



NASA Land Science Team Status

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with contributions from:

The Terra/Aqua/Suomi-NPP Land Discipline Team

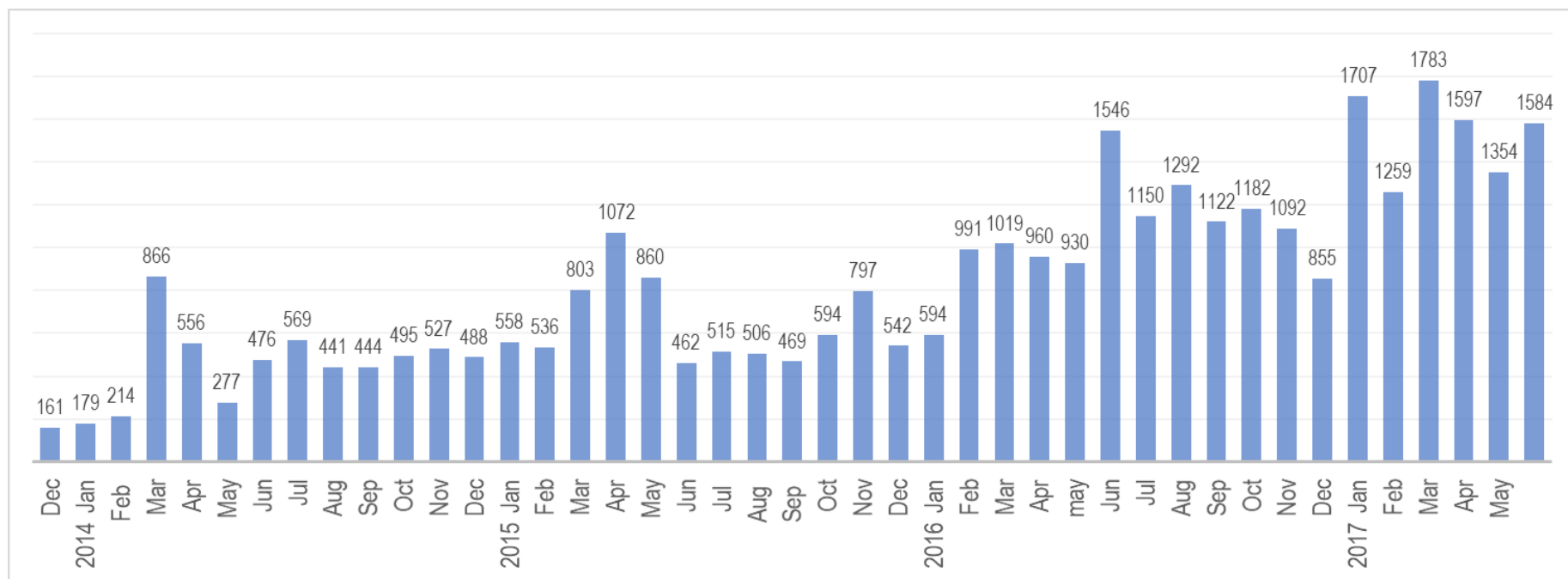
NASA's Disasters Response Program

STAR JPSS NCWCP

8/17/2017 (13:55-14:15)



Home	Products	Validation	People	Tools	Publications	Links
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S-NPP VIIRS Land Discipline Website (<http://viirsland.gsfc.nasa.gov/>) and associated pageviews per month (since Dec, 2013).



Home	Products	Validation	People	Tools	Publications	Links
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EOS Products	Algorithms Delivered to Land SIPS	Product Integration and Testing	Draft ATBD Delivery	Delivery of User's Guide	Products Delivered to assigned DAAC
Surface Reflectance	✓	✓	✓	✓	✓
LAI/FPAR	✓	Underway	✓	✓	Summer, 2017
Snow Products	✓	✓	✓	✓	Summer, 2017
MAIAC	Pending	Pending	Summer, 2017	Summer, 2017	Summer, 2017
BRDF/Albedo	✓	Underway	✓	✓	Summer, 2017
Burned Area	Pending	Pending	Summer, 2017	Summer, 2017	Summer, 2017
Active Fires	✓	✓	✓	✓	✓
Vegetation Index	✓	Underway	Summer, 2017	Summer, 2017	Summer, 2017
LST&E	✓	Underway	✓	✓	Summer, 2017
Ice Surface Temp	✓	Underway	✓	✓	Summer, 2017
Sea Ice Cover	Summer, 2017	Underway	Summer, 2017	Summer, 2017	Summer, 2017
Phenology	✓	Underway	✓	✓	Summer, 2017
Black Marble	✓	Underway	Fall, 2017	Fall, 2017	Fall, 2017

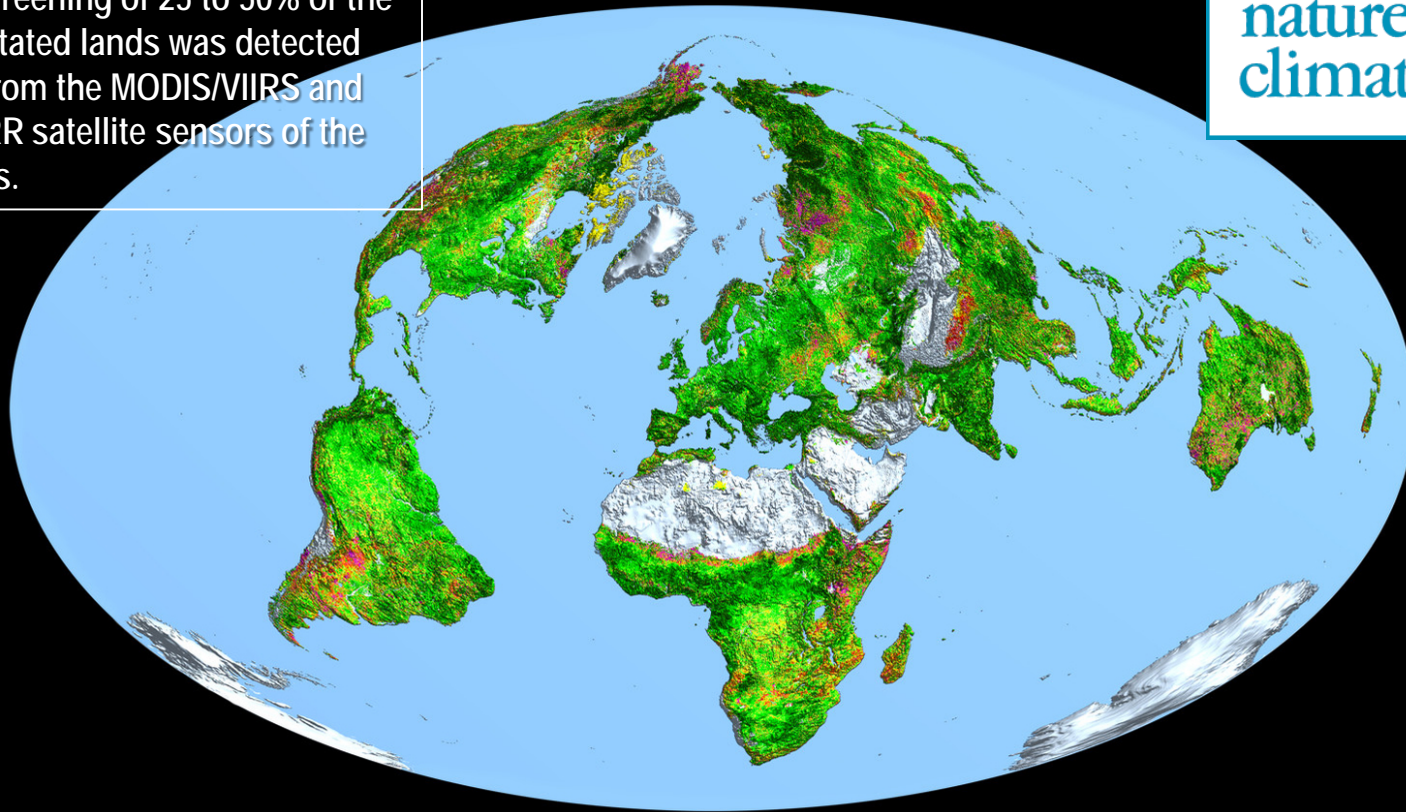
✓Completed Task;

S-NPP VIIRS Land Discipline Website (<http://viirsland.gsfc.nasa.gov/>)
and current schedule including key milestones.

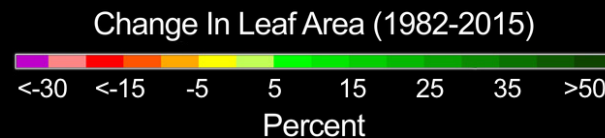
Carbon Dioxide Fertilization Greening the Earth

Significant greening of 25 to 50% of the Earth's vegetated lands was detected using data from the MODIS/VIIRS and NOAA-AVHRR satellite sensors of the past 34 years.

nature
climate change



This represents an increase in leaves on plants and trees equivalent in twice the are of the Continental USA.



The increase was linked to the fertilization effect from increasing concentration of carbon dioxide in the atmosphere.

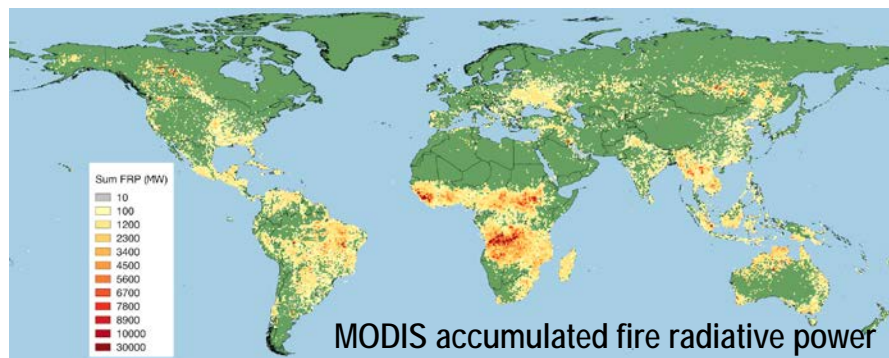
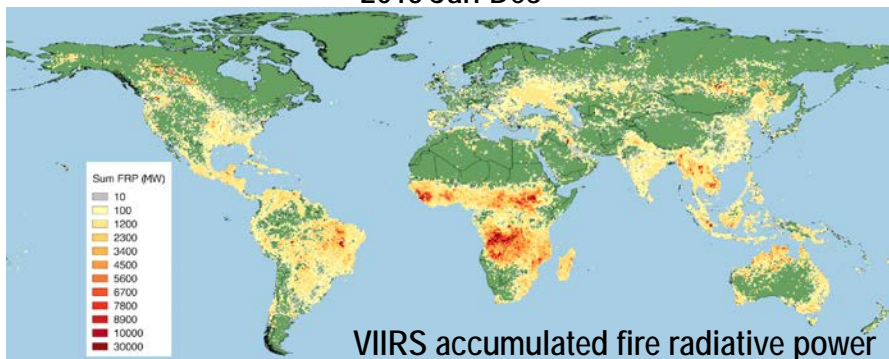
R. Myneni, BU

Zhu et al., Greening of the Earth and its Drivers. Nature Climate Change, doi:10.1038/nclimate3004.

VIIRS Active Fire Products Improve Global Estimates of Biomass Burning

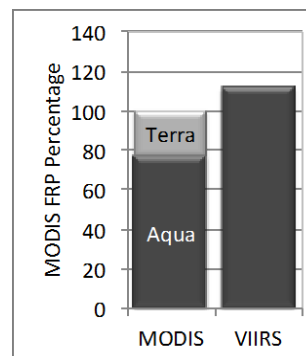
VIIRS can detect significantly more fire activity compared to heritage MODIS fire products.

2015 Jan-Dec

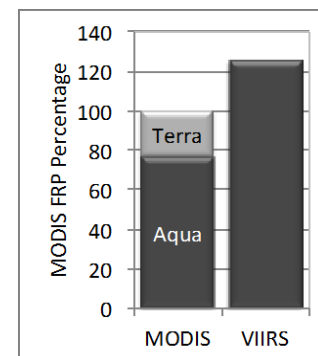


Global fire radiative power totals for 2015 showed that VIIRS can pick up as much fire activity as two heritage MODIS instruments: (Terra/MODIS: 6.1×10^6 MW; Aqua/MODIS: 13.4×10^6 MW; S-NPP/VIIRS: 19.6×10^6 MW)

As a result, regions dominated by small and low intensity fires (e.g., Southeast Asia) are now becoming ever more apparent – enhancing awareness of global hotspots and improving carbon emissions accounting.



Africa

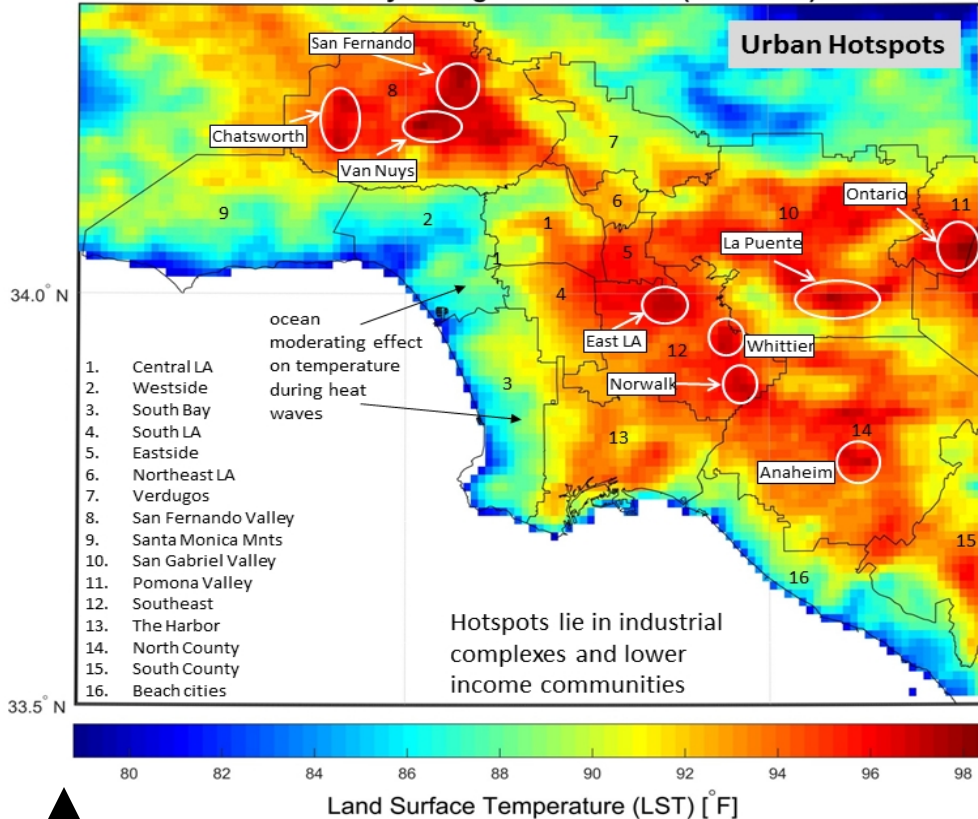


South East Asia

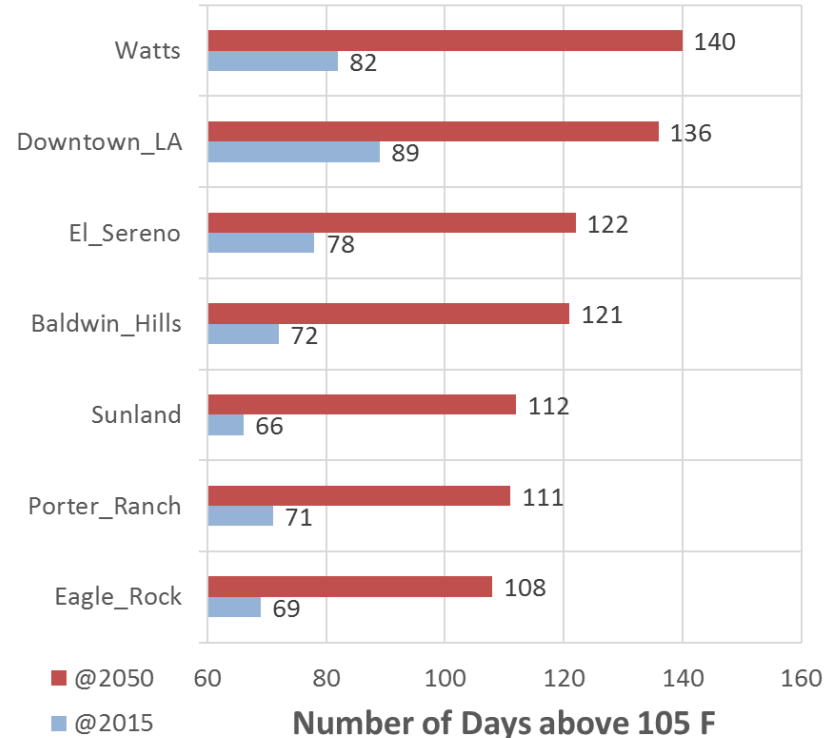


MODIS Detects Rising Temperatures and Heat Wave Trends in Cities

MOD21 Daily average heatwave LST (2003-2016)



New MODIS surface temperature data can pinpoint current and future communities that are most vulnerable to the detrimental effects of heat waves. These satellite products are helping guide efforts to advise local governments on effective climate adaption and mitigation strategies.

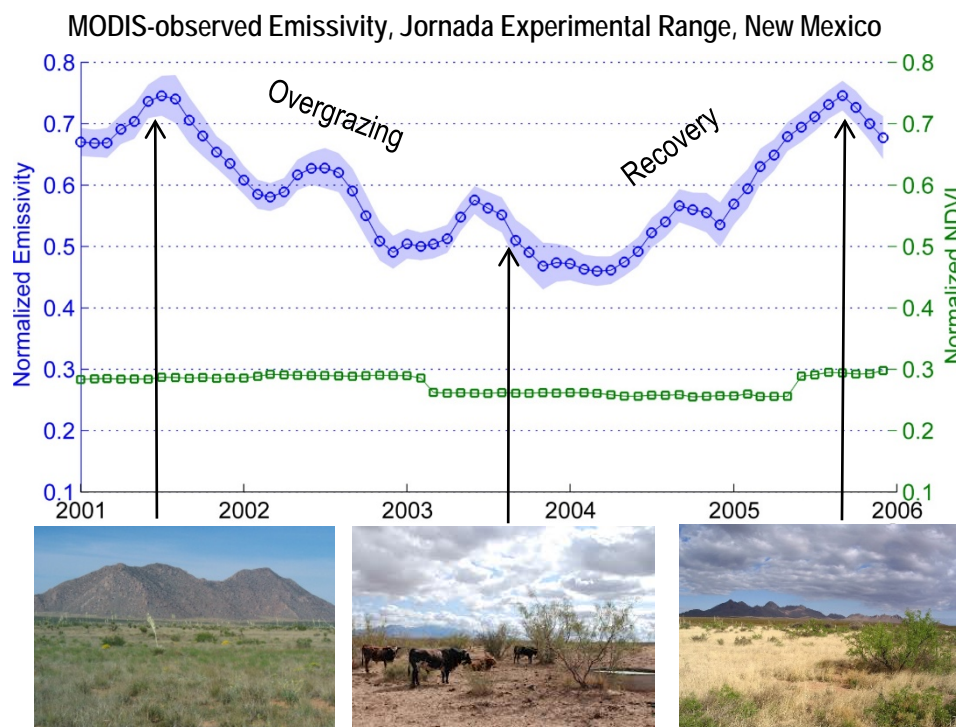


Current and predicted days above 105° F in Los Angeles, CA based on the refined MODIS Land Surface Temperature product suite. All regions were predicted to warm, with inland areas warming faster than areas near the coast.



JPL

Desertification monitoring with a new MODIS/VIIRS thermal infrared emissivity product



MODIS emissivity and NDVI mean monthly time-series at the Jornada Experimental range from 2001-2006. MOD21 emissivity values show a distinct decreasing linear trend due to land degradation (increased soil exposure) from 2001-2004 followed by a recovery due to more controlled grazing from 2004-2006. Corresponding NDVI results show no seasonal cycle and insignificant linear trends.

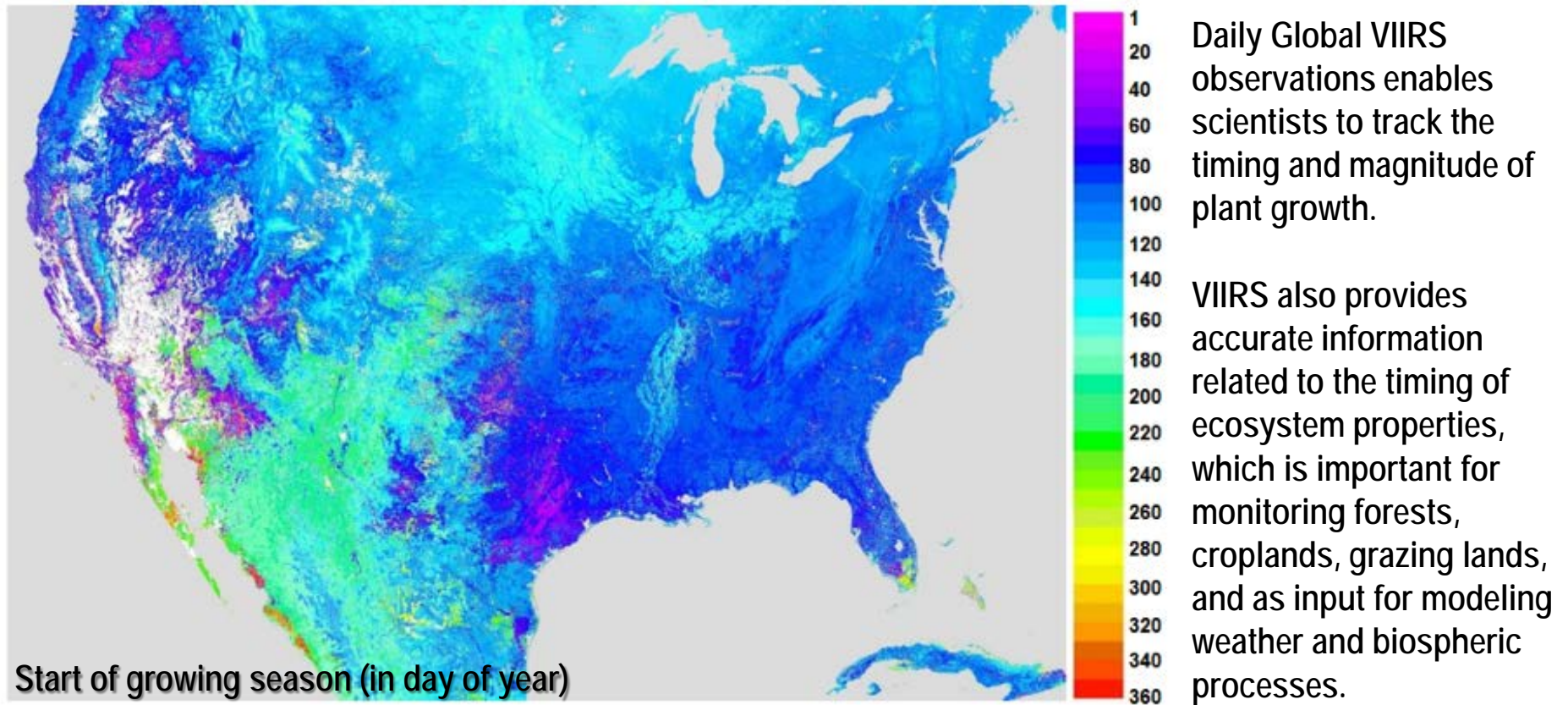
Objective: Develop a new land surface temperature and emissivity product using MODIS/VIIRS thermal infrared data that improves our ability to detect changes in land cover/use.

Finding: The new MOD21 emissivity product **increased sensitivity to land cover changes from desertification** (left image) in a more consistent manner to **complement existing long-term time series of vegetation data**.

Significance: Desertification in drylands at the fringes of the world's major deserts has been a prime environmental concern affecting the livelihoods of millions of people on Earth. The new MOD21 product will monitor desertification in these regions with much greater sensitivity than previously possible.



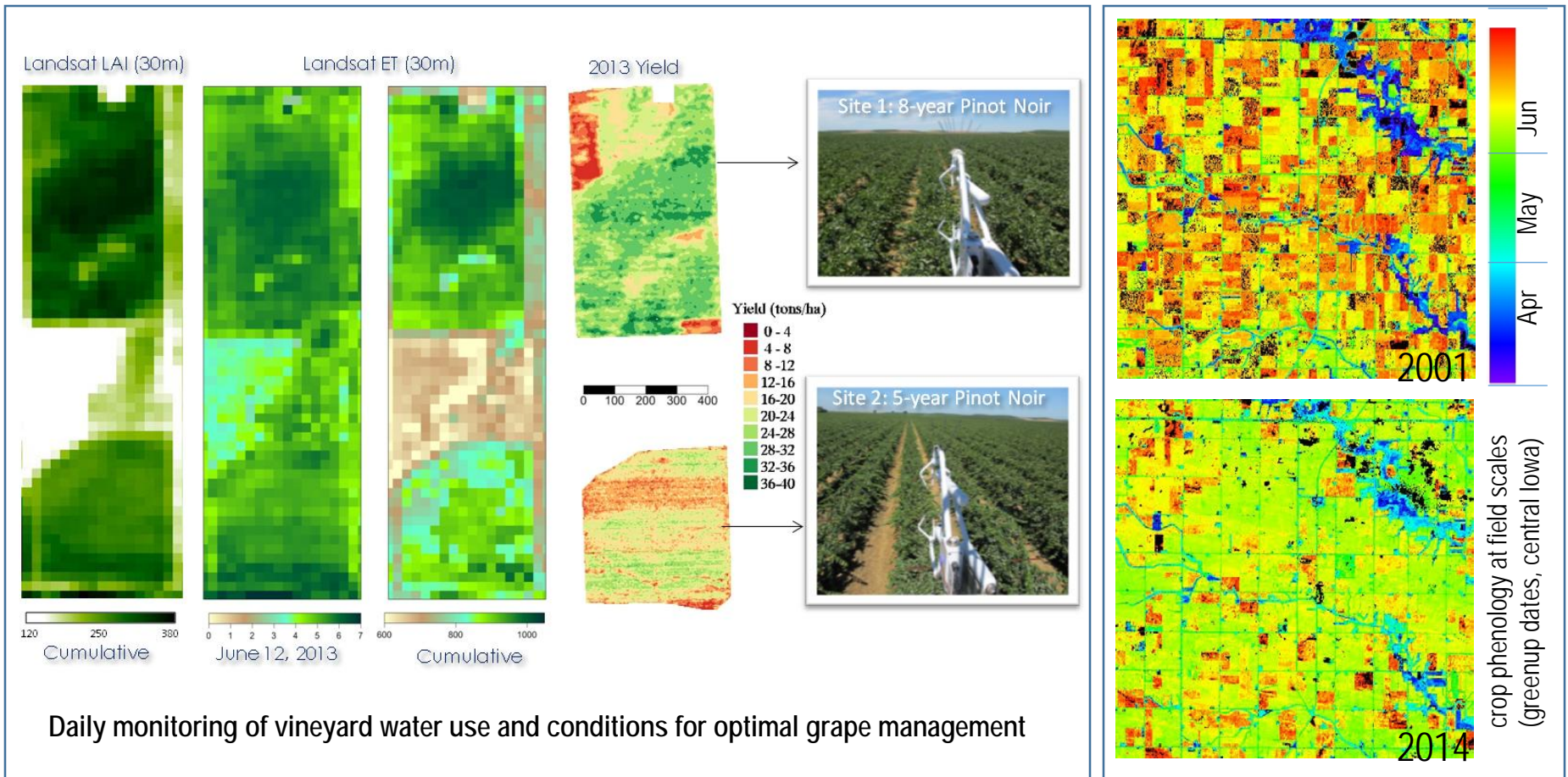
Tracking Nature's Calendar using Suomi-NPP VIIRS



Who uses MODIS phenology products? (1) Farmers, ranchers, and meteorologists that want to monitor drought extent and severity; (2) foresters that want to detect disturbances related to wind damage, pests and disease outbreaks, and invasion of exotic species; (3) public health officials looking for short-term forecasts of allergenic pollen; (4) scientists looking to improve weather and environmental models; and (5) tourists and the travel industry with information on the timing and location of spring wildflowers blooms or peak fall foliage.



MODIS/VIIRS, Landsat, and GOES Enable Daily Monitoring of Crop Condition and Water Use

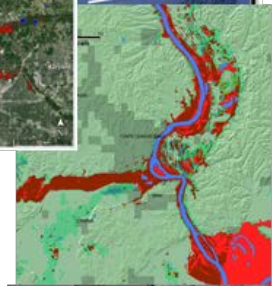
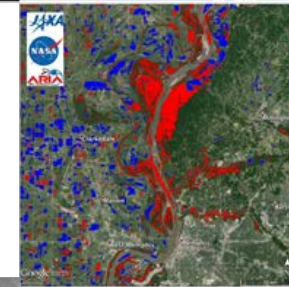
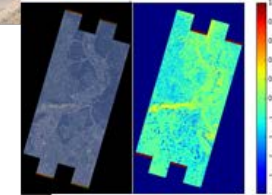


Frequent observations at the field level are necessary for effective precision agriculture, which benefit local farmers. Daily monitoring of crop condition and water use at fine scales has become possible by fusing MODIS/VIIRS, Landsat and Geostationary data. These measurements are critical for decision making in estimating crop yield, mitigating risks and ensuring food security.



Disaster Risk Reduction and Response from a NASA Perspective

- Engagement with Stakeholders and Partners
- Monitoring and Observation
- Data Acquisition, Processing, and Distribution
- Interpretive and Decision Support



NASA Earth Science
DISASTERS PROGRAM

NASA Applied Sciences Program | www.nasa.gov

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ORGANIZATION DISASTERS PRODUCTS RESOURCES

NASA-Produced Maps Help Gauge Italy Earthquake Damage
October 5, 2016
NASA/JPL-Caltech-produced maps of damage in and around Amatrice, Italy, from the Aug. 2016, quake, based on ground surface changes detected by Italian and Japanese radar satellites. The color variations from yellow to red indicate increasingly more significant ground surface change. Credits: Copernicus Maps (as of Aug. 27)

Amatrice
ARIA ALOS-2 DPM

Recent Disasters
Hurricane Matthew 2016
Typhoon Megi 2016
Puerto Rico Blackout 2016
Amatrice Italy Earthquake 2016
Louisiana Flooding 2016
California Wildfires 2016
Alaska Pavlof Volcano 2016
Eastern US Blizzard January 2016
Mississippi Flooding January 2016
Hurricane Patricia 2015
[View All](#)

About the NASA Disasters Program
The Disasters Applications area promotes the use of Earth observations to improve prediction of, preparation for, response to, and recovery from natural and technological disasters. Disaster applications and applied research on natural hazards support emergency preparedness leaders in developing mitigation approaches, such as early warning systems, and providing information and maps to disaster response and recovery teams.
[Learn More](#)

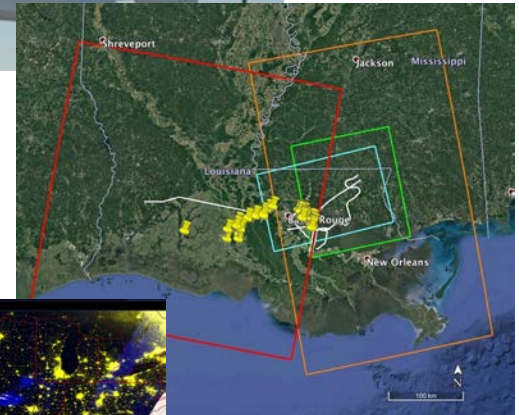
<https://disasters.nasa.gov/>

<https://disasters.nasa.gov/argentina-summit-2017>



Disaster Response Capacities

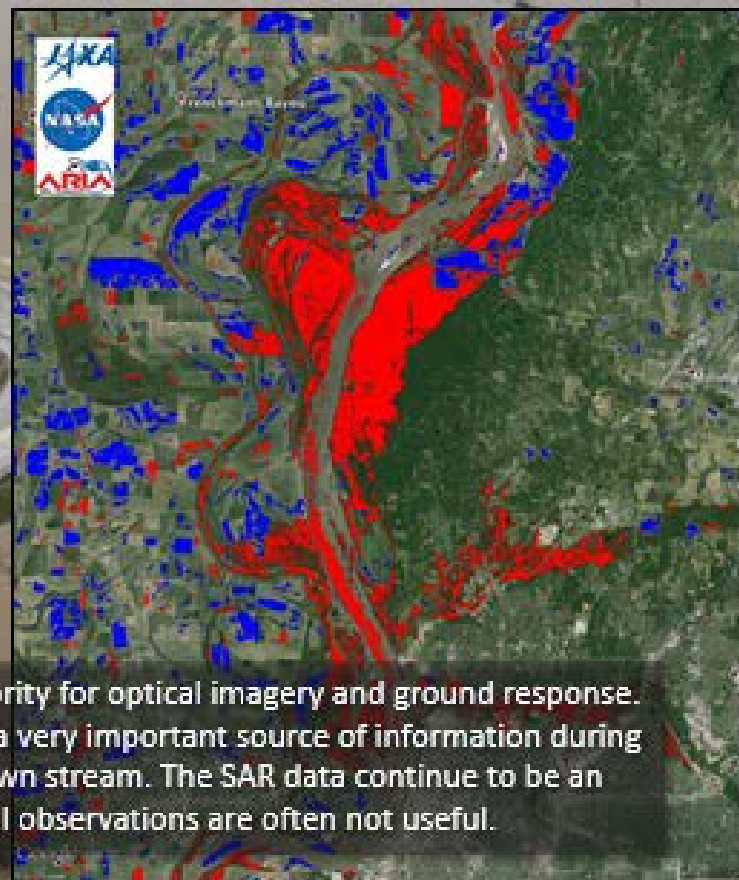
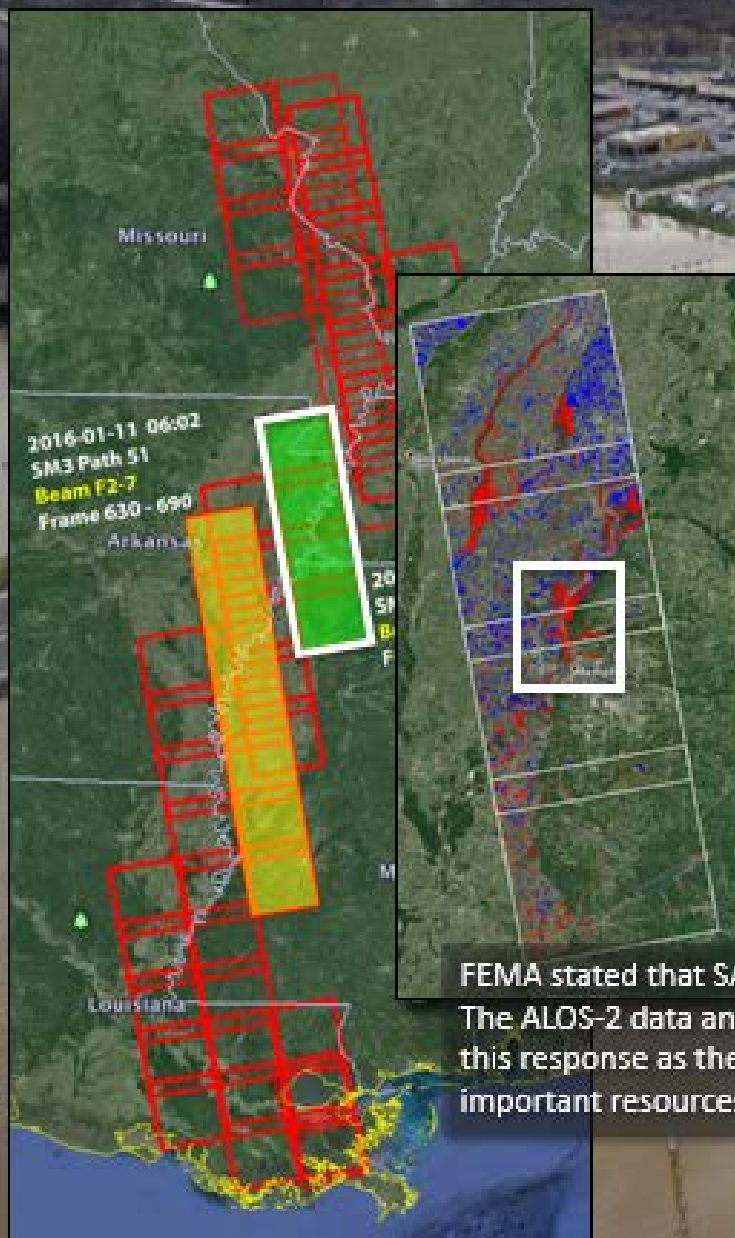
- *Airborne Instruments*
 - UAVSAR – Radar
 - LVIS – Lidar
 - AMS, MASTER – Thermal Infrared
 - HIWRAP, APR2, HAMSR, HIRAD, PALS
MAPIR – Active and passive microwave
- *Data processing, analysis systems, Data Centers*
 - EOSDIS-ESDIS
 - LANCE/NRT/DB
- *Modeling and Analysis*
 - *Flood and Earthquake Models, Damage and infrastructure Maps, Day/Night and plum extent maps*
 - *Capacity Building*
 - *Response Exercises & Simulations*



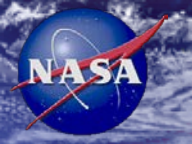


2016 Midwest Floods

Sensor: ALOS-2 SAR (JAXA)
Coverage: 70km x (240km + 420km)
Resolution: ~12m
Blue pixels: Open Land Floods
Red pixels: Vegetation Floods
Available online at
<http://aria-share.jpl.nasa.gov/events/>



FEMA stated that SAR provides inspection priority for optical imagery and ground response. The ALOS-2 data and the products have been a very important source of information during this response as the flood crest has moved down stream. The SAR data continue to be an important resources during times when optical observations are often not useful.

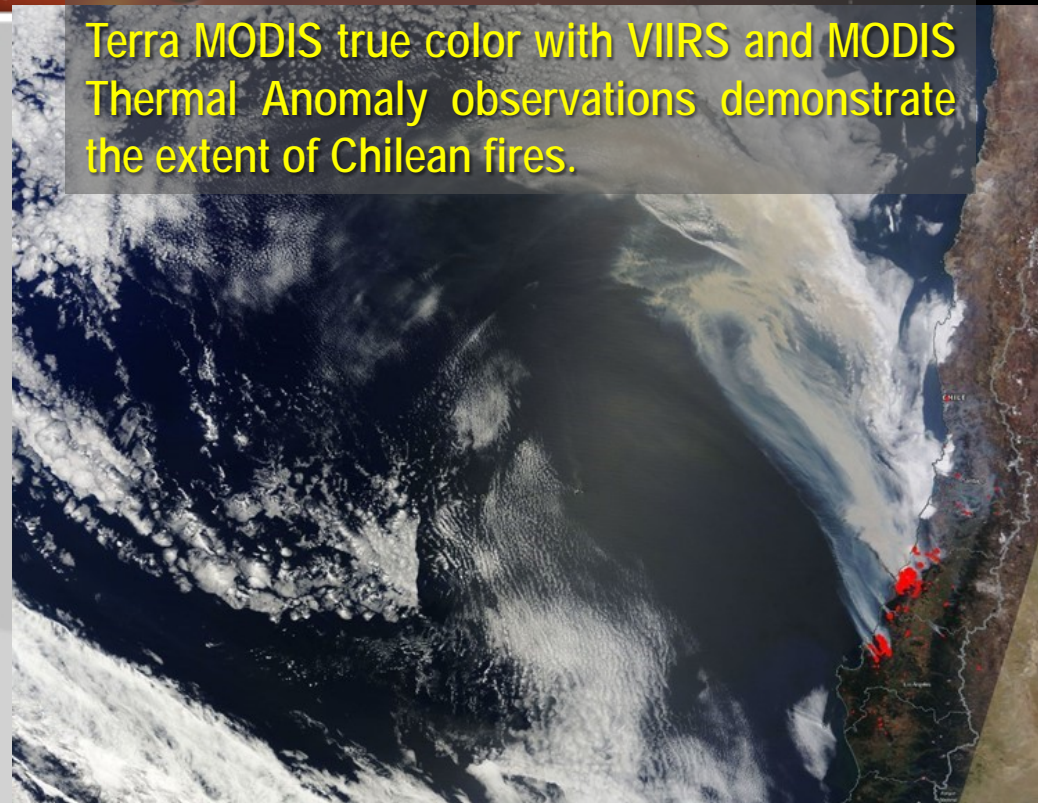


Wildfire Extent Chile and Argentina 2017

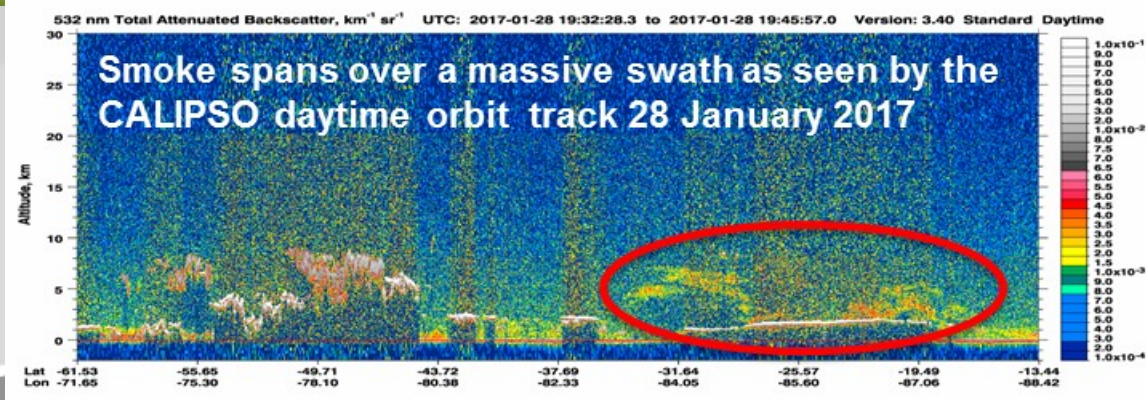
Landsat 8 Operational Land Imager (OLI)
(January 24, 2017)



Terra MODIS true color with VIIRS and MODIS
Thermal Anomaly observations demonstrate
the extent of Chilean fires.



Massive fires extent over 100's of kilometers (km) in Chile, and the smoke pollution extends 1000s of km over the Pacific Ocean,



PUERTO RICO

San Juan

Aguirre Power
Station

BEFORE (Sept 21, 2016; 02:00EDT)

PUERTO RICO

San Juan

Aguirre Power
Station

AFTER (Sept 22, 2016; 02:10EDT)



syria from space





Summary

- *At Year 5, the S-NPP Land Discipline team has met its mission success criteria – (1) Provide continuation of the EOS measurements for at least 3 years; (2) Provide risk reduction for JPSS 1/2 and beyond.*
- *The focus now is on transition of EOS continuity products into designated DAACs by Mid-to-Late 2017.*
- *Continued exploitation of unique S-NPP capabilities (e.g., 375m Fire, NASA Black Marble) into LANCE NRT and other decision support systems.*
- *Increased emphasis on multimission and multisensor innovative research that can be used to quantify change, characterize human-natural processes, and examine function within the Earth System over time.*