

MODIS Land 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 1 week 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 2001

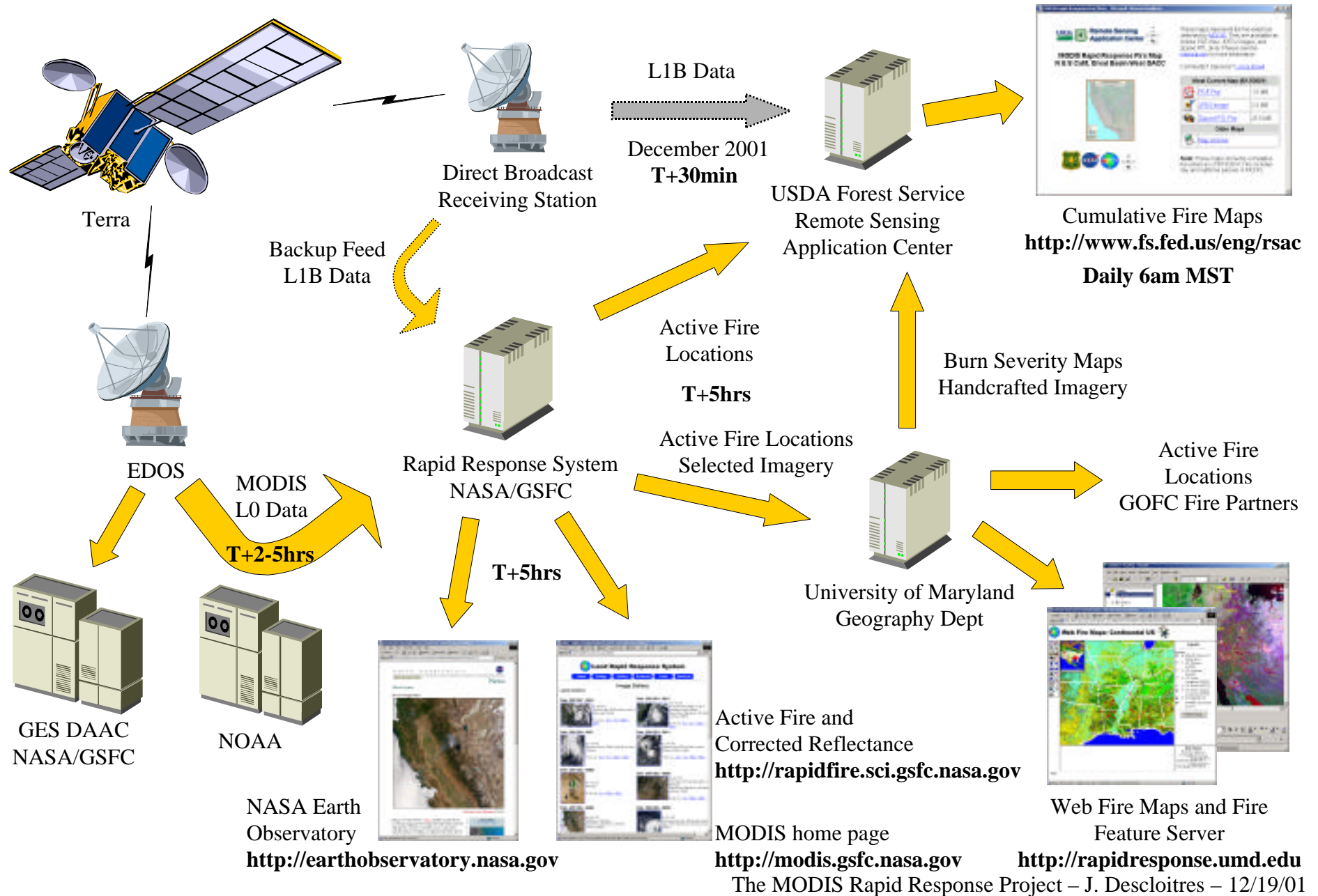
Approach

- To develop a **rapid, flexible, and streamlined** processing and distribution user-driven system with **global coverage** to meet users needs with respect to **rapid access** to MODIS data
- 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)
- To **develop applications partnerships with other agencies** to utilize the data and gain recognition and support for EOS (e.g., U.S.D.A. Forest Service)

Design

- Processing developed at NASA/GSFC using **MODIS Level-0 data from NOAA** (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 data** – No FDS definitive attitude
- **No real-time ancillary data necessary**
- Processing system **100% 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

MODIS Rapid Response Project: Design



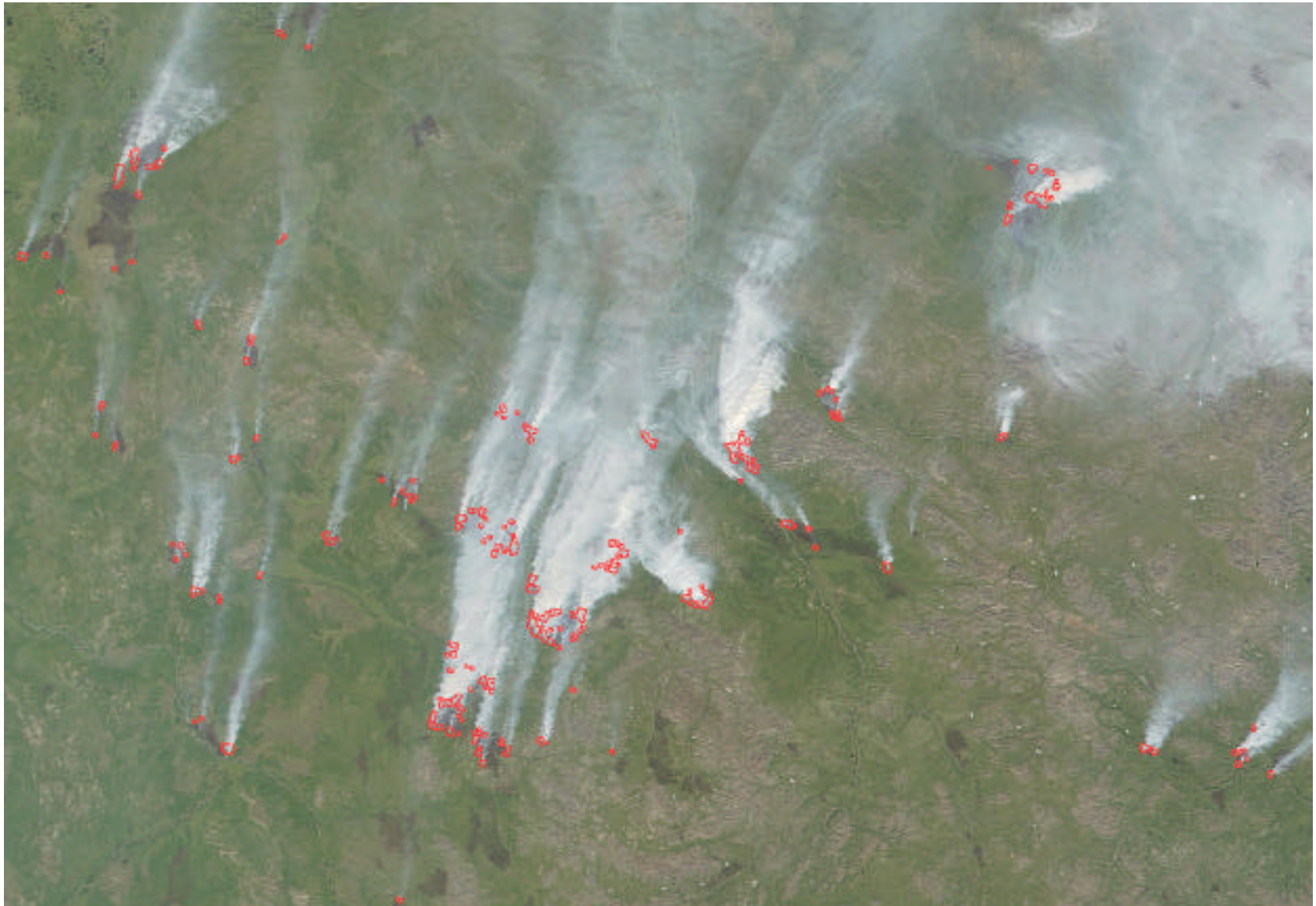
Distribution Approach

- 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 Siberia (05/22/01)



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



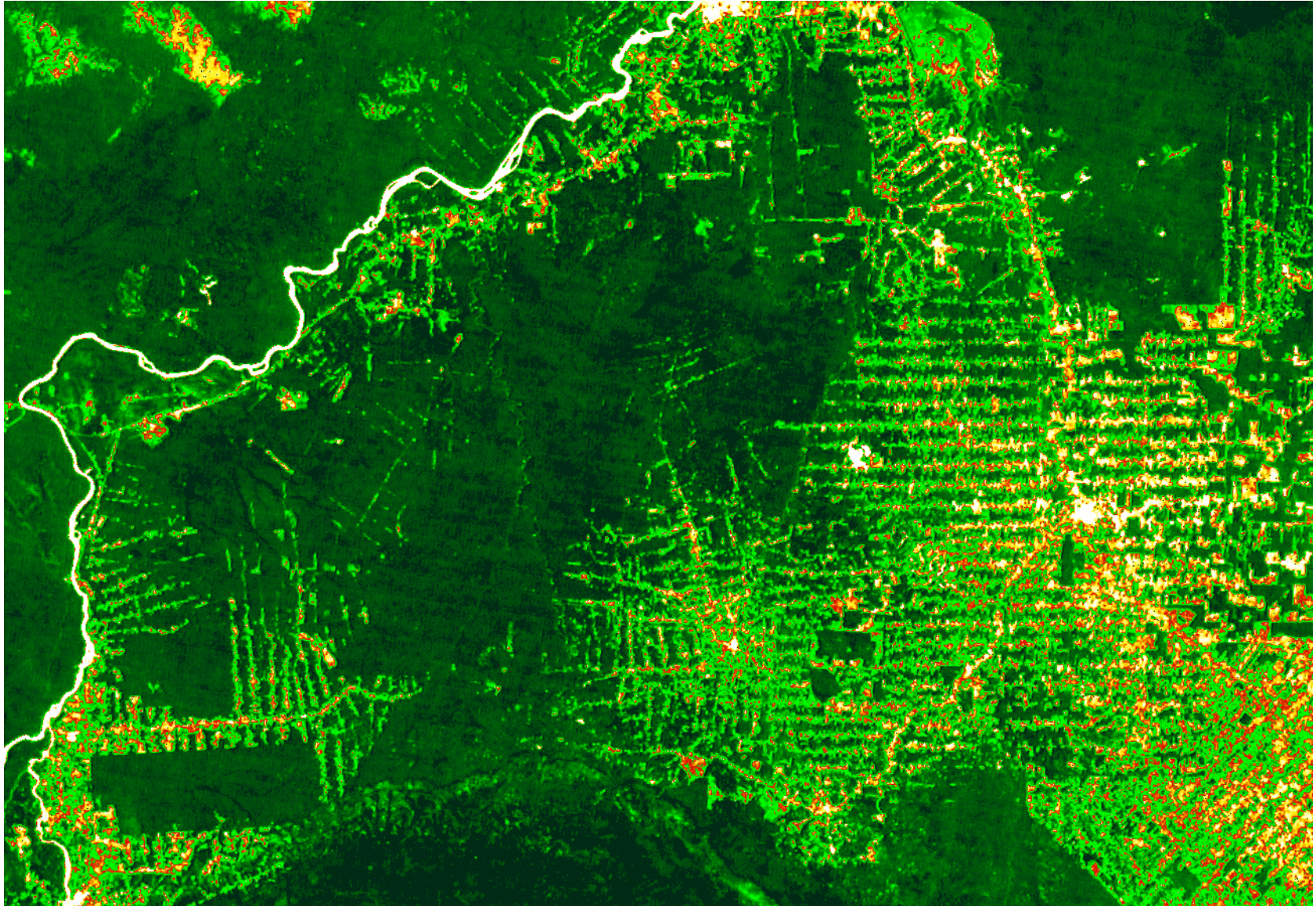
Example of Corrected Reflectance Product
Dust Storm in Western Africa (05/08/01)



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



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



Example of 250m Corrected Reflectance Product
Lake Michigan (09/11/01)



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


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





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


National Fire Maps

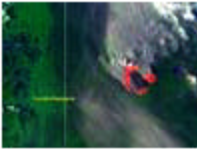
 [Large Fire Locations](#) from the National Interagency Coordination Center at NIFC.

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

 [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](#).

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

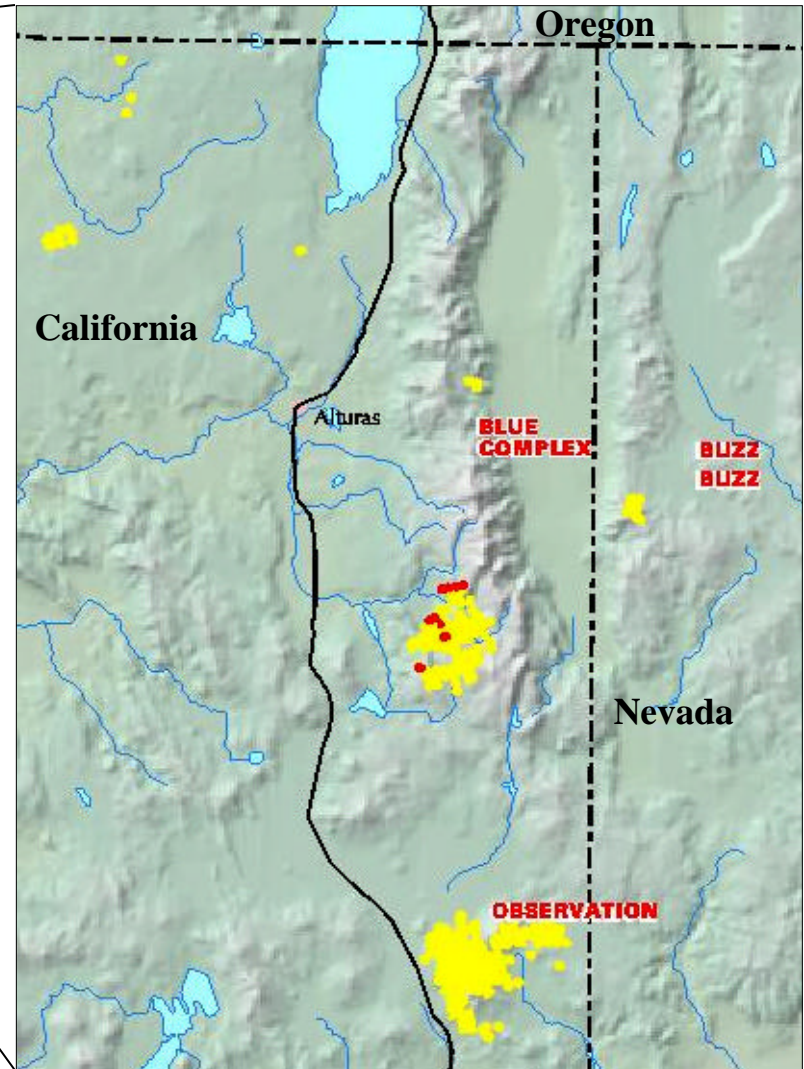
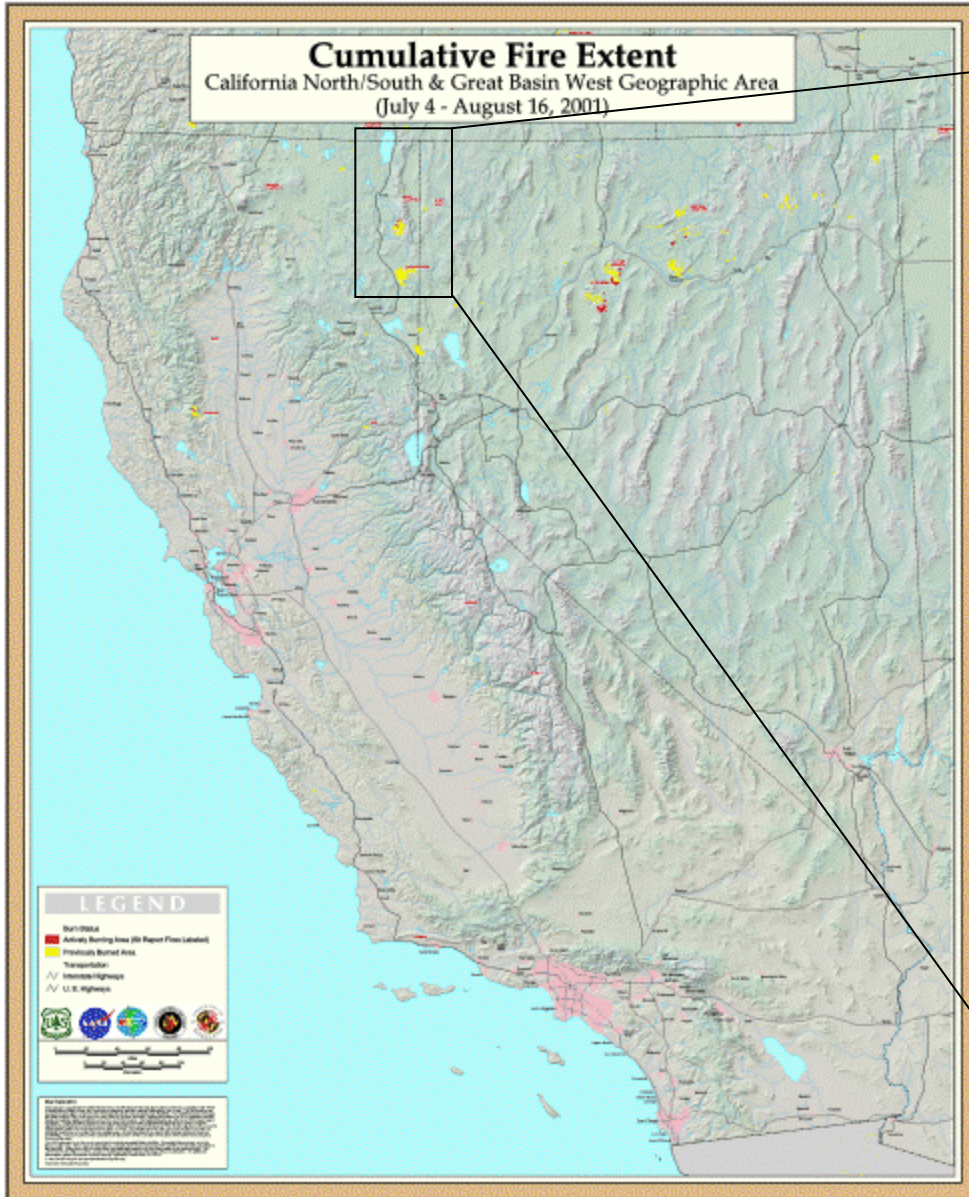
 [U.S. Drought Monitor](#): National Drought Mitigation Center

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

Document: Done

Blue Complex Fire

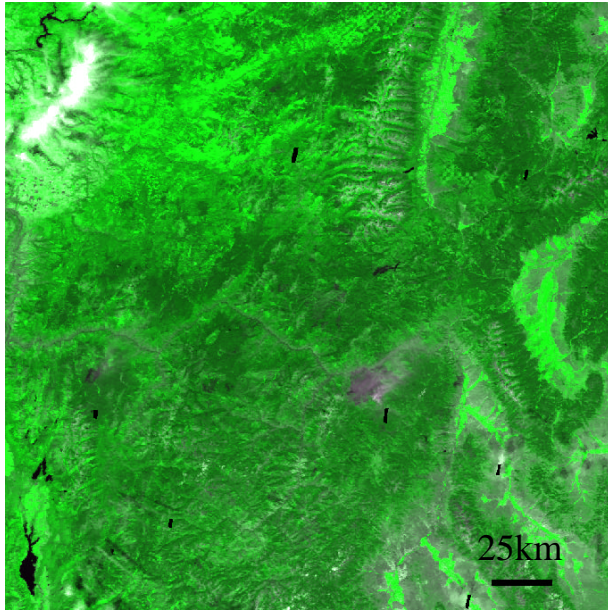
16 August 2001



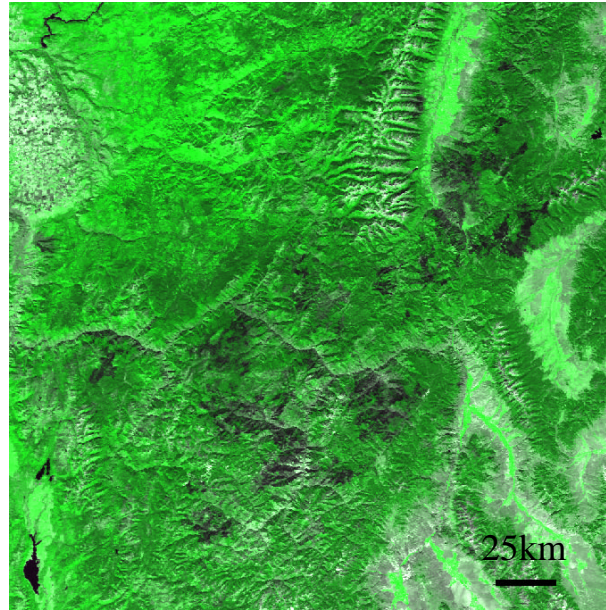
Active Fire in RED **Previously Burned in YELLOW**

Idaho/Montana 2000 Wildfire

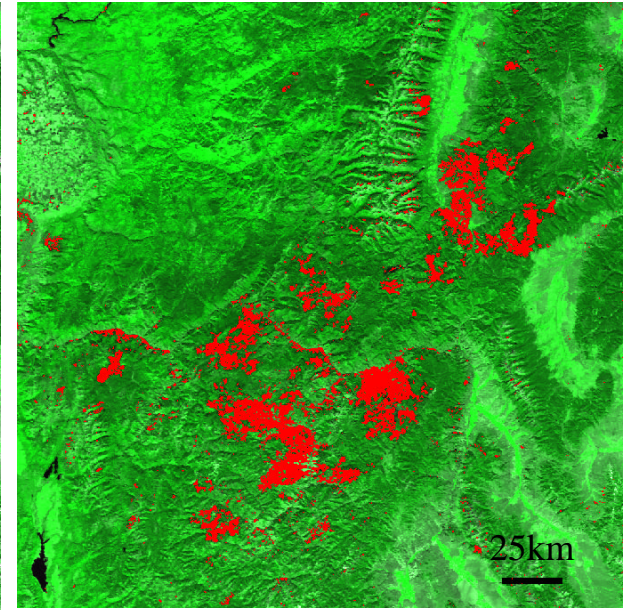
Vegetative Cover Conversion Alarm Result in Red



July 24th



September 26th



VCC

VCC identified the land cover change resulting from the Wilderness Complex, Valley Complex, Diamond Creek, and Clear Creek wildfires.

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
- Preliminary test and packaging work initiated in August 2001 with Direct Readout Lab at NASA/GSFC
- 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
- Effort to standardize existing Direct Broadcast Level-1 processing softwares

Accomplishments

- Developed a system to provide quality imagery and active fire information from MODIS within hours of acquisition
- Demonstrated feasibility of science data system rapid prototyping – a few months to “operational” status
- Demonstrated new, easy access approaches for EOS data distribution
- Filled a large gap in existing data system capabilities with a flexible, responsive system
- Made available new NASA data to disaster management users and the public
- 400+ images ingested into Visible Earth database
- Developed active collaboration with new MODIS data users in other federal agencies (USFS/NIFC)
- Major contribution to international GOFC fire

Future Development

- Finalize software transition to Direct Broadcast
- Streamline image generation process for rapid publication (press)
- Consider expanding geographic coverage (oceans)
- Investigate feasibility of new rapid products: vegetation index, burn severity, smoke index, fire risk, flood monitoring
- Developing new partnerships (e.g., crop forecasting and food security application with U.S.D.A. Foreign Agricultural Service)
- Explore transition to operational agency (NOAA/NESDIS)
- Explore collaboration with U.S. Air Force

Positive Media Coverage for All Partners



The New York Times



UNITED PRESS INTERNATIONAL



THE SUN



Federal Computer Week

Communications Daily

Satellite Week



Plus 40 stations which ran the NASA-TV video file

For more information

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

<http://rapidresponse.umd.edu>