VOLCANO MONITORING USING MODIS

Robert Wright

Hawai‘i Institute of Geophysics and Planetology, Honolulu, HI
MODVOLC uses infrared satellite data acquired by NASA’s MODIS instrument to monitor Earth’s surface for the thermal emission signature of volcanic eruptions, wildfires, and anthropogenic heat sources (e.g., gas flares). Two MODIS sensors, one on the Terra satellite, one on the Aqua satellite, allow the entire Earth to be monitored every 48 hours. If an eruption is detected, its details are reported here, usually within 12-18 hours of the satellite passing over the volcano. You can search, plot, and download the data using the tools below. If you are unsure as to what you are looking at, this page provides links to published papers and other information that describe the data, and this website.
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MODVOLC
near-real-time satellite monitoring of global volcanism using MODIS

MODVOLC uses infrared satellite data to detect active or recent volcanic activity by identifying patterns in temperature and heat emissions. If an eruption is detected, it provides real-time updates and alerts to authorities and scientists. 

1. Which volcano are you looking for?

   - Volcano name: St. Helens
   - Lat/Long/Center: 46.200, -122.180, 0.071
   - Volcano ID: 1025

2. Which MODIS sensor?
   - Terra
   - Aqua

3. What time of day?
   - Daytime
   - Nighttime

4. Observation geometry?
   - Sunlight angle: 12.
   - Scan angle:

5. Which variable would you like to plot?
   - Number of hotspot pixels
   - Radiant flux
   - 5.955μm spectral radiance

6. Additional data options
   - Progress
   - View/Save data

7. Graph showing Volcanic radiant flux over time.
MODIS has detected volcanic thermal anomalies at over 100 volcanoes since 2000
Relatively insensitive to low temperature and hydrothermal volcanic (i.e. non-eruptive) phenomena.
MODIS measurements of emitted spectral radiance act as an effective proxy of eruption intensity during volcanic eruptions

2006 eruption of Mount Augustine, Alaska

Source: USGS
Some volcanoes have been persistently active since 2000.
Some volcanoes have erupted only once since 2000
Some volcanoes have been episodically active since 2000
MODIS has catalogued volcanic thermal emissions at the global scale.
Allowing for direct quantitative comparisons of the intensities and magnitudes of terrestrial eruptions
MODIS reveals evidence for periodicity in thermal output at some volcanoes, but not at others

Wright et al. 2015
MODIS allows us to estimate the volumetric flux of lava from the vent 5 km Integra3ng effusion rate over time allows the total lava output to be estimated, and MODIS-derived estimate of final volume (1.3 km³) is consistent with in-situ estimates (~1.2 km³)
The rate at which (and total amount of) lava that is erupted constraints sub-surface magma chamber conditions.
Can we use MODIS data to predict when an eruption will end?
Using MODIS data to predict when an eruption will end

Nyamuragira, Democratic Republic of Congo, 2000

Bonny and Wright, in review
Using MODIS data to predict when an eruption will end

Kizimen, Russia, 2011
No reason why MODIS cannot be used to predict lava flown hazards in near-real-time