1. Title Slide

Title: Suomi NPP (SNPP) Visible Infrared Imager Radiometer Suite (VIIRS) Active Fire Data for Fire Management and Fire Weather Applications

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Topics: (Other)

Program: (JPSS PGRR)

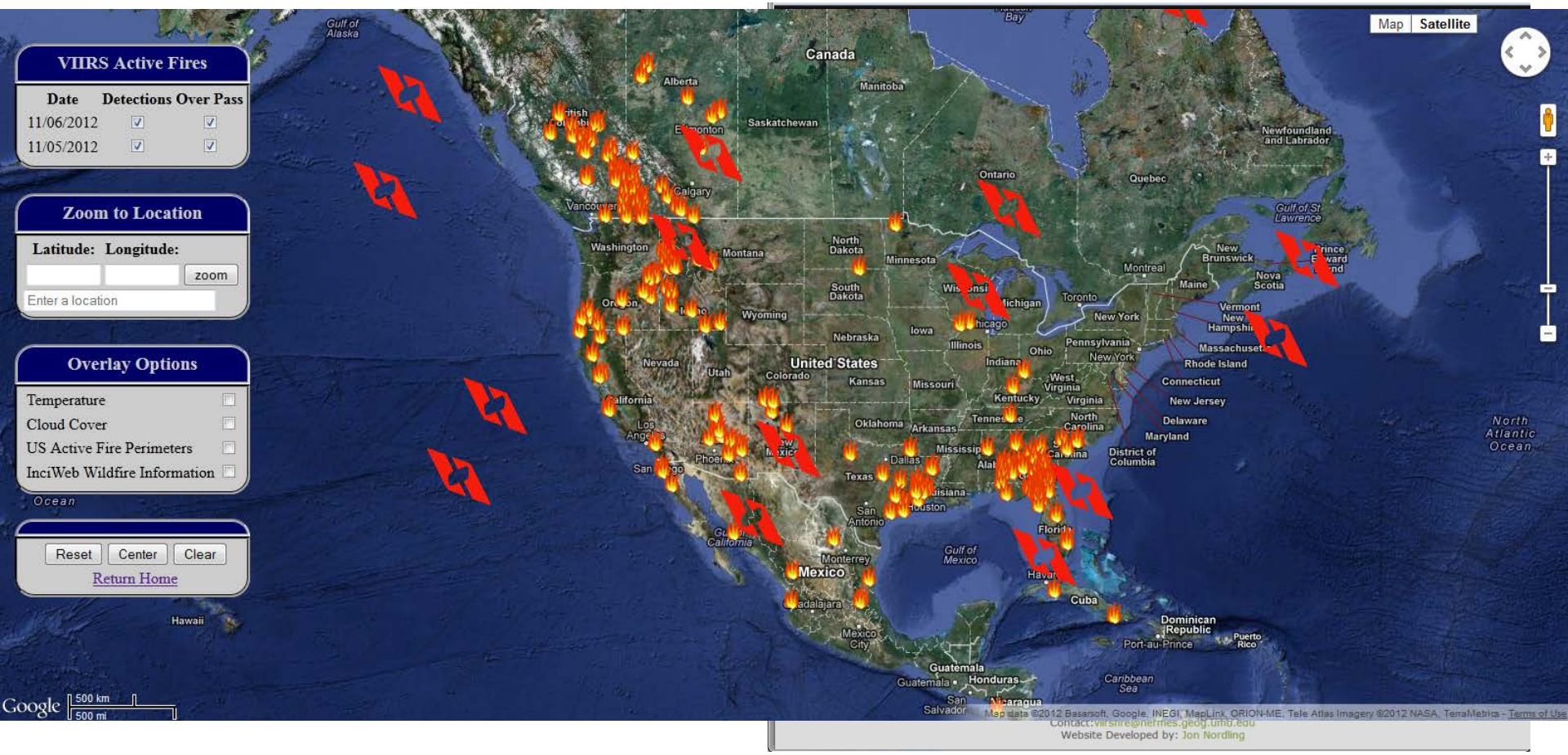
2. Introduction

- **The VIIRS Active Fire product is critical for disaster and resource management.**
- The product is expected to be used by **real-time resource and disaster management; air quality monitoring; ecosystem monitoring; climate studies,** etc.
- The **JPSS PGRR program's primary objective** is to maximize the benefits and performance of SNPP data, algorithms, and products for downstream operational and research users (gateways to the public)
- Current user-readiness is limited due to contractual restrictions, uncertainties regarding sensor performance, and differences between VIIRS and MODIS.
- **The goals of the VIIRS AF PGRR project are product evaluation and improvement and the development of a near-real-time enhanced product delivery system to support fire management and NOAA operations.**

3. Product Evaluation

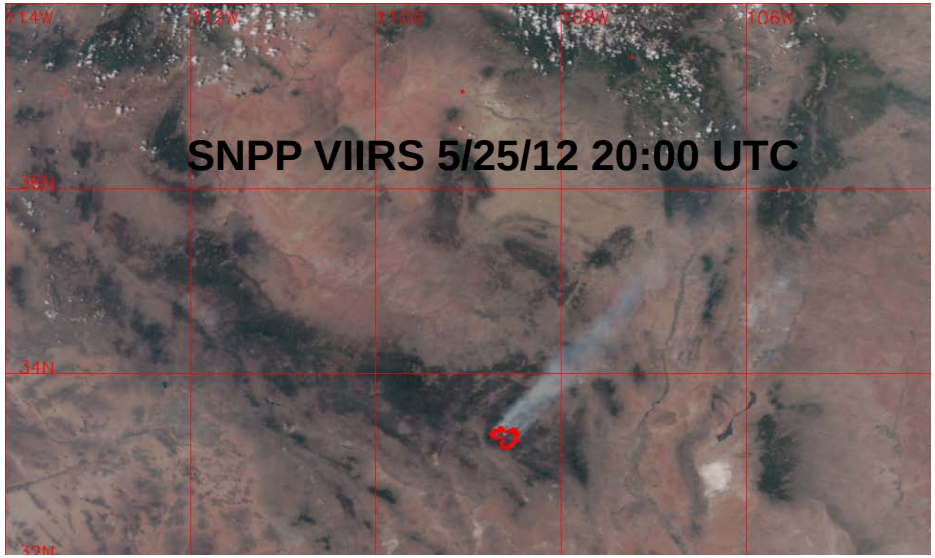
- While there is no sufficient reference data available to determine commission and omission errors, current quantitative evaluation is based on correlative analysis with Aqua MODIS since it's performance is well characterized using moderate resolution (Landsat-class) reference data.
- Detailed evaluation of the product to characterize and improve its performance includes the following evaluation methods:
  - **24/7 script for data visualization**
    - Designed for qualitative assessment of fire data
    - Used to identify major anomalies in data
  - **VIIRS x Aqua/MODIS intercomparison**
    - Qualitative assessment of VIIRS using near-coincident Aqua/MODIS data
    - Verify active fire product consistency on a per-pixel and/or grid basis
  - **Detailed data inspection tool**
    - Used to assess quality of individual bands and the corresponding QA flags
  - **Collection and analysis of in-situ and airborne data**

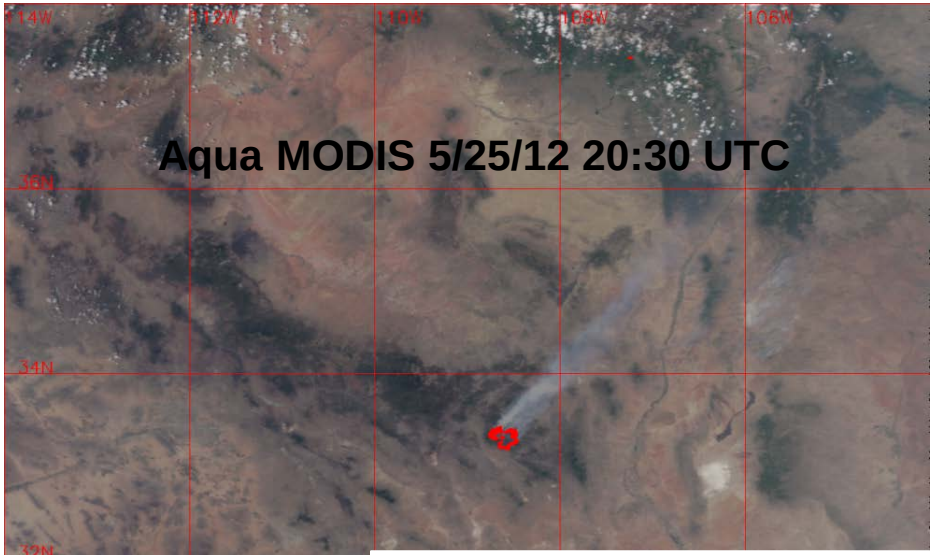
In addition, we've engaged the user-community (e.g. IMETs) to include them in product evaluation, improvement, and continuity. The following is a screen shot of the data delivery interface on the VIIRS Active Fire website.



http://viirsfire.geog.umd.edu

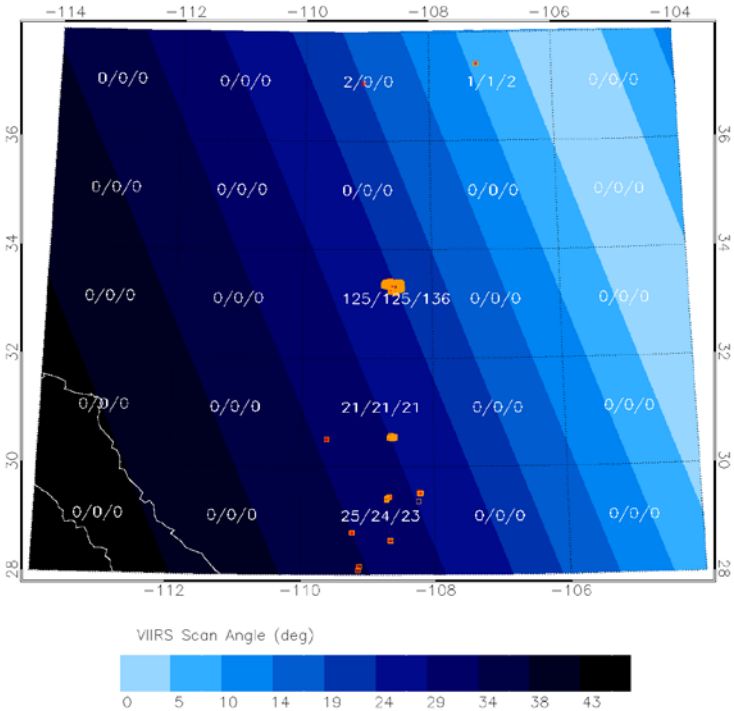
VIIRS x MODIS: Whitewater-Baldy fire



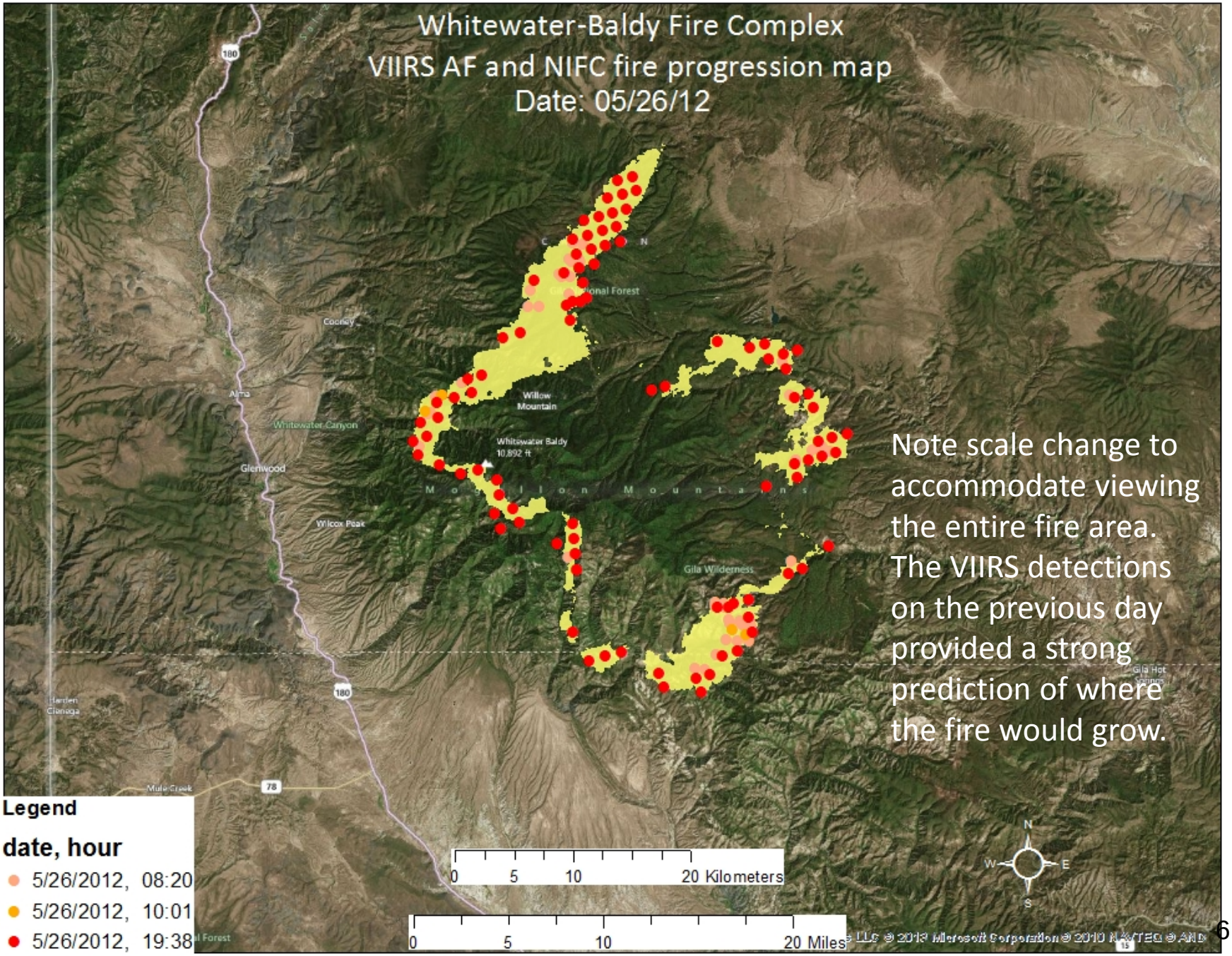


The color-coded grid plot provides a comparison of nearly coincident detections from VIIRS and Aqua. The detections are binned in 2° x 2° cells and the color reflects the VIIRS scan angle; the darker the color, the greater the angle.

The first number (N/x/x) is the VIIRS detections; the second (x/N/x) is the number of VIIRS pixels with a coincident MODIS fire detection; and the third number (x/x/N) is the MODIS-Aqua detections.

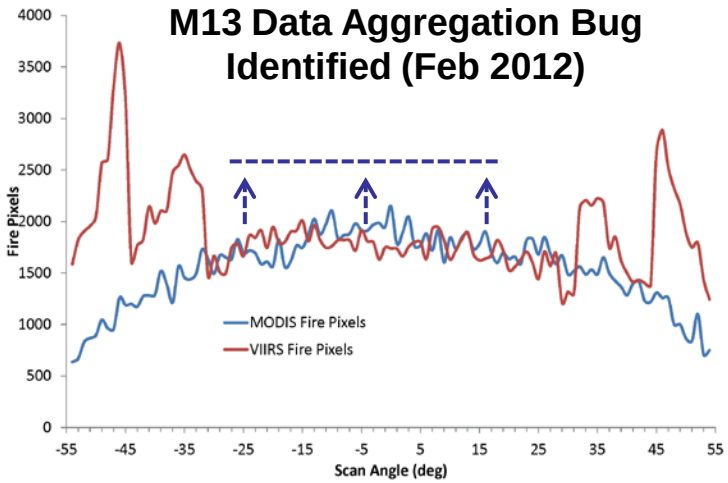


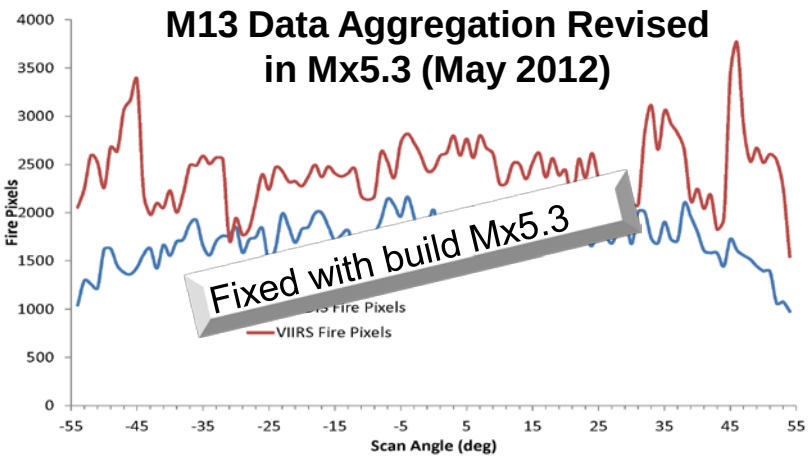
In this example, MODIS "saw" more fires because; a) better viewing geometry for this particular overpass and; b) an bug in the VIIRS pixel aggregation code had not yet been fixed which lead to a reduction in the number of thermal anomalies being correctly identified as fire in the algorithm (see slide 7).



Note scale change to accommodate viewing the entire fire area. The VIIRS detections on the previous day provided a strong prediction of where the fire would grow.

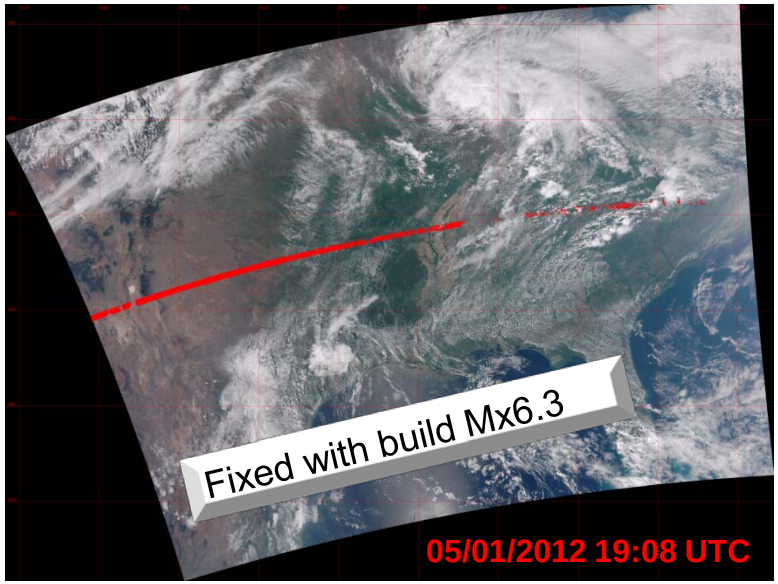
4. Results

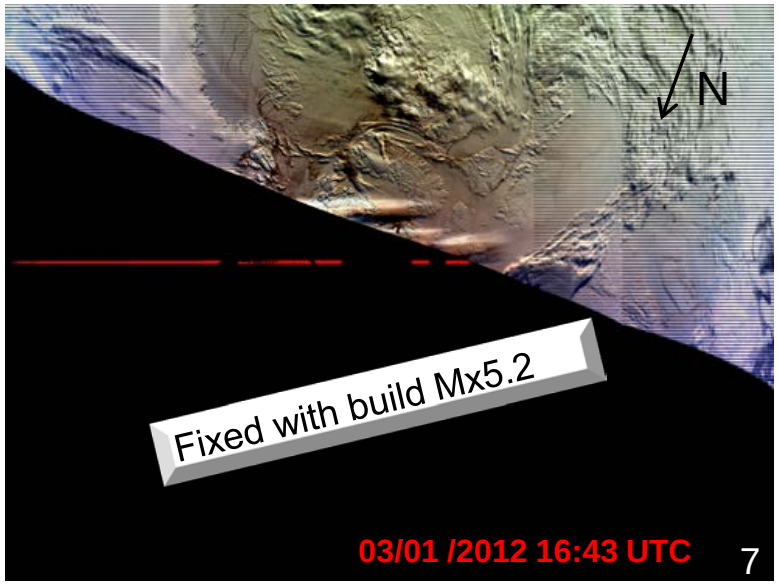




VIIRSxMYD14 Fire Detection Frequency (**19 Jan <> 13 Feb**)

VIIRSxMYD14 Fire Detection Frequency (**11 May <> 10 Jun**)





AF product goes Beta

NOAA HOME WEATHER OCEANS FISHERIES CHARTING SATELLITES CLIMATE RESEARCH COASTS CAREERS NOAA

VIIRS ARP Release, Beta Data Quality
Last Updated: 10/22/2012
Read-me for Data Users

ETADATA
»GO

The Joint Polar Satellite System (JPSS) Algorithm Engineering Review Board approved the release of the Visible Infrared Imager Radiometer Suite (VIIRS) Active Fires Application Related Product (ARP) to the **public with a Beta level quality as of 03 May 2012**. Beta quality is defined as:

- Early release product
- Initial calibration applied
- Minimally validated and may still contain significant errors (additional changes are expected)
- Available to allow users to gain familiarity with data formats and parameters
- Product is not appropriate as the basis for quantitative scientific publications, studies and applications

Tutorial for ordering Suomi NPP data in CLASS:
A tutorial for ordering data through CLASS can be found at Data Access. The tutorial references Suomi NPP data but is applicable to all data types. If you have any questions please email CLASS Help Desk.

5. Possible Path to Operations

- As part of a user readiness and proving ground activity, the team has also developed a web-based data visualization, analysis, and distribution system, which provides near-real-time data and a rolling archive of all VIIRS fire observations over North America.
- VIIRS AF continues to be tested and improvements made to reduce errors and increase continuity with predecessor sensors (i.e. MODIS).
- Partners, such as the USFS Remote Sensing Applications Center (RSAC) are also providing Direct Broadcast VIIRS AF data to users while also testing the new VIIRS AF algorithm (based on MODIS Collection 6) for implementation in the near future.

6. Future Plans

- Work with end-users to evaluate VIIRS AF product in operational scenarios. For example, engage IMETs on how to obtain and visualize VIIRS AF data, product characteristics, and VIIRS x MODIS comparisons.
- Continue detailed *a posteriori* analysis of select fires in the 2012 fire season, which was particularly active over the Conterminous United States.
- The system is currently being augmented to distribute data from a science code that includes the latest MODIS algorithm components, a full spatially explicit fire mask, and Fire Radiative Power.
- Science support and coordination is also being provided to the domestic and international direct readout user community, which is incorporating VIIRS fire data into near-real-time applications.

7. Publication List

Presentations:

- Csiszar, I., E. Ellicott, W. Schroeder, L. Giglio, C.O. Justice, B. Wind, K. Vadrevu, P. Roohr, and B. Quayle, “Fire monitoring from the Suomi NPP Visible Infrared Imager Radiometer Suite” Town Hall Meeting Presentation, 2013 Annual Meeting of the American Meteorological Society, Austin, TX, January 6-10, 2013.
- Csiszar, I., E. Ellicott, W. Schroeder, L. Giglio, C.O. Justice, B. Wind, K. Vadrevu, P. Roohr, and B. Quayle, “Observations of major 2012 fire events in the United States from Suomi NPP: product evaluation and user readiness”, 2013 Annual Meeting of the American Meteorological Society, Austin, TX, January 6-10, 2013.
- W. Schroeder, I. Csiszar, L. Giglio, E. Ellicott, and C. Justice; Fall Meeting of the American Geophysical Union, San Francisco, CA, December 7th, 2012, “Assessment of polar orbiting and geostationary satellite active fire retrievals using a suite of ground, airborne and spaceborne reference data sets”.
- E. Ellicott, I. Csiszar, W. Schroeder, L. Giglio, B. Wind, and C. Justice; Tactical Fire Remote Sensing Advisory Committee (TFRSAC) Fall Meeting, NIFC Boise, ID, November 8th, 2012, “VIIRS active fire product: Current status and developments”.
- Csiszar, I., L. Giglio, W. Schroeder, E. Ellicott, and C.O. Justice, “The Suomi NPP VIIRS Active Fire Product Status and Early Evaluation Results”. 2012 International Geoscience and Remote Sensing Symposium (IGARSS), Munich, Germany, July 22-27, 2012.