

# The MODIS Rapid Response Project

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# Background

- The complexity of the ECS production and distribution system does not always permit **rapid access** to MODIS data – System contingencies may significantly delay data availability
- The most optimistic data turnaround is acceptable for some but not all applications: Level-1B data not available earlier than 24-48hrs, Level-2 available a few days later, Level-3 composite products 8/16 days later
- Rapid data access is most critical at least in two areas: **active fire detection** and **PR imagery**
- Manual workarounds have been developed in 2000 to provide rapid PR imagery to the Earth Observatory in response to specific events
- Expedited active fire information derived from MODIS was handcrafted and provided to the Forest Service to document fires in Montana/Idaho during summer 2000

# Approach

- To develop a **rapid** and **flexible** processing and distribution **user-driven** system as an alternative to the ECS system
- To provide **enhanced PR and outreach** for some of the unique capabilities of MODIS
- To generate value-added science-quality products to **augment the MODIS standard products** – Initial emphasis on combined Active Fire Detection / Corrected Reflectance product
- To **reuse** existing software, hardware and expertise (e.g., ESIP-funded MODIS 250m Production System, MODIS Land Global Browse Processing System)
- Develop **applications partnerships** with other agencies (e.g., USDA Forest Service)

# System Characteristics

- MODIS Level-0 data from NOAA's NRT System (using existing "bent pipe" feed mechanism used to generate weather products)
- L0 data processed with IMAPP software (DAAC processing code modified for Direct Broadcast applications)
- Geolocation derived from spacecraft attitude and ephemeris data – No definitive attitude
- No real-time ancillary data necessary
- Processing system **fully automated** – No operator
- Corrected reflectance and active fire locations produced within **2-5hrs of data acquisition** and automatically sent to Rapid Response distribution site and to partners



# Distribution Approach

- RGB imagery with Active Fire overlay is archived and distributed to the public by the Rapid Response System at NASA/GSFC
- Near-real-time imagery: <http://rapidfire.sci.gsfc.nasa.gov/production/> (full production)
- Selected handcrafted imagery: <http://rapidfire.sci.gsfc.nasa.gov/gallery/>
- On-line archive – No ordering interface
- **Straightforward “point-and-click” web interface**
- Application-specific products distributed by partners (e.g., web fire maps by University of Maryland, cumulative fire maps by Forest Service)
- Privileged relationship developed with selected science image publishers to increase product visibility: Earth Observatory, Visible Earth, MODIS home page, Science Visualization Studio

Example of Active Fire / Corrected Reflectance Product  
Star fire in California (08/29/01)

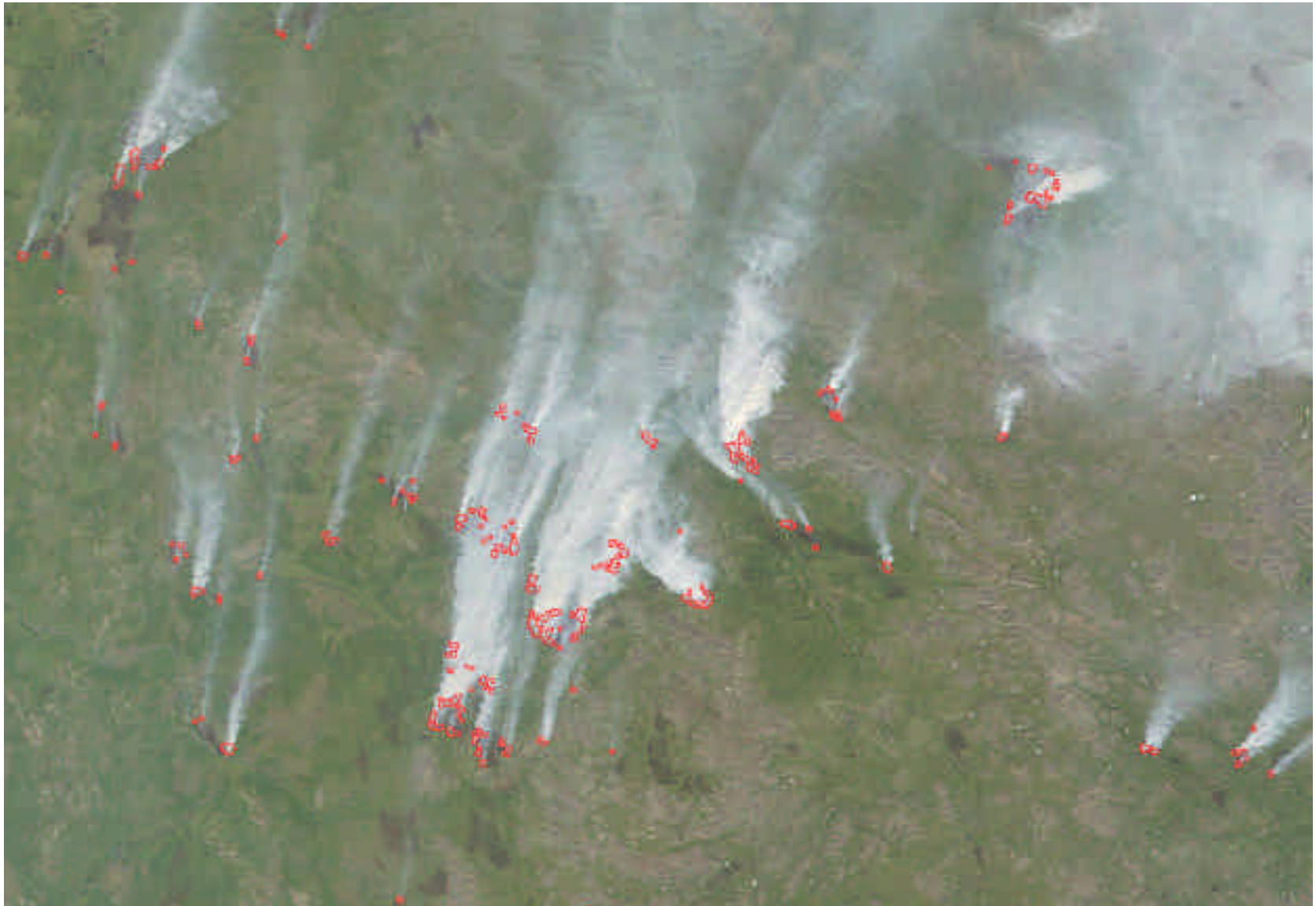


Example of Active Fire / Corrected Reflectance Product  
Rodeo fire in Arizona (06/19/02)

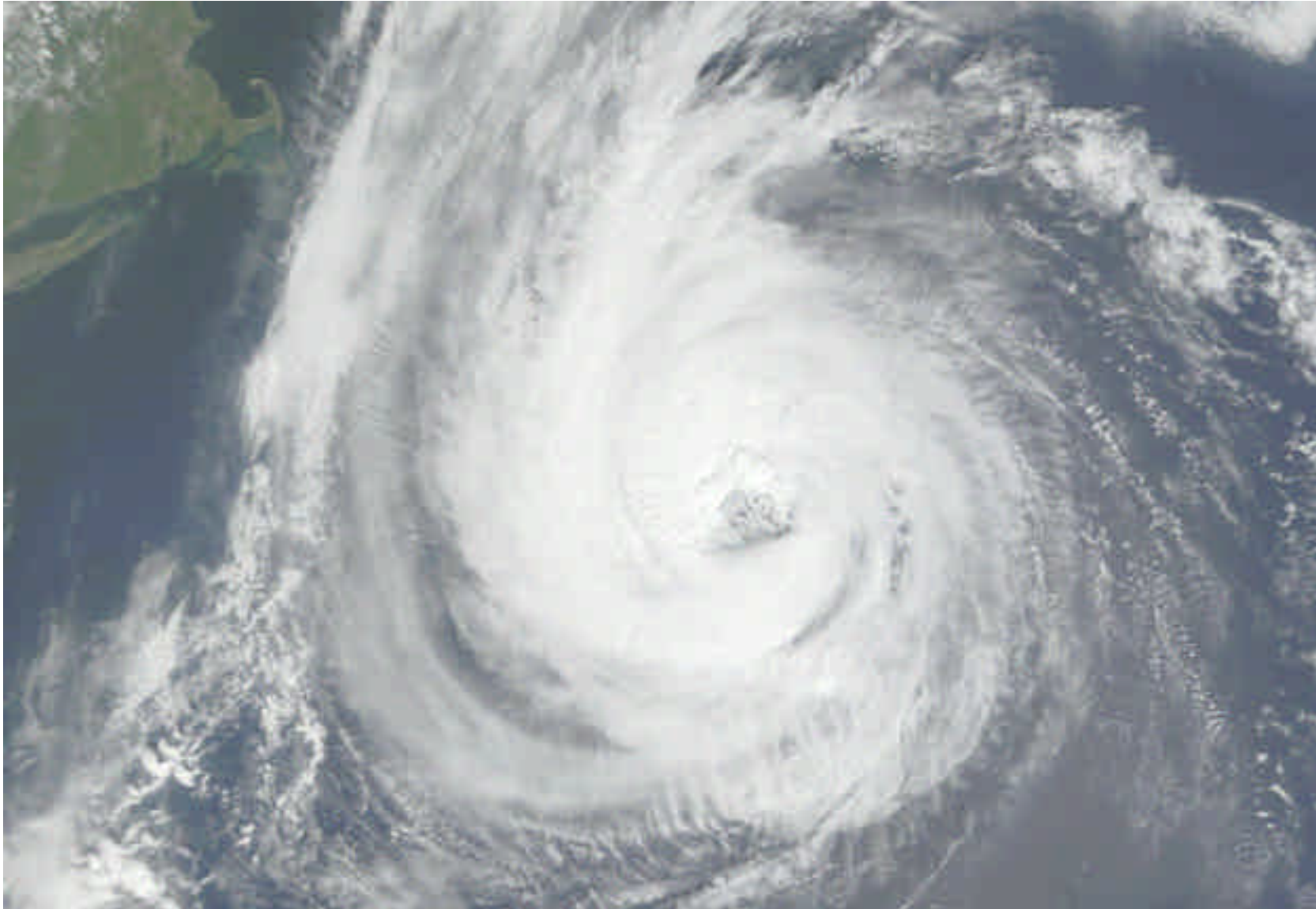




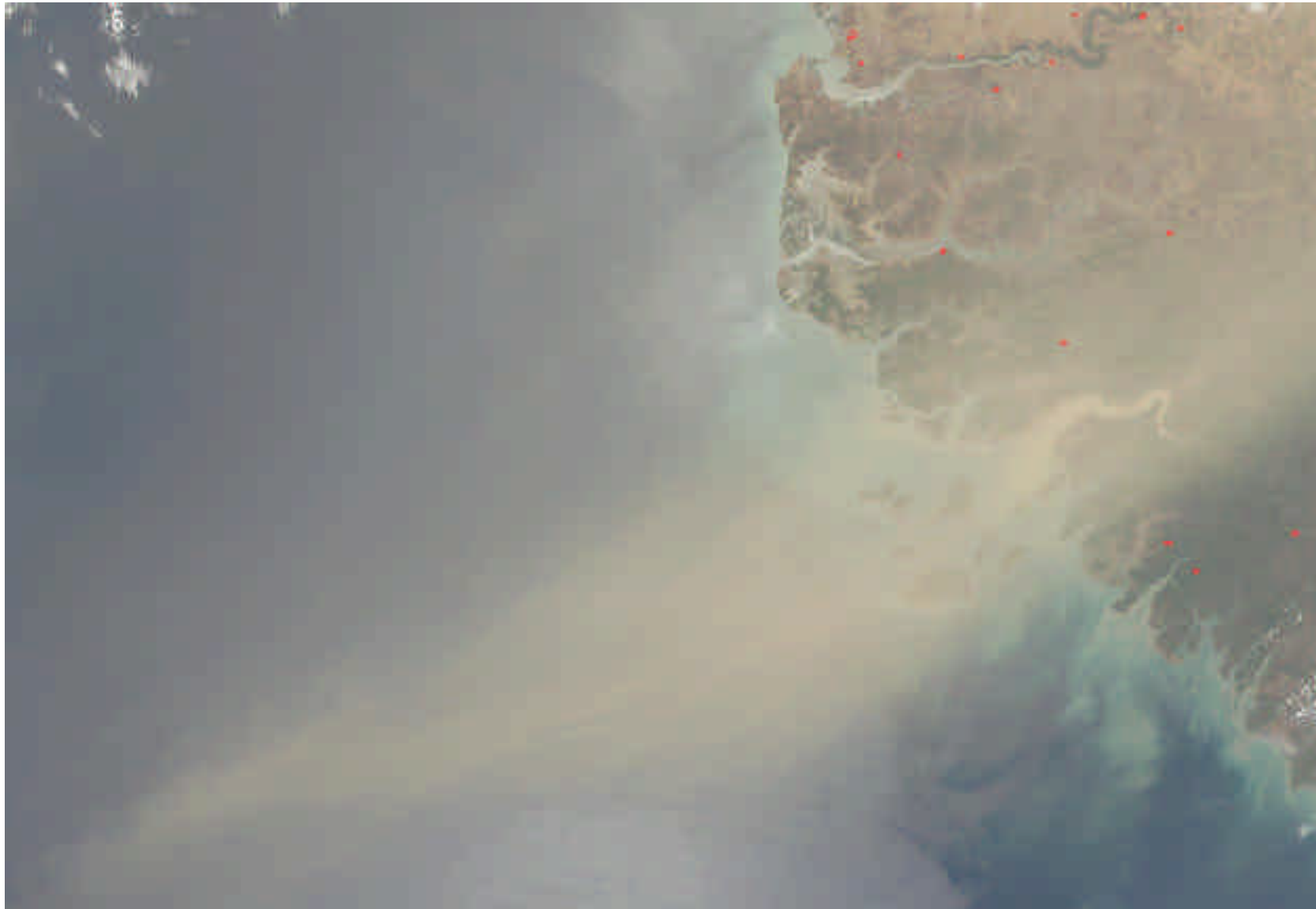
## Example of Active Fire / Corrected Reflectance Product Siberia (05/22/01)



Example of 250m Corrected Reflectance Product  
Hurricane Erin (09/11/01)



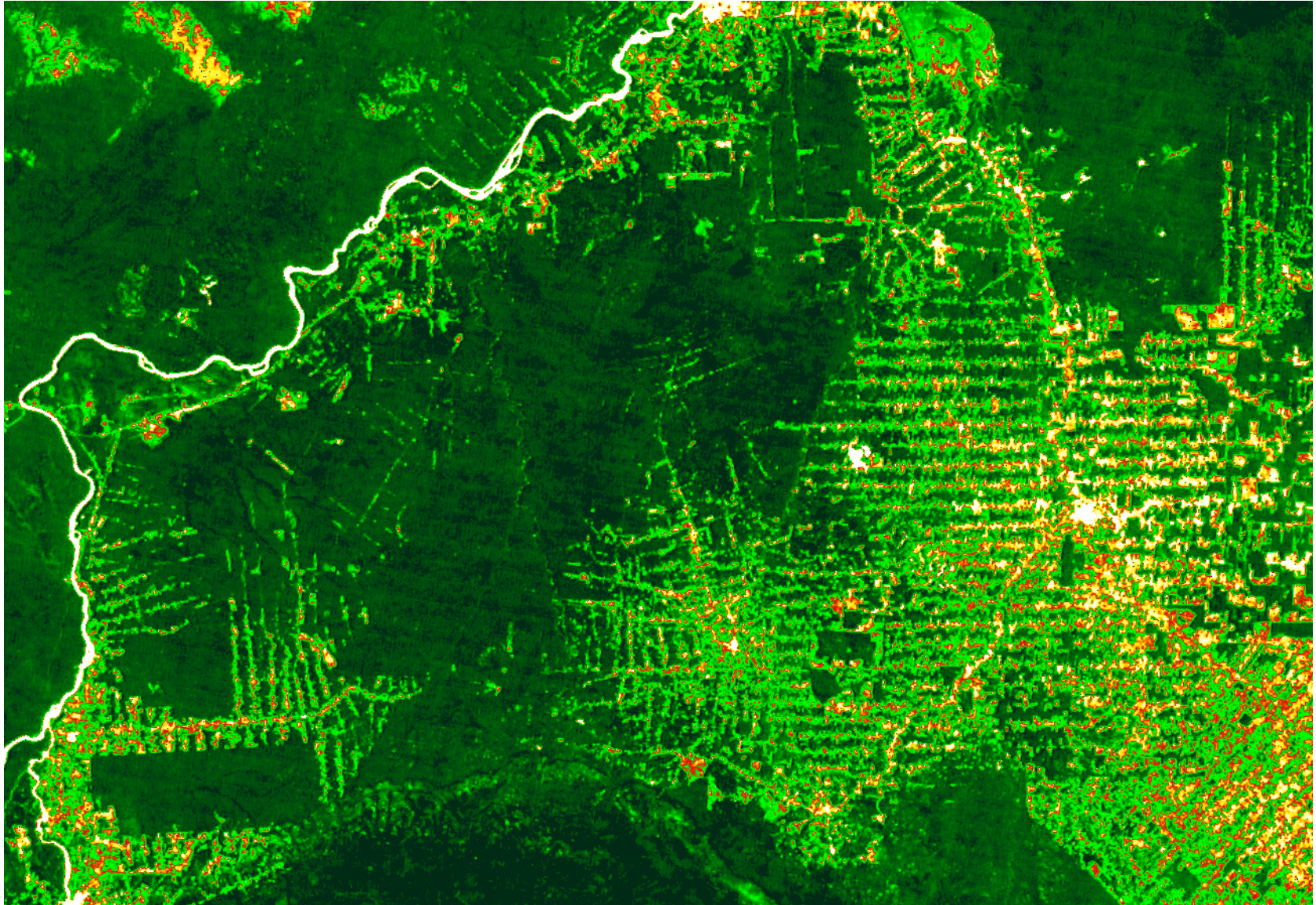
Example of Corrected Reflectance Product  
Dust Storm in Western Africa (05/08/01)



Example of 250m Corrected Reflectance Product  
Brazil/Bolivia (08/02/01)



Example of 250m Vegetation Index  
Rondonia, Brazil (08/02/01)



# MODIS Rapid Response Products used by Fire Managers

- MODIS provides a new synoptic view at high resolution and gives the “big picture” to planners for resource allocation
- Remote sensing avoids limitations of airborne platforms (heavy smoke, limited flight resources, limited geographic coverage)
- Helps focus reconnaissance resources and prepare rehabilitation work on the ground

**USFS Remote Sensing Applications Center** (Salt Lake City, Utah): Provider of geospatial and remote sensing support to USFS and related agencies

**National Interagency Fire Center** (Boise, Idaho): National coordination center for all federal and state wildfire resources

**USFS Fire Science Lab, Rocky Mountain Research Station** (Missoula, Montana): Smoke forecasting and fire behavior research


**Burned Area Emergency Rehabilitation Teams**: Federal inter-agency program to mitigate impacts on water quality and ecology



National Fire Maps - Netscape

File Edit View Go Communicator Help


Bookmarks Location: <http://www.nifc.gov/firemaps.html> What's Related




Home | [FAQs](#) | [Site Map](#)

# National Fire Maps


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 [Large Fire Locations](#) from the National Interagency Coordination Center at NIFC.


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 [GeoMac](#): A multi-agency effort to bring together on-line, real-time information about wildland fires.


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 [RSAC Fire Maps](#): These maps were compiled at the USDA Forest Service Remote Sensing Applications Center in cooperation with NASA Goddard Space Flight Center, the University of Maryland and the National Interagency Fire Center. The fire locations are mapped using imagery collected by the [Moderate Resolution Imaging Spectroradiometer](#).


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 [Wildland Fire Potential Assessment Map](#), July 19 - August 16, 2001: A map describing the wildland fire potential for areas throughout the country.

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 [U.S. Drought Monitor](#): National Drought Mitigation Center

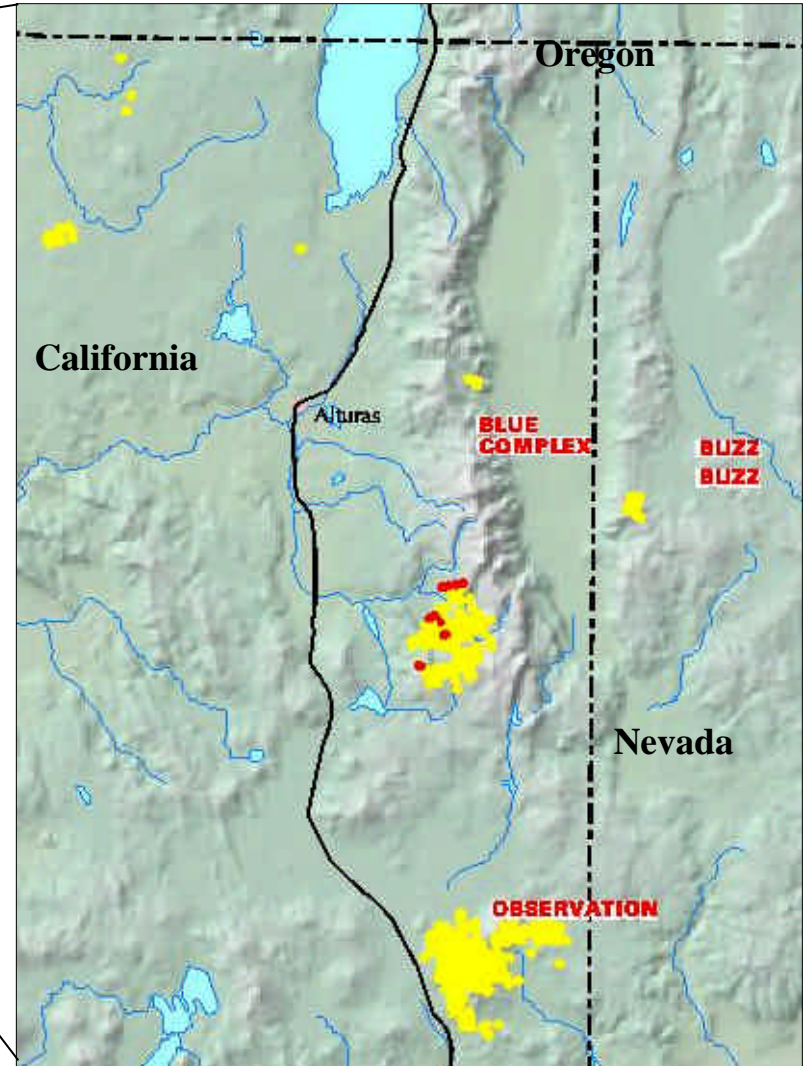
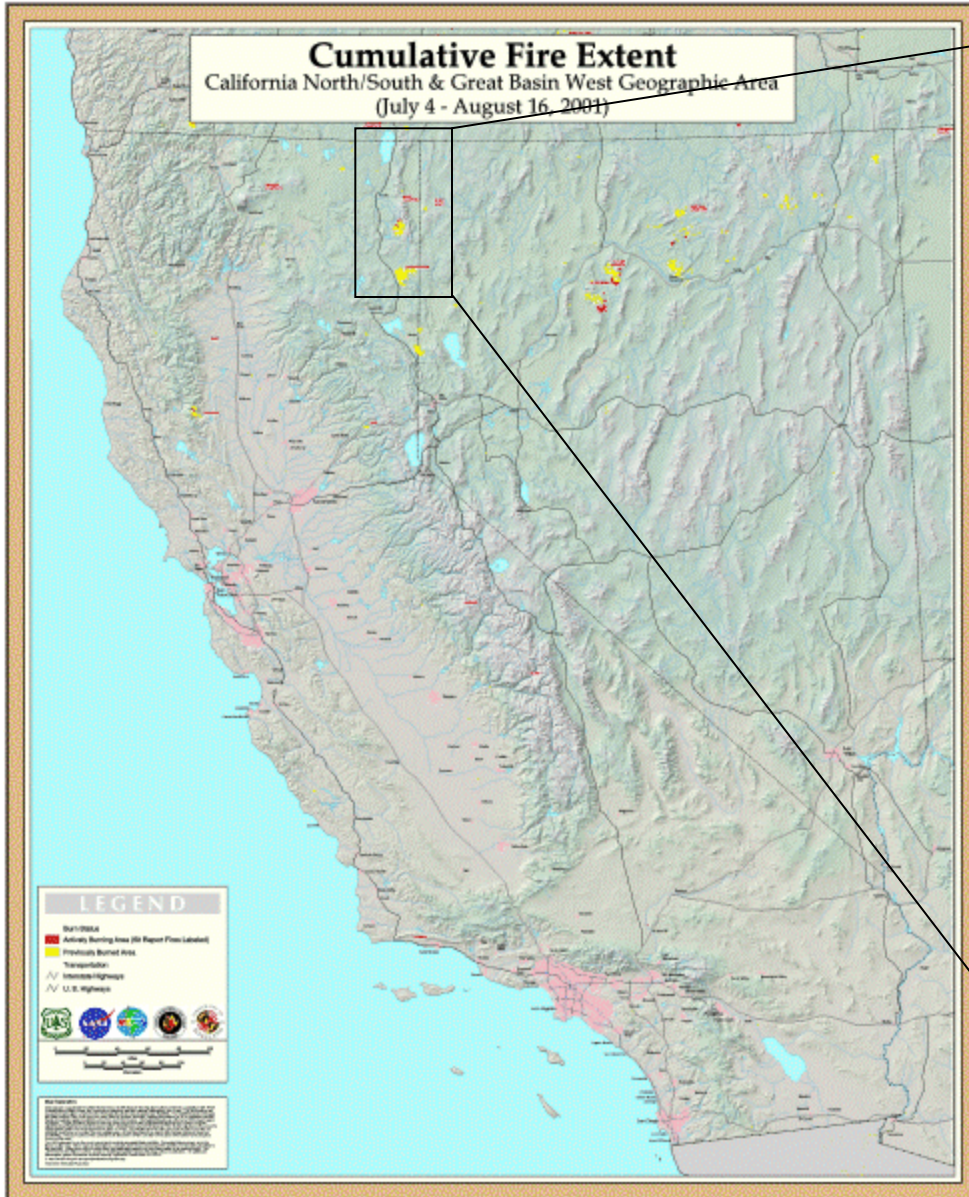
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 [Fire Events](#): National Oceanic and Atmospheric Administration (NOAA) Fire Maps

Document: Done

# Blue Complex Fire

16 August 2001



Active Fire in RED Previously Burned in YELLOW



# MODIS Rapid Response System and Direct Broadcast Applications

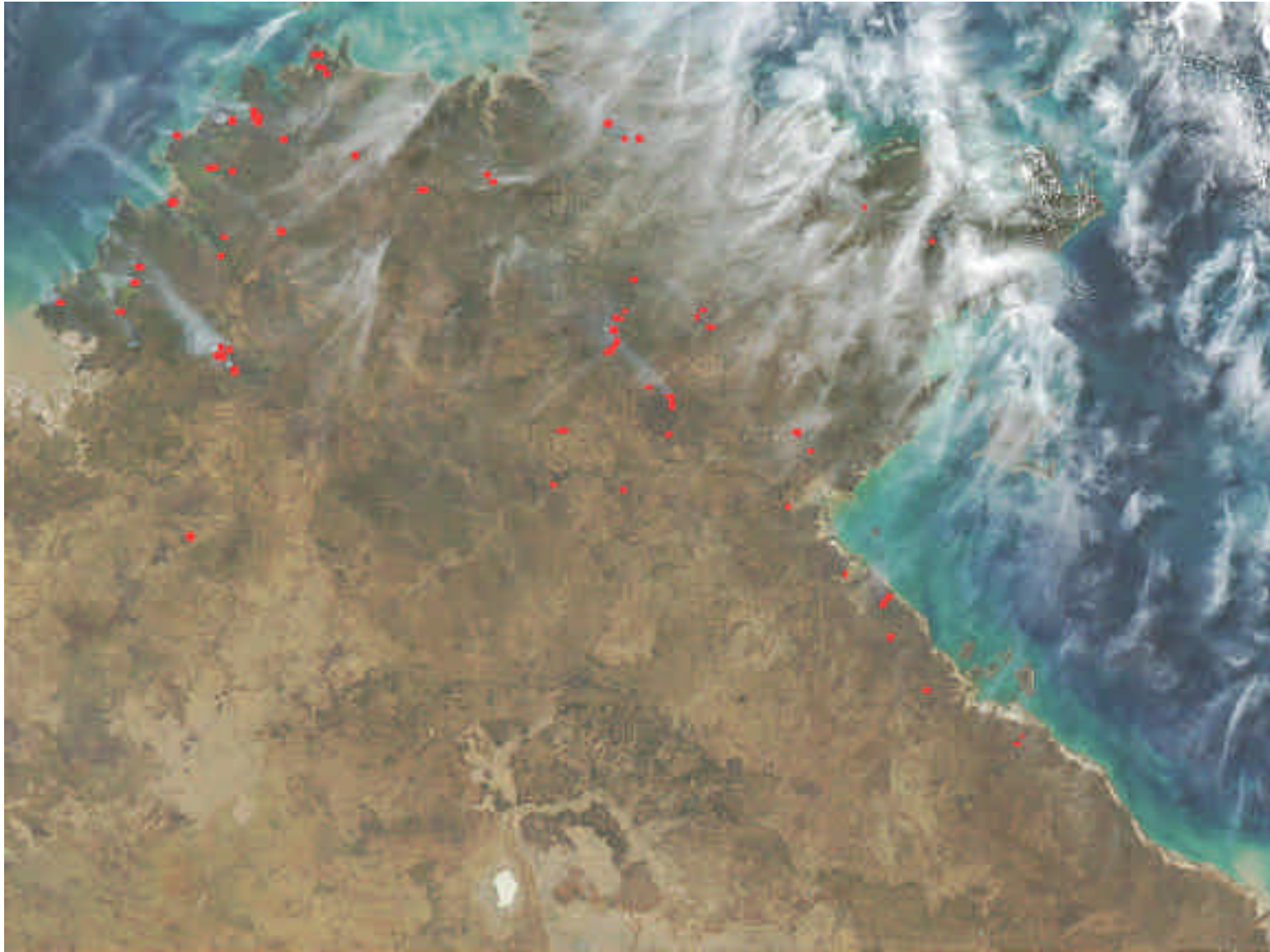
- Science products developed to support both DAAC Level-1 data and Direct Broadcast Level-1 data
- Rapid Response processing progressively transitioned to Direct Broadcast
- First field implementation prototyped in December 2001 with USDA Forest Service
- Standard Rapid Response products generated within minutes of acquisition
- Code sharing approach: ongoing effort to make Rapid Response processing available to Direct Broadcast users through Direct Readout Lab at NASA/GSFC
- Active fire detection code distributed in April 2002

# Recent Progress

- Implemented new band combinations to enhance snow/ice, floods, burn scars
- Substantial improvement of input feed from NOAA NRT System since June 2002 (less than 1% data loss)
- Implemented version 4 of active fire detection algorithm
- Implemented a Rapid Response Vegetation Index product
- Developed new partnership with USDA Foreign Agricultural Service (crop monitoring, food security applications)
- Corrected Reflectance and Vegetation Index products available to Direct Broadcast users in July 2002
- Clustered production system (multi-processor, multi-machine)
- Started transition to NOAA – Waiting for support
- Streamlined image generation process – Increased feed to Earth Observatory (new Natural Hazard section), MODIS home page, Visible Earth, PAO
- Increased PR: 1100+ images sent to Visible Earth database
- Growing popularity: 5675 different visitors and 75000 images downloaded from Rapid Response site in June 2002
- Aqua: first light images processed in Rapid Response System – Still some geolocation issues to solve

# Aqua First Light

## Northern Australia (06/25/02)



# Aqua First Light

Shark Bay, Australia (06/25/02)



**For more information**

**<http://rapidfire.sci.gsfc.nasa.gov>**

**<http://rapidresponse.umd.edu>**