



# JPSS Proving Ground and Risk Reduction

# Bringing New Capabilities to Operations!



# Outline

- Introduction
- PGRR Background
- PGRR Projects
- PGRR User Communication
- PGRR Proving Ground Initiatives
- Additional JPSS PGRR Project Highlights
- Summary



# JPSS Proving Ground and Risk Reduction

## Background

- The PGRR Program was established in 2012, following the launch of the Suomi National Polar Partnership (SNPP) satellite.
- Nearly 100 proposals went through a rigorous user-led selection – initially nearly 40 projects selected for funding.
- Project leads work with the users to determine how best to use new JPSS data, and to quickly transition these capabilities to operations.
- PGRR has established Proving Ground Initiatives: the River Ice and Flooding, the Fire and Smoke, and the NOAA Unique CrIS/ATMS. Processing System (NUCAPS). Six other initiatives are in planning stages
- A new JPSS PGRR Call-for-Proposals was released on 2 Dec with a 13 Jan suspense for Letters-of-Intent. Focus of the call are current and additional Proving Ground Initiatives



# JPSS Proving Ground and Risk Reduction Partners





# PGRR Projects

Principal Investigator	PI Office	Title
Dr. William Blackwell	MIT (Students at CIRA, CIMSS and CICS)	NAST-M Campaign Support
Dr. Sid Boukabra Dr Jim Jung	STAR	JCSDA - improvements to data assimilation
Dr. Chris Brown	STAR/CICS	Comparison of 4DVAR and LETKF in Assimilating JPSS-derived Sea-surface Temperature in the Chesapeake Bay Operational Forecasting System
Dr.Naira Chaouch	STAR/CREST	River and Lake Ice mapping using NPP/JPSS VIIRS sensor To support NOAA NWS
Dr. Bernie Connell	STAR/CIRA	CIRA Support of NOAA's Commitment to the Coordination Group for Meteorological Studies: Enhancing the Virtual Laboratory
Dr. Ivan Csiszar	STAR/CICS	A rapid delivery system of enhanced VIIRS active fire data for fire management and fire weather applications
Dr. Mark DeMaria	STAR/CIRA	Application of JPSS Imagers and Sounders to Tropical Cyclone Track and Intensity Forecasting
Dr. Mark Eakin	STAR	Application of NPP and JPSS for High-Resolution SST and Coral Bleaching Products for Resource Management
Dr. Alex Gilerson	STAR/CREST	Development of Neural Network algorithms for retrieval of chlorophyll-a in the Chesapeake Bay and other coastal waters based on JPSS-VIIRS bands
Dr. Irina Gladkova	STAR/CREST	Combining JPSS with Geostationary Imager data for Fused Earth Observation Parameters (Vegetation Index products)
Dr. Andy Harris	STAR/CICS	Assimilation of VIIRS SSTs and Radiances into Level 4 Analyses
Dr. Andy Heidinger	STAR/CIMSS STAR/CIRA	Advancing Nighttime VIIRS Cloud Products with the Day/Night Band
Dr. Allen Huang	UW	Community Satellite Processing Package



# PGRR Projects

Principal Investigator	PI Office	Title
Kent Hughes	STAR	Global VIIRS Ocean Color Pre-Operational User Expansion, User Specified Independent Quality Assessment, Product Development/Support, and Next Generation Distribution Portal Deployment
Dr. Eugenia Kalnay	UMD	QC JPSS data assimilation (Use of LETKF sensitivity to improve QC of data from JPSS polar orbiting instruments and to detect the origin of the NCEP "5-day forecast skill dropouts")
Dr. Jeff Key	STAR/CIMSS	Development, Generation, and Demonstration of New JPSS Ice Products in Support of a National Ice Center JPSS Proving Ground and Risk Reduction Activity
Dr. Shobha Kondragunta	STAR	Application of NPP/VIIRS Fire and Aerosol Optical Thickness (AOT) Products as Evidence for EPA's Exceptional Events (EEs) Rule (Alaska Region focus)
Dr. Jun Li	STAR/CIMSS	Near real-time assimilation system development for improving tropical cyclone forecasts with NPP/JPSS sounder measurements
Dr. Huan Meng	STAR/CICS	ATMS Derived Snowfall Rates to Support Weather Forecasting
Dr. Paul Menzel	STAR/CIMSS	Scientific Support and Concept Study to Extend HIRS Clouds with CrIS
Dr. Steve Miller	STAR/CIRA	'Seeing the Light': Exploiting VIIRS Day/Night Band Low Light Visible Measurements in the Arctic
Dr. Ralph Petersen	STAR/CIMSS	Improving very-short-range forecasts for the NWS Alaska Region using objective tools designed to optimize the retention of Hyperspectral Infrared and Microwave Moisture LEO Soundings
Dr. Hank Revercomb (Daniel Tobin)	STAR/CIMSS	Scan His Campaign Support
Dr. Donglian Sun	STAR	Application of NPP/JPSS Data for Enhanced Flood Mapping and Inundation Area Estimates
Dr. Daniel Tong	STAR	Development and validation of a marine Isoprene emission product for the US National Air Quality Forecasting Capability (NAQFC)
Dr. Elizabeth Weisz (Bill Smith)	STAR/CIMSS	Hyperspectral Retrievals from Polar-Orbiting Sounders for Use in the NWS Alaska Region Forecasting Applications
Dr. Fuzhong Weng	STAR	Improve Hurricane Structure Monitoring and Intensity Forecast Using NPP ATMS and GCOM-W AMSR2
Dr. Fuzhong Weng	STAR/CICS	Global Satellite InterCalibration System (GSICS)



# PGRR Projects

Principal Investigator	PI Office	Title
Dr. Bob Yu	STAR	Monitoring Land Surface Vegetation Phenology from VIIRS
Dr. Jerry Zhan	STAR/CICS	Enhance Agricultural Drought Monitoring Using NPP/JPSS Land EDRs For NIDIS
Dr. Tom Heinrichs	GINA	High Latitude Proving Ground - Improving forecast and warnings by leveraging GOES-R investment to deliver and test NPP/JPSS data in support of operational forecasters
Dr. Rich Jefferies (Spangler)	COMET	The COMET Program Spending Plan for FY13 Activities
Dr. Pingping Xie	CPC	Infusing JPSS PMW Retrievals to CMORPH Precipitation Estimates for Improved Weather, Climate, and Water Applications
Tom Schott (Walter Wolf)	OSD	JPSS Risk Reduction VIIRS ABI algorithms
Dr. Howard Diamond	NCDC	Howard University Support of NOAA's commitment to the Global Climate Observing System (GCOS) Reference Upper Air Network (GRUAN)
Dr. Chris Elvidge	NGDC	Estimating flared gas volumes and CO2 emissions with VIIRS data
Dr. Cara Wilson	NMFS	Facilitating end-user access to VIIRS data
Dr. Nancy Baker	NRL	NRL/JPSS Coordinated Assimilation of CrIS/ATMS Observations from NPP and ATMS Calibration/Validation
Dr. Jeff Hawkins Dr. Tom Lee	NRL	Education and Training for the NPP/JPSS Missions
Dr. Arunas Kuciauskas	NRL	Using the Next Generation Satellite (NexSat) Webpage to Demonstrate and Apply NPP Sensor Products During the NPP/JPSS Missions
Dr. Gary Jedlovec	NASA	SPORT Proving Ground Support
Dr. Allen Larar	NASA	NAST-I Campaign Support



# PGRR User Communication

- NOAA Line Office Executive Board for Proving Ground and Risk Reduction Program
- Team with GOES-R Proving Ground and Risk Reduction Program on projects focused on joint/blended products
- Frequent input on Science Section of JPSS Website
- Monthly JPSS Science Seminars
- Conference and technical meeting participation
  - American Meteorological Society's Annual Meeting
  - Science Week
  - Proving Ground and User Readiness Meeting
  - NOAA Satellite Conference
  - National Weather Association Meeting
- PGRR Project Review – May 2014
  - User Executive Board reviewed all PGRR Projects
  - Board provided feedback to projects
  - Projects making changes based on feedback



# JPSS Website

[www.jpss.noaa.gov](http://www.jpss.noaa.gov)

NOAA • NESDIS  
**JPSS**  
Joint Polar Satellite System

YouTube Facebook Twitter RSS Contact Us

A collaborative mission between NOAA and NASA



Home About JPSS Science User Community Outreach Media Resources

## News Highlights

### First JPSS-1 Satellite Instrument Integrated with Spacecraft

The CERES instrument that will fly on the Joint Polar Satellite System-1 spacecraft (JPSS-1), NOAA's next polar orbiting environmental satellite, has been successfully integrated with the spacecraft. CERES is the first JPSS-1 instrument to be integrated, marking the start of a new phase in the completion of the satellites' development.

[Read full story here >>](#)

### Latest Antenna to Directly Receive Suomi NPP Satellite Data Now Installed

### Suomi NPP Satellite Team Defends Against Space Debris

## INTERACTIVE JPSS GALLERIES



**VIDEO GALLERY**

[CLICK HERE TO VIEW](#)



**IMAGE GALLERY**

**JPSS Science Seminar Annual Digest 2014**

Now available!

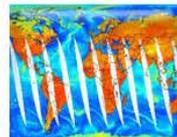
[Click to view the digest](#)



### What is JPSS?

The Joint Polar Satellite System (JPSS) is our Nation's next generation polar-orbiting operational environmental satellite system. JPSS is a collaborative program between NOAA and its acquisition agent NASA.

[Click Here to Learn More >>](#)



### The Science Behind JPSS

Information about our planet is vital for the ability to plan, predict, respond and protect our Nation's lives and property. JPSS Science is critical to accomplishing this primary goal.

[Click Here to Learn More >>](#)



### Explore the NOAA View Portal



# JPSS Science Seminars – Past

<b>Date</b>	<b>Presenters</b>	<b>Topic</b>
November 18, 2013	Mark DeMaria	Joint JPSS-GOES-R Tropical Cyclone Satellite Data Assimilation Discussion
December 16, 2013	Arunas Kuciauskas and Jeff Hawkins	NexSat JPSS Demonstration Project NRL-MRY VIIRS Data and Cal-Val Work
January 27, 2014	Cara Wilson	Facilitating NOS/NMFS End-User Access to VIIRS data
February 24, 2014	Walter Wolf	Uniform Multi-Sensor Algorithms for Consistent Products
March 21, 2014	Alex Gilerson	Development of algorithms for retrieval of chlorophyll-a in the Chesapeake Bay and other coastal waters based on JPSS-VIIRS bands
April 21, 2014	Active Fire Team	JPSS and GOES-R Activities Supporting 2013 Fire Outbreaks
May 19, 2014	Amy Huff Shobha Kondragunta	VIIRS Aerosol Products for Air Quality Applications
June 23, 2014	Dan Pisut	Visualization of Suomi NPP Data
July 21, 2014	Daisuke Hotta Eugenia Kalnay	Application of EFSO to Proactive Quality Control, and Efficient Testing of Forecast Impact of New Instruments
August 18, 2014	Training Team	Introduction to Satellite Training Program and Opportunities
September 29, 2014	Pingping Xie	Infusing JPSS PMW Retrievals to CMORPH Precipitation Estimates for Improved Weather, Climate, and Water Applications
October 20, 2014	Jerry Zhan	Enhance Agricultural Drought Monitoring Using NPP/JPSS Land EDRs For NIDIS



# JPSS Science Seminars

## Future

Date	Presenters	Topic
December 1, 2014	SPORT, Mike Pavolonis	Joint JPSS/GOES-R Low Cloud and Fog
December 15, 2014	Jeff Key	The Cold and The Dark: JPSS and The Cryosphere
January 26, 2015	Mark Eakin	Pushing the Limits: Increasing Resolution of Satellite-Derived Coral Bleaching Products using VIIRS and Geo-Polar Blended SSTs
February 18, 2015	Gary Jedlovec	SPoRT Product Assessments for JPSS
March 23, 2015	Huan Meng	ATMS-Derived Snowfall Rate Product and its Applications in Weather Forecasting and Hydrology
April 20, 2015	Danny Satterfield	Broadcast Meteorology use of Satellites
May 18, 2015	Felix Kogan	SNPP Drought & Products Portal
June 22, 2015		
July 20, 2015		
August 17, 2015		
September 21, 2015	Julie Price	
October 19, 2015		
November 17, 2015		
December 14, 2015		
January 11, 2016		
February 22, 2016		
March 21, 2016		



# Proving Ground Initiatives

- **River Ice and Flooding**
- **Fire and Smoke**
- **Sounding Applications - (NUCAPS)**
- Land Data Assimilation
- OCONUS and NCEP Center AWIPS Initiative
- Cryosphere
- Ocean and Coastal
- Hydrology
- Aerosol Data Assimilation
- OMPS (Atmospheric Chemistry)
- NWP Impact Studies and Critical Weather Applications
- Innovation



# River Ice and Flooding Initiative

- Initiative began in Nov 2013
- Initiative Objectives
  - Test new River Ice and Flooding Products in operational River Forecast Center (RFC) environments
  - Determine the value of these products in their use in response to real-world ice jam and flooding events
  - Implement procedures to transition these research capabilities to operations
- Initiative has high interest in NWS River Forecast Centers (RFCs)
  - Alaska-Pacific and North Central RFCs partners in initial actions
  - Northeast and Missouri Basin RFCs new 2014 partners
  - Two more RFCs considering joining the initiative
- Products available from Direct Broadcast data through The Community Satellite Processing Package (CSPP) to RFC Systems
- Products evaluated during Winter 2013-14 Project
- Flooding Product has been applied year-round to US and international river basins (Paraguay request)



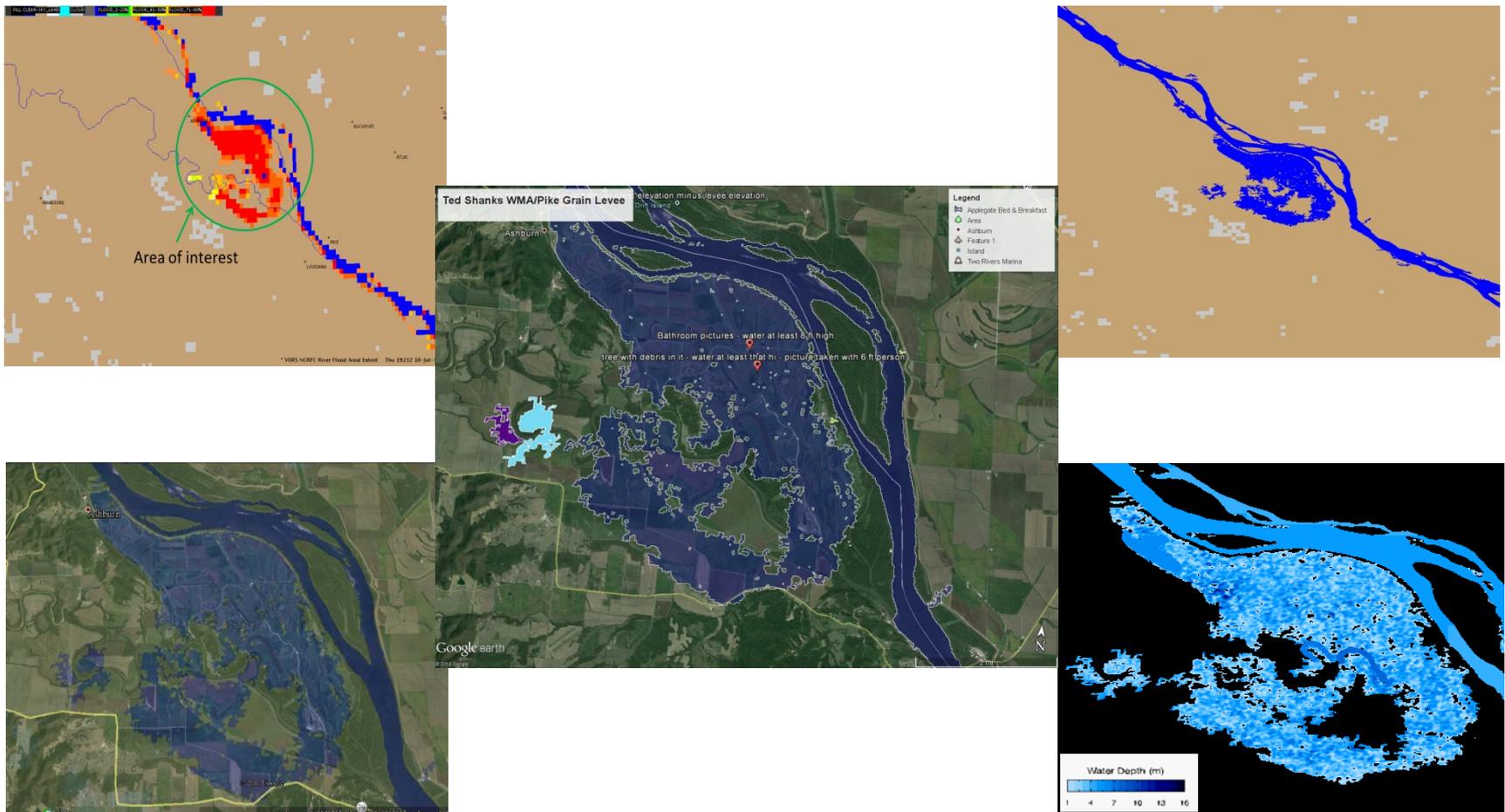
# River Ice and Flooding Initiative

 NWS RFC Partners



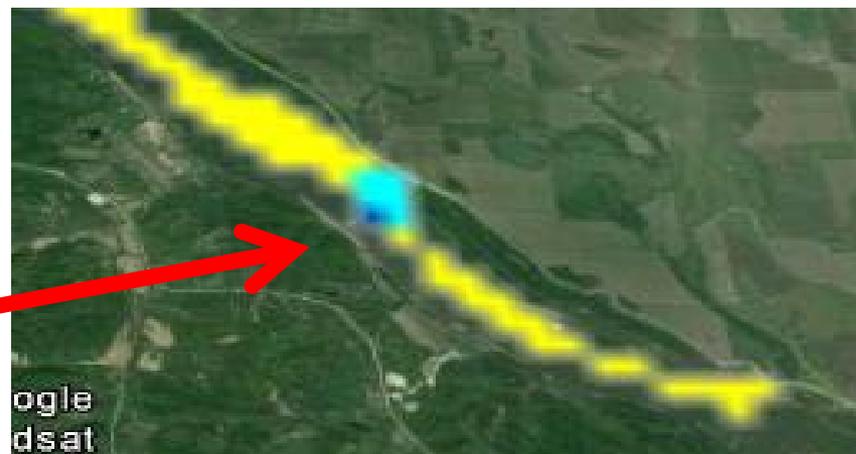
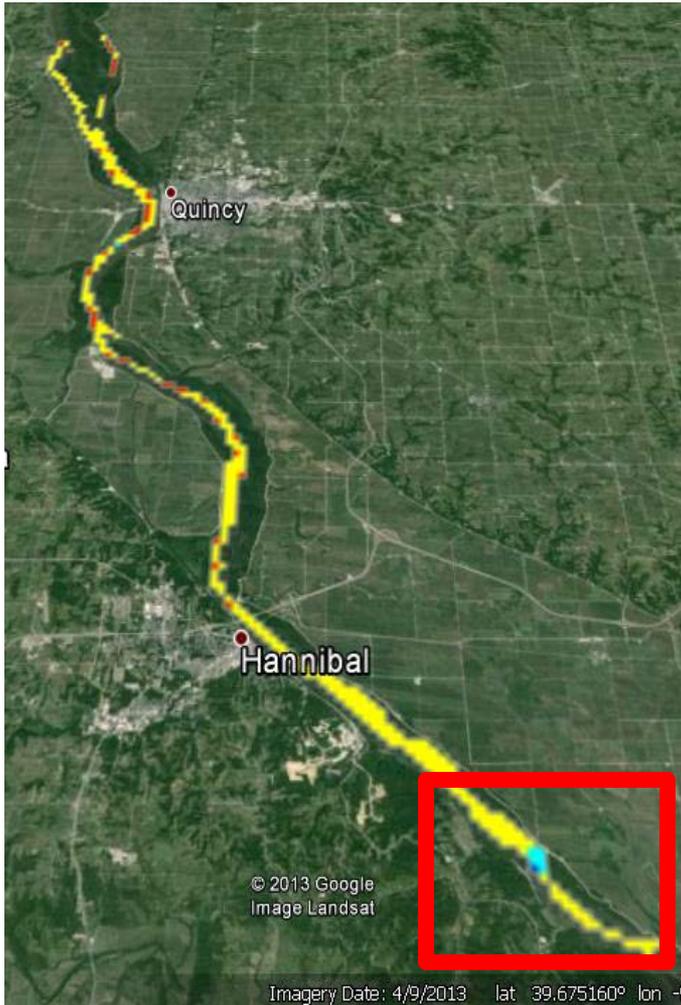
# River Ice and Flooding Initiative

## Ted Shanks Wildlife Management Area (Missouri) Flooding



# River Ice and Flooding Initiative

## Hanibal MO Ice Jam (Jan-Feb 2014)





# Fire and Smoke Initiative

- Initiative began in May 2014
- Initiative Objectives
  - Evaluate the current use of geostationary and polar orbiting satellite capabilities in support of Fire and Smoke detection and forecasting mission
  - Identify current SNPP/JPSS and new GOES-R data and capabilities with the potential to improve support to this mission
  - Establish methodologies and procedures for the operational demonstrations of these capabilities
  - Identify the satellite capabilities whose operational impacts are sufficient to warrant transition from research to operations
- Focus has been on Western Region high risk fire areas
- Includes both JPSS and GOES-R program capabilities

# Fire and Smoke Initiative

## How WFOs Currently Use Satellite Imagery

**US National Weather Service Elko NV**  
4 hrs · Edited ·

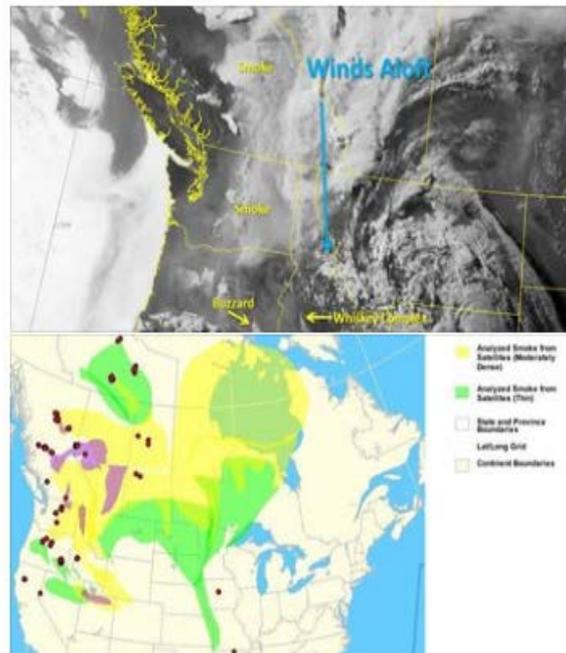
Where there is smoke...is there fire? Not necessarily. Go to the following link for satellite analysis <http://ow.ly/zfTHG> and information on smoke in northern and central Nevada.



Like · Comment · Share · 8 2

**US National Weather Service Boise Idaho** added 2 new photos.  
18 hrs ·

Where is all this smoke coming from? The smoke is coming from multiple sources...including wildfires in Canada as the jet stream has shifted to a more Northerly direction. Local wildfires are also contributing to the smoke, mainly the Whiskey Complex and Buzzard Fire. #idwx #orwx



Like · Comment · Share · 8 1 19

**US National Weather Service Spokane Washington** added 2 new photos.  
9 hrs ·

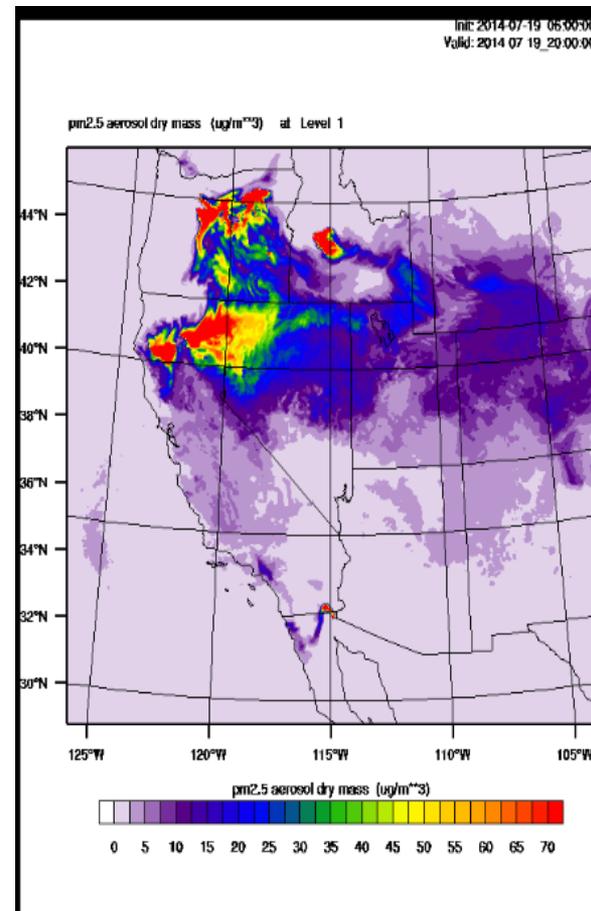
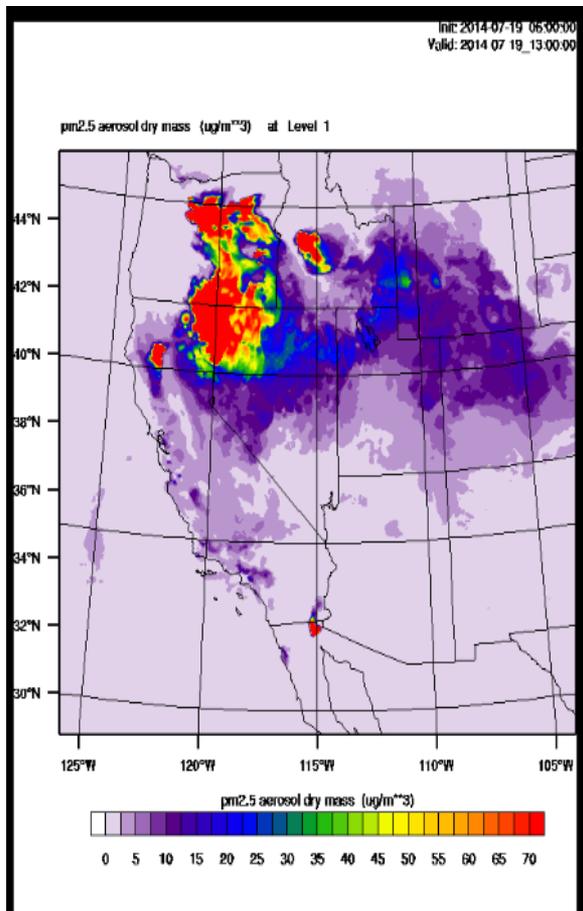
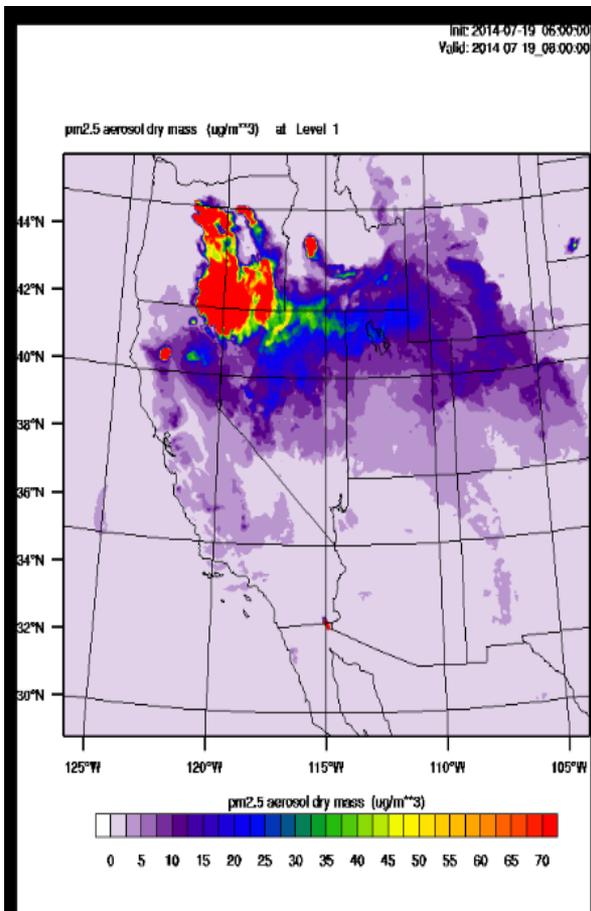
Here's what the local fires and smoke looked like from 438 miles above the ground.



Like · Comment · Share · 12 16

# Fire and Smoke Initiative

## HRRR Smoke Product



Weak east-west frontal boundary from northern UT to northern CA -- smoke from fires get caught up along front -- verified pretty well



# Fire and Smoke Initiative

## King Fire Views via SNPP VIIRS DNB Night Time Visible

NPP VIIRS Night-Visible 2014/09/14 10:40:48Z NRL-Monterey

125°W

120°W

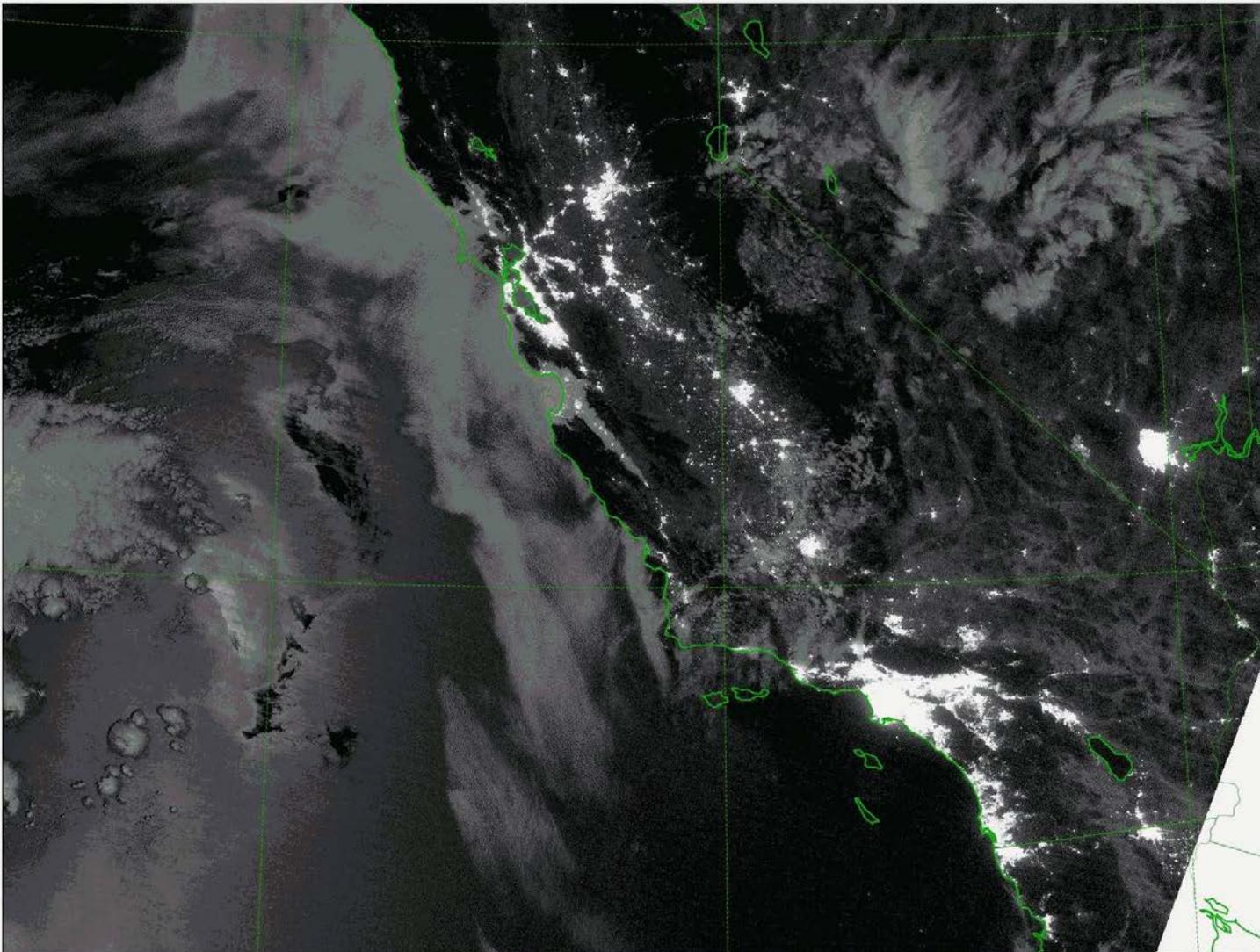
115°W

40°N

40°N

35°N

35°N





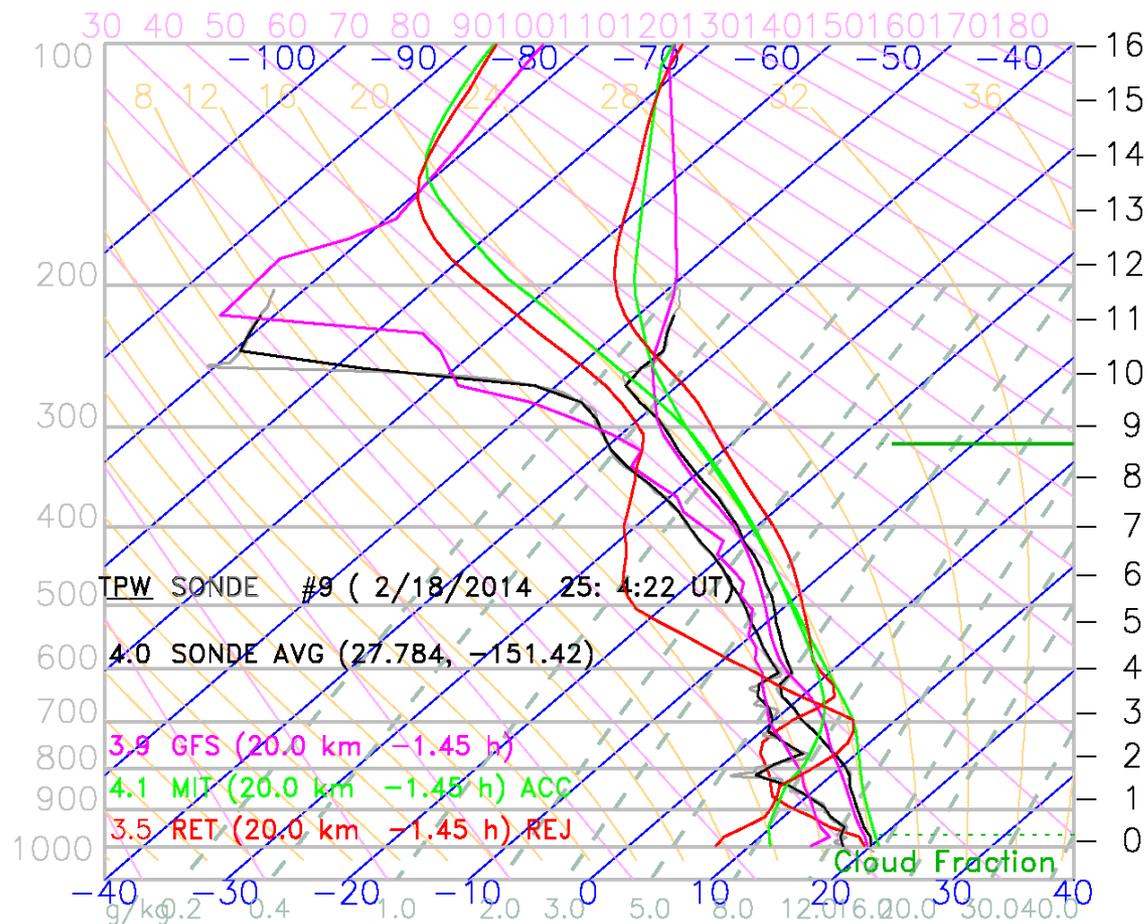
# NUCAPS Initiative

- Initiative began in Jul 2014
- NUCAPS Program Objectives.
  - Generate spectrally and spatially thinned radiances
  - Provide retrieved products such as profiles of temperature, moisture, trace gases and cloud-cleared radiances to users
  - Provide global validation products such as radiosonde matchups and gridded radiances and profiles
- Initiative Objective: to improve the operational use of SNPP for those NWS offices with AWIPS II and assist those offices that will be getting AWIPS II with NUCAPS.
- The initiative will address:
  - NUCAPS algorithm work (STAR)
  - Operational application and validation of NUCAPS (Omaha/Boulder WFO)
  - NUCAPS training (NWS)

# NUCAPS Initiative

## Sounding Comparisons During CalWater Experiment (Feb 2014)

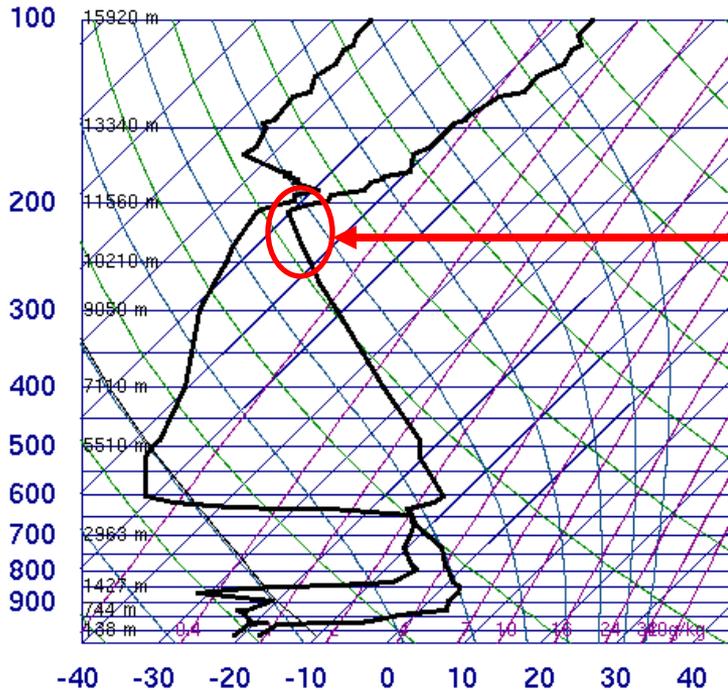
- Black = dropsonde (full-res and smoothed)
- Cyan = GFS forecast interpolated to retrieval location
- Green = uW-only retrieval
- Red = IR+uW retrieval





# NUCAPS Initiative

70026 PABR Barrow



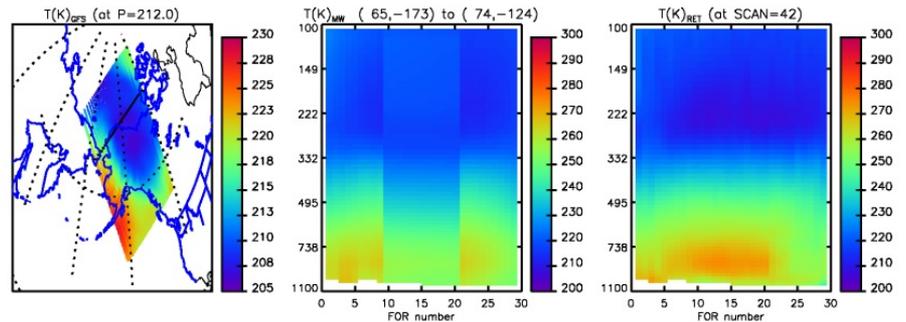
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SLAT 71.28
SLON -156.79
SELV 19.00
SHOW 13.61
LIFT 35.17
LFTV 35.17
SWET 236.1
KINX 0.60
CTOT 0.90
VTOT 23.90
TOTL 24.80
CAPE 0.00
CAPV 0.00
CINS 0.00
CINV 0.00
EQLV -9999
EOTV 9999
    
```

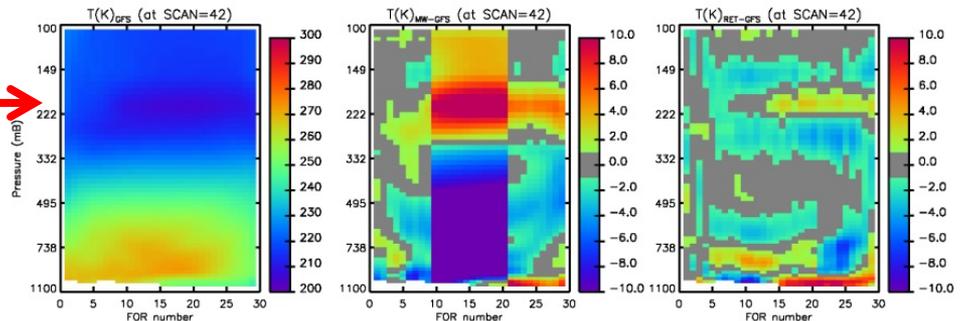
Alaska Cold Air Aloft  
-65F Causes Aviation Fuel to  
become like Gelatin

12Z 24 Feb 2014

University of Wyoming



Initial NUCAPS Product shows the  
right temps but some work is still  
needed



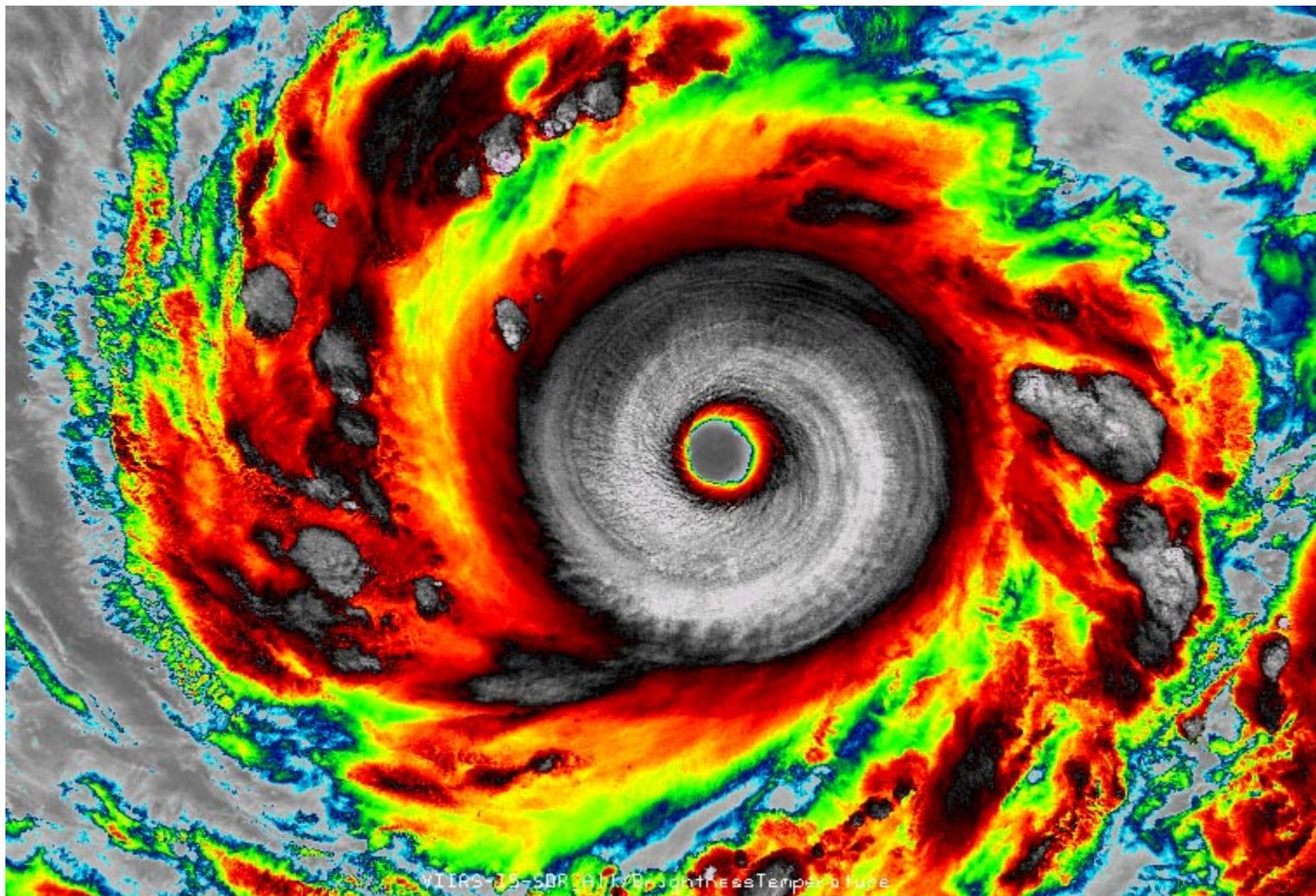
5/21/2015



# Additional JPSS PGRR Project Highlights

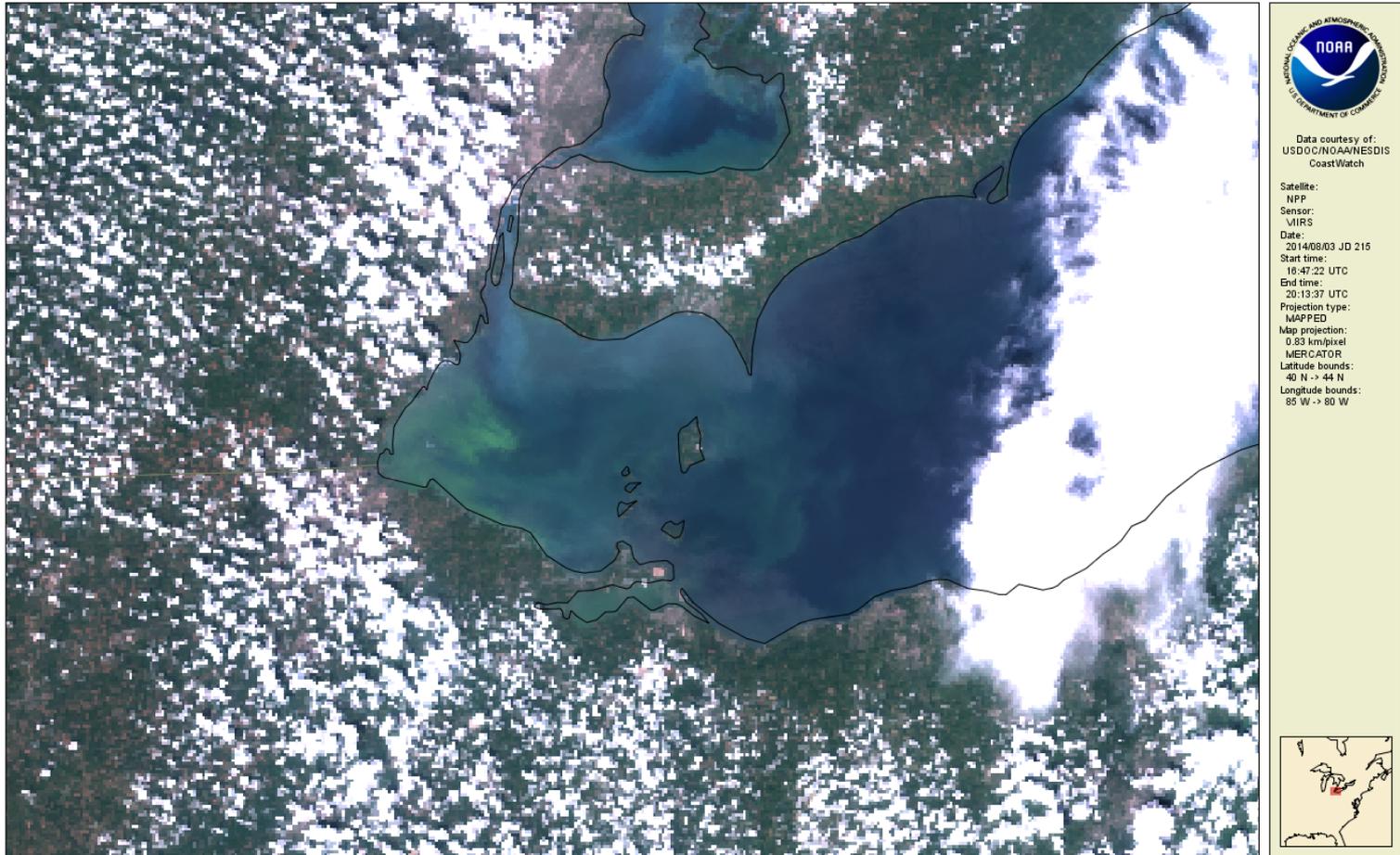
# Super Typhoon Vongfong

VISIT Training Audio Available



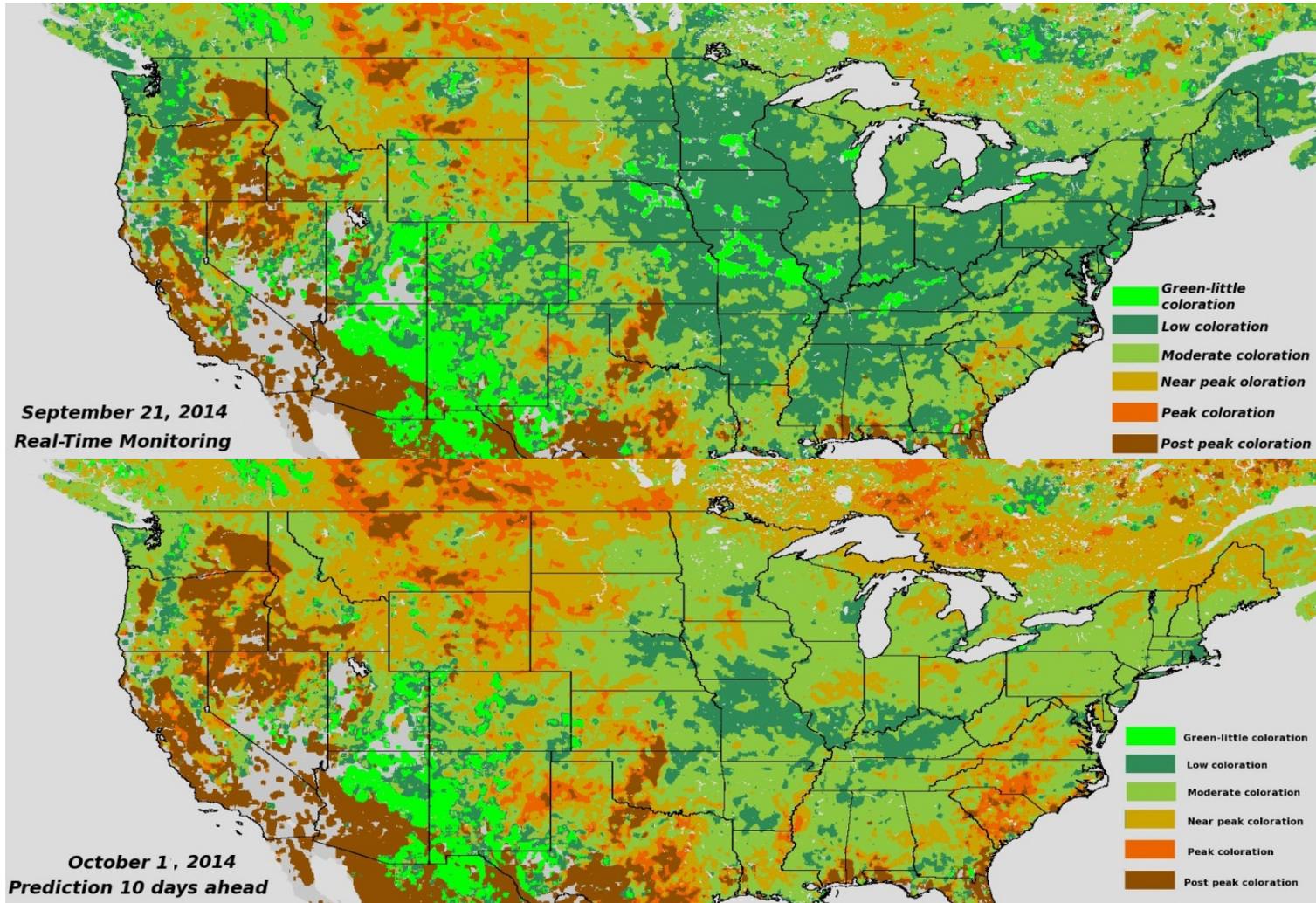


# Lake Erie Algal Bloom



VIIRS coastal true color image of Lake Erie for 3 Aug 2014, depicting the large bloom of the cyanobacterium, *Microcystis* sp. threatened the water supply of Toledo, OH

# Fall Foliage Coloration



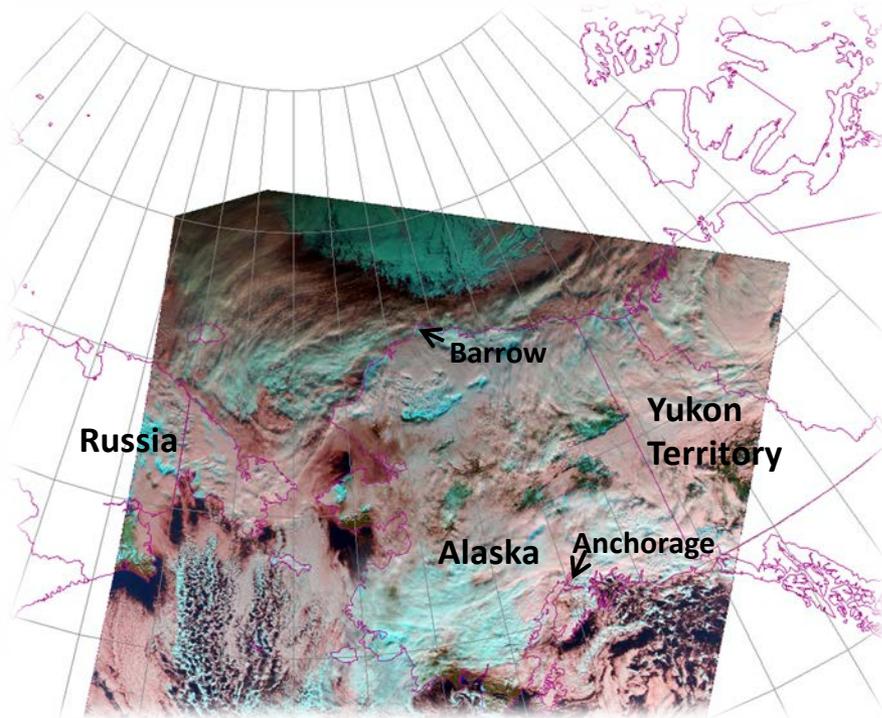
Monitoring and forecasting fall foliage coloration using VIIRS data before 09/21/2014.



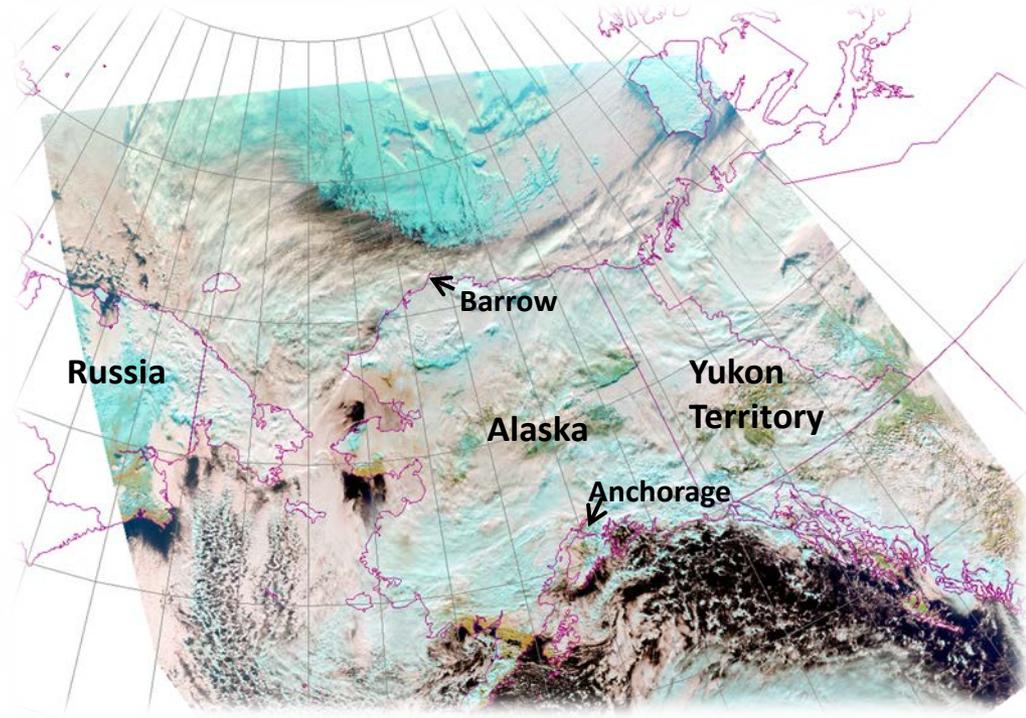
# Alaska VIIRS vs MODIS Comparison

## 20 October 2014

MODIS Falsecolor 2211Z



VIIRS Falsecolor 2232Z





# Summary

- PGRR Projects have provided critical resources (time, funds, expertise) to help transition SNPP capabilities from research to operations
- Frequent face-to-face interaction between project teams and their users are key to many successes
- Operational forecasters have found SNPP capabilities to be a valuable part of their integrated observation system
- General satellite, and specific product, training helps maintain initiatives over the long term
- Once forecasters are on-board with the operational use of satellite data, they become agents of change to drive even more creative use of SNPP and JPSS data