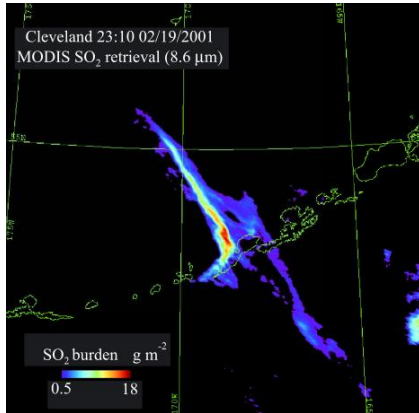


# MODIS Uses in Volcanology - Nick Taylor

## Applications

- Early warning and detection of volcanic activity
- Near-real-time monitoring of activity
- Post-eruption analysis of airborne particulate



[1]

## Bands Used

- In detection and monitoring:
- Normalized Thermal Index (NTI) from  $(22-32) / (22+32)$  or  $(21-32) / (21+32)$  [2]

In particle analysis:

- Bands 28-32

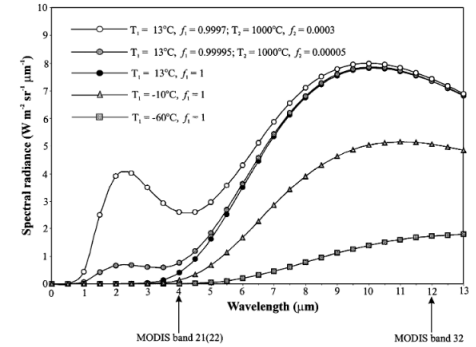


Table 1

Applications of MODIS TIR channels

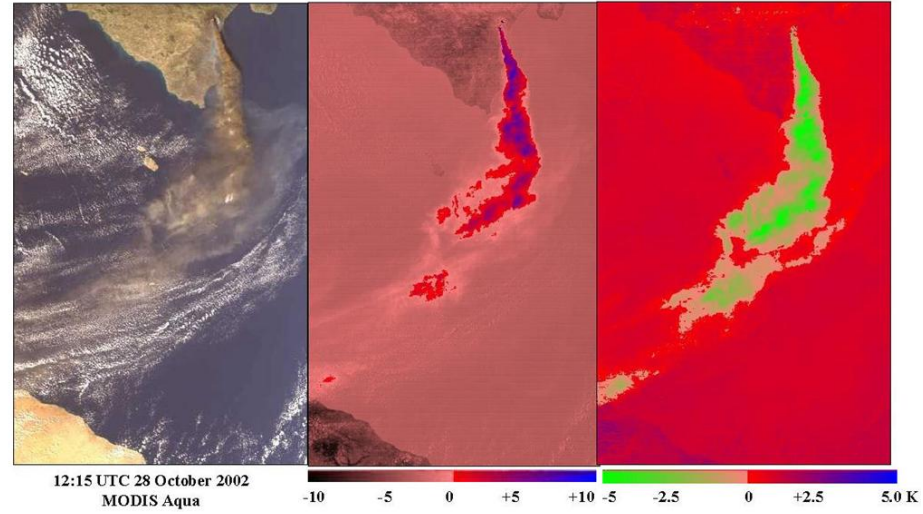
| Channel number | Wavelength (μm) | Applications                                    | Resolution (km) |
|----------------|-----------------|---|-----------------|
| 28             | 7.175–7.475     | H <sub>2</sub> O, SO <sub>2</sub>               | 1               |
| 29             | 8.400–8.700     | SO <sub>2</sub> , SO <sub>4</sub> <sup>2-</sup> | 1               |
| 30             | 9.580–9.880     | SO <sub>4</sub> <sup>2-</sup> , O <sub>3</sub>  | 1               |
| 31             | 10.780–11.280   | ice, ash, SO <sub>4</sub> <sup>2-</sup>         | 1               |
| 32             | 11.770–12.270   | ice, ash, SO <sub>4</sub> <sup>2-</sup>         | 1               |



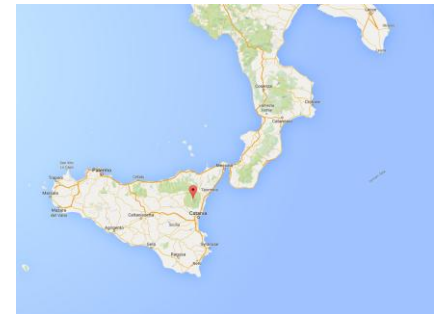
Mount Etna Eruption

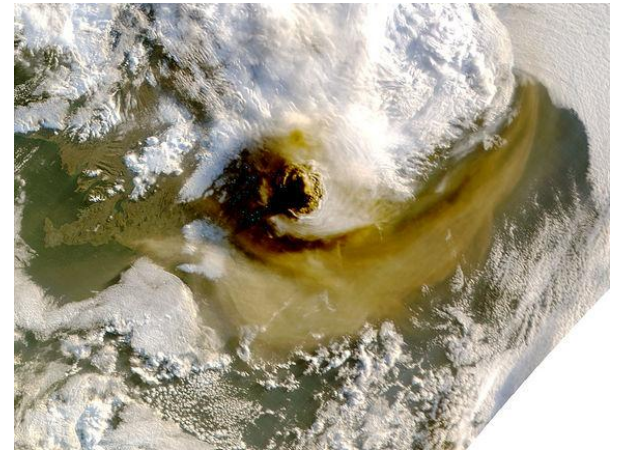
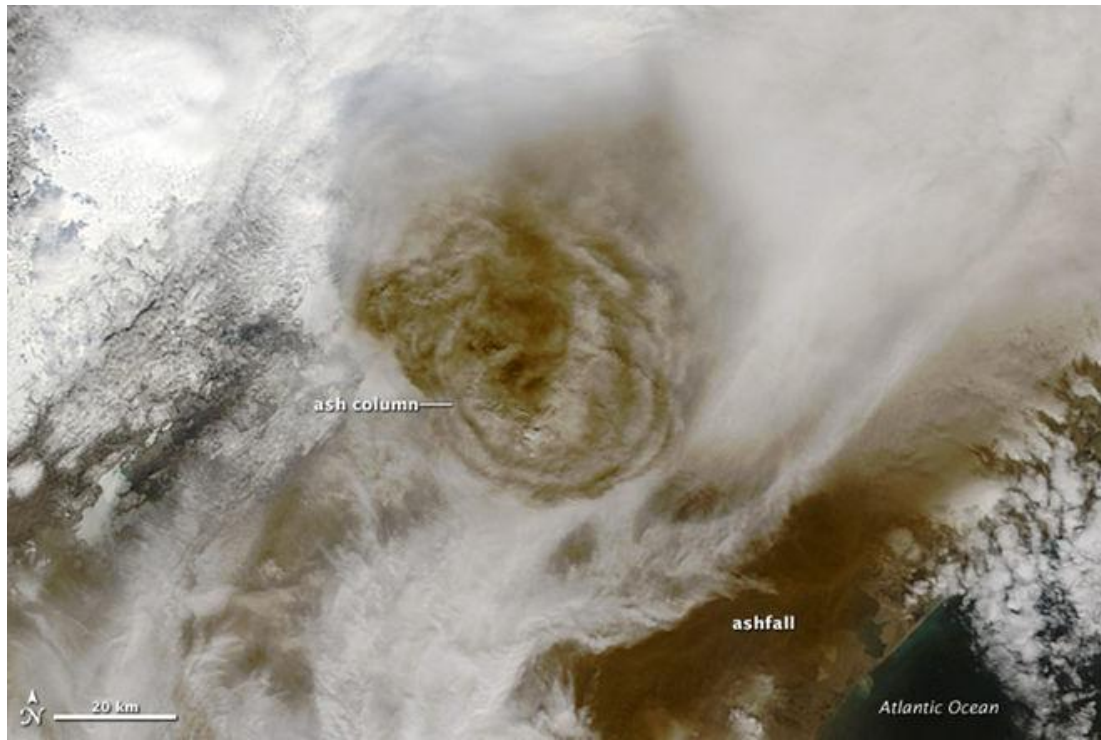
8 - 11 micron BTDF

11-12 micron BTDF



The eruption of Mt. Etna and analysis of its plume [3]





Eruption of Grimsvotn Volcano in Iceland in 2011 [4]

# Interesting Research

- [1]I. WATSON, "Thermal infrared remote sensing of volcanic emissions using the moderate resolution imaging spectroradiometer", Journal of Volcanology and Geothermal Research, 2004.
- [2]R. Wright, L. Flynn, H. Garbeil, A. Harris and E. Pilger, "Automated volcanic eruption detection using MODIS", Remote Sensing of Environment, vol. 82, no. 1, pp. 135-155, 2002.
- [3]"Mt. Etna eruption - MODIS images", Ssec.wisc.edu, 2002. [Online]. Available: <https://www.ssec.wisc.edu/media/spotlight/etna.html>. [Accessed: 05- Mar- 2016].
- [4]S. Staff, "Satellite Photos Show Grimsvotn Volcano Eruption From Space | Grimsvotn Volcano Photos & Satellite Images | NASA Satellites & Earth Observation", Space.com, 2011. [Online]. Available: <http://www.space.com/11749-grimsvotn-volcano-eruption-satellite-photos.html>. [Accessed: 05- Mar- 2016].
- NASA Rapid Response images: <http://rapidfire.sci.gsfc.nasa.gov/gallery/>