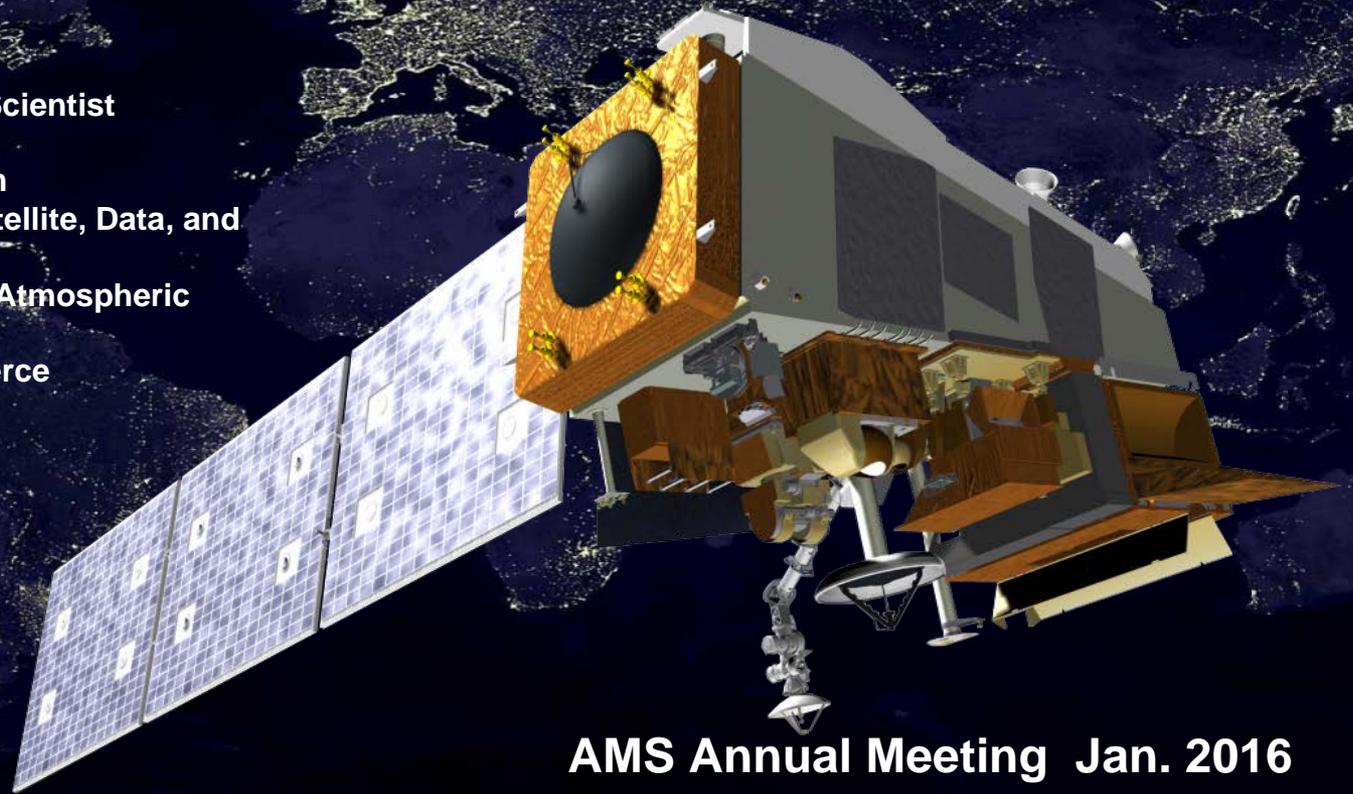


Joint Polar Satellite System (JPSS)

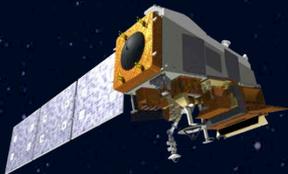
The JPSS Instruments and their Impacts on Applications

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

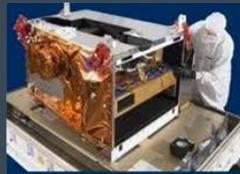


AMS Annual Meeting Jan. 2016



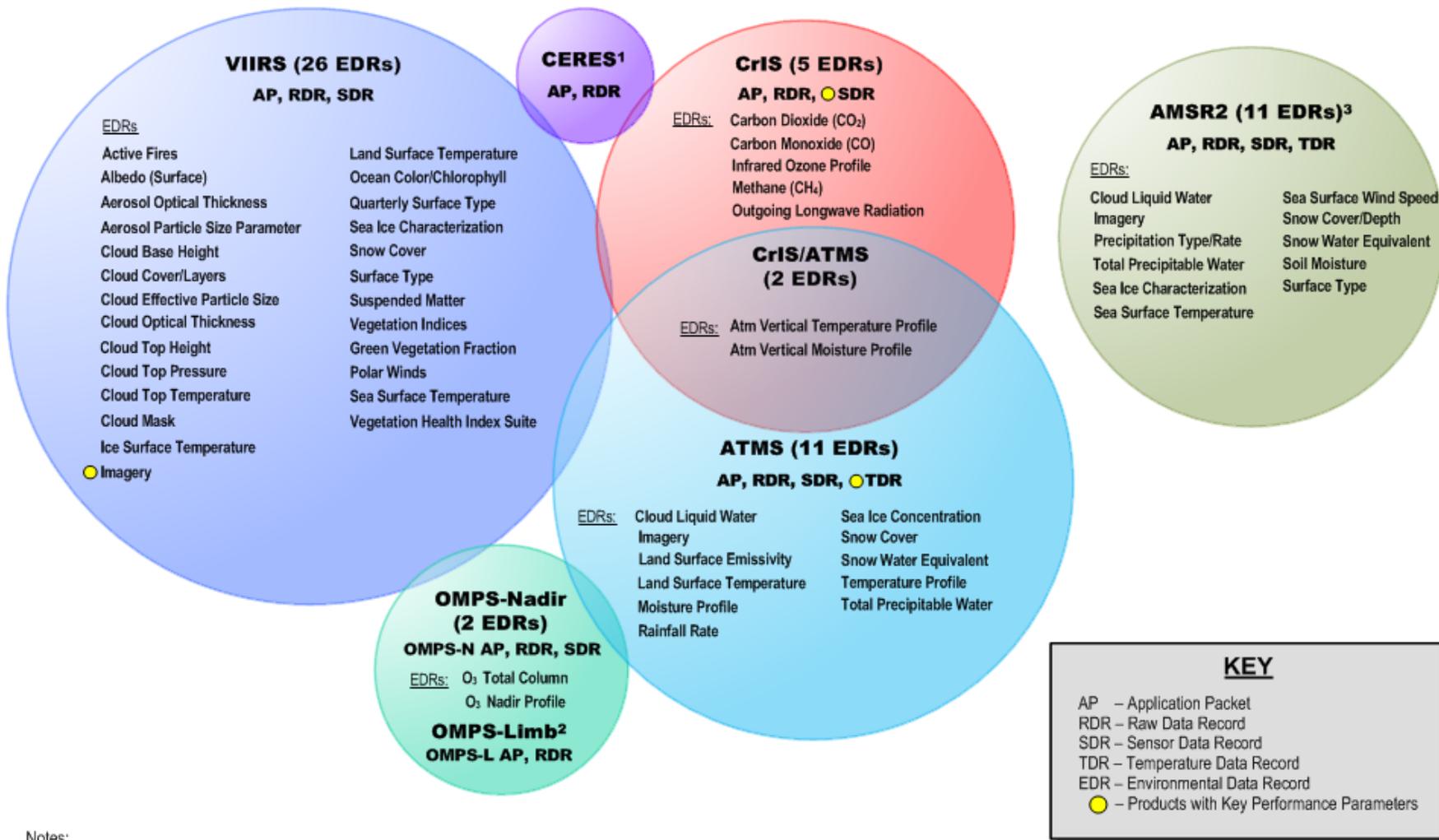
JPSS Instruments



| <i>JPSS Instruments</i> | | <i>Measurements & Products</i> | <i>Contractor</i> |
|---|--|--|--|
|  | ATMS - Advanced Technology Microwave Sounder | High vertical resolution temperature and water vapor information critical for forecasting extreme weather events, 5 to 7 days in advance | Northrup Grumman Electronic Systems |
|  | CrIS - Cross-track Infrared Sounder | | Exelis |
|  | VIIRS – Visible Infrared Imaging Radiometer Suite | Critical imagery products, including snow/ice cover, clouds, fog, aerosols, fire, smoke plumes, vegetation health, phytoplankton abundance/chlorophyll | Raytheon Space and Airborne Systems |
|  | OMPS - Ozone Mapping and Profiler Suite | Ozone spectrometers for monitoring ozone hole and recovery of stratospheric ozone and for UV index forecasts | Ball Aerospace and Technologies Corp. |
|  | CERES – Clouds and the Earth’s Radiant Energy System (S-NPP and JPSS-1) | Scanning radiometer which supports studies of Earth Radiation Budget (ERB) | CERES - Northrup Grumman Aerospace Systems |
| | RBI – Radiation Budget Instrument (JPSS-2, 3, 4; provided by NASA) | | RBI - Exelis |

JPSS Program Data Products

JPSS Level 1 Requirements Document, v1.8



Notes:

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

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

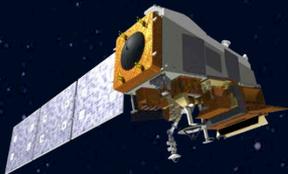
³All products dependent on the Global Change Observation Mission (GCOM) provided by the Japan Aerospace Exploration Agency

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



Applications



- Applications utilize science and technology to provide products and services.
 - Weather forecasting is the application of science and technology to predict the atmospheric state for a given place and time.
- Application pyramids building upon space and ground-based information and other relevant information including geography, food supply, population, transportation and housing are needed to improve decisions to protect lives and property.

Courtesy: <http://gideonmendel.com/drowning-world-curators-words>

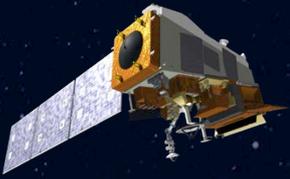
Cost of Floods

- Floods have many negative socio-economic impacts.
- In 2014, there were 32 documented flash floods, killing over 1000 people, affecting over 1 million people, and costing \$1.6 billion.
- The cost of floods could exceed \$500 billion globally by 2030.

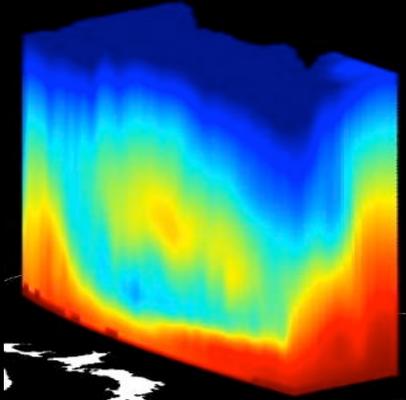
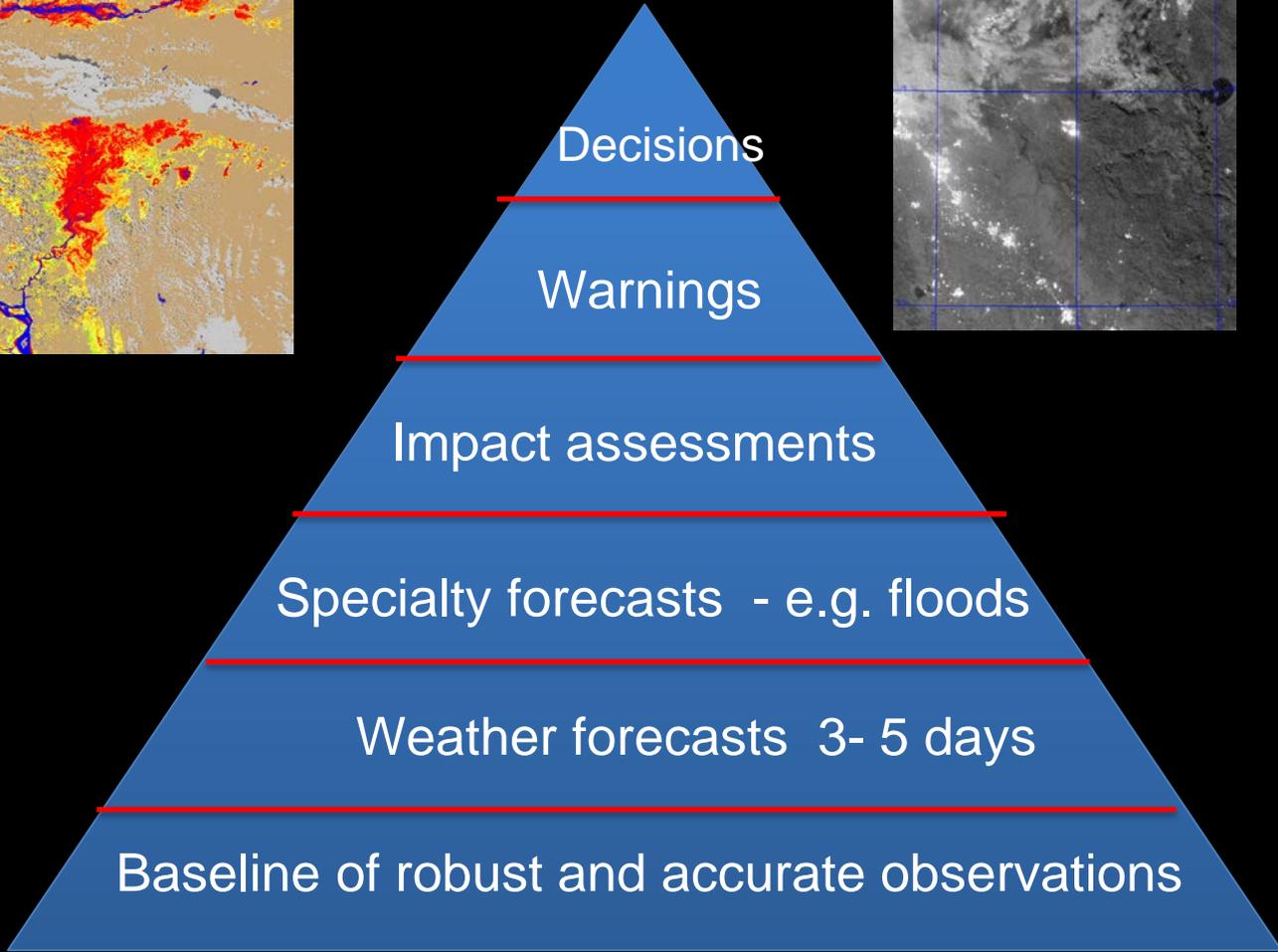
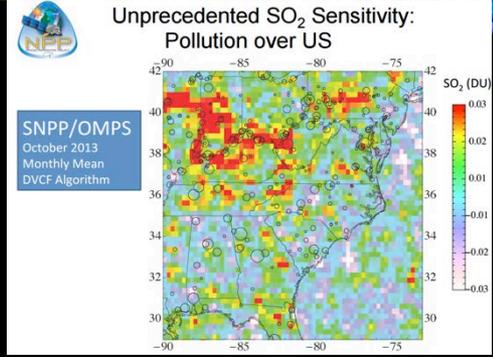
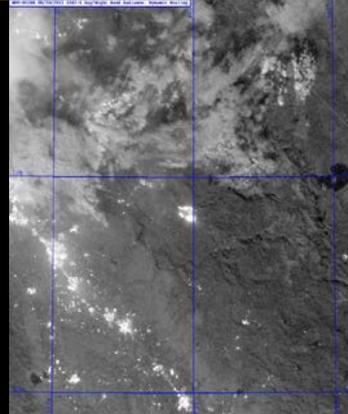
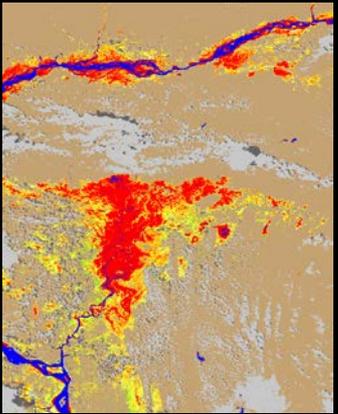


3/43
Wilaporn Hongantuek
Amornchai
Bangkok
Thailand
November 2011

Credit: Jacola Roman (CIMSS)



Application Pyramid





NOAA Product and Services



- Large portfolio of product and services the Nation depends on.
 - Weather warnings and forecasting, space weather, fire weather, drought, air quality
 - Ocean and coastal ecosystems impacting marine species and coastal communities
 - Safe transportation, access to the Arctic.
 - Climate monitoring and attribution.

NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HOME FORECAST PAST WEATHER SAFETY INFORMATION EDUCATION NEWS SEARCH ABOUT

Local forecast by "City, St" or ZIP code
Enter location ... Go
[Location Help](#)

Winter storm bringing heavy snow to Intermountain West, Great Plains
A winter storm moving across the western U.S. will bring heavy snowfall from the central Rockies to the central and northern Plains on Monday, as well as showers across the Desert Southwest. In addition, locally-heavy rainfall is possible across part of the Upper Midwest. Meanwhile, snow and freezing rain will create travel impacts across northern Maine.
[Read More...](#)

ACTIVE ALERTS FORECAST MAPS RADAR RIVERS, LAKES, RAINFALL AIR QUALITY SATELLITE PAST WEATHER

Customize Your Weather.gov
City, ST
Enter Your City, ST or ZIP Code
 Remember Me
[Get Weather](#)
[Privacy Policy](#)

Created: 12/14/15 at 21:55 UTC

NOAA NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Home Climate Information Data Access Customer Support Contact About Search

Home > Climate Monitoring > Climate at a Glance November Global Release: Thu, 17 Dec 2015, 11:00 AM EST

Climate at a Glance

Climate Monitoring | State of the Climate | Temp, Precip, and Drought | Climate at a Glance

Extremes
Societal Impacts
Snow and Ice
Teleconnections
GHCN Monthly
Monitoring References

Time Series | Mapping | Data Information | Background

Time Series

U.S. | **Globe**

Choose from the options below and click "Plot" to create a time series graph. Please note, Global and hemispheric anomalies are with respect to the 20th century average. Continental anomalies are with respect to the 1910 to 2000 average.

Timescale: 12-Month
Month: December
Start Year: 1880
End Year: 2015
Region/Continent: Global
Surface: Land and Ocean

Options
Display Trend
+ per Decade per Century
Start: 1880 End: 2015

[Plot](#)

Move mouse towards an axis until highlighted. Left-click mouse to pan. Shift key + left-click to zoom.

Global Land and Ocean Temperature Anomalies, January

Anomaly (°C)

Download: [XML](#) [HTML](#) [PDF](#)

| YEAR | ANOMALY | RANK |
|------|---------|------|
| 1880 | -0.13°C | 47 |
| 1881 | -0.07°C | 61 |



National Ocean Service National Marine Fisheries Service

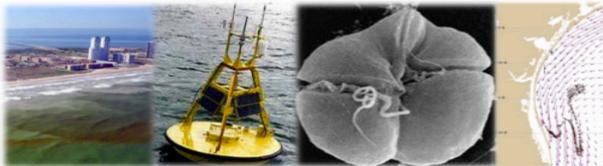
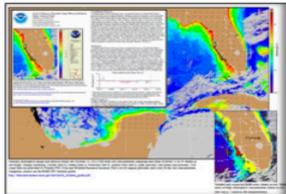


Photo credit: NOAA, TPW

HAB-OFS Products:

[Overview](#) - [FAQs](#) - [Contact Us](#)

Public Conditions Reports by Region (including Impact Forecasts):

[Southwest Florida](#) [Northwest Florida](#) [East Florida](#) [Texas](#)

Operational Conditions R

Southwest Florida

Monday, December 14, 2015

Karenia brevis (commonly known as Florida red tide) ranges from not present to high concentrations along the coast of southwest Florida, and is not present in the Florida Keys. *K. brevis* concentrations are patchy in nature and levels of respiratory irritation will vary locally based upon nearby bloom concentrations, ocean currents, and wind speed and direction. The highest level of potential respiratory irritation forecast for Monday, December 14 through Thursday, December 17 is listed below:

County Region: Forecast (Duration)

Southern Pinellas: Moderate (M, Th), Low (Tu-W)
 Southern Pinellas, bay regions: High (M-Th)
 Northern Manatee, bay regions: Moderate (M-Th)
 Southern Manatee, bay regions: Moderate (M-Th)
 Northern Sarasota: Moderate (M-Th)
 Northern Sarasota, bay regions: High (M-Th)
 Southern Sarasota: Low (M-Tu, Th), Very Low (W)
 Southern Charlotte, bay regions: Low (M-Th)
 All Other SWFL County Regions: None expected (M-Th)
 All Other NWFL County Regions: Visit
<http://tidesandcurrents.noaa.gov/hab/#nwfl>

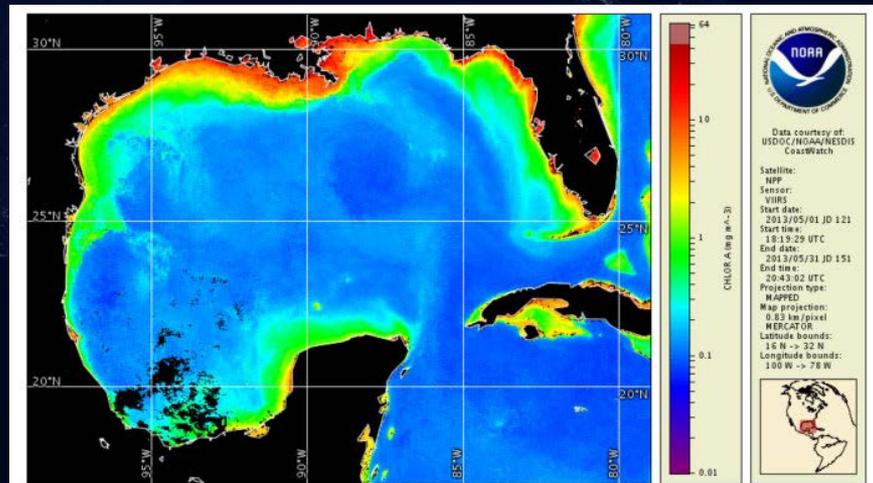
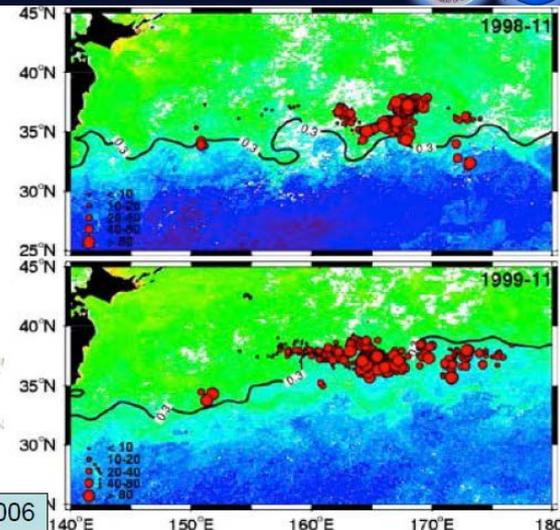
Check

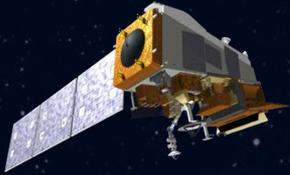
http://tidesandcurrents.noaa.gov/hab/beach_conditions.html
 for recent, local observations. Health information, from the Florida Department of Health and other agencies, is available at
http://tidesandcurrents.noaa.gov/hab/hab_health_info.html.
 Respiratory irritation has been reported in Pinellas and Sarasota counties. Dead fish have been reported in Pinellas, Manatee, and Sarasota counties.

Albacore CPUE (catch per unit effort) overlain on SeaWiFS chlorophyll, showing that the longline fishery largely operates along the transitional zone chlorophyll front (TZCF)



Zainuddin et al., DSR-II, 2006





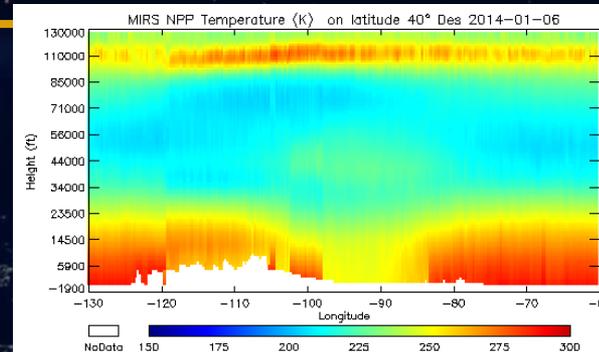
Why JPSS contributes:



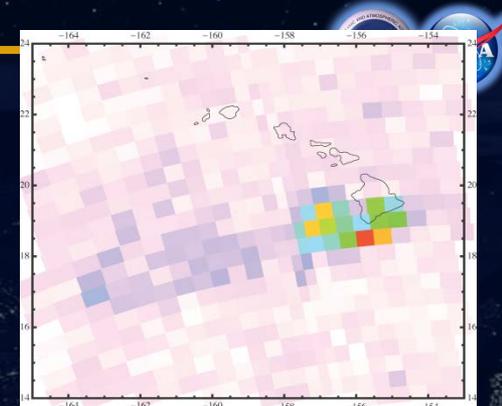
- JPSS sensor and environmental data records (SDRs and EDRs) will contribute significantly to societal benefits
 - Global coverage
 - Suite of instruments contributing to nearly all of the societal benefit areas
 - Relatively high spatial resolution considering repeat cycle of twice per day
 - Outstanding sensor performance – rock solid stability
 - Sustained capabilities for the next 20 years.
 - Establish agreements/ partnerships with domestic/international community for data sharing access.

JPSS provides a wide range of capabilities

- Microwave – provides temperature and moisture soundings in cloudy conditions and rainfall rates, sea ice, snow, surface temperature
- Infrared – provides high vertical resolution temperature and moisture soundings in clear and cloud corrected regions; atmospheric chemistry - CO, CH₄, SO₂, ... and cloud products
- Visible (day & night) and Infrared Imagery (including deep blue channels) – chlorophyll, cloud imagery, cloud products, SST, Active Fires, Smoke, Aerosols, land products, Snow, Ice, oil spills... at exceptional resolution/global coverage
- UV - ozone - Aerosols over bright surfaces, SO₂ plumes, NO_x (air quality)...



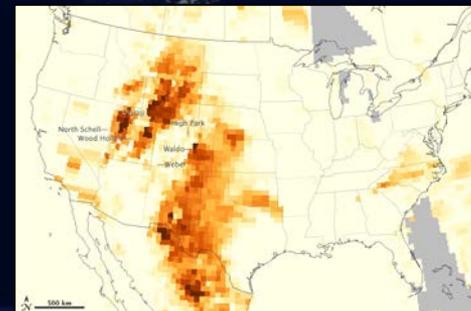
Temperature X-Section Polar Vortex



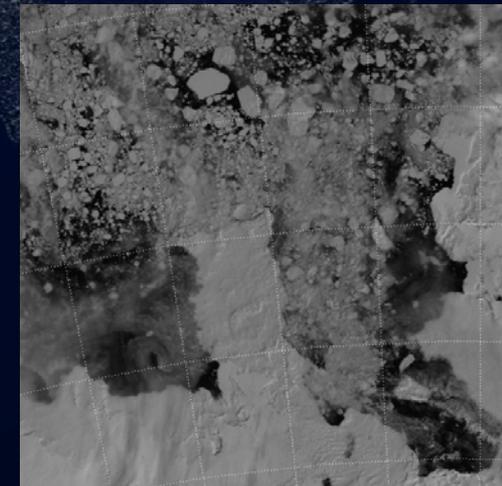
OMP- Volcano SO₂ degassing



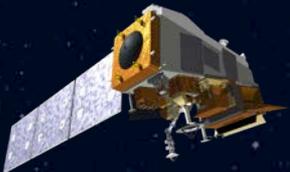
Algae in Lake Erie



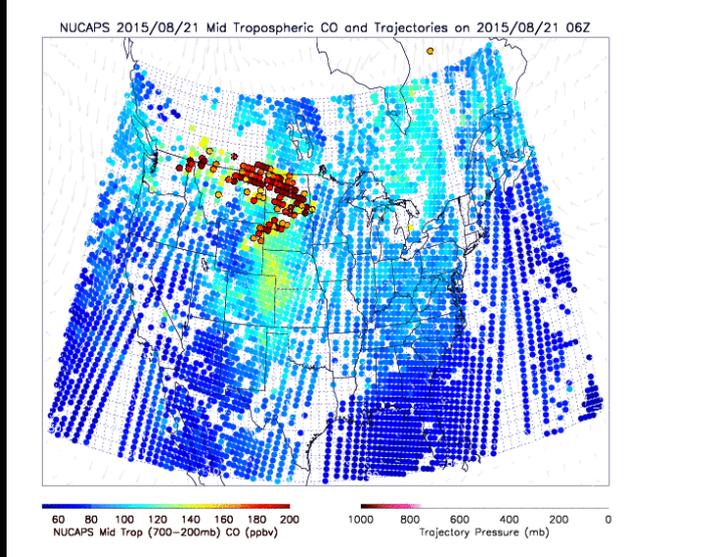
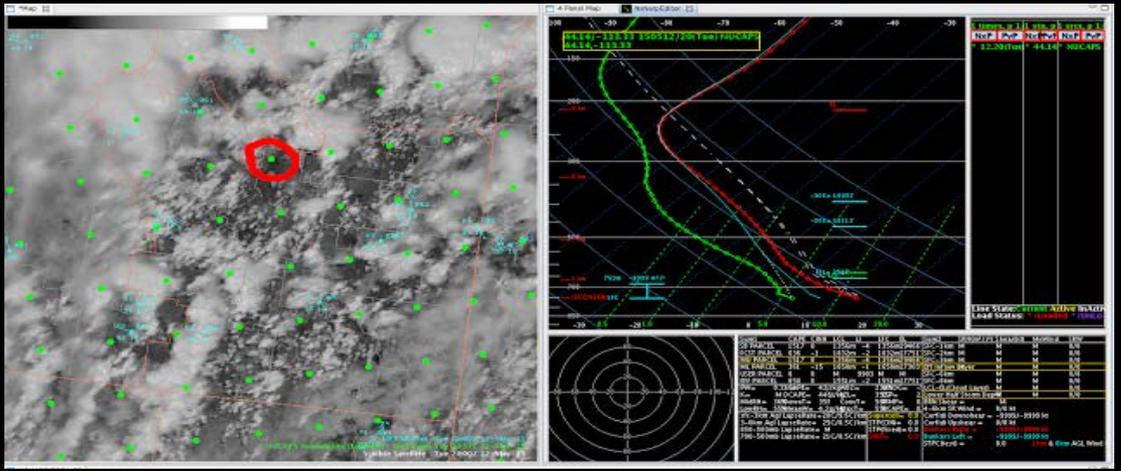
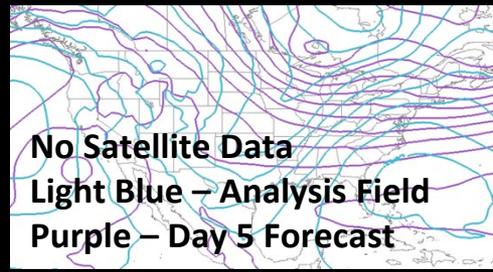
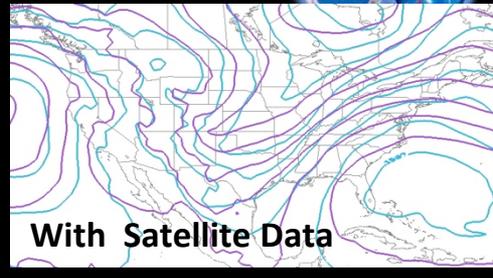
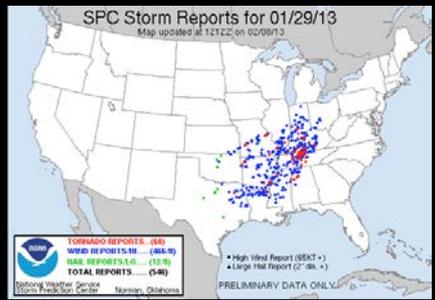
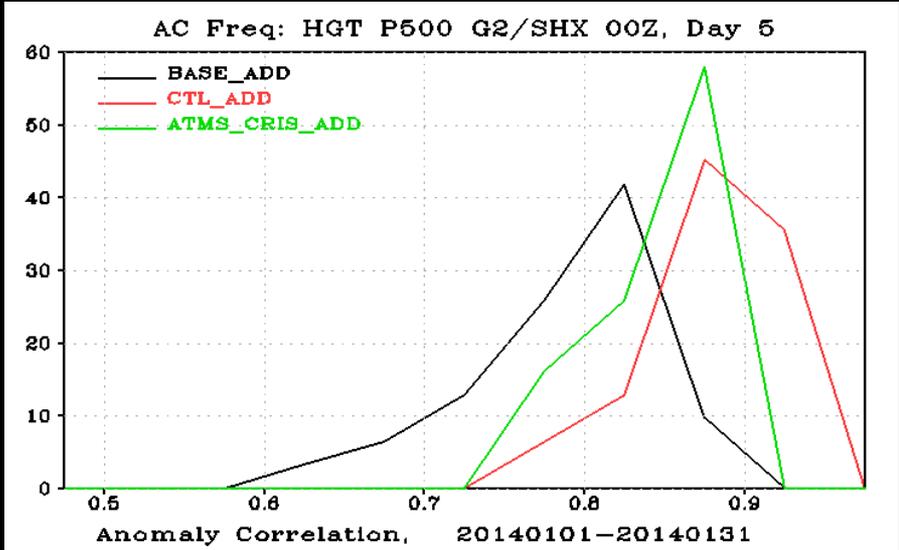
OMPS Aerosols from Fires

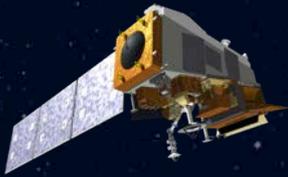


DNB Ice detection

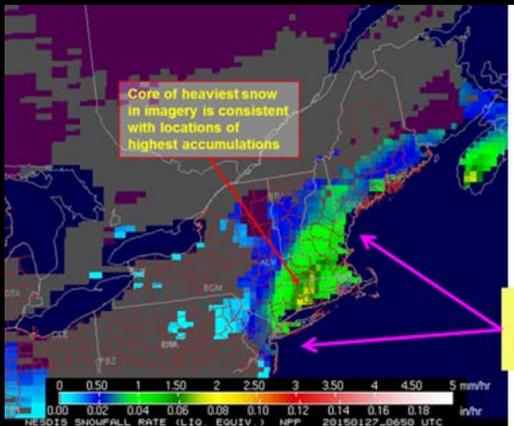
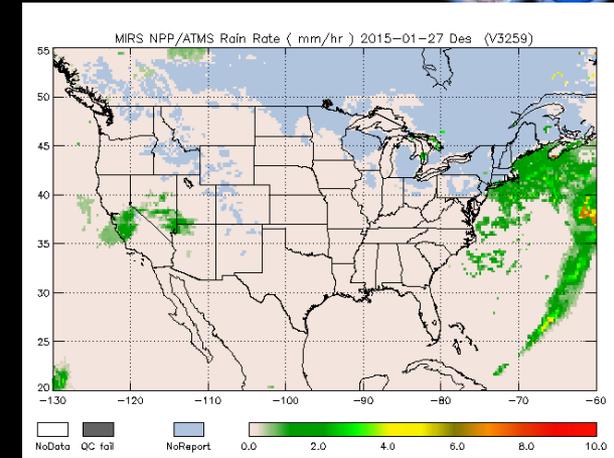
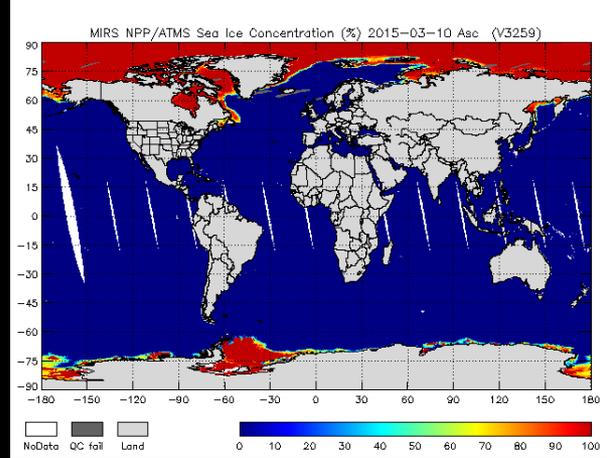
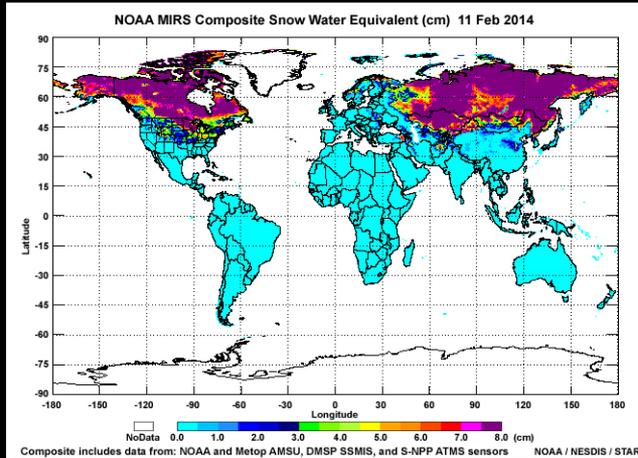


CrIS/ATMS applications





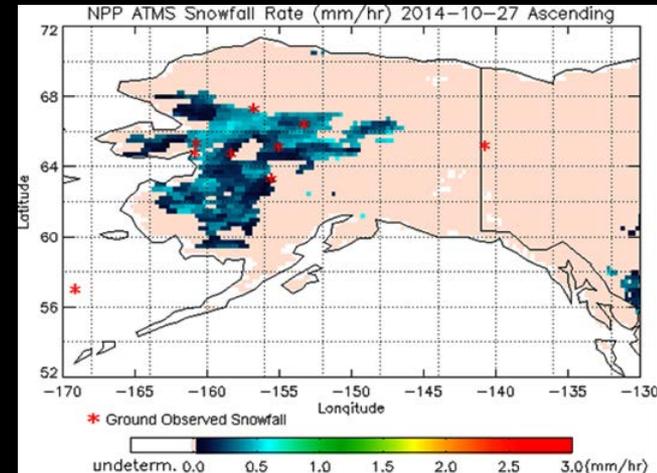
ATMS applications

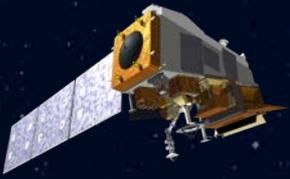


ATMS SFR

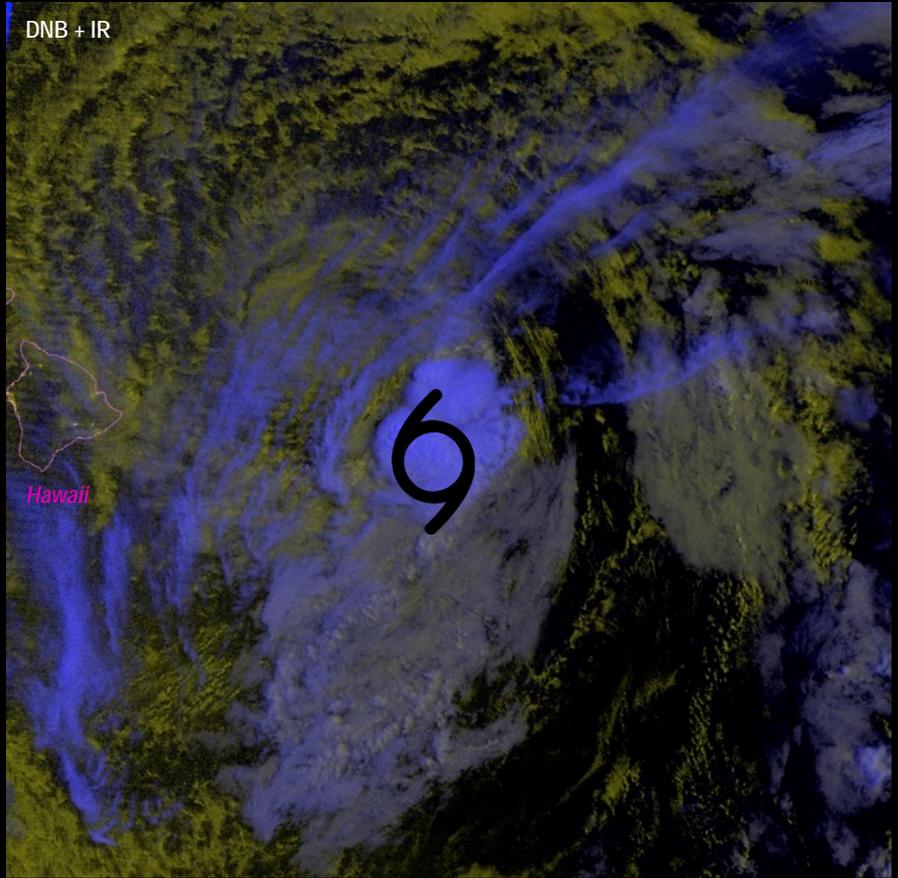
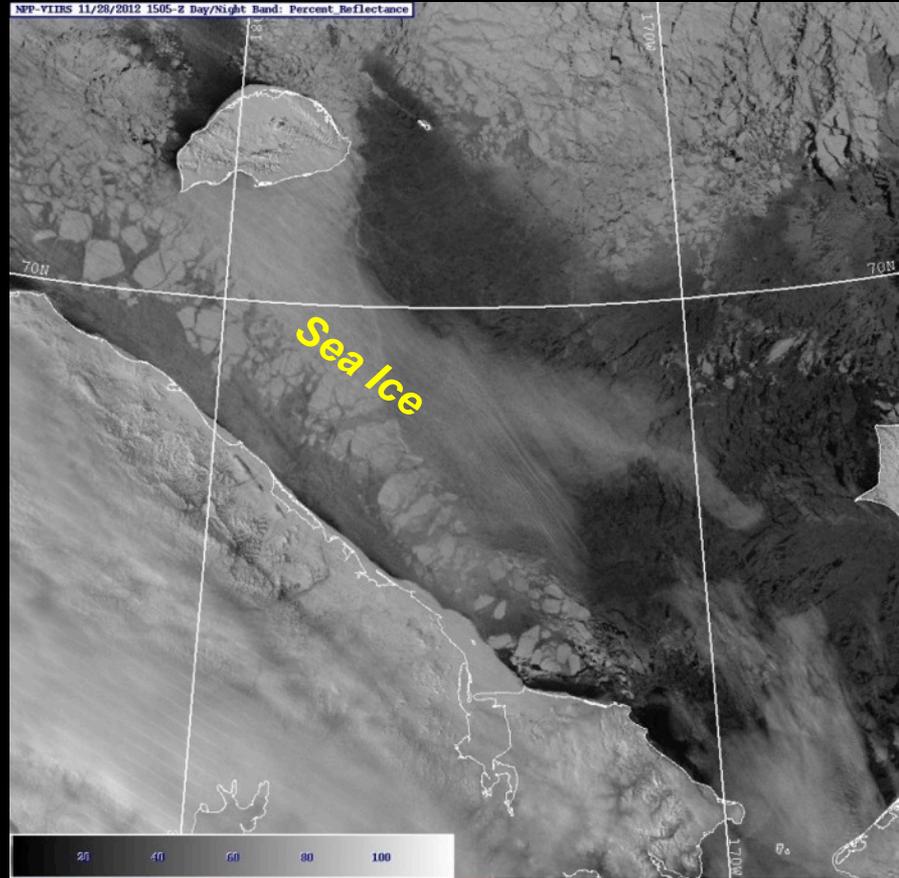


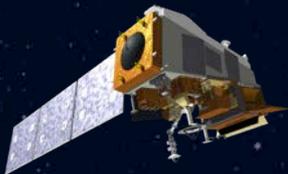
Radar Reflectivity



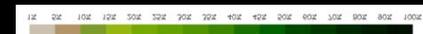
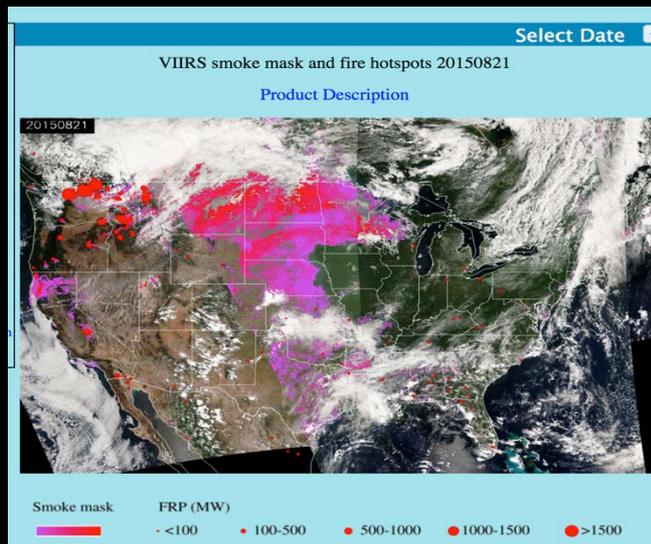


Two key applications of Day Night Band for NWS

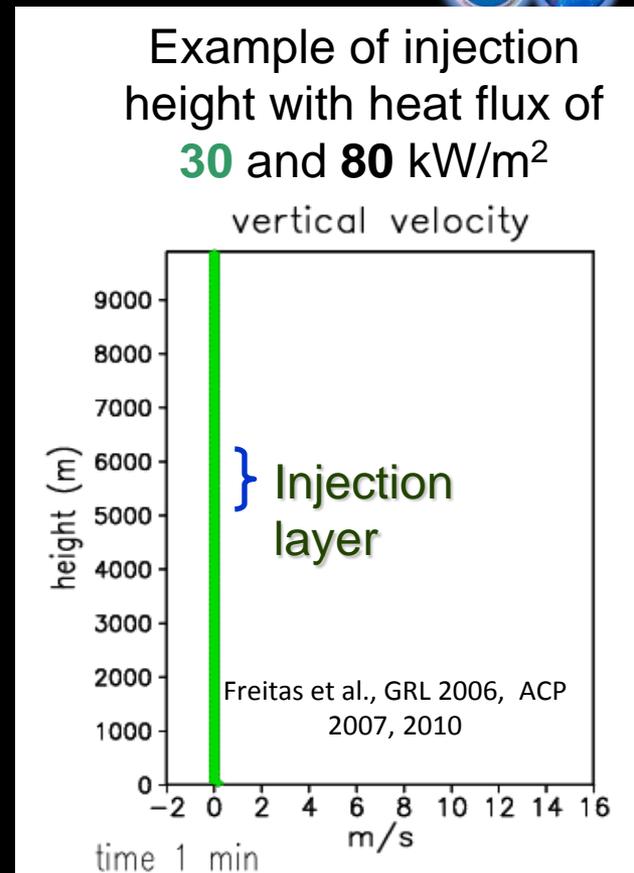
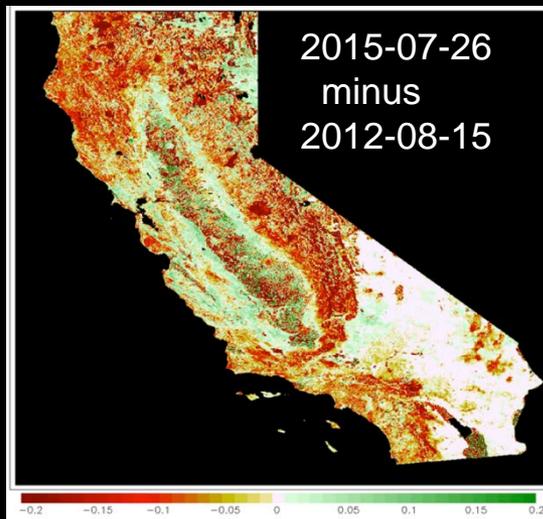


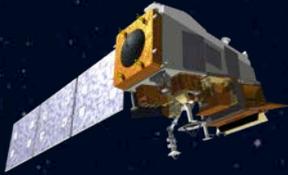


VIIRS applications

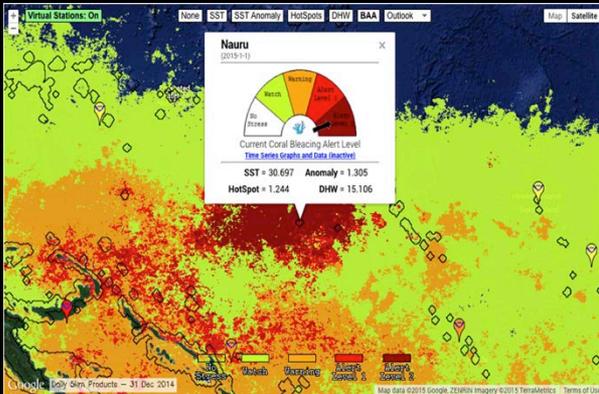
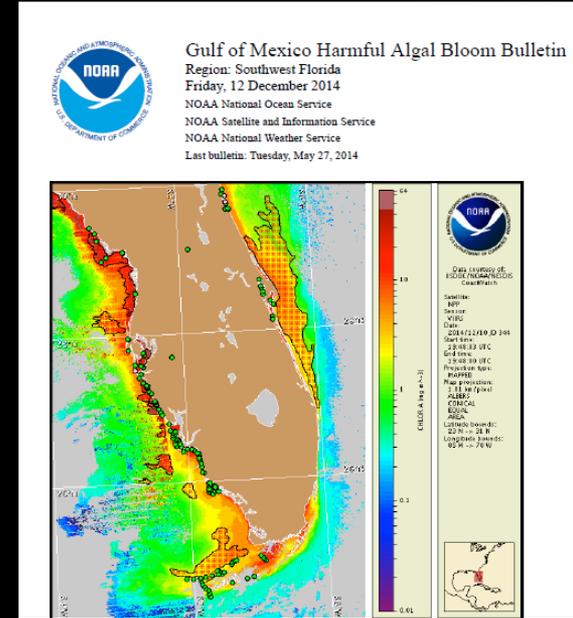


Weekly GVF 7/26/15





VIIRS applications



SEAFAN
Southeast Florida Action Network

Florida Department of Environmental Protection

Coral Reef Conservation Program

SEAFAN BleachWatch Program

Current Conditions Report #20140902

September 2, 2014

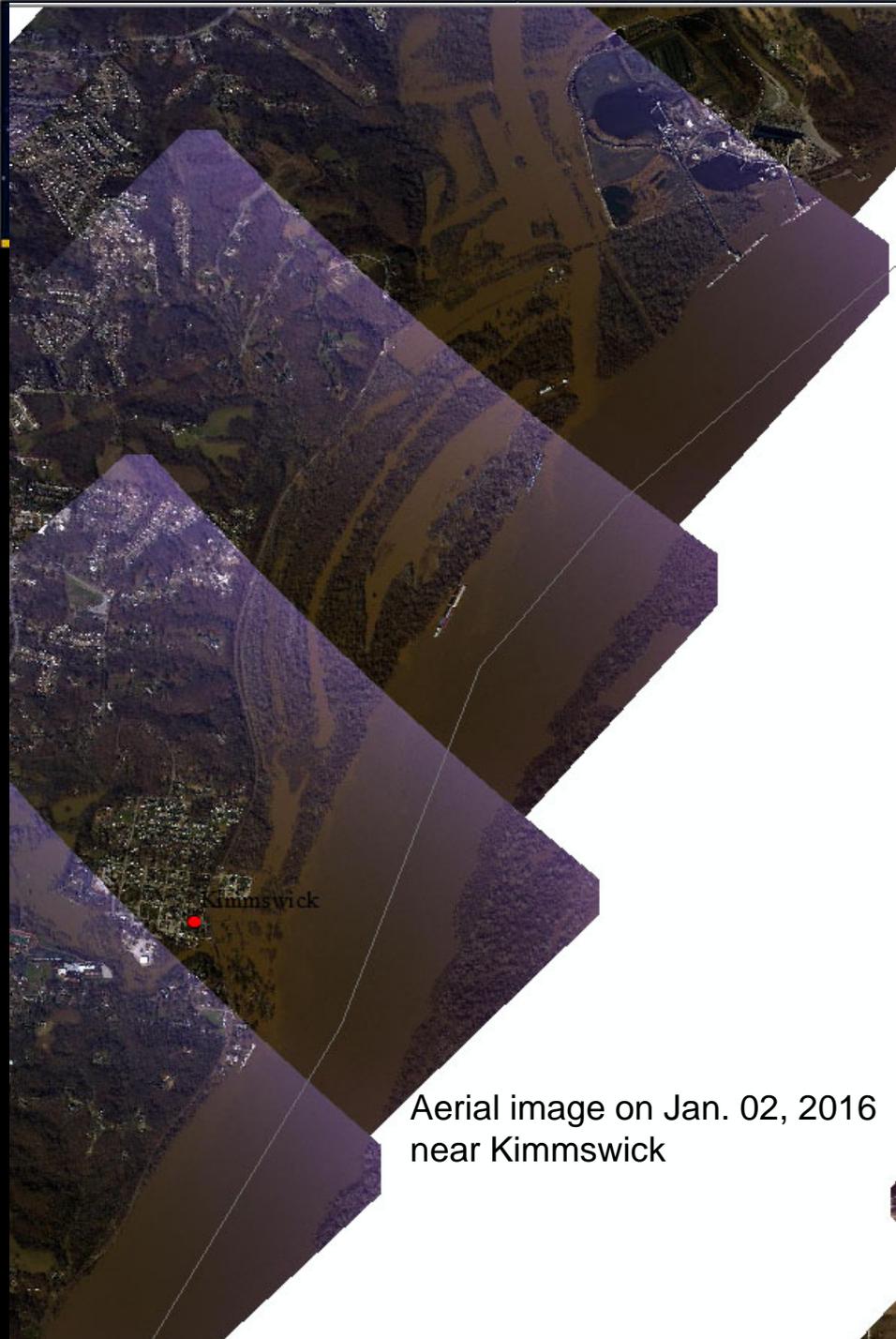
Summary: Based on climate predictions and field observations, the threat for mass coral bleaching in southeast Florida, between Miami-Dade and Martin counties is currently **HIGH**.

Environmental Monitoring

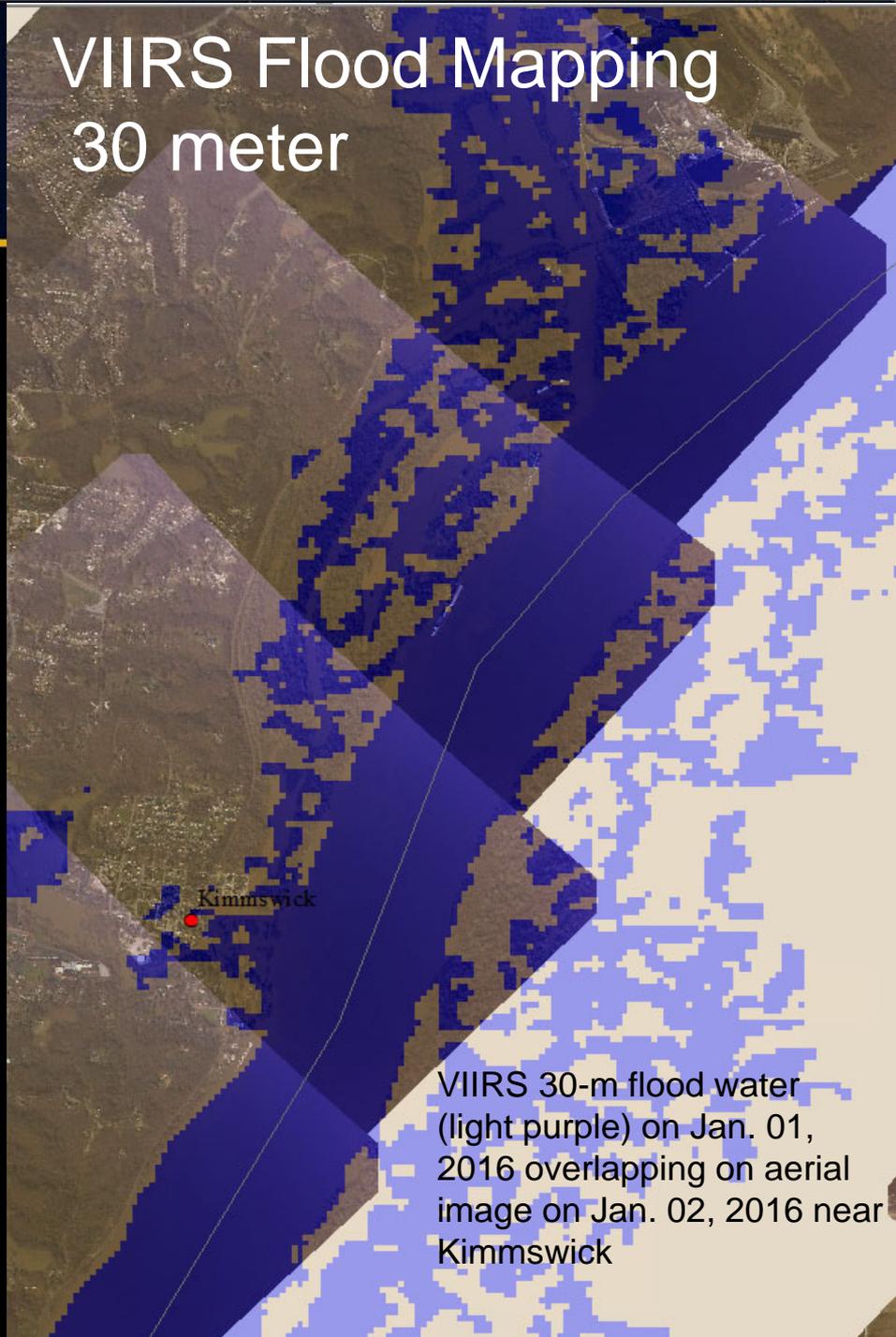
The latest CRW experimental 5 kilometer (km) Daily Coral Bleaching Alert Area (Figure 1) indicates that southeast Florida is presently experiencing a moderate to high level of thermal stress, with an Alert Level 1 or Bleaching Warning present throughout the region. This indicates that bleaching is likely in southeast Florida and additional alerts are possible if current conditions continue or worsen.

NOAA's Bleaching Hotspot Map compares current SST to the maximum monthly mean, which is the average temperature during the

Figure 1. NOAA CRW Experimental Daily 5 km Bleached Geo-Polar Nighttime Bleached Bleaching Alert Area, August 31, 2014
<http://coralreefwatch.noaa.gov/satellite/bleaching5km/index.php>



Aerial image on Jan. 02, 2016
near Kimmswick

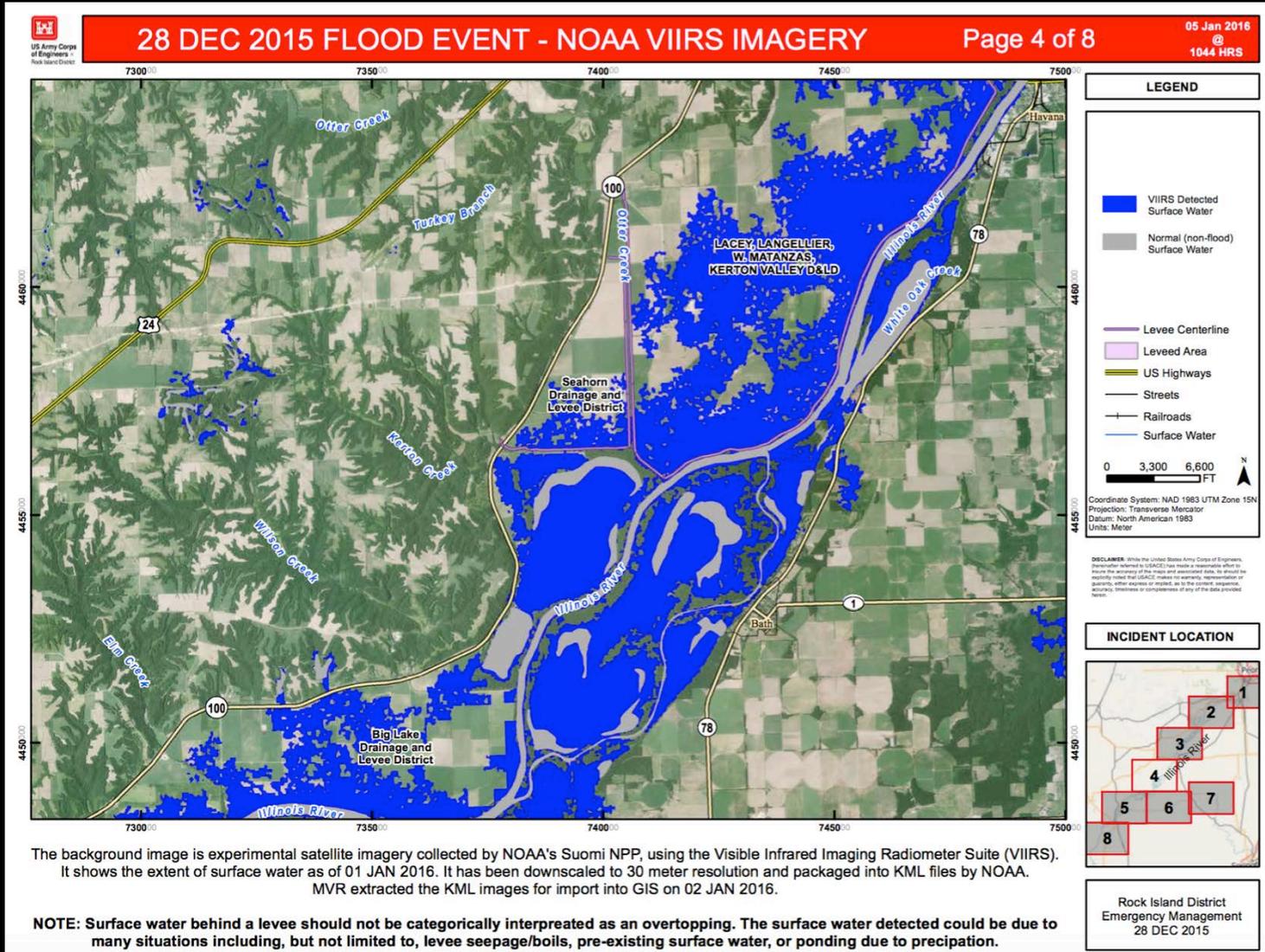


VIIRS Flood Mapping 30 meter

VIIRS 30-m flood water
(light purple) on Jan. 01,
2016 overlapping on aerial
image on Jan. 02, 2016 near
Kimmswick



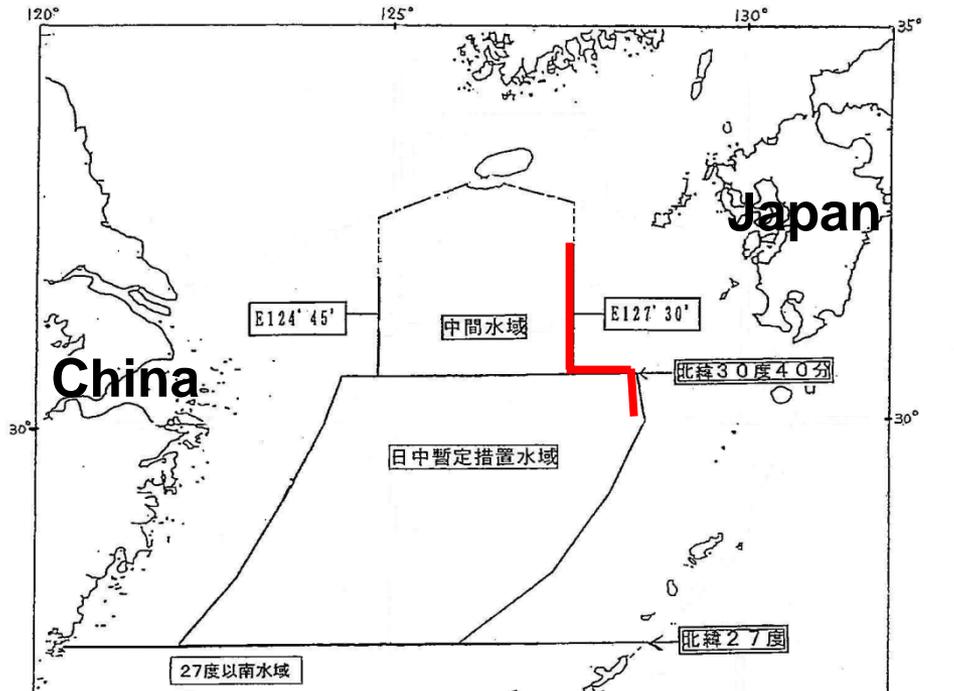
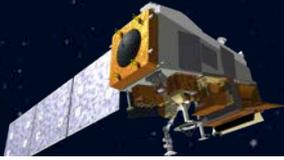
Recent VIIRS flood product being used by Army Corp of Engineers



The background image is experimental satellite imagery collected by NOAA's Suomi NPP, using the Visible Infrared Imaging Radiometer Suite (VIIRS). It shows the extent of surface water as of 01 JAN 2016. It has been downscaled to 30 meter resolution and packaged into KML files by NOAA. MVR extracted the KML images for import into GIS on 02 JAN 2016.

NOTE: Surface water behind a levee should not be categorically interpreted as an overtopping. The surface water detected could be due to many situations including, but not limited to, levee seepage/boils, pre-existing surface water, or ponding due to precipitation.

The Politics of Fishing...



05 17:29:00 UTC - Image Display

Courtesy: W. Straka, UW-CIMSS

WHITE HOUSE VIIRS ILLEGAL BOAT DETECTION ANNOUNCEMENT AT "OUR OCEAN" CONFERENCE in CHILE

The White House

For Immediate Release

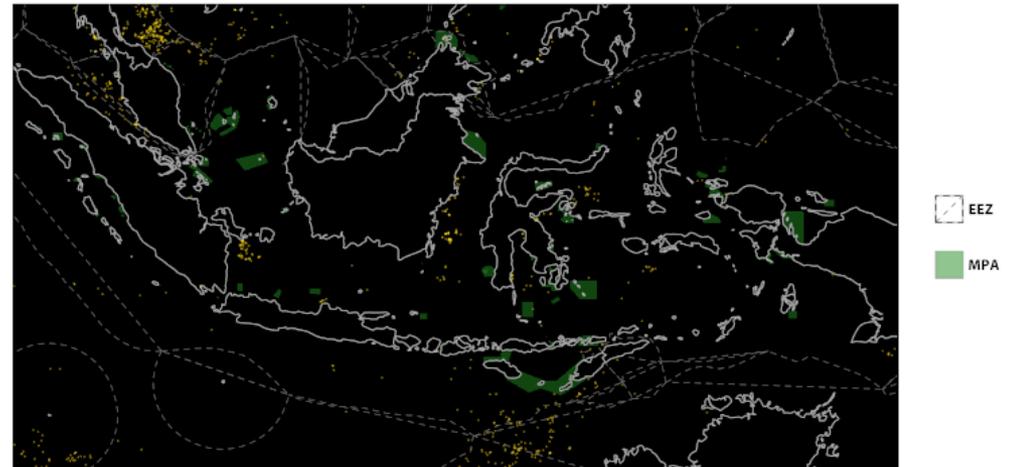
October 05, 2015

Fact Sheet: Preserving and Protecting Oceans and America's Waterways for Future Generations

President Obama is committed to protecting the ocean and its marine ecosystems. The Administration has launched landmark initiatives and policies to protect and preserve some of our country's most special places and introduce a new generation of Americans to our national lands and waters.



BOAT LIGHTS DETECTED FROM VIIRS ON 2015-02-01



Source: VIIRS Boat Detection (VBD) Data (PROTOTYPE) - NGDC (2015)

<http://jason-doug-climate.blogspot.com/2015/04/boat-lights-from-viirs-shedding-some.html>

Remote Sens. **2015**, 7(3), 3020-3036; doi:10.3390/rs70303020

Open Access

Article

Automatic Boat Identification System for VIIRS Low Light Imaging Data

Christopher D. Elvidge ^{1,*}, Mikhail Zhizhin ², Kimberly Baugh ² and Feng-Chi Hsu ²

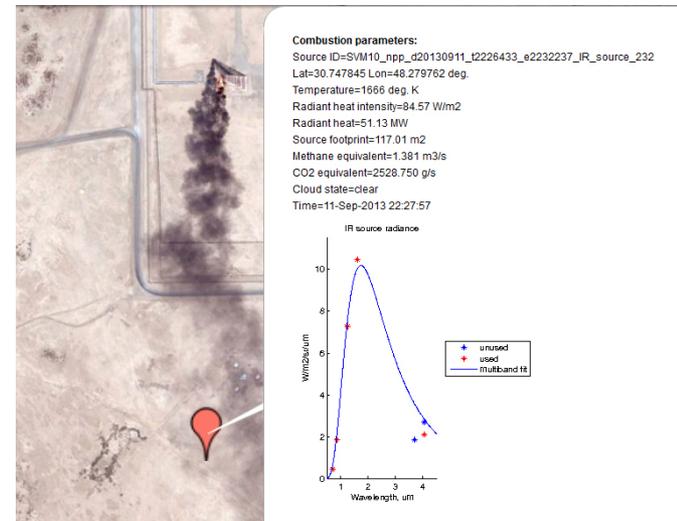
¹ Earth Observation Group, NOAA National Geophysical Data Center, 325 Broadway, Boulder, CO 80305, USA

² Cooperative Institute for Research in the Environmental Sciences, University of Colorado, Boulder, CO 80303, USA; E-Mails: mikhail.zhizhin@noaa.gov (M.Z.); kim.baugh@noaa.gov (K.B.); feng.c.hsu@noaa.gov (F.-C.H.)

Key Accomplishment: VIIRS is key to monitoring progress towards “Zero routine flaring by 2030”



From Chris Elvidge



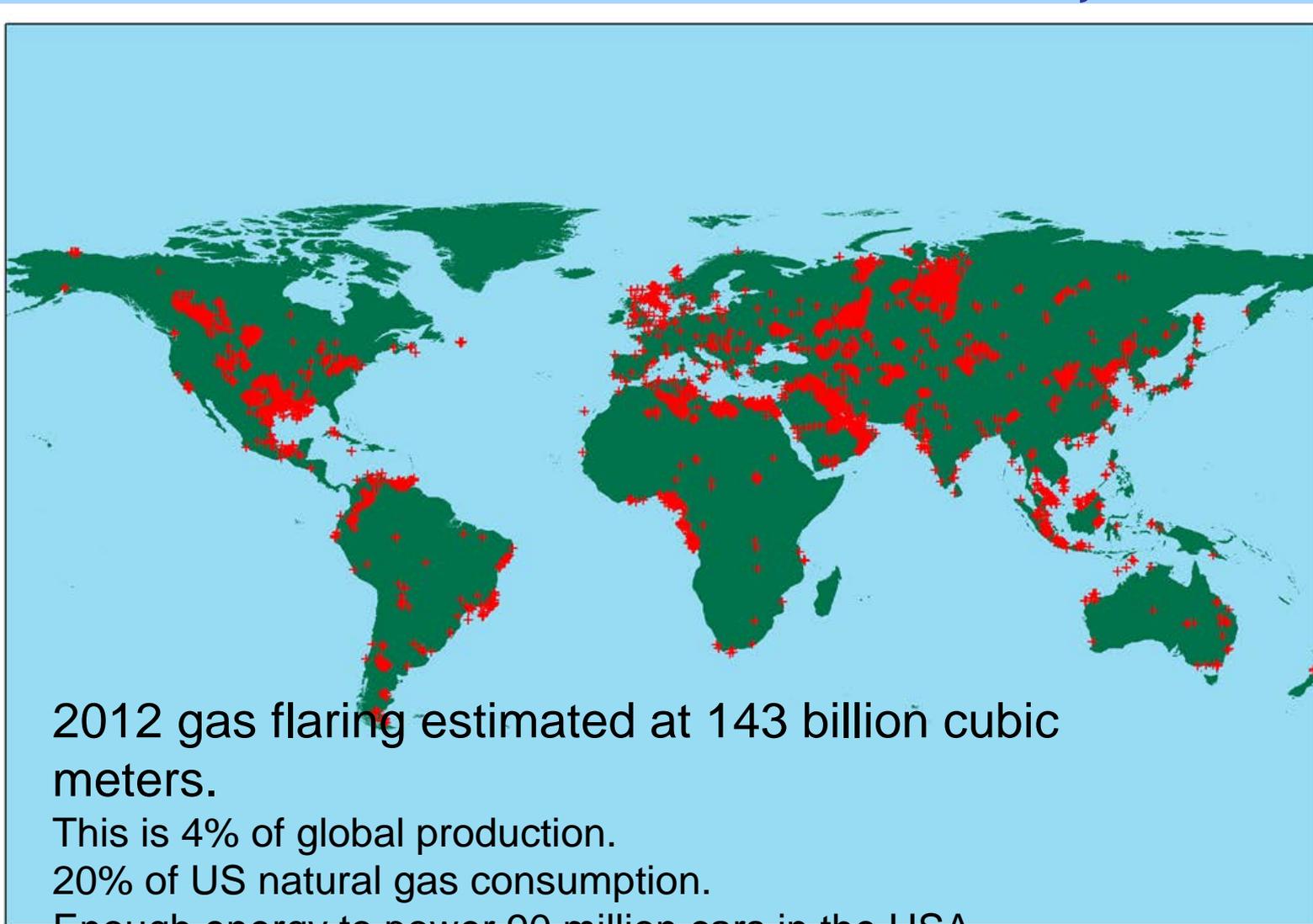
“Zero Routine Flaring by 2030” Initiative was officially launched on April 17, 2015 by United Nations Secretary-General Ban Ki-moon and World Bank President Jim Yong Kim with a coalition of governments, oil companies, and development institutions.

“The gas bubbles up alongside the far more valuable oil, and with less economic incentive to capture it, the drillers treat the gas as waste and simply burn it.”

New York Times – 2011 , Krauss



Global distribution of gas flaring in 2012. Total is 7,467.



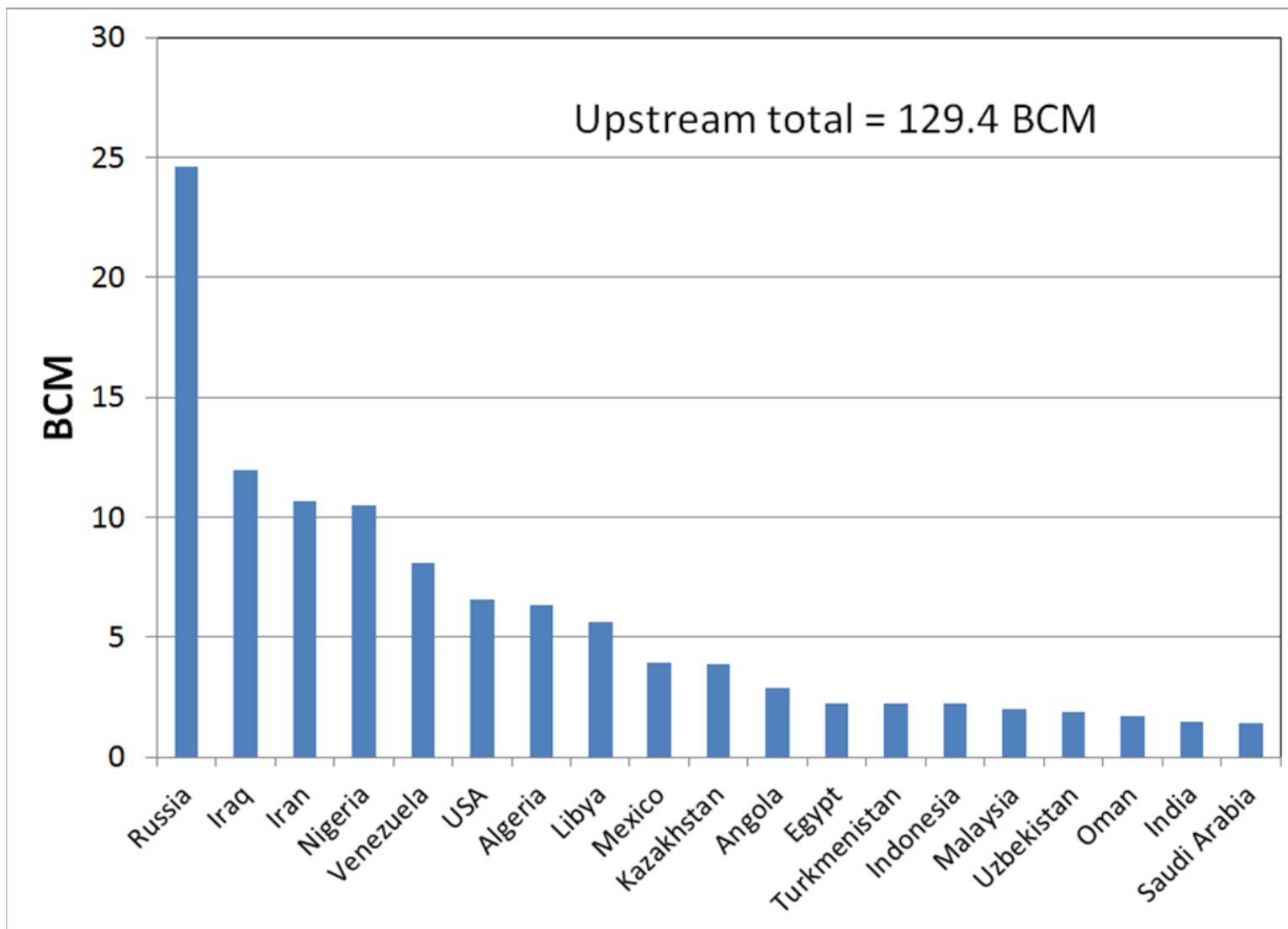
2012 gas flaring estimated at 143 billion cubic meters.

This is 4% of global production.

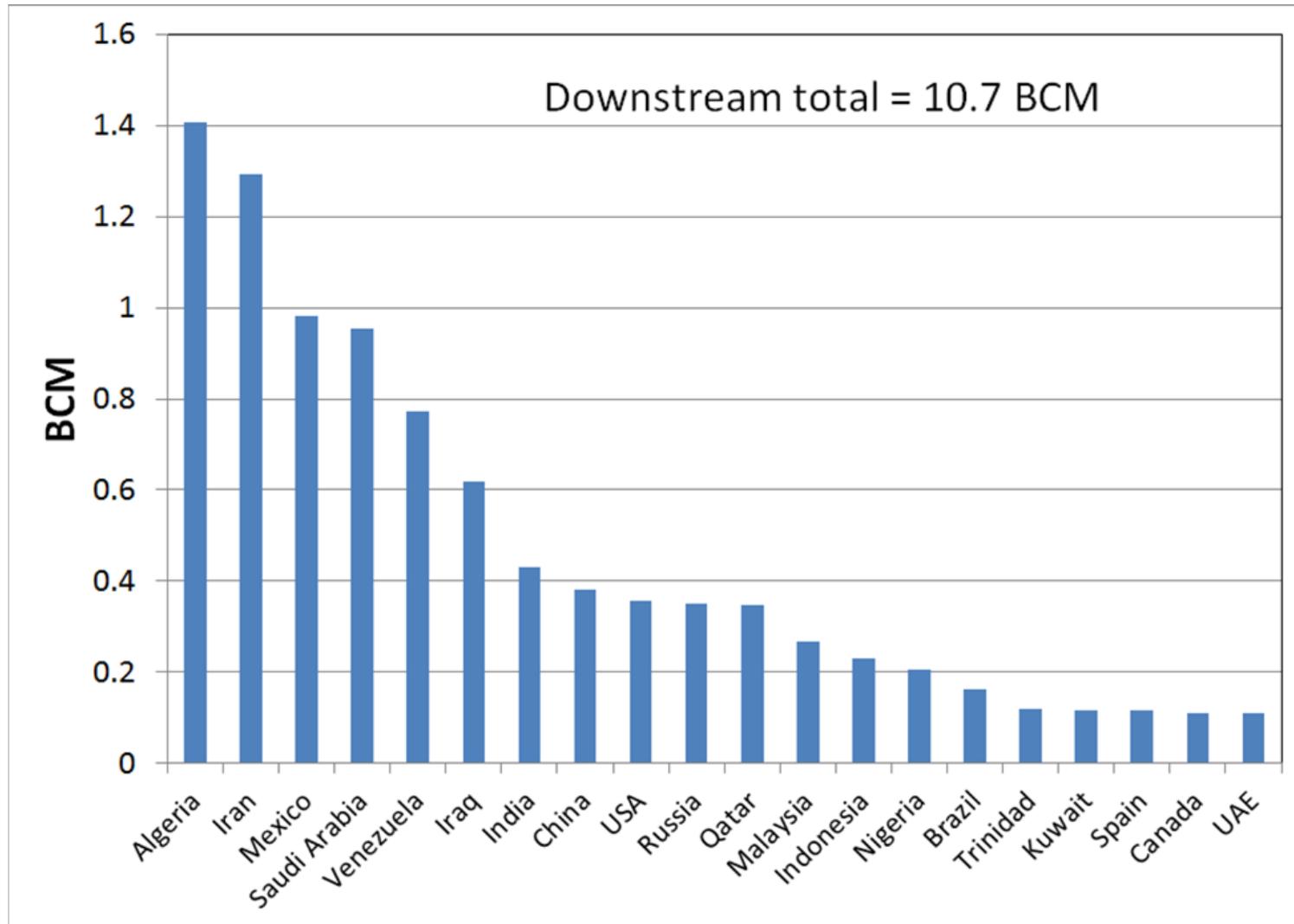
20% of US natural gas consumption.

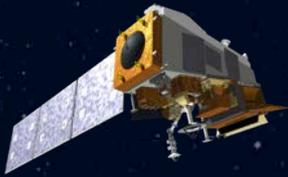
Enough energy to power 90 million cars in the USA.

Upstream flaring 2012 (production sites)



Downstream flaring 2012 (refineries)

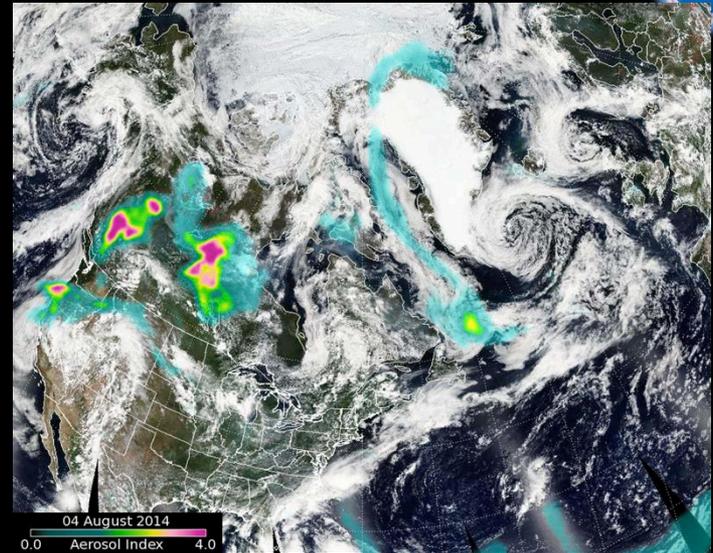
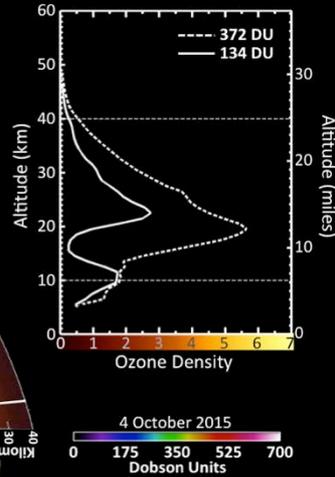
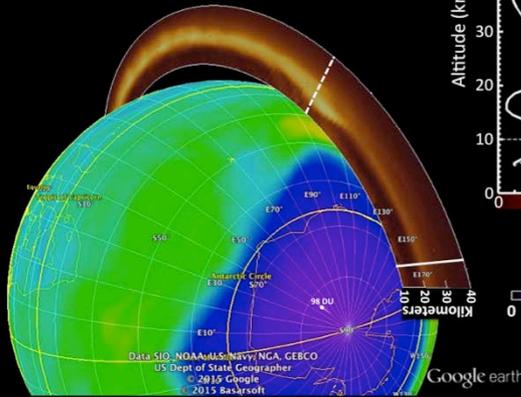




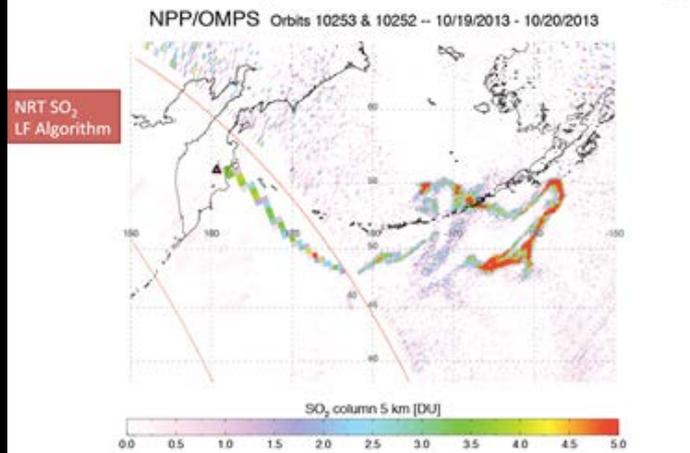
OMPS Applications



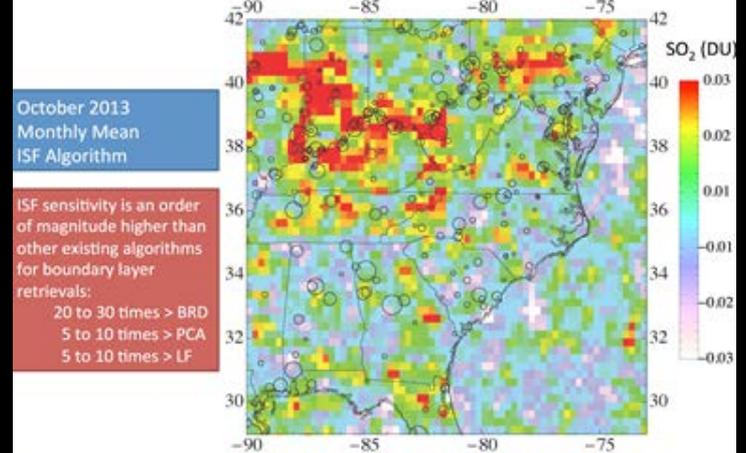
4th largest ozone hole since 1991



OMPS Capabilities: Volcanic SO₂



OMPS Capabilities: Pollution SO₂





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