TRANSITION OF JPSS PRIORITY 3 AND 4 EDR PRODUCT GENERATION TO ESPC

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JPSS Algorithm Management Project &
Satellite Project Manager for JPSS PSDI

August 12, 2016

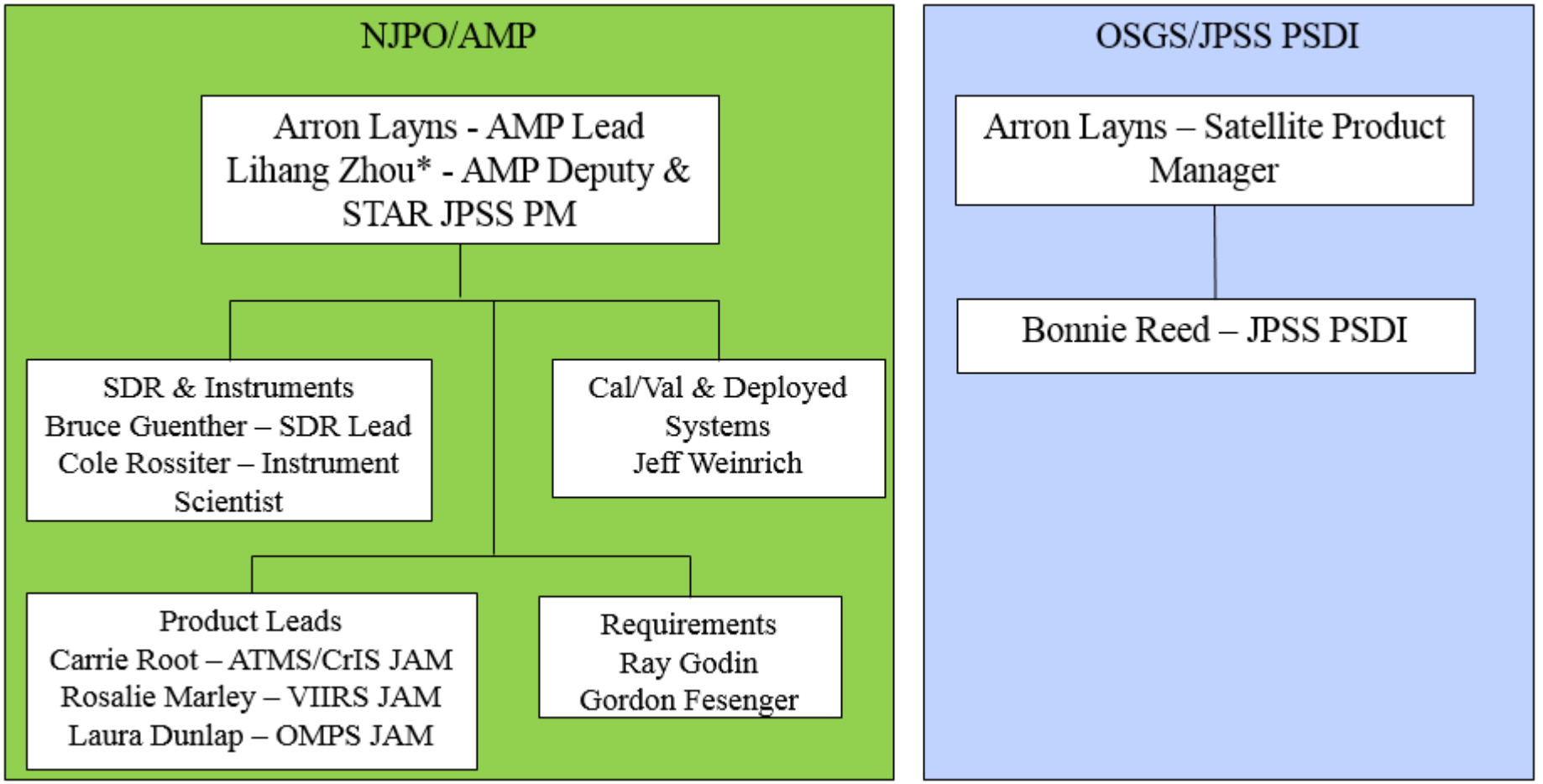
Outline

- Satellite Product Management for JPSS
- Background on transition of EDRs
- Process for transition
- Timeline for transition
- Items to be Worked

Satellite Product Management for JPSS

- JPSS, **through the Algorithm Management Project (AMP),** is responsible for providing JPSS data products that meet user requirements.
- OSGS, **through Product System Development and Implementation (PSDI),** is responsible for sustaining product algorithms based on user needs.
- **STAR** is responsible for providing high quality science and algorithms that meet the program requirements as well as provide calibration/ validation, long-term science maintenance, product quality monitoring, and anomaly resolution for the life of the products.
- In the past, **AMP** has focused on those products implemented in the **IDPS** whereas **OSGS/PSDI** focused on those products implemented in **ESPC.**
  - NESDIS is moving towards consolidation of AMP and PSDI management for all data products regardless of processing system.

AMP & PSDI Organization (Current)



Background on the Transition

- The JPSS Proving Ground/Risk Reduction funded the adaption of GOES-R algorithms to the JPSS/VIIRS sensors.
  - Product performance was overall better than the performance of the IDPS algorithms and provided an opportunity to move towards Enterprise Algorithms.
- The JPSS Program reallocated product processing responsibilities from IDPS to NDE through approval of the following CCRs:
  - NJO-2013-12, Reallocation of CrIS/ATMS EDRs
  - NJO-2013-15, Reallocation of VIIRS SST EDR
  - NJO-2014-25, Reallocation of Active Fires
  - NJO-2015-18, Reallocation of all Priority 3 and 4 EDRs
- The reallocation of the Priority 3 and 4 EDRs was approved with liens:
  - DAP delivery and integration efforts can proceed.
  - Performance assessments of the NDE system to be completed in order to confirm if (and how much) additional processing capability needs to be added.
    - OSGS is conducting this analysis now and will likely have results before the NDE 2.0 ORR
- Full transition process is outlined on the next slide

Process for Transitioning to Enterprise Algorithms/Processing

Following the approval to reallocate processing to an enterprise processing system (e.g., NDE):

1. **Flow down of Requirements**: The Configuration Managers of the applicable Level 2, 2.5, and 3 boards will confirm that CCRs have been generated in response to the Level 1 CCRs.
2. **Project Planning and Execution:** Satellite Product and Services Review Board (SPSRB) project plans are developed and executed leading to an SPSRB recommendation for operational readiness.
3. **Operationalization:** OSPO, with the applicable ground segment project, confirms reallocated product is operational, and users have been notified of the pending status of the terminated product.
4. **User Notification and Transition:** OSPO and NCEI confirm reallocated product is archived appropriately, and users have been notified of the availability of the new product, and pending status of the terminated product.
5. **Termination of Legacy Product**: After users have been given sufficient time to transition to the new products (estimated 1-2 months), the legacy products will be terminated.

S-NPP Data Products (EDRs Only)

Note: Does not include VIIRS Imagery EDRs because they will be processed in IDPS

Enterprise		
Aerosol Detection (VIIRS)	Global Surface Type (VIIRS)*	Rainfall Rate (ATMS)
Active Fires (VIIRS)	Green Vegetation Fraction (VIIRS)	Sea Ice Characterization (AMSR-2)
Aerosol Optical Depth(VIIRS)	Ice Age/Thickness (VIIRS)	Sea Surface Temperature (AMSR-2)
Aerosol Particle Size (VIIRS)	Ice Concentration (VIIRS)	Sea Surface Temperature (VIIRS)
Albedo (Surface) (VIIRS)	Ice Concentration (ATMS)	Sea Surface Wind Speed (AMSR-2)
AMSR Calibrated Sensor Data (AMSR-2)	Ice Surface Temperature (VIIRS)	Snow Cover/Depth (AMSR-2)
Atmospheric Vertical Moisture Profile (CrIS/ATMS)	Imagery (AMSR-2)	Snow Cover (ATMS)
Atmospheric Vertical Temperature Profile (CrIS/ATMS)	Imagery (ATMS)	Snow Cover (VIIRS)
Carbon Dioxide (CO) (CrIS)**	Infrared Ozone Profile (CrIS)	Snow Water Equivalent (ATMS)
Carbon Monoxide (CO2) (CrIS)**	Land Surface Emissivity (ATMS)	Snow Water Equivalent (AMSR-2)
Cloud Cover/Layers (VIIRS)	Land Surface Temperature (VIIRS)	Soil Moisture (AMSR-2)
Cloud Height (Top and Base) (VIIRS)	Land Surface Temperature (ATMS)	Surface Reflectance (VIIRS)
Cloud Liquid Water (AMSR-2)	Methane (CH4) (CrIS)**	Surface Type (AMSR-2)
Cloud Liquid Water (ATMS)	Moisture Profile (ATMS)	Temperature Profile (ATMS)
Cloud Mask (VIIRS)	Ocean Color/Chlorophyll (VIIRS)	Total Precipitable Water (AMSR-2)
Cloud Optical Depth (VIIRS)	Outgoing Longwave Radiation (CrIS)	Total Precipitable Water (ATMS)
Cloud Particle Size Distribution (VIIRS)	Ozone Nadir Profile (OMPS-N)	Vegetation Indices (VIIRS)
Cloud Phase (VIIRS)	Ozone Total Column (OMPS-N)	Vegetation Health Index Suite (VIIRS)
Cloud Top Pressure (VIIRS)	Polar Winds (VIIRS)	Volcanic Ash Detection And Height (VIIRS)
Cloud Top Temperature (VIIRS)	Precipitation (Type/Rate)(AMSR-2)	

Already available in ESPC	Expected to be operational in NDE 1.0 soon	Will be available when NDE 2.0 is operational	Will be available soon after NDE 2.0 is operational	Implementation in NDE planned in 2017

S-NPP EDRs Transition to Operations Timeline

- **Cryosphere, Aerosol, and Cloud algorithms delivered to NDE.**
  - Operational Readiness Review (ORR) will coincide with NDE 2.0 ORR
  - Products will be available operationally when NDE 2.0 becomes operational (expected November 2016)
- **Ozone products (Total Column and Nadir Profile) algorithms delivered to NDE.**
  - Expected to be made operational in the first NDE software release following NDE 2.0 ORR
- **Land Products**
  - Surface Reflectance
    - ARR planned for December 2016
    - ORR planned for January 2017
  - Surface Albedo & Land Surface Temperature
    - ARR planned for June 2017
    - ORR planned for August 2017
  - Vegetation Indices
    - Algorithm Readiness Review planned for May 2017
    - ORR planned for July 2017

NOTE: Products are usually transitioned to operations within 1 month of ORR

JPSS-1 Timeline

	2016			2017												2018								
Task Name	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9
J-1 MiRS	CDR																	ARR			Ops			
J-1 NUCAPS Level 2 Products	CDR																	ARR			Ops			
J-1 CrIS OLR	CDR																	ARR			Ops			
J-1 ACSPO	CDR																	ARR			Ops			
J-1 Polar Winds	CDR																	ARR			Ops			
J-1 V8Pro (NP)										ORR	Ops													
J-1 V8TOz/LFSO2 (TC)										ORR	Ops													
J-1 Cloud, Aerosol, LST, LSA, and Cryo						CDR													ARR		ORR		Ops	
J-1 Active Fires	CDR																	ARR			Ops			
J-1 Surface Reflectance	CDR																	ARR			Ops			
J-1 GVF	CDR																	ARR			Ops			
J-1 Veg Health	CDR																				ARR			Ops
J-1 Vegetation Indices	CDR																	ARR			Ops			

Note: Blended products (e.g., Ozone, Snow, Biomass Burning, SST, and Microwave TC) planned operational dates in late 2018/early 2019)

Items to be Worked

1. Close-out remaining actions from the Priority 3/4 reallocation CCR so that Ozone and Land products can transition to operations
2. Efficiently transition all users of IDPS-generated EDRs to Enterprise products
3. Retire the IDPS-generated EDRs as quickly as possible to avoid ongoing maintenance costs
4. Proceed with long-term planning for the Enterprise Land products
5. Continue to refine/update products and requirements to meet user needs

Summary

- The transition to enterprise algorithms is making very good progress.
  - Cryosphere, Aerosol, and Cloud products will become operational when NDE 2.0 goes operational
  - Ozone EDR algorithms have been delivered to NDE and await operationalization
  - Land products have clear plans for DAP delivery and operationalization
- We need to start transitioning users IDPS-generated EDRs to the enterprise products now.
  - IDPS-generated EDRs will be terminated after the enterprise products are available and archived, and users are transitioned.
- AMP and PSDI responsibilities will combine (starting in FY2017), and all JPSS algorithms and products will follow SPSRB processes and standards and will be evaluated using consistent maturity standards.

JPSS ASSISTT Overview and STAR Enterprise Algorithm Development

Tom King[2], Walter Wolf[1], Bigyani Das[2], Valerie Mikles[2], Priyanka Roy[2] and Shanna Sampson[2]

[1]NOAA/NESDIS/STAR, College Park, MD 20740 USA
[2]IMSG, College Park, MD 20740, USA

ASSISTT

- Changed team name from AIT to ASSISTT earlier this year
- ASSISTT - Algorithm Scientific Software Integration and System Transition Team
- Name was changed since we do more than algorithm integration
- AIT is part of ASSISTT

ASSISTT works with science teams and the stakeholders to do the following:

- Conduct a standard set of project reviews
- Generate a standard set of documentation
- Stakeholder interaction
  - Requirements development/refinement
- Risk tracking and mitigation
- Code cleanup for:
  - Coding/Security
  - Configuration Management
  - Software Testing & Product Validation
  - Common data formats and metadata (CF & ISO)
  - Standard languages, tools, and libraries
- Early product distribution for user pre-operational readiness
- Delivered Algorithm Package (DAP) delivery

ASSISTT Role

- ASSISTT supports the JPSS algorithms and product transition to operations
- There has been a migration of the IDPS Algorithms to the Enterprise Algorithms
- This migration has brought about a merging of responsibilities across ASSISTT projects
  - JPSS, NDE, and GOES-R

ASSISTT Project Intersection

- The 3 teams intersect because:
  1) JPSS is the mission, project management, funding source, IDPS was where EDRs were generated
  2) The GOES-R efforts are where the Enterprise algorithms and the STAR Algorithm Processing Framework (SAPF) have their origin
  3) NDE is where all these Enterprise algorithms (using the SAPF) are now starting to be run

- Adoption of NDE S-NPP products and Blended products under the ASSISTT umbrella, as well as migrating the EDRs to NDE, has caused a shift in some staff responsibilities

IDPS ASSISTT

- Project Lead – Bigyani Das
  - OMPS SDR and EDR support, Aerosol EDR Support, Cryosphere EDR Support
- QA – Valerie Mikles
- Algorithm Support – Vipuli Dharmawardane
  - CrIS and ATMS SDR Support
- Algorithm Support – Weizhong Chen
  - VIIRS SDR Support, Imagary Support, Cloud Support, Software Installation
- Algorithm Support – Qiang Zhao
  - Land EDR Support
- Testing Support – Kristina Sprietzer
- Configuration Management – Yunhui Zhao
- Documentation Support – Larisa Koval

IDPS Algorithms

- VIIRS SDR
- ATMS SDR
- OMPS SDR
- CrIS SDR
- VIIRS Imagery
- Remaining IDPS EDR algorithms

NDE ASSISTT

- Project Lead – Tom King
- QA – Priyanka Roy
- Algorithm Support – Letitia Soulliard
  - NUCAPS, GCOM
- Algorithm Support – Mike Wilson
  - NUCAPS, GCOM, Surface Reflectance
- Product Tailoring – Yi Song
- Product Monitoring – Peter Keehn
  - Also supports GCOM
- Configuration Management – Yunhui Zhao
- Documentation Support – Larisa Koval

NOAA Unique Algorithms in NDE Plus Enterprise JPSS Algorithms

- NOAA Unique Combined Atmospheric Processing System (NUCAPS)
- CrIS Full Resolution
- CrIS Outgoing Longwave Radiation (OLR)
- Microwave Integrated Retrieval System (MiRS)
- Microwave Tropical Cyclone Products (MTCP)
- Green Vegetation Fraction (GVF)
- Vegetation Health (VH)
- VIIRS Polar Winds (VPW)
- AMSR-2 Products
- Ocean Color (OC)
- Sea Surface Temperature – Advanced Clear-Sky Processor for Oceans (ACSPO)
- Active Fires (AF)
- OMPS Total Ozone (V8TOz)
- OMPS Nadir Profile (V8Pro)
- OMPS Limb Profile
- Surface Reflectance (SR)
- Vegetation Index Products (VI)
- JPSS Risk Reduction "Enterprise" Algorithms

Blended and Tailored

- Blended SST
- Blended Biomass Burning
- Blended Snow and Ice Cover
- Blended Ozone
- Reformatter Toolkit
  - CrIS Radiances (BUFR)
  - ATMS Radiances (BUFR)
  - VIIRS Radiances (BUFR)
  - Nadir Profile Ozone (BUFR)
  - Total Column Ozone (BUFR)
  - OMPS Limb Profile (BUFR)
  - Sea Surface Temperature (BUFR)
  - Aerosol Optical Depth (BUFR)
  - VIIRS Polar Winds (BUFR)
  - Green Vegetation Fraction (GRIB2)
  - AMSR2 Radiances (BUFR)
  - AMSR2 SST (BUFR)
  - AMSR2 Sea Ice (GRIB2)

STAR Algorithm Processing Framework Support for Enterprise Algorithms

- Project Lead – Shanna Sampson
- Integration Lead – Aiwu Li
- QA – Veena Jose
- Algorithm Support – Ruiyue Chen
  - Clouds, Aerosols
- Algorithm Support – Brian Helgans
  - Winds, SST
- Algorithm Support – Qiang Zhao
  - Land
- Algorithm Support – Anil Kapahi
  - Cryosphere
- Framework Developer – Alexander Ken
- Configuration Management – Yunhui Zhao
- Documentation Support – Larisa Koval

JPSS Algorithms in the STAR Algorithm Processing Framework

- Cloud Mask
- Cloud Top Phase
- Cloud Type
- Cloud Top Height
- Cloud Top Temperature
- Cloud Top Pressure
- Cloud Optical Depth
- Cloud Particle Size Distribution
- Cloud Liquid Water
- Cloud Ice Water Path
- Aerosol Detection – Smoke & Dust
- Aerosol Optical Depth
- Aerosol Particle Size
- Volcanic Ash Mass Loading
- Volcanic Ash Height
- Ice Concentration and Cover
- Ice Surface Temperature
- Ice Thickness/Age
- Snow Cover
- Fractional Snow Cover
- Land Surface Temperature
- Surface Albedo
- Cloud Base Height
- VIIRS Polar Winds (VPW)

ASSISTT Goals

- Support teams through the change process for the SDR and EDR algorithms for algorithm updates, bug fixes and LUT updates
  - Extended data processing when needed
  - Guide teams through transition process
  - Prepare Delivered Algorithm Packages

- To be ready to process J1 data using the SDR and EDR algorithms when the J1 data is available

- To run the S-NPP and J1 algorithms in near real-time for validation purposes and support user readiness

- Eventually, to support reprocessing using the EDR algorithms

Life Cycle Processes

- Lifecycle process and change process for IDPS and NDE algorithms are different:
  - JPSS Lifecycle Process
    - Based upon the NASA 7120 and 7150 processes
  - SPSRB Process for algorithms going into NDE
    - http://projects.osd.noaa.gov/SPSRB/design_review_guidance.htm
- Documentation for each process is different

Algorithm Change Steps Are the Same

- Science Teams update their algorithms
- Algorithms are implemented into the offline version of the operational system
- Algorithms are unit tested
- Algorithms are tested on extended data (currently 6 weeks to 3 months)
- Algorithms are tested in near real-time
- Algorithm delivered for operational implementation

Algorithm Testing

- Implemented an HTCondor cluster within STAR to support the algorithm change process and algorithm testing

- Cluster will be used for algorithms testing on extended data (currently 6 weeks to 3 months)

- When the algorithm team gives the go ahead from the extended testing results, then the algorithms will be promoted to near real-time processing on the cluster

More on Cluster Processing

- Will purchase more cores in FY17 to support NRT J1 processing
- Intend to process both S-NPP and J1 algorithms in NRT as well as to support the extended data runs
  - Also running AHI and ABI algorithms in NRT
- Large scale reprocessing is currently not within the cluster capabilities
  - Storage is the limiting factor

Summary

- The main goal is to support the transition to operations of the S-NPP and J1 algorithms
  - Change process
  - Algorithm integration
  - Unit tests
  - Extended runs
  - Near real-time processing of pre-operational algorithm for thorough testing and user support
  - DAP development and support

- Will continue to merge the responsibilities across the ASSISTT

- By working with the Science Teams, ASSISTT will be ready to make J1 algorithm updates ASAP after launch

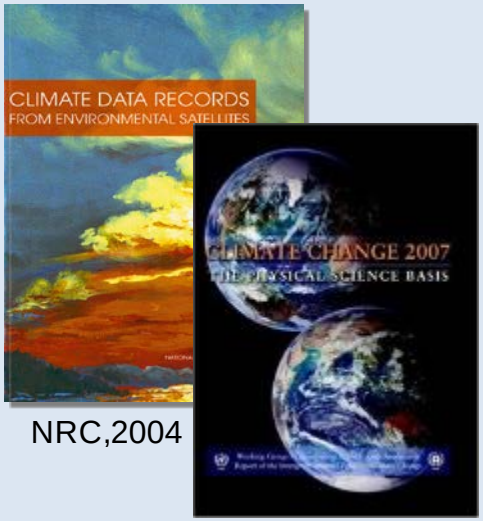
NOAA CDRs: Moving From POES to JPSS

Jeff Privette

Deputy, Center for Weather and Climate
National Centers for Environmental Information

15th Annual Advisory Board Meeting
29 July 2016

Program Genesis



NRC,2004

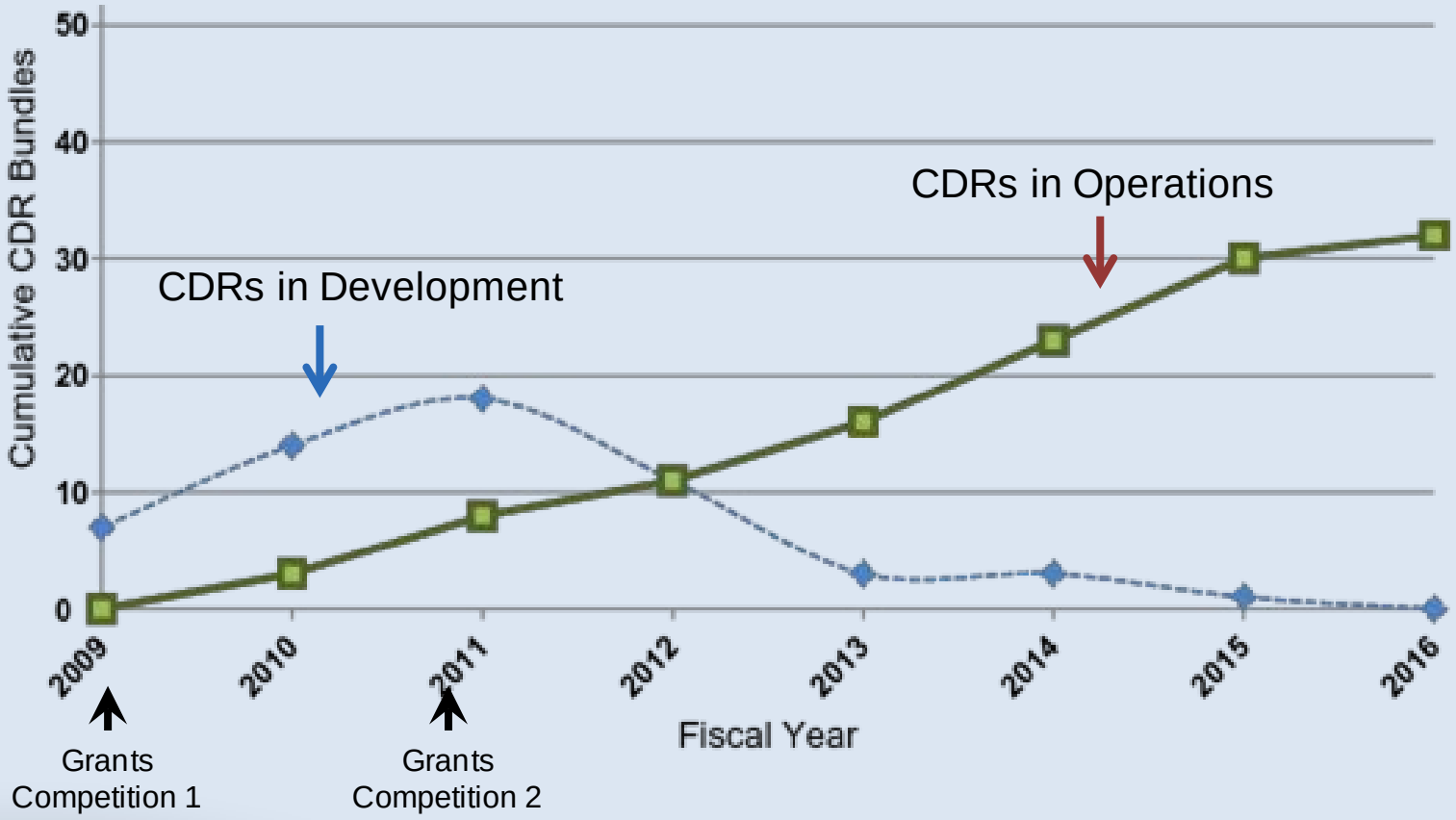
IPCC AR4, 2007

Start: 2010

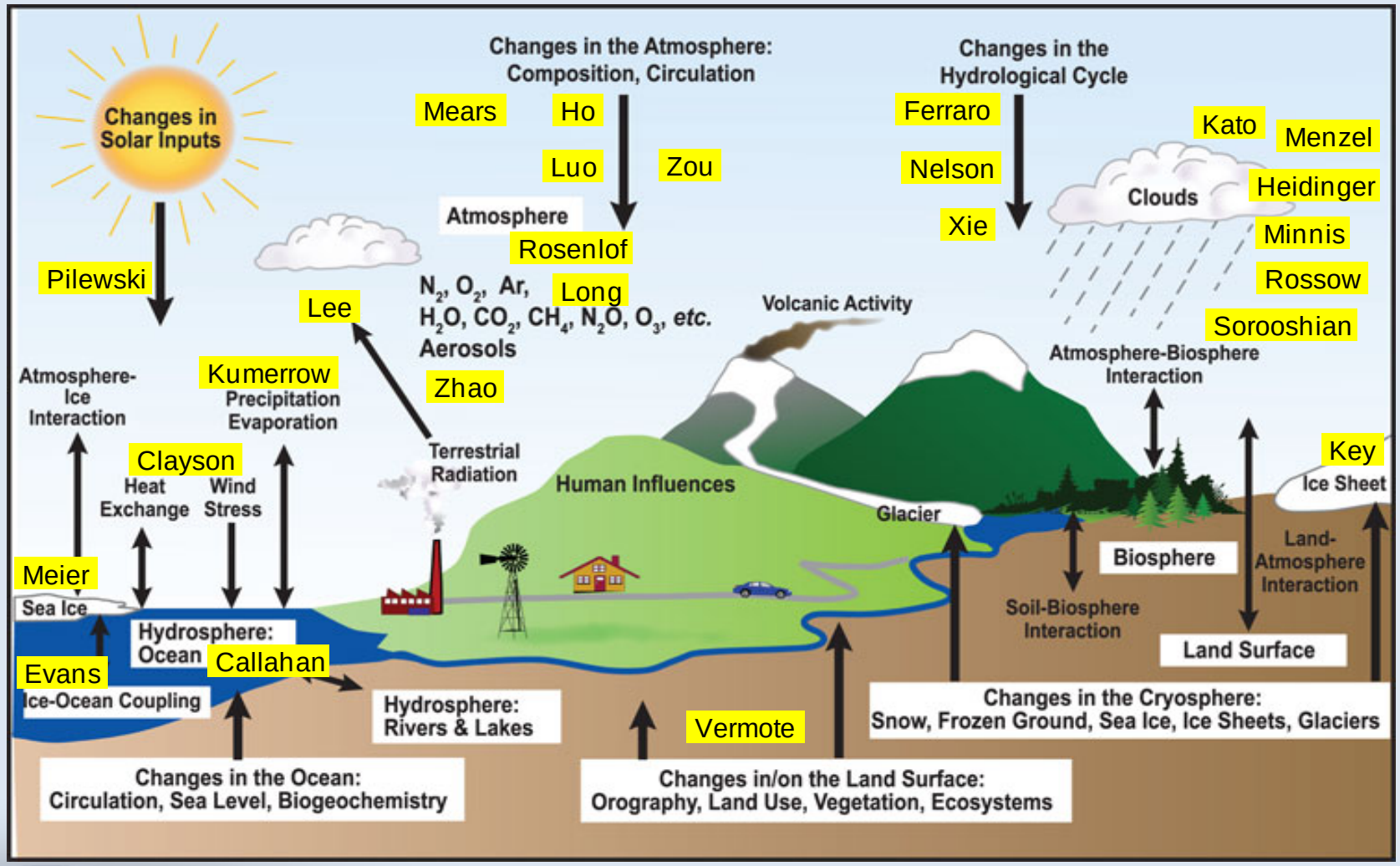
Goal: Develop, sustain and steward long-term homogeneous products in a transparent, cost-effective, and scientifically-defensible manner

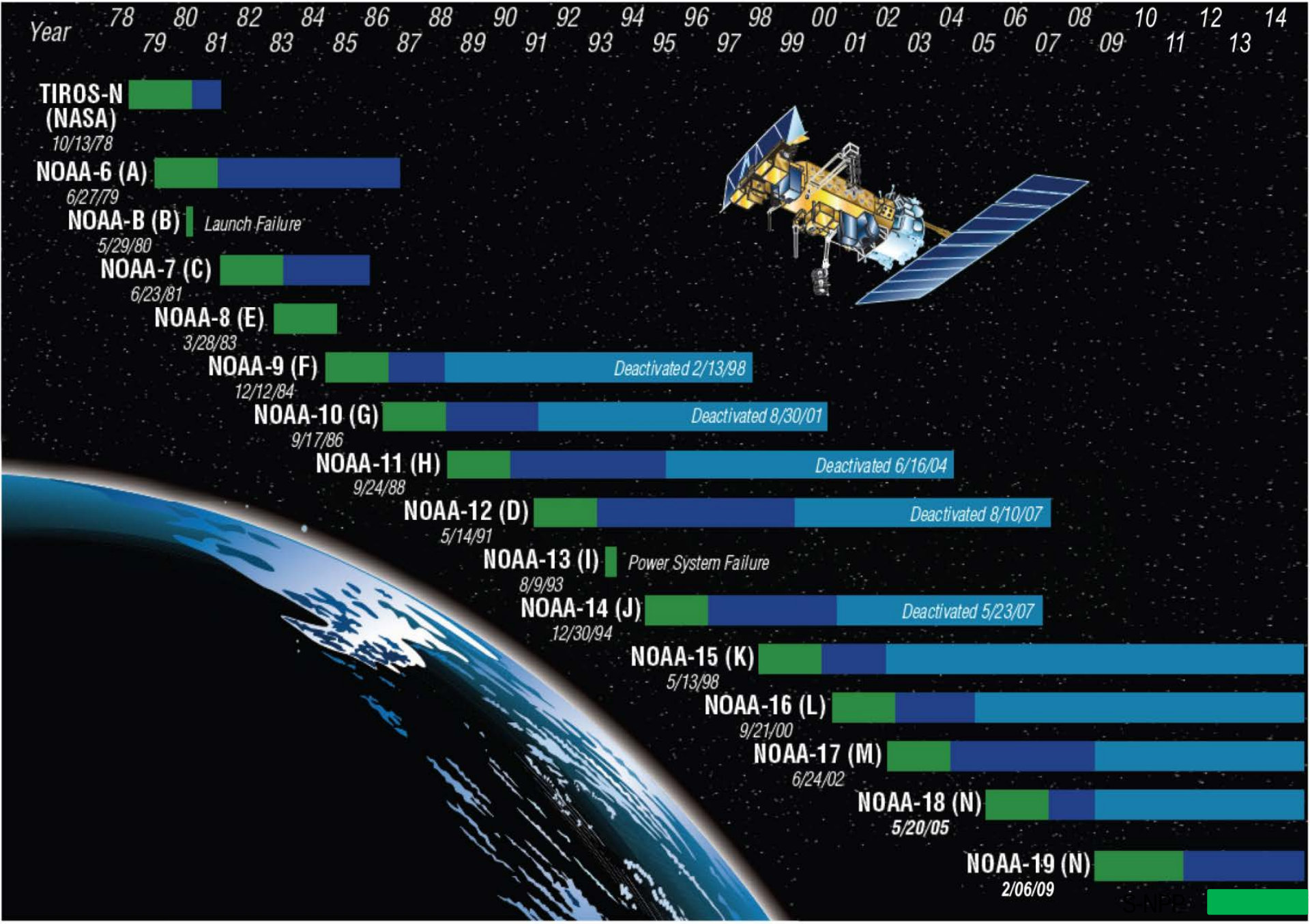
Approach: Select and adapt leading research satellite products and transition to NOAA operations

Nearly All CDR Developments Now Operational



Key System Variables Now Sustained




Year
78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14
TIROS-N (NASA)
10/13/78
NOAA-6 (A)
6/27/79
NOAA-B (B)
Launch Failure
5/29/80
NOAA-7 (C)
6/23/81
NOAA-8 (E)
3/28/83
NOAA-9 (F)
12/12/84
Deactivated 2/13/98
NOAA-10 (G)
9/17/86
Deactivated 8/30/01
NOAA-11 (H)
9/24/88
Deactivated 6/16/04
NOAA-12 (D)
5/14/91
Deactivated 8/10/07
NOAA-13 (I)
8/9/93
Power System Failure
NOAA-14 (J)
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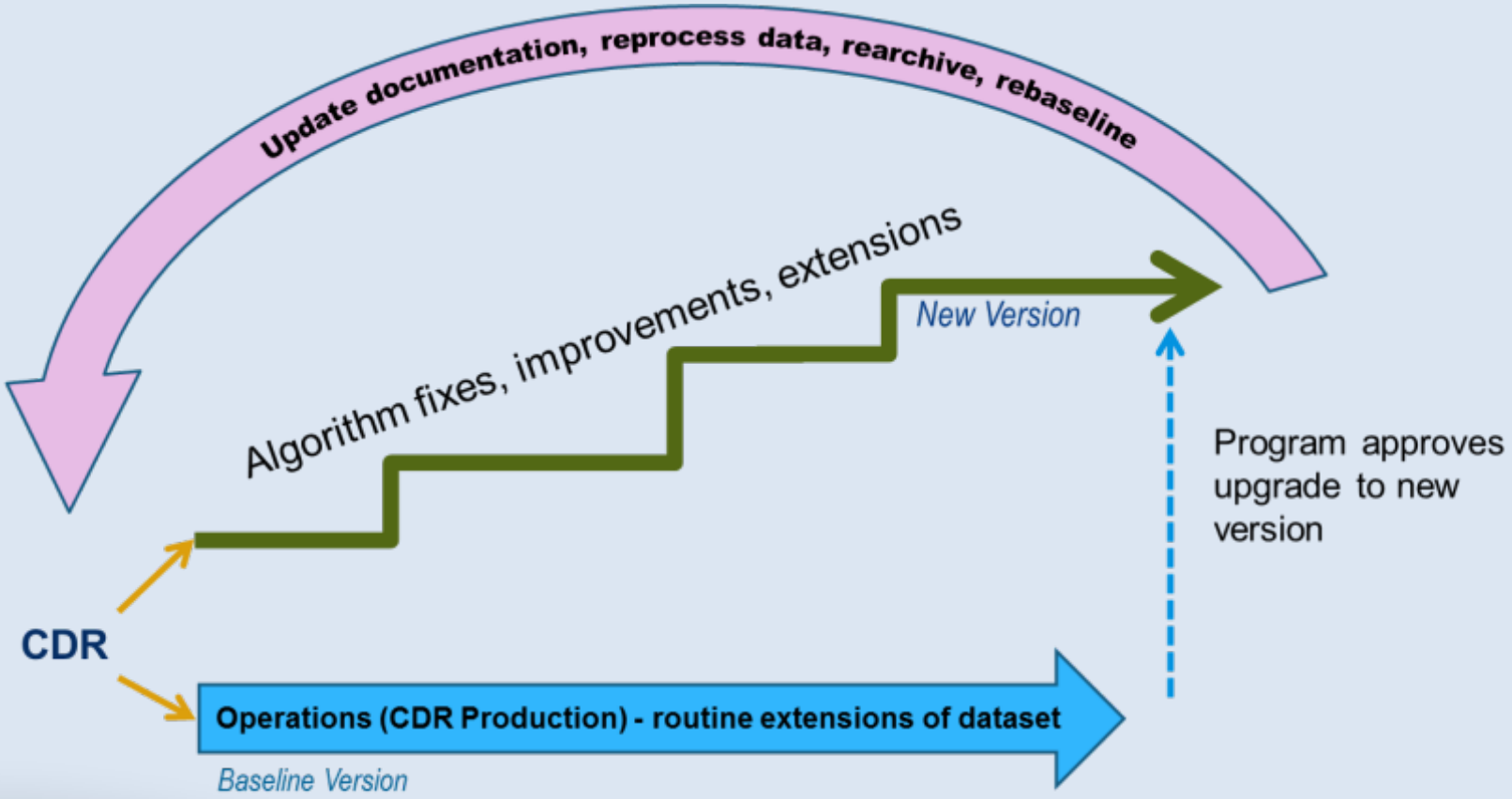
NOAA-15 (K)
5/13/98
NOAA-16 (L)
9/21/00
NOAA-17 (M)
6/24/02
NOAA-18 (N)
5/20/05
NOAA-19 (N)
2/06/09
S-NPP
Expected 2 Year Operational Life
Expected Operational Life (Beyond 2 years)
Expected Backup Operational Life

Baselined Operations, With Algorithm Improvement Options



CDRs Extendable With VIIRS

Thematic CDRs

1. AVHRR Aerosol Optical Thickness
2. AVHRR Cloud Properties - PATMOS-x
3. Ocean Near-surface Atmospheric Properties (derived)
4. Extended AVHRR Polar Pathfinder (APP-x)
5. Sea Surface Temperature - Optimum Interpolation
6. Sea Surface Temperature - Pathfinder
7. Sea Surface Temperature – WHOI (derived)
8. Ocean Heat Fluxes (derived)
9. AVHRR Surface Reflectance
10. Leaf Area Index and FAPAR
11. Normalized Difference Vegetation Index
12. Snow Cover Extent (Northern Hemisphere) (derived)

Fundamental CDR

1. **AVHRR Reflectance - PATMOS-x**
2. **AVHRR Polar Pathfinder (APP)**

CDRs Extendable With CrIS

Thematic CDRs

1. Outgoing Longwave Radiation - Daily
2. Outgoing Longwave Radiation - Monthly
3. Precipitation - PERSIANN-CDR (derived)
4. Geostationary IR Channel Brightness Temperature - GridSat (derived)

Fundamental CDR

1. **HIRS Ch12 Brightness Temperature**

CDRs Extendable With ATMS

Thematic CDRs

1. Mean Layer Temperature - NOAA
2. Mean Layer Temperature - RSS
3. Mean Layer Temperature - UAH
4. Mean Layer Temperature - UCAR (Lower Stratosphere)
5. Mean Layer Temperature - UCAR (Upper Trop & Lower Strat)
6. Precipitation - PERSIANN-CDR (derived)
7. AMSU Brightness Temperature – NOAA (Water Vapor)

Fundamental CDR

1. **MSU Brightness Temperature – NOAA (Static)**

CDRs Extendable With OMPS

Thematic CDRs

1. Ozone – ESRL (Static)

One Approach for Migrating to NPP/JPSS

1. **Designate a CDR JPSS Steering Team**
   - Cross-NOAA user representatives, NCEI User Engagement
   - Remote sensing experts
   - Common-interest partners (STAR, NASA, GSICS, EUMETSAT, Copernicus)

2. **Prioritize CDRs for JPSS-era continuity**
   - Assess partners' products as alternatives

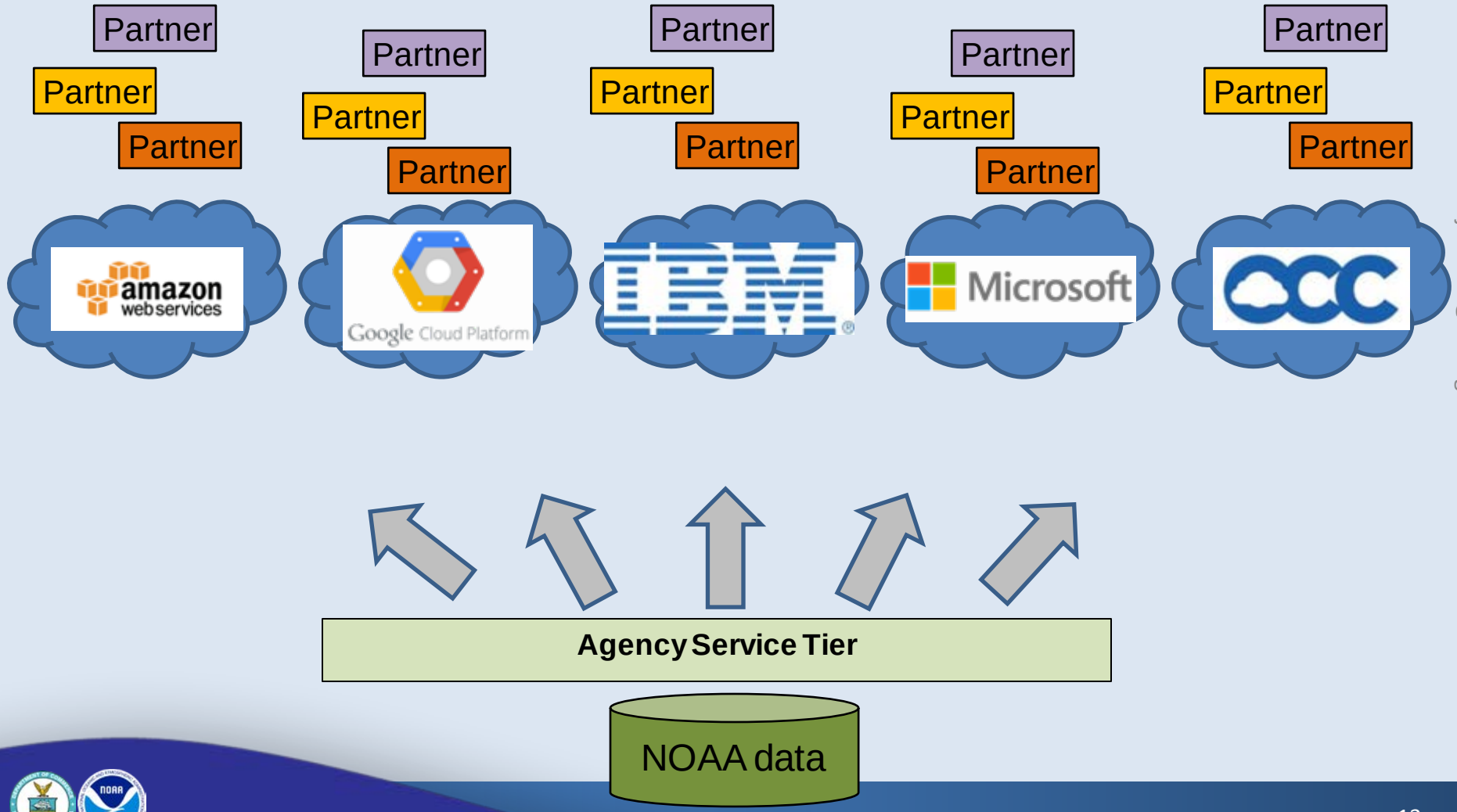
3. **Determine options for extending prioritized CDRs**
   - Adjust JPSS to look like POES (User systems don't change)
   - Improve product by exploiting new JPSS capabilities (User systems change)
   - Assess options for using common FCDRs, including reprocessed SDRs as viable

4. **Negotiate execution and sustainment among partners**

Summary

- **NCEI will soon be sustaining 35 operational CDR bundles (~200 products)**
- **Most rely on POES data and are suitable for extension with NPP/JPSS data**
- **Transition priorities will be developed together with user communities**
- **Transitioning from POES to NPP/JPSS will involve significant effort and resources**
- **Partnering is necessary for long-term affordability**
  - STAR
  - NASA
  - GSICS
  - EUMETSAT
  - Copernicus
  - Others

NOAA Big Data Partners: Alliance Concept



Jeff.deLaBeaujardiere@noaa.gov

2015-09-24

13

Thanks!

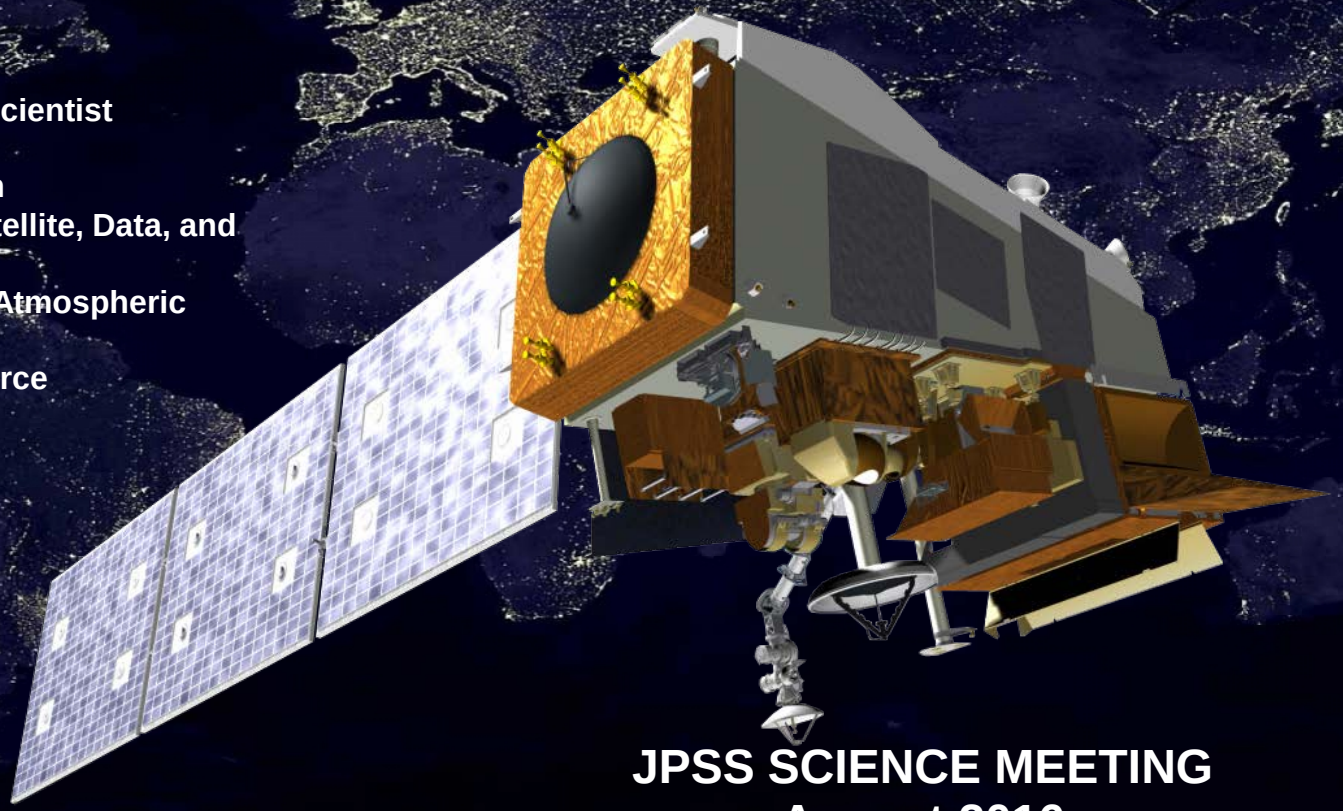
Questions?

Joint Polar Satellite System (JPSS)

JPSS Applications and User Engagements

Mitch Goldberg, Program Scientist

Joint Polar Satellite System
National Environmental Satellite, Data, and Information Service
U.S. National Oceanic and Atmospheric Administration
U.S. Department of Commerce

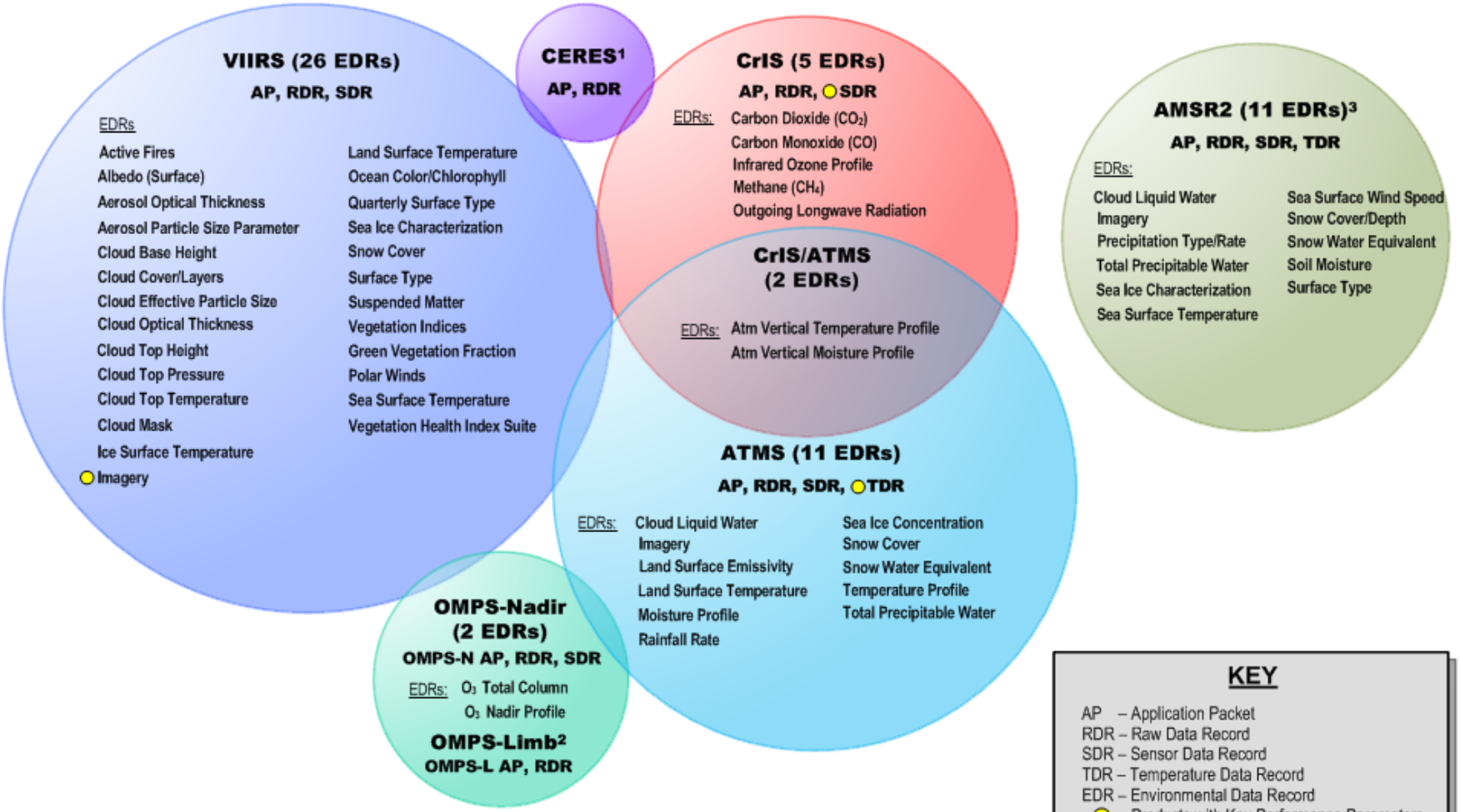


JPSS SCIENCE MEETING
August 2016

www.jpss.noaa.gov

JPSS Program Data Products

JPSS Level 1 Requirements Document, v1.8



KEY

AP – Application Packet
RDR – Raw Data Record
SDR – Sensor Data Record
TDR – Temperature Data Record
EDR – Environmental Data Record
○ – Products with Key Performance Parameters

Notes:

[1]AP and RDR for the JPSS-2 Mission are contingent on NASA manifest of the Radiation Budget Instrument (RBI)

[2]Not applicable to JPSS-1; AP and RDR contingent on NASA manifest of OMPS-Limb on the JPSS-2 Mission

[3]All products dependent on the Global Change Observation Mission (GCOM) provided by the Japan Aerospace Exploration Agency

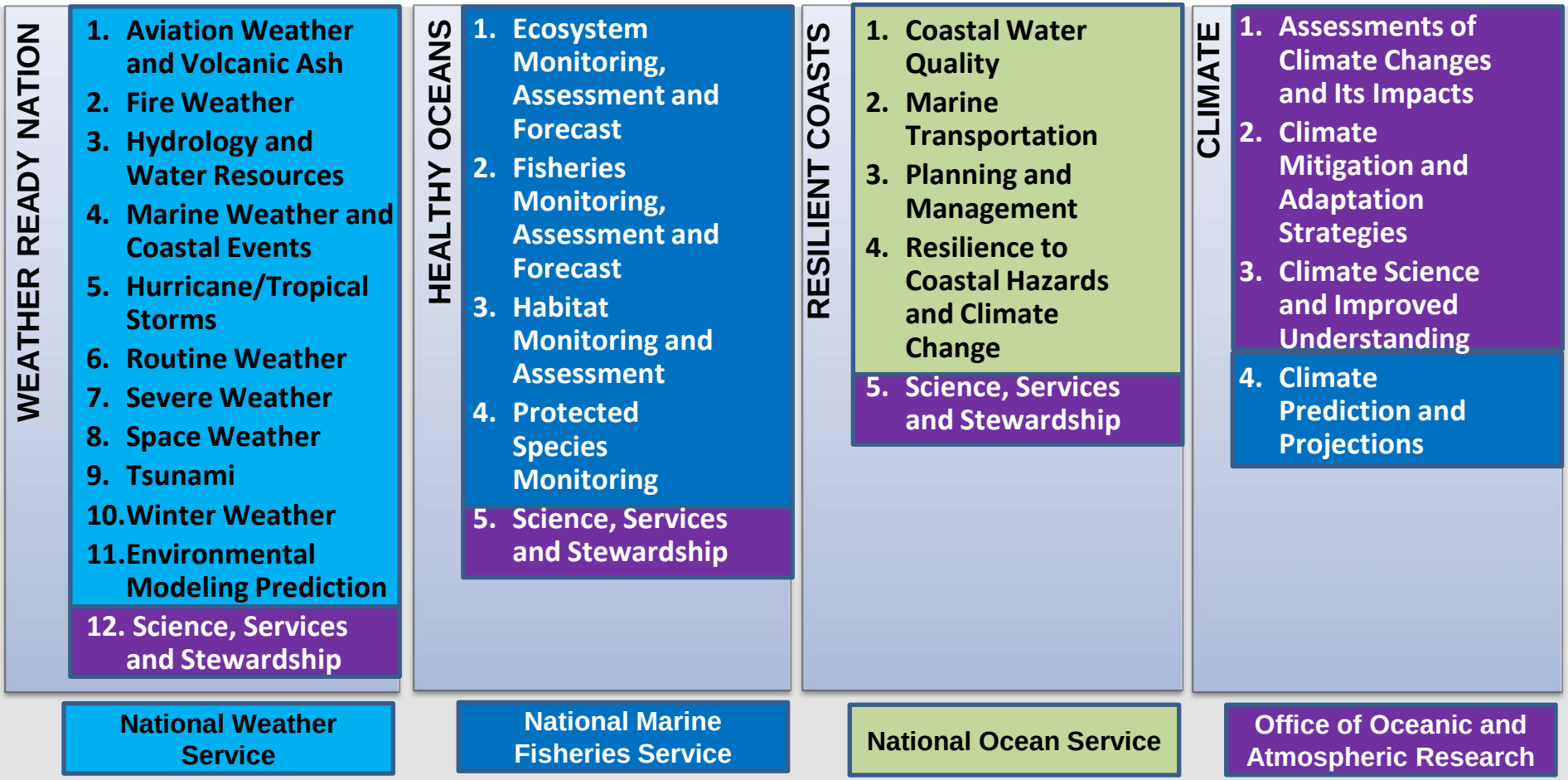
The JPSS Program includes Ground System Support for the Metop, DMSP, and GCOM missions

April 3, 2015

This chart is controlled by JPSS Program Systems Engineering

JPSS-P Rev C.1

Addressing Needs Across NOAA



NOAA Mission Service Areas by Line Office

NOAA End-to-End Science Approach

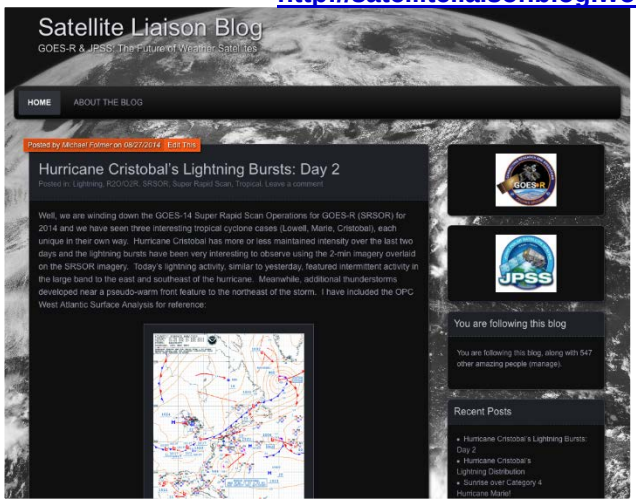
- User Readiness (Proving Ground)
  - User engagement and priorities through JPSS Proving Ground Executive Board and Satellite Development Executive Board and Proving Ground and User Readiness Meeting.
  - Projects to improve NOAA products and services throughout NOAA LOs via infusion of JPSS data into applications (prioritized by PGED/SDEB).
  - Proving Ground Initiative Process for improved user interactions
  - Training for better understanding of how to best use our products in key applications
- New Science (Risk Reduction)
  - To meet user needs (e.g. flood mapping and river ice, improved data fusion of multiple data source)
  - User of Direct Readout to test new algorithms or to further reduce latency.

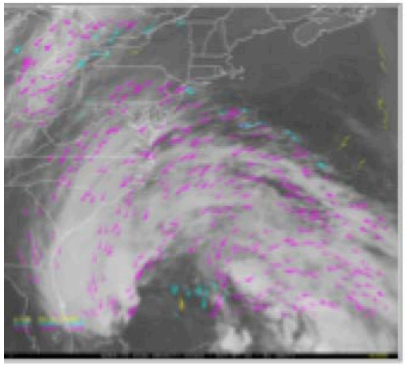
Satellite Proving Grounds

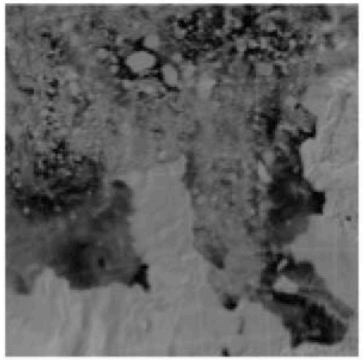
Key Aspects:

- Demonstrations
- Satellite liaisons (subject matter experts) at NWS National Centers
- Develop training for users
- International Projects
- Visiting Scientist Program

http://satelliteliaisonblog.wordpress.com

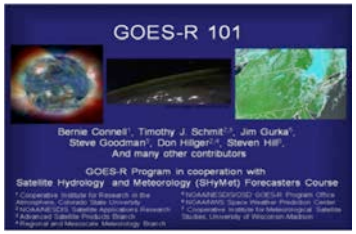






S-NPP Day/Night Band
Ice Detection

Training and Education



GOES-R Online Training Modules (COMET)

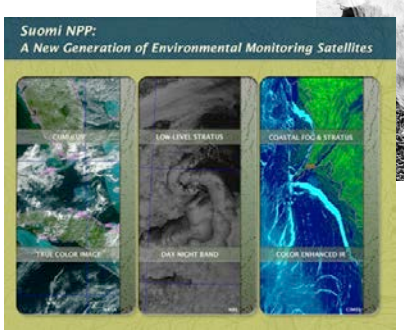
- GOES-R GLM: Introduction to the Geostationary Lightning Mapper
- How Satellite Observations Impact NWP
- GOES-R ABI: Next Generation Satellite Imaging
- GOES-R: Benefits of Next-Generation Environmental Monitoring
- Satellite Hydrology and Meteorology for Forecasters (SHyMet)
- SPoRT product training modules
- VISIT Training Resources
- GOES-R: beneficios de la observación ambiental de próxima generación
  Suomi NPP: Una nueva generación de satélites de observación ambiental
- Numerous other training modules in Spanish at http://bit.ly/COMETspanish

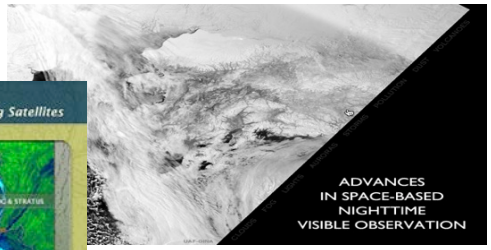
Printed Materials

- ABI Bands Quick Information Guides
- GOES-R Fact Sheets (18)
- User Readiness Plan
- GRB Downlink Specifications and Product Users Guide
- Proving Ground Demonstration Final Reports and Annual Reports

JPSS COMET Online Training Modules

- Suomi NPP
- Advances in Space-Based Nighttime Visible Imagery (VIIRS Day Night Band)
- Remote Sensing Using Satellite, 2nd Edition (COMET)
- Multispectral Satellite Applications: RGB Products Explained
- Coming attractions from COMET:
  - Polar Sat updates on hyperspectral, wildland fires, and VIIRS
  - Nighttime Polar Applications Module
  - Satellite Data Informing NWP
  - Satellite Feature ID: Three Dimensionality of Water Vapor





Proving Ground Initiatives

- What is an initiative? An interagency group of developers and operational users that frequently interact in a structured forum to address forecast and mission support challenges in NOAA operational focus areas.
- Initiative activities
  - Products/capabilities are evaluated to ensure their optimal use in these focus areas.
  - Based on user feedback, changes to these capabilities are considered to increase their effectiveness
  - Actions to transition these capabilities to user operations are identified and implemented
- Why are initiatives successful?
  - Well defined objectives established and specific actions worked
  - NOAA stakeholders are actively participating
  - Products and capabilities are evaluated in operational environments
  - Monthly and bi-monthly meetings ensure proposed improvements can be worked on and then implemented quickly

PGRR Proving Ground Initiatives

- River Ice and Flooding
- Fire and Smoke (Aerosols)
- Sounding Applications
- NWP Data Assimilation
- Imagery/Nowcasting
- Ocean and Coastal
- Hydrology
- Arctic
- Land Data Assimilation
- Atmospheric Chemistry

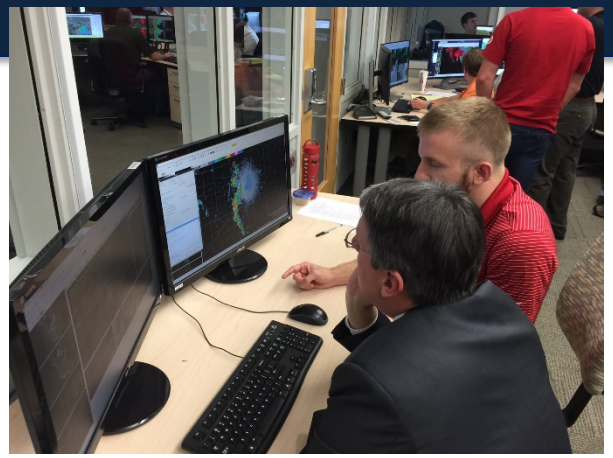
Soundings and Fire/Smoke Initiatives

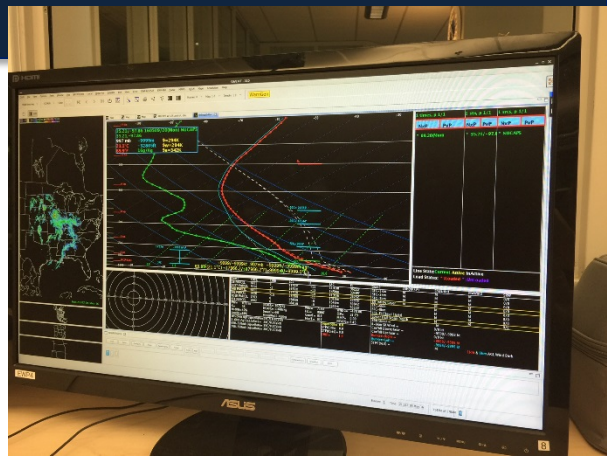
Sounding Products

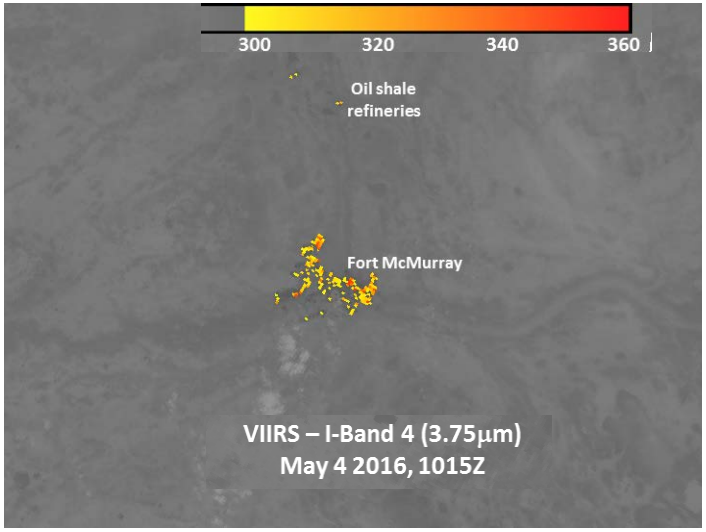
- On AWIPS and AWIPS Thin Client
- Demonstrations with operational forecasters at 2015 & 2016 Spring Experiment

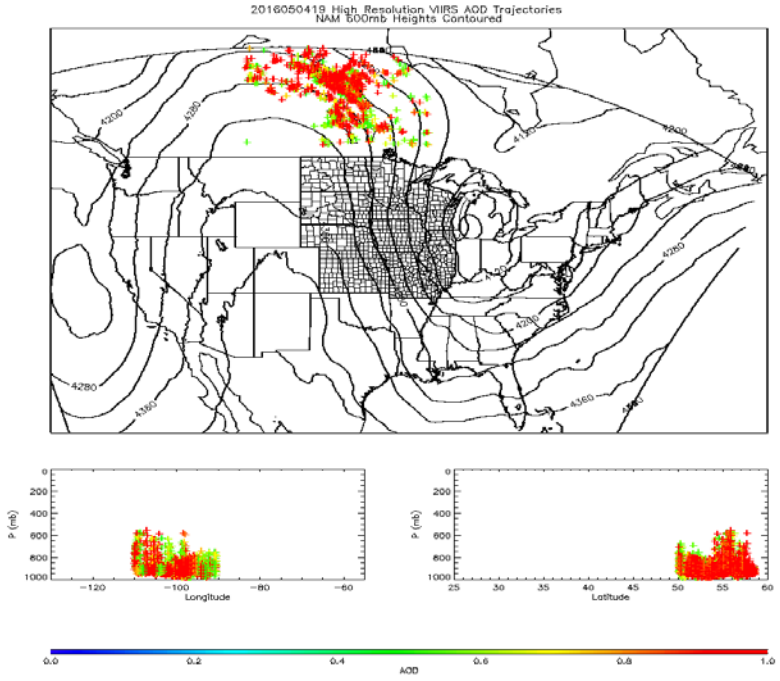
Imagery

- NCC/DNB now on AWIPS
- Active fires and smoke forecasting







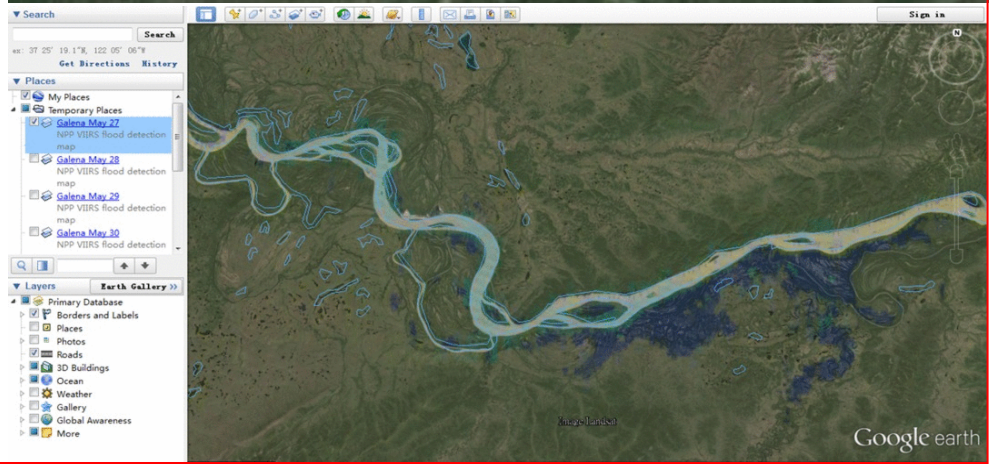


High resolution (NAM 3km) trajectory forecast Fort McMurray Wildfire May 04, 2016

First Initiative:
VIIRS flood mapping and river ice products with NWS River Forecast Centers (RFCs) (Alaska Pacific, North Central and Ohio River)

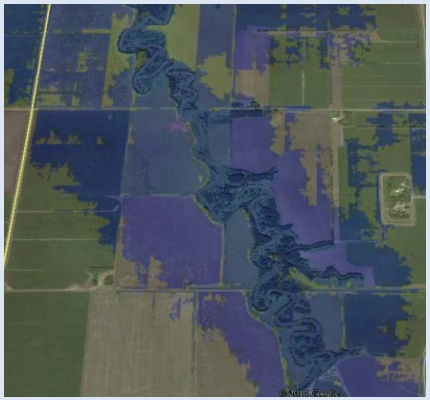
JPSS Proving Ground presented flood map and river ice examples to RFC's and received strong user support for further evaluation.

- JPSS PG established an operational demonstration work plan with the RFCs which included implementation of algorithm in CSPP (direct readout), experimental products in AWIPS and assessment from users (RFCs) including validation with airborne imagery.



- VIIRS can identify river ice jams which can lead to large flood events
- Flooding from ice jams can occur in a very short time
- Flooding can occur from snow melt and heavy rains

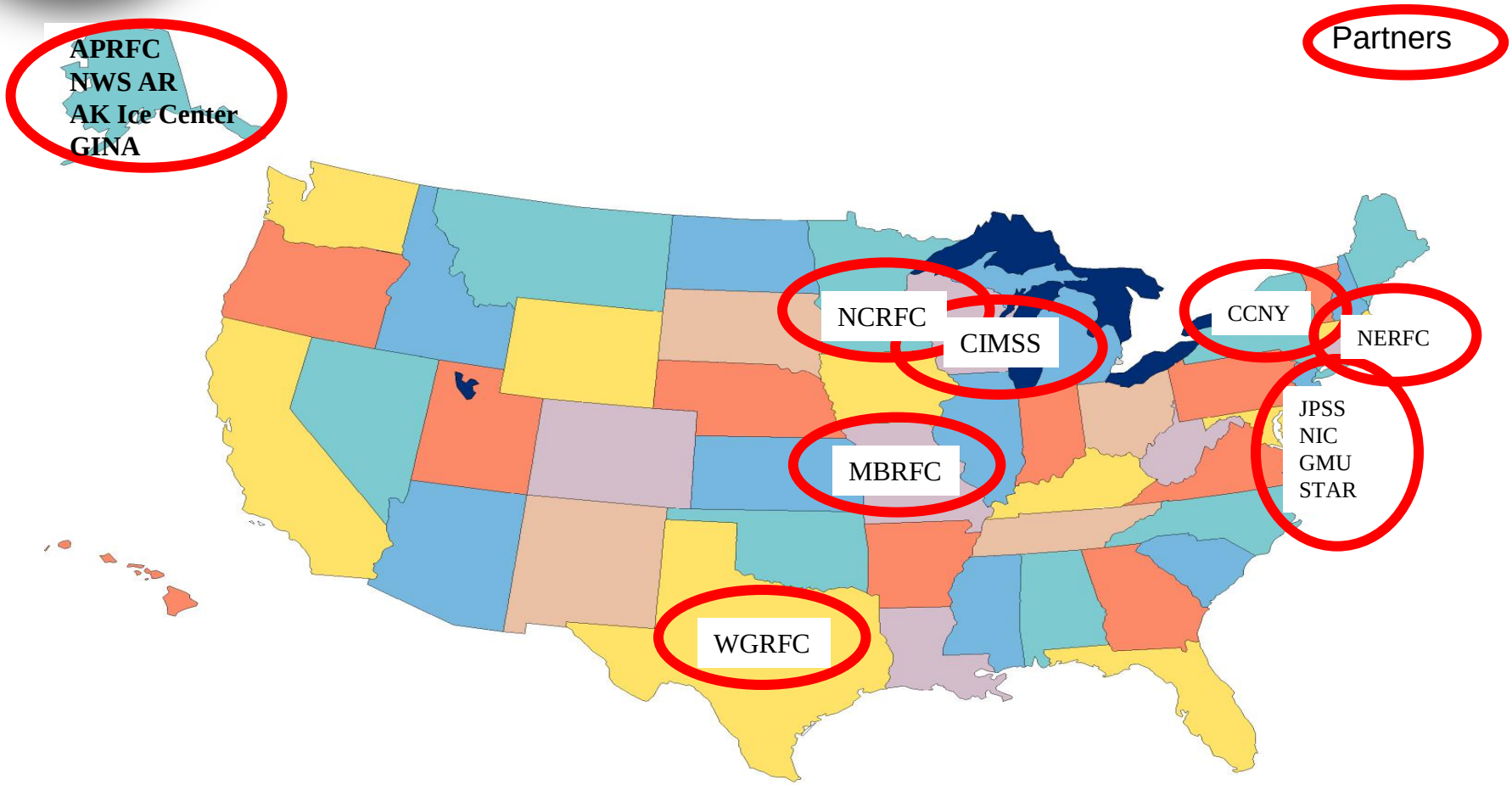
April 15, 2014
Red River Flooding from snow melt



Feedback from the RFCs

- *"River ice vs no ice detection appears excellent"*
- *"Prove useful delineating area of active snowmelt at multiple basin scales"*
- *"All RFCs identified significant value and future potential for river forecasting applications"*
- *"Color coded products with overlays are easily interpreted by forecasters"*
- *"Will formally request product to become operational"*

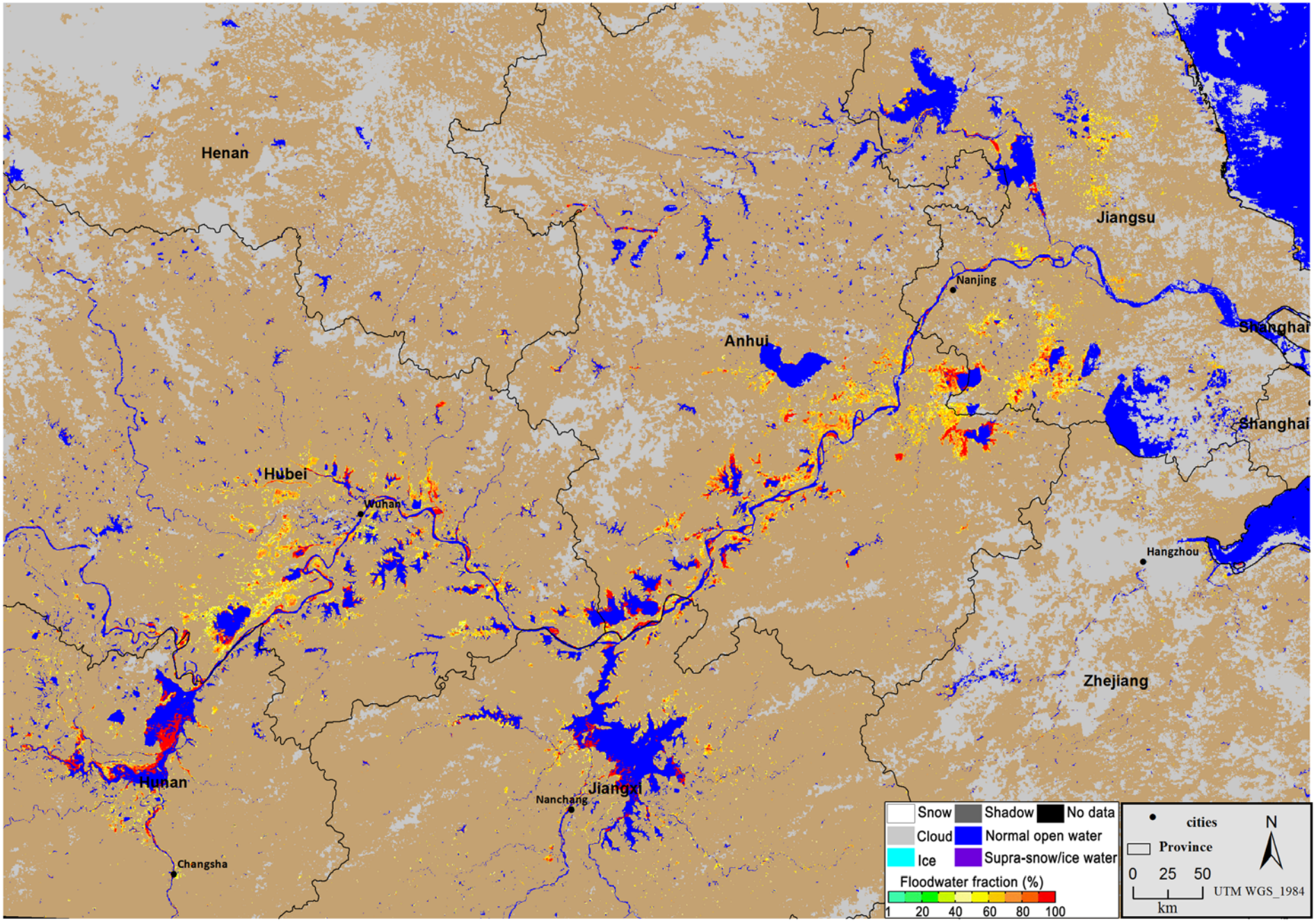
River Ice & Flooding Initiative



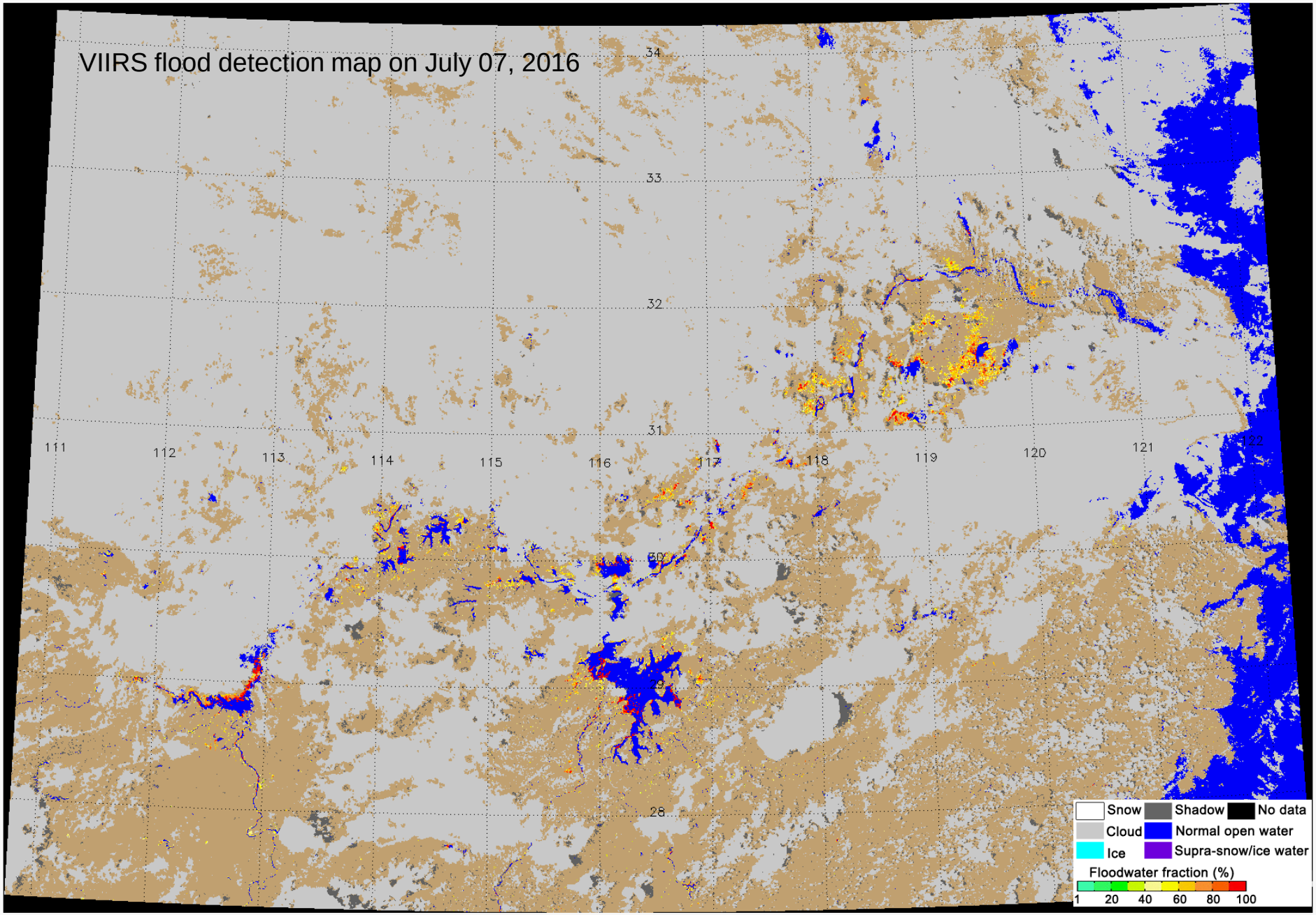
Produced by the Cartographic Research Lab
University of Alabama

SNPP/VIIRS Automatic Flood Detection Map in Southern China

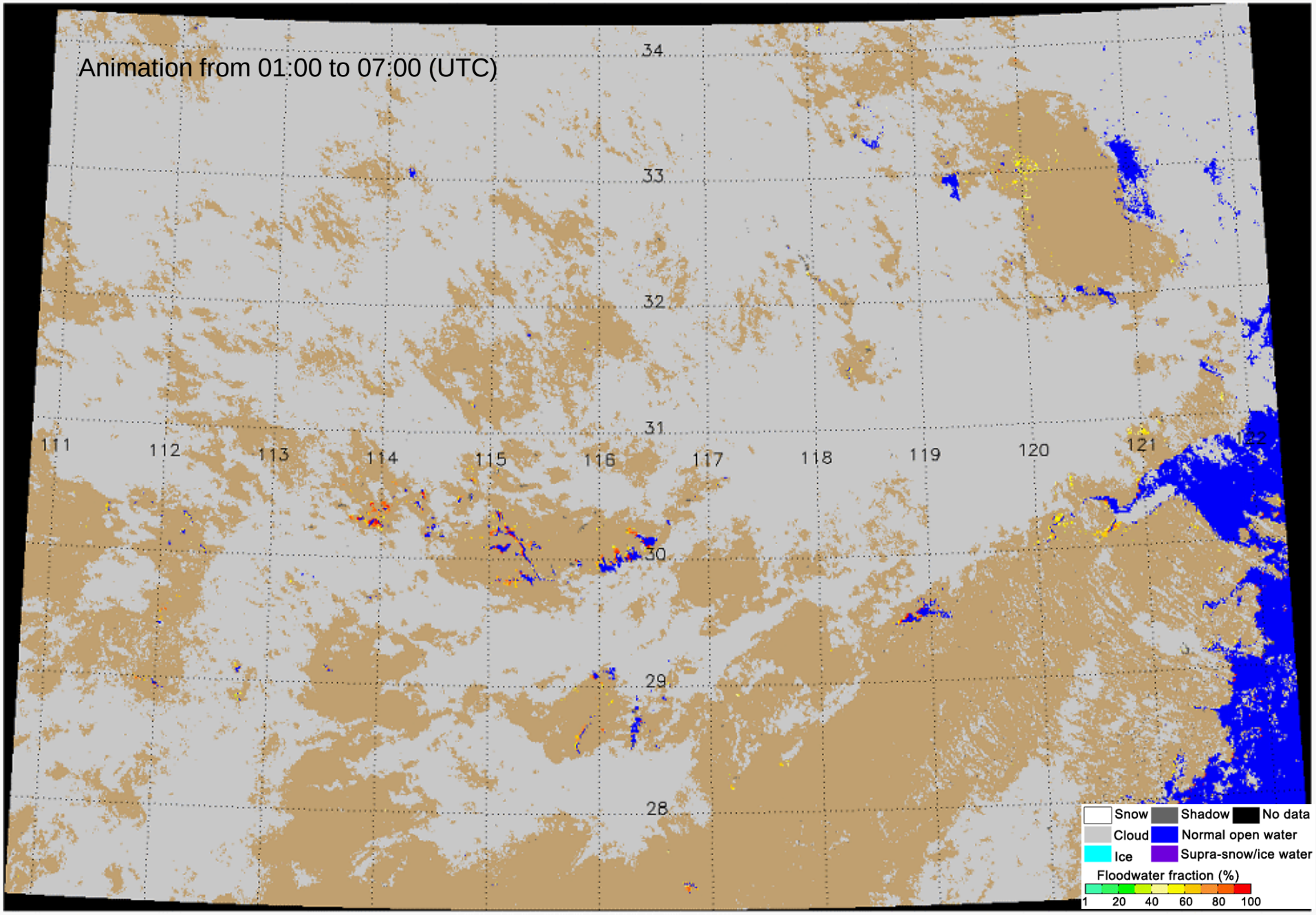
July 07 to July 09, 2016



SNPP/VIIRS Flood Detection Map 20160707 04:43(UTC)

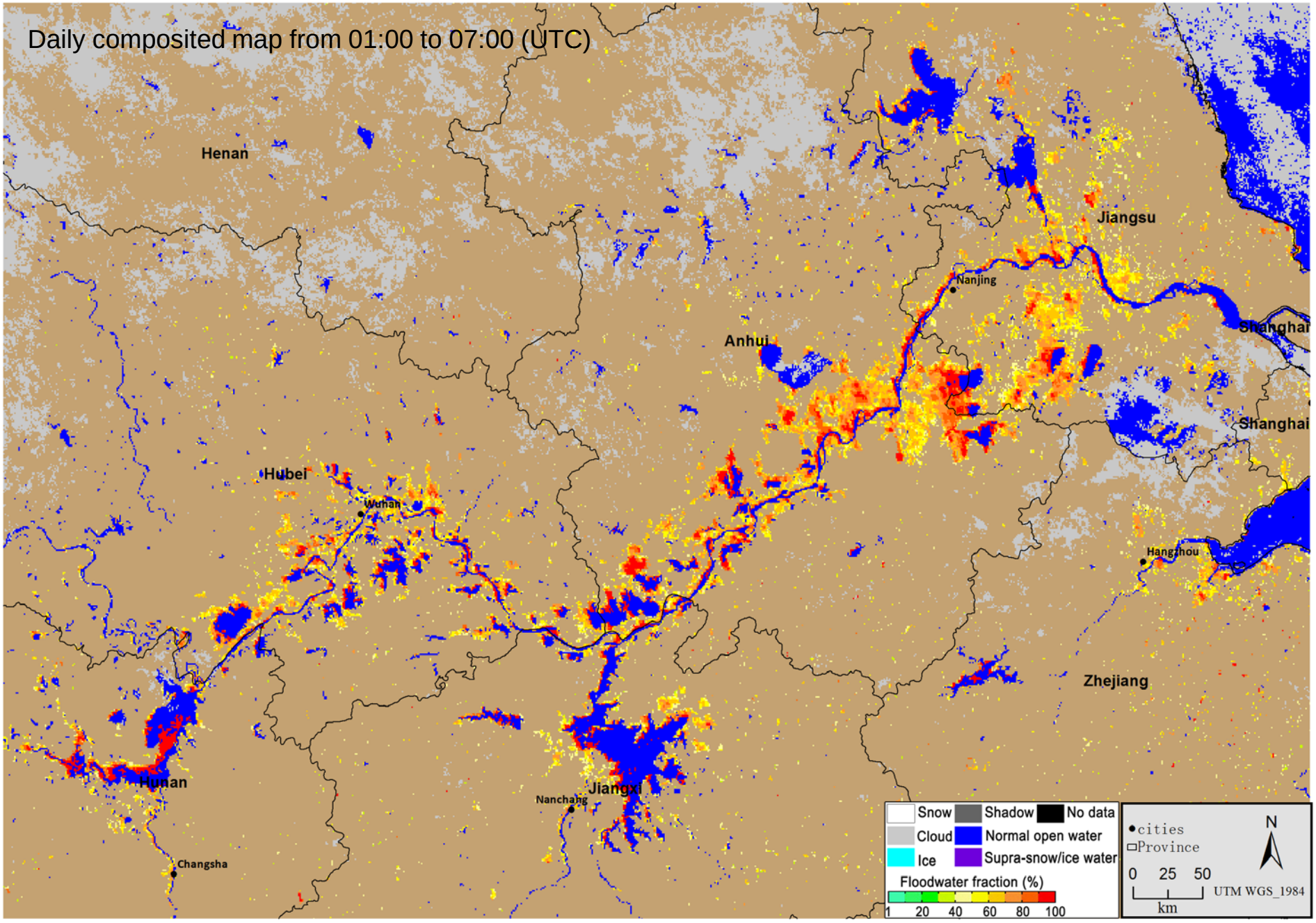


HIMAWARI-8 Flood Detection Map 20160707 01:00(UTC)



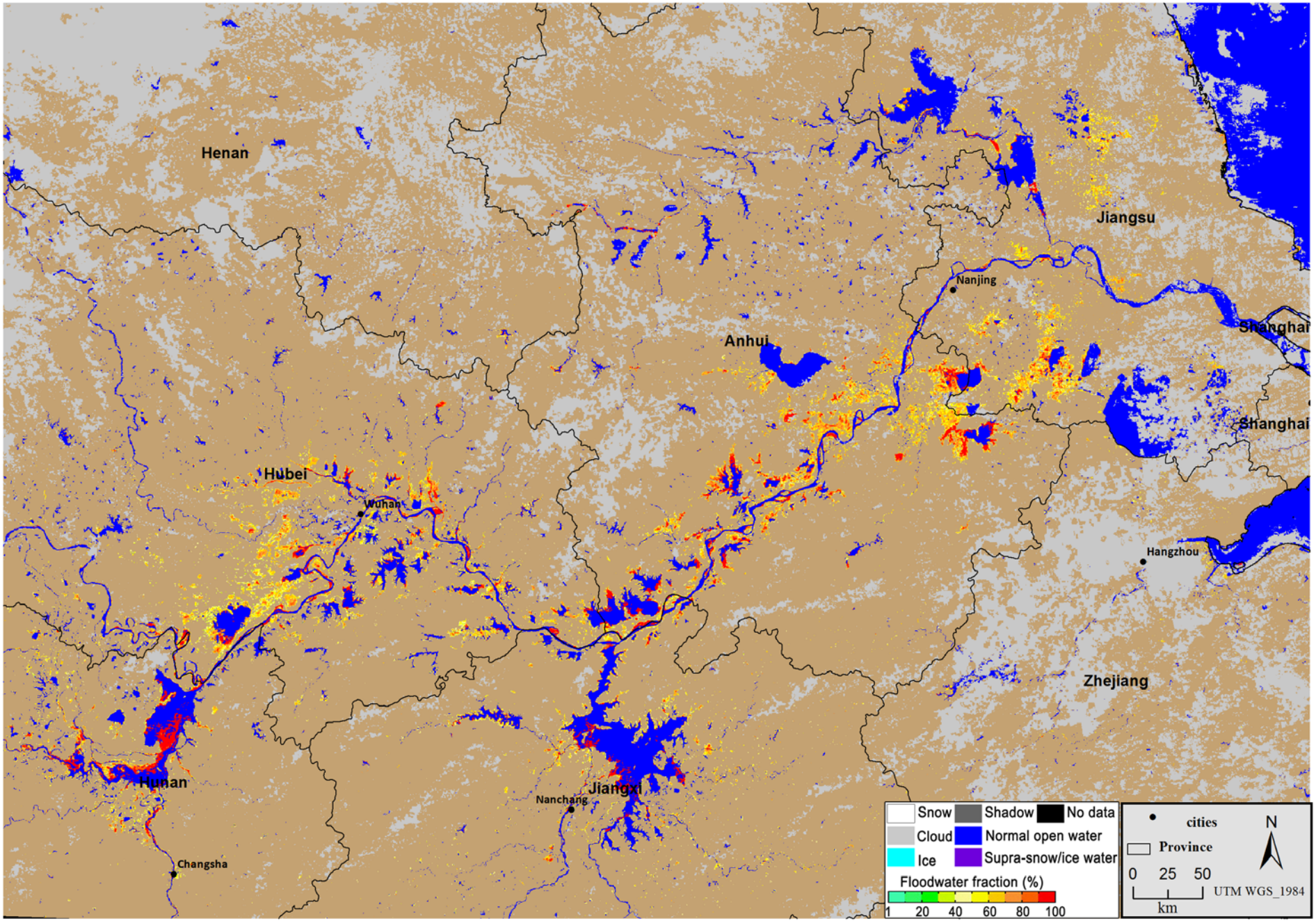
HIMAWARI-8 Automatic Flood Detection Map in Southern China

July 07, 2016



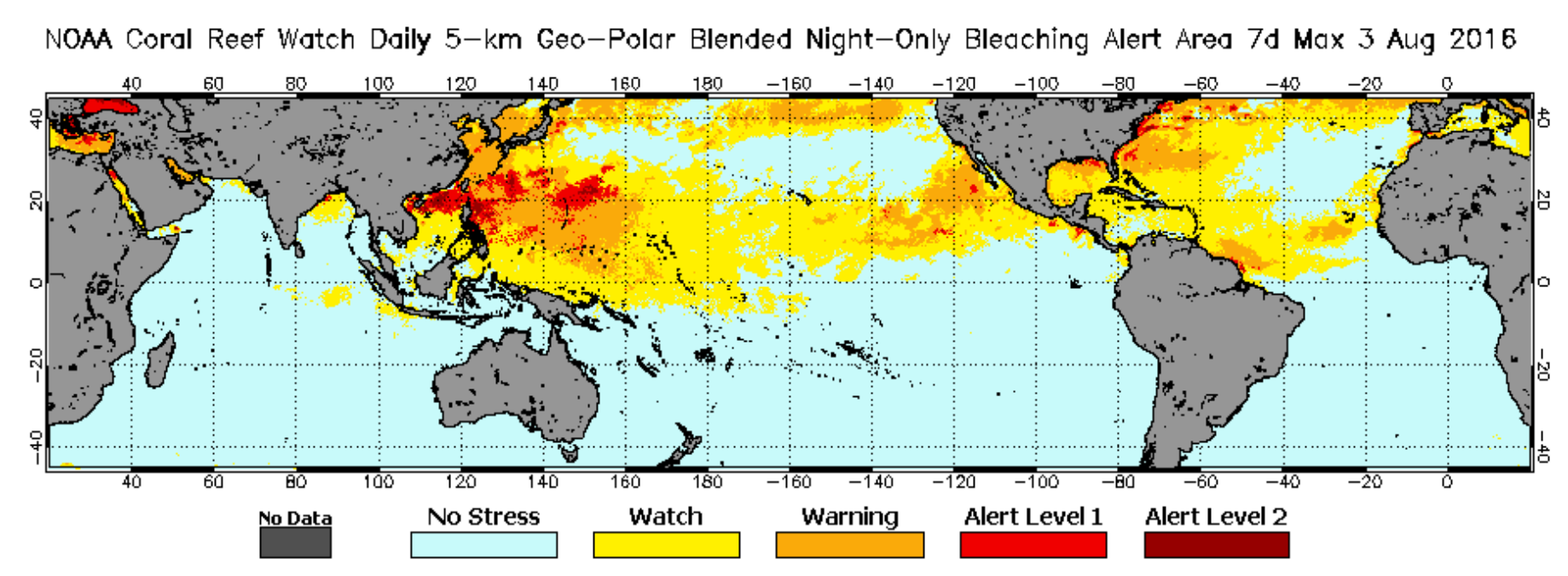
SNPP/VIIRS Automatic Flood Detection Map in Southern China

July 07 to July 09, 2016



STAR JPSS Oceans

VIIRS SST User: NESDIS & NOAA Coral Reef Conversation Program

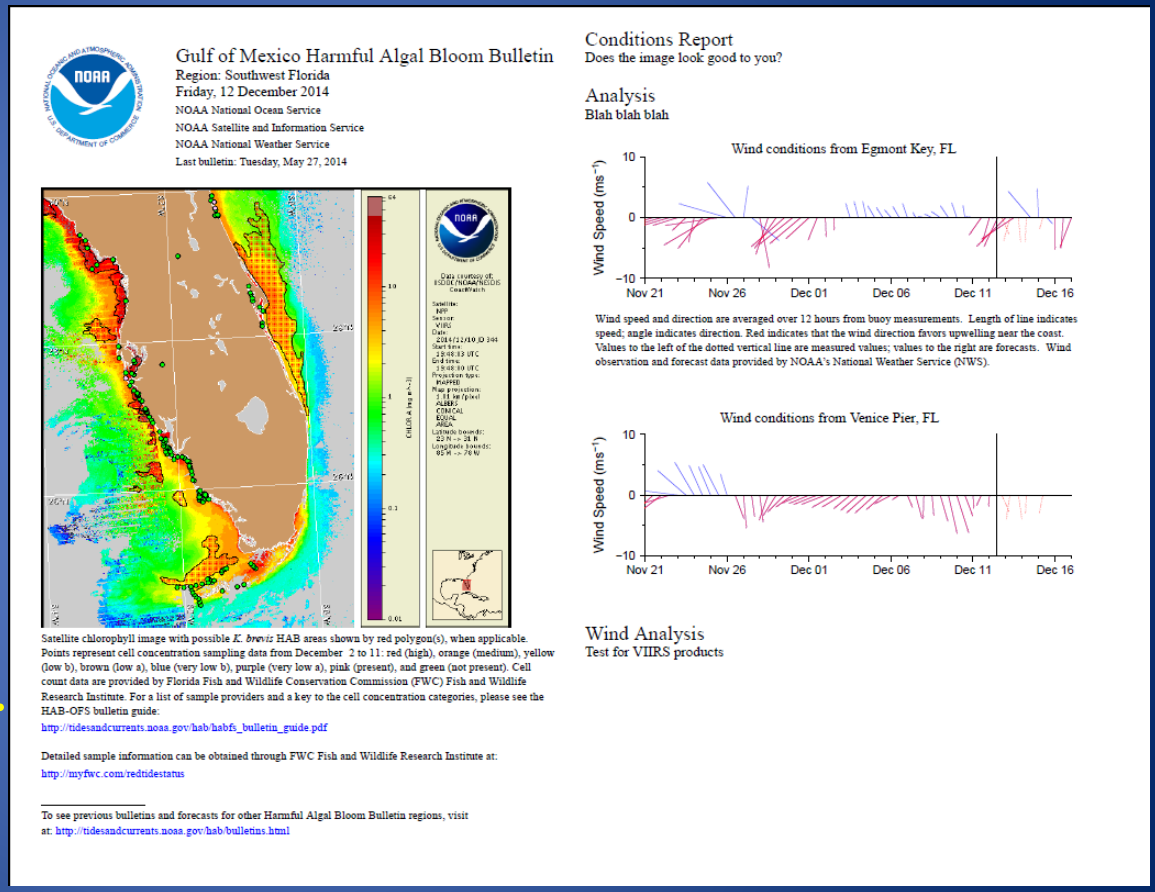


… to generate a new climatology for their bleaching alert and monitoring products for coral reef managers around the globe.

STAR JPSS Oceans

VIIRS Ocean Color User: NOS

- JPSS PGRR Program has supported integration of VIIRS ocean color data into NOS HAB bulletins.
- Currently testing Science Quality dataset to better interpret NRT data stream.



Gulf of Mexico Harmful Algal Bloom Bulletin
Region: Southwest Florida
Friday, 12 December 2014
NOAA National Ocean Service
NOAA Satellite and Information Service
NOAA National Weather Service
Last bulletin: Tuesday, May 27, 2014

Satellite chlorophyll image with possible *K. brevis* HAB areas shown by red polygon(s), when applicable. Points represent cell concentration sampling data from December 2 to 11: red (high), orange (medium), yellow (low b), brown (low a), blue (very low b), purple (very low a), pink (present), and green (not present). Cell count data are provided by Florida Fish and Wildlife Conservation Commission (FWC) Fish and Wildlife Research Institute. For a list of sample providers and a key to the cell concentration categories, please see the HAB-OFS bulletin guide:
http://tidesandcurrents.noaa.gov/hab/habfs_bulletin_guide.pdf

Detailed sample information can be obtained through FWC Fish and Wildlife Research Institute at:
http://myfwc.com/redtidestatus

To see previous bulletins and forecasts for other Harmful Algal Bloom Bulletin regions, visit at: http://tidesandcurrents.noaa.gov/hab/bulletins.html

Conditions Report
Does the image look good to you?

Analysis
Blah blah blah

Wind conditions from Egmont Key, FL

Wind Speed (ms⁻¹)
10
0
-10
Nov 21 Nov 26 Dec 01 Dec 06 Dec 11 Dec 16

Wind speed and direction are averaged over 12 hours from buoy measurements. Length of line indicates speed; angle indicates direction. Red indicates that the wind direction favors upwelling near the coast. Values to the left of the dotted vertical line are measured values; values to the right are forecasts. Wind observation and forecast data provided by NOAA's National Weather Service (NWS).

Wind conditions from Venice Pier, FL

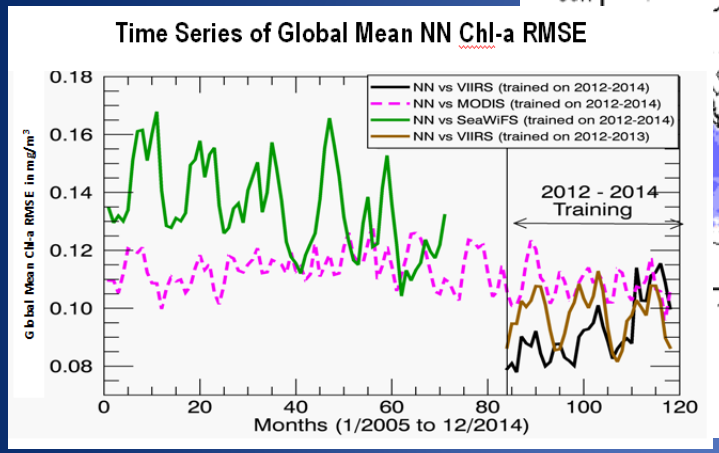
Wind Speed (ms⁻¹)
10
0
-10
Nov 21 Nov 26 Dec 01 Dec 06 Dec 11 Dec 16

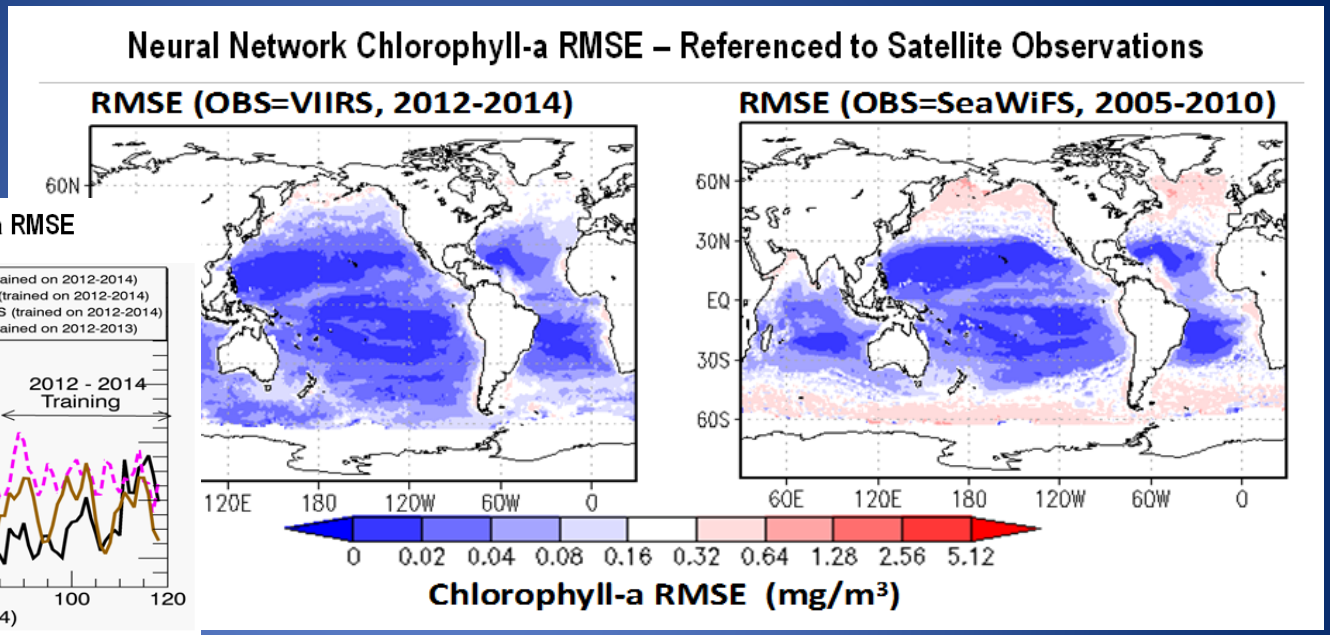
Wind Analysis
Test for VIIRS products

NOAA CoastWatch is working with NOS as part of the NOAA Ecological Forecasting Initiative

STAR JPSS Oceans

VIIRS Ocean Color
User: NWS

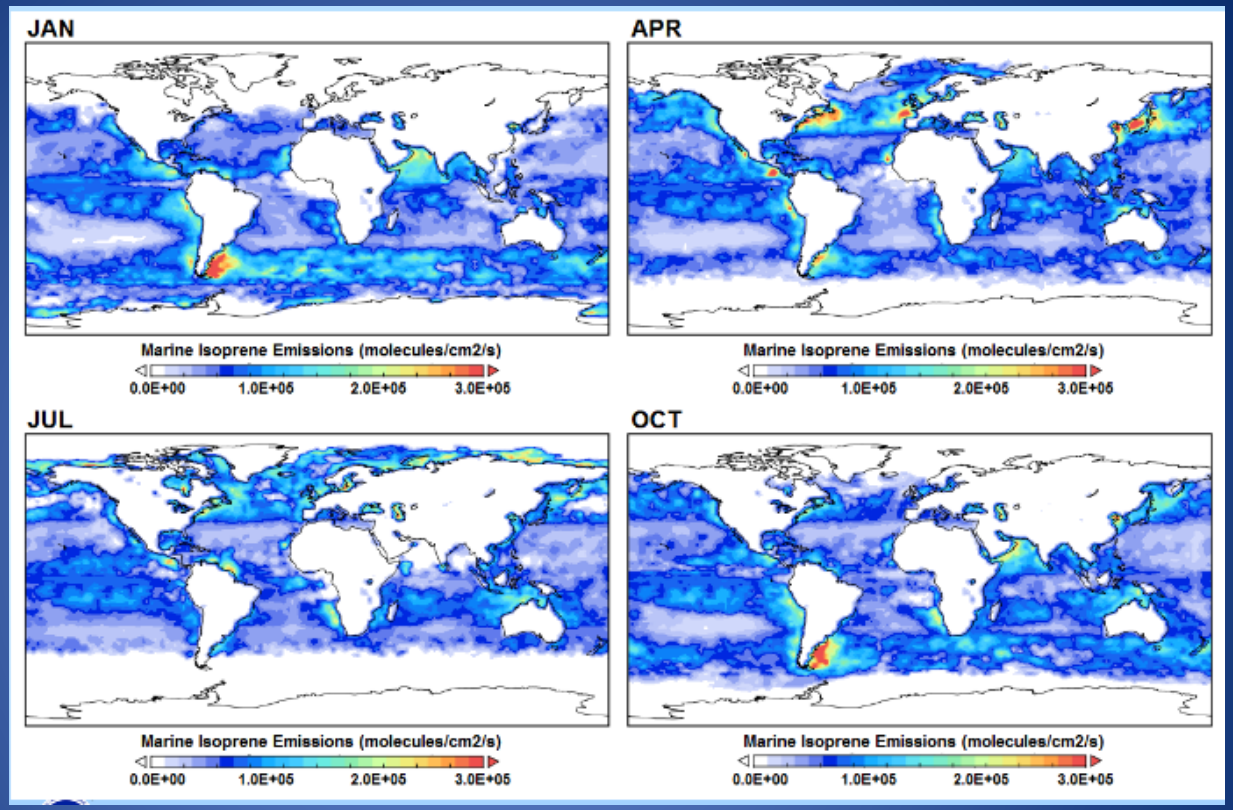




NWS/NCEP/EMC is using VIIRS Ocean Color to train a neural network to estimate gap-free, consistent ocean color fields (e.g., chlorophyll-a) to be assimilated into a pre-operational environment for NOAA's operational ocean models (HYCOM, MOM4).
(And see Kim et al. at OC Breakout, Wednesday afternoon.)

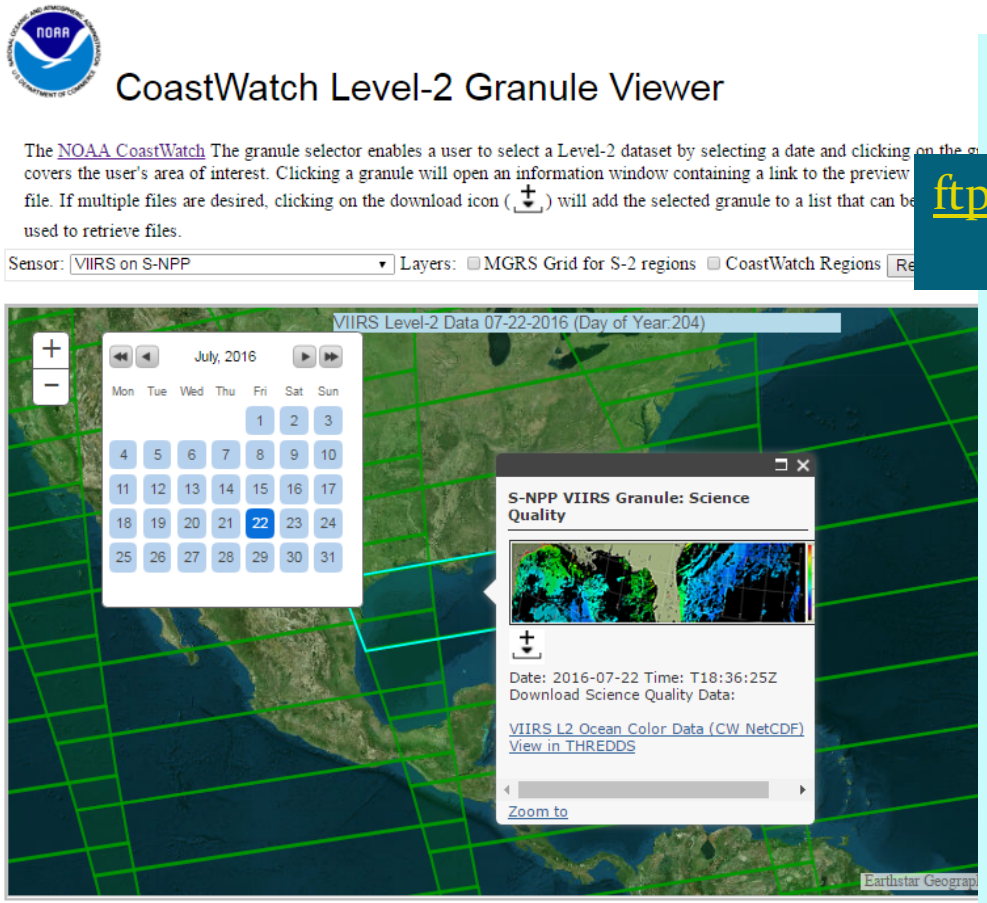
STAR JPSS Oceans

VIIRS Ocean Color User: OAR



The **NOAA Air Resources Laboratory** (OAR) derives the global distribution of marine isoprene which is then incorporated into emission models for the National Air Quality Forecasting Capability (NAQFC).

Science Quality 'Life-of-Mission'



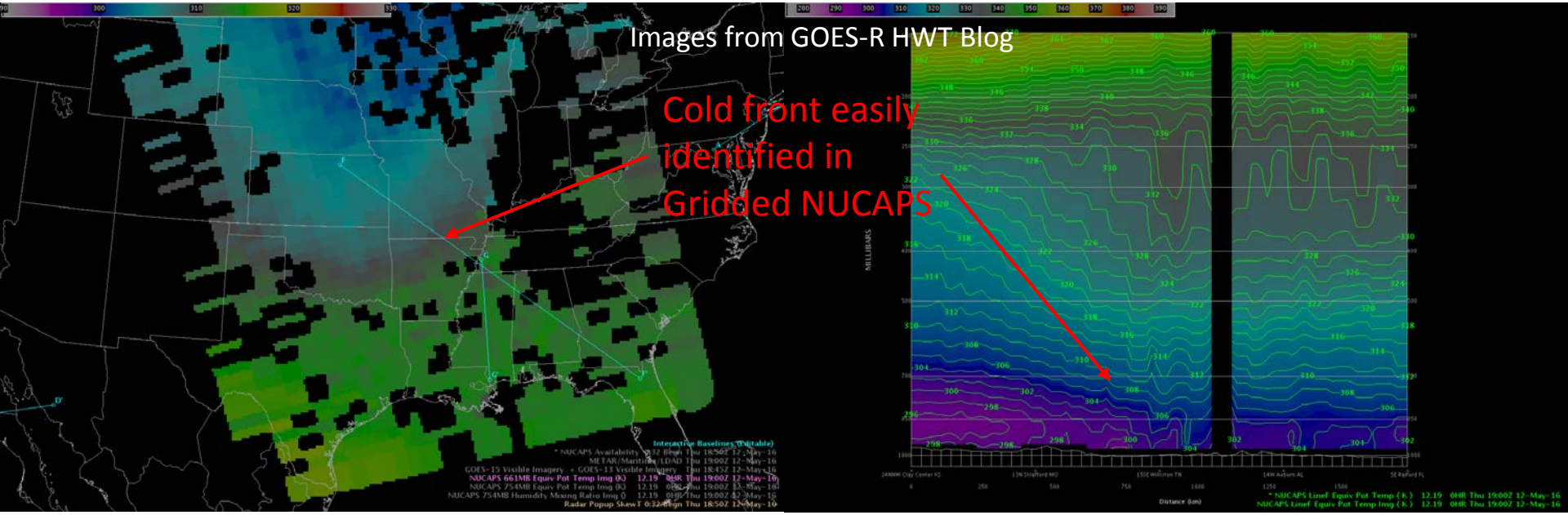
- FTP OC 2012 to [Present – 15 days]:

ftp://ftp.star.nesdis.noaa.gov/pub/socd1/mecb/coastwatch/viirs/science/L2/

- Integrated with the same L2 Granule Selector tool
  - Present – 15 days: NRT Granules
  - 15 days old and prior: Science Quality
  - Includes data preview and data cart
- VIIRS SST RAN1 will be included when ready
- OLCI OC will be included when ready for release

http://coastwatch.noaa.gov/cwn/cw_granule_selector.html

Gridded NUCAPS Convection Application

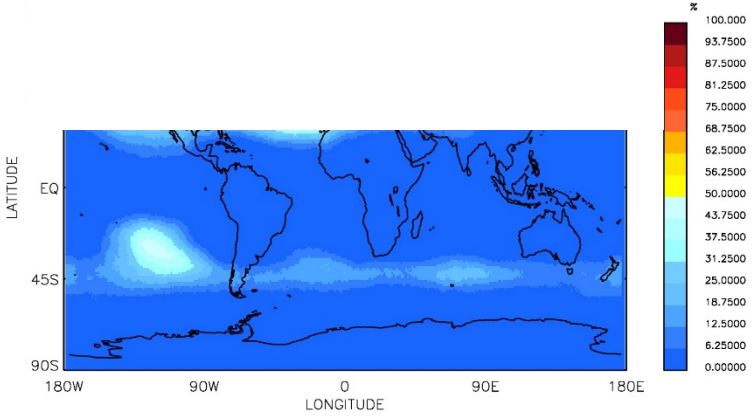


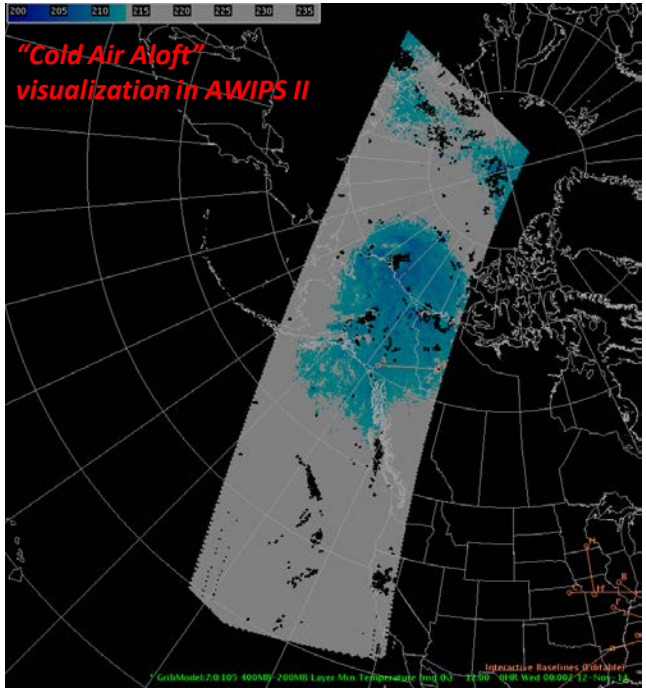
"We recently gained the ability to create cross sections through the NUCAPS swaths. This will be helpful for diagnosing phenomena such as boundaries and convective instability. The first image below is a plan view display of theta-e at 660 mb across the region. Obvious is the much cooler, drier air behind the cold front (low theta-e) with moist, warmer air ahead of it to the east (high theta-e). Also plotted is a line, denoting the location for which the cross-section (image below) was taken, through the cold front. The cross-section depicts theta-e vertically through the atmosphere. This provides another perspective on the cold front, which is obvious in the image."

Forecast Challenge: Cold Air Aloft

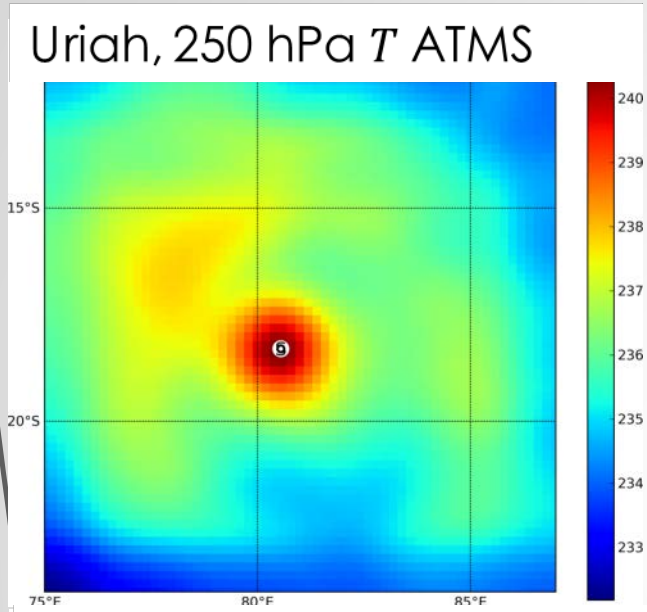
- Have found that temperatures below -60°C at flight levels occur regularly in the arctic and also pockets of colder air even occur over the mid-latitudes
- Using visualization color curve based on web graphics developed by CIRA, the Gridded NUCAPS products will be evaluated
  - Light blue shading for temperatures anywhere below 100 hPa in the column that are < -60°C
  - Darker blue shading for temperatures anywhere below 100 hPa in the column that are < -65°C
- Will be deploying NUCAPS data and visualization capabilities as part of an operational demonstration with forecasters at the Alaska CWSU in the fall/winter

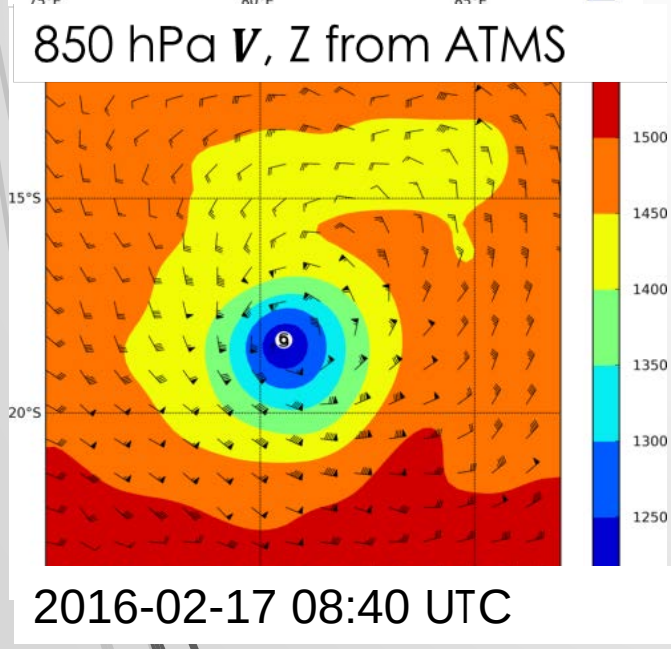
Probability of observing T ≤ -60°C in AIRS at at 200 hPa from Jan. 2005 to Jan. 2015





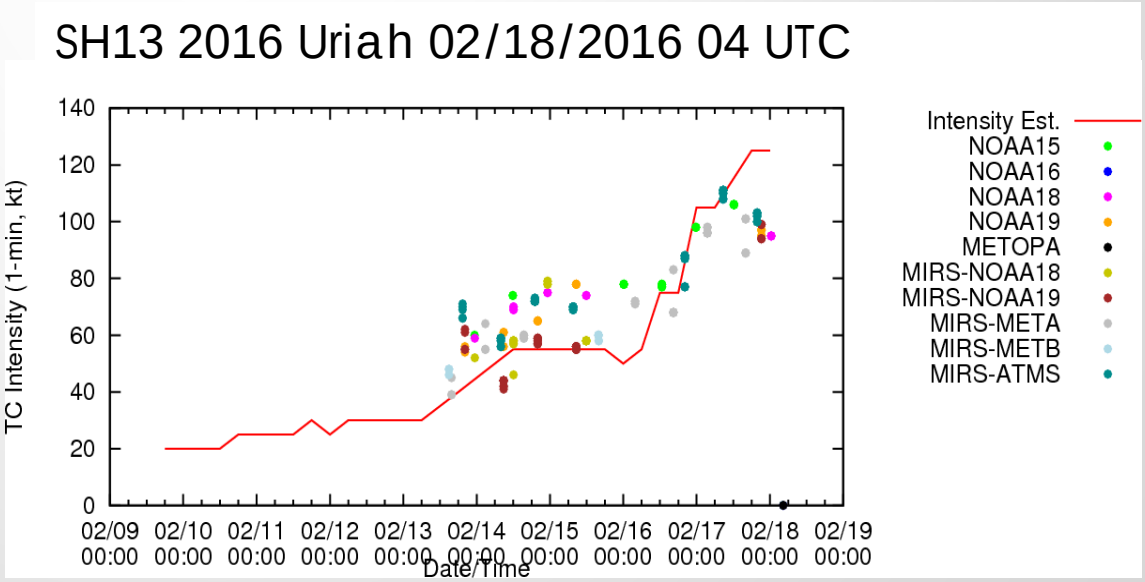
CIRA Operational ATMS TC Intensity and Structure Algorithm – Output Example



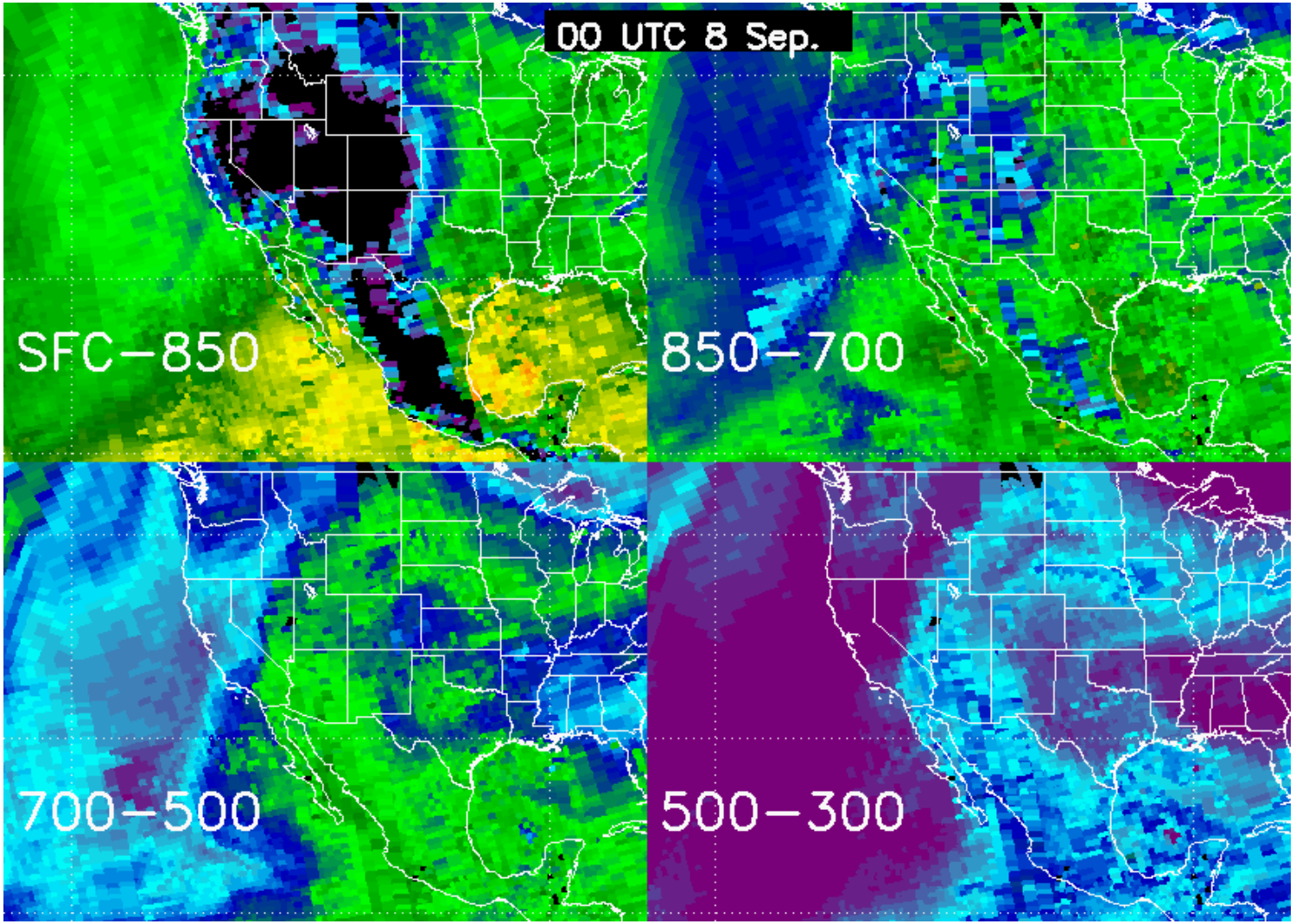


- **Operational version uses S-NPP ATMS-MIRS**
- **Version using JPSS-1 data will be transitioned to operations in 2019**

- The ability of ATMS-MIRS to resolve warm core is important for obtaining accurate wind and structure estimates



Four-layer LPW leading up to the Colorado Front Range floods in September 2013



Cooperative Institute for Research in the Atmosphere

Delivering Existing Layer Precipitable Water Product to National Centers

MESOSCALE PRECIPITATION DISCUSSION 0530
NWS WEATHER PREDICTION CENTER COLLEGE PARK MD
1016 AM EDT TUE SEP 29 2015

CONCERNING...HEAVY RAINFALL...FLASH FLOODING LIKELY

SUMMARY...A TROPICAL AIRMASS WITH NEAR RECORD PRECIPITABLE WATER WILL RESULT IN A CONTINUED FLOOD AND FLASH FLOOD THREAT INTO THIS AFTERNOON.

...

FORCING FROM THE SHORTWAVE IN GA AND A GENERALLY DIVERGENT PATTER ALOFT IS HELPING FORCE ASCENT ON THE LARGE SCALE...WITH 20-30 KTS OF LOW LEVEL UPSLOPE FLOW AIDING IN LIFT. LAYERED PRECIPITABLE WATER PRODUCTS SHOW AN IMPRESSIVE COMBINATION OF FACTORS CONTRIBUTING TO THE NEAR RECORD PRECIPITABLE WATER VALUES ACROSS THIS REGION. A CONNECTION TO THE PACIFIC AND TROPICAL STORM MARTY CAN BE SEEN IN THE MID/UPPER LEVELS...WITH A DEEP LAYER CONNECTION TO THE GULF OF MEXICO AND ALSO TROPICAL STORM JOAQUIN IN THE ATLANTIC. THIS IS ALL RESULTING IN A VERY EFFICIENT ATMOSPHERE FOR HEAVY RAIN RATES. THE ONE THING LACKING IS INSTABILITY...BUT AT LEAST SOME DOES EXIST ACROSS THE AREA AS NOTED BY SOME LIGHTNING AND COLDER CLOUD TOPS…

Example NOAA WPC usage of LPW for flooding in New England

AXNT20 KNHC 301212
TWDAT

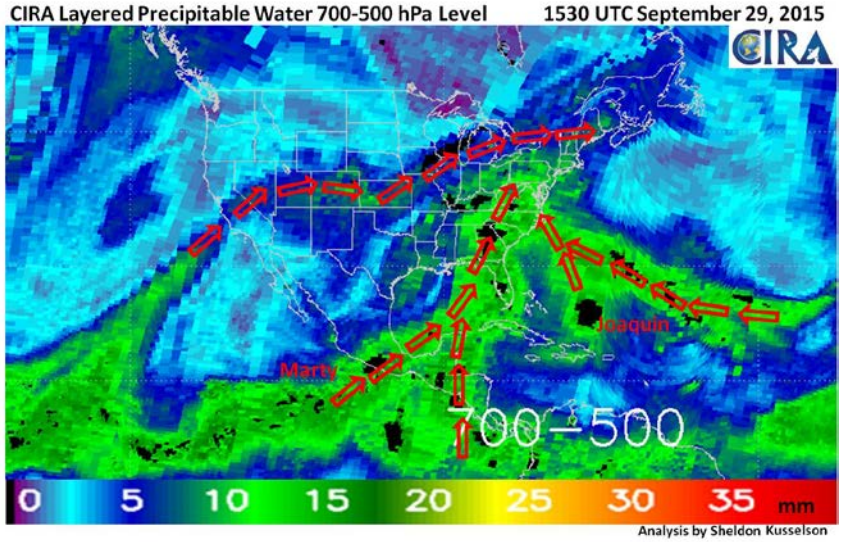
TROPICAL WEATHER DISCUSSION
NWS NATIONAL HURRICANE CENTER MIAMI FL
805 AM EDT WED SEP 30 2015

...

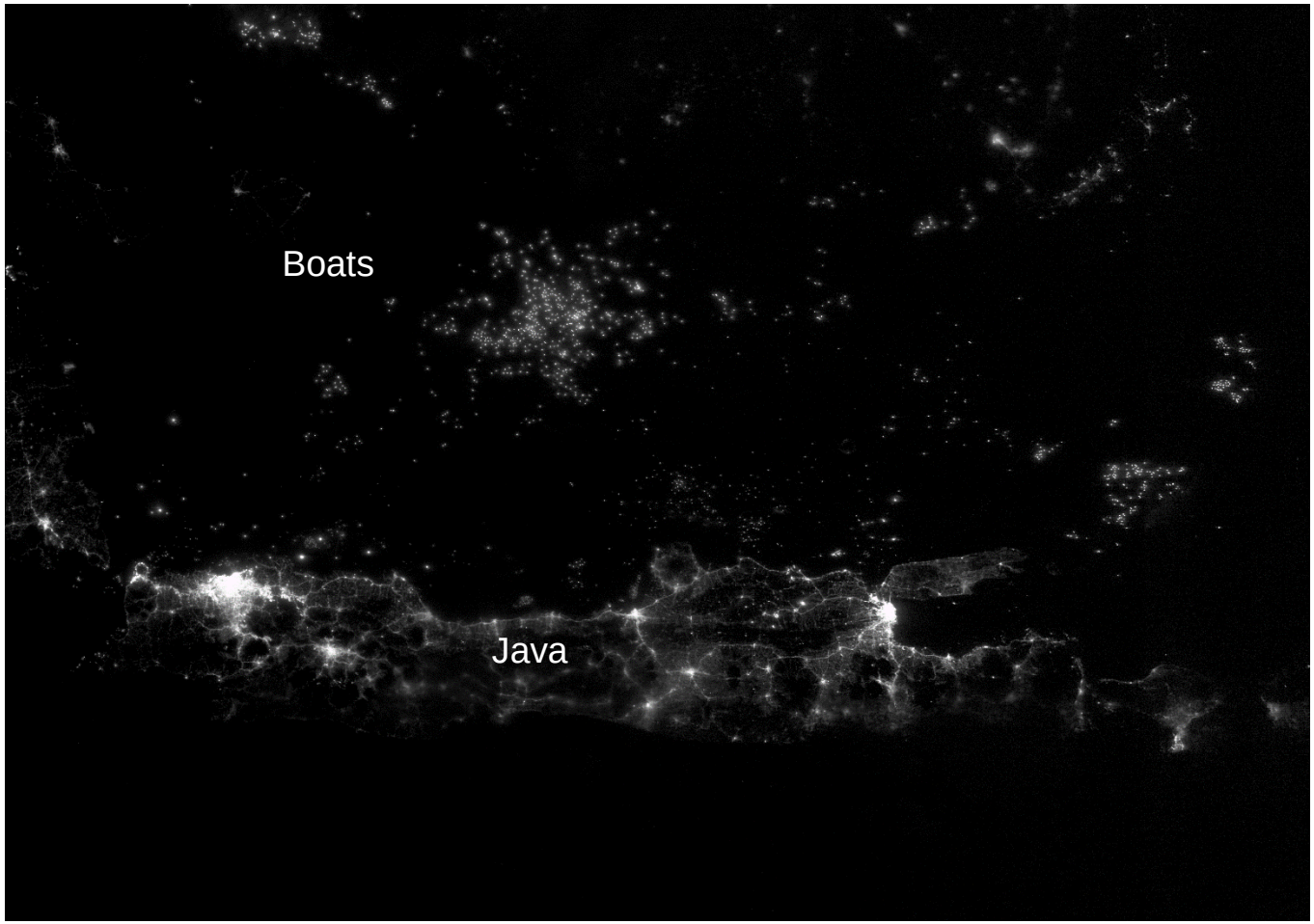
A TROPICAL WAVE IS IN THE CENTRAL ATLC WITH TILTED AXIS EXTENDING FROM 16N36W SW TO A 1009 MB LOW PRESSURE CENTER EMBEDDED IN THE MONSOON TROUGH NEAR 11N39W...MOVING W AT 5-10 KT. CIRA LAYER PRECIPITABLE WATER IMAGERY SHOW THE WAVE IS EMBEDDED IN A MODERATE MOIST ENVIRONMENT FROM THE SURFACE TO 850 MB. HOWEVER...SOME DRY AIR INTRUSION IS ALSO DEPICTED IN THE N-NW WAVE ENVIRONMENT...WHERE METEOSAT ENHANCED IMAGERY SHOW DRY AIR AND DUST.

Example NHC usage of LPW

Five streams of moisture fuel flooding in SC



VIIRS Boat Detection (VBD) Product



Java Sea, Indonesia September 28, 2014

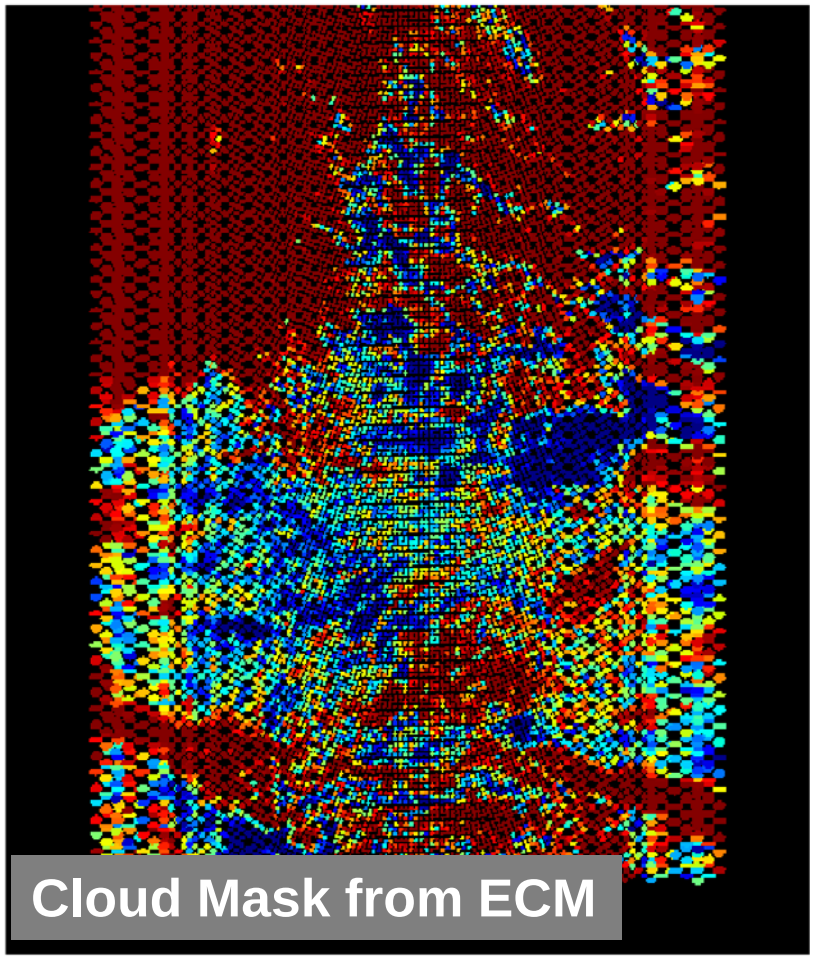
- The Visible Infrared Imaging Radiometer suite has a unique capability to detect lights at the earth's surface. This includes heavily lit boats.

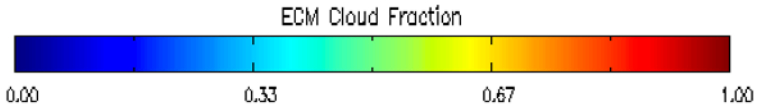
- NCEI has been working on algorithms for reporting boat detections since September 2014.

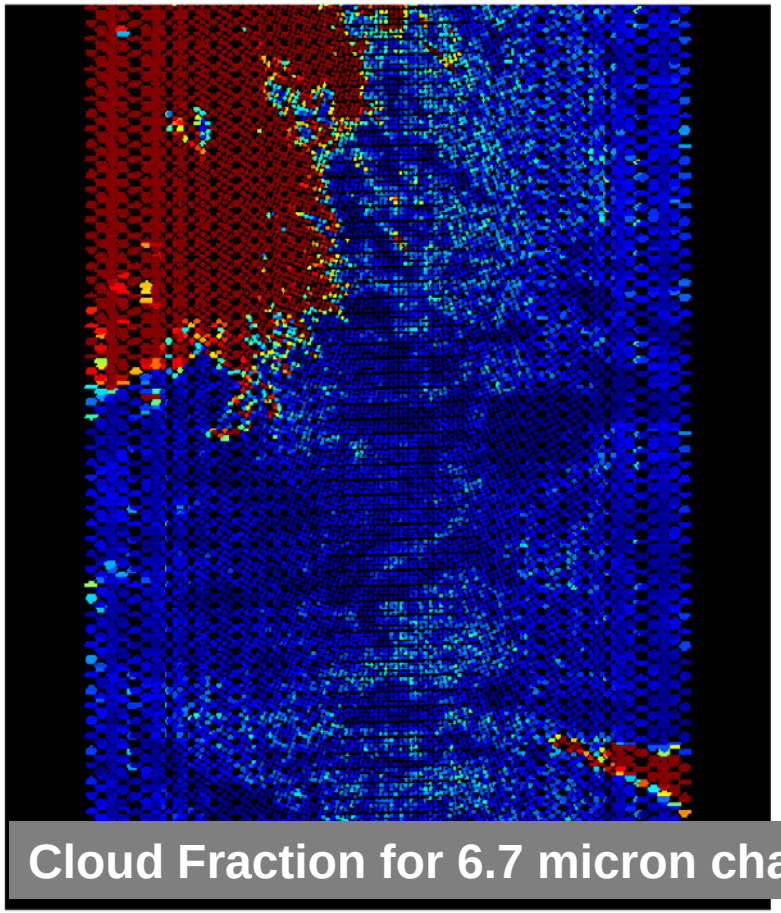
- Supported by the JPSS program office and USAID.

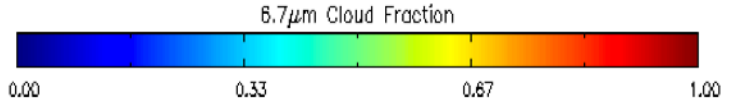
- Files available by 06:00 local time.

Resulting Cloud Mask for 6.7 micron channel.

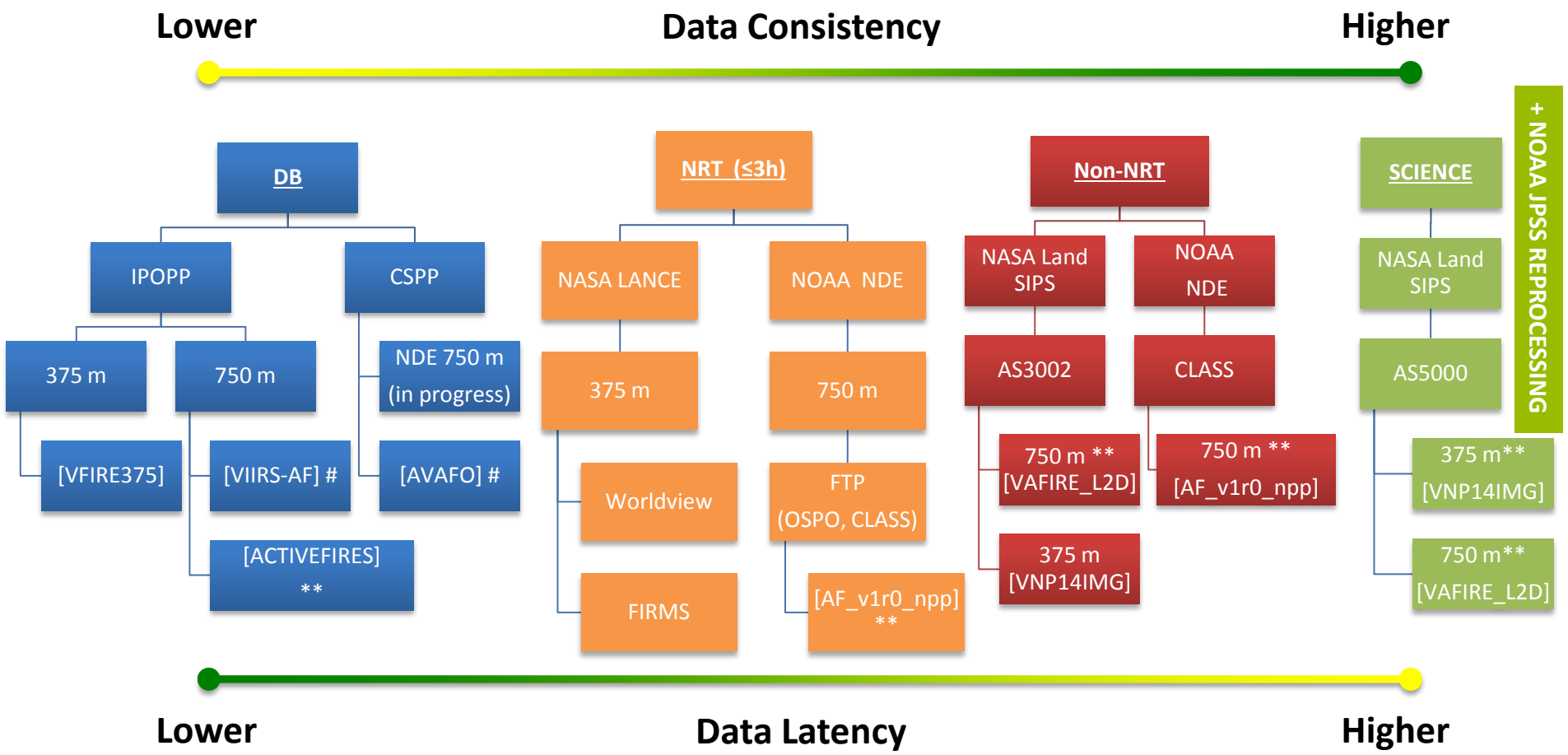








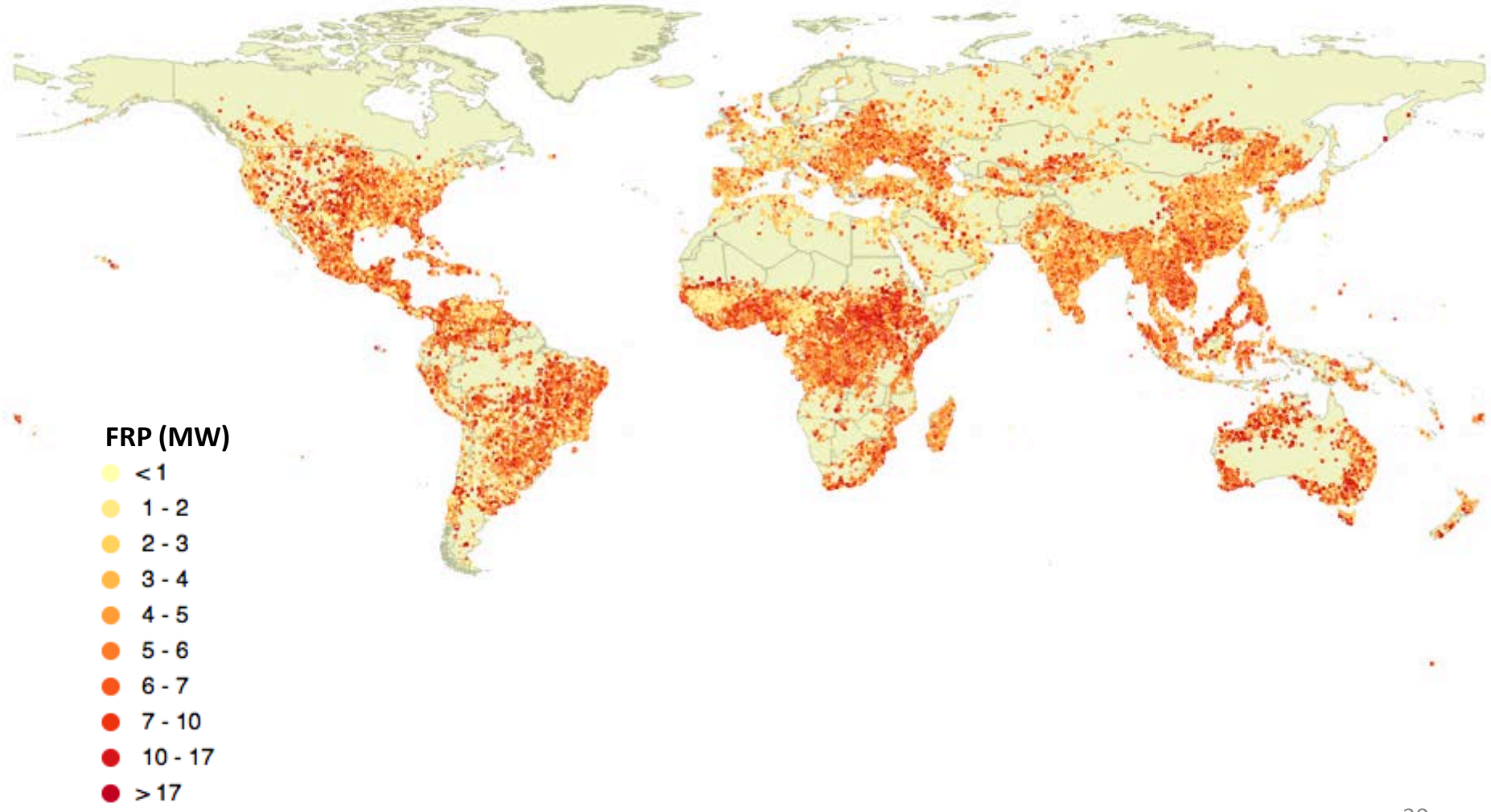
VIIRS Active Fire Product Lineage



** marked products include FRP retrieval
# marked products describe discontinued algorithm
[ ] indicate official product name

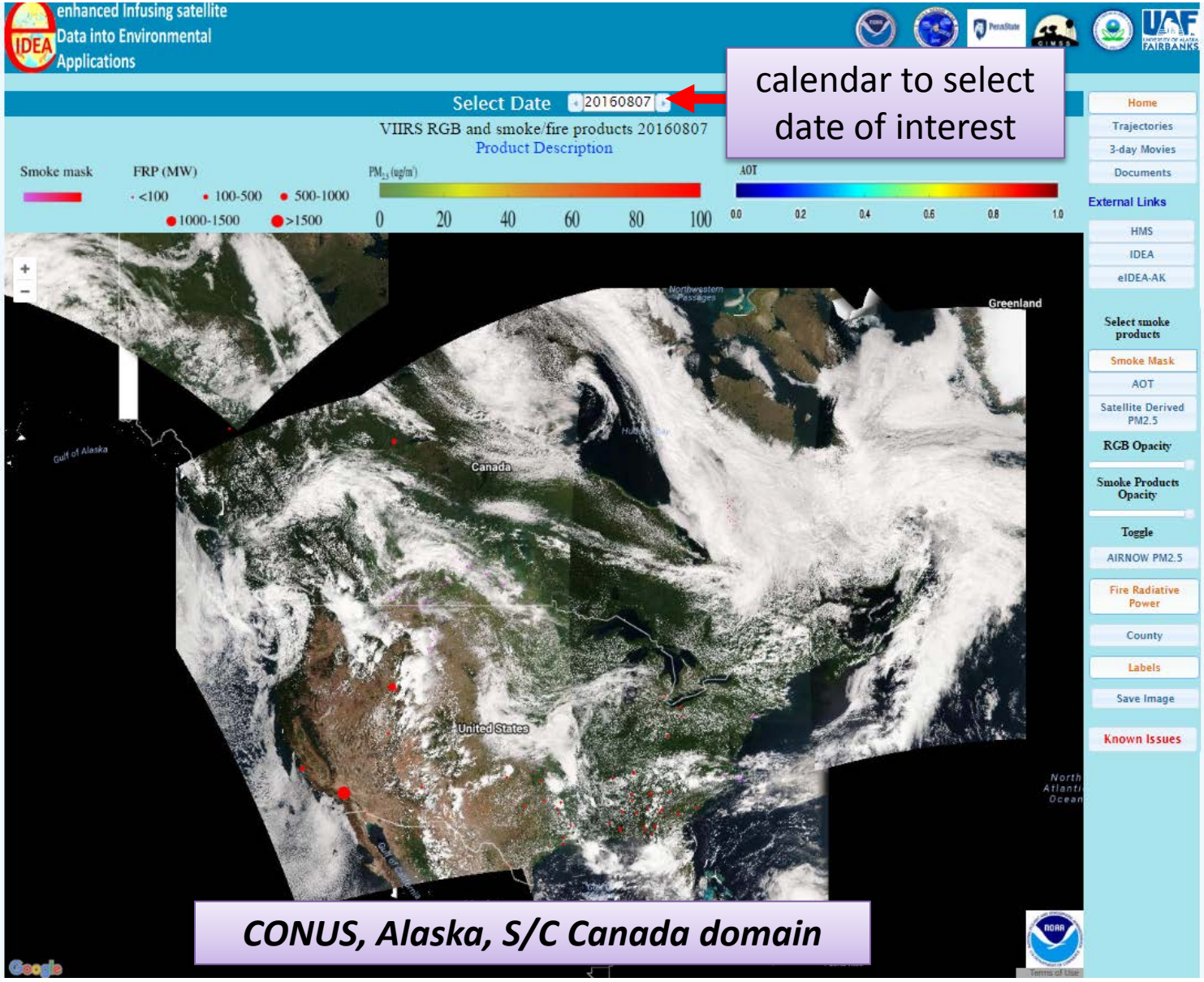
Details soon to be available at:
http://viirsfire.geog.umd.edu/

VIIRS 375m (hybrid) Fire Pixels (March 2016)
'Collection 2'

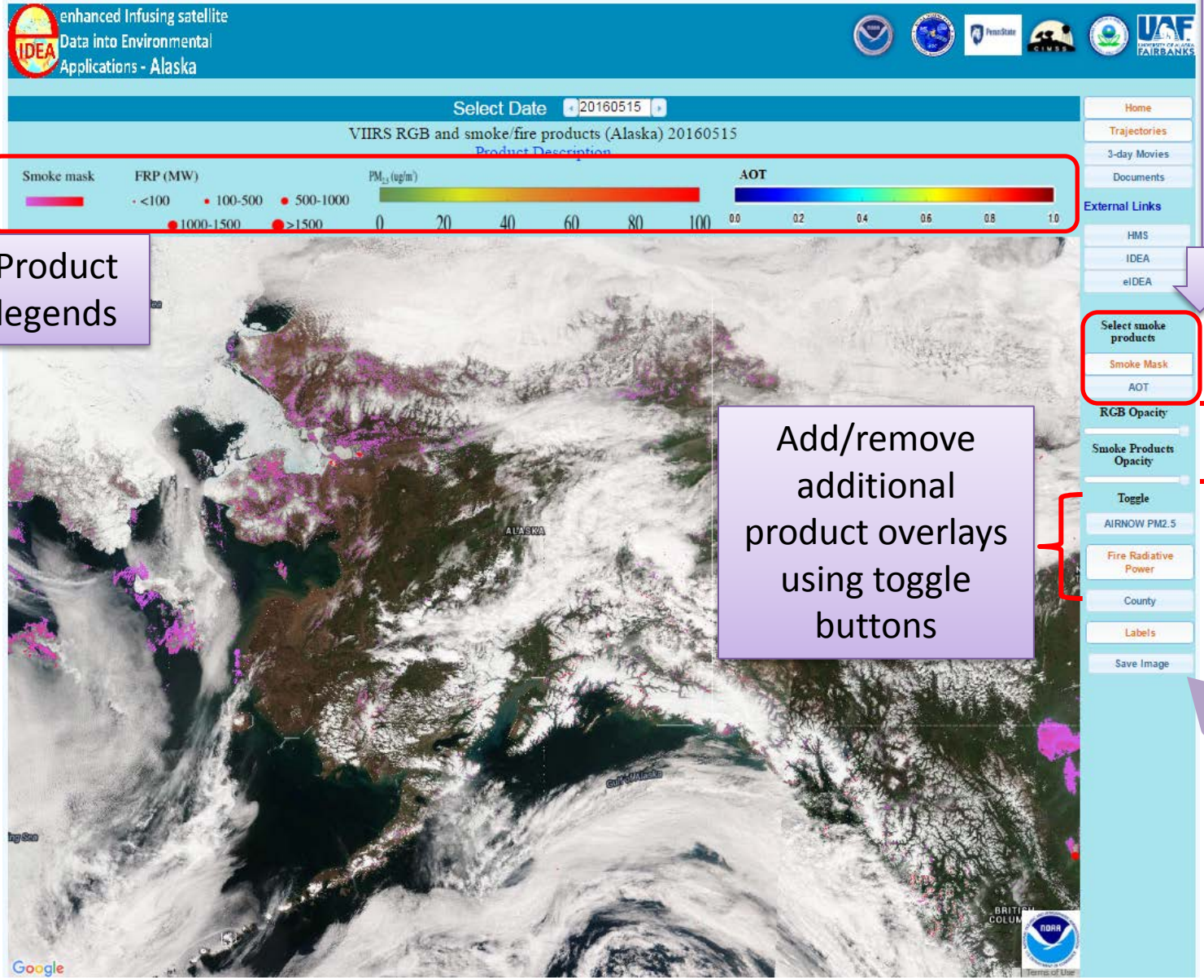


eIDEA: New 1-Stop Fire and Smoke Imagery

http://www.star.nesdis.noaa.gov/smcd/spb/aq/eidea/



eIDEA-Alaska: Overlays



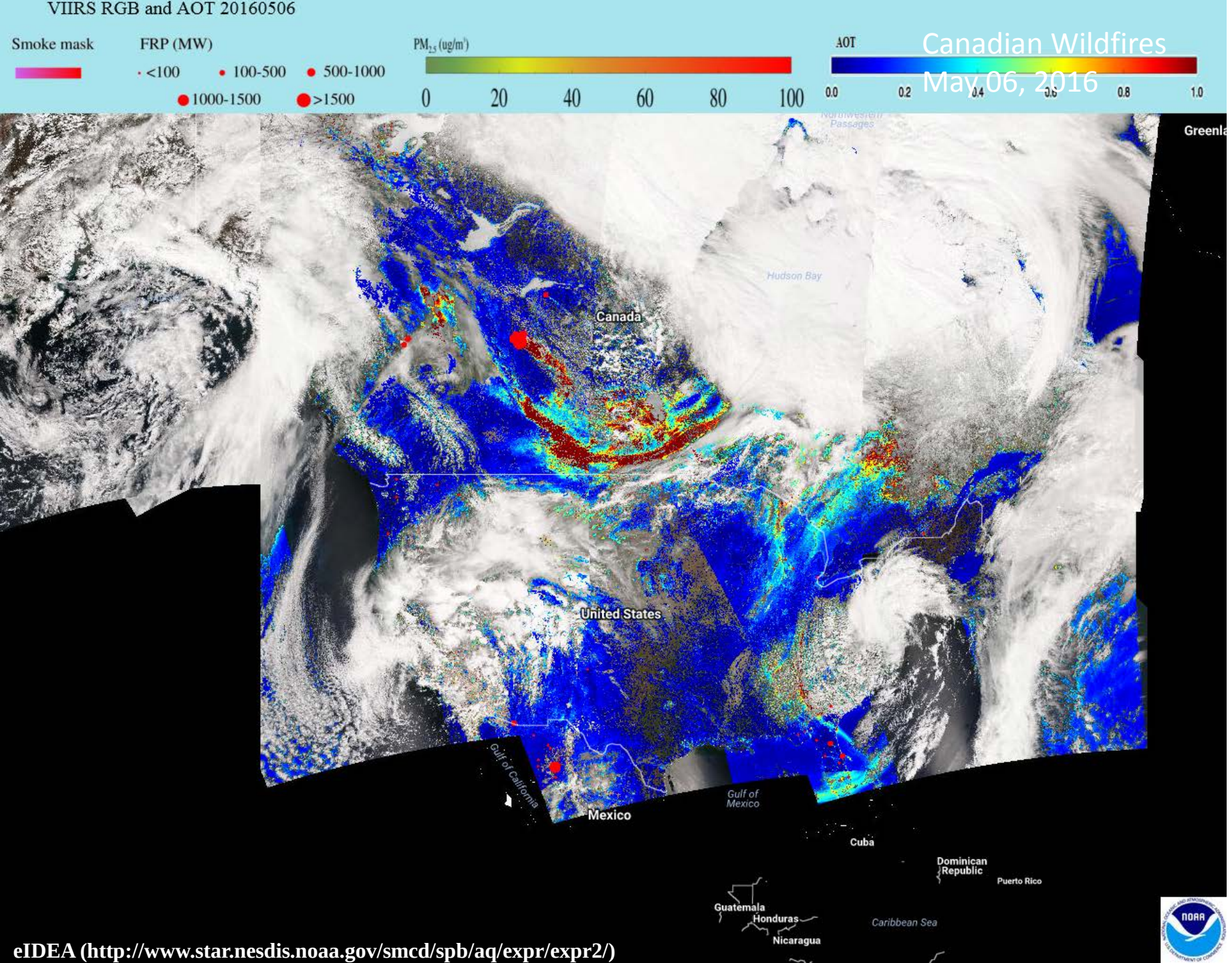
Product legends

"Smoke Mask" is default smoke product; click on "AOT" or "Satellite Derived $PM_{2.5}$" to switch b/w smoke products

Slider bars adjust opacity of RGB and smoke products

Add/remove additional product overlays using toggle buttons

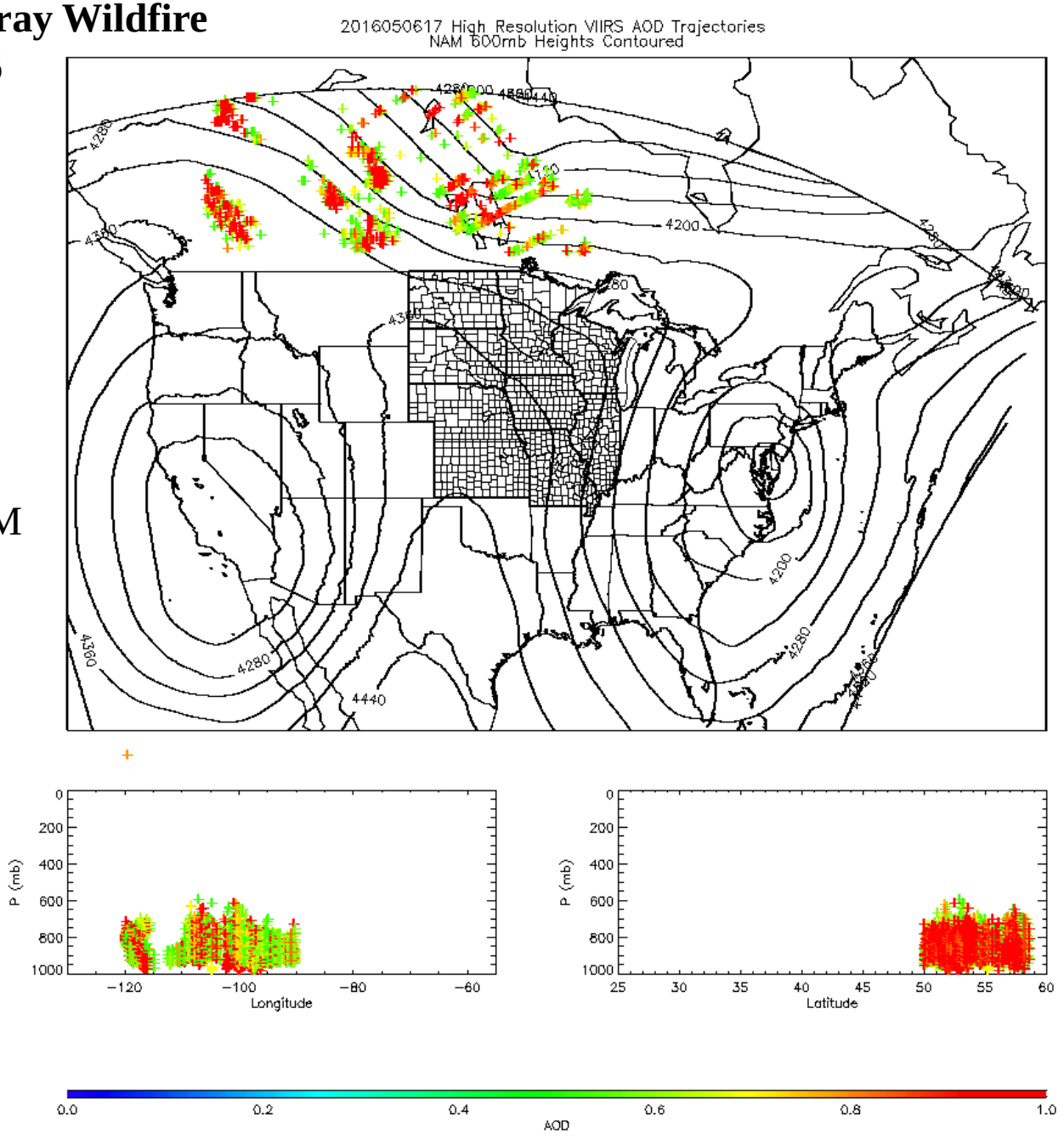
Click "Save Image" to save configuration as a graphics file



eIDEA (http://www.star.nesdis.noaa.gov/smcd/spb/aq/expr/expr2/)

IDEA-I High resolution (NAM 4km) trajectory forecast
Fort McMurray Wildfire
May 06, 2016

- IDEA-I high resolution trajectories initialized at each 6km VIIRS pixel (only AOD>0.5 initialized)
- Upper panel shows NAM 600mb heights
- Lower panels show longitude and latitude cross sections
- IDEA-I high resolution trajectory forecast colored by initial AOD



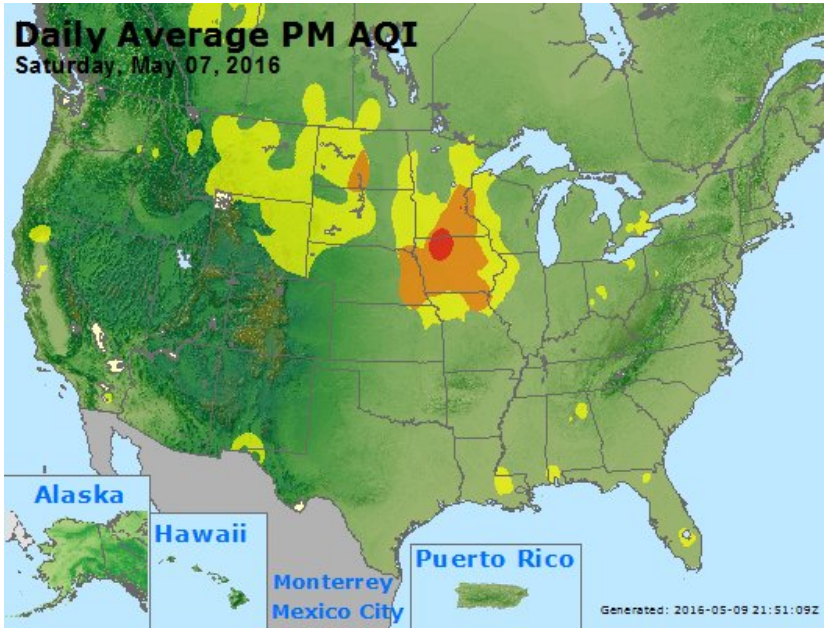
652
WWUS83 KMPX 070627
SPSMPX

From Andy Edman/NWS

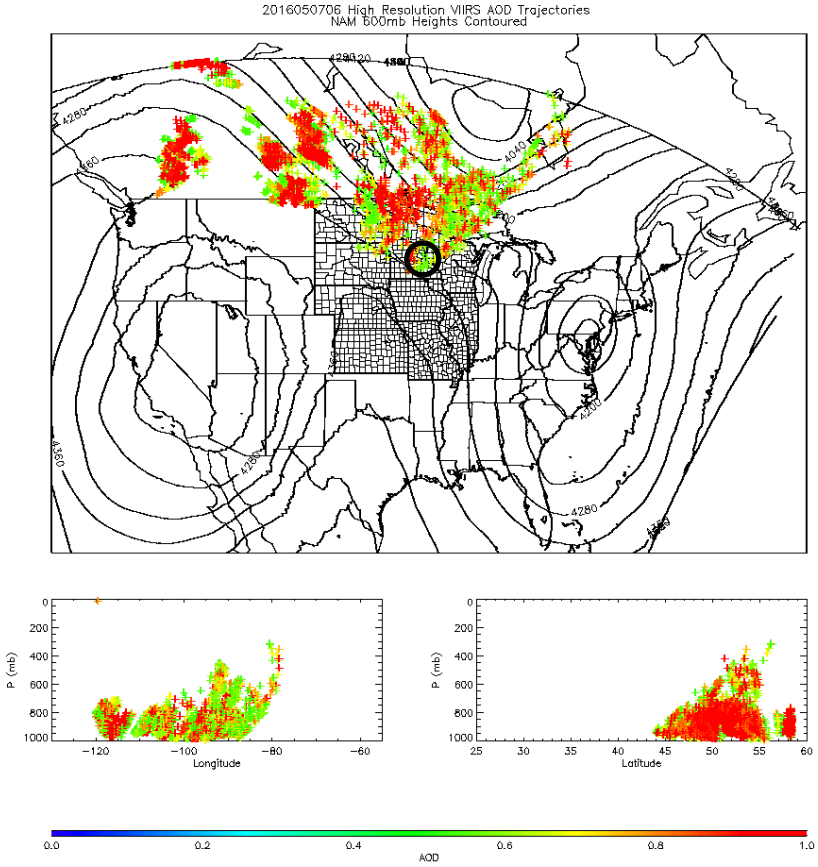
SPECIAL WEATHER STATEMENT
NATIONAL WEATHER SERVICE TWIN CITIES/CHANHASSEN MN
127 AM CDT SAT MAY 7 2016

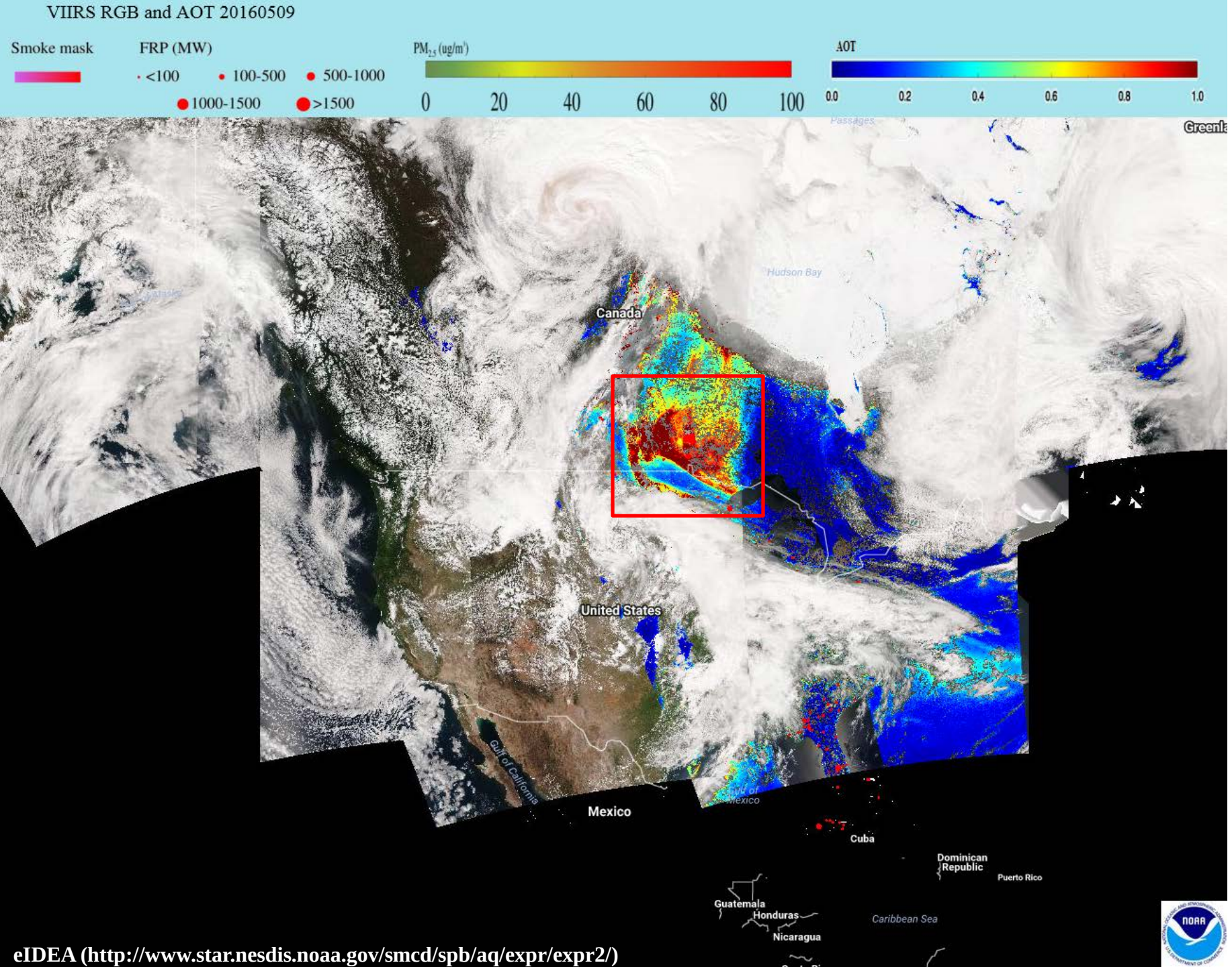
...SMOKY CONDITIONS TO PERSIST THROUGH THE OVERNIGHT HOURS...

WIDESPREAD SMOKE FROM BOTH THE LARGE CANADIAN WILDFIRES AND A SMALLER WILDFIRE NEAR LAKE HATTIE IN HUBBARD COUNTY MINNESOTA HAS BLOWN INTO CENTRAL MINNESOTA...PARTICULARLY WITHIN AND NEAR THE TWIN CITIES METROPOLITAN AREA...DUE TO STRONG WINDS FROM THE NORTHWEST. VISIBILITIES HAVE BEEN REDUCED TO BETWEEN 1 AND 3 MILES...AND AIR QUALITY HAS BEEN SIGNIFICANTLY IMPACTED.



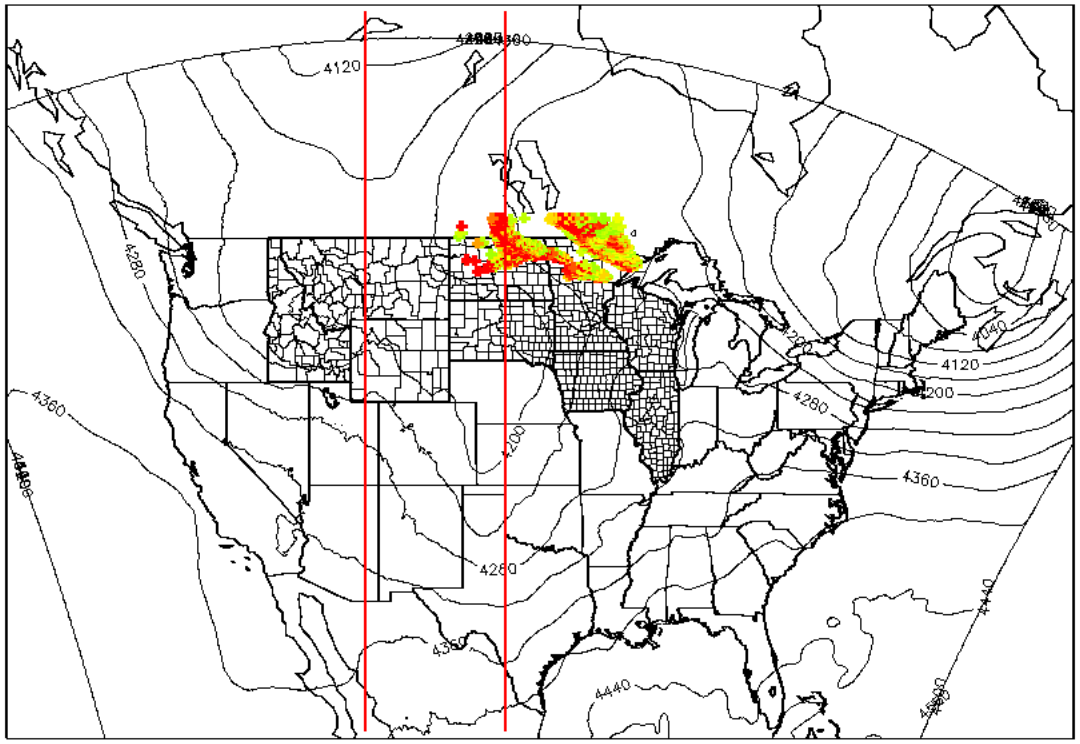
https://www.airnow.gov/



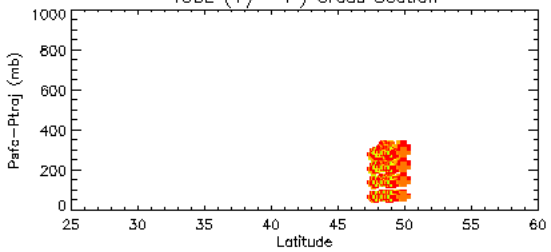


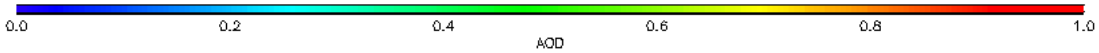
eIDEA (http://www.star.nesdis.noaa.gov/smcd/spb/aq/expr/expr2/)

2016050919 High Resolution VIIRS AOD Trajectories
NAM 600mb Heights Contoured/PCP (mm/hr) Purple

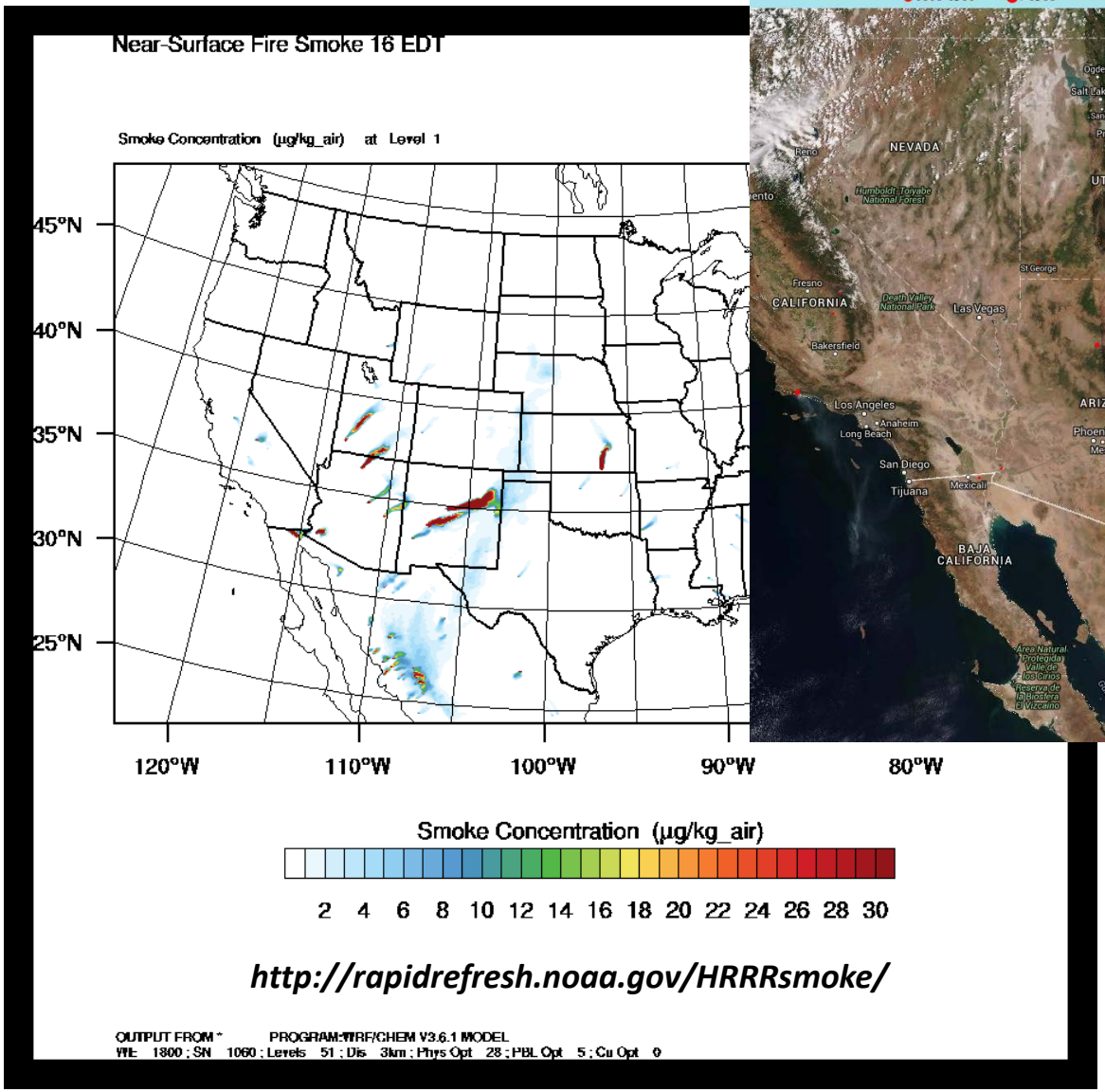


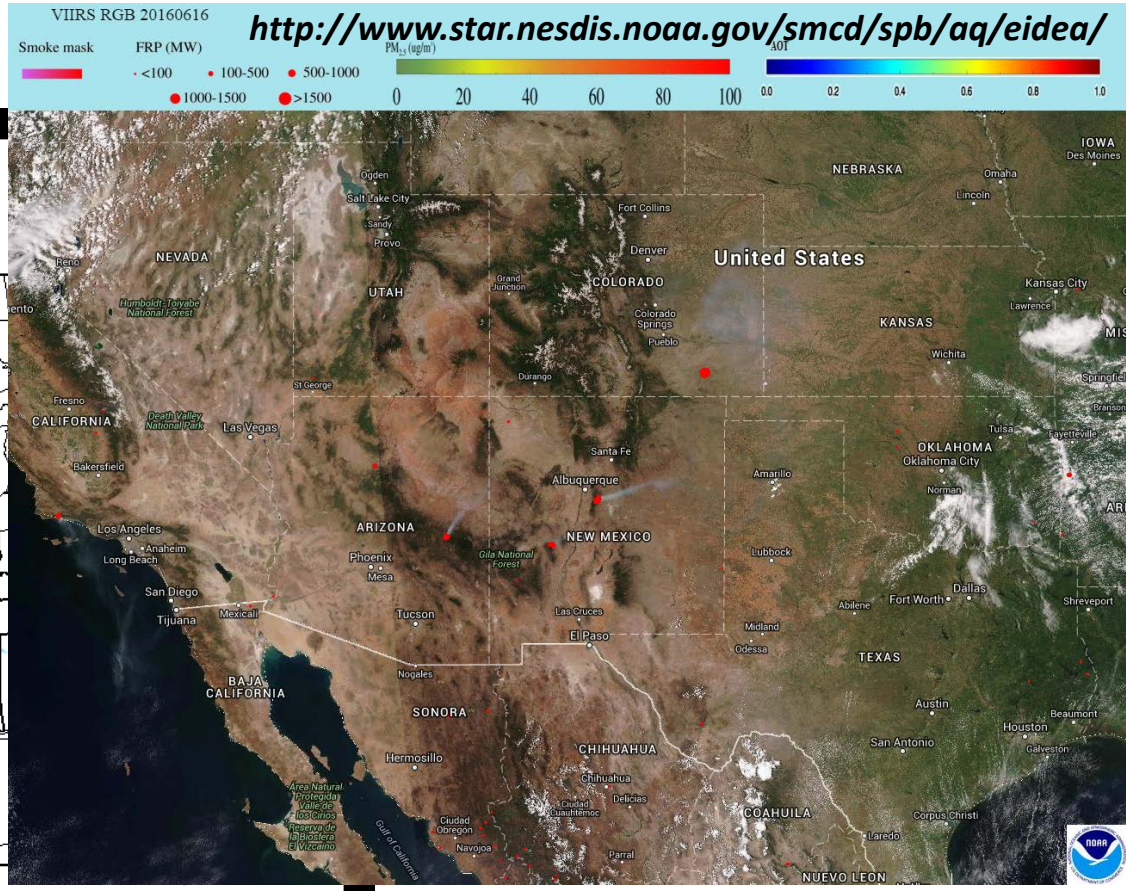
100E (+/- 1°) Cross Section





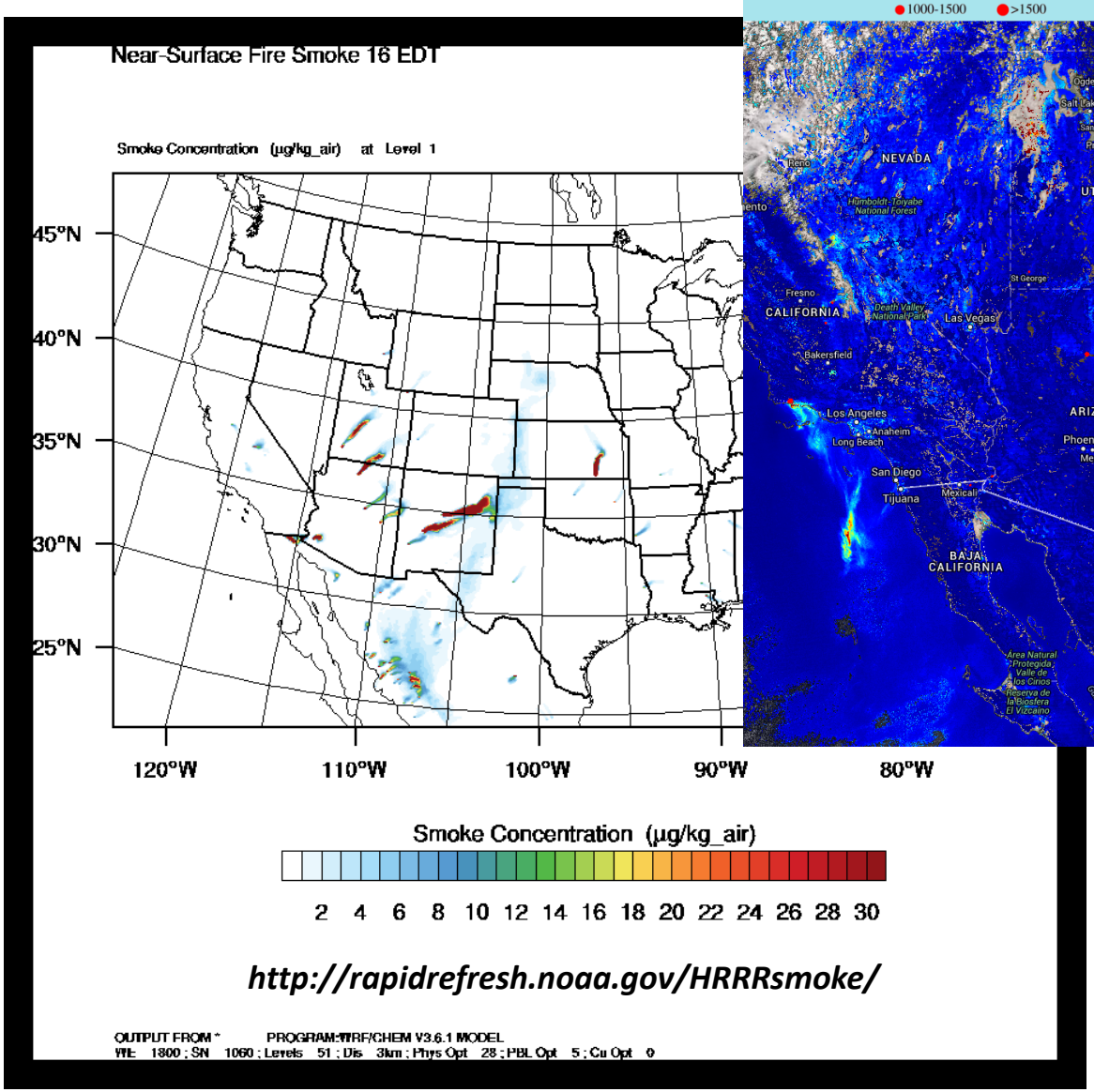
HRRR smoke forecast vs. eIDEA observations

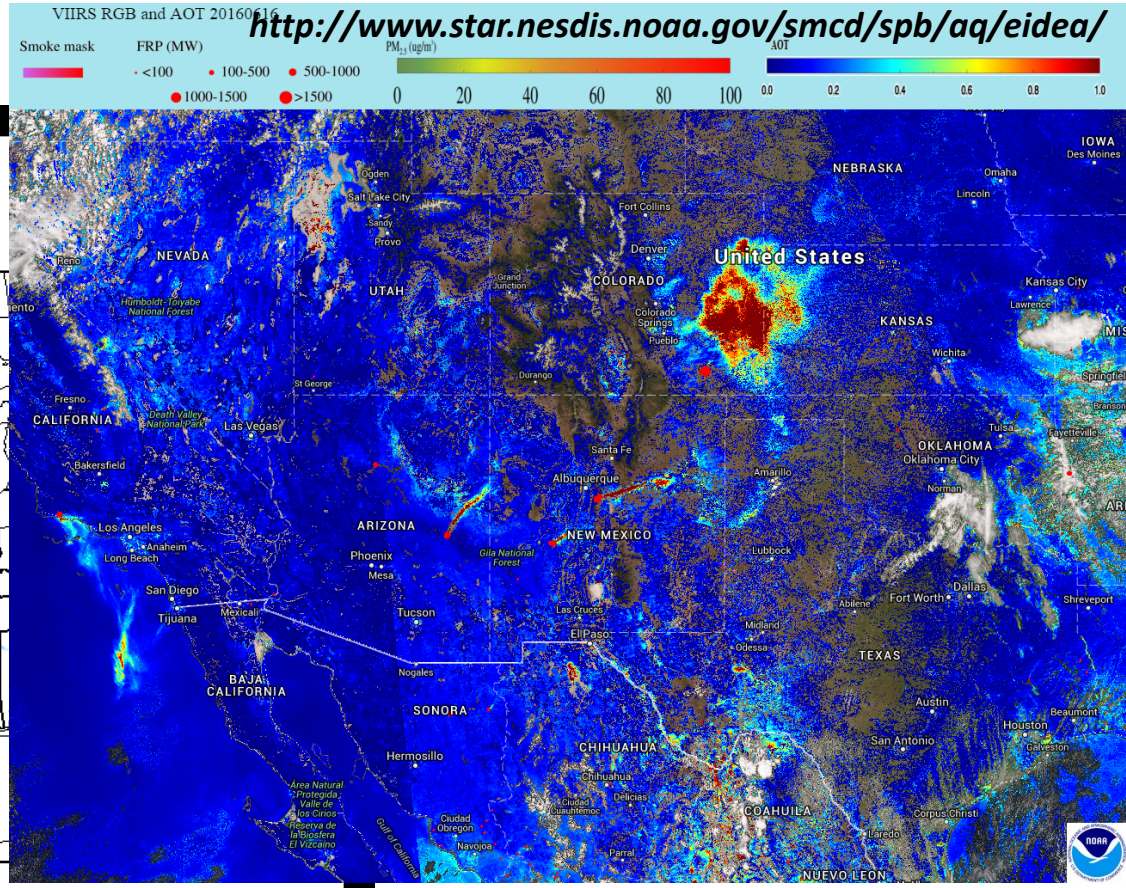




June 16, 2016

HRRR smoke forecast vs. eIDEA observations

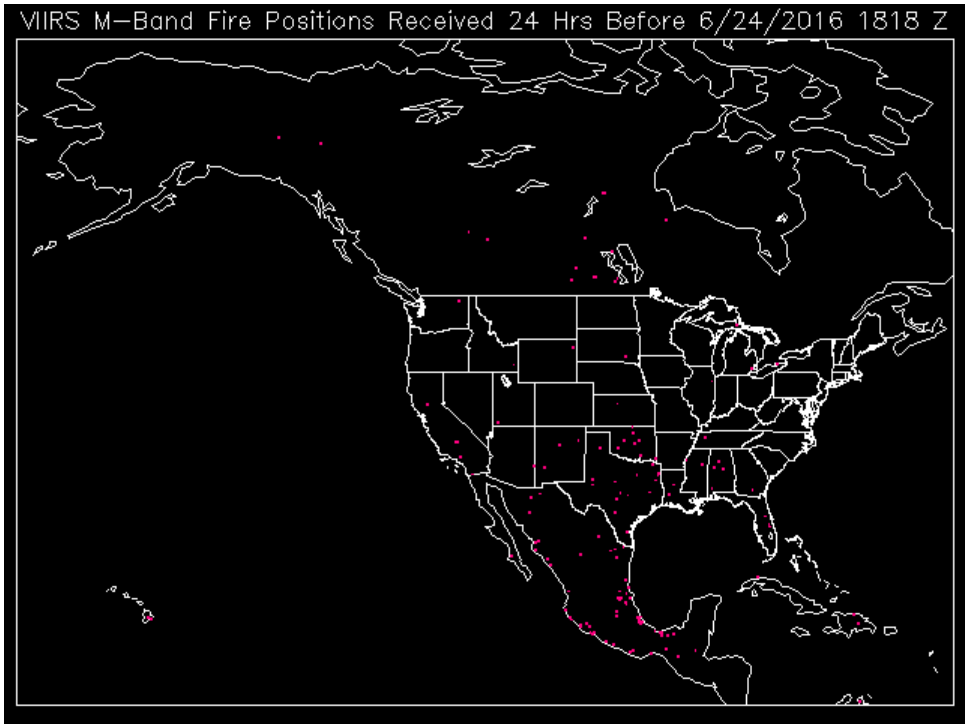




June 16, 2016

Hazard Mapping System / OSPO status

- Global NDE data are available in text format
  - granule-based (.txt) : real-time
  - daily summary (.dat)
- Graphics / web GIS under development
- VIIRS data to appear in HMS in the next release (October 2016)



NOAA NESDIS Office of Satellite and Product Operations (OSPO)

http://satepsanone.nesdis.noaa.gov/pub/FIRE/VIIRS/

Incorporating NOAA-derived VIIRS AOD into the Navy Aerosol Model to Monitor SAL Events over the North Tropical Atlantic Basin

Arunas Kuciauskas[1], P. Lynch[1], J. Campbell[1], E. Hyer[1], and M. Oyola[2]

1. Naval Research Laboratory, Marine Meteorology Division (NRL-MMD)
2. American Society for Engineering Education, Washington, DC

Focus:

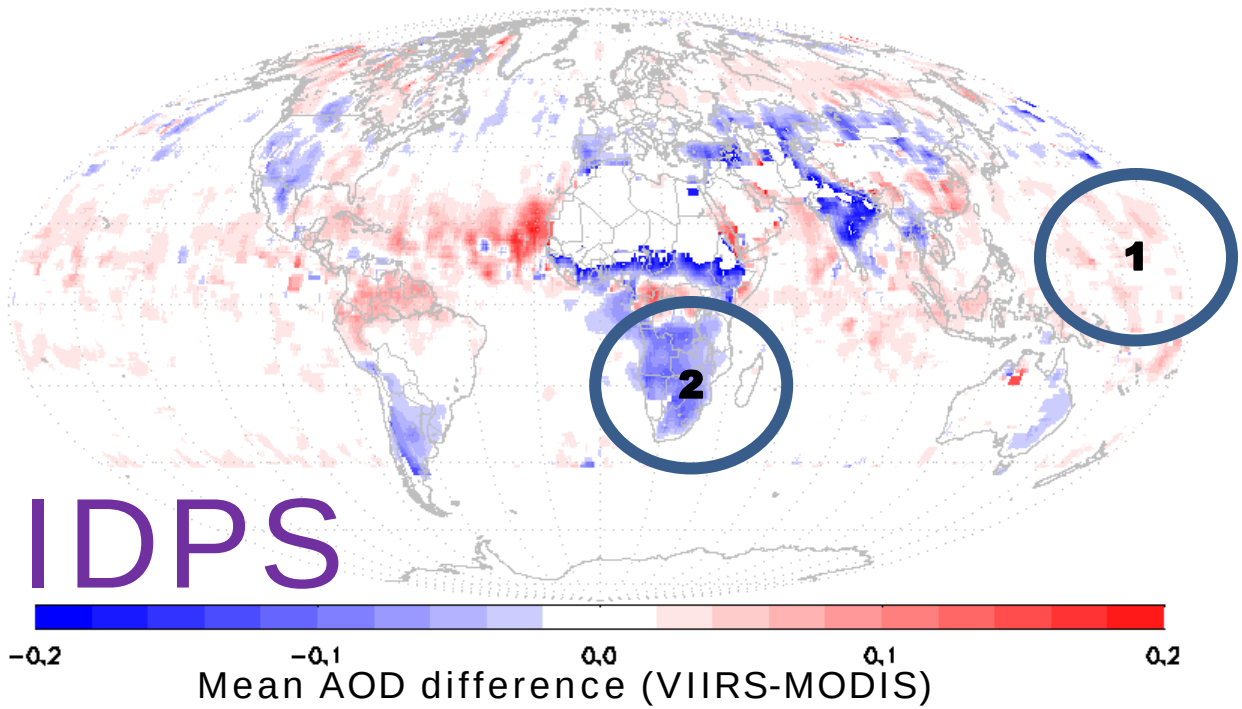
Assist Puerto Rico NWS/Fire Weather Agency in forecasting SAL events beyond 3 days

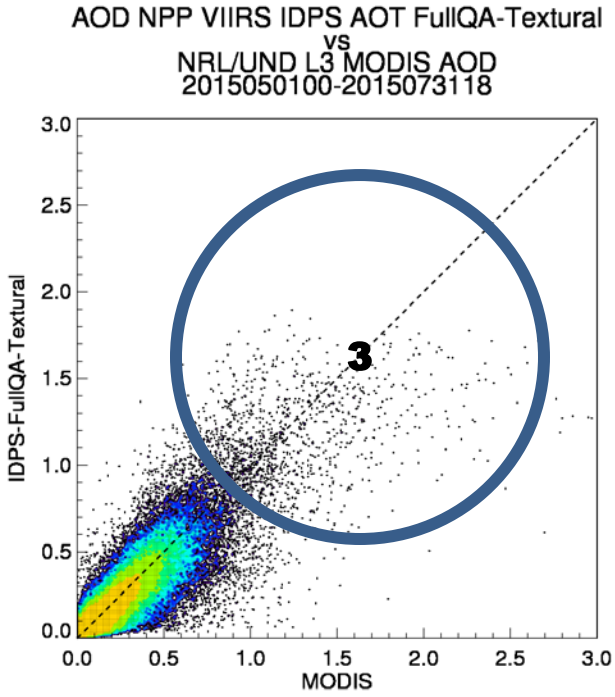
effort adaptable to downwind regions:
South/Southeast US, Gulf of Mexico, Bahamas, Central America, North and South America

STAR JPSS 2016 Annual Science Team Meeting, 8 – 12 August, College Park, MD

photo courtesy: NOAA

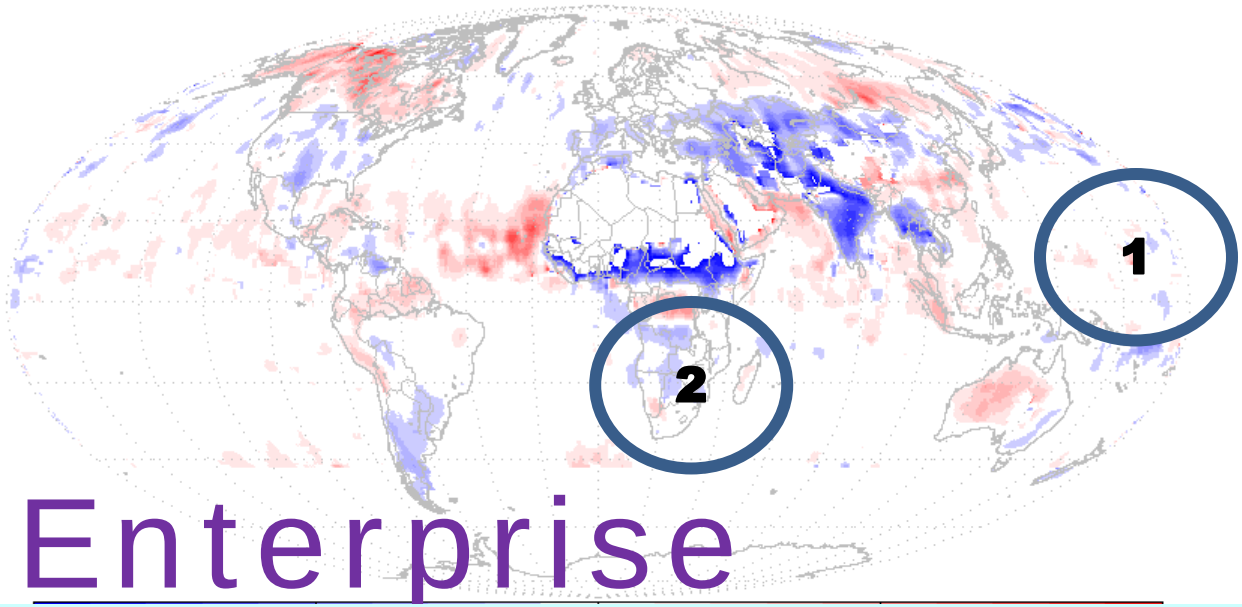
VIIRS AOD data using IDPS



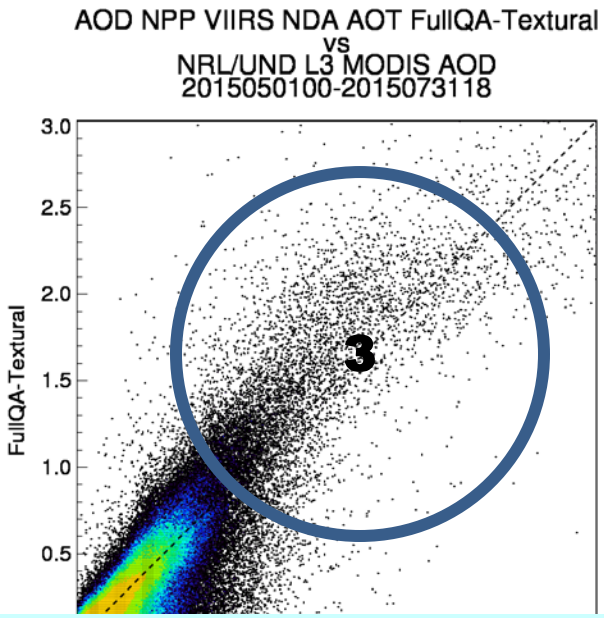


- 3-month comparison to MODIS NRL/UND L3 Data Assimilation product: 201505-201507
- VIIRS data aggregated and filtered ‘FullQA’ + buddy checks and neighborhood tests
- Left: map of AOD differences (paired) (smoothed for plotting)
- Right: scatter-density plot of AOD differences vs MODIS

New VIIRS AOD data using NOAA STAR Enterprise



Enterprise



Enterprise AOD from NOAA STAR

- ***Improves bias correction compared to AERONET***
- ***Allows greater number of dust-related values into NAAPS DA***
- ***DA testing of new Enterprise product is underway at NRL***

U.S. NAVAL RESEARCH LABORATORY

Summary

VIIRS impact on monitoring & predicting SAL events

1. Comparisons of NAAPS DA: MODIS (OPS) vs MODIS+VIIRS AOD

a) VIIRS + MODIS outperforms MODIS-only

b) Improvements seen in case studies and statistical analyses

c) VIIRS has more spatial coverage than MODIS, particularly over the tropics, so more AOT retrievals

d) IDPS VIIRS AOT contains more bias than NOAA STAR Enterprise VIIRS AOT

e) Positive impact to forecasting SAL dust events at NWS, San Juan

   i. VIIRS DA should yield improved forecasts and characteristics of SAL propagation out to 3–6 days

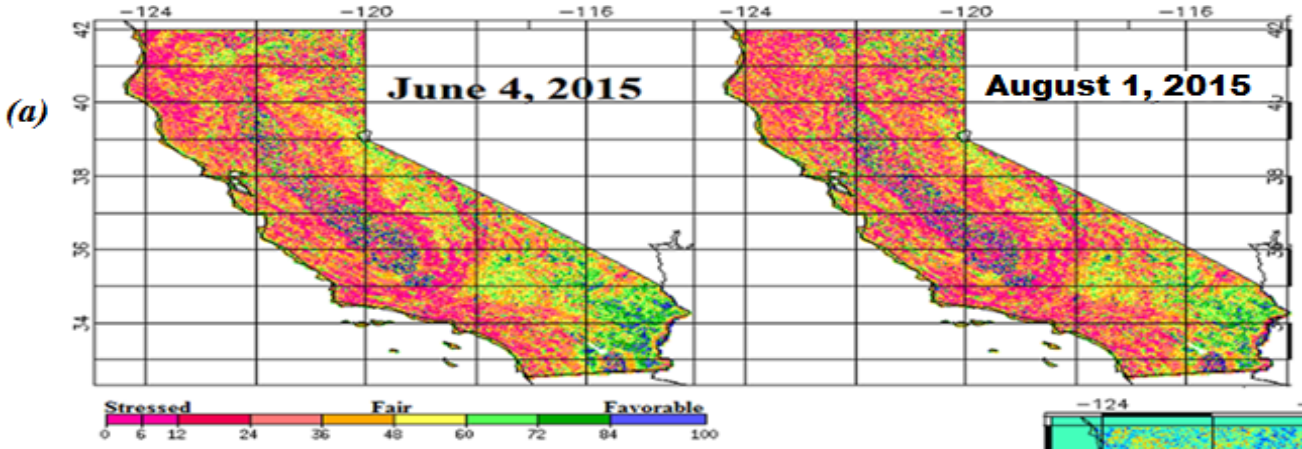
2. Future Efforts

a) Will provide NAAPS with Enterprise VIIRS AOD as DA into NRL-MMD SAL webpage

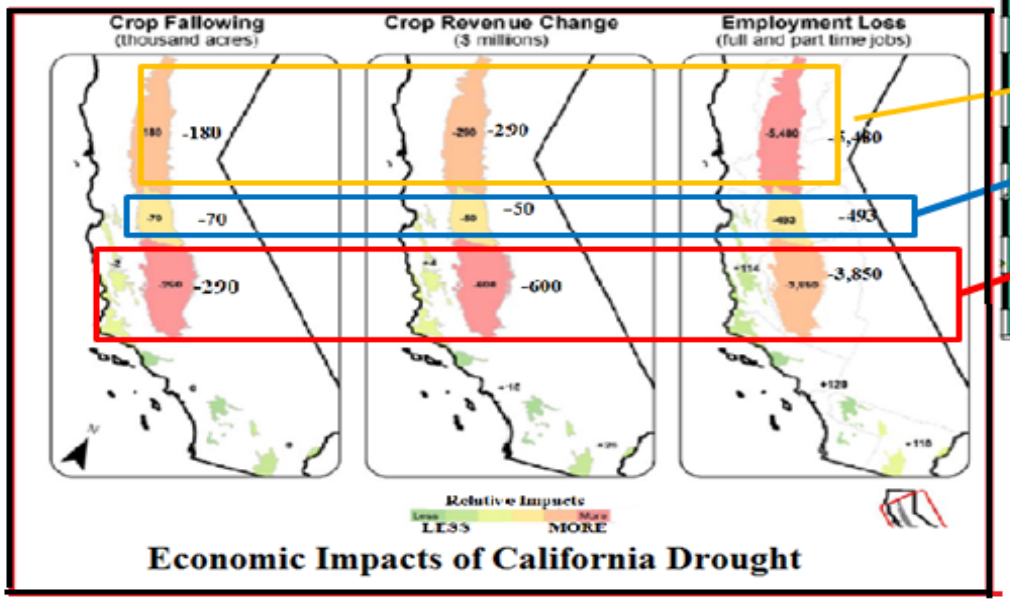
b) More interaction with forecasters/scientists within greater Caribbean

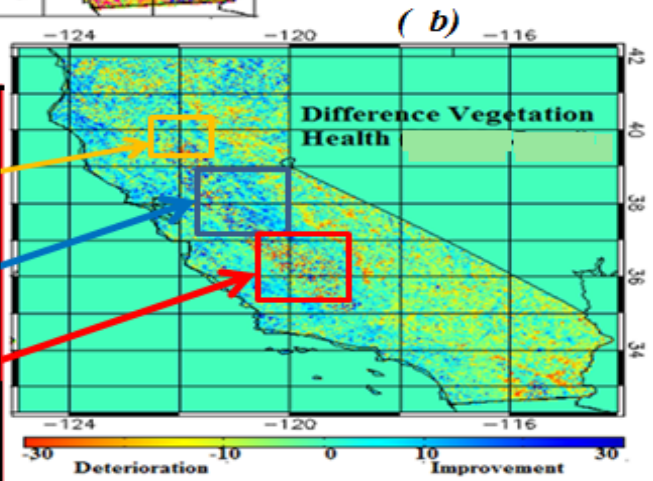
Web resource: http://www.nrlmry.navy.mil/NEXSAT.html & SAL.html

Vegetation Health from SNPP/VIIRS & Economic Indicators



Vegetation Health from 500 m S-NPP/VIIRS





Difference Vegetation Health
August 1 - June 4, 2015

(c)

Intensity of Economic and VH-assessed Impacts
Stronger Moderate Weaker

Image of the month: JPSS Applications Advancements: USDA Agricultural Productivity Estimates

USDA provide outlooks monthly on agricultural productivity and NOAA/STAR'S vegetation health product is always a critical input to the reports

USDA United States Department of Agriculture

World Agricultural Supply and Demand Estimates

ISSN: 1554-9089

Office of the Chief Economist | **Agricultural Marketing Service, Farm Service Agency** | **Economic Research Service, Foreign Agricultural Service**

WASDE - 553 | Approved by the World Agricultural Outlook Board | May 10, 2016

Note: This report presents USDA's initial assessment of U.S. and world crop supply and demand prospects and U.S. prices for 2016/17. Also presented are the first calendar-year 2017 projections of U.S. livestock, poultry, and dairy products. Due to spring planting still underway in the Northern Hemisphere and being several months away in the Southern Hemisphere, these projections are highly tentative. Forecasts for U.S. winter wheat area, yield, and production are from the May 10 *Crop Production* report. For other U.S. crops, the March 31 *Prospective Plantings* report is used for planted acreage. Methods used to project 2016/17 harvested acreage and yield are noted in each table.

WHEAT: U.S. wheat supplies for 2016/17 are projected up 6 percent from 2015/16 on higher beginning stocks and imports. All wheat production is projected at 1,998 million bushels, down 3 percent. The year-to-year decrease is due to a sharp reduction in planted area that more than offsets increased yields. The all wheat yield is projected at 46.7 bushels per acre, up 7 percent from the previous year. The survey-based forecast for 2016/17 winter wheat production is up with higher yields more than offsetting reduced harvested area. Winter wheat has benefited from excellent spring growing conditions and yields are projected higher for Hard Red Winter, Soft Red Winter, and White Winter. Spring wheat and Durum production for 2016/17 is projected to decline 16 percent on lower area, as well as a return to trend yield, which is below last year's level.

Total U.S. wheat use for 2016/17 is projected up 7 percent from the previous year on higher exports, feed and residual use, and food use. The 2016/17 exports are projected at 875 million bushels, up 95 million bushels from the previous year's low level but still well below average. Large supplies in several major competing countries will continue to limit U.S. exports. Feed and residual use is projected up 30 million bushels on increased supplies. U.S. ending stocks are projected to rise 51 million bushels from the elevated 2015/16 total to 1,029 million, the highest since the 1987/88 crop year. The all wheat season-average farm price is projected at $3.70 to $4.50 per bushel; the mid-point of this range is the lowest in 11 years.

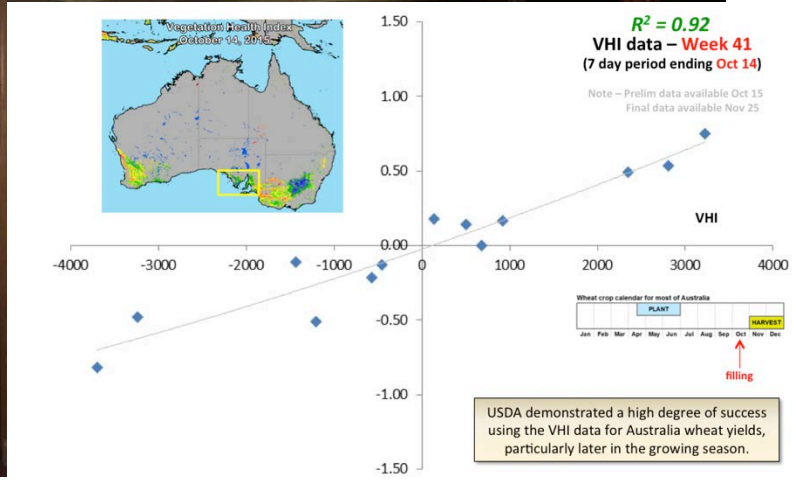
Global wheat supplies are projected to rise 2 percent from 2015/16 as increased beginning stocks more than offset a decline in production from the previous year's record. Total wheat production is projected at 727.0 million tons, the second highest total on record. Large crops are expected in most key competing countries and favorable spring growing conditions suggest that yields will be well above trend in the EU, Russia, and Ukraine. Global wheat consumption for 2016/17 is projected slightly higher than in 2015/16 with higher food use more than offsetting a reduction in world wheat feeding. Global import demand for 2016/17 is down from last year's record, but still very large. Global ending stocks for 2016/17 are projected at a record 257.3 million tons, up 14.4 million from 2015/16.

COARSE GRAINS: U.S. feed grain supplies for 2016/17 are projected up 4 percent from the 2015/16 record with increases in both beginning stocks and production. Corn production for 2016/17 is projected at 14.4 billion bushels, up 829 million from 2015/16 and 214 million higher than the previous record in 2014/15. A 5.6-million-acre increase in corn plantings more than offsets a small reduction in yield. The U.S. corn yield is projected at 168.0 bushels per acre, down 0.4 bushels from 2015/16. Corn supplies for 2016/17 are projected at a record 16.3 billion bushels, up 886 million from 2015/16, which more than offsets projected declines for sorghum, barley, and oats.

U.S. corn use for 2016/17 is projected at a record 14.1 billion bushels, 4 percent higher than for 2015/16. Feed and residual use for 2016/17 is projected 300 million bushels higher with higher production, lower expected prices, and further expansion in animal numbers in 2016/17. Corn used to produce ethanol is projected 50 million bushels higher than in 2015/16 with a reduction in sorghum use for ethanol and higher

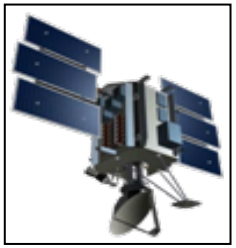
APPROVED BY:

MICHAEL T. SCUSE
SECRETARY OF AGRICULTURE DESIGNATE



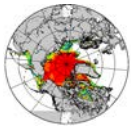
NIC Product Generation

Arctic Maritime Domain Awareness


Satellites

+


Buoys


Models

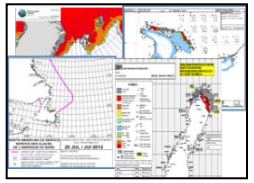

Aircraft


Webcam


Radar


Ship Obs

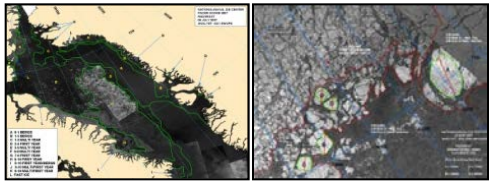

Surface Obs


International Partners

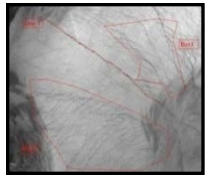
Interpretive Snow and Sea Ice Analysis and Sea Ice Forecasting

- Geographic Information System
- Meteorology
- Semi-automation
- Subject Matter Expertise

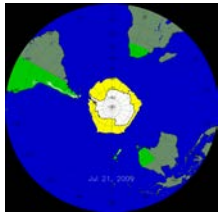
Annotated Images

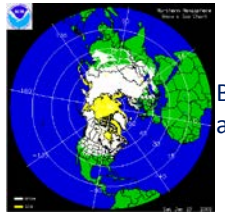


Fractures, Leads and Polynyas (FLAP)



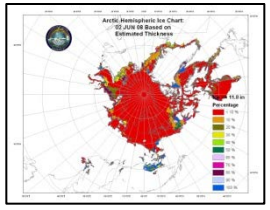
Automated Snow and Ice products



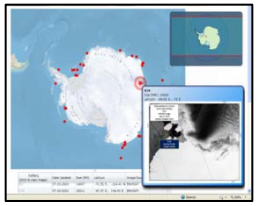


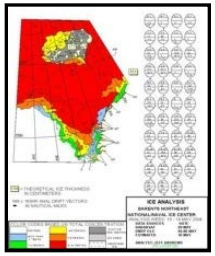
Blended Snow and ice cover

Ice Thickness Estimations



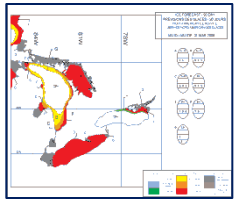
Antarctic Icebergs

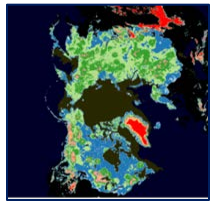




Hemispheric and Regional Ice Charts

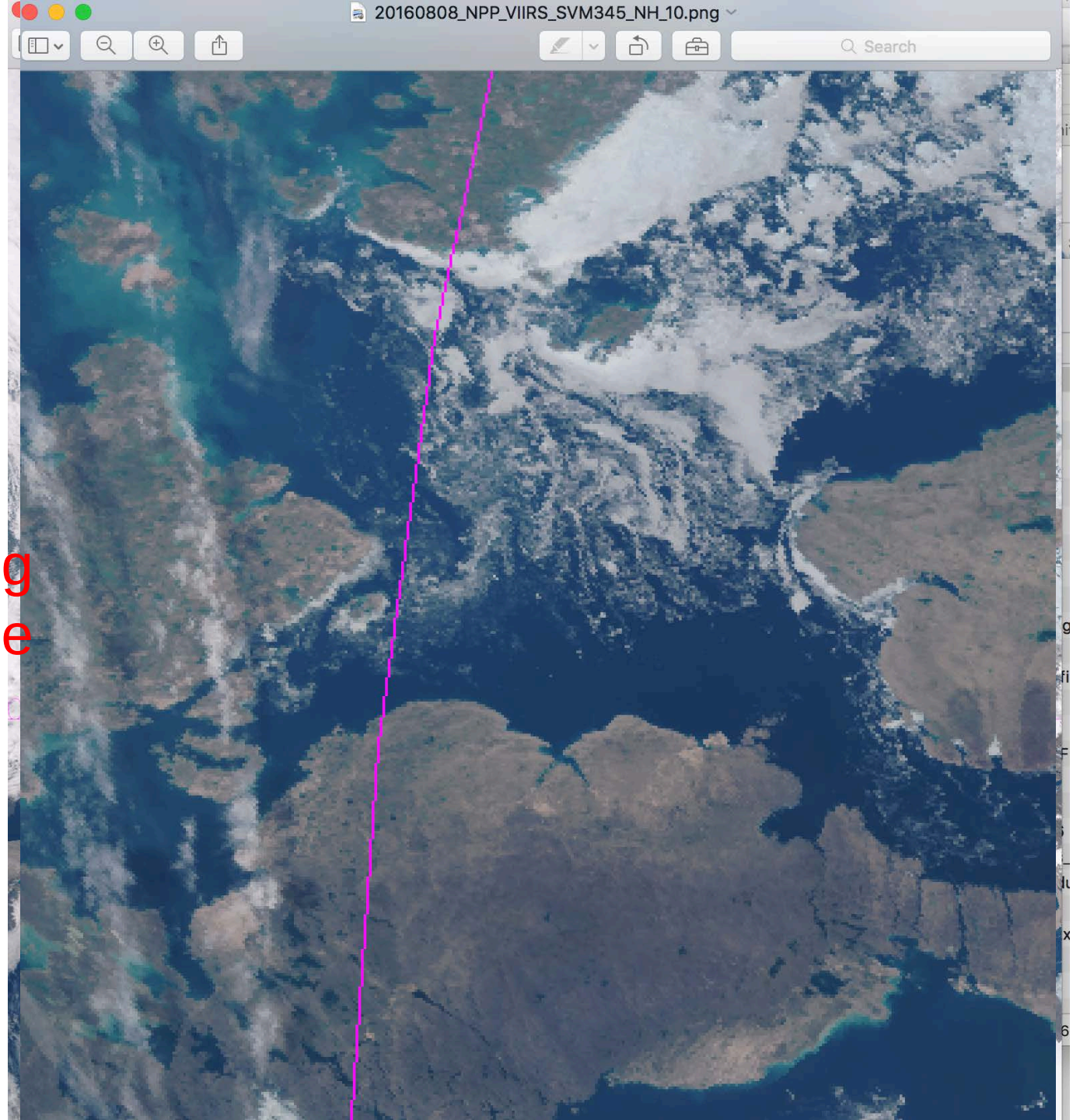
Ice Outlooks





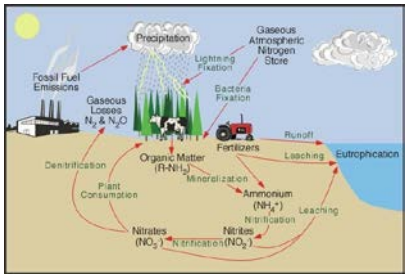
Blended Snow Depth

Finding NW Shipping Passage



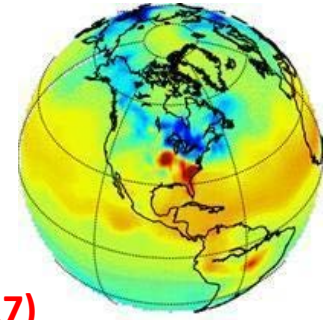
FY13-FY16 Atmospheric Chemistry, Carbon Cycle, and Climate (AC4) Research Portfolio

Nitrogen Cycle (FY13,15)



Atmospheric composition from space (FY16)

CarbonTracker (FY13)



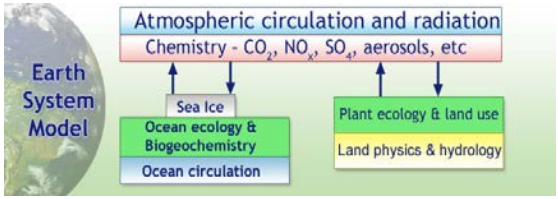
Emissions and Chemistry of Wildfires (FY16-17)

Urban Emissions (FY13,14,17)

Oil & Gas Emissions (FY 14,17)

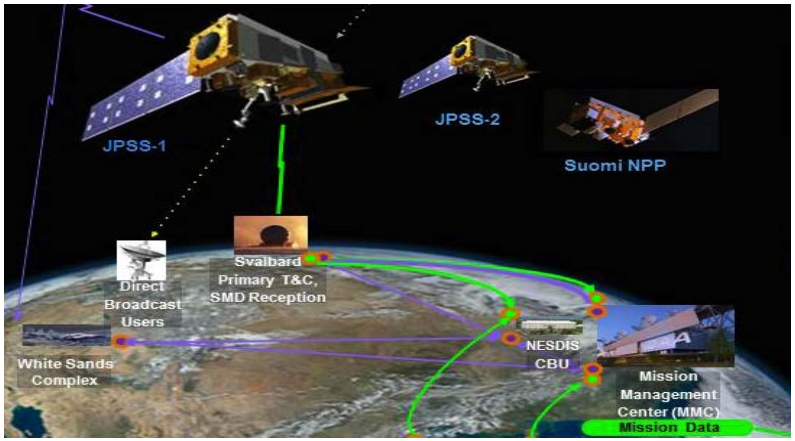
ESRL/CSD, PMEL, ARL Field Campaigns

GFDL Nitrogen Modeling



ESRL/GMD Monitoring

Atmospheric Composition from space

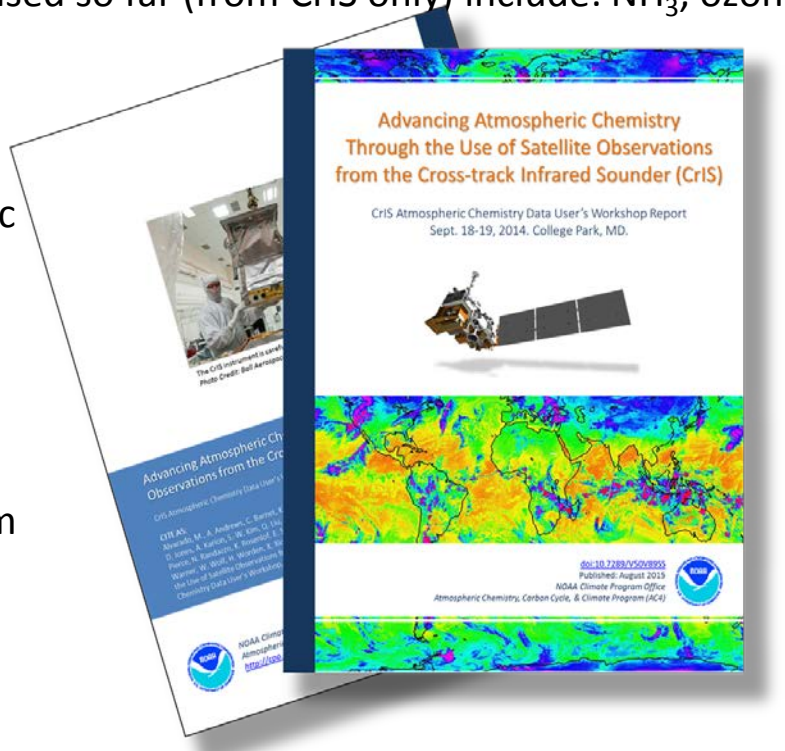


Data from JPSS instruments and AC4 program science:

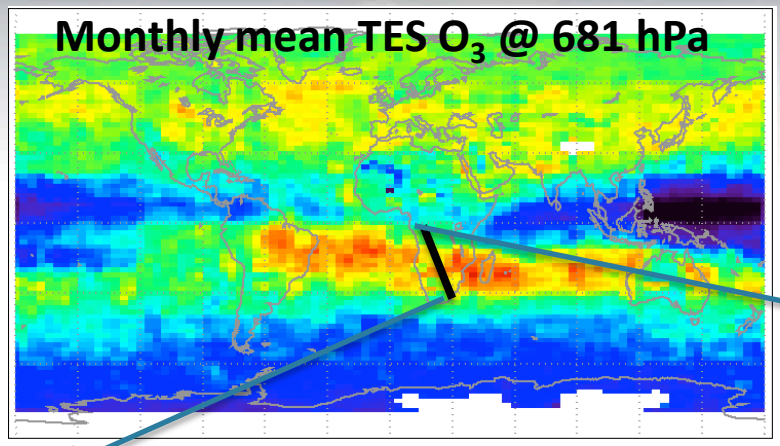
- AC4 typically supports field and laboratory data, which can be complemented by JPSS data
- CrIS, OMPS and VIIRS composition products (trace gases and aerosols) can all supply relevant products
- Retrievals are used in connection with global and Earth System models
- Data used so far (from CrIS only) include: NH_3, ozone

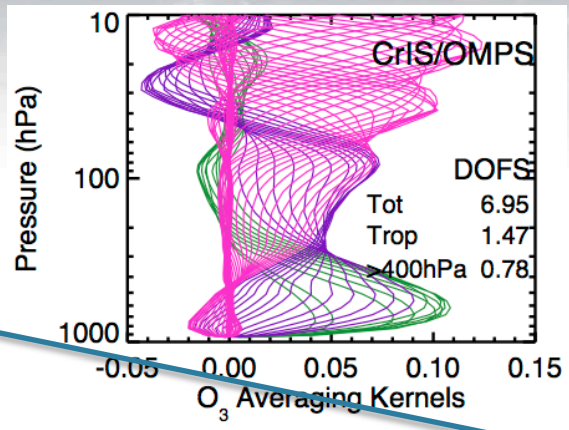
AC4 current and future activities:

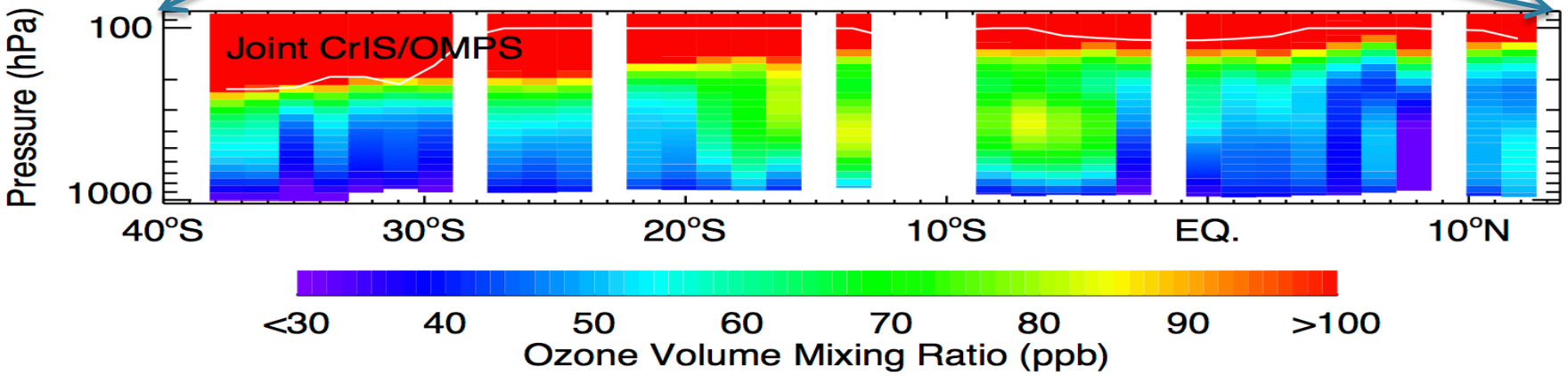
- CrIS data users workshop, focused on atmospheric composition took place September 18-19, 2014; report published August 2015
- Three projects include NH_3 data product development, validation and application
- Upcoming project on CrIS/OMPS ozone retrieval
- Ongoing interest in atmospheric composition from space, with special emphasis on monitoring and field campaign support/complement



Extension to Joint CrIS/OMPS O_3 Retrievals



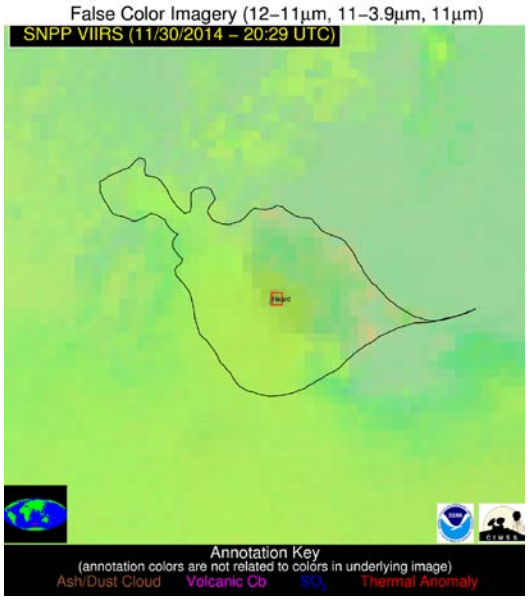




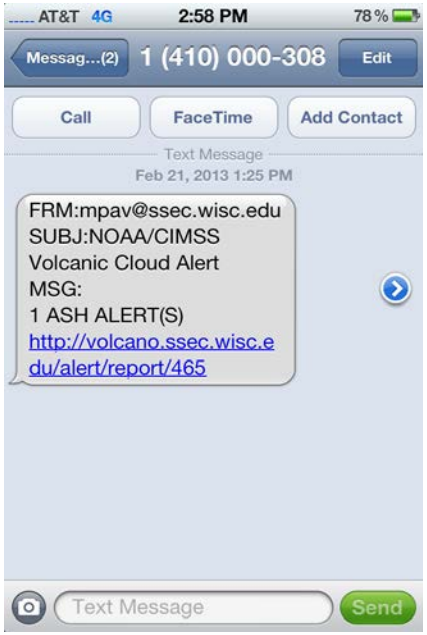
- MUSES has been applied to joint CrIS/OMPS ozone retrievals over Africa on October 21, 2013.
- The elevated ozone concentrations between 2 - 20° S are associated with biomass burning.
- Joint CrIS/OMPS O_3 and CrIS CO retrievals using MUSES will support the NOAA FIREX flight campaign (Fire Influence on Regional and global Environments Experiment) – an intensive study of the impacts of western North America fires on climate and air quality.

VOLcanic Cloud Analysis Toolkit (VOLCAT)

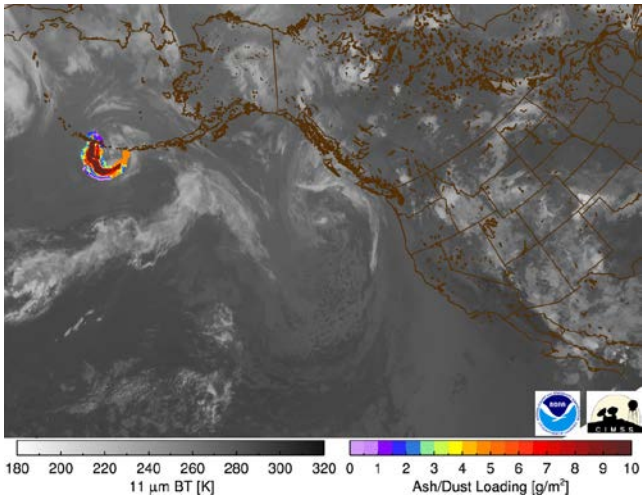
1). Unrest Alerts



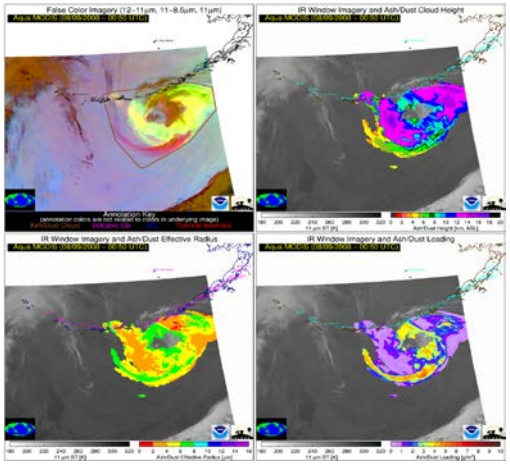
2). Eruption Alerts



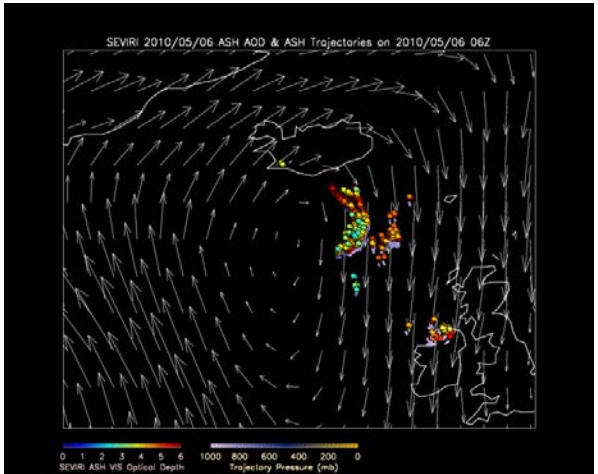
3). Volcanic Cloud Tracking



4). Volcanic Cloud Characterization



5). Dispersion Forecasting



Spectrally Enhanced Cloud Objects (SECO) Method for SO_2 Detection

- Automatically extract coherent SO_2features from OMPS and CrIS using cloud object analysis
- Construct an *a priori* probability from OMPS and CrIS and utilize it in VIIRS implementation of SECO method
- Final SO_2 detection results are at the VIIRS resolution and are overlaid on VIIRS imagery
- The fused JPSS SO_2 detection results can then be used to aid in SO_2 detection and tracking from GEO satellites

Take away

Cal/Val and periodic assessments of performance, and understanding issues and addressing them continues to be important.

End of the day, it's the applications. But the applications will depend on the performance. Think about the applications, talk to the users, and talk to PG Initiative Coordinators– where we can verify the priority and user committment and help with the coordination.

Societal Benefits of NOAA Data

2016 STAR JPSS
Annual Science Team Meeting

Monica Grasso, Ph.D.

Chief Economist
Office of Performance, Risk, and Social Science
(PRSS - CFO)

August 12th, 2016

Purpose

- Introduce the Office of Performance, Risk, and Social Science (PRSS - CFO)
- Present a Brief Summary of NOAA's Social Science Vision and Strategy goals
- Value Concept and Economic Valuation
- Social Science Initiatives in Valuation Economics

Office of Performance, Risk, and Social Science (PRSS-CFO)

Mission: Deploy best practices from enterprise performance and risk management as well as social science integration to help decision makers achieve NOAA's mission.

Social Science Integration

Core Functions

- Quantify and promote value and impact of NOAA's products and services
- Incorporate social science research in management decisions
- Integrate social science in program planning and budgeting

FY16 Major Initiatives

- Developing Value of Information (VOI) approach and research in NOAA to quantify the impact of products and services
- Integration of ecosystem services across NOAA
- Promoting new risk communications strategies across NOAA

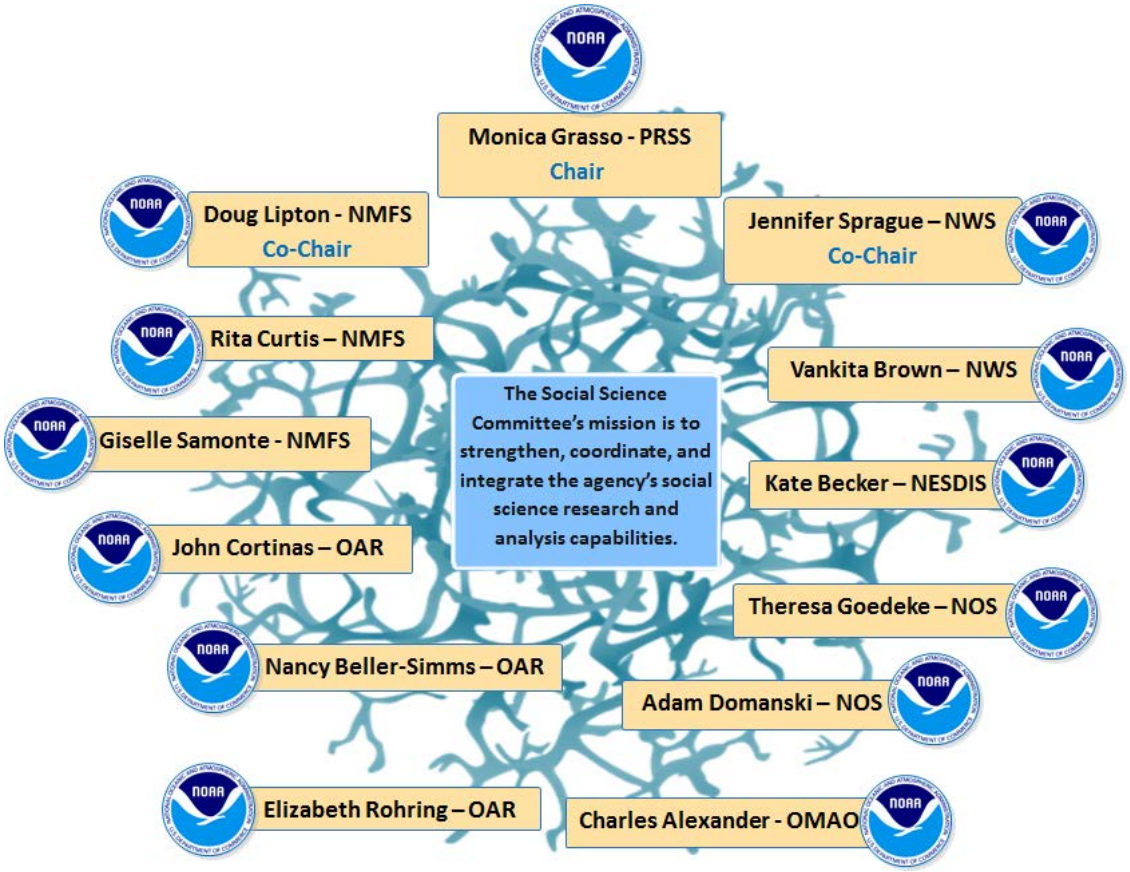
What is Social Science?

"Social science is the process of describing, explaining and predicting ***human behavior*** *and institutional structures* ***in interaction with their environments****…"*

NOAA Science Advisory

NOAA's Social Science Committee

The Social Science Committee is a formal NOAA Committee formed in 2014 and composed of representatives from each Line Office



SOCIAL SCIENCE

VISION AND STRATEGY

SUPPORTING NOAA'S MISSION WITH SOCIAL SCIENCE

VISION

NOAA's mission and priorities more effectively drive positive environmental, societal, and economic change.

STRATEGY

Integrate Social, Behavioral, and Economic science end-to-end in NOAA's mission and priorities.

Make communities more resilient	Evolve the Weather Service	Invest in observational infrastructure	Achieve organizational excellence

GOAL 1
NOAA's impact on society is defined and measured.

Quantify and promote the value and impact of NOAA's products and services in serving communities and meeting its mandates.

Standardize approaches for defining and measuring high profile economic data.

Strengthen the impact of investment by valuing improvements in NOAA products and services.

GOAL 2
NOAA's products and services strengthen societal decision-making.

Incorporate social science research in management decisions to increase community resilience.

Use social science methods to assess and communicate risk while reducing vulnerability to changing environmental conditions.

Consistently collect social science data and information to strengthen the implementation of ecosystem-based management.

GOAL 3
Institutionalize social science to further NOAA's mission.

Integrate social science in program planning and budgeting.

Apply social science methods in internal agency operations and decision-making.

Use only the most high-quality, robust, and innovative social science in NOAA products and services.

Science, Service, and Stewardship

NOAA Social Scientists

NOAA Employee Survey Results (2013)

- Number of Survey Recipients = 220 people
- Respondents = 160 people
- Economists = 53 people (20%)
- Line Office Distribution
  - NMFS = 68 people (43%)
  - NOS = 35 people (22%)
  - OAR = 31 people (19%)
  - NWS, PPI, NESDIS = 26 people (16%)

Social Science Newsletter

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Social Science Community Newsletter

Volume 8, June 2016 ~ Sharing knowledge for better practices

NOAA Transitioning Research on Risk and Behavior

The National Oceanic and Atmospheric Administration (NOAA) spends **billions** of dollars each year monitoring and predicting risk from environmental hazards to help people, communities, businesses, and local governments find and use the correct information to understand risk and make smart decisions. However, those investments only achieve their full potential value if risk is communicated effectively, which empowers people to pursue the response options that are best for them. Research from NOAA and its external partners improves the ability to deliver weather and coastal warnings more effectively, communicate local hazards and risks, and provide guidance and decision support tools to stakeholders.

NOAA is working across its line offices to transition research on risk communication and behavior to application. This will help improve the public's response to information regarding risk and lead to more protection of life and property. The Social Science Committee recently released a report titled "*Risk Communication and Behavior: Best Practices and Research Findings*." The report reviews risk communication and public response research literature within the context of key episodic hazards. It covers three weather hazards (tornadoes/severe wind, floods, and tropical cyclones), findings for general weather, and three other environmental hazards (tsunami, volcano, and wildfire). These specific hazards were chosen for their relevance to NOAA's mission, priorities, and vision for the future.

This report also recommends best practices for risk communication relevant to NOAA practitioners including manager and forecasters, outreach coordinators, warning coordination meteorologists, and communication directors. The goal of this work is to provide information to develop community resilience and accelerate the transition of research to application across NOAA.

For more information on the Risk Communication and Behavior Report, contact Denna.Geppi@noaa.gov.

Multilevel Partnership to Support a More Weather-Ready Nation

Recently, the Office of Oceanic and Atmospheric Research (OAR), National Weather Service (NWS), and the Federal Highway Administration (FHA) partnered to study how broadcasters, private companies, government forecasters, academics, and others use and support social and behavioral science research in the field of meteorology. Interest in social and behavioral sciences has grown because despite high-quality forecasts, recent weather events impacted communities negatively. For example, people have lost their lives because they ignored barricades, drove through flooded roadways, and were swept away. The NWS, OAR, and FHA recognized a need to partner with external groups to improve their risk communication capabilities. While interest has grown, concerns remain about the amount of resources dedicated to social and behavioral science and the barriers that may exist in implementing research findings in operations. To address these concerns, the study will evaluate research implementation and make recommendations to improve the links between researchers and practitioners.

For more information contact Kim.Klockow @noaa.gov.

"Gender Mainstreaming" in the National Weather Service

Did you know?

For some weather hazards, men are 80% of the fatalities in the United States because they do not perceive the threat.[1]

Across the globe, natural disasters such as droughts, floods and storms kill more women than men, and tend to kill women at a younger age, according to the World Health Organization. In the U.S. however, statistics show more men die than women annually, due to cold, heat and floods. The reason for these inconsistencies are complex, and the National Weather Service is looking to social science to help explain these unique vulnerabilities.

Social science revealed that gender has tremendous, and sometimes inequitable, impacts on a partner's reception of and reaction to weather information. Gender roles are of particular concern. For one, socio-economic status, which is largely a product of gender roles, affects response and resilience to weather events differently for men and women. Consider that women, especially single mothers, are the majority of the nation's poor and simply don't have the tools, means, and opportunities to take protective action. Women also make up a greater proportion of the elderly—one of the groups with the highest mortality rates during disasters such as heat events.

"Situational and cultural context are extremely important with regard to the ways women and men access information"

There are many gender differences, such as communication practices, social relations, and risk behaviors, that directly affect individual responses to weather information. Social science perspectives and approaches help to further understand how these and other gendered social norms, roles, behaviors, and preferences influence weather event outcomes for men and women. For example, men have been found to be more risk prone; thus making them more vulnerable to hazards.

58.6 percent of the U.S. population between the ages of 70-100 are female (U.S. Census Bureau, 2012)

In light of these findings, the National Weather Service is actively integrating "Gender Mainstreaming" into its operations. Gender Mainstreaming refers to the concept of assessing the different implications for women and men of any planned policy action, program design, and education. In practice it is simply to take into consideration gender differences when planning, deciding, studying, providing, and all other activities that serve people through organizational efforts. As such, Gender Mainstreaming functions as a social science lens through which implications for both men and women are viewed and assessed to determine appropriateness, which in turn places the focus directly on the impact piece of the National Weather Service's Impact Based Decision Support services, and the Weather-Ready Nation program (http://www.nws.noaa.gov/com/weatherreadynation/).

Gender Mainstreaming was first introduced to NWS by Deputy Director, Laura Furgione. "Situational and cultural context are extremely important with regard to the ways women and men access information. Even more important still are the ways women and men process and relay information, particularly disaster risk related weather and climate information," said Ms. Furgione, "and building a Weather-Ready Nation is about understanding those processes to make ALL people climate and weather resilient."

55.6 percent of the 45.3 million people living in poverty in the United States are women and girls (American Community Survey, 2013).

NWS established a Gender Mainstreaming Working Group to promote the concept within the organization and consider ways in which the concept can be used to address external partner needs. Among other activities, NWS will also host a Diversity and Inclusion Conference in October that will feature Gender Mainstreaming.

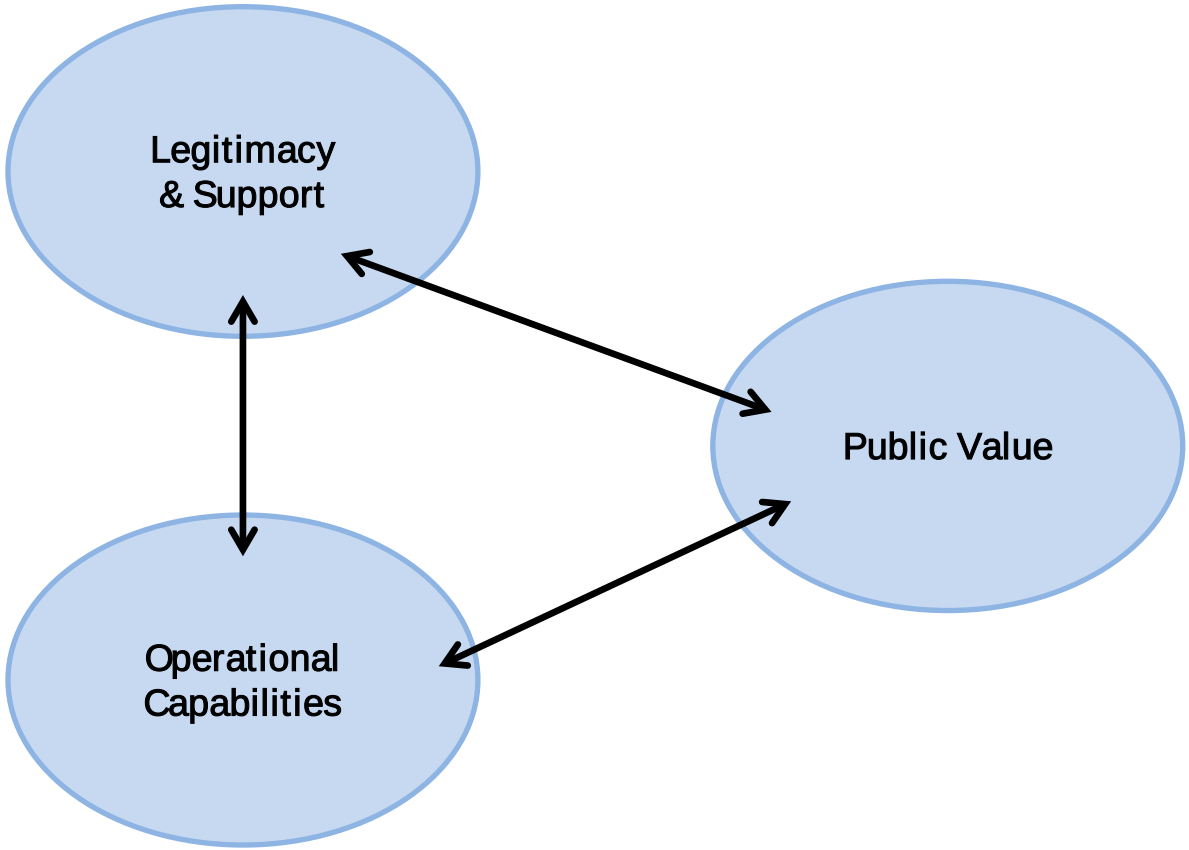
For more information contact: Vankita.Brown@noaa.gov or Dave.Rowell@noaa.gov

Public Sector Characteristics

- Focus on people's welfare (public goods)
- Long term and future oriented mission and strategy
- Emphasis on *ends* rather than *means*
- Efforts focus more on *macro* rather than *micro* levels
- Core mission remains constant

Adapted from Moore, M. H. 1997. Creating Public Value: Strategic Management in Government. John F. Kennedy School of Government. Harvard University Press.

Public Sector Value Alignment

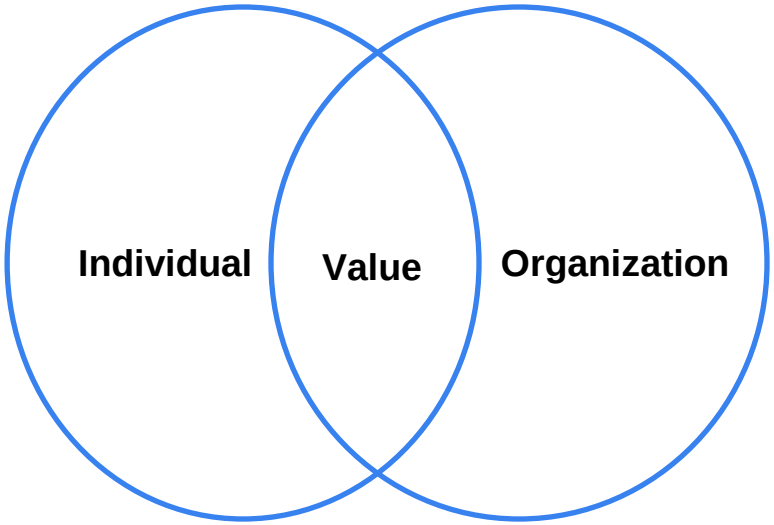


Moore, M. H. 1997. Creating Public Value: Strategic Management in Government. John F. Kennedy School of Government. Harvard University Press.

Value of NOAA Data

- NOAA products are used by both private and public sectors
- Value to Private Sector: leads to private sector productivity gains and creation of new products and businesses
- Value to Public Sector: contributes to protection of life and property, management of coastal resources, safety, security, etc.
- Open and free access information can boost economic efficiency and create new business lines and industries

Valuation Economics



Valuation Economics

- NOAA is a provider of environmental intelligence (public good)
- Value is a perceived benefit that can involve more dynamic and complex concepts such as emotions and human behavior
- Value is also acquired as an input to a production process that generates economic value

Valuation Economics (cont.)

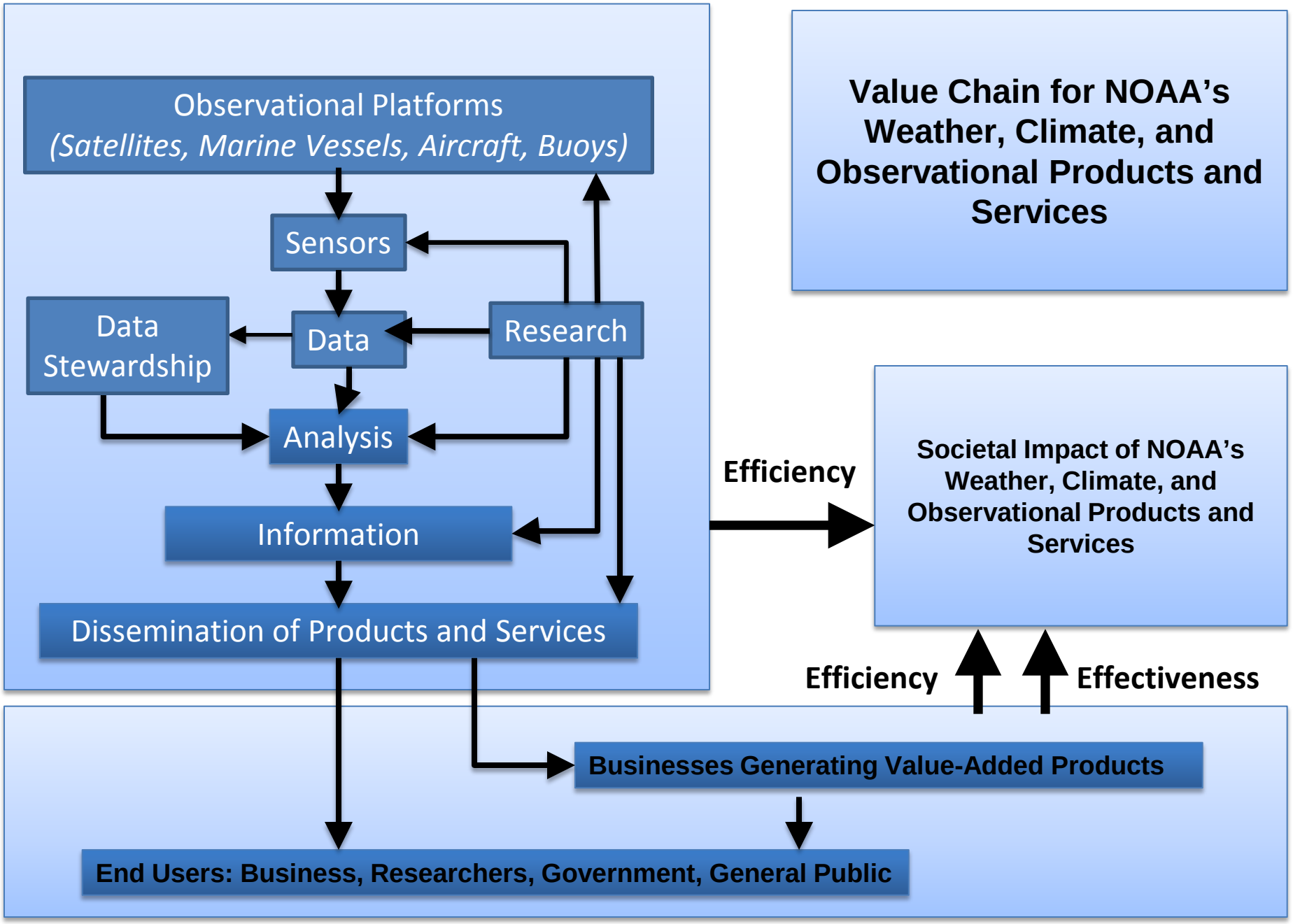
- Benefits derive from the information products and services that result in improved economic decisions
- Cost-benefit analysis allows the comparison of net benefits among data/observing systems
- Analysis of alternatives provides cost and benefits of different scenarios of program/project implementation

Market and Non-Market Valuation

- Market values: estimated using market data, e.g., prices
- Non-market values: used when goods or services are not part of formal markets (*market failures)*
- Non-market valuation applied to monetize benefits
- Non-market valuation methods (stated and revealed preferences)

Why is Valuation Important?

- Justification for government funding
- Alignment of mission and operations to public value
- Provide information for the decision-making process (resource allocation process)
- Help prioritize investments in observing systems and information policy


Value Chain for NOAA's Weather, Climate, and Observational Products and Services
Observational Platforms
(Satellites, Marine Vessels, Aircraft, Buoys)
Sensors
Data Stewardship
Data
Research
Analysis
Information
Dissemination of Products and Services
Efficiency
Societal Impact of NOAA's Weather, Climate, and Observational Products and Services
Efficiency
Effectiveness
Businesses Generating Value-Added Products
End Users: Business, Researchers, Government, General Public

Satellite Valuation Studies

Study (Date)	Description	Notes	2016 $
JPSS Economic Benefit Analysis, Tecolote (2015)	Top-Down analysis of JPSS contribution to weather information	Inputs date back to 2002, cumulative benefits, 2012-2025	$139b - $213b
JPSS Preliminary Benefits Study, Wolfe (2010)	Top-Down analysis of JPSS contribution to weather information	Inputs date back to 1972, annual benefits	$3b - $10b
JPSS Preliminary Benefits Study, Wolfe (2010)	Bottom-Up analysis	Inputs date back to 1972, annual benefits, selected economic impacts	$1.5b
The case for EPS/METOP Second Generation, EUMETSAT, 2014	Bottom-Up analysis, protect property, value added, private use	Annual, benefits to EU nations	$18b - $68b
GOES -R Sounder and Imager CBA, CENTREC 2002	Bottom-Up	Annual	$855b

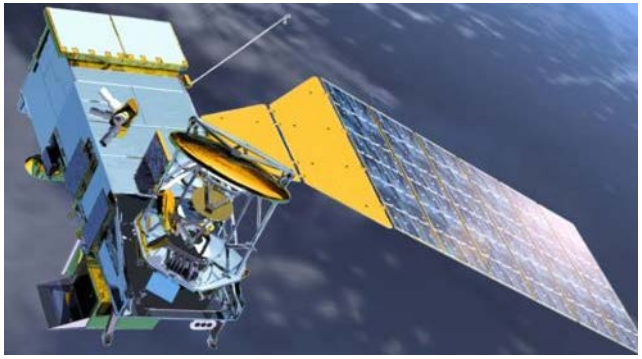
Satellite Valuation Studies

Study (Date)	Description	Notes	2016 $
An Investigation of the Economic and Social Value of Selected NOAA Data and Products for GOES, CENTREC, 2007	Bottom-Up	Annual	$1.4b
GPS Civilian Economic Value to the U.S., Interim Report. Leveson, 2015	Bottom-Up	Preliminary, based on existing data, 2013 data only	$58b
State of the Satellite Industry Report, Satellite Industry Association (2015)	2014 global revenues of satellite industry	Revenues, not benefits	$207b

Current PRSS Initiatives

Value of Information Workshop

- Value of NOAA products and services #1 request from all Line Offices
- Workshop Goals
  - Creating same language across industries
  - Connecting scientists to user communities
  - Who is using the data and how can we track them?
  - The need for consistent practice



Community of Practice Draft Objectives

1. Improve the quality and consistency of VOI studies
2. Coordinate input from US agencies for use in international discussions
3. Advance implementation of strategic goals set by the international body
4. Provide a forum for information sharing and consultation for VOI studies

NASA ROSES Proposal

- Recently submitted NASA ROSES Proposal
  - "Linking Aquatic Satellite Observations to Social Benefits"
- End-to-end value from aquatic satellite observations to decision making and socio-economic benefits in the areas of:
  - Water quality and maritime safety
  - Navigation
  - Security
  - Incident response

Economic Impacts of Space Weather

Objective: Understand and quantify the impacts of extreme and moderate space weather events

This effort will gather information from users on impacts to

- Electric power distribution
- Global Navigation Satellite System signal
- Aviation, including health risks, and
- Damage or anticipated damage to satellites

Expected Results:

- Description of the value chain from observation to socioeconomic impact
- An estimate of the socioeconomic benefits
- A reusable model

Winter Storms NYC

Objective: Understand the value of existing products and services and to understand how they could be improved

This project will gather information from users on impacts to

- Aviation
- Ground transportation
- Human health and safety

Expected Results:

- Description and quantification of storm-related losses
- Description of the use of weather products that prevented higher losses
- Identification of the attributes of weather products that could reduce losses further

Economic Value of Marine Vessel Observations

Objective: Support ongoing fleet recapitalization studies

This project will gather information from users on

- Value of products and services supported by NOAA ship operations
- Cost-effectiveness of using contract vessels for collecting data
- Capacity of contract vessel fleet

Expected Results:

- Description of the value chains
- An estimate of the economic value of NOAA fleet
- Description of the cost-effectiveness of expanded use of contract vessels

How can Social Science help NOAA's Mission?

- ✓ Valuing NOAA's products and services and valuing what is at risk - ***economic statistics and valuation studies*** *(e.g. Space Weather, Value of Information)*
- ✓ Managing, mitigating and communicating risk – ***integrated risk assessment, research on risk communication and behavior***
- ✓ Enhancing and valuing stewardship (resources, protection)- ***valuing ecosystem services***
- ✓ Linking earth systems to human wellbeing (housing, job security, clean water access) - ***social indicators***
- ✓ Measuring long-term successes and societal impacts - ***performance metrics***

Thank you!

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