NASA SPoRT OCONUS Collaborations

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OCONUS R2O Interchange Meeting

Anchorage, AK

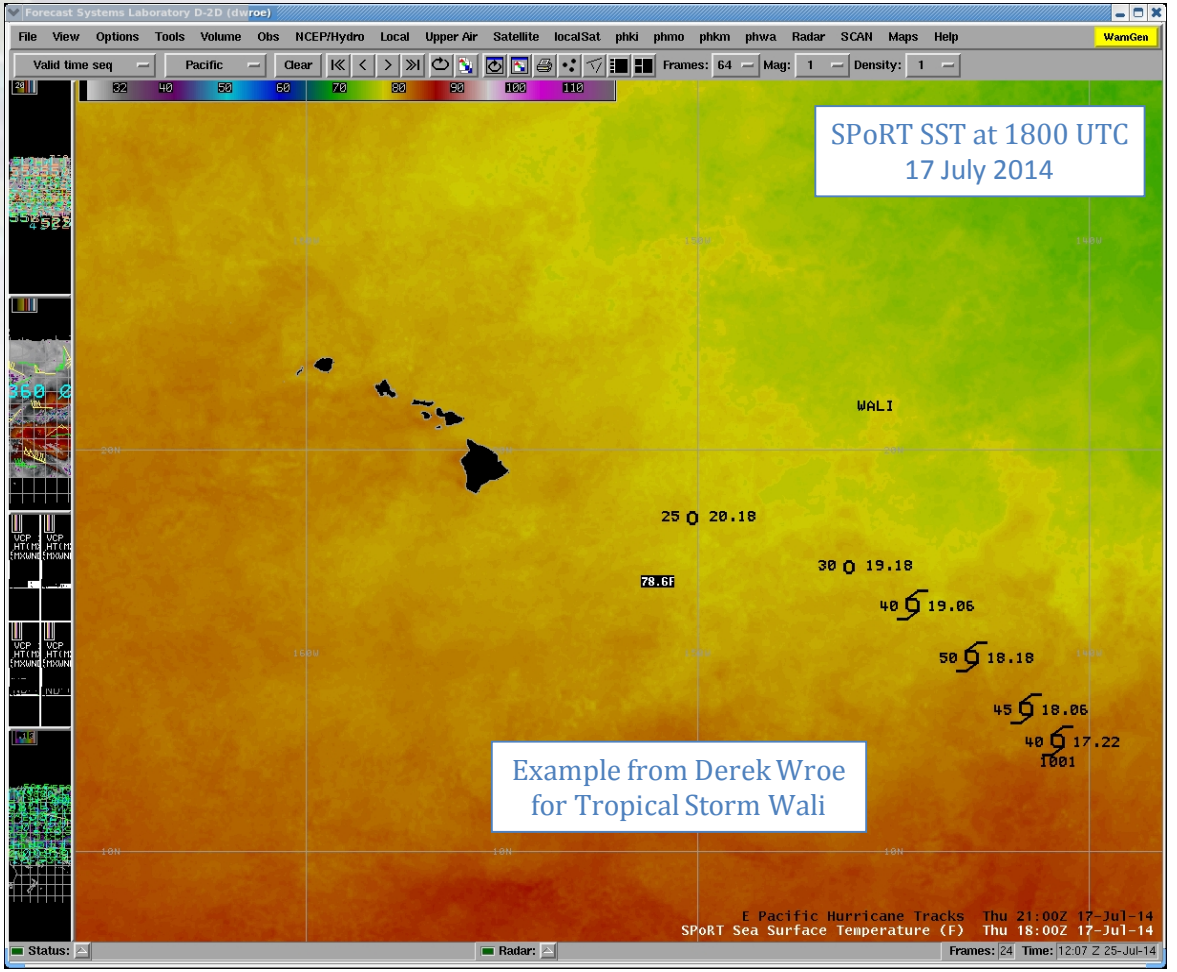
May 2015

Outline

- Recent/Ongoing and Potential Collaborations
  - SSTs at PR
  - Passive Microwave Rain Rates at PR
  - **Looking forward**—new calibrated GPM swaths transitioned to AK, PR
  - GOES-R QPE/LPW at AK WFOs, APRFC, SJU
  - GOES-R QPE at PR
  - **Looking forward**—GOES-R QPE using Himawari
  - RGBs at High Latitude 2014
  - RGBs at High Latitude 2015
  - **Looking forward**—24hr Micro in Summer in AK
  - SFR at High Latitude

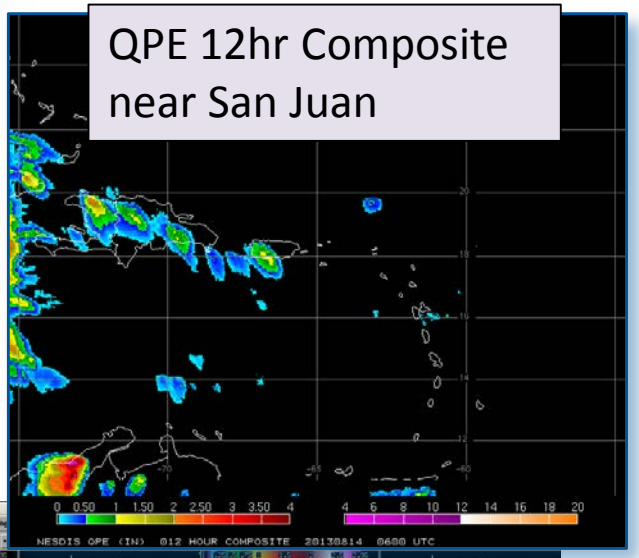
NASA SPoRT SST Composite

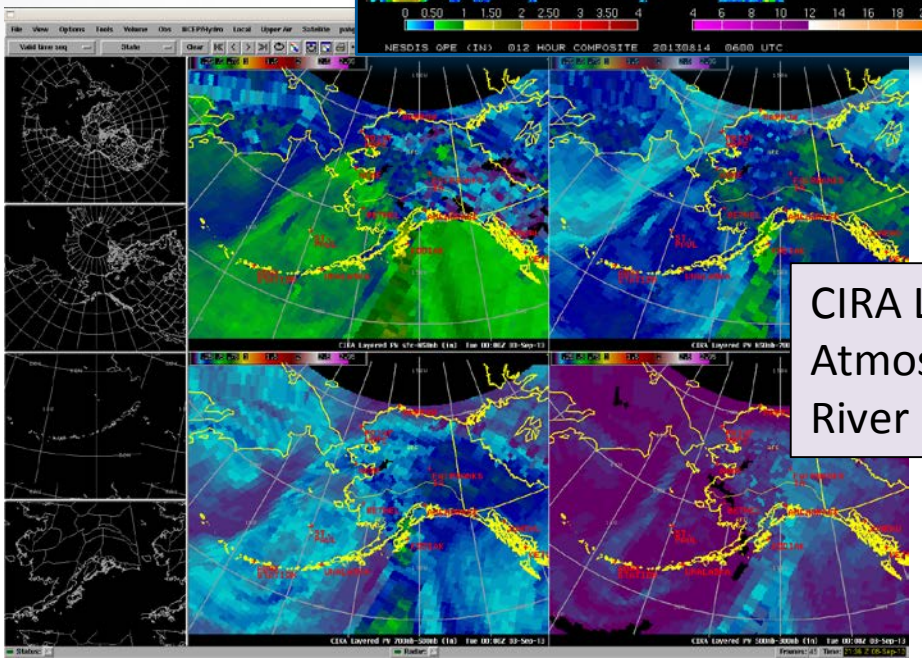
- Earliest collaboration with Pacific Region
- Temporal resolution (2 km) extremely popular with forecasters
- Supporting both local WFO and Central Pacific Hurricane Center operations
- Impact: Efficient analysis of SST gradients for tropical cyclone development



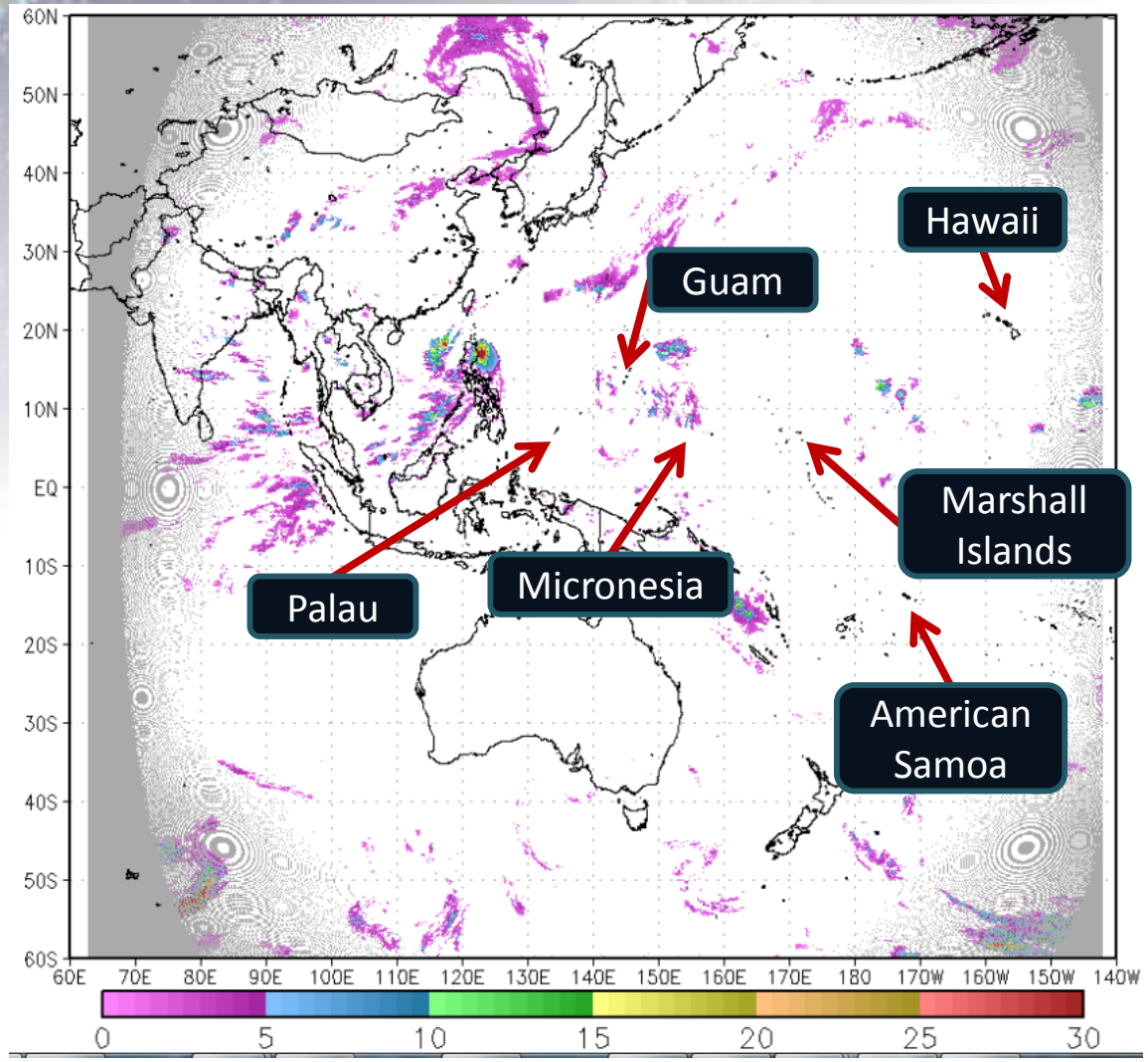
GOES-R QPE / CIRA Layered PW

- QPE major need for OCONUS
- GOES-R QPE (via NESDIS) transitioned
  - AK WFOs/RFC, San Juan, and West Coast WFOs evaluated 2013
  - PR users evaluated 2014
  - QPE proxy had limited value due, in part, to lack of channels from current GOES
- NESDIS planning AHI version of QPE for FY16
- CIRA Layered Precipitable Water using Passive Microwave was included with QPE transition
  - LPW includes use of ATMS
- QPE/LPW continue to be used in operations





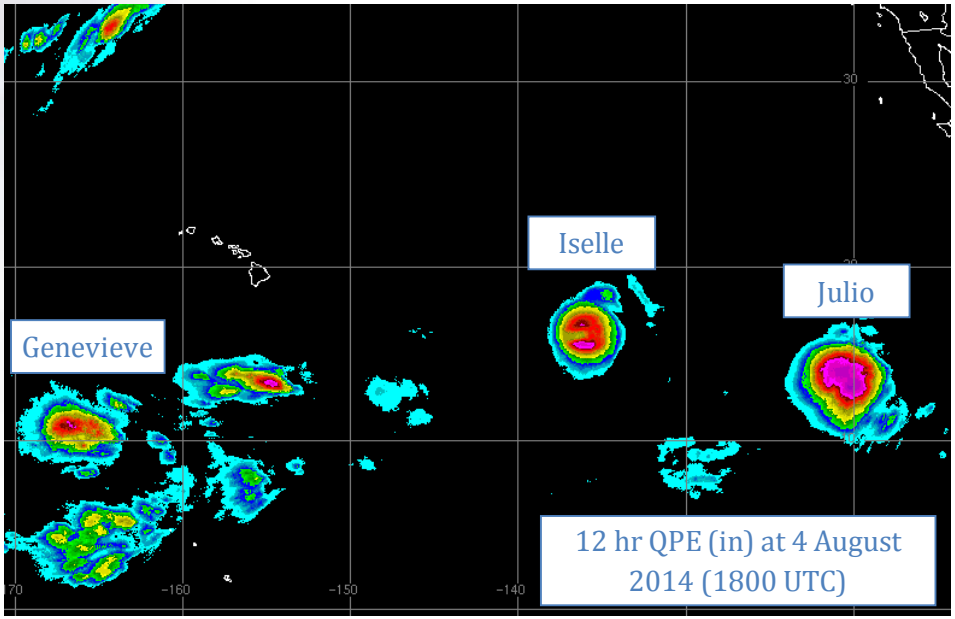
GOES-R QPE: Himawari Field of View

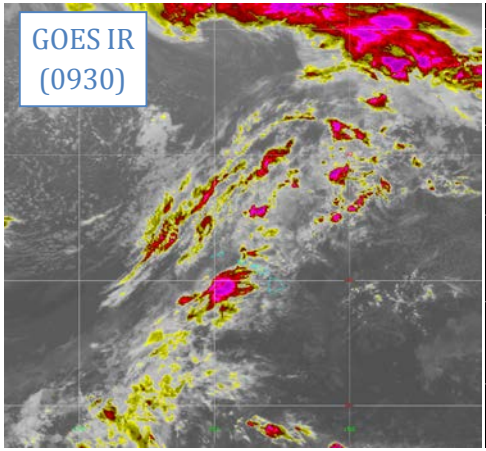


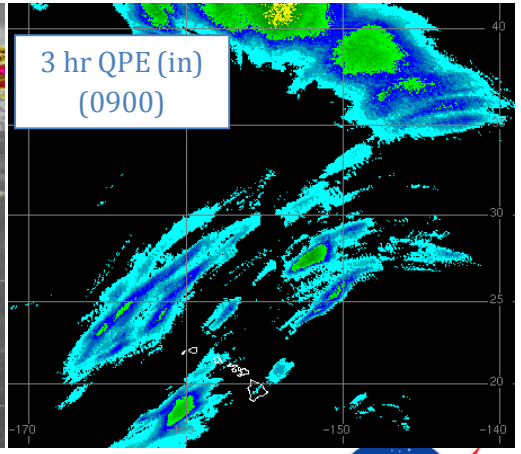
- Provided by Dr. Kuligowski (QPE developer)
- Demonstrates QPE field of view using pre-Himawari observations
- Himawari will cover several important Pacific Region sites
- Most lack radar coverage

2014 QPE Trial Details w/ PR Users

- Requested as initial product to review with Pacific Region
- Effort began in mid-2014 with visiting scientist
- Informal evaluation throughout summer of 2014
- Like San Juan, noted large underestimate
- Initial response is to wait for the Himawari version of the algorithm
- In spite of concerns, the Region is very interested in QPE for remote locations with no radar coverage

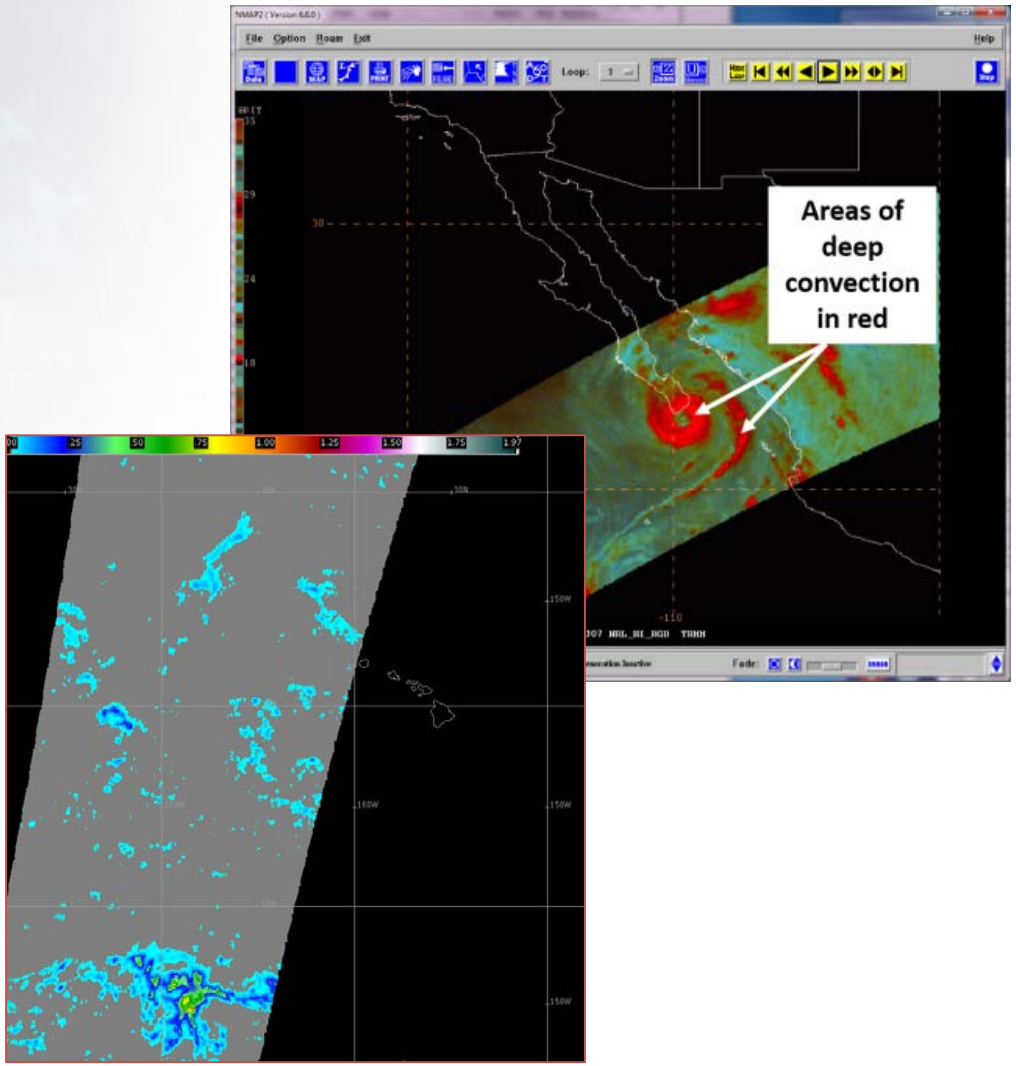






Passive Microwave Data With OCONUS

- SPoRT has AWIPS II bundle ready for Passive Microwave suite for OCONUS. Includes ATMS from S-NPP
  - 89GHz (H/V, RGB), 37GHz (H/V, RGB)
  - Rain Rate
- PM Suite from intercalibrated resource (GPM Constellation)
- NHC currently uses PM suite in N-AWIPS (since ~2012)
- PR/CPHC forecasters desired similar capabilities to NHC; SPoRT is ready to provide this to PRHQ for implementation
- July/August 2015 trial of GPM Rain Rain to include AK WFOs/RFC

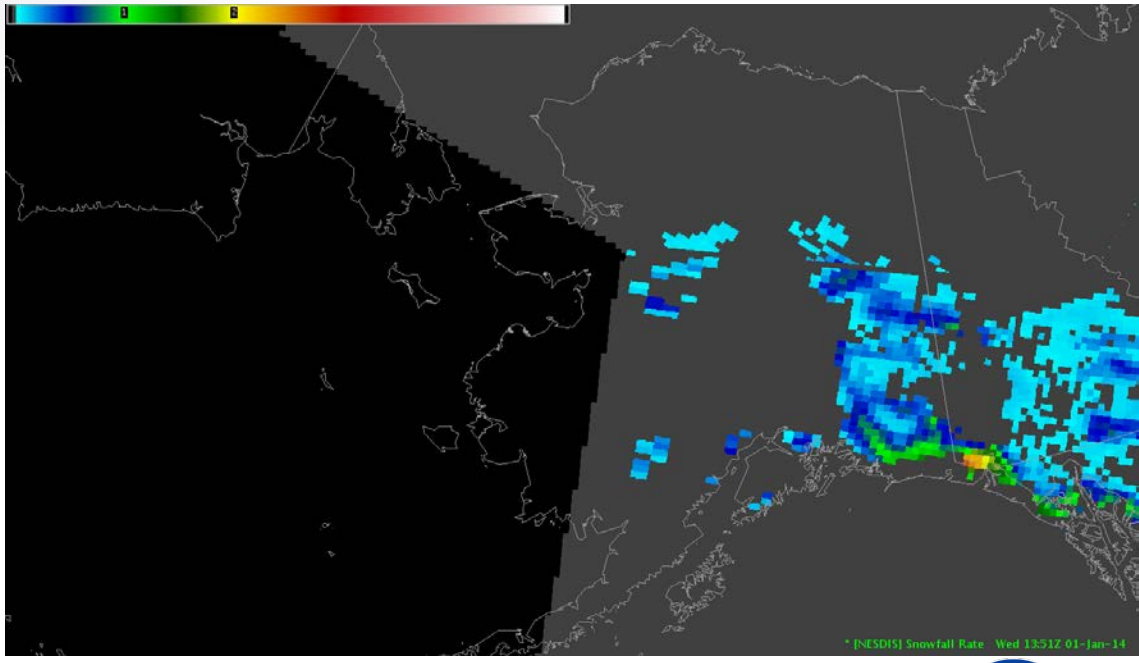


NOTE:
Upcoming … July/August 2015
Rain Rate w AK WFOs

- Not a strong PG issue
  - Only 89V from ATMS is available presently. No rain rate as part of the GPM constellation currently on our website. Frank to check if ATMS rain rate is on site w/ intercalibrated data

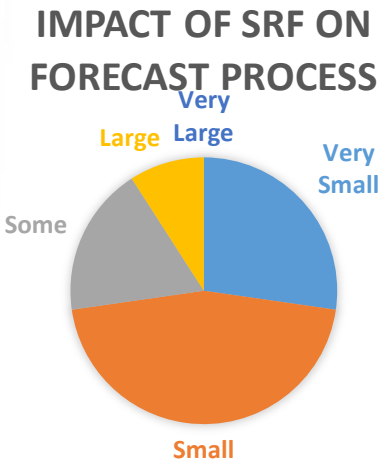
NESDIS SFR Fall/Winter 2015

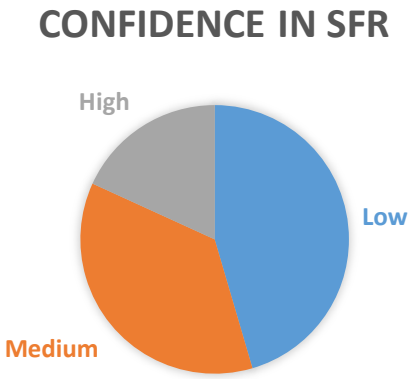
- Evaluated at AFC, AFG, AJK, BOU, BVT, SAB
- Uses passive microwave from ATMS (Suomi-NPP) and AMSU/MHS instruments to produce liquid equivalent snowfall rates
- Multiple polar-orbiting satellites result in nearly hourly data for AK
- Retrievals not valid where surface air temperature is below 7F

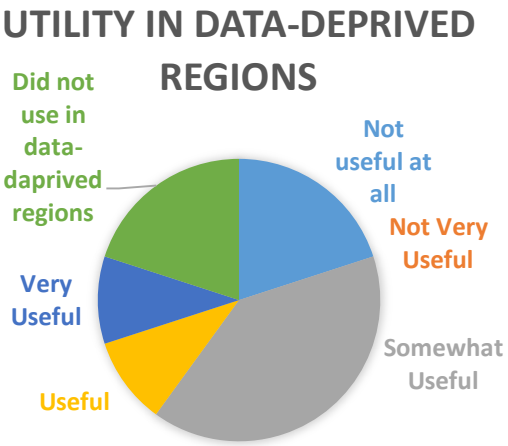


NESDIS SFR Feedback

- First demonstration in AWIPS II
- Lack of snowy weather and data display issues resulted in less assessable cases and less feedback overall
- In 75% of cases evaluated, SFR either slightly underestimated, slightly overestimated, or was about equal to observations
- SFR "seemed to have a really good handle on liquid rates…"
- "I like it and hope to use it more with bigger events."
- "Not enough passes to fill in the [radar] gaps."
- "Resolution is not good enough for mountains and snow bands."



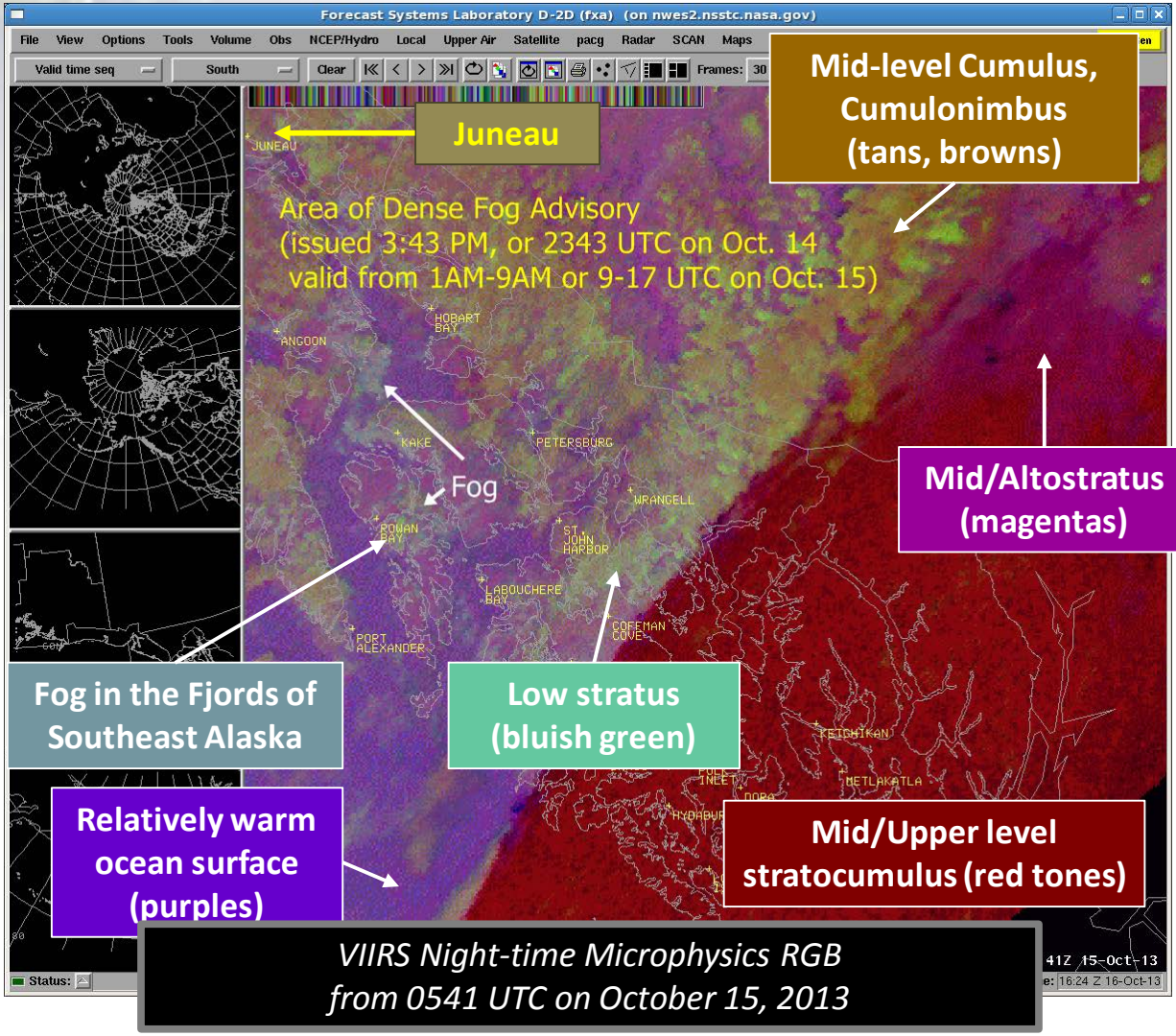




RGB Imagery Assessment: High Lat. 2014

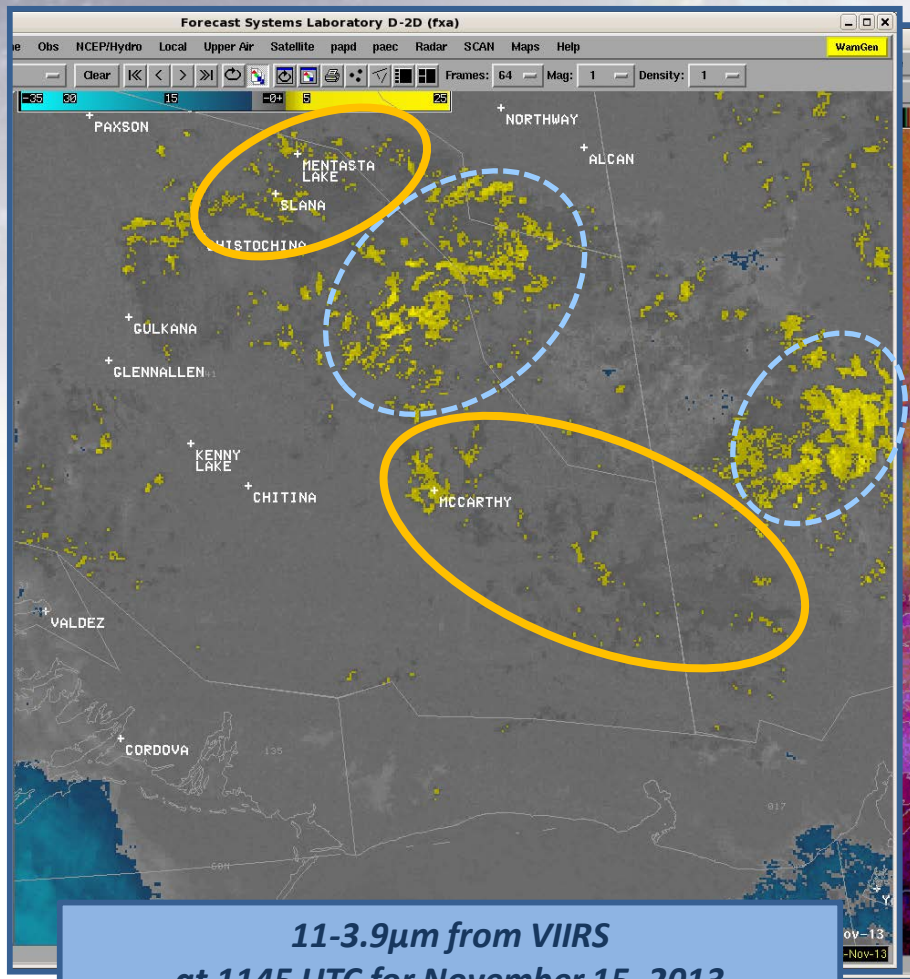
(Focus: Aviation Hazards and Cloud Analysis)

- Jan/Feb 2014
- Nighttime Microphysics and Day-Night Band RGBs
- Compare to traditional GOES 11-3.9µ difference, in hybrid GEO/LEO form
- 32 Evaluated events from AK WFOs and Medford/Great Falls
- Objectives:
  - Expose users to RGB imagery and test value
  - Can RGBs help to differentiate low cloud features?
  - Are TAFs impacted?

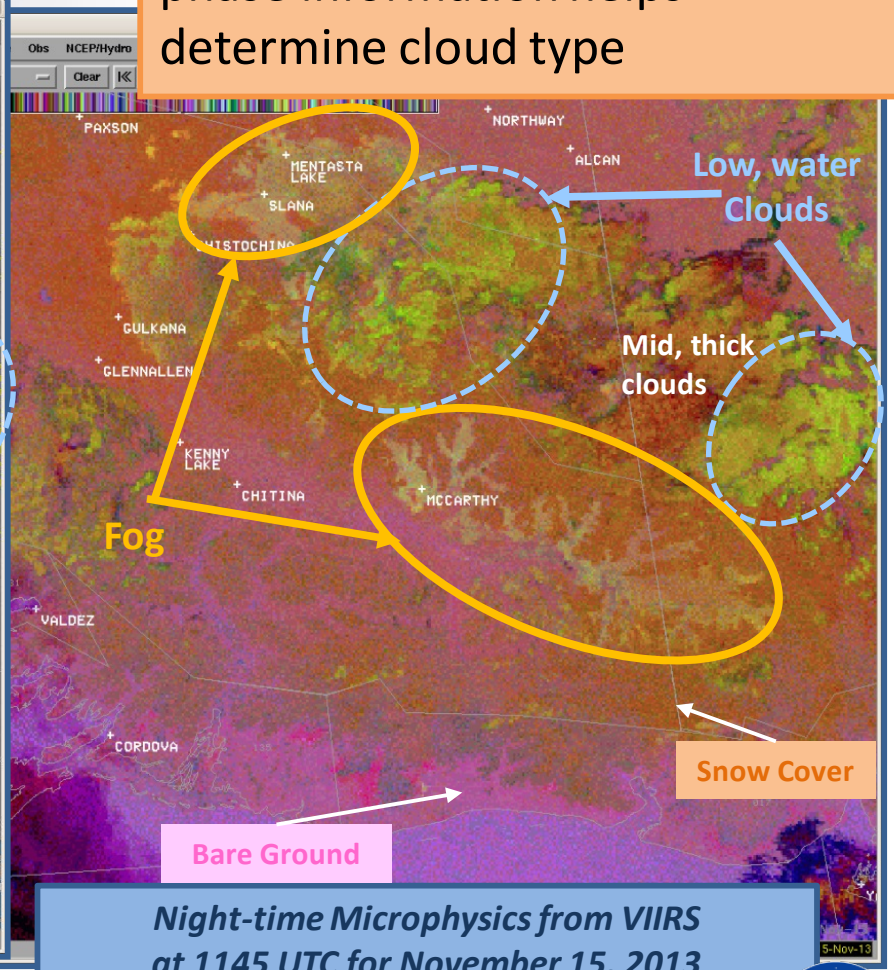


McCarthy, AK Training Module Example:
Low Cloud vs. Fog

Additional thermal and particle phase information helps determine cloud type



11-3.9µm from VIIRS at 1145 UTC for November 15, 2013



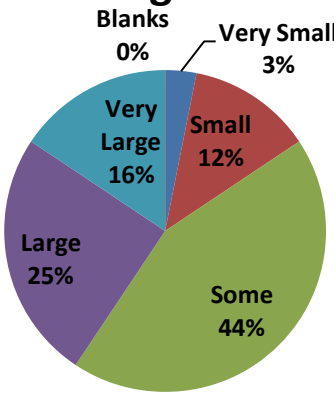
Night-time Microphysics from VIIRS at 1145 UTC for November 15, 2013

Jan/Feb 2014 RGB Assessment – User Comments

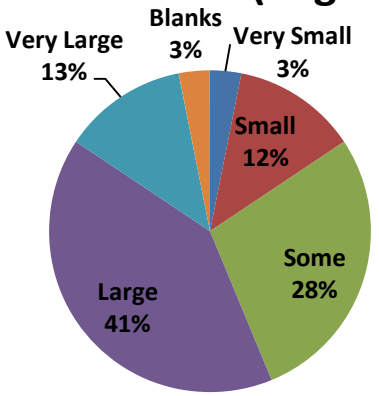
- *"[…]Using the [NtMicro] RGB in conjunction with the Hybrid 11-3.9 µm imagery provided a clearer picture on which was fog/stratus and which was mid-level."*
- *"…the microphysics image was very helpful in picking out where the fog and low clouds were in the complex terrain"*
- *"…the microphysics image was very helpful with figuring out fog for zone and marine forecasts."*
- *"Tonight, was able to discern the low clouds from the fog using the RGB imagery. This also allowed me to narrow my area for the dense fog advisory for this morning"*

Jan/Feb 2014 Overall Feedback Results

Impact of NtMicro RGB to Differentiate Fog from Low Cloud



Impact of NtMicro RGB to Aviation Forecast Issues (in general)

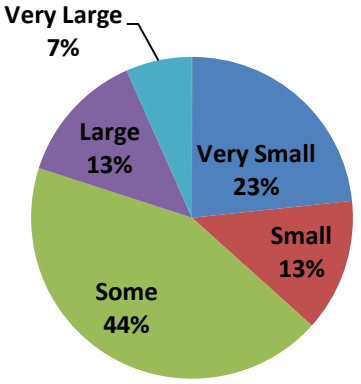


Other issues:

- In scenes with -20C, stratus and fog appeared similar
- Availability of RGBs was infrequent and NtMicro will be limited during AK summer

Hence, 24hr Micro RGB for 2015

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

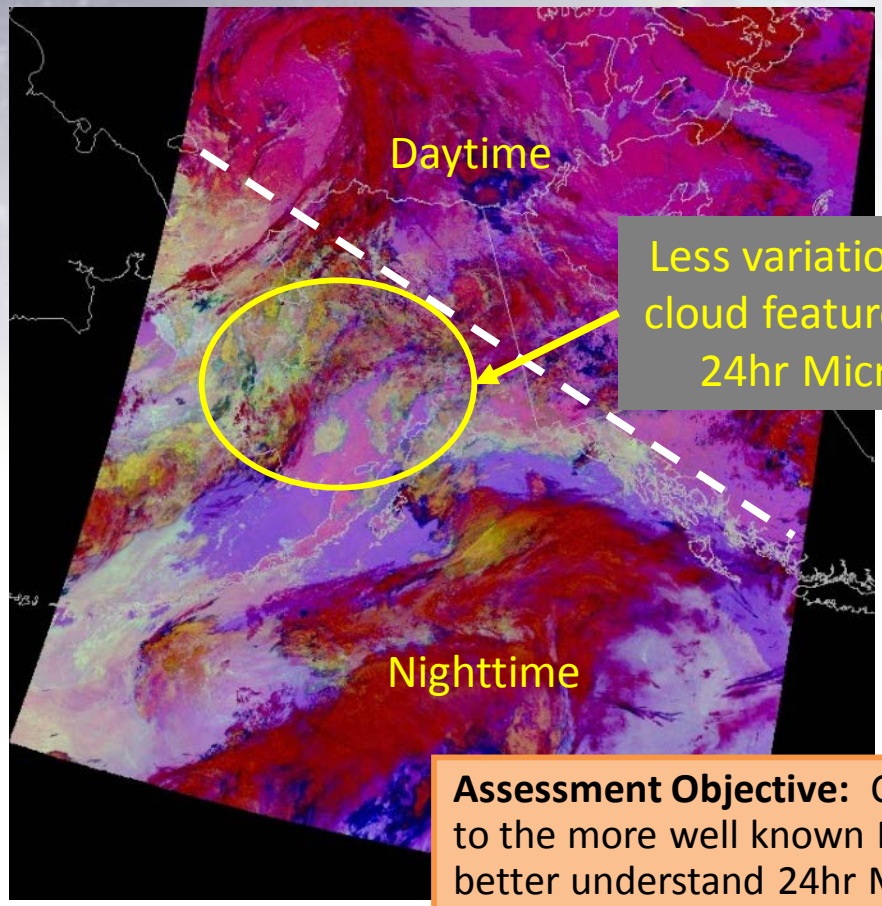


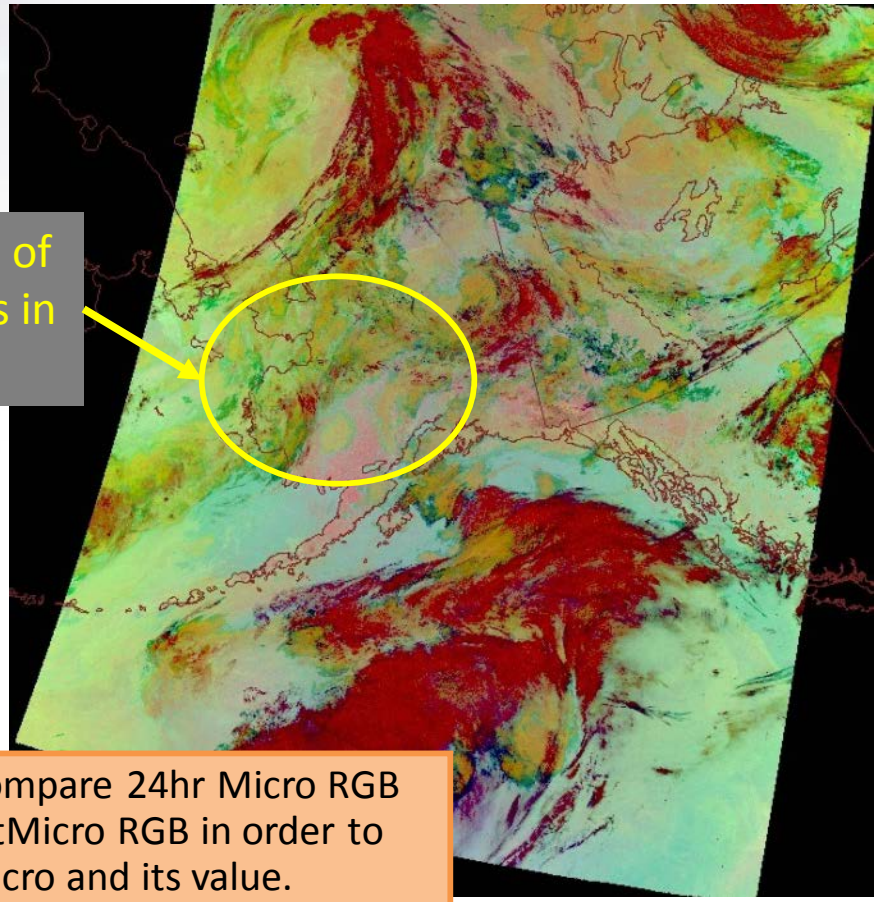
2015 RGB Assessment w AK

(Focus: Aviation Hazards and Cloud Analysis)

Nighttime Microphysics

24-hr Microphysics



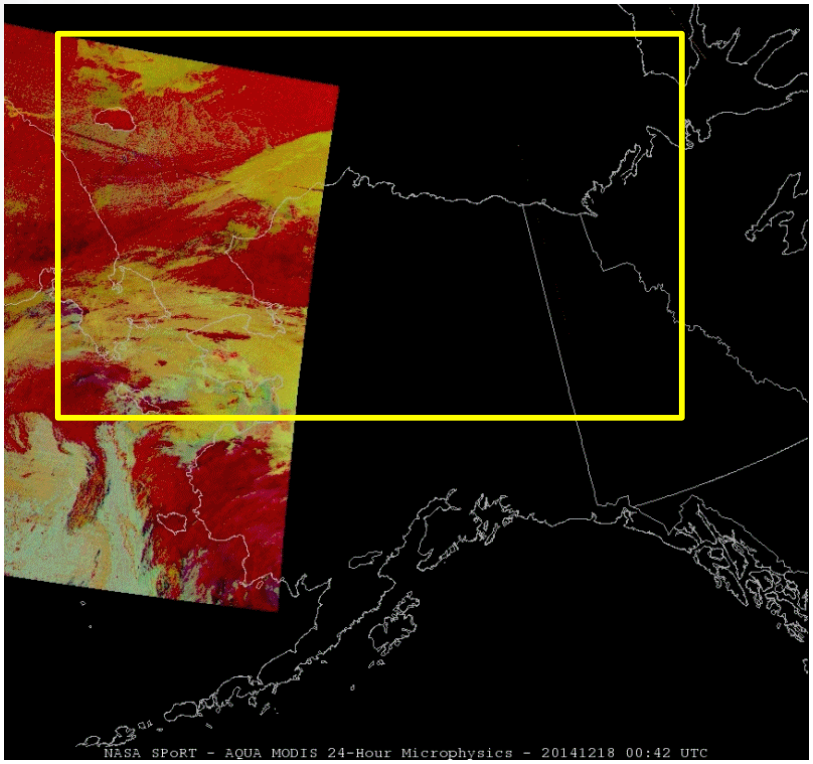


Less variation of cloud features in 24hr Micro

Assessment Objective: Compare 24hr Micro RGB to the more well known NtMicro RGB in order to better understand 24hr Micro and its value.

24hr Micro RGB at High Latitudes
(Winter 2015)

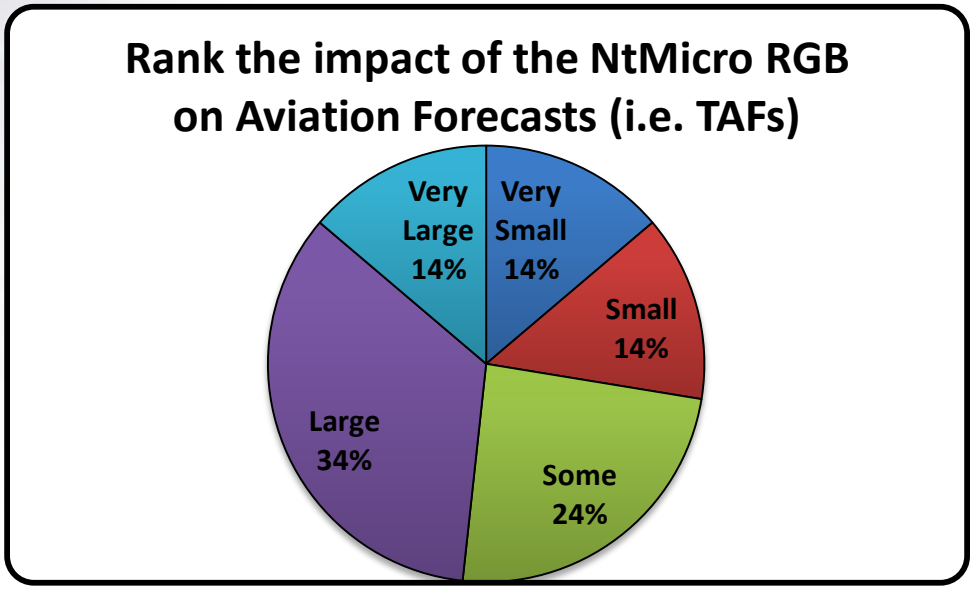
- Product allows for use imagery both day and night.
- Frequency of polar orbiter data in AK provided coherent imagery for weather systems (Focus on region inside yellow outline)
- 24 hours of data shown using both VIIRS and MODIS
- Cloud objects can be tracked and anticipated to impact TAF sites (user input)

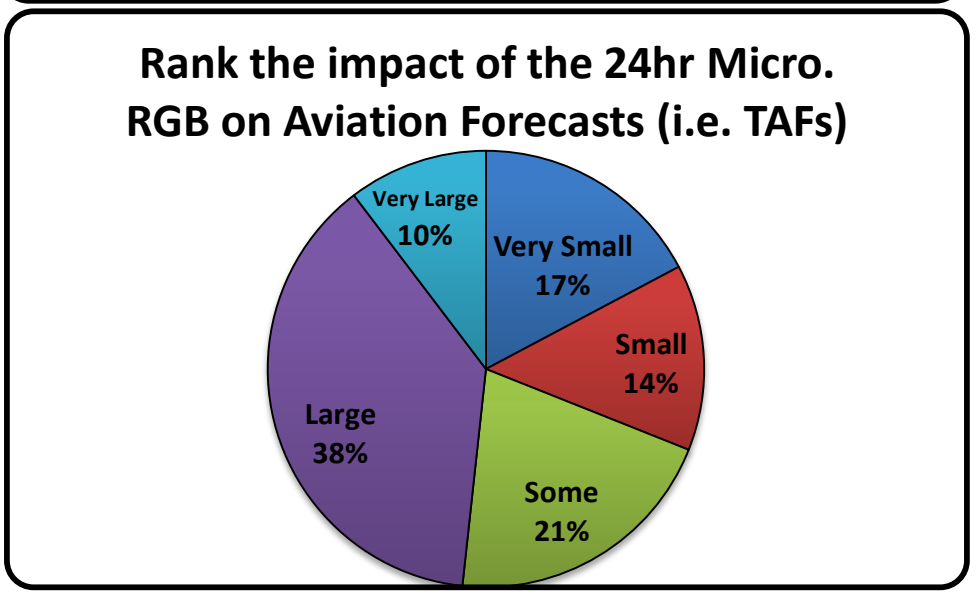


Jan/Feb 2015 Assessment Results

Nighttime vs 24hr Micro. RGB in AK

- User feedback indicated similar impacts. Therefore, 24hr Micro. may have analogous value and be used in place of NtMicro.
- ~28 submitted user evaluations
- Several user comments indicated TAF adjustments were made based on imagery use.
- Fairbanks forecaster uses imagery during briefing to next shift and regularly sites it in AFD
- At times 24hr RGB lacks contrast to other clouds/sfc





24hr Micro RGB Impact on TAF

1/28/15 User Feedback Example for Bethel, AK

- "Two images of the 24-hr microphysics clearly delineated the cloud deck and gave some idea of its movement."
- "Based on this knowledge, simply added a TEMPO group to the Bethel TAF for MVFR conditions."

Verification of MVFR ceiling

```
PABE  AA 28 2153Z FEW041 BKN110          10      -1  -8 01022G27  018  71% -26  27
PABE  MP 28 2248Z BKN029 BKN110          10      -2  -9 02024G28  020  71% -28
PABE  AP 28 2248Z BKN029 BKN110          10      -2  -9 02024G28  020  71% -28  28
PABE  AA 28 2253Z BKN029 BKN110          10      -2 -10 02019      019  68% -25
PABE  MP 28 2324Z BKN034 BKN120          10      -2  -9 02020G26  019  71% -26
PABE  AP 28 2324Z BKN034 BKN120          10      -2 -10 02020G26  019  68% -26  26
PABE  AA 28 2353Z BKN038 BKN120          10      -2 -10 02017      020  68% -24
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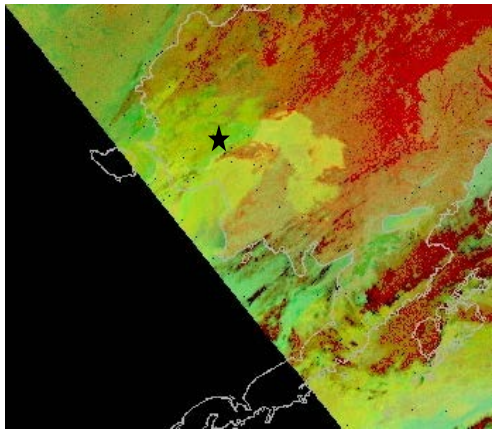
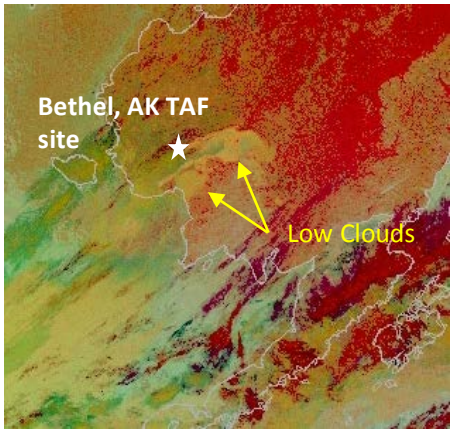
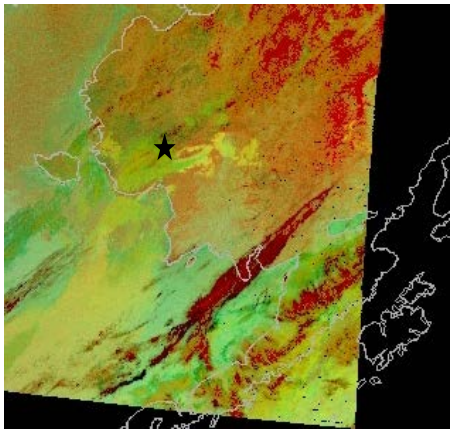


2115 UTC



2254 UTC



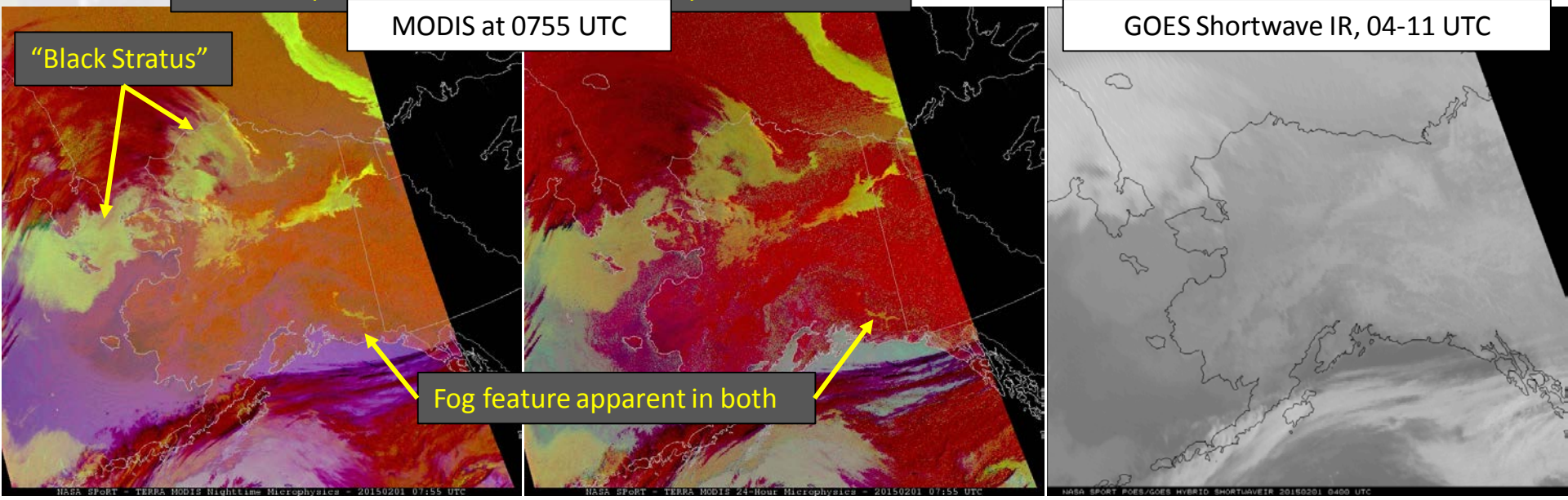
0038 UTC

NtMicro vs 24hr Micro vs GOES

February 1, 2015 Fairbanks WFO Feedback

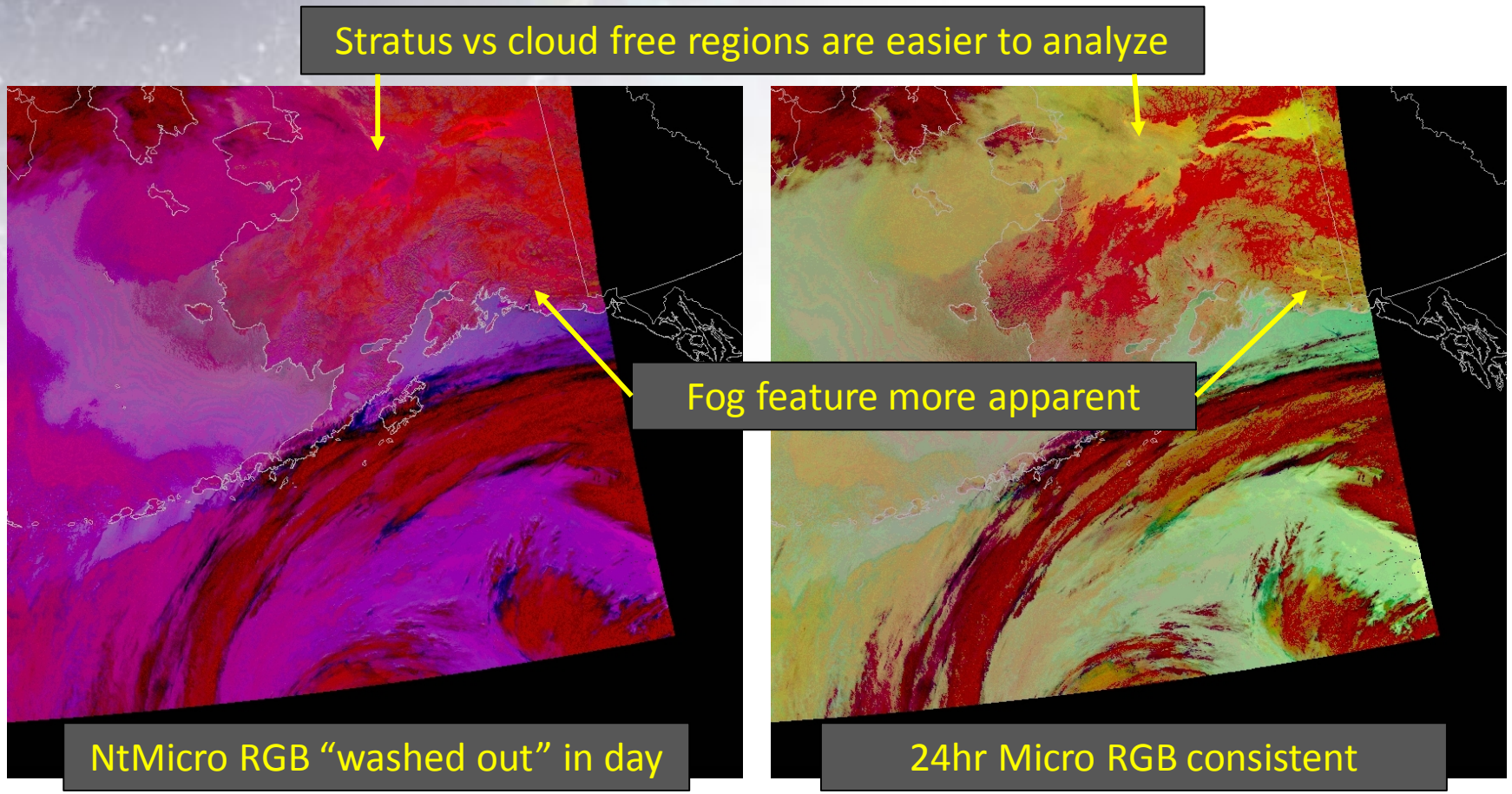
"This [24hr Micro] has been an excellent product to use with black stratus that developed over the west coast and arctic. it was particularly helpful for the TAFs in those areas as the model guidance gave no indication of clouds moving into the area...but by using this product I could project the stratus slowly moving east into other areas."

Can learn from nighttime comparison of cloud objects what to expect from 24hr Micro during daytime



Earlier, on January 31 (Daytime)

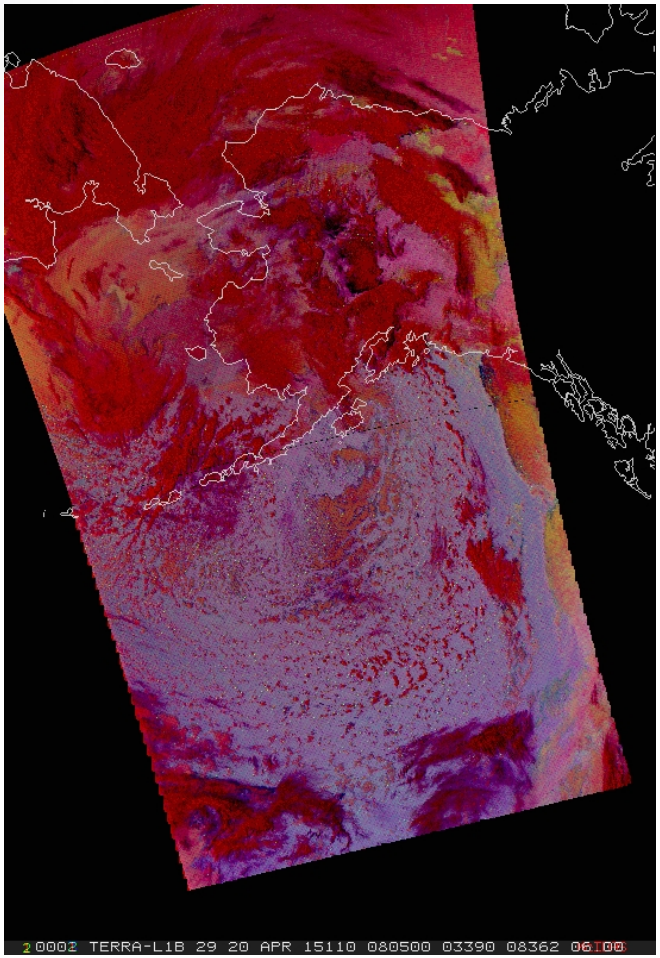
Nt vs 24hr Micro RGB from VIIRS at 2338 UTC



Upcoming … June/July 2015

24hr Micro AK Summer Assessment

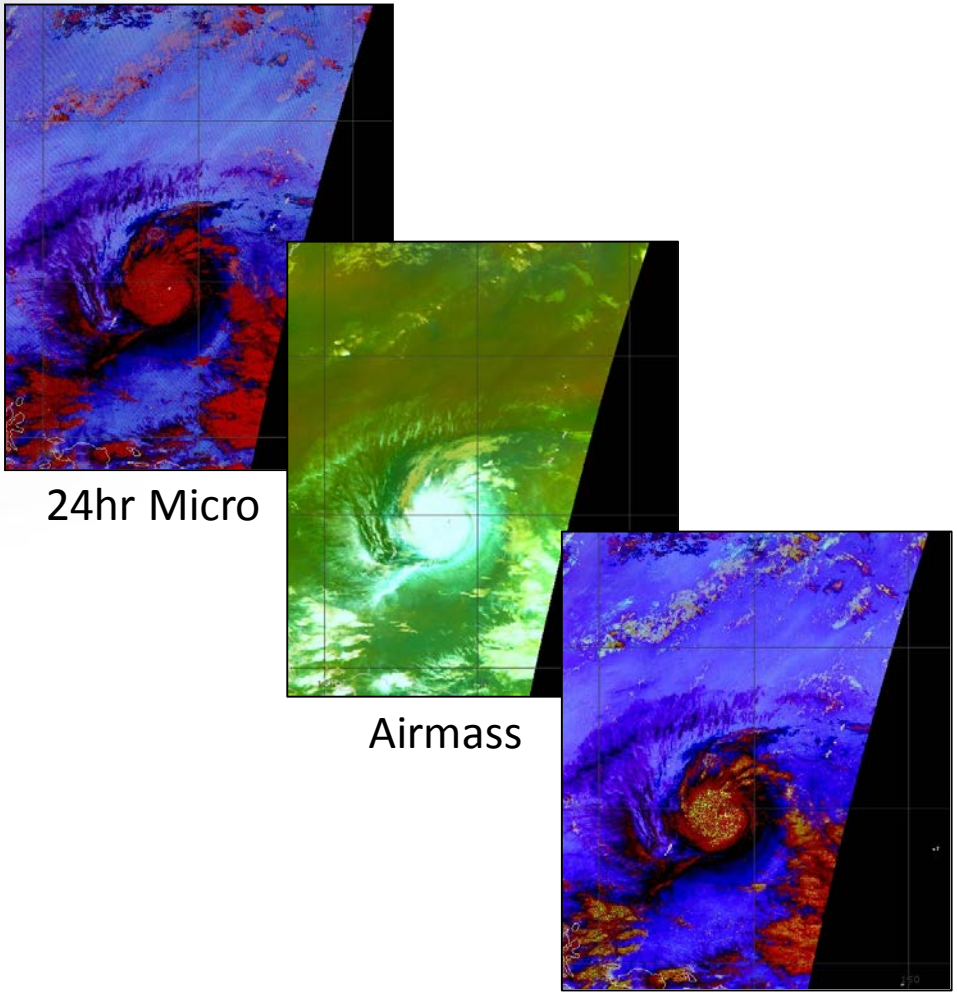
- Summer in AK -> lots of daytime
- 24hr Micro RGB will be useable more often than NtMicro RGB
- New “green” component stretch to data to improve contract between low clouds and ground features
- New limb/bias correction for MODIS and VIIRS for improved intercomparison
- Objective: Test if improved 24hr Micro RGB provides value to Aviation in High-lat. summer regime.



Upcoming … Transition of RGB Imagery to PR

Also applicable to AWC and OPC

- Objective: Provide NRT proxy AHI/ABI imagery to PR users as precursor to GOES-R
- SPoRT has data over Guam (via LANCE) and Hawaii (via DB access)
  - 24hr Micro., Nighttime Micro., Dust, Airmass RGBs
  - Other convective-related RGBs to be available
  - MODIS & VIIRS limb and bias corrected for intercomparison
  - May add AVHRR to suite in future (it can make several RGBs w limited channels)
- In AWIPS II, ready for transition



24hr Micro

Airmass

Nt Micro

Transition of Himawari RGB Imagery

- Once data is regularly available, provide RGB suite for use in PR and/or National Centers (AWC, OPC, and OPG)
- Insert AHI image here

Conclusions

- PR potential collaborations include passive microwave, Himawari RGBs (not shown), GOES-R QPE using Himawari.
- AK future collaborations include passive microwave and newly developed RGBs.
- Forecasters continue to find value in previously transitioned products