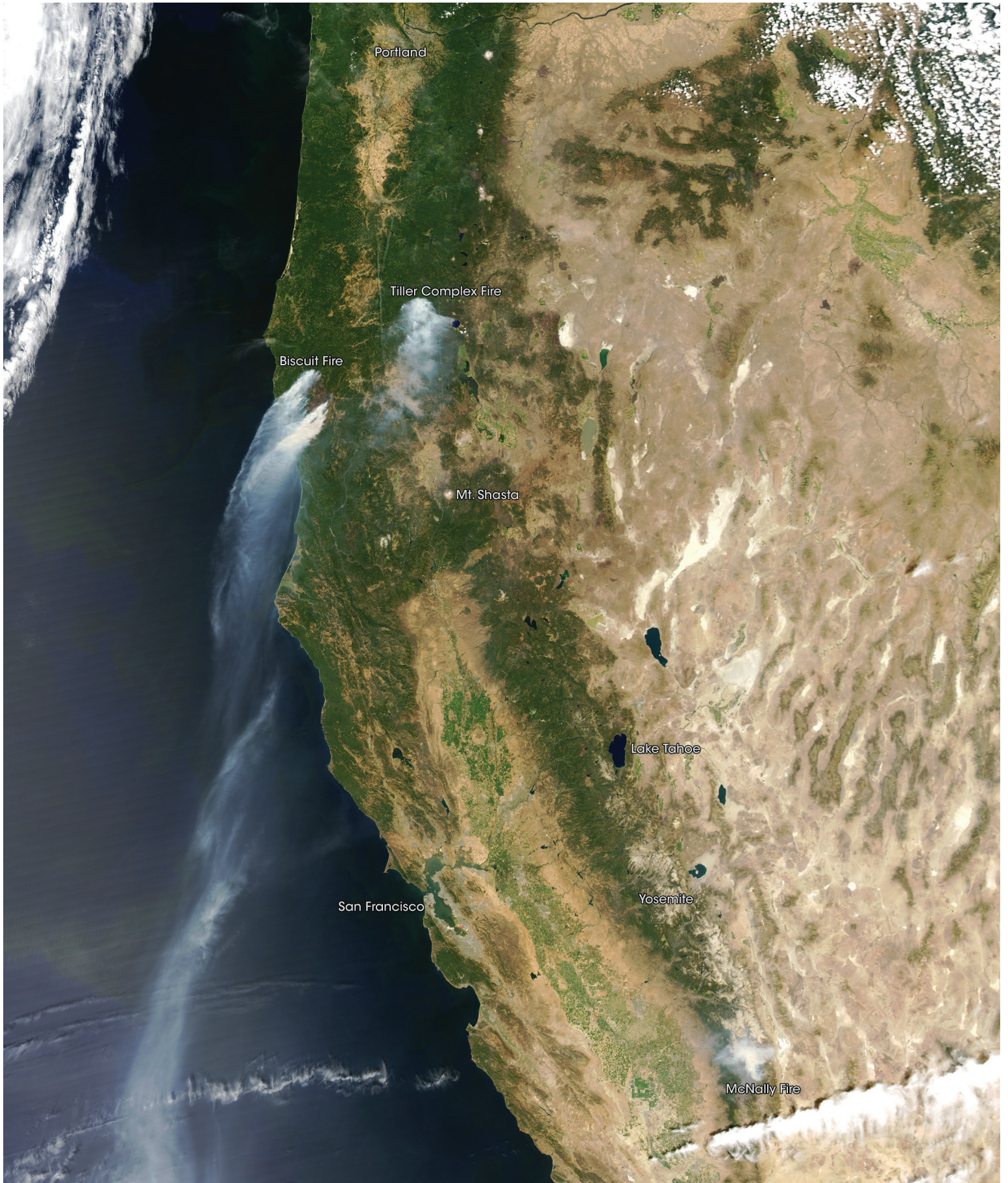


National Aeronautics and
Space Administration

Goddard Space Flight Center

MODIS Rapid Response Project





About this Image

In mid-July 2002, lightning started a fire in the Klamath Mountains in southwestern Oregon that eventually burned over the state line into California and consumed more than 400,000 acres by late August. The Biscuit fire became one of the largest in the state's history, threatening not only human life and property, but also three nationally designated wild and scenic rivers and habitat for several species of plants and animals already at risk of extinction. Firefighters also had their hands full with other fires across the state, including the Tiller Complex Fire to the northeast.

Meanwhile, in southern California, a large human-caused fire was threatening some of the ancient groves of trees in the Sequoia National Forest. More than 150,000 acres were burned in the McNally Fire before the blaze was brought under control, including about 17,000 acres in the Giant Sequoia National Monument, where groves of Giant Sequoia mix with other forest types. Thanks to the efforts of firefighters, none of the giant trees was lost.

This Moderate Resolution Imaging Spectroradiometer (MODIS) image from the Terra satellite captured on August 8, 2002, shows smoke from the Biscuit Fire drifting southward along the Pacific Coast, while smoke from the McNally Fire lingers above the southern Sierra Nevada Mountains at the southeast end of California's San Joaquin Valley.

MODIS Rapid Response Project

Natural hazards such as fires, floods, and hurricanes affect increasing numbers of people as human populations expand and development of hazard-prone areas increases; climate change may increase natural hazards as well. Regular Earth observation using satellites is a powerful way to monitor natural events that have the potential to become hazardous.

The Moderate Resolution Imaging Spectroradiometer (MODIS) instruments onboard NASA's Terra and Aqua satellites offer an unprecedented combination of near-global daily coverage, spatial detail, and technological capabilities that allow them to detect a broad spectrum of electromagnetic energy—from visible light to thermal radiation—reflected or emitted from the Earth. These capabilities make MODIS ideal for observing a variety of rapidly changing events: fires, floods, smoke transport, dust storms, hurricanes and cyclones, iceberg calving, and volcanic eruptions.

Using a double-sided, continuously rotating scan mirror, MODIS can observe almost half the United States in a single pass of the satellite and nearly the entire surface of the Earth every day. In addition to many scientific uses, MODIS produces stunning, natural-color imagery, and daily, global-scale fire detection. Thousands of fires burn daily across the world—transforming the landscape, releasing soot and gases into the atmosphere, and threatening life and property. Fire monitoring is important on a global and local scale, both scientifically and operationally.

MODIS' fire-detection capability drew the attention of the U.S. Department of Agriculture (USDA) Forest Service in the summer of 2000, as the western U.S. experienced one of the worst fire seasons in a century. With scores of wildfires spread across hundreds of thousands of square miles in Montana and Idaho alone, fire management teams needed a big picture perspective of active fires for resource allocation and strategic decision making. In response to their needs, a new data processing system was developed at NASA's Goddard Space Flight Center to provide fire information derived from MODIS to federal fire managers.

The MODIS Rapid Response Project was developed through collaboration between NASA, the National Oceanic and Atmospheric Administration

(NOAA), the University of Maryland, and the USDA Forest Service. The project is a rapid prototype, research and development contribution to NASA's Applications Program, whose aim is to provide data and information in support of decision making.

MODIS observations are received via geostationary satellite transmission at a ground station in White Sands, Mexico, and are transmitted to NASA's Goddard Space Flight Center (GSFC). The Rapid Response System at GSFC processes the data and displays images and fire detections on the Web in near-real time—within 2 to 4 hours of when MODIS collects the observations. Coordinates of all fire detections in the United States, including Alaska and Hawaii, are relayed within seconds of processing to the USDA Forest Service's Remote Sensing Applications Center in Utah, which makes poster-sized maps twice a day for the nation's regional fire briefings. Fire detections are available to the U.S. fire community via the Web.

Active fire locations are also distributed to the Global Observation of Forest and Land Cover Dynamics (GOF-C-GOLD) user community through a Web interface that integrates MODIS active fire locations with Geographic Information System (GIS) data sets, in which geographic features like roads, rivers, and topography exist as separate map "layers." Users can create customized maps of regions of interest by selecting their own combination of GIS layers. Through GOF-C-GOLD, MODIS fire detections are being used by fire monitoring and management agencies throughout the world. In Australia, the Rapid Response Project served as a model for a national fire monitoring project launched in November 2002.

From its original true-color imagery and fire detection products, the MODIS Rapid Response System has expanded to include near-real time production of false-color imagery useful for mapping burn scars, detecting floods, monitoring vegetation, and separating snow and ice on the ground from clouds. Rapid Response System products have been used by the national TV news media, weather forecasting agencies, the Environmental Protection Agency, National Geographic Magazine, and the U.S. Air Force Weather Agency among others.

Building on its initial success serving the fire community, the MODIS Rapid Response Project is currently increasing its contribution to decision support systems in the area of crop condition and drought monitoring in partnership with the USDA Foreign Agricultural Service. The Rapid Response System serves as an operational prototype for future satellite missions that will provide data designed for specific user communities from MODIS "follow-on" instruments—namely the Visible and Infrared Imaging Radiometer Suite (VIIRS), a moderate resolution sensor planned for the National Polar-Orbiting Operational Environmental Satellite System (NPOESS) missions, which will converge existing Air Force, NASA, and NOAA polar-orbiting (i.e., from pole to pole) meteorological satellites into an integrated national program beginning around 2008.

On the Web

MODIS Rapid Response System

-Near-real-time imagery and fire detection
<http://rapidfire.sci.gsfc.nasa.gov>

MODIS Rapid Response Project at the University of Maryland

-Searchable, global, GIS maps with fire locations
<http://rapidresponse.umd.edu>
<http://firemaps.geog.umd.edu>

Remote Sensing Applications Center

-Cumulative, poster-sized U.S. fire maps updated twice daily
http://www.fs.fed.us/eng/fsac/fire_maps.html