

MODIS Thermal Anomalies – Fires (MOD 14); MODIS Burn Scars (MOD 40)

Product Description

The MODIS Thermal Anomalies product includes fire occurrence (day/night), fire location, the logical criteria used for the fire selection, and an energy calculation for each fire. The product also includes composite 8-day-and-night fire occurrence (full resolution), composite monthly day-and-night fire occurrence (full resolution), gridded 10-km summary per fire class (daily/8-day/monthly), and a gridded 0.5° summary of fire counts per class (daily/8-day/monthly). The Level 2 product includes various fire-related parameters including the occurrence of day and nighttime thermal anomalies, flagged and grouped into different temperature classes with emitted energy from the fire. These parameters are retrieved daily at 1-km resolution. The fire product uses the special fire channel at 3.9 μm that saturates at 500 K and the high-saturation level of the 11- μm channel. During the night, the fire product will also use the 1.65- and 2.15- μm channels. The standard products will include the area burned.

Research and Applications

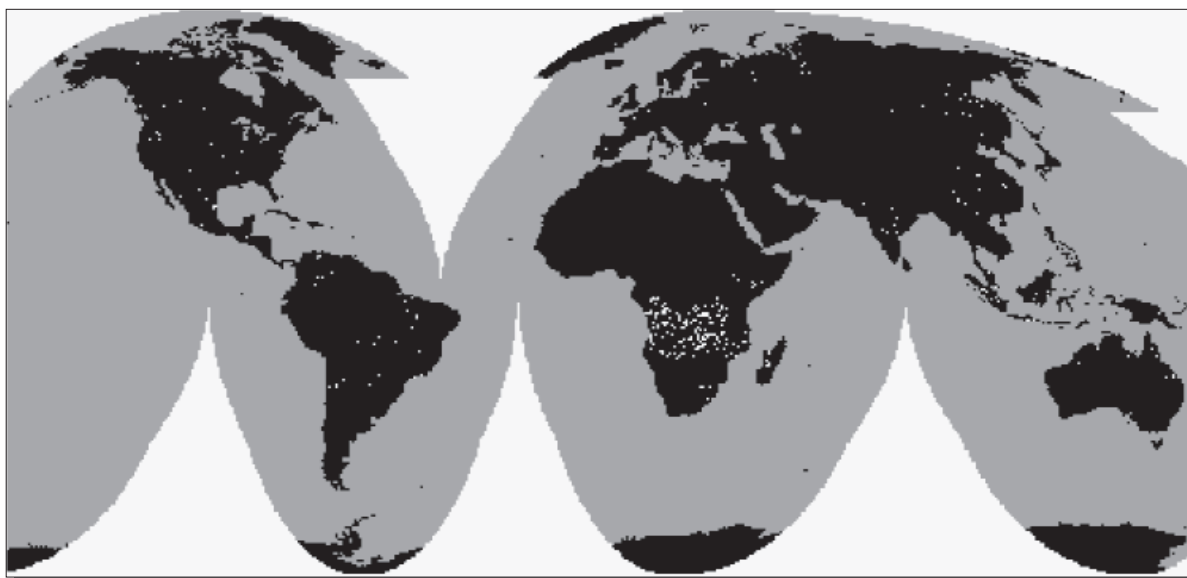
Fire is an important process within a significant number of terrestrial biomes, and the release of gases and particulate matter during biomass burning is an important contributor to the chemical reactions and

physical processes taking place in the atmosphere. Fire is a significant and continuous factor in the ecology of savannas, boreal forests, and tundra, and plays a central role in deforestation. Fire information will be used to drive regional emissions models, trace-gas transport models, and mesoscale models of atmospheric chemistry. Important impacts of fires include:

- changes of physical state of vegetation and release of greenhouse gases;
- release of chemically reactive gases during biomass burning;
- release of soot and other particulate matter during fires;
- changes in the exchange of energy and water between land surfaces and the atmosphere; and
- changes in plant community development and soil nutrient, temperature, and moisture, and cloud development and reflectivity.

Data Set Evolution

The MODIS fire products build and improve upon the experience of fire assessment primarily using the NOAA AVHRR and GOES systems. Currently, no one sensing system provides the instrument characteristics needed for an effective global fire-monitoring program. The MODIS sensor has been designed to include characteristics specifically for fire detection and will provide a unique capability over existing sensors in terms of fire monitoring. The locational accuracy and improved instrument characterization and calibration will enable unprecedented fire-moni-



NOAA/AVHRR-Detected High-Temperature Sources for June 25, 1992, derived from the IGBP-DIS global 1-km set provided by the USGS Eros Data Center.

(MODIS Thermal Anomalies, continued)

toring data sets. The combination of Terra and Aqua data will provide four observations per day, giving a good sampling of the diurnal cycle of fire activity. MODIS will also offer unique spatial and radiometric capabilities for burn-scar detection. Automatic procedures for burn-scar detection will be developed to provide a standard burn-scar product.

Suggested Reading

Andreae, M.O. *et al.*, 1994.

Justice C.O. *et al.*, 1993.

Justice C.O. *et al.*, 1998.

Kaufman, Y.J. *et al.*, 1990.

Kaufman, Y.J. *et al.*, 1998a.

Levine, J.S., 1991.

Penner, J.E. *et al.*, 1992.

MODIS Thermal Anomalies – Fires and Burn Scars Summary

Coverage: Global, daytime/nighttime

Spatial/Temporal Characteristics: 1 km, 10 km, and 0.5°/1-day (MOD 14 only), 8-day, 16-day (MOD 40 only), monthly

Key Geophysical Parameters: Fire occurrence and class, fire selection criteria, fire location, smoldering and flaming ratio, burned area

Processing Level: 2, 3 for MOD 14; 4 for MOD 40

Product Type: Standard, at-launch and post-launch

Maximum File Size: 81 MB (MOD 14), 92 MB (MOD 40)

File Frequency: 1/day (Daily, MOD 14 only), 1/8-day (8-day), 1/16-day (16-day, MOD 40 only), 1/month (Monthly)

Primary Data Format: HDF-EOS

Additional Product Information:
<http://modis-land.gsfc.nasa.gov/products/products.asp?ProdFamID=1>

DAAC: EROS Data Center

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MODIS Sea Surface Temperature (SST) (MOD 28)

Product Description

This Level 2 and 3 product provides sea surface temperature at 1-km (Level 2) and 4.6 km, 36 km, and 1° (Level 3) resolutions over the global oceans. In addition, a quality-assessment parameter is included for each pixel. The Level 2 product is produced daily and consists of global day and night coverage every 24 hours. It is used to generate the gridded Level 3 products daily, 8-day weekly, monthly, and yearly for day and night conditions. A quality parameter is provided for each data set.

Research and Applications

The global distribution and variability of sea surface temperature are key inputs to Earth energy and hydrological balance studies and long-term climate-change studies. In addition, sea surface temperature is required by a number of MODIS algorithms including those for precipitable water, lifted index, water-leaving radiance, productivity, oceanic aerosol properties, and temperature and water-vapor profiles. MODIS sea surface temperature retrievals will be incorporated into a match-up database with radiance and buoy sea surface temperature observations (see MOD 32).

Data Set Evolution

Sea surface temperature determination is based on MODIS-calibrated mid- and far-IR radiances (Bands 20, 22, 23, 31, and 32 from MOD 02), using an algorithm that exploits the differences in atmospheric transmissivity in the different IR bands to enable highly accurate estimation of the atmospheric effects, thereby enabling ancillary input to the algorithm along with a land mask, which is used to mark non-water pixels while an ice-extent mask limits polar sea coverage. A sequence of spatial and temporal homogeneity tests is applied to validate the quality of the cloud-free observations. The AIRS SST estimate will be used as a near-real-time quality assessment of skin temperature. Visible and near-IR radiances (Bands 3, 4, 5, 6) will be used as a secondary cloud flag in the event that the cloud-screening product is not available.