



# **2015 STAR ICVS**

## **Instrument Performance Review**

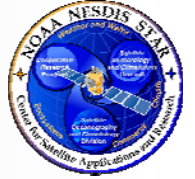
# **ICVS for a Weather-Ready Nation**

**Kenneth Carey**

May 8, 2015



# Weather-Ready Nation – Saving Lives



NOAA's Weather-Ready Nation is about building community resilience in the face of increasing vulnerability to extreme weather and water events.



Record-breaking snowfall, cold temperatures, extended drought, high heat, severe flooding, violent tornadoes, and massive hurricanes have all combined to reach the greatest number of multi-billion dollar weather disasters in the nation's history.



## STAR Scientists – Excellence in Enterprise Support



The devastating impacts of extreme events can be reduced through improved readiness, which is why the Weather-Ready Nation initiative is so important. NOAA is transforming its science and operations to help America respond. In the end, emergency managers, first responders, government officials, businesses and the public will be empowered to make fast, smart decisions to save lives and livelihoods. STAR and its satellite science expertise supports this.

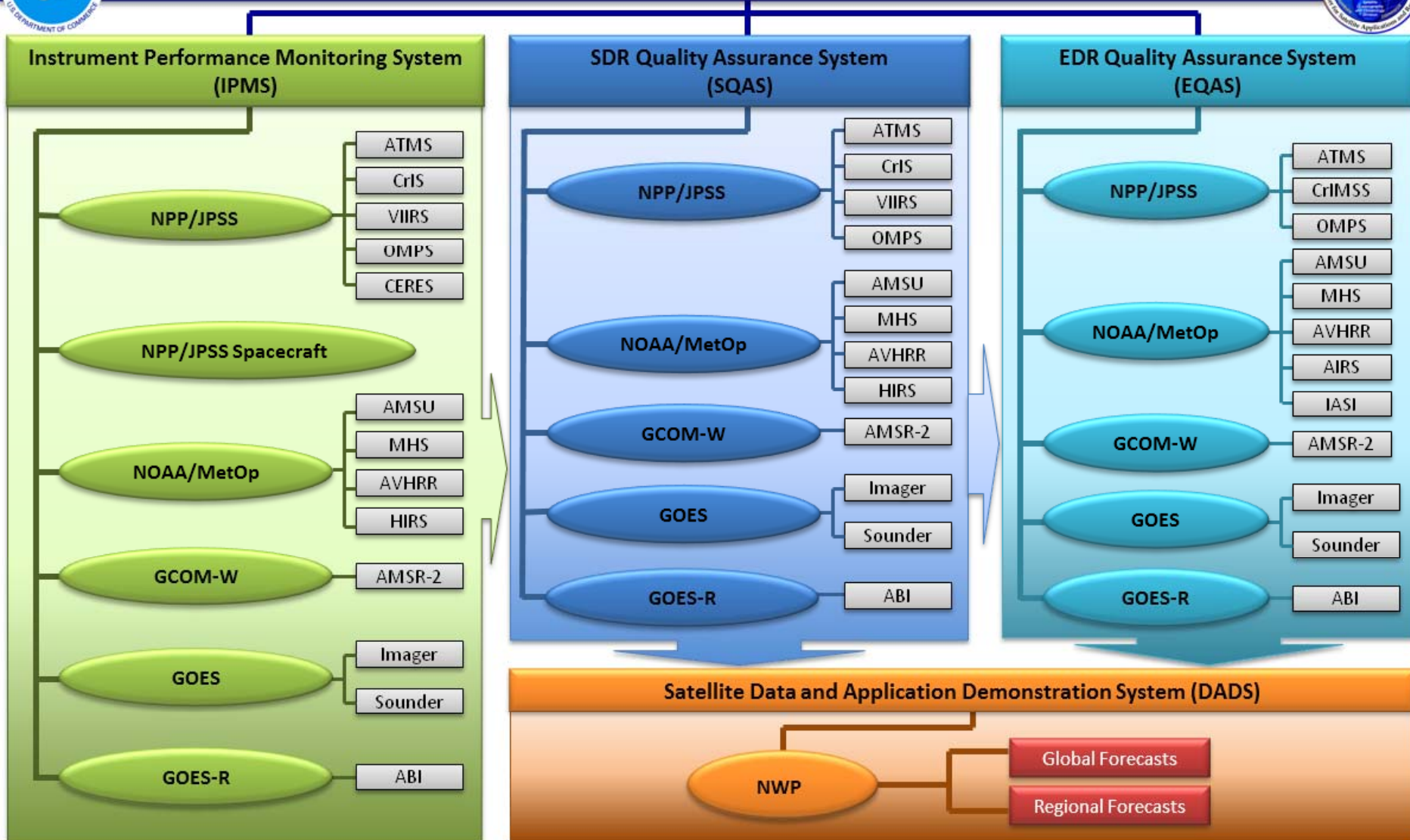




# STAR ICVS – Weather-Ready Information

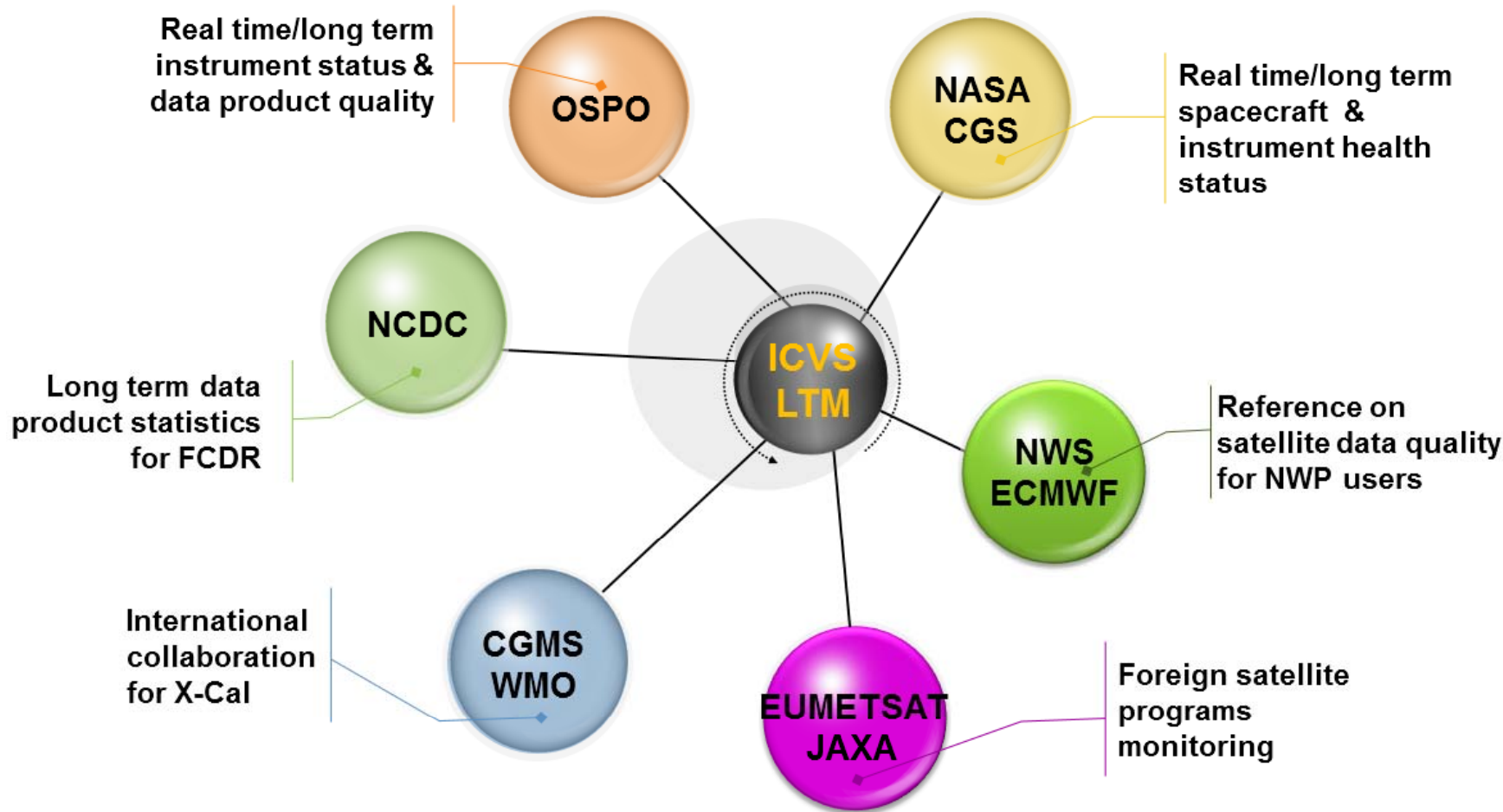


## NOAA/NESDIS/STAR Integrated Cal/Val System (ICVS)





# STAR ICVS Users – Building Global Weather Resiliency



**NOAA STAR ICVS are now providing more parameters for applications by broader communities including NWP. It is a very powerful tool and should be set up as a gold standard for all the space agencies to follow in satellite instrument monitoring and trending** - Stephen English (ECMWF DA Head)





# STAR ICVS-LTM Information Gateway



LTM Parameters

Satellite/Instrument

Select Date

**STAR ICVS Long-Term Monitoring**  
 About the Suomi NPP ATMS Instrument  
 Instrument Status > NPP > ATMS  
 Slide Show of All Charts for Selected Date

Search

» STAR ICVS Home  
 » Operational Notices  
 • Notices Archive

» Instrument Performance Monitoring

- Suomi NPP
  - Spacecraft
  - **ATMS >>**
  - CrIS
  - VIIRS
  - OMPS Nadir Mapper
  - OMPS Nadir Profiler
  - OMPS Limb Profiler
- MetOp-B
  - AMSU-A
  - MHS
  - AVHRR
  - HIRS
- NOAA-19
  - AMSU-A
  - MHS
  - AVHRR
  - HIRS
- MetOp-A
  - AMSU-A
  - MHS
  - AVHRR
  - HIRS
- NOAA-18
  - AMSU-A
  - MHS
  - AVHRR
  - HIRS
- GOES
  - GOES-13 Sounder
  - GOES-13 Imager
  - GOES-15 Sounder
  - GOES-15 Imager
- DMSP
  - DMSP F17 SSMIS
  - DMSP F18 SSMIS
- » OMPS Product Demonstration Site

Select a parameter:  
 ATMS TDR Global Image

ATMS TDR Global Image Channel 1

Select a Date:  
 02-19-2015

**Suomi NPP ATMS TDR Ch.1 23.8 GHz QV-POL**  
 2015-02-19  
 Ascending

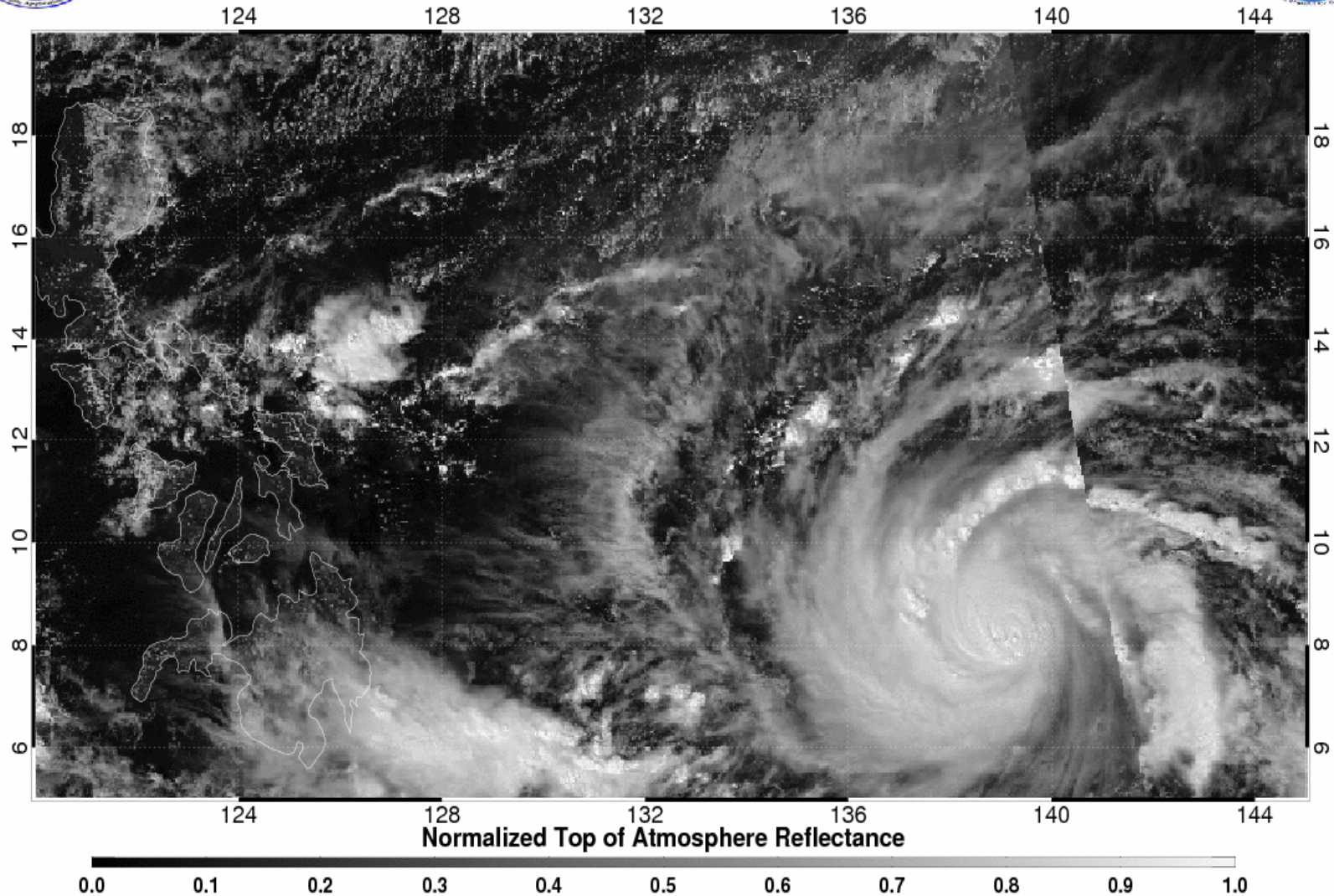
NOAA/NESDIS/STAR



# Work in Progress -- Image Animation



SNPP VIIRS Near Constant Contrast (Day Time)  
2014-12-03 Hagupit



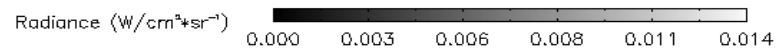
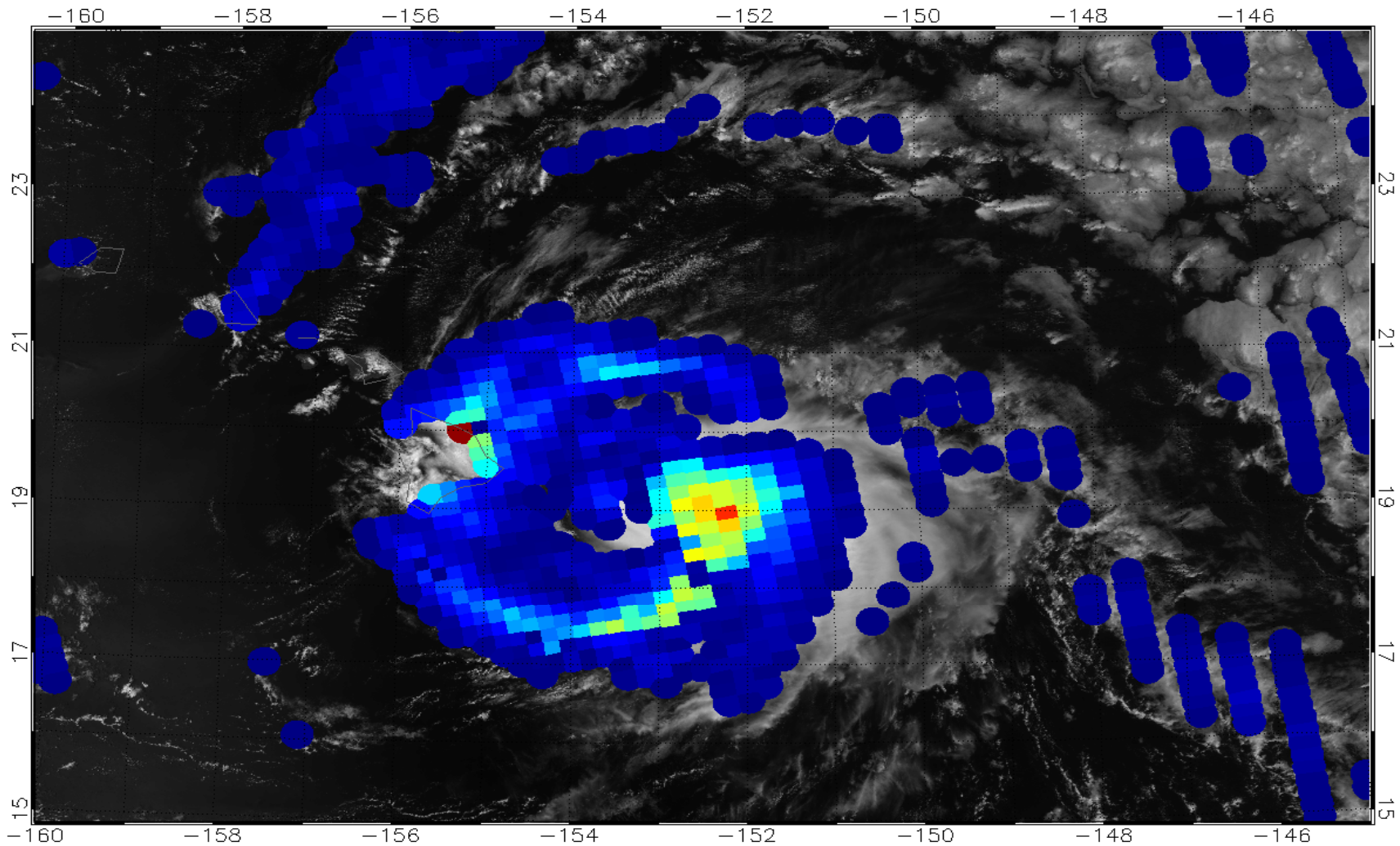




# Recent Progress -- Image Overlay



SNPP ATMS Liquid Water Path Over VIIRS DNB 2014-08-07







# Performance -- Global Mean Bias



### S-NPP ATMS Daily Global Mean Bias Time Series (IDPS TDR - CRTM SIM) (10 Days)



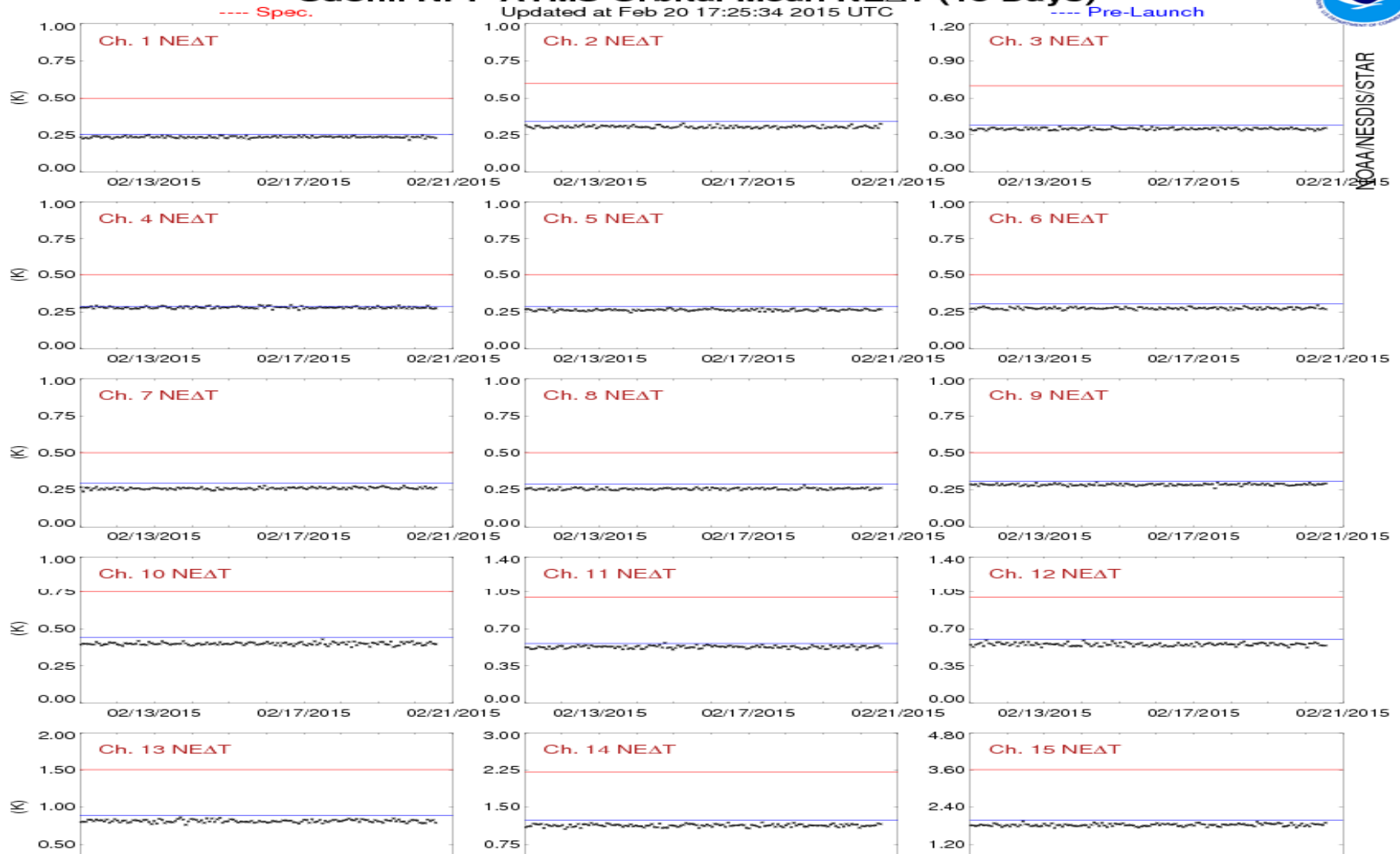


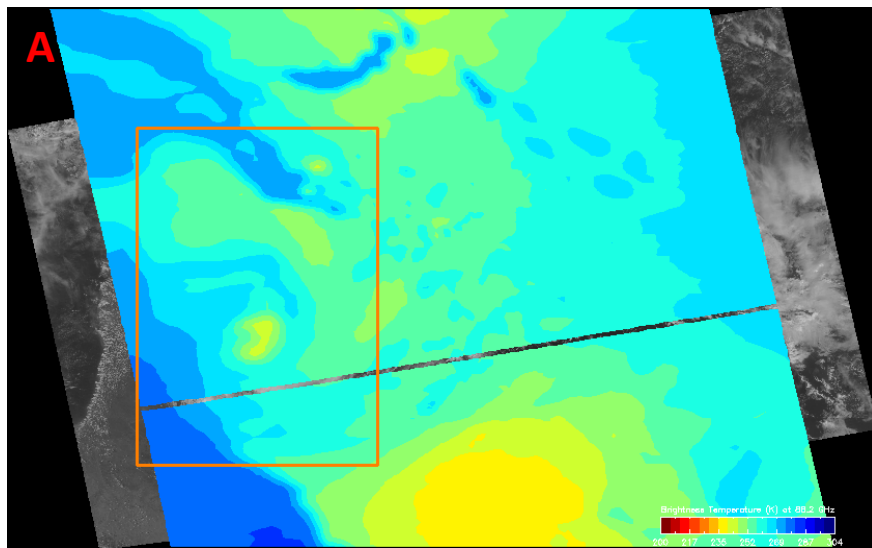
# Health -- Noise Equivalent Temperature Change



## Suomi NPP ATMS Orbital Mean NE $\Delta$ T (10 Days)

Updated at Feb 20 17:25:34 2015 UTC





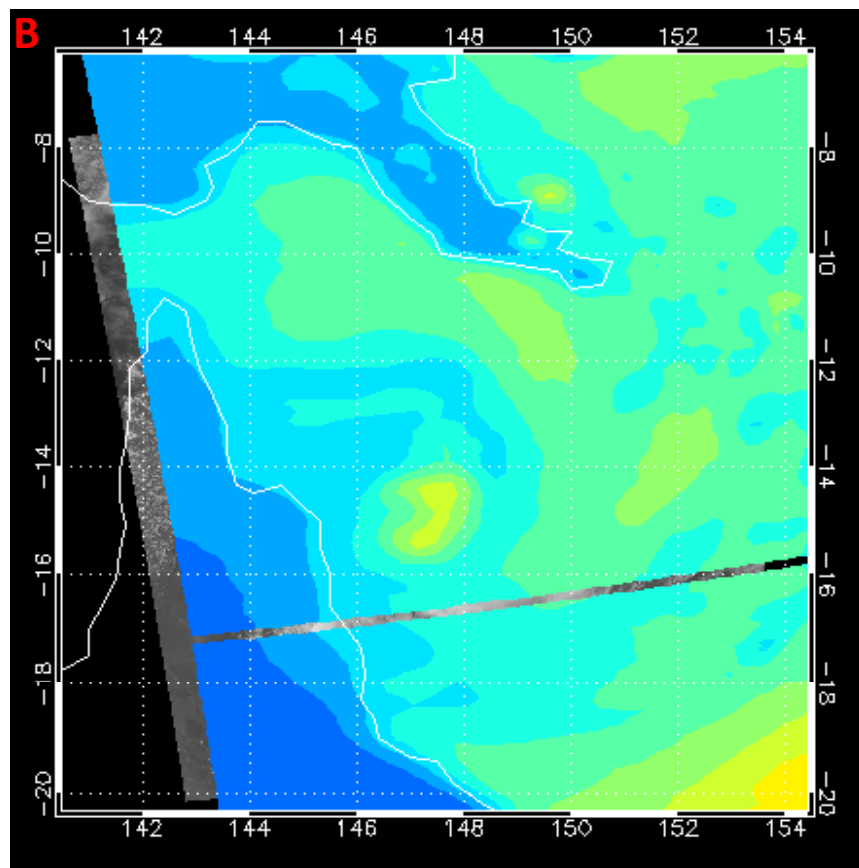
## Imagery Cropping

The first image (A) shows an overlay of ATMS on VIIRS with the orange box representing the user-defined area of interest. Image B is the cropped/zoomed version of the VIIRS-ATMS composite. Image C is the final version with ATMS as a semi-transparent overlay.

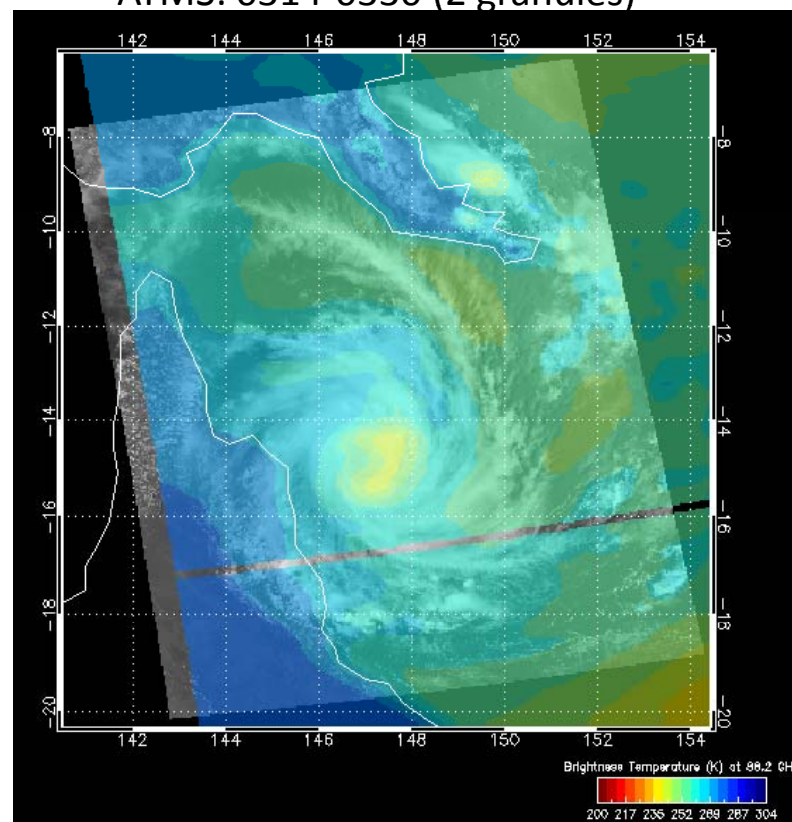
Typhoon Nathan

VIIRS: 0320-0325 (3 granules)

ATMS: 0314-0330 (2 granules)



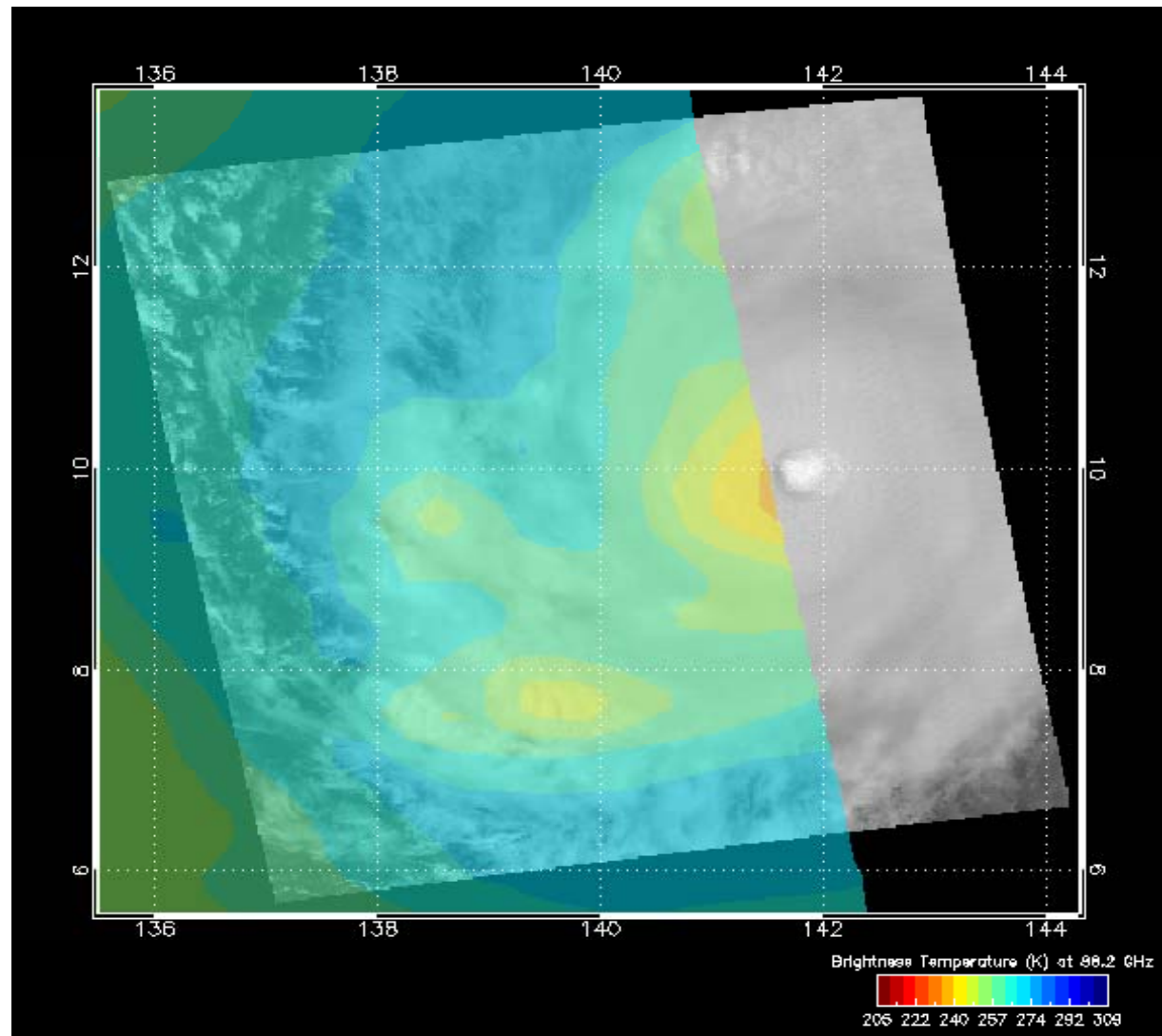
C





**ATMS:** ability to see through clouds

**VIIRS:** IR and visible imagery to better identify ice and snow, aerosols, etc.



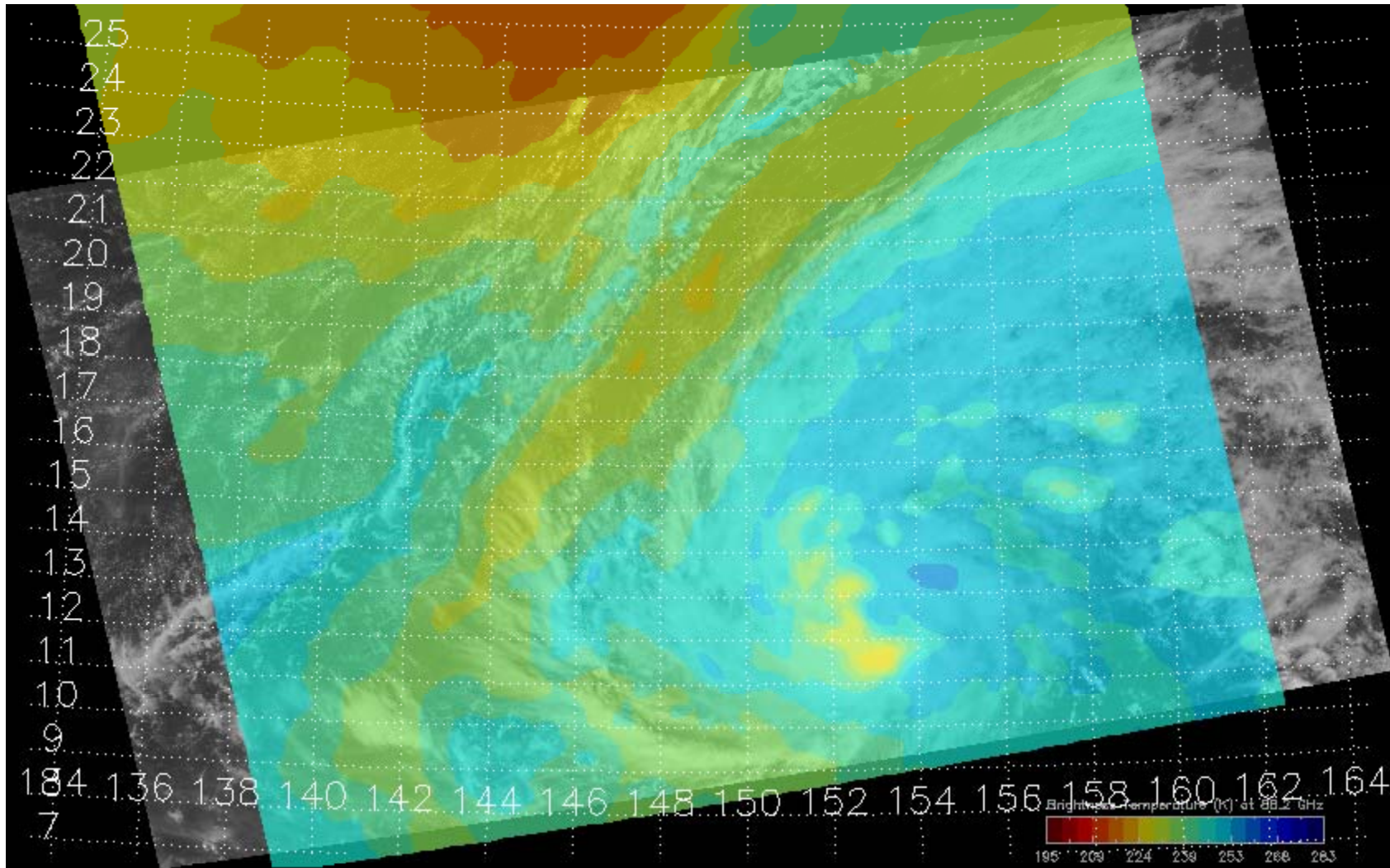
### **Typhoon Maysak, March 31, 2015**

VIIRS: 0443-0446 (3 granules)

ATMS: 0440-0448 (1 granule)\*

\*Only part of the system is captured by ATMS at the same time as VIIRS <sup>12</sup>

# Integrating the ATMS Mapper into VIIRS Software



**Typhoon Bavi – March 14, 2015**

VIIRS: 0323-0327 (3 granules)

ATMS: 0322-0330 (1 granule)



# Summary and Next Steps



- **STAR ICVS is a very powerful tool for:**
  - Monitoring Instrument performance/health status and SDR data quality
  - Diagnosing Instrument and Data Product Anomaly
  - Addressing the users questions or concerns on the calibration changes
  - Evaluating/verifying pre- and post-launch instrument performance
  - Notifying users the instrument/data anomaly automatically
  - Providing flexible customized datasets for re-analysis
- **Future Activities and Plans**
  - Extend STAR ICVS to other missions (GOES-R, Sentinel-2A/B, JPSS-1/2, etc.)
  - Automate download and generation of user-identified images
  - Expand generation to visible and IR imagery
  - Develop 3-dimensional ATMS and VIIRS DNB retrievals of hurricane warm core features
  - Engage weather user community to enhance usefulness/impact





# STAR ICVS Position in Search Engines



First result in major search engines

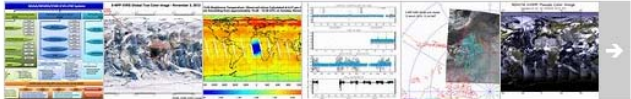
**bing** STAR ICVS

30,300,000 RESULTS Any time

**STAR - Integrated Calibration/Validation System (ICVS ...**  
[star.nesdis.noaa.gov/icvs-draft](http://star.nesdis.noaa.gov/icvs-draft)  
 Data and images displayed on STAR sites are provided for experimental use only and are not official operational NOAA products. More information>>

**Stars Pictures , Images & Photos | Photobucket**  
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 star . stars . stars . Stars . Stars . Next ; Shipping Country Currency Units Help © 2014 Photobucket © 2014 Photobucket. Get Deals, Giveaways & More. Website Help;

**Images of star icvs**  
[bing.com/images](http://bing.com/images)



[PDF] **NOAA STAR ICVS LTM – Suomi NPP VIIRS WEB PAGE**  
[www.star.nesdis.noaa.gov/.../2014JPSSAnnual/Posters/poster-icvs.pdf](http://www.star.nesdis.noaa.gov/.../2014JPSSAnnual/Posters/poster-icvs.pdf)  
 NOAA STAR ICVS LTM – Suomi NPP VIIRS WEB PAGE Vicky Lin2, Fuzhong Weng1, Ninghai Sun2, Lori Brown2 , Jason Choi2, Wanchun Chen2 , Changyong Cao1

**Incredible Pictures of Stars - Stars Pictures Gallery**  
[space.about.com](http://space.about.com) > About Education  
 Pictures of Stars - Cepheid Variable Star in Galaxy M100. Pictures of Stars ... Pictures of Stars - Hubble Sees Changes in Gas Shell around Nova Cygni 1992.

**Star Photos -- National Geographic - Science and Space ...**  
[science.nationalgeographic.com/science/photos/stars-gallery](http://science.nationalgeographic.com/science/photos/stars-gallery)  
 See photos of stars and star clusters in this photo gallery from National Geographic.

[PDF] **2014 STAR JPSS Science Teams Annual Meeting ICVS ...**  
[www.orbit.nesdis.noaa.gov/star/.../08\\_Session9\\_Sun\\_ICVS\\_Report.pdf](http://www.orbit.nesdis.noaa.gov/star/.../08_Session9_Sun_ICVS_Report.pdf)  
 • STAR ICVS website hosts a number of ozone product monitoring web pages • ICVS team will be working with STAR ozone EDR group to build a EDR LTM

**Google** STAR ICVS

About 22,400 results (0.55 seconds)

**ICVS - STAR - NOAA**  
[www.star.nesdis.noaa.gov](http://www.star.nesdis.noaa.gov) ... National Oceanic and Atmospheric Administration  
 Jun 19, 2014 - STAR Integrated Calibration/Validation System website banner. Search.  
 STAR ICVS ... Monitoring. STAR ICVS LTM System Schematic Chart ...

<b>CrIS</b> NPP - CrIS, Integrated Calibration/Validation System ...	<b>About ICVS</b> November 8, 2013 - STAR's ICVS instrument monitoring ...
<b>VIIRS</b> NPP - VIIRS, Integrated Calibration/Validation System ...	<b>MHS</b> NOAA-18 - MHS, Integrated Calibration/Validation System ...
<b>ATMS</b> NPP - ATMS, Integrated Calibration/Validation System ...	<b>AVHRR</b> NOAA-19 - AVHRR, Integrated Calibration/Validation System ...

More results from [noaa.gov](http://noaa.gov)

[PDF] **Ozone Instrument Calibration and EDR Products Validatio...**  
[satelliteconferences.noaa.gov/.../T60\\_Ozone%20Cal\\_Val%20with%20IC...](http://satelliteconferences.noaa.gov/.../T60_Ozone%20Cal_Val%20with%20IC...)  
 Apr 12, 2013 - Ozone Instrument Calibration and EDR Products Validation with STAR ICVS. Wei Yu3, Larry Flynn1, Jianguo Niu2, Eric Beach3, X. Wu1, ...

[PDF] **Suomi NPP Spacecraft Parameters - GOES-R**  
[www.goes-r.gov/downloads/AMS/.../TJ-34-4-Ninghai\\_Sun.pdf](http://www.goes-r.gov/downloads/AMS/.../TJ-34-4-Ninghai_Sun.pdf) GOES-R  
 in STAR Integrated Cal/Val System (ICVS). Ninghai Sun, Fuzhong Weng, Li Bi, Xin. Jin, Michael Grotenhuis, Tim Chang., Scott Hu, Lilly Qi. Satellite Meteorology ...

**Abstract: STAR Integrated Cal/Val System (ICVS) and Global ...**  
<https://ams.confex.com/ams/91Annual/webprogram/Paper187009.html>  
 The international community is becoming more interested in using all JPSS sensor data in real-time for weather and climate applications after the JPSS is ...

**Abstract: Suomi NPP ATMS Instrumental Performance and ...**  
<https://ams.confex.com/ams/94Annual/webprogram/Paper241140.html>  
 Feb 4, 2014 - Suomi NPP ATMS Instrumental Performance and Sensor Data Quality Long Term Monitoring (LTM) in STAR Integrated Cal/Val System (ICVS).