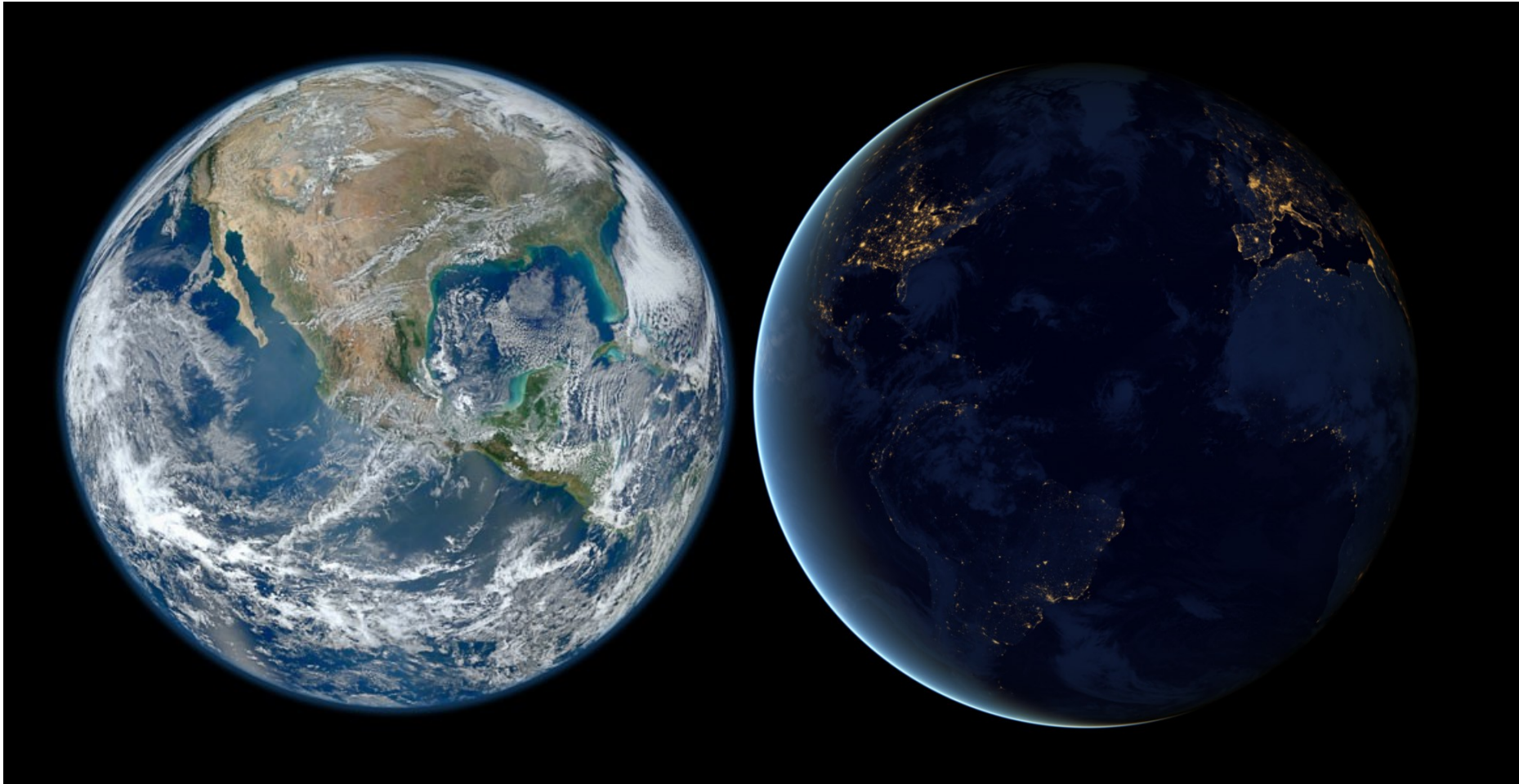




Land, Cryosphere, and Nighttime Science Products from Suomi NPP VIIRS: Overview and Status



Miguel O. Román, with contributions from the VIIRS Land Science Team: C. Justice; I. Csiszar; L. Giglio; W. Schroeder; J. Coen; E. Vermote; R. Wolfe; S. Hook; M. Friedl; C. Schaaf; T. Miura; M. Vargas; M. Tschudi; G. Riggs; D. Hall; A. Lyapustin; R. Myneni; S. Devadiga; C. Davidson; E. Masuoka

The Land PEATE: meeting the needs of the NASA Science Team and helping the NOAA IDPS

VIIRS LDOPE QA: http://landweb.nascom.nasa.gov/NPP_QA/

National Aeronautics and Space Administration
Goddard Space Flight Center

NPP- Land Product Evaluation and Testing Element

VIIRS

Visible Infrared Imaging Spectroradiometer

Home Browse Time Series

Welcome to the NPP VIIRS Land Product Q

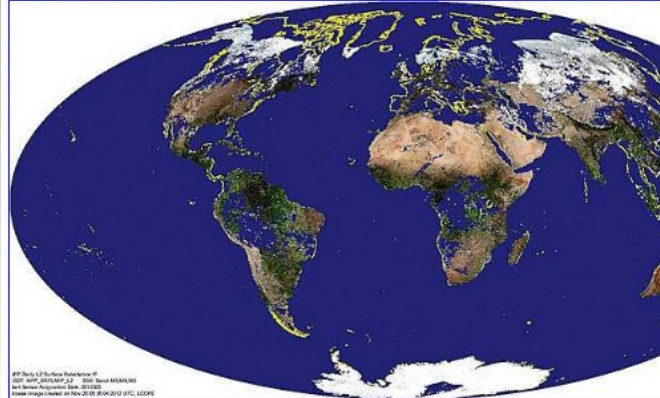
The objective of the VIIRS (Visible Infrared Imaging Spectro Radiometer) is to document the science quality of products made from the remote sensing of Earth's land surface. This includes the science quality assessment of samples of VIIRS Land products made at IDPS evaluation of improvements to the VIIRS Land Science algorithm (Product Evaluation and Testing Element) using the new algorithm (National Polar Orbiting Earth Satellite System Preparatory Program) from the IDPS OPS algorithms, and the Land PEATE algorithm. PEATE and of the science algorithm improvements are done in IDPS from LDOPE's evaluation of the pre-launch and at launch version MODIS data are posted on the Algorithm Updates/Evaluation site. For global browse images from immediate post-launch check the page. Please direct your questions and comments to SatelliteQA@gsfc.nasa.gov

VIIRS Global Browse

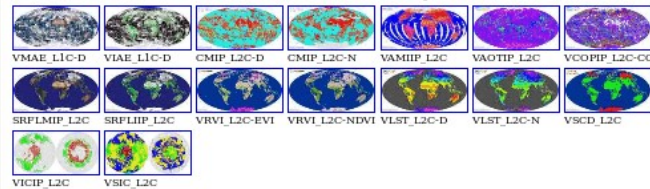
NPP_SRFLMIP_L2(Surface Reflectance IP, Moderate), day 2012325 (11/20/2012), IDPS (AS3000)

Click on your interested area on the image to zoom in. Go To Day:

[PREV](#) [NEXT](#) [View: LPEATE \(AS3001\)](#) [View: LPA \(AS3002\)](#) [24 km Browse](#) [6 km Browse](#) [Orbits](#)



All the browses available for IDPS (AS3000), day 2012325:



Known Issues Page

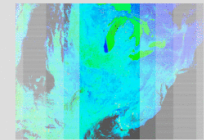
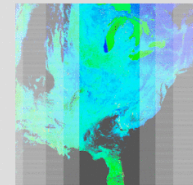
Detailed Description

[Color Key](#) [Case pending](#) [Case closed](#) [Case reopened](#) [QA note](#)

[Large Image](#)

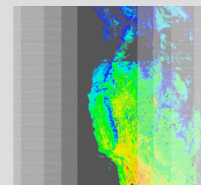
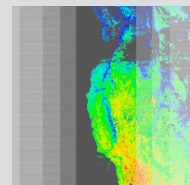
Case #: PM NPP_VLST_L2_12122 Opening date: 05/01/12 Last update: 08/15/12
Status: Closed

The VIIRS NPP VLST_L2 Land Surface Temperature product reports incorrect high temperatures over inland water bodies. This issue is observed in both the IDPS and Land PEATE archive. The images below show two examples in IDPS and LPEATE where inland water bodies report incorrect high temperatures. The first and second images below show a LST granule over North America, where the Great Lakes report a high temperature of 310K (98F) on DOY 2012.097. The third and fourth images show the Western coast of North America, and the inland water bodies such as the Salton Sea in Southern California, which is smaller and shallower than the Great Lakes. The Salton Sea reports a temperature of 340K (152F).



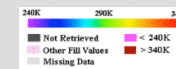
Filename: NPP_VLST_L2_A2012097.1835.AGG_03000.2012100032020.hdf
NPP_VLST_L2(Land Surface Temperature-Daytime)
DOY 2012097, IDPS (AS3000)

NPP_VLST_L2_A2012097.1835.P1_03001.2012106030951.hdf
NPP_VLST_L2(Land Surface Temperature-Daytime)
DOY 2012097, LPEATE (AS3001)



NPP_VLST_L2_A2012111.2055.AGG_03000.2012112180045.hdf
NPP_VLST_L2(Land Surface Temperature-Daytime)
DOY 2012111, IDPS (AS3000)

NPP_VLST_L2_A2012111.2055.P1_03001.2012114104917.hdf
NPP_VLST_L2(Land Surface Temperature-Daytime)
DOY 2012111, LPEATE (AS3001)



Note: This issue has been fixed in Mx6.2 put into operation at IDPS starting data day 2012223 (8/10/2012)

VIIRS Level 3 Products

Suomi-NPP Land Cal/Val Phases

Late 2011

- | | |
|------------------------------------|----------------------|
| (1) Land Surface Temperature (LST) | |
| (2) Surface Type | (7) Albedo |
| (3) Active Fires (ARP) | (8) Vegetation Index |
| (4) Surface Reflectance | (9) Snow Cover/Depth |
| (5) Ice age | (10) |
| Ice Concentration | |
| (6) Ice motion | (11) Ice Surface |
| Temperature | |
| ▲ | |
| ⋮ | |

SNPP-VIIRS Land/Cryosphere Products



Pre-Launch (2009)



Liam (4yrs)

At-Launch (2011)



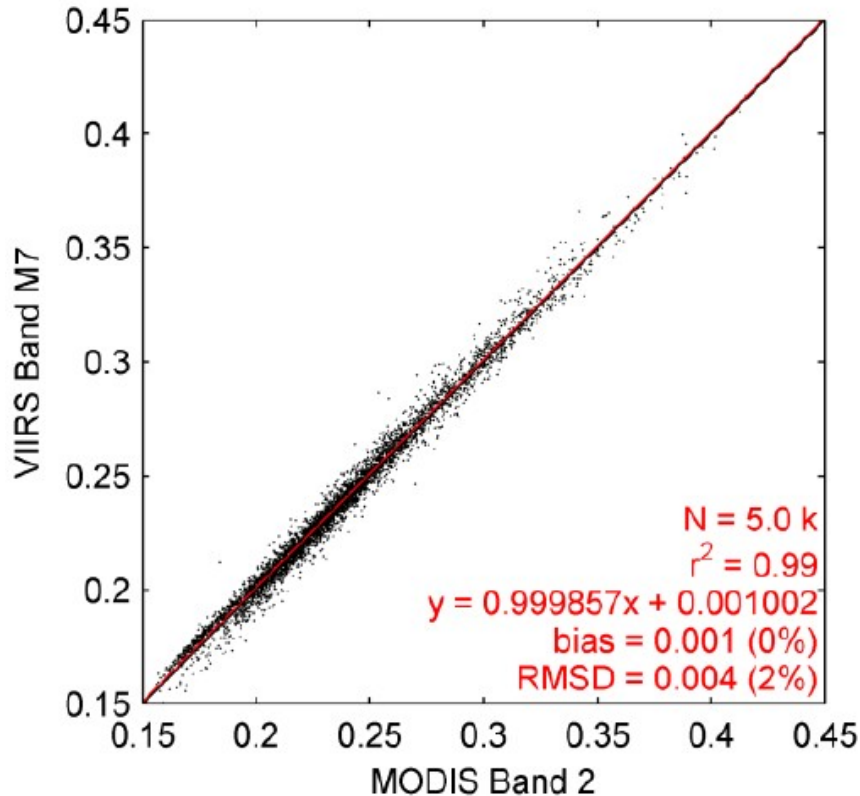
Luca (2yrs)

ICV (2012)



Clara (12 months)

VIIRS Sensor Data Record (SDR): from Vermote, et al. (2013) RSE



MODIS/VIIRS cross calibration over a 50km x 50km site in Australia (left), and true color image of the site (right). The agreement between the two reflectance products is excellent. Data were acquired on 3/6/2012 after a calibration update of the VIIRS.

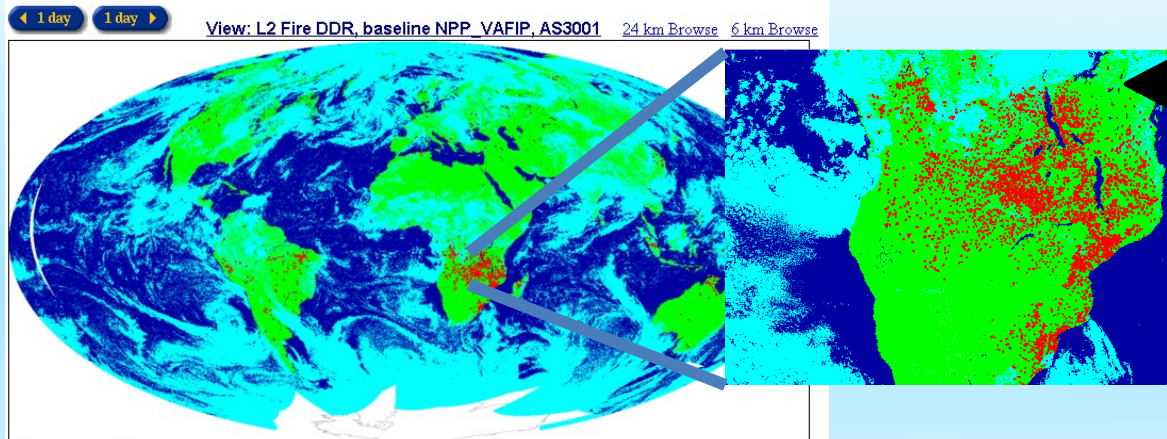
VIIRS Land Science Team Support Activities



Land PEATE- adjusted version of VIIRS Surface Reflectance IP

Provision of spatially gridded VIIRS Surface Reflectance at both moderate (0.5 – 1.0 km) and CMG resolutions.

E. Vermote (GSFC)



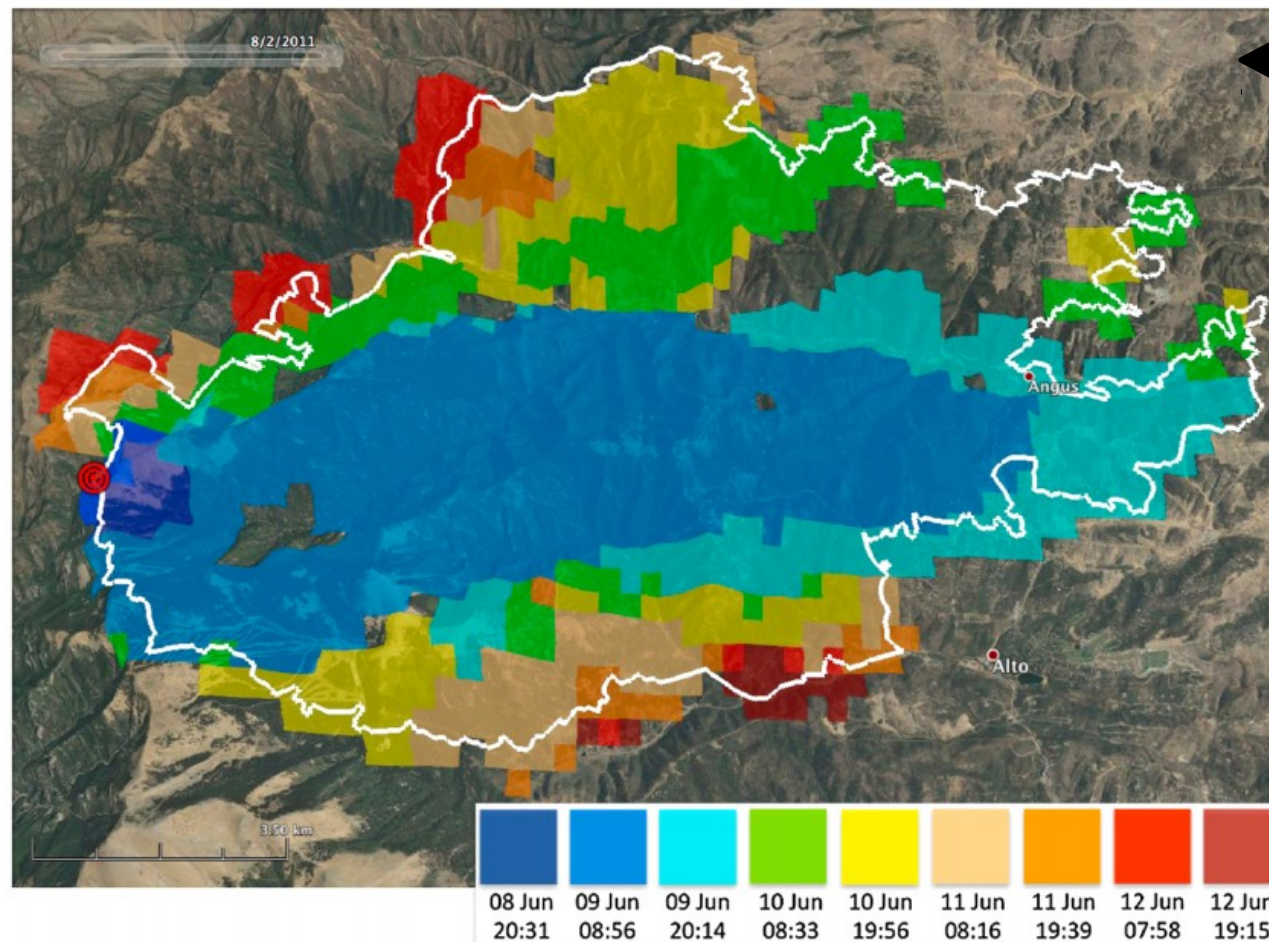
Integration and testing of VIIRS Active Fire DDR. New PGE installed to operations.

Level 2 Fire DDR, baseline NPP_VAFIP, 8/12/2012

L. Giglio (UMD)

Use of spatially refined satellite remote sensing fire detection data to initialize and evaluate coupled weather-wildfire growth model simulations

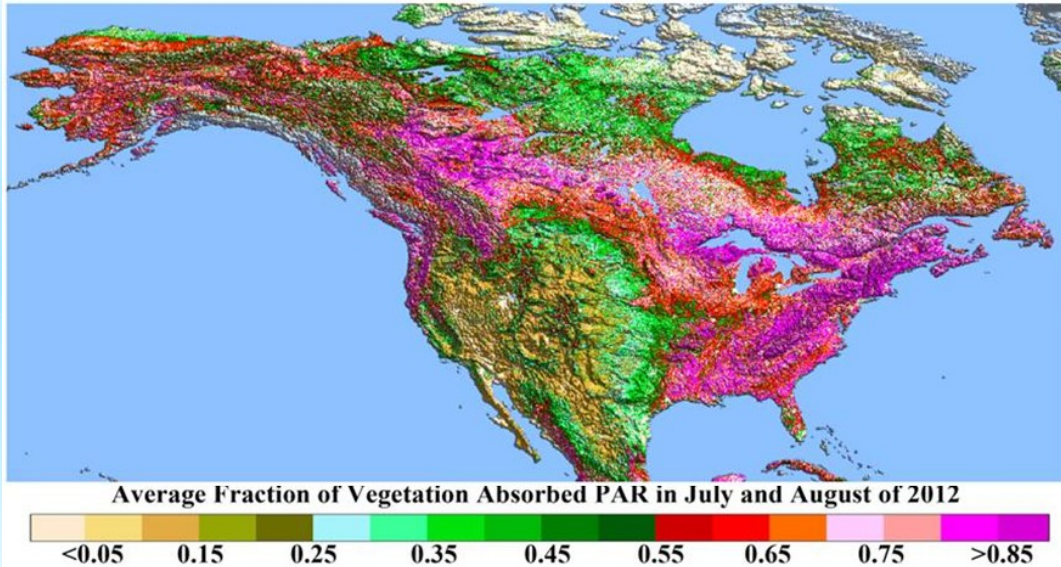
Janice L. Coen¹ and Wilfrid Schroeder²



▶ The first nine VIIRS active fire detection polygons during the Little Bear Fire. Colors indicate detected fire extent at different Suomi-NPP overpass dates and times (UTC).

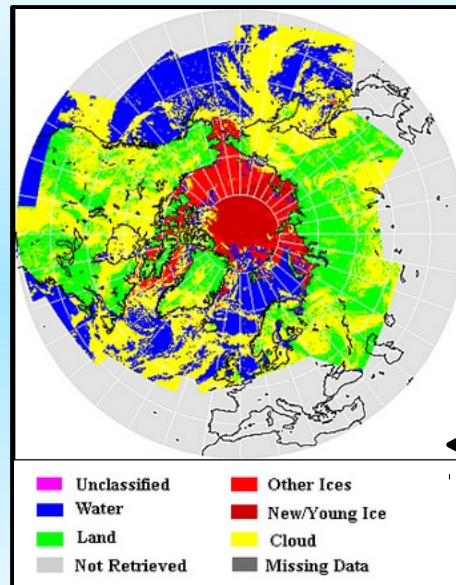
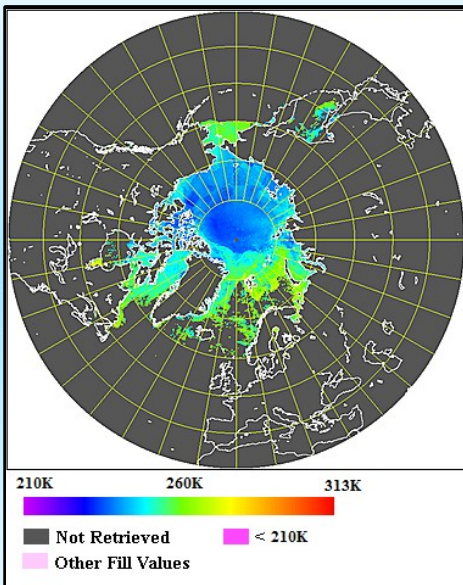
“Simulating wildfires from ignition can lead to accumulated errors from the model’s deteriorating skill even before first detection and any detectable fire growth.”

VIIRS Land Science Team Support Activities



Conversion of MODIS code for Daily LAI/FPAR to VIIRS Land Science DDR is complete.

R. Myneni (BU)

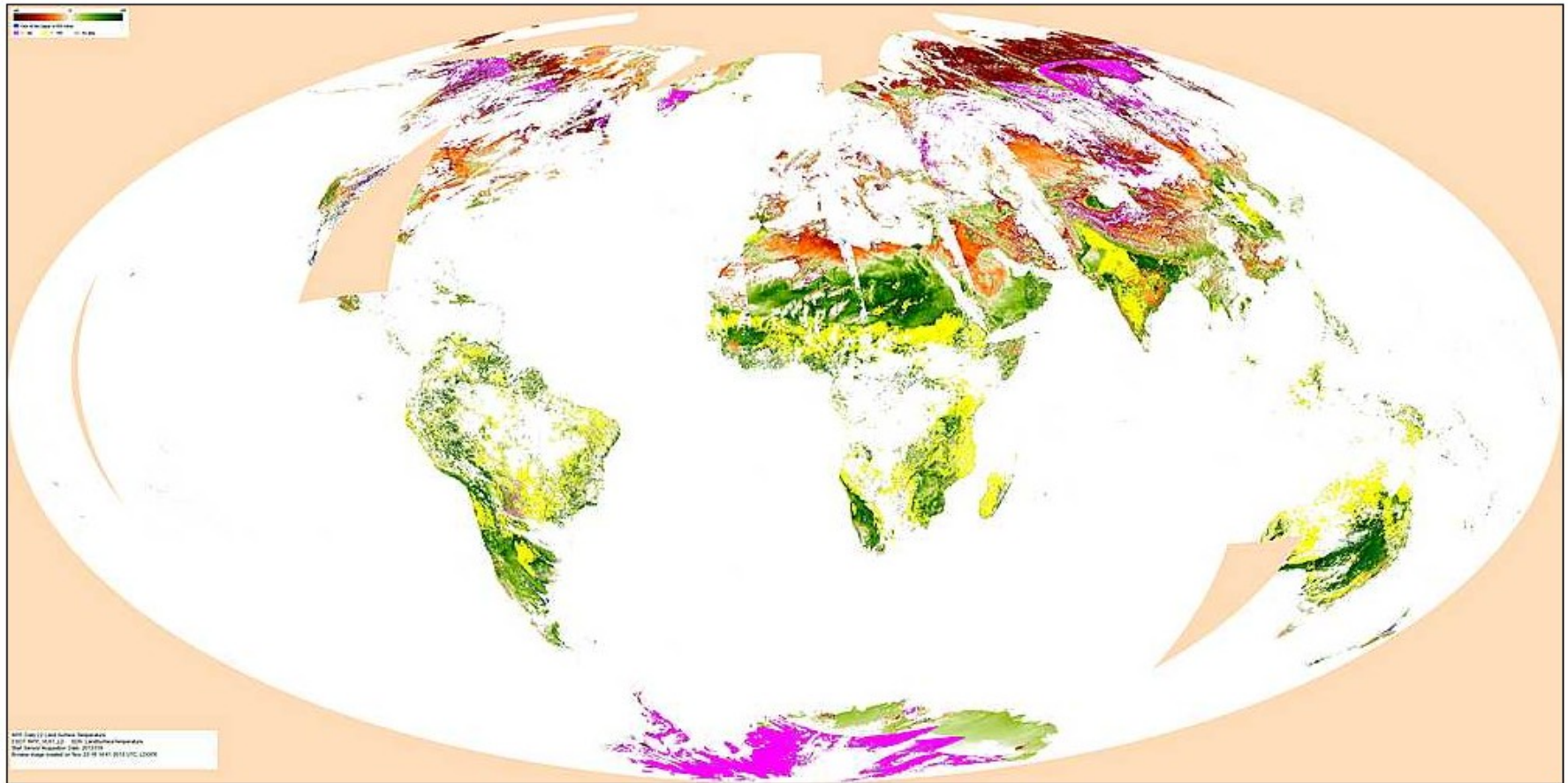


Reprocessing for IceBridge campaign: Latest code versions (MX6.3) were matched up with early 2012 NASA P3-B airborne campaign data.

(Left) Ice Surface Temperature and (Right) Sea Ice Characterization EDRs for 3/20/12.

M. Tschudi (CU-Boulder)

Recent Product Evaluations: Global Absolute Difference in LST (Mx8.0 / Mx7.2), 2013.319



Color Look Up: -4K 0 +4K



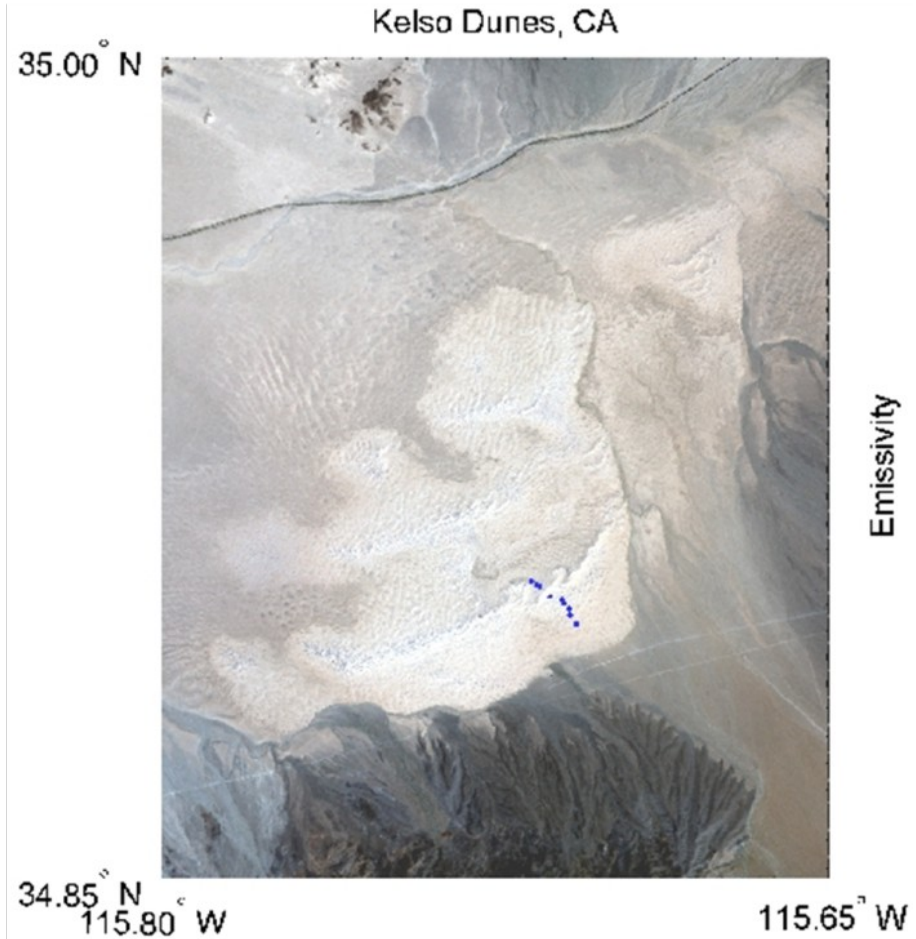
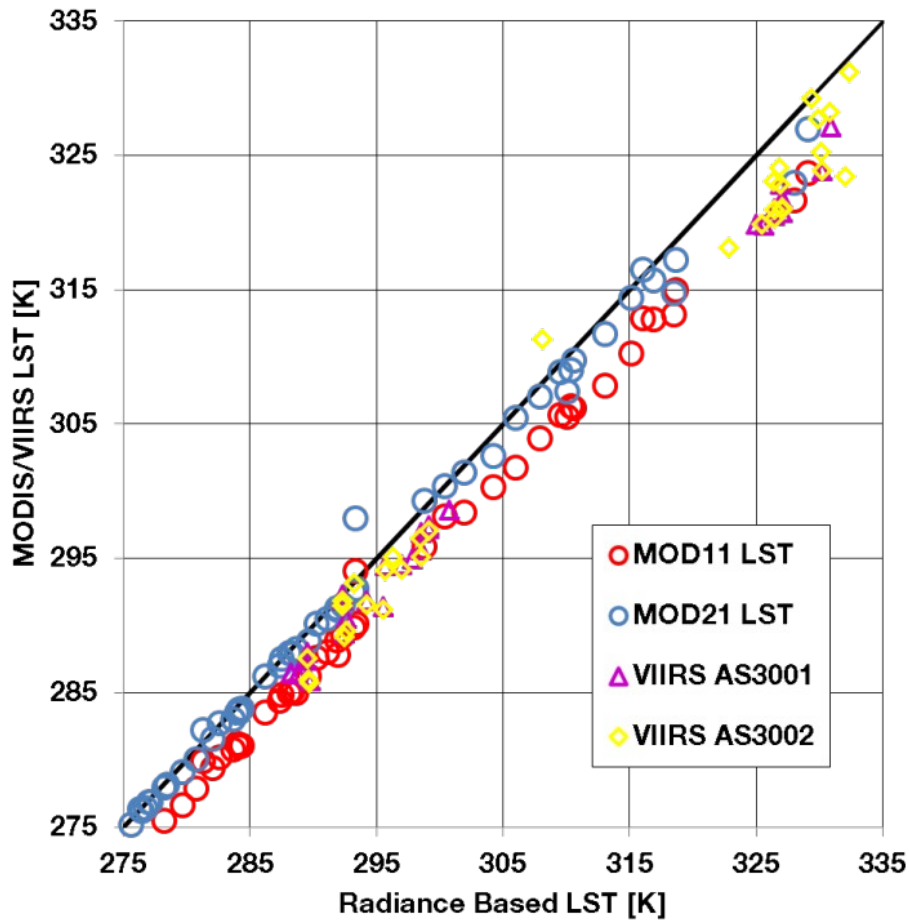
- Blue: One of the input is fill value
- Magenta: < -4K
- Yellow: > +4K
- Grey: No data

S. Devadiga (GSFC/LDOPE)

IDPS Mx8 version of the LST algorithm was recently found to underestimate the LST nearly for all of the surface types. LST generated from the previous IDPS build (Mx72) using Mx8 coefficient matches the current IDPS version. Thus, the surface type based coefficients are the source of the error in retrieved LST.

Evaluation of the VIIRS Land Surface Temperature (LST) EDR

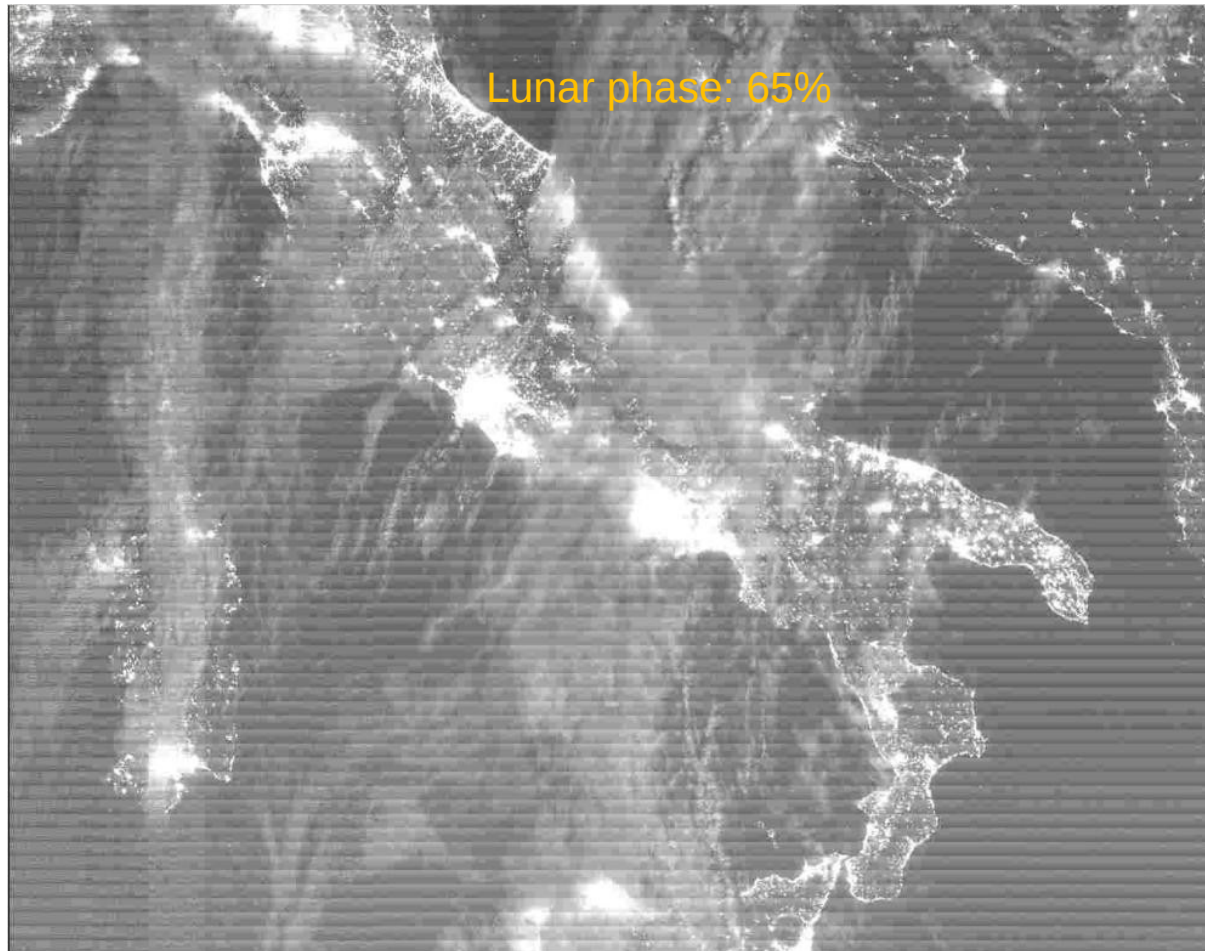
The generation of an VIIRS LST product compatible with MODIS (i.e., a merged product using both split-window and dynamic emissivity retrieval) will result in a much more stable EDR.



MODIS/VIIRS LST at the Kelso Dunes, California, pseudo-invariant site (right) versus radiance-based LST.

from Simon Hook (JPL)

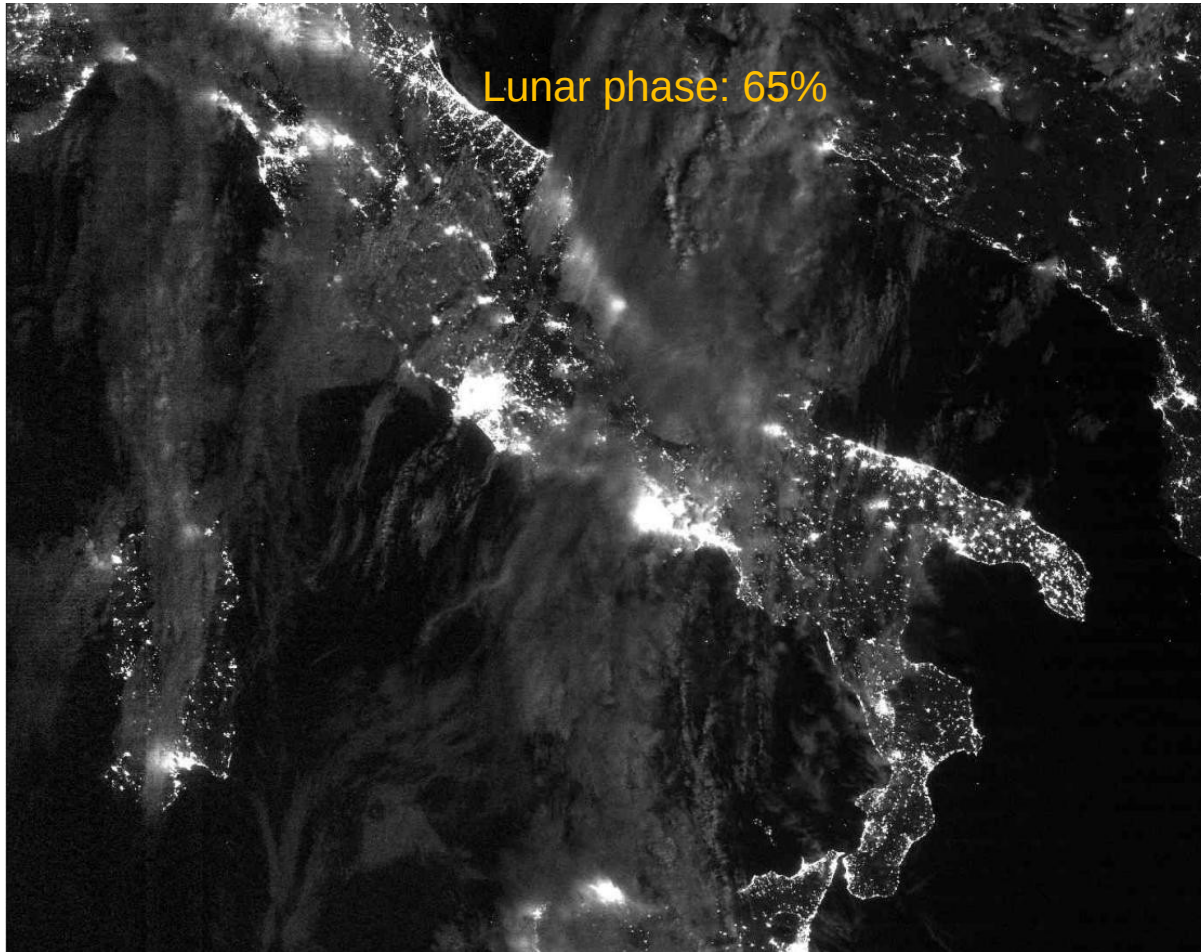
The Suomi-NPP VIIRS Day Night Band



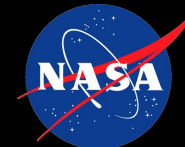
Detail of Italy 6/10/12, 00:02 UTC without
stray light correction

S. Mills, NGAS

Detail of Italy 6/10/12, 00:02 UTC with stray-light correction



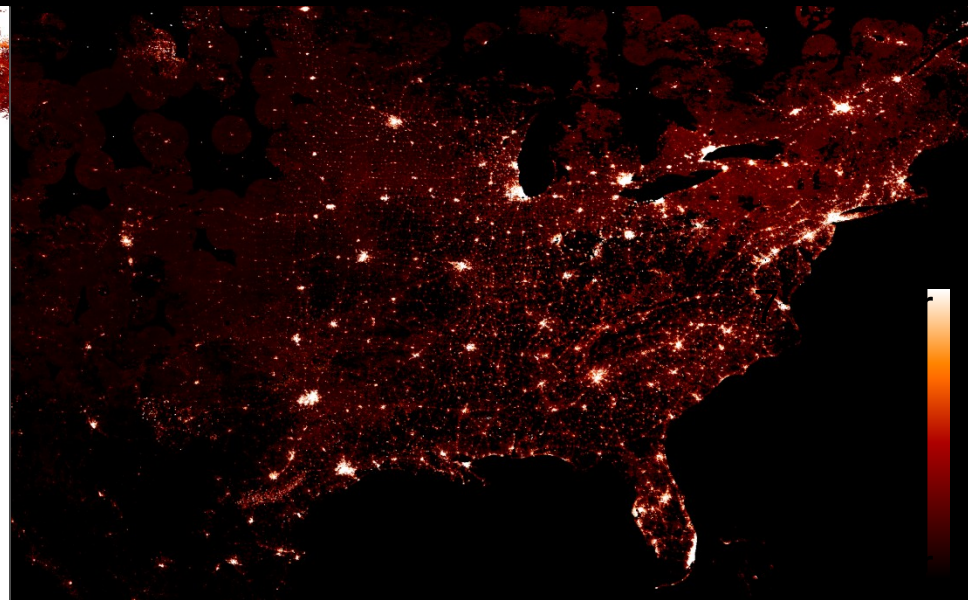
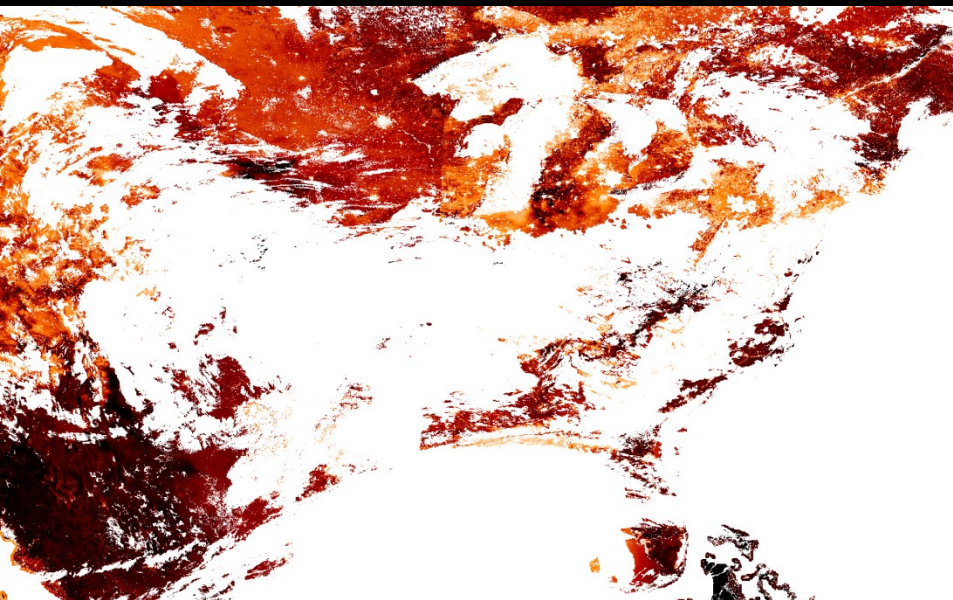
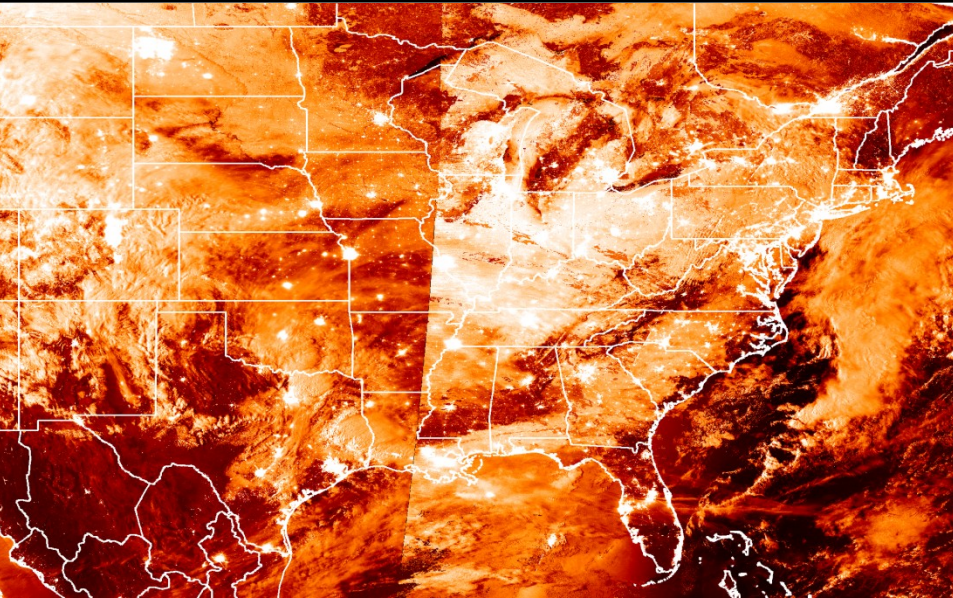
Variations of carbon footprint of human settlements across cultures

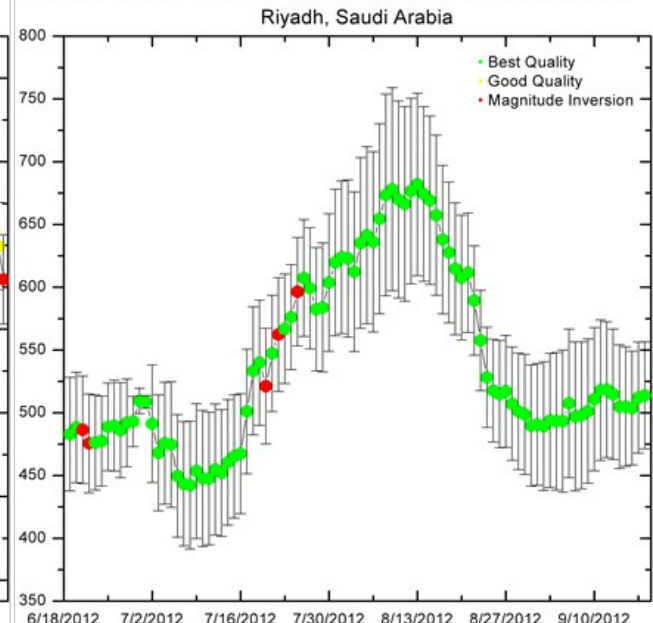
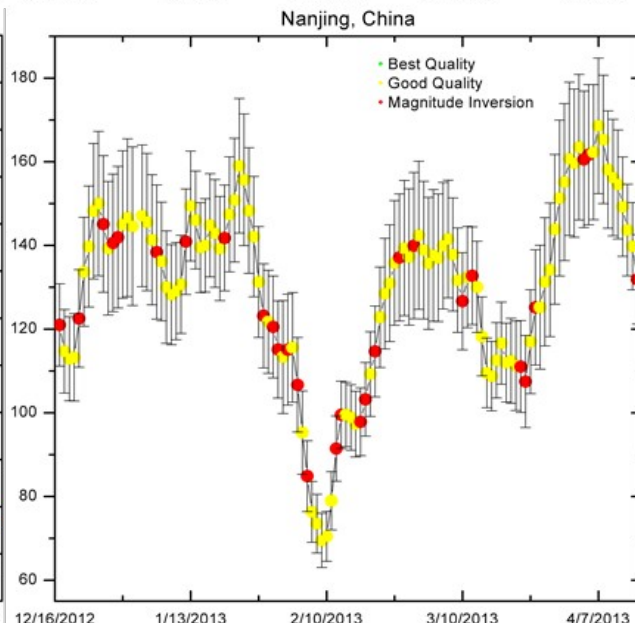
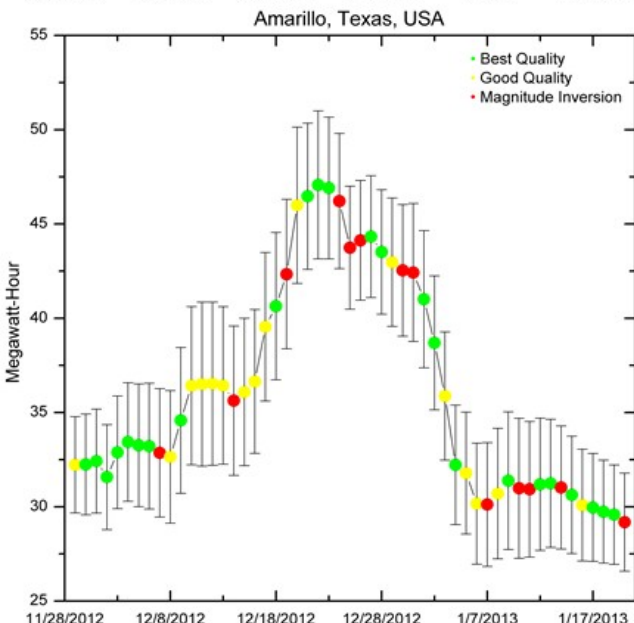
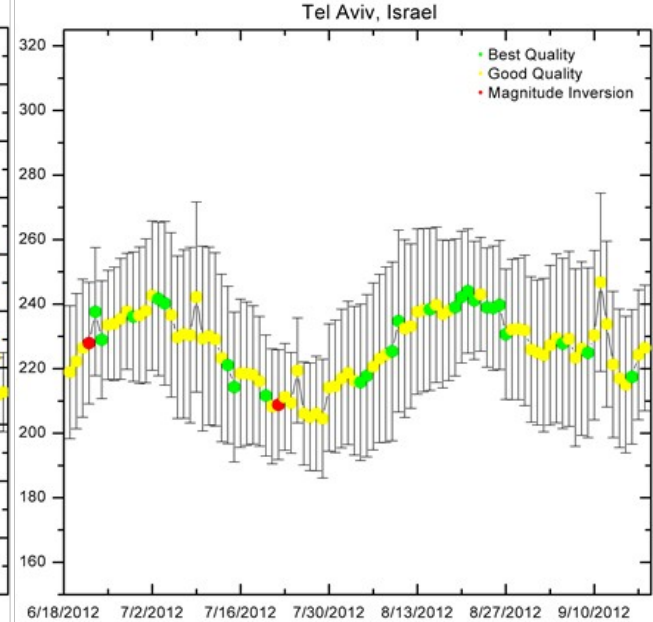
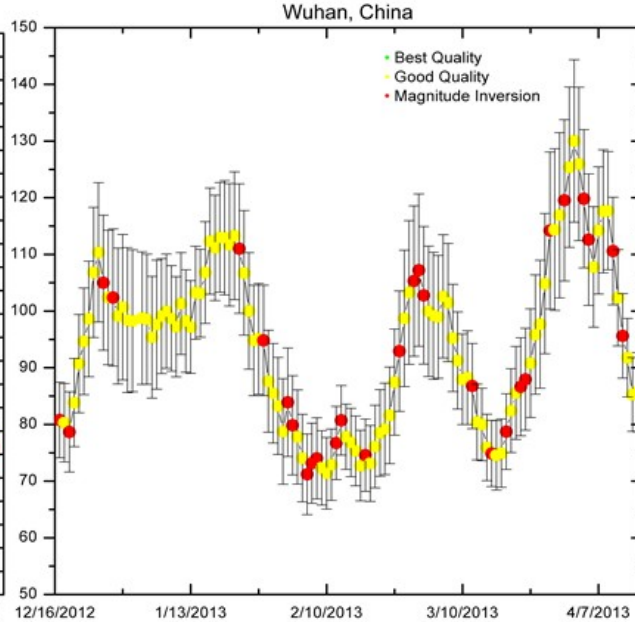
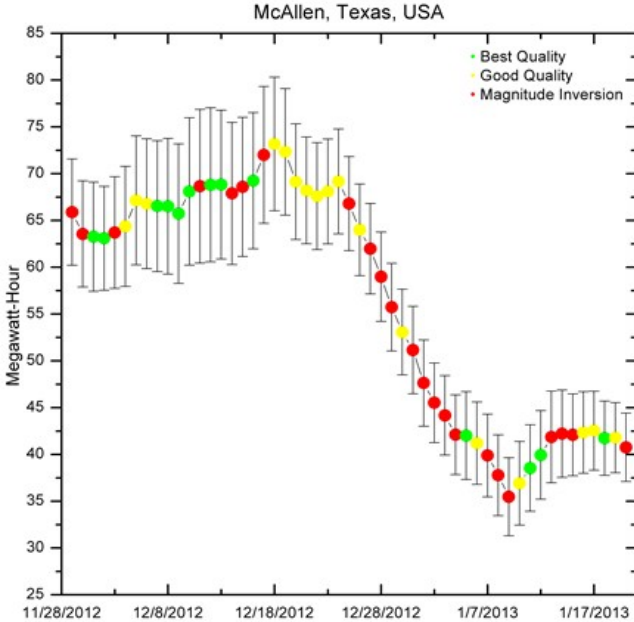




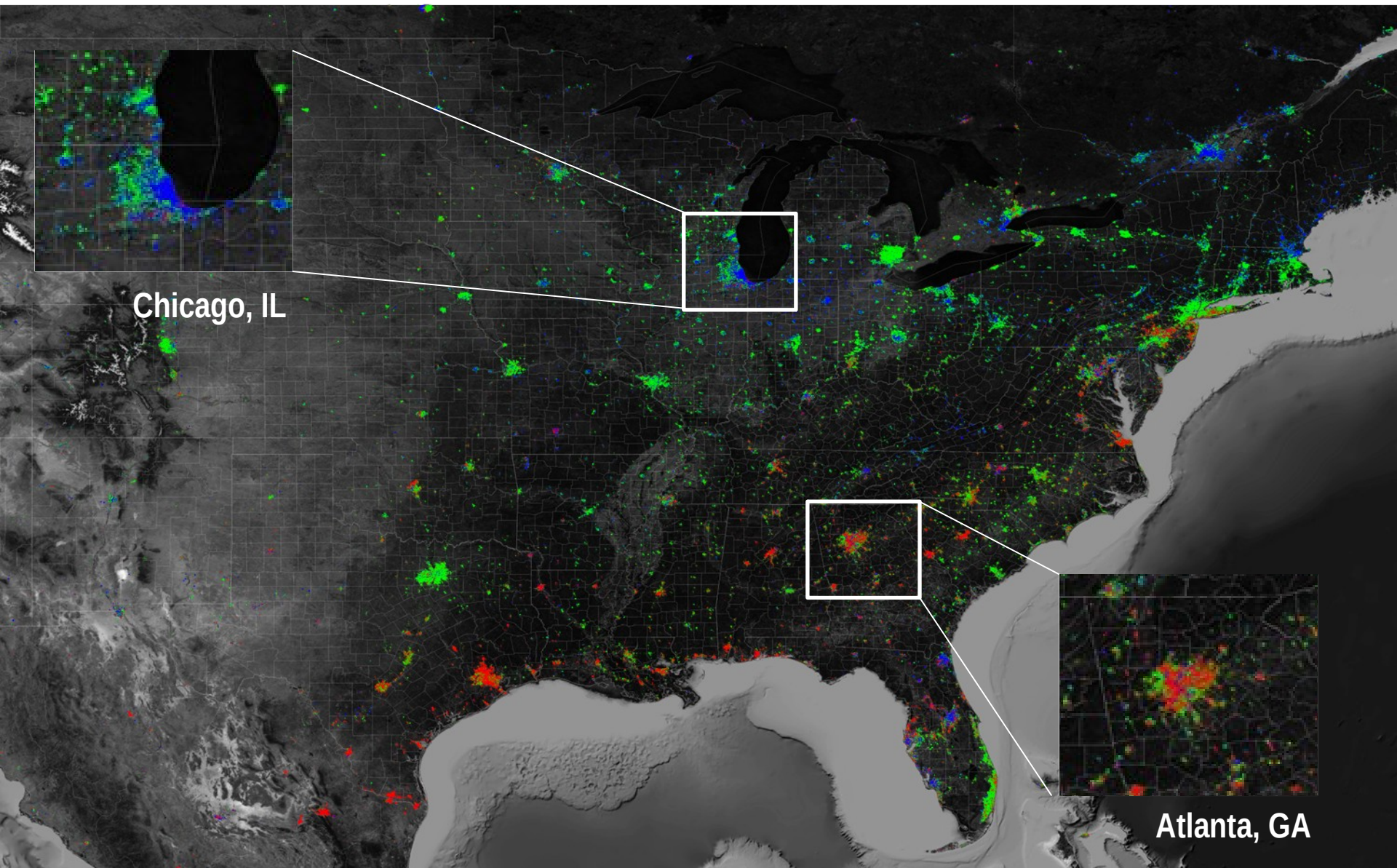
Ramadan, 2012 (Jul 19 - Aug 18)

We seek to benefit two separate communities that are both related to global climate change science. One deals with energy use from human settlements (mitigation), while the other deals with climate change effects on human settlements (adaptation).





Timing of Peak of Total Lighting Electricity Usage



■ (Dec 04, 2012 - Dec 19, 2012)

Before Xmas

■ (Dec 20, 2012 - Jan 04, 2013)

During Xmas

■ (Jan 05, 2013 - Jan 20, 2013)

After Xmas

Findings:

- Different holidays have different energy consumption signatures.
- The character and economic role of the city plays a critical role in the variation in energy use.
- Less clear is what phenomena drive the variations within countries and regions.
- **This study demonstrates the VIIRS high sensitivity to variations in energy use and its potential for assessing climate change mitigation and adaptation strategies.**

I.

IV.

I.

IV.

II.

III.

II.

III.

Summary: Strengths and Weaknesses of the VIIRS

- **What can VIIRS do that MODIS cannot?**
 - Improved fire detections (25% higher VIIRS fire counts than MODIS in the three-pixel VIIRS aggregation zone).
 - **(VIIRS Day/Night Band): VIIRS can directly assess a variety of phenomenon associated with human settlements (e.g., population, socio-economic activity, the built environment, and urbanization).**
- **What can MODIS do that VIIRS cannot?**
 - **MODIS can 'see' the Amazon**: TERRA-MODIS was designed to cross the equator at a time when cloud cover is at its daily minimum (10:30AM, descending).
- **What can VIIRS do that is currently missing?**
 - VIIRS can/should be used to measure the Earth's Biosphere: (i.e., not just daily VI and Surface Type, but also LAI/FPAR, NPP/GPP, Burned Area, Phenology, etc.)

For more information, visit:



National Aeronautics and Space Administration
Goddard Space Flight Center

Search NASA.gov

GO

Sciences and Exploration



Suomi NPP
VIIRS Land
Visible Infrared Imaging Radiometer Suite

Home Products Validation People Tools Publications Links

The banner features a background of Earth satellite imagery. On the right side, there are three circular logos: NASA, NOAA, and the University of Colorado. Below the banner is a dark navigation bar with white text for each menu item.

<http://viirsland.gsfc.nasa.gov/index.html>

Justice, C. O., et al. (2013), Land and Cryosphere Products from Suomi NPP VIIRS: Overview and Status, *Journal of Geophysical Research-Atmospheres*, 118, 1-13, [doi:10.1002/jgrd.50771](https://doi.org/10.1002/jgrd.50771).