



# NOAA Satellite and Information Service

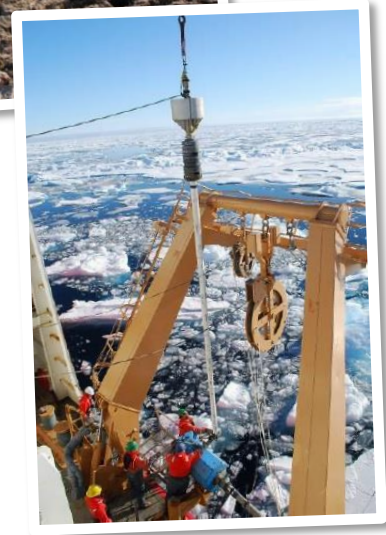
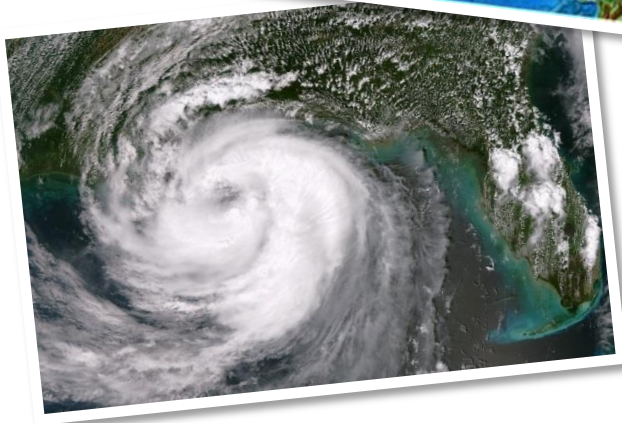
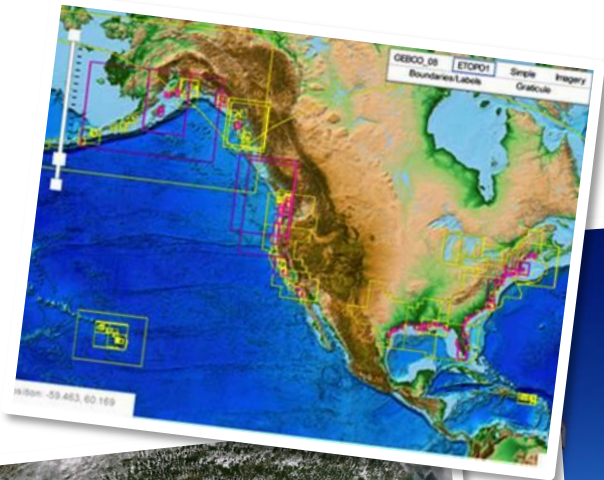
Briefing to Committee on Earth Science and Applications from Space

Dr. Thomas Burns  
Deputy Assistant Administrator for Systems  
September 21, 2014



# The NESDIS Mission

**Our mission is to deliver accurate, timely, and reliable satellite observations and integrated products and to provide long-term stewardship for global environmental data in support of the NOAA mission.**



# Supporting NOAA's Mission

Improved understanding of a changing climate system with new higher resolution measurements and long-term record of key indicators like sea-level rise and sea surface temperature.



Reduced impacts on life and property from severe weather events through continuous surveillance, providing primary input for numerical prediction models, real-time images and products.

Improved coastal water quality support that enables communities to effectively manage resources and improve resiliency with oil spill monitoring and hydrologic and Arctic sea ice analysis.



Improved understanding of ecosystems to inform resource management decisions including coral reef bleaching alerts, harmful algal bloom detection, and migratory tracking.



# NESDIS Principal Activities

## Providing On-Orbit Satellite Operations

24/7 Satellite operations and product processing

Geostationary satellites (GOES)

Polar-orbiting satellites (POES)

Defense Meteorological Satellite Program (DMSP)

DMSP is operated by NOAA for the U.S. Air Force

Jason-2 altimetry satellite

Suomi National Polar-orbiting Partnership (SNPP)

## Acquiring Next Generation Satellites

GOES-R Satellite Series

Joint Polar Satellite System (JPSS)

DSCOVR (Solar Wind Continuity)

Jason-3 Altimetry Satellite

COSMIC-2 Radio Occultation

## Providing Long Term Data Stewardship

National Climatic Data Center

National Oceanographic Data Center

National Geophysical Data Center



POES

GOES



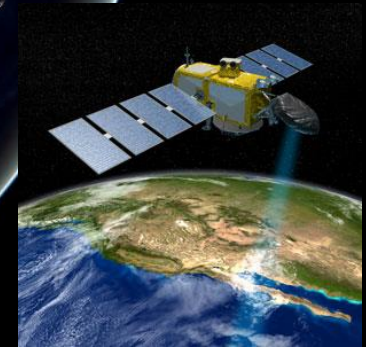
JPSS



Jason-2



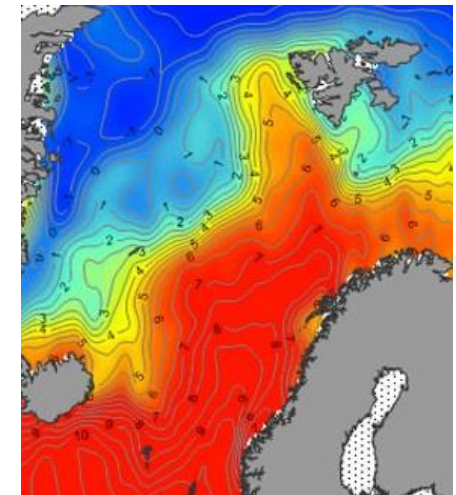
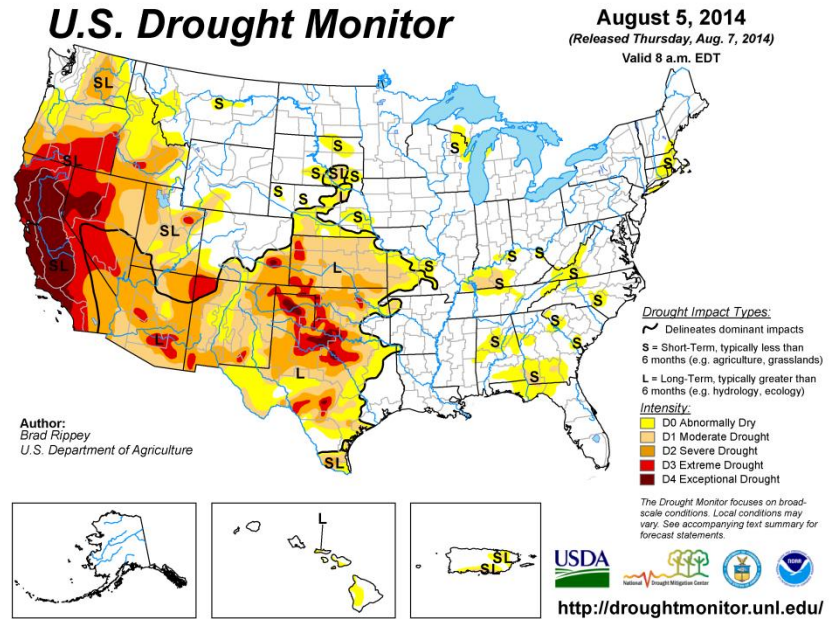
GOES-R



Jason-3

# Data Centers

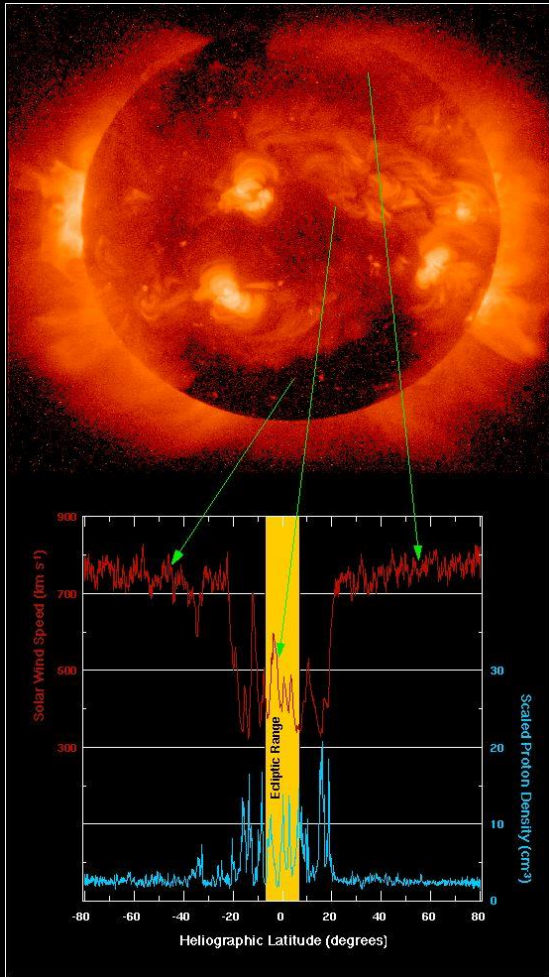
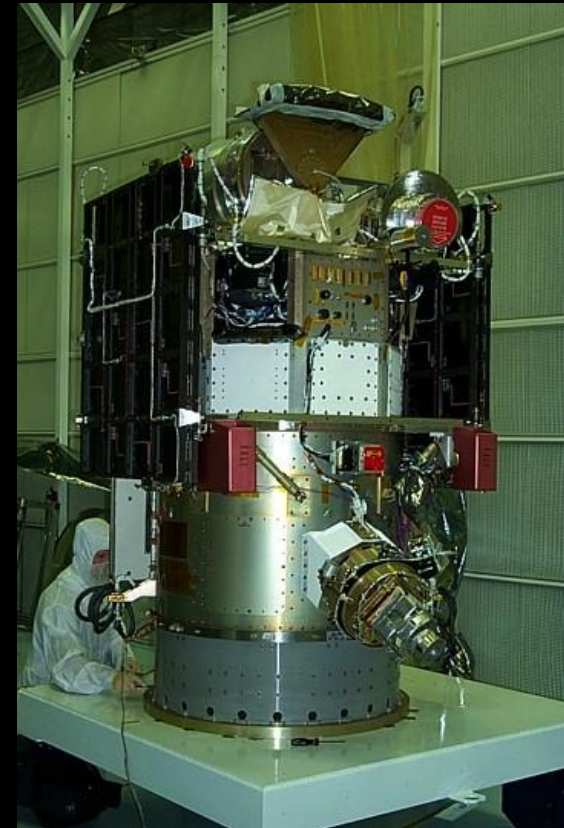
- NCDC
  - Monthly U.S. and Global Climate Reports
  - Weekly U.S. Drought Monitor
  - Editors on BAMS reports like “Explaining Extreme Events”
- NGDC
  - Digital Elevation Models
  - Geomagnetic Models
  - EOS Nighttime Lights observations
- NODC
  - World Ocean Atlas
  - World Ocean Database
  - Gulf of Mexico Data Atlas



# DSCOVR

## Deep Space Climate Observatory

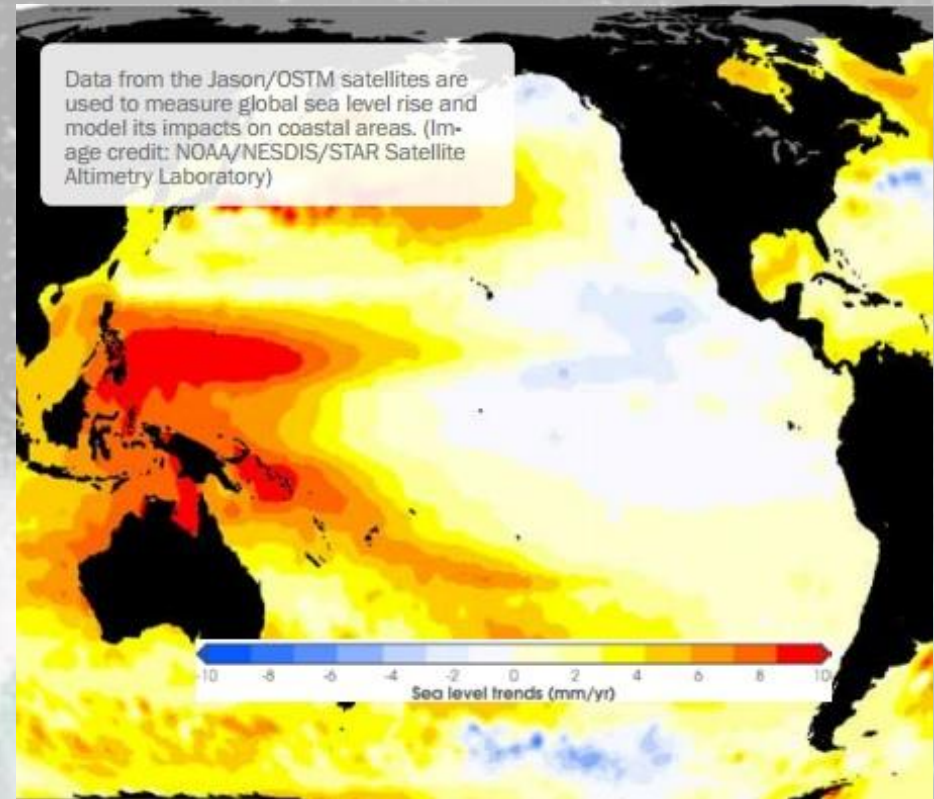
- Joint NOAA/NASA/DoD space weather program which will succeed NASA's ACE mission in providing solar wind measurement continuity from the L1 orbit
- Will maintain accuracy and improve the lead time for geomagnetic storm warnings
- Provides necessary national infrastructure protection for transportation, power grids, telecommunications, and GPS
- **Launch Commitment Date: January 2015**



*Credit: Los Alamos National Laboratory*

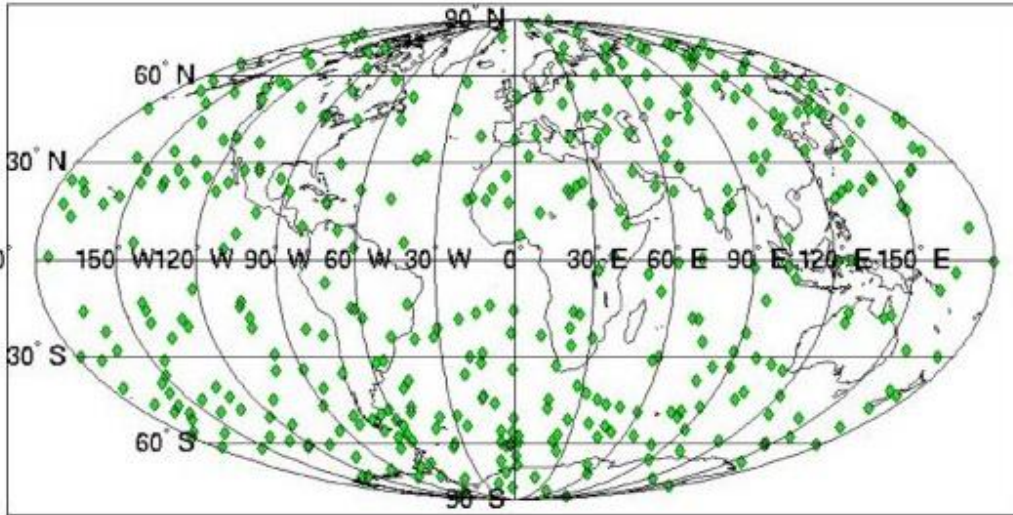
# Jason-3

- Jason-3 will succeed Jason-2 in providing global sea surface height measurements and continuity of a 20 year data record
  - Joint NOAA/NASA/EUMETSAT/CNES mission for operational satellite oceanography measurements
  - Crucial to improvements in weather modeling and hurricane intensification
  - **Launch Commitment Date: March 2015**

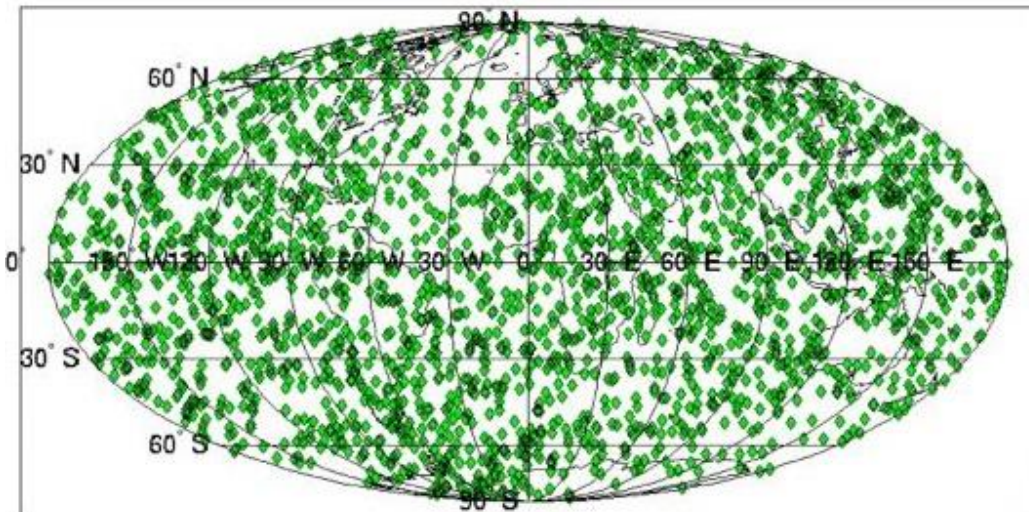


# COSMIC-2

COSMIC Occultations: 3 hours



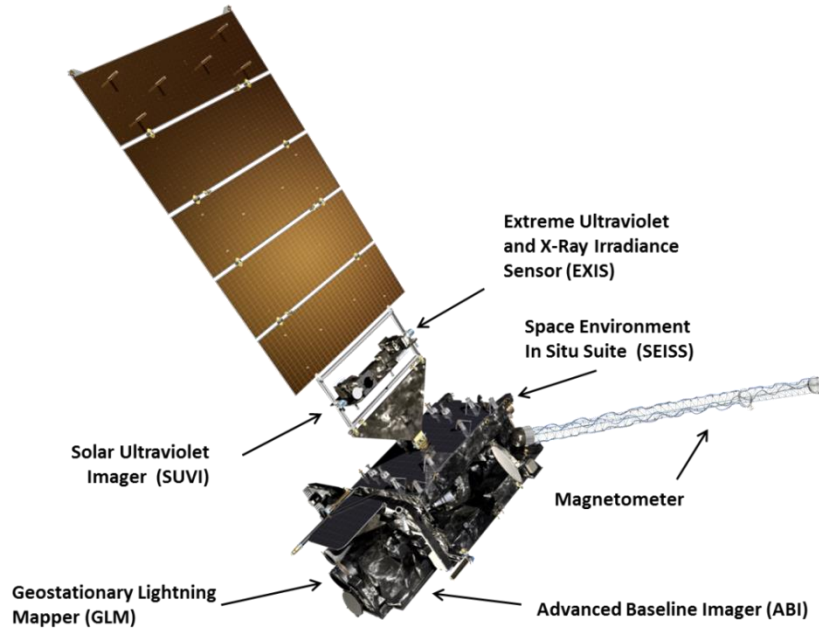
COSMIC-II Occultations, ALL S/C, GPS/Galileo/Glonass: 3 hours



- Partnership with Taiwan, NASA and the U.S. Air Force
- Will provide global radio-occultation measurements of ionosphere, temperature and water vapor information to improve weather forecasts
- Valuable data due to non-biased quality, accuracy and depth
- Shown here is a comparison of sounding distribution over three hour periods between COSMIC and fully-implemented COSMIC-2
- **Launch in 2016**



# Geostationary Operational Environmental Satellite R-Series (GOES-R)



Goes-East image of Hurricane Arthur from July 2, 2014

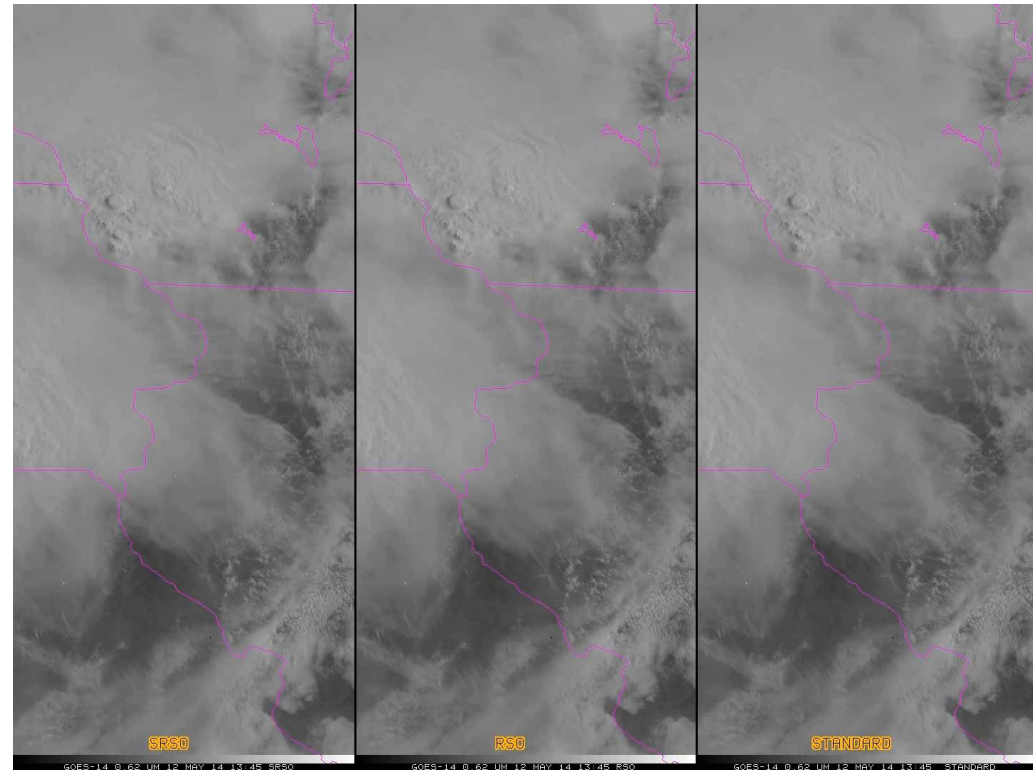
GOES-R Launch Commitment Date*	<b><u>2Q FY 2016</u></b>
Program Architecture	4 Satellites (GOES-R, S, T & U) 10 year operational design life for each spacecraft
Program Operational Life	FY 2017 – FY 2036
Program Life-cycle	\$10.829 billion

\*Launch Date based on FY 2015 President's Budget Request

# Benefits of GOES-R

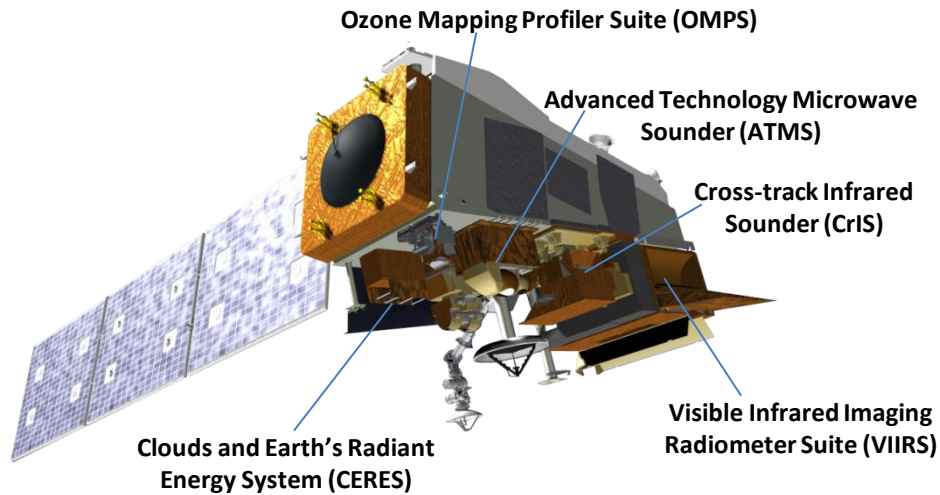
## Super Rapid Scan Operations for GOES-R (SRSOR)

- SRSOR experiments operate GOES-14 in super rapid scan mode, providing one-minute imagery.
- SRSOR imagery emulates the high-temporal resolution capabilities of GOES-R's Advanced Baseline Imager.
- Experiments are conducted to provide NWS centers/forecast offices and NOAA testbeds datasets for forecaster assessment of the utility of GOES-R's imaging capabilities.
- One-minute imagery allows users to visualize phenomena while they are happening.
- Two phases of the 2014 SRSOR experiment were conducted May 8-25 and August 14-28.



*Credit: Cooperative Institute for Meteorological Satellite Studies*

# Joint Polar Satellite System (JPSS)

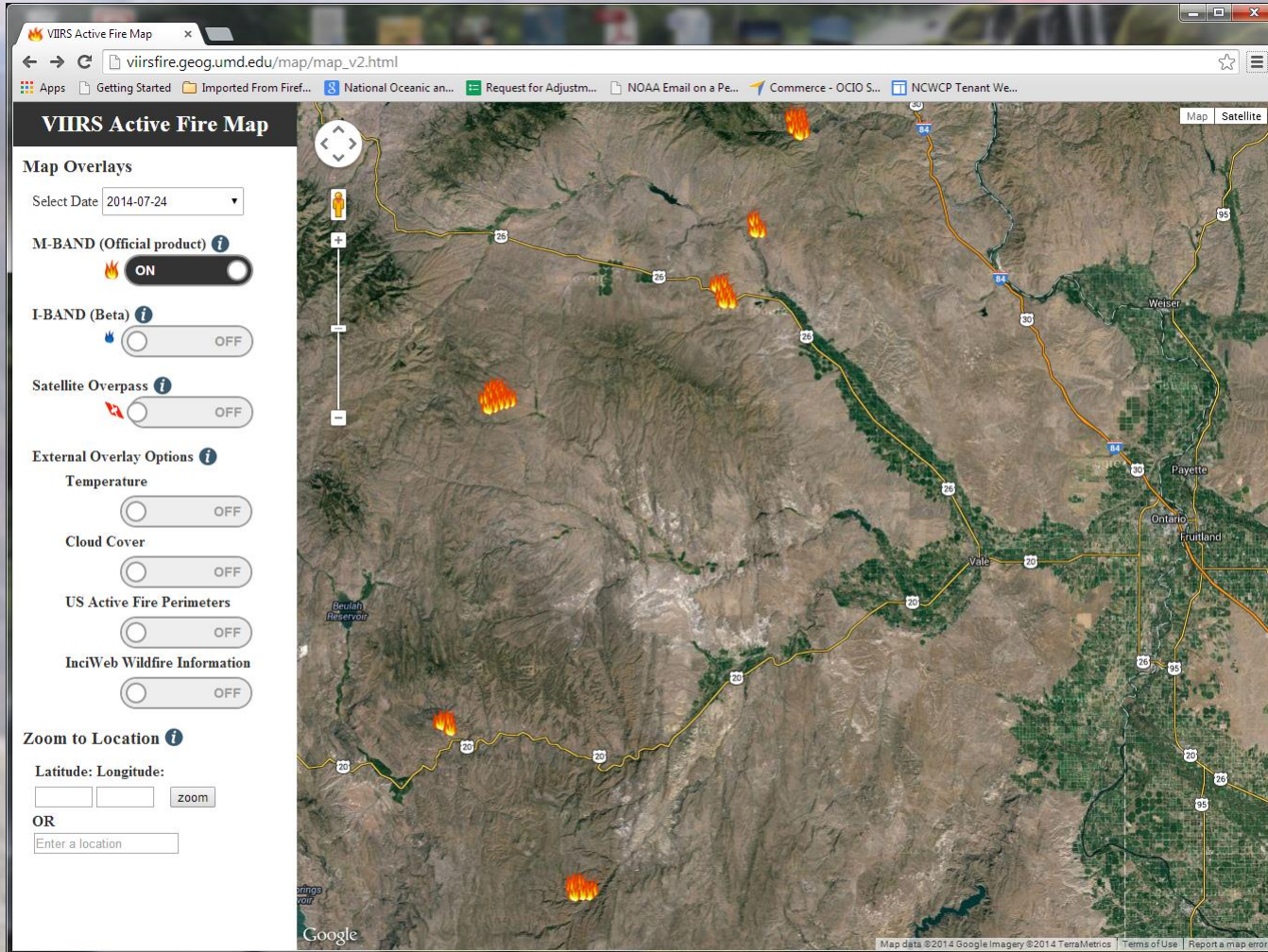


Suomi NPP image of plankton blooms in the Baltic Sea. RGB color composite uses the satellite's SVI1, SVM4, and SVI2 bands

Launch Commitment Dates	NLT <b>2QFY 2017</b> (JPSS-1)*; 1QFY 2022 (JPSS-2)
Program Architecture	3 Satellites (SNPP, JPSS-1, JPSS-2) SNPP- 5 year operational design life; JPSS-1 7-year operational design life
Program Operational Life	FY 2012 - FY 2025
Program Life-cycle (FY 2015 President's Budget)	\$11.323 billion

\*Launch Date based on FY 2015 President's Budget Request

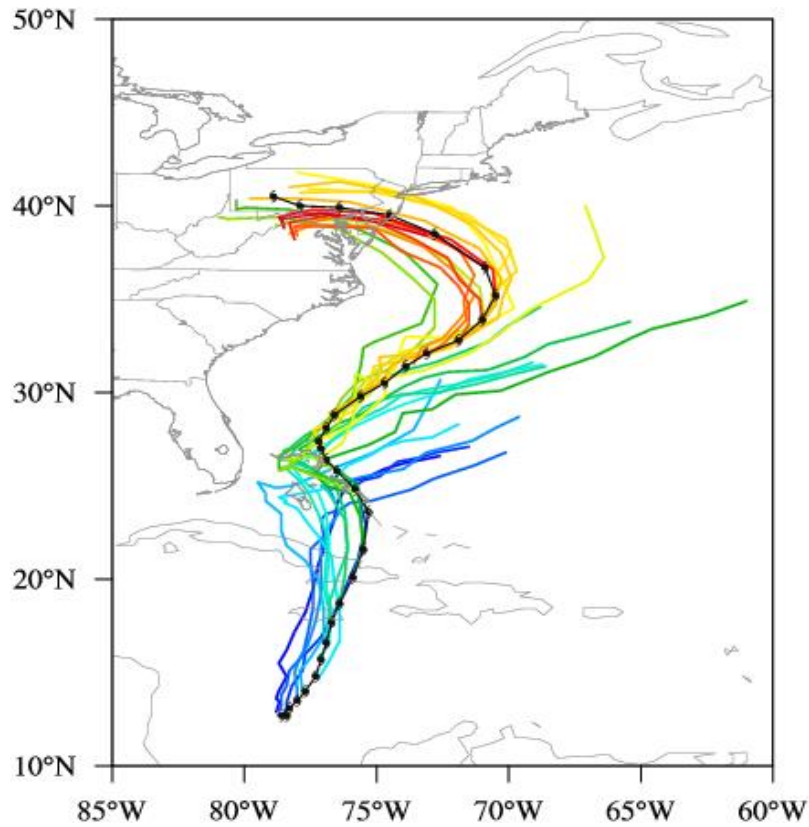
# Benefits of JPSS



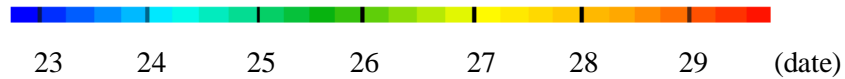
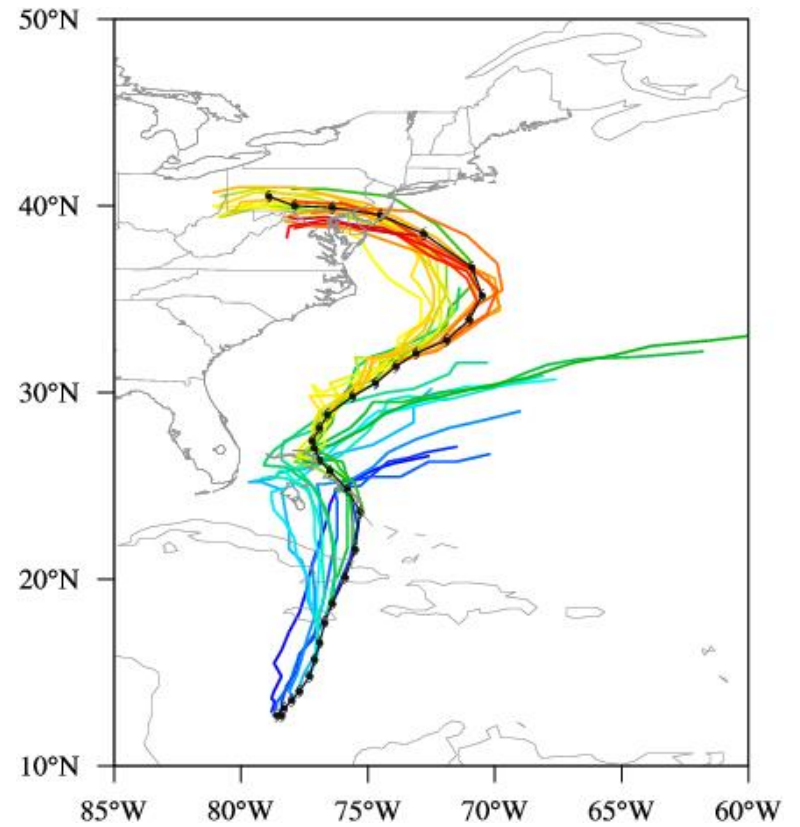
*Fire detections from the operational Suomi NPP VIIRS Active Fire product in northwestern U.S. on July 24, 2014. Data in various user-friendly formats are available from the product evaluation portal at [viirsfire.geog.umd.edu](http://viirsfire.geog.umd.edu).*

# Benefits of JPSS

## Control Run



## Control Run + ATMS



# Polar Follow-On

## Top JPSS risk is continuity of observations

- Legacy systems (POES/EOS) have ensured S-NPP backup to date
- By late 2010s to early 2020s, the U.S. afternoon orbit data will come solely from JPSS
- JPSS-class polar observations have 200x the data volume, providing substantially improved observations
- The high accuracy three-to-seven-day mid-range forecasts depend on these high capability observations to give emergency managers the confidence to act by three days ahead of severe weather events
- JPSS also provides unprecedented imagery (day/night) critical for polar regions (Alaska) and many other observations critical to support all of NOAA mission categories
- To ensure continuity, must be able to recover from on-orbit sounder (ATMS/CrIS) failure—must be two failures to a gap in coverage—so must have resiliency to launch a replacement asset within an acceptable time

Coverage by one polar satellite in one rotation



Coverage by one polar satellite over 6 hours



Coverage by two polar satellites over 6 hours



# JPSS Program Robustness

- NOAA is developing options to improve JPSS robustness for Administration decision with FY16 budget in early September

## Achieving Robustness

- JPSS class missions take anywhere from 6-10 years to develop depending on starting point – lead time forces need for action to address beyond JPSS-2 now
- JPSS undertook extensive study in FY12/13 to lay the ground work for a follow-on to JPSS-2 given that there was, and is, no approved plan beyond the JPSS Program of Record (POR); in parallel there were several independent reviews of JPSS (notably NESDIS enterprise IRT, and GAO) which recommended action
- Following JPSS KDP-I, NOAA and NESDIS entered a second phase of planning to define Polar Follow-On (PFO) to assure continuity of observations
- August–October 2013: The NESDIS IRT held a second review and strongly recommended that NOAA take action to achieve JPSS robustness ASAP as a national priority
- November 2013–present: Intense activities undertaken to define PFO for FY16 addition to POR

# Strengthening NESDIS

**“Strengthening NESDIS” is a comprehensive reorganization plan to keep NESDIS meeting mission objectives in a cost-effective manner into the coming decades.**

- Team is in the midst of detailed work to complete concept of operations that will inform transition to new state. Changes being implemented are reflected in a proposed NESDIS reorganization, which has been submitted in concert with FY 2015 budget process.
- More robust systems architecture at enterprise level and common ground services to standardize product distribution, access, archiving and compression
- Laying groundwork for consolidation of world-class NOAA National Data Centers
- Studies underway to enhance robustness of the operational Polar Weather Constellation beyond the JPSS program considering most timely and cost-effective options



# Satellite Enterprise Architecture Studies

- NESDIS is engaging with the Aerospace Corporation to support analysis of alternatives for satellite architectures beyond JPSS and GOES-R timeframes.
- Short term studies (know as “Charettes”) are ongoing to narrow trade space in order to identify concepts worthy of further study
- Charettes are the first step in establishing the technical, programmatic and business vision for the post-JPSS and post-GOES-R future
- NESDIS will be developing a plan in FY15 for moving from vision to formulation for the Next Generation



# Summary

- NOAA's satellite acquisition programs continue to successfully meet their major milestones as they progress toward their respective launches starting early next year.
- Launch schedule:
  - DSCOVR: January 2015
  - Jason-3: March 2015
  - GOES-R: early 2016
  - COSMIC-2: 2016 (first six satellites)
  - JPSS-1: early 2017
- Strengthening NESDIS reorganization—supports enterprise-level systems engineering, lays groundwork for evolution to common ground services, and consolidates National Data Centers—all of which will allow NESDIS to increase efficiencies. Reorganization and budget restructure approval is needed for FY15 implementation.
- NESDIS, NOAA, and DOC are moving quickly to plan future Polar Follow-On program which is critical for continuity of polar observations and a robust JPSS program.