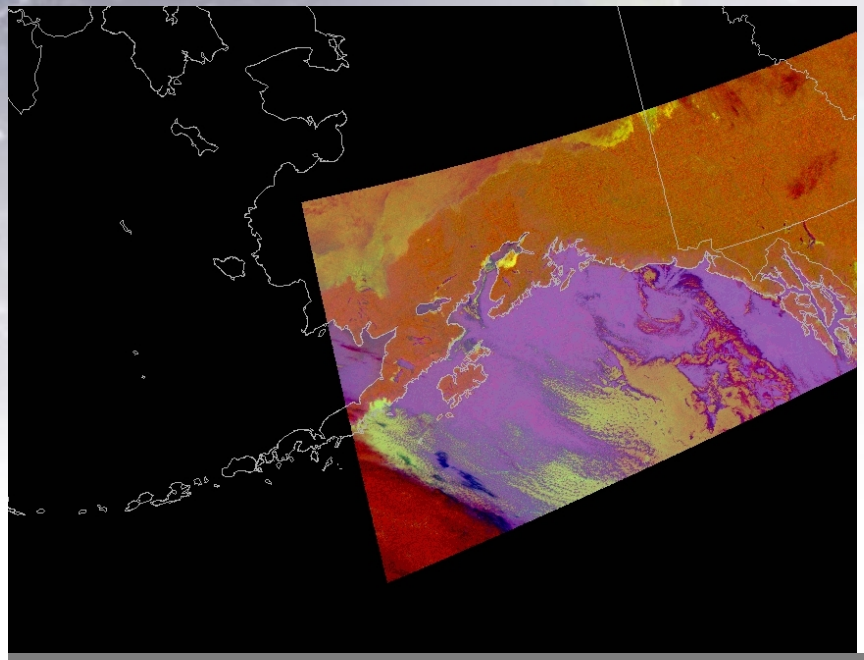
- Total number of feedback submissions: 32
  - Juneau, Anchorage, Medford, Great Falls
- Impact on Aviation (general): 82% said some to very large
- Impact to distinguish fog from low clouds: 85% said some to very large
- Training
  - Micro-lesson (self-paced training) created with Alaska specific examples
    - Done in coordination with Eric S.
  - Quick Guide for assessment period
  - 1-on-1 session with forecasters on RGBs during visits to WFOs (Fall 2013)
- Recommendations:
  - Users need more training examples and experience with RGB imagery
  - Very cold temps. and increased summer daylight limit NtMicro RGB, hence looking to testbed 24-hr Microphysics RGB



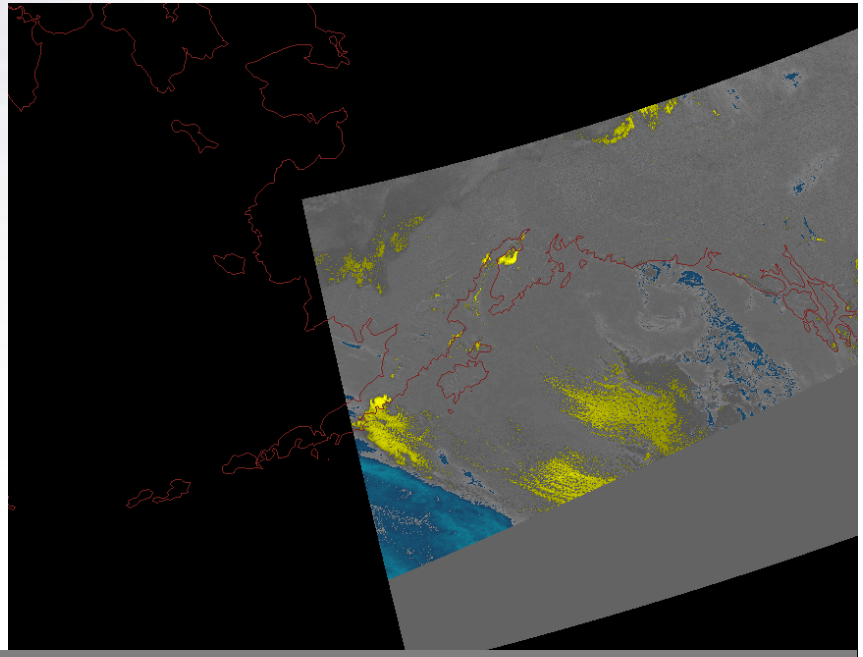


Alaska – RGB User Feedback

NtMicro RGB (MODIS)



11-3.9µ Difference (MODIS)



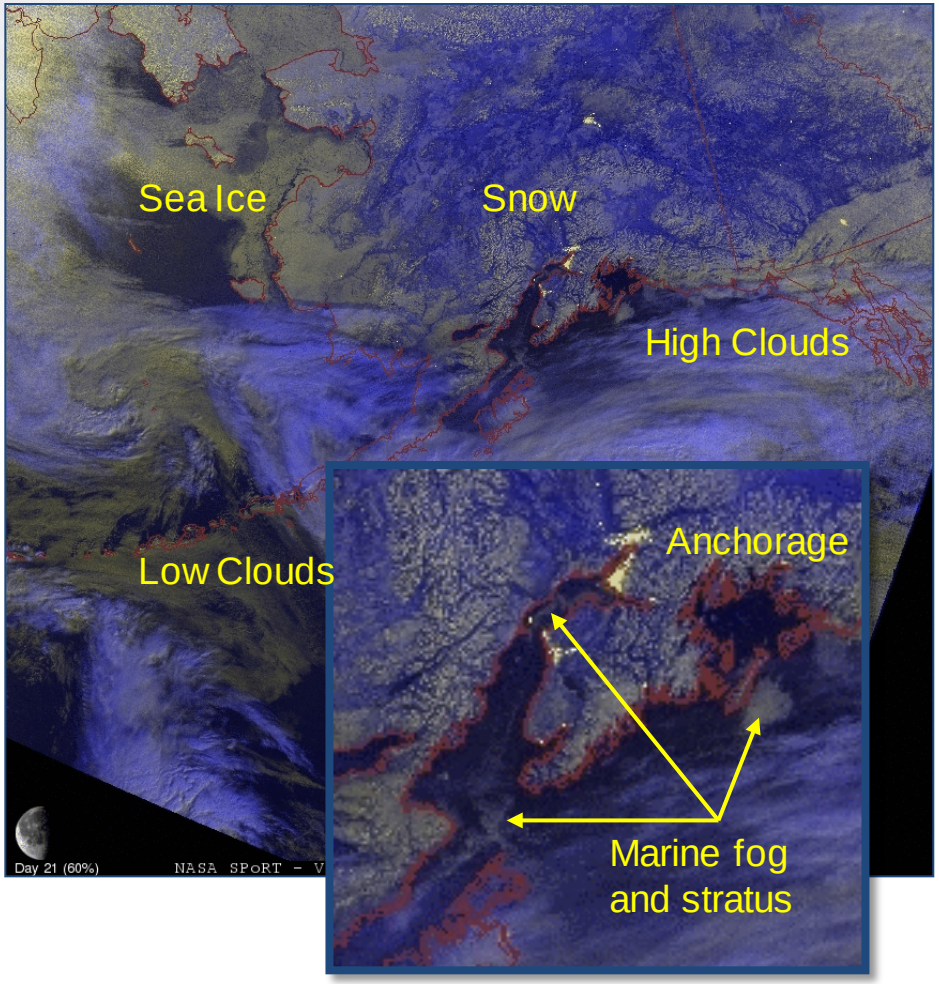
Anchorage Forecaster: “The nighttime microphysics RGB product did a good job in the early morning of the 18th at identifying the areas of fog/low stratus over the Cook Inlet region. ….The mid level deck doesn't exhibit the same brightness but is a similar shade. Using the RGB in conjunction with the Hybrid 11-3.9um imagery provided a clearer picture on which was fog/stratus and which was mid-level.”

Alaska – Day-Night Band Assessment

Day-Night Band RGB

- Use of Radiance or "Reflectance" along with thermal channel to create RGB.
- Reflectance imagery is radiance value from the VIIRS DNB normalized by the amount of available moonlight (meaning phase and angle)
  - Benefit: Provides a more consistent brightness in the resulting image throughout the moon cycle
- RGB Imagery
  - Red: Day-Night Band
  - Green: Day-Night Band
  - Blue: 11 micron (longwave IR)
- Reflected light from low level clouds/fog are yellow shades
- Reflected light from thick, high level clouds will be more white to bluish-gray
- Surface emissions are saturated yellow (e.g. City Lights, wild fires, gas wells)

Reflectance RGB



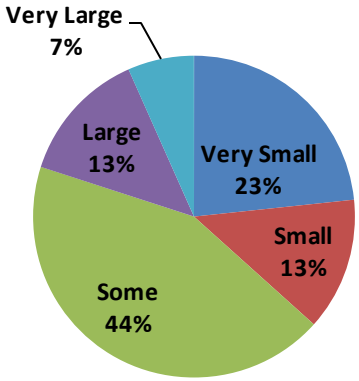
Alaska – High Latitude DNB Use

(Nighttime Microphysics and DNB compared to traditional 11-3.9µ)

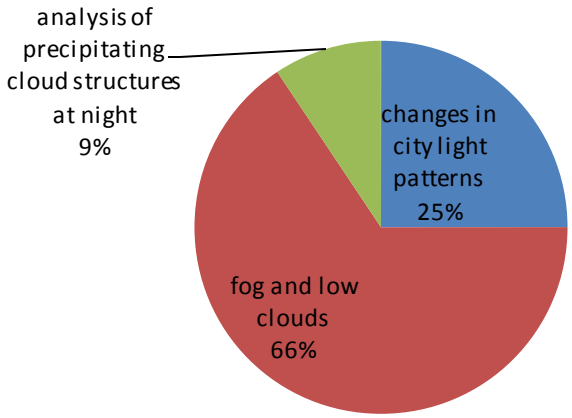
Assessment Results – Day-Night Band

- Included with NtMicro submissions
- Impact on Aviation (general): 64% said some to very large
- Had multiple uses, but usually was not the preferred product for aviation.
- Training
  - Included Alaska-specific examples in same Micro-lesson
  - Quick Guide for assessment period
  - Presented in teletraining sessions
- Recommendations:
  - Users need more experience.
  - Applications/Feedback limited by product frequency
  - Derived products for unique situations (i.e. disasters) likely to increase operational use.

Impact of VIIRS DNB RGB to Aviation Forecast Issues (in general)



How VIIRS DNB RGB Was Used



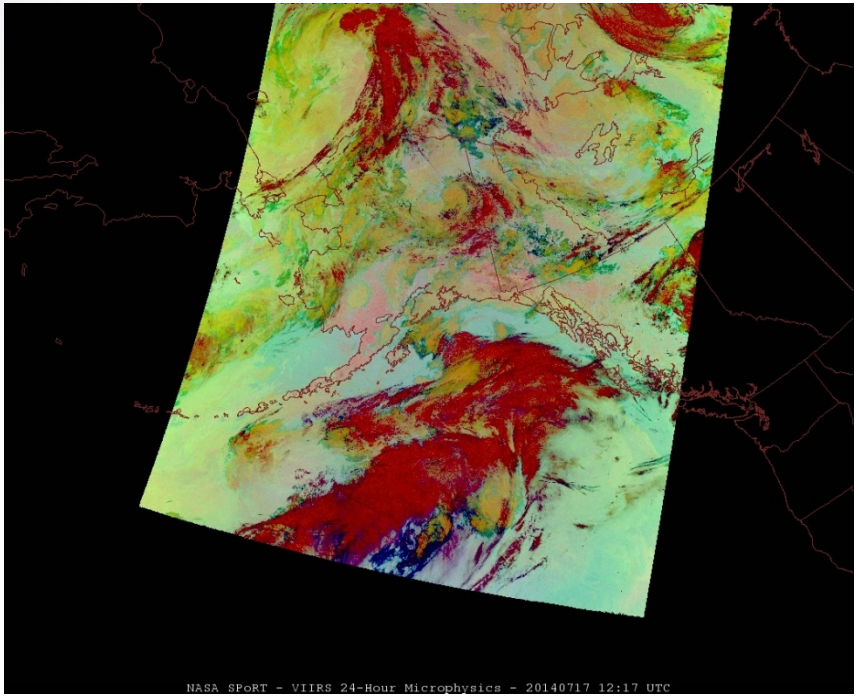
Alaska – New 24 Hour RGB

24-hr Microphysics

12.0µm-10.8µm
10.8µm-8.7µm
10.8µm

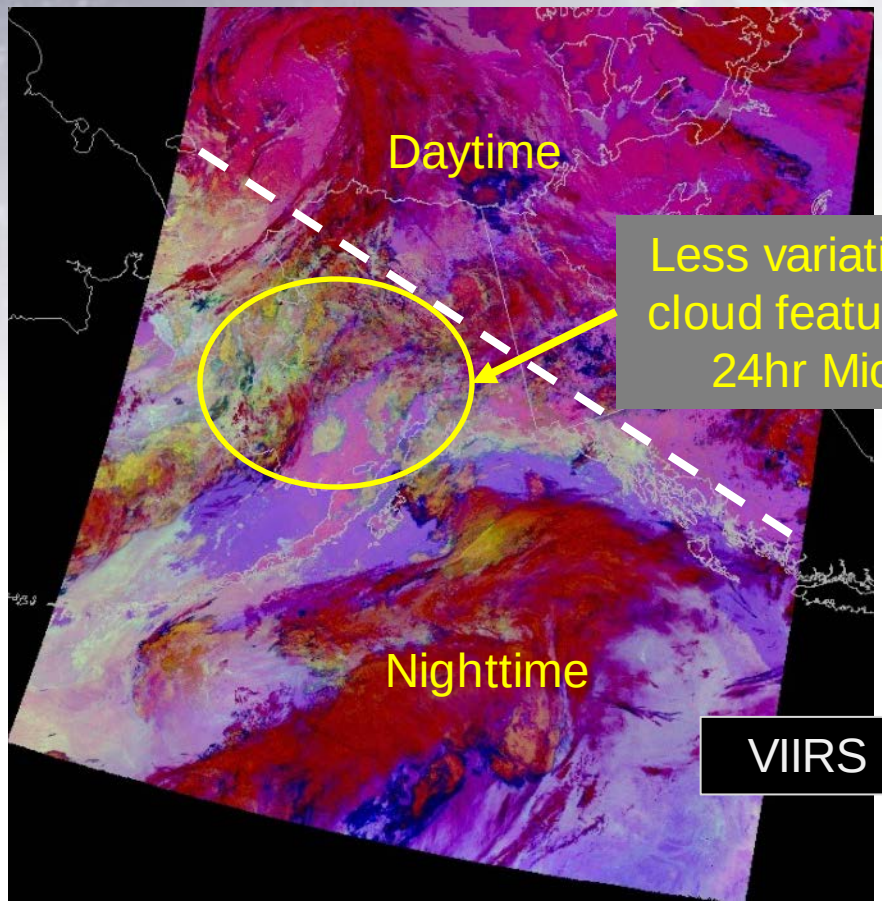
- The green component uses 8.7 instead of 3.9µ channel
  - Range of green component difference is half of NtMicro RGB so less distinction between low cloud features
  - Less noisy in cold scenes
  - Able to use in day compared to NtMicro

VIIRS swath over AK



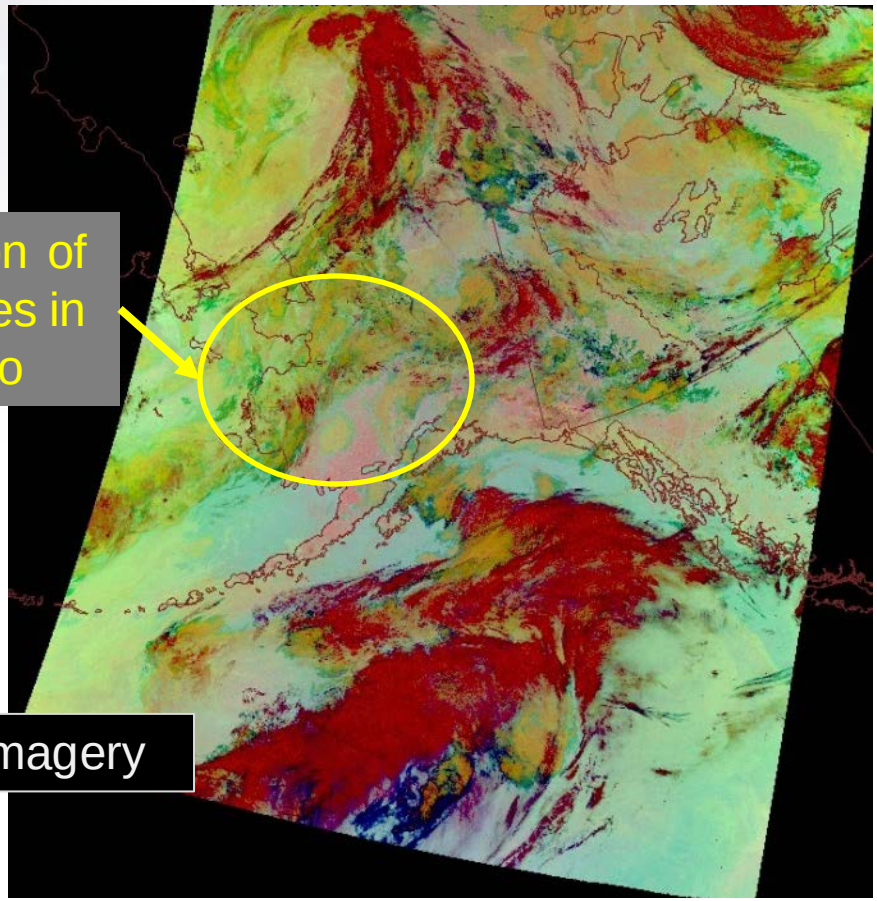
Alaska – New 24 Hour RGB (cont.)

Nighttime Microphysics



12.0µm-10.8µm
10.8µm-3.7µm
10.8µm

24-hr Microphysics



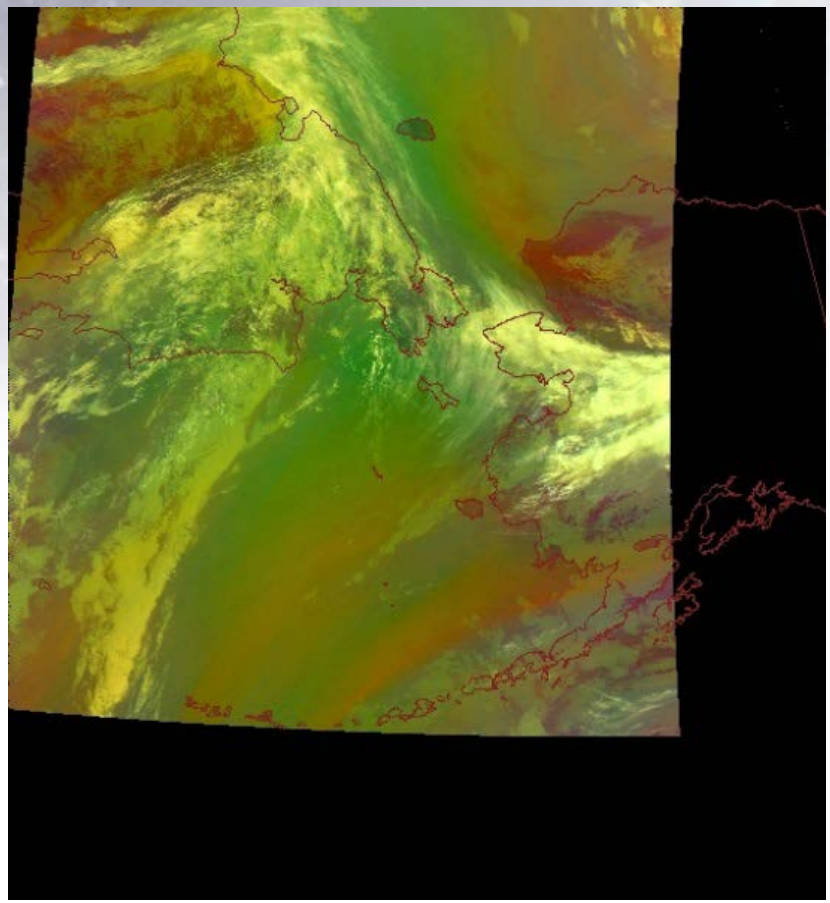
12.0µm-10.8µm
10.8µm-8.7µm
(using different channel as well as range)
10.8µm

Less variation of cloud features in 24hr Micro

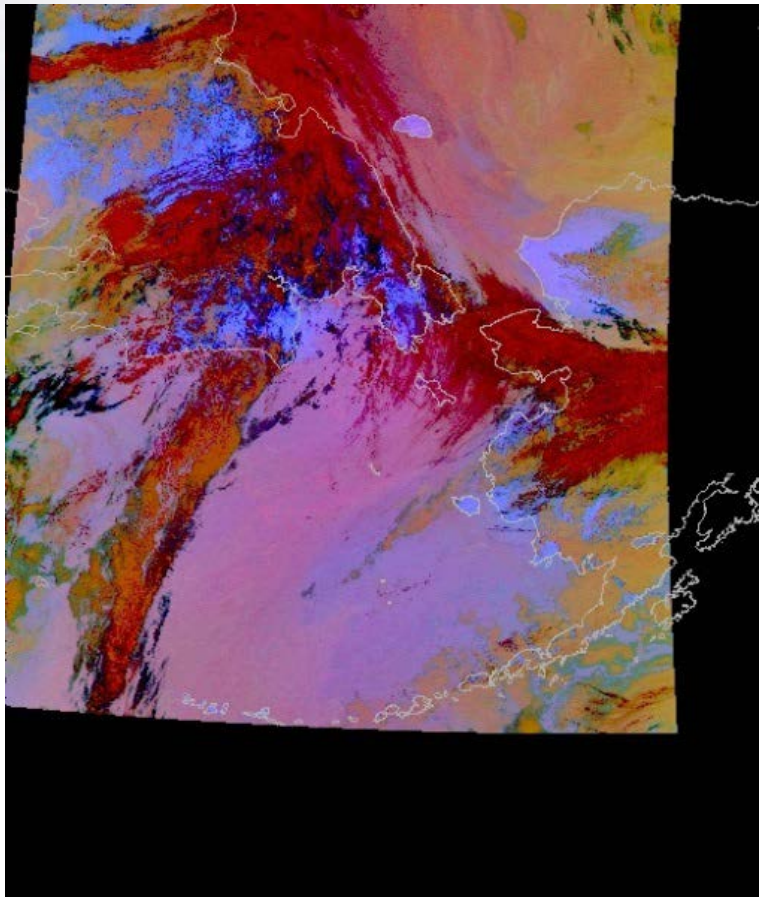
VIIRS Imagery

Additional OCONUS RGBs

Airmass (MODIS only)

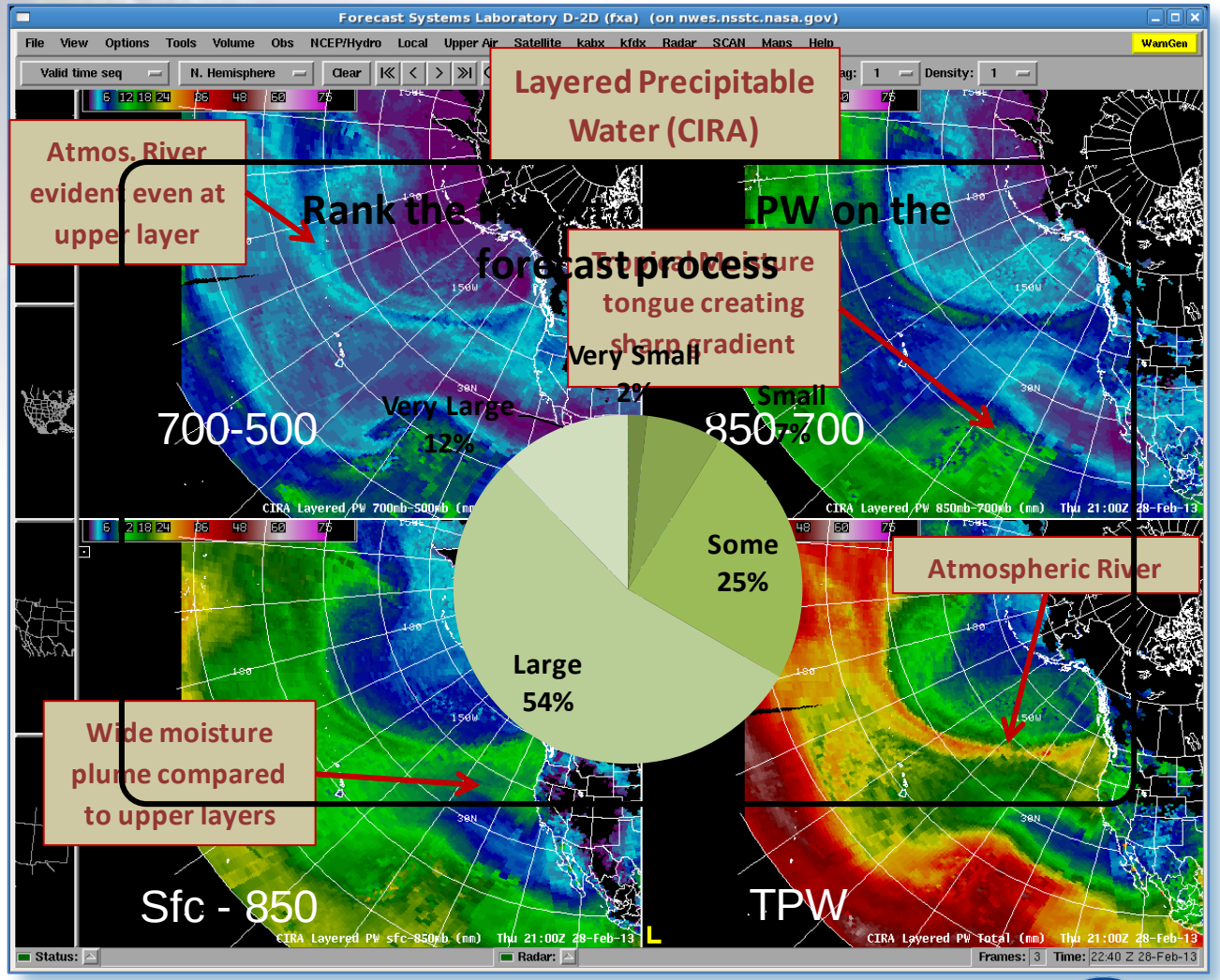


Dust (MODIS and VIIRS)

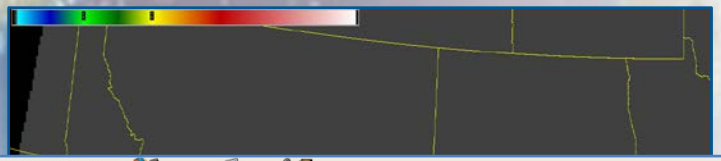


Alaska – Assessments

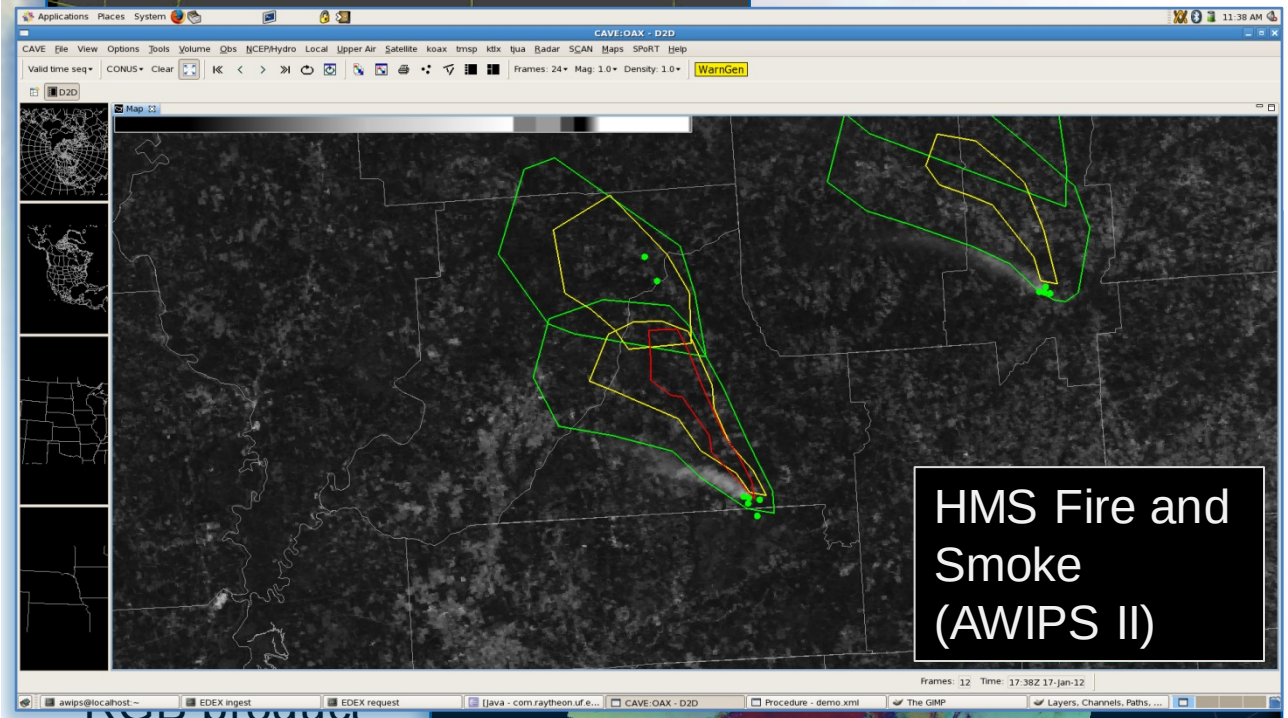
- 2013 focused on QPE and layered precipitable water (LPW)
- Joint effort with San Juan
- Demonstrate collaboration with developers (CIRA and NESDIS)
- Combine GOES-R capabilities with other products



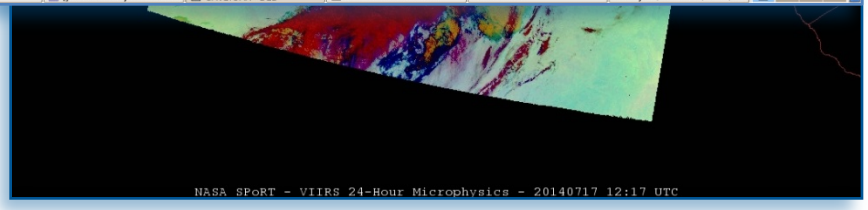
Alaska – Upcoming Activities



NESDIS Snowfall



RGB product



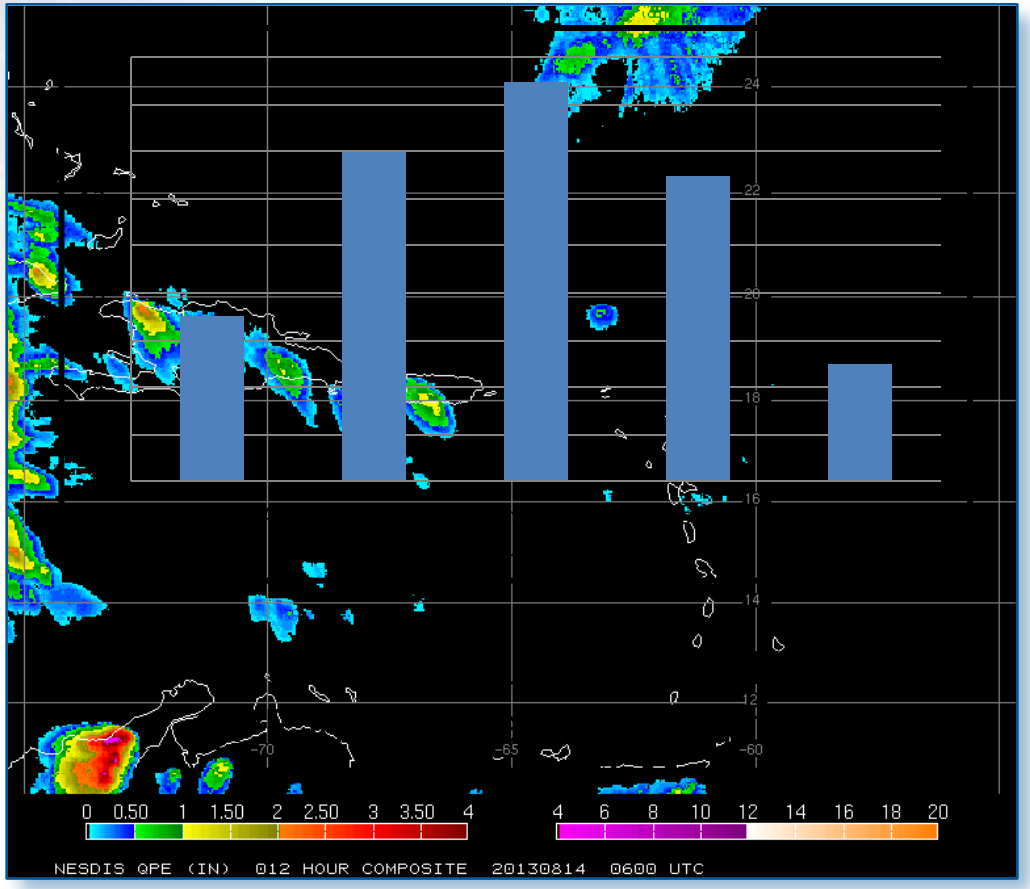
- GINA upgrades
  - Faster processing
- 24 hour microphysics RGB assessment
- Snowfall rate assessment
- Alaska lightning visualizations
- HMS fire / smoke
- Land Information System

San Juan, Puerto Rico – Features

- Southern Region WFO with OCONUS issues
- Future direct broadcast site
- Lessons learned applicable to Pacific Region
- Currently AWIPS I

San Juan - Collaborations

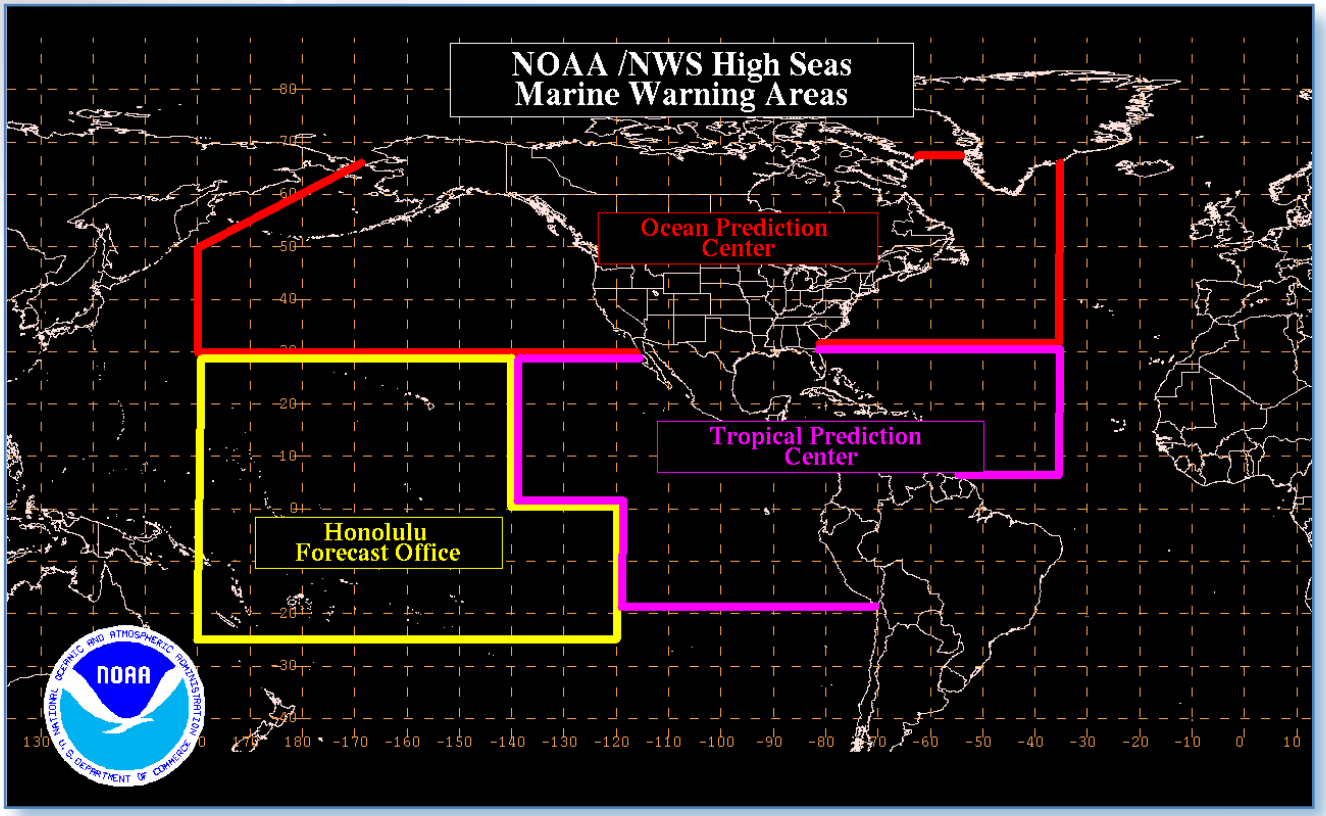
- QPE and LPW assessment (2013)
- Valuable QPE feedback
  - Results leading to updates by NESDIS
  - 12 hr accumulation
  - Lessons learned can be applied to Pacific Region
- Future Work
  - Products from eventual direct broadcast
  - Identify RGBs most applicable to operations
  - Possible site visit



12 hr QPE accumulation

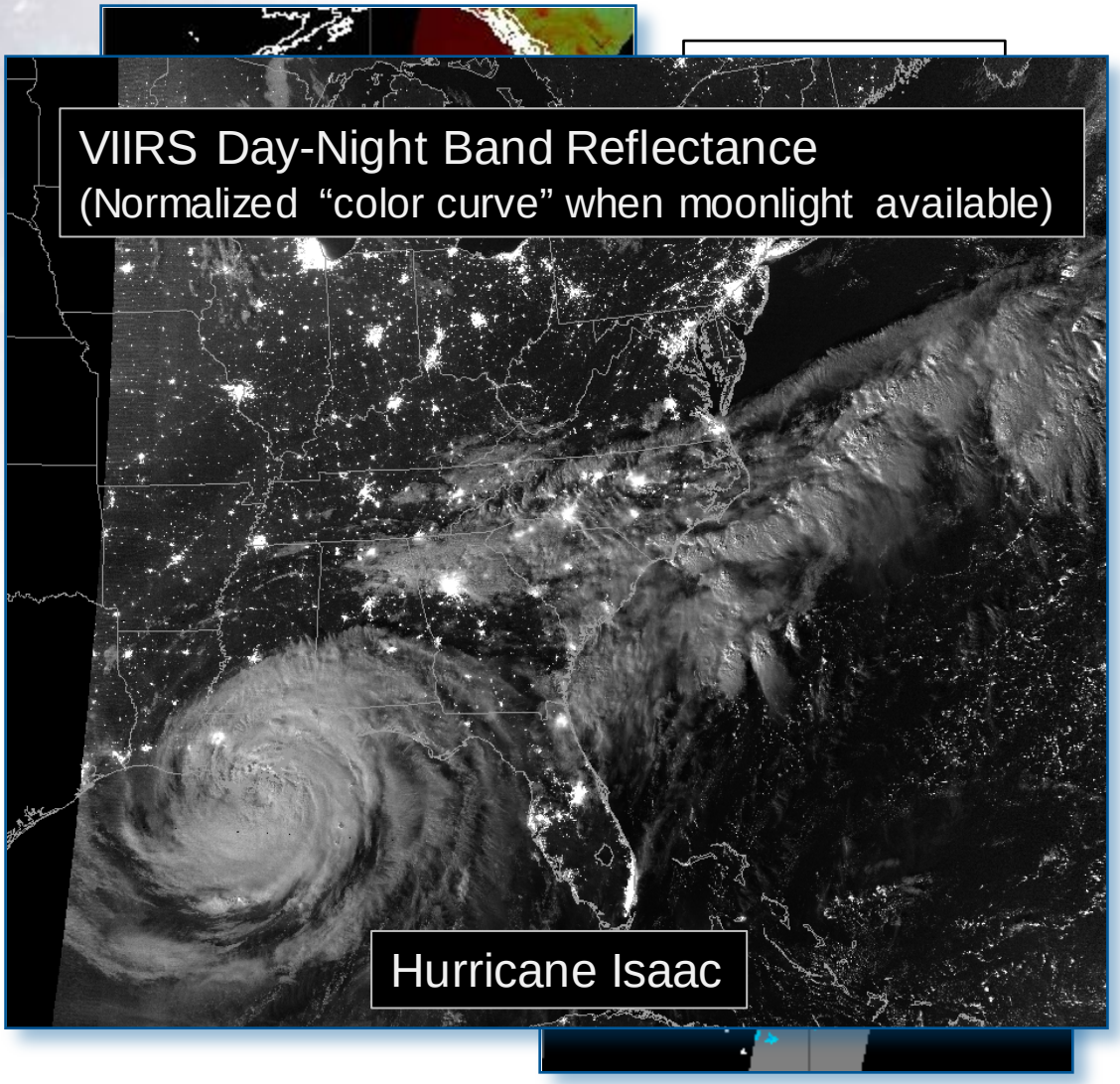
National Centers – Features

- Massive, data sparse domains
- N-AWIPS displays
- Where to get data?

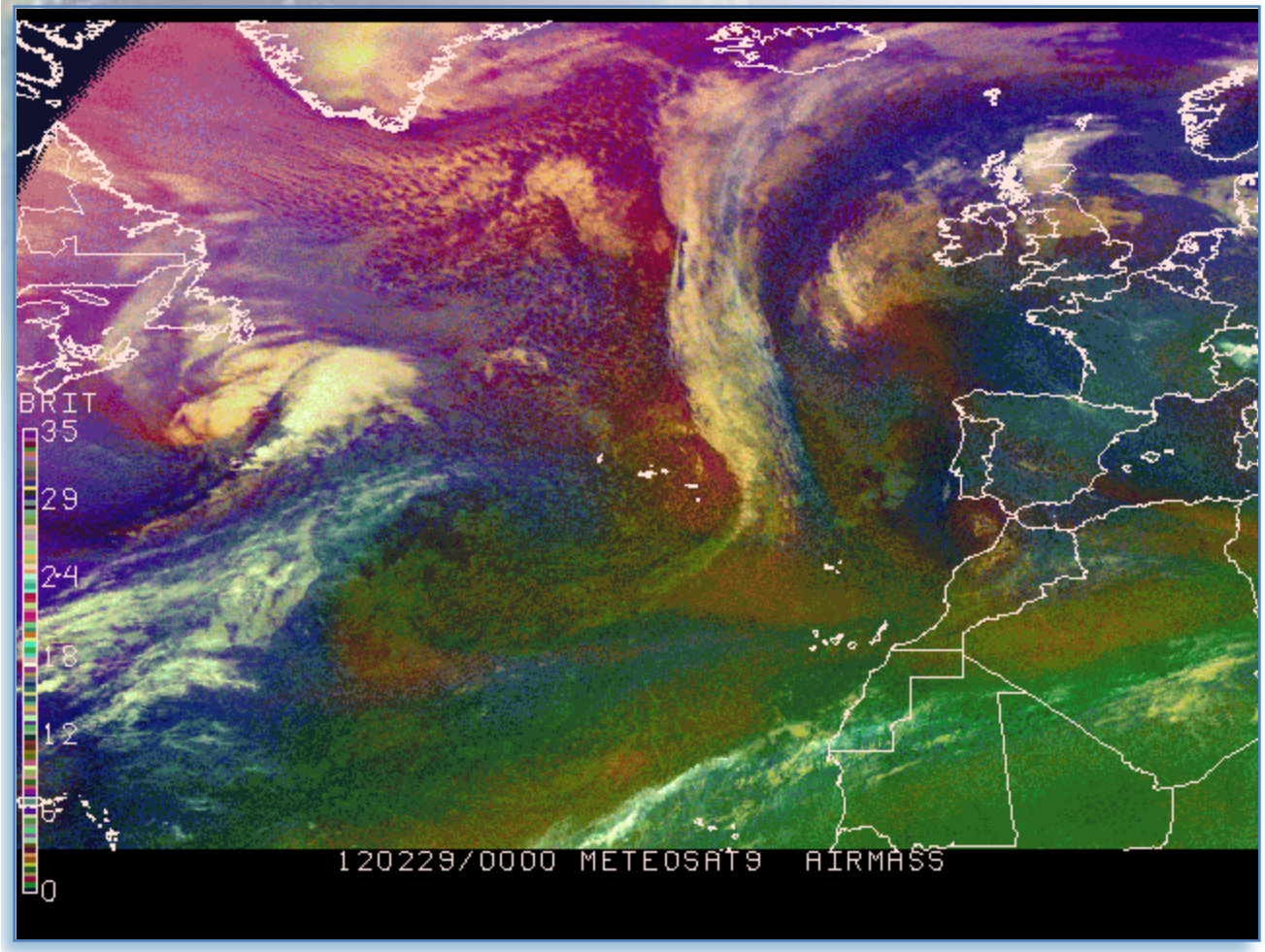


National Centers

- Not a "traditional" OCONUS partner
- Illustrate other instruments
- OPC / WPC / NHC
- Passive Microwave
  - Support GOES-R / JPSS beyond current uses (e.g., RGBs, QPE, and CI)
  - Opportunity for fusion
- VIIRS day-night band reflectance



National Centers

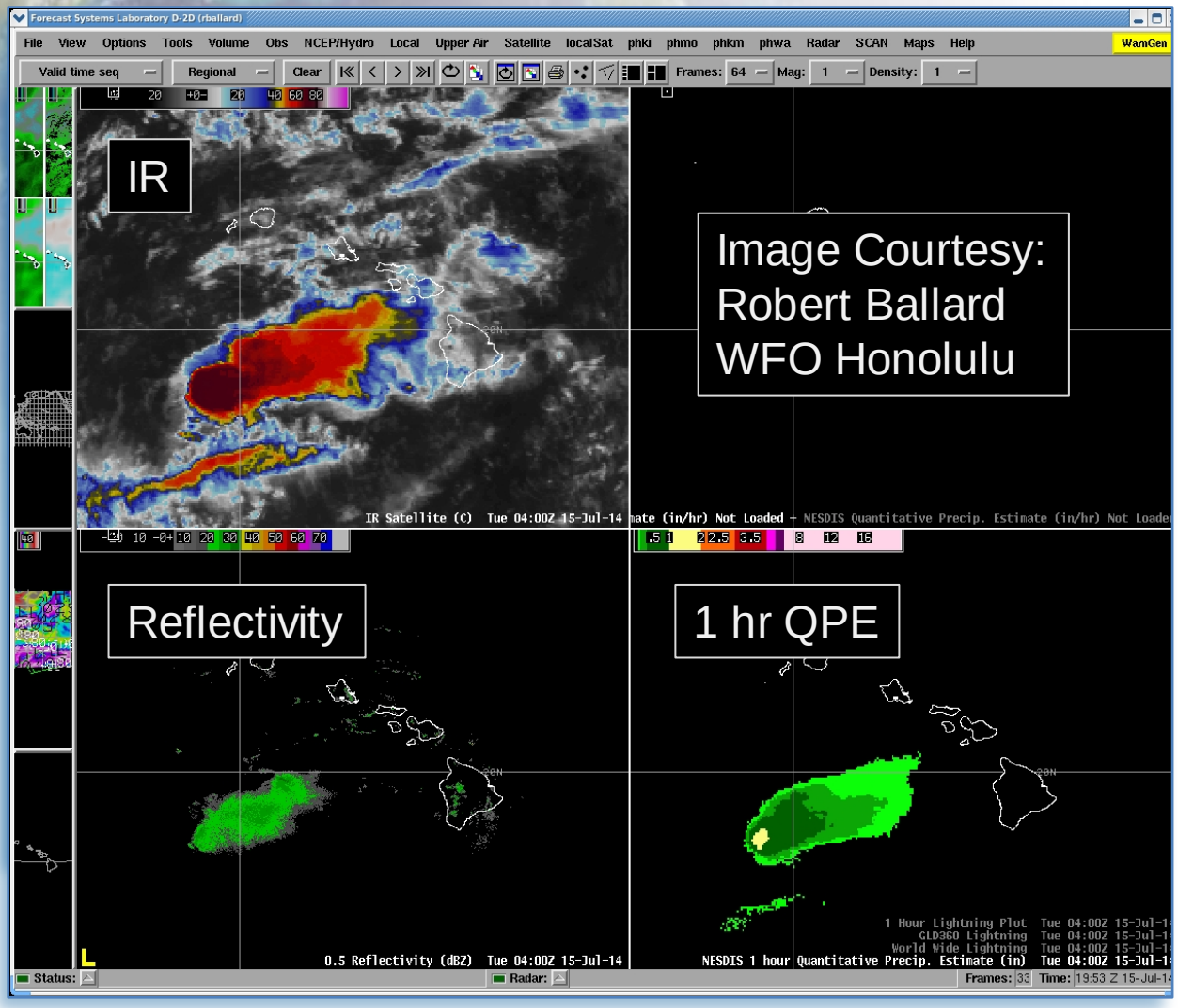


- SEVIRI RGBs in NAWIPS for Hurricane Center
- Airmass and Dust
- Recently transitioned GEO/LEO hybrids
  - VIS, IR, WV, SWIR

Pacific Region – Features

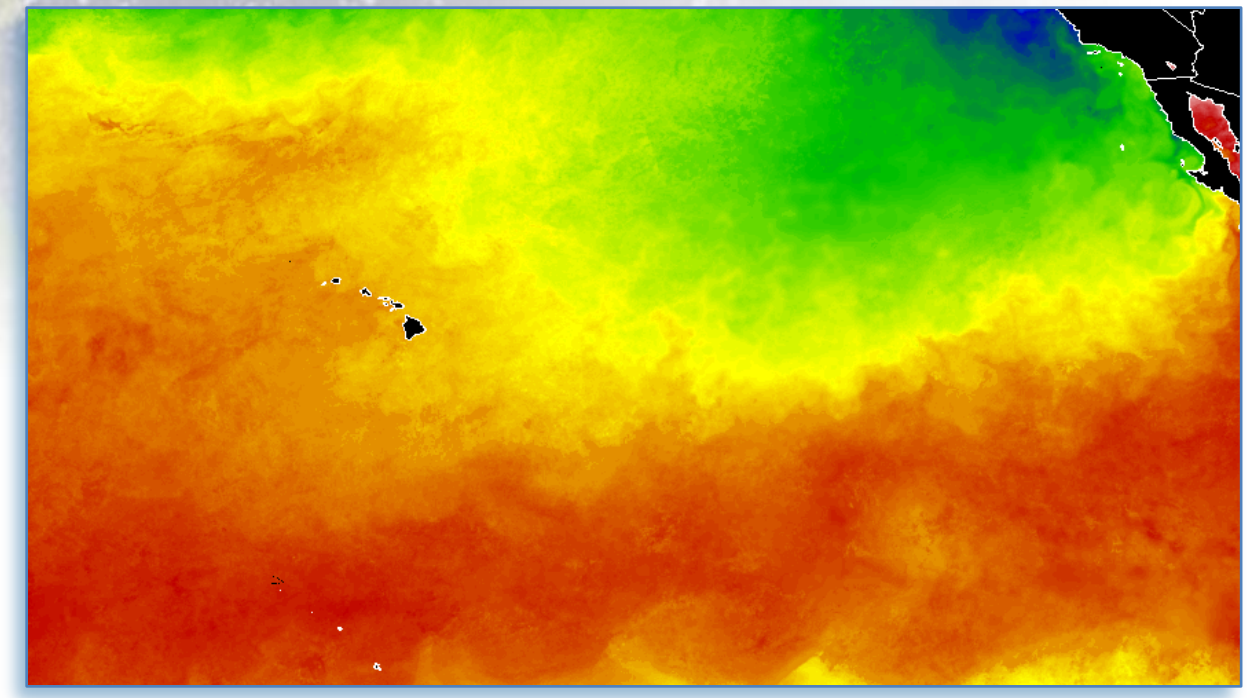
- Massive data sparse region
- WFO Honolulu and Central Pacific Hurricane Center combined
- Region best situated to take advantage of Himawari data
- Headquarters is AWIPS II
- WFOs are AWIPS I

Pacific Region – QPE Assessment



- Completed first VSP
- Region identified QPE as initial test
- Preparing local examples for additional training
- Recommendation:
  - Alter color to match radar precipitation rate curve
- Possible wet season evaluation

Pacific Region – Sea Surface Temperature

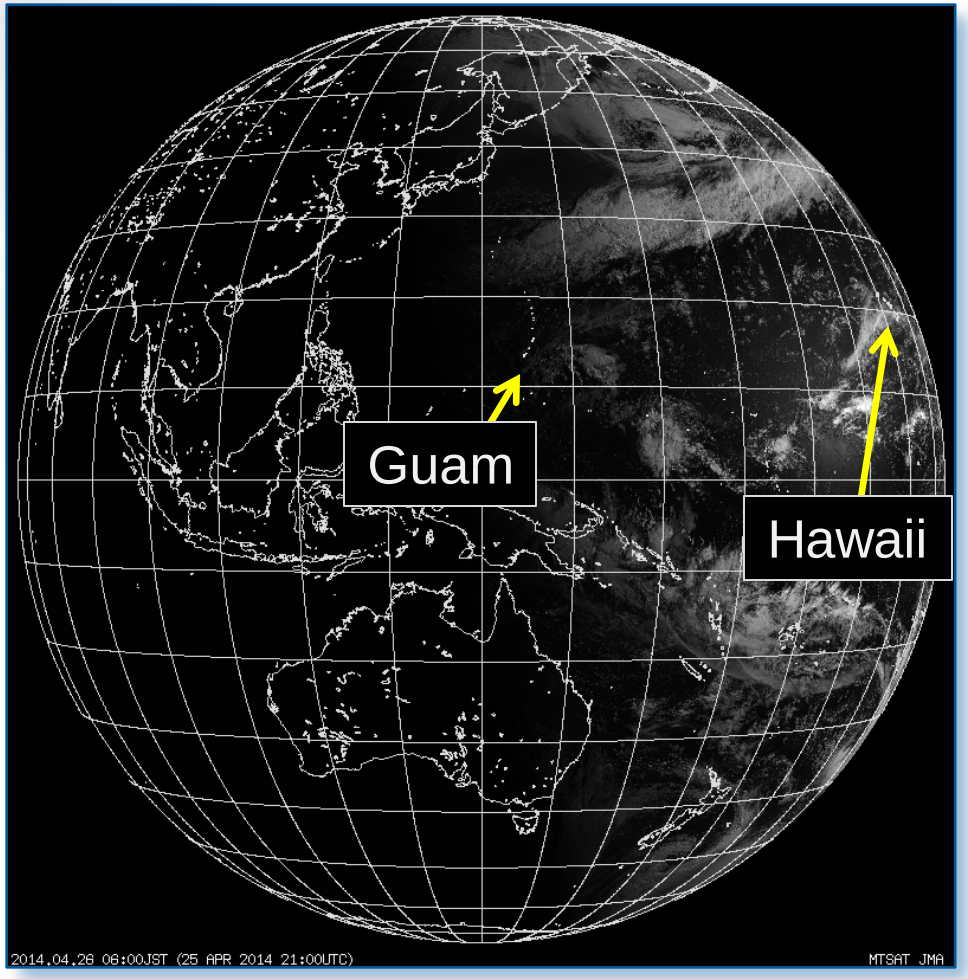


- SST Composite also transitioned
- Soon to include VIIRS
- Recently used at Central Pacific Hurricane Center
  - Tropical Storm Wali

Pacific Region – Himawari (AHI)

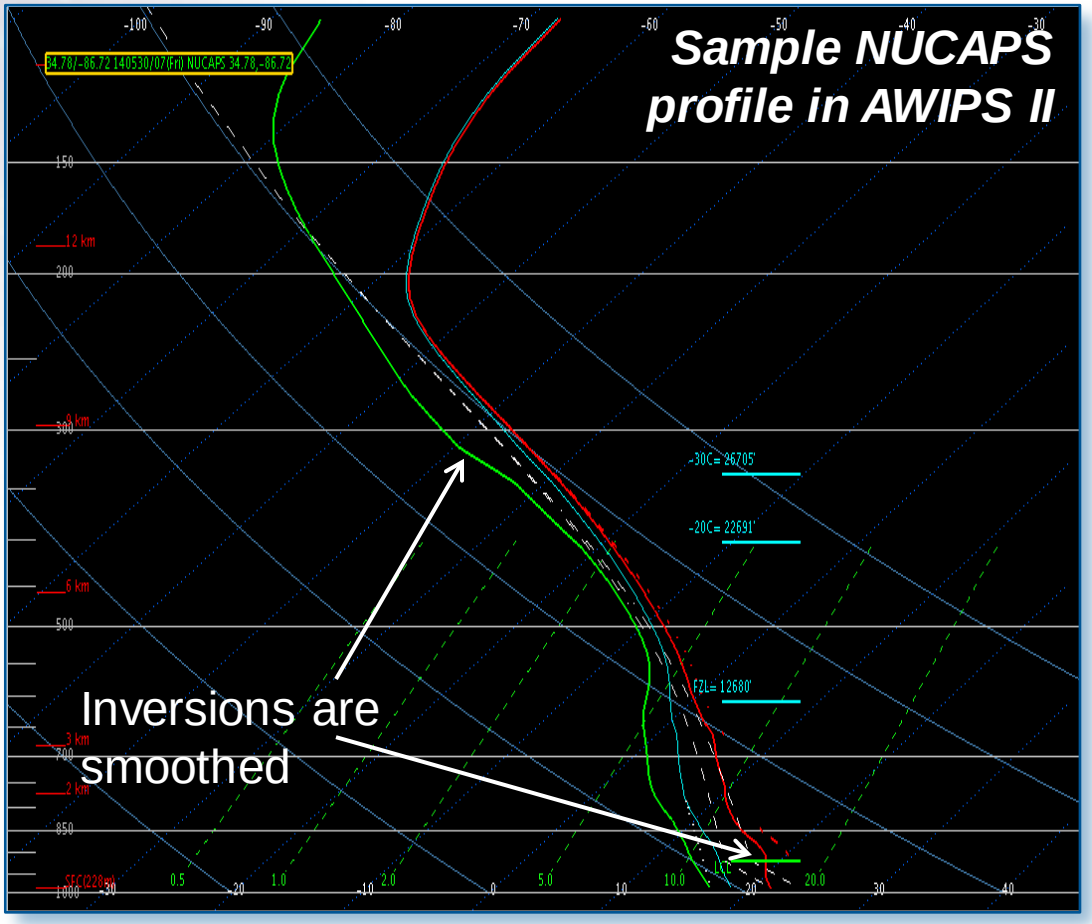
- Proposing as 2015 activity
- Fall 2014 launch
  - Very similar channels to ABI
  - Full res data from NESDIS in Spring 2015
- AHI is opportunity to expand collaborations with Pacific Region (e.g., WFO Guam)
  - Expand QPE / SST evaluations
  - Add other AWG, like CI
  - Aim for Fall 2015 evaluations
- RGBs can be transitioned
  - Situational awareness
  - Marine and aviation needs

Himawari Field of View

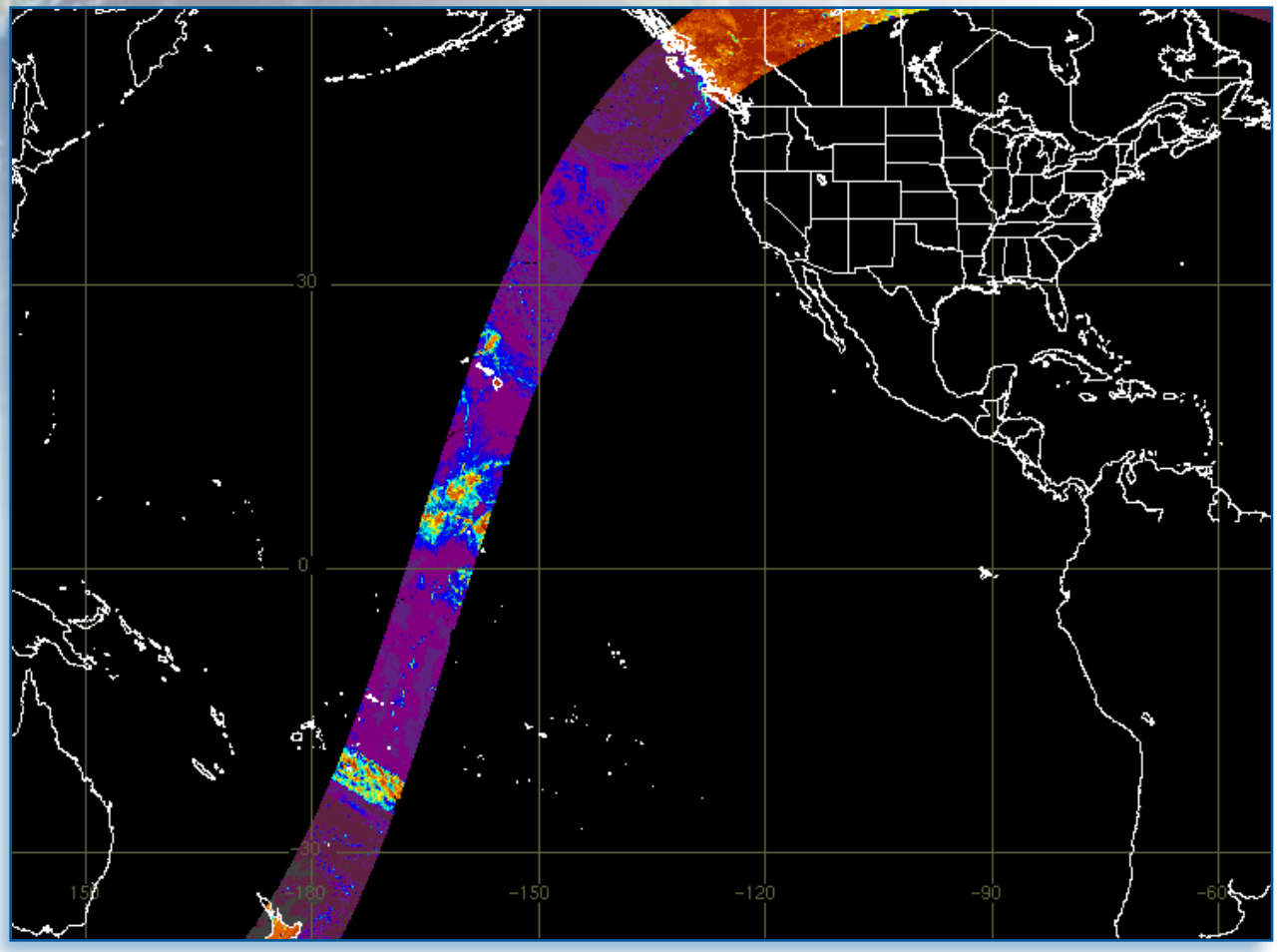


All Regions – Newest Activities

- Numerous OCONUS opportunities
- NUCAPS
  - Retrieved temperature and moisture from CrIS
  - Now in AWIPS II
  - Upcoming cross section tool in development
- RGB Sampling Tool
  - AWIPS II
  - Complement imagery
  - Show RGB contribution
  - “First guess” interpretation



All Regions - GPM



- Level 1B available
  - N-AWIPS / AWIPS / AWIPS II
- Level 2 rain rates
  - September
- IMERG end 2014
  - Global accumulation
- Opportunity
  - Integrate with GOES-R / JPSS products

All Regions – Looking Forward

- Continue to expand use of JPSS data
  - Investigate additional fusion options
  - More opportunities with additional direct broadcast sites
- Post launch of GOES-R
  - Evaluation of QPE / CI / other AWG products with ABI vs previous GOES
  - Training and integration of Geostationary Lightning Mapper
  - Training and integration of red-green-blue composites
  - Investigate additional fusion options (e.g., GOES-R and GPM)
- Apply lessons learned from Himawari evaluations
- Expansion of RGB use / evaluation with Pacific Region

Acknowledgements

- Many thanks to the entire SPoRT team who pulled together much of this information!
- Many thanks to the operational forecasters and satellite liaisons for their time, feedback, and critiques for all of the assessments!

Questions?

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