

# Generalized EOS Data Converter: Making Data Products Accessible to GIS Tools

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# Abstract

- We have developed a tool, which can be used to convert science data in HDF-EOS format into GeoTIFF formatted files. These latter files are directly accessible to many Geographical Information System Tools. This tool, called the HDF-EOS to GeoTIFF conversion tool (HEG), is available to individual users on Windows, Linux, Sun and SGI platforms. It contains both a graphical and a command line interface. The HEG tool is operable on a wide variety of EOS products, including MODIS, MISR, and ASTER data
- HEG has been integrated into the interface of the new online archives for earth sciences data developed for NASA archive centers. These online archives are called Data Pools and are directly associated with the Earth Observing System Core System.
- We will discuss basic functionality provided by HEG. This includes mosaicing, sub-sampling, reprojection, reformatting, sub-setting, creation of multi-band GeoTIFFs, and creation of new metadata.

# EOS Data Product Storage

- Standard products are stored and distributed in HDF-EOS format, based on HDF.
- The format is self-describing and portable.
- The format was developed to provide a convention for geo-locating data from disparate instruments.
- This allowed product developers to use the same data structures, limiting need to develop access software.
- For example, four EOS-AURA instruments will use the same file structure.
- However.....

# EOS Data Access Issues

- The format did not provide standards in detail. For example:
  - Products contain HDF as well as HDF-EOS objects.
  - There are different standards for fill data.
  - MODIS products have little uniformity.
- Many data are in swath (orbit-based) format and geolocation isn't always available pixel by pixel.
- The format was not developed specifically for GIS applications.
- Co-registration of disparate products is desired
- Want ability to customize data at source or at local facility

# Solution: EOS Data Converter

- Convert EOS ASTER, MODIS, MISR data to GeoTiff, Binary, HDF-EOS formats.
- Process as many EOS products as possible. Initially, ~60 land products selected. MODIS Oceans/Atmosphere data added.
- Convert HDF-EOS Swath to HDF-EOS Grid.
- Allow file selection from users local storage.
- Make functionality available through a common interface: graphical and command line.
- Make details of internal file structures transparent to users.

## Converter Functionality (cont.)

- Re-projection: USGS, MODIS Integerized Sinusoidal.
- Stitching (Mosaicing).
- Smoothing across granules.
- Subsetting by band/parameter.
- Subsetting by geolocation.
- Metadata preservation/creation.
- Resampling.
- Subsampling.

# User Interface

- Portable, written in C and Java.
- Operable on Sun, SGI, Linux, Windows.
- Not dependent on any COTS (eg. IDL).
- Functionality accessible by GUI or command line.

# Availability

ftp edhs1.gsfc.nasa.gov

Name: anonymous

Password: <your email address>

ftp> quote site group sdptk

ftp> quote site gpass ecs-tkit

ftp> cd HEG\_Tool

In this directory are five (5) files. The are as follows:

hegSUN.tar.Z – HEG for the Sun/Solaris system

hegSGI.tar.Z – HEG for the SGI system

hegLNX.tar.Z – HEG for the Linux system

hegWIN.zip – HEG for Windows

HEG\_UsersGuide.doc.Z – HEG Users Guide in MS-Word format

# 60 MODIS/ASTER/MISR Products Tested

## **ASTER Products:**

Level 1B Registered Radiance  
Level 2 Brightness Temperature  
Level 2 Emissivity Product  
Level 2 Decorrelation Stretch (VNIR)  
Level 2 Decorrelation Stretch (SWIR)  
Level 2 Decorrelation Stretch (TIR)  
Level 2 Surface Reflectance (VNIR)  
Level 2 Surface Reflectance (SWIR)  
Level 2 Surface Reflectance (TIR)  
Level 2 Surface Kinetic Temperature  
Level 2 Surface Radiance (VNIR)  
Level 2 Surface Radiance (SWIR)  
Level 2 Surface Radiance (TIR)  
Level 3 DEM

## **MISR Products:**

L1B2 Ellipsoid Data  
L1B2 Terrain Data  
L2 Land Products  
L2 Aerosol Products  
L2 Cloud Products

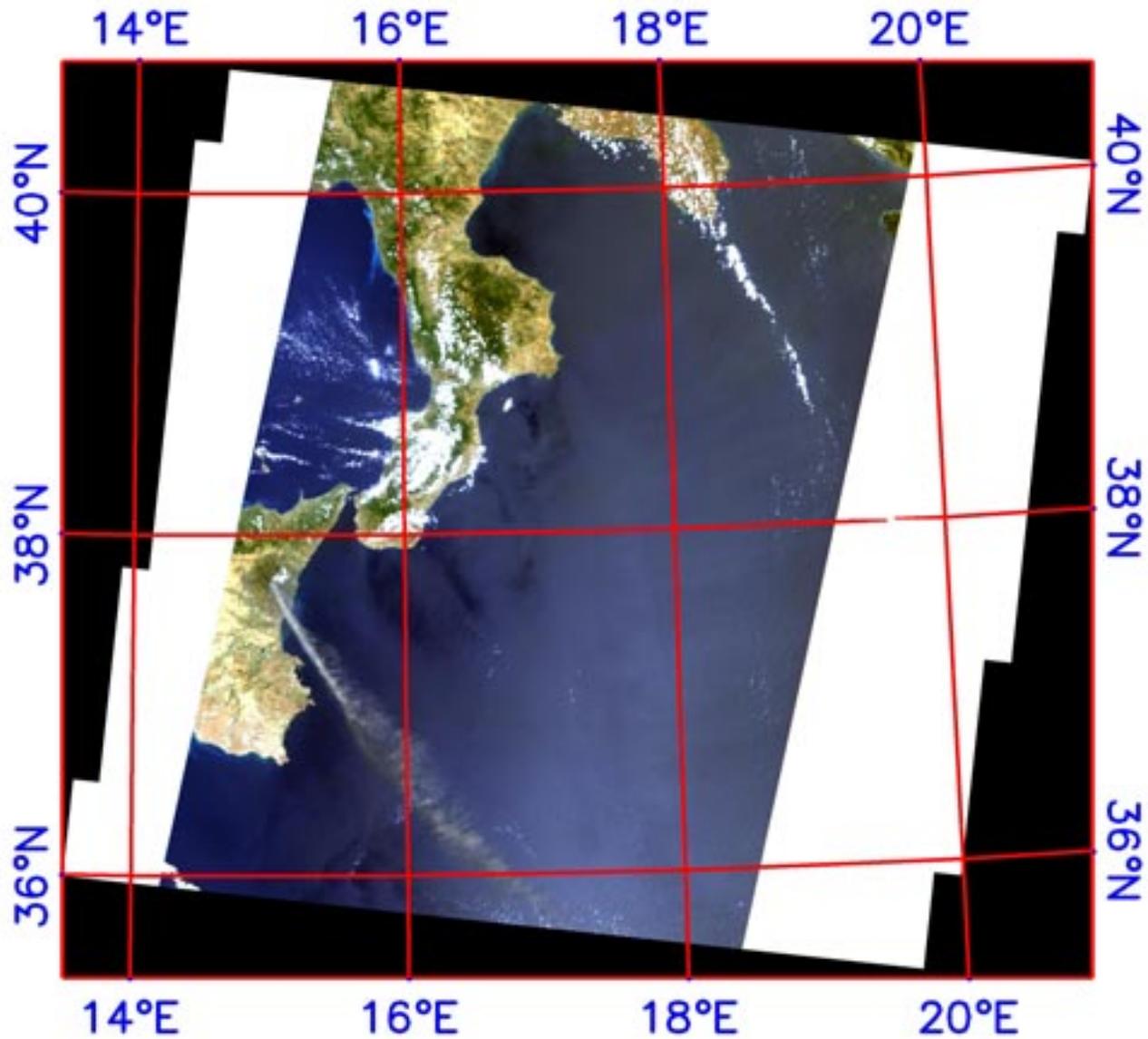
## **Digital Elevation Model:**

1 Km Global DTED

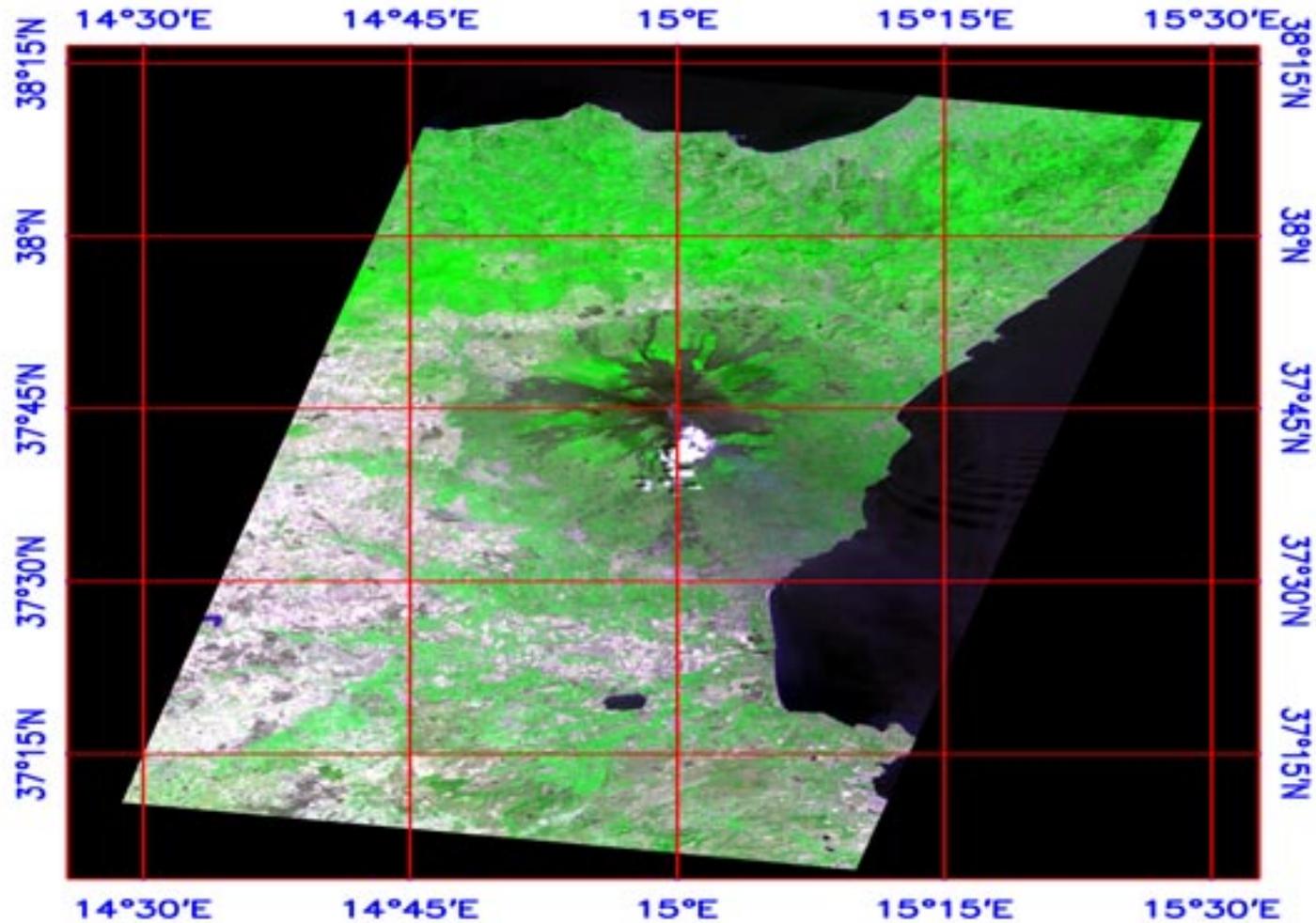
## **MODIS Products:**

L1B Calibrated Radiances (1000 m)  
L1B Calibrated Radiances (500 m)  
L1B Calibrated Radiances (250 m)  
L1A Geolocation Fields – 5-Min Swath  
L2 Ocean Color Products  
L2 Sea Surface Temperature Products  
L2 Land Surface Reflectance - 250 m,  
L2 Land Surface Reflectance - 500 m  
L2 Land Surface Reflectance - 1 km  
L2 Snow Cover- 500 m  
L2 Land Surface Temperature and Emissivity  
L3 Gridded Surface Reflectances  
L3 Gridded Snow Cover Product  
L3 Gridded Daily Land Surface Temp./Emissivity  
L3 Level 3 Gridded 96-Day Land Cover – 1km  
L3 Gridded Thermal Anomalies - 1 km  
L3 Leaf Area Index  
L3 Net Photosynthesis  
L3 Daily Gridded Sea Ice Extent  
L3 16-day SemiEmpirical BRDF and Albedo  
L3 BRDF Adjusted Nadir Surface Reflectance  
L3 Ocean Color and SST  
L2/3 Atmosphere Products

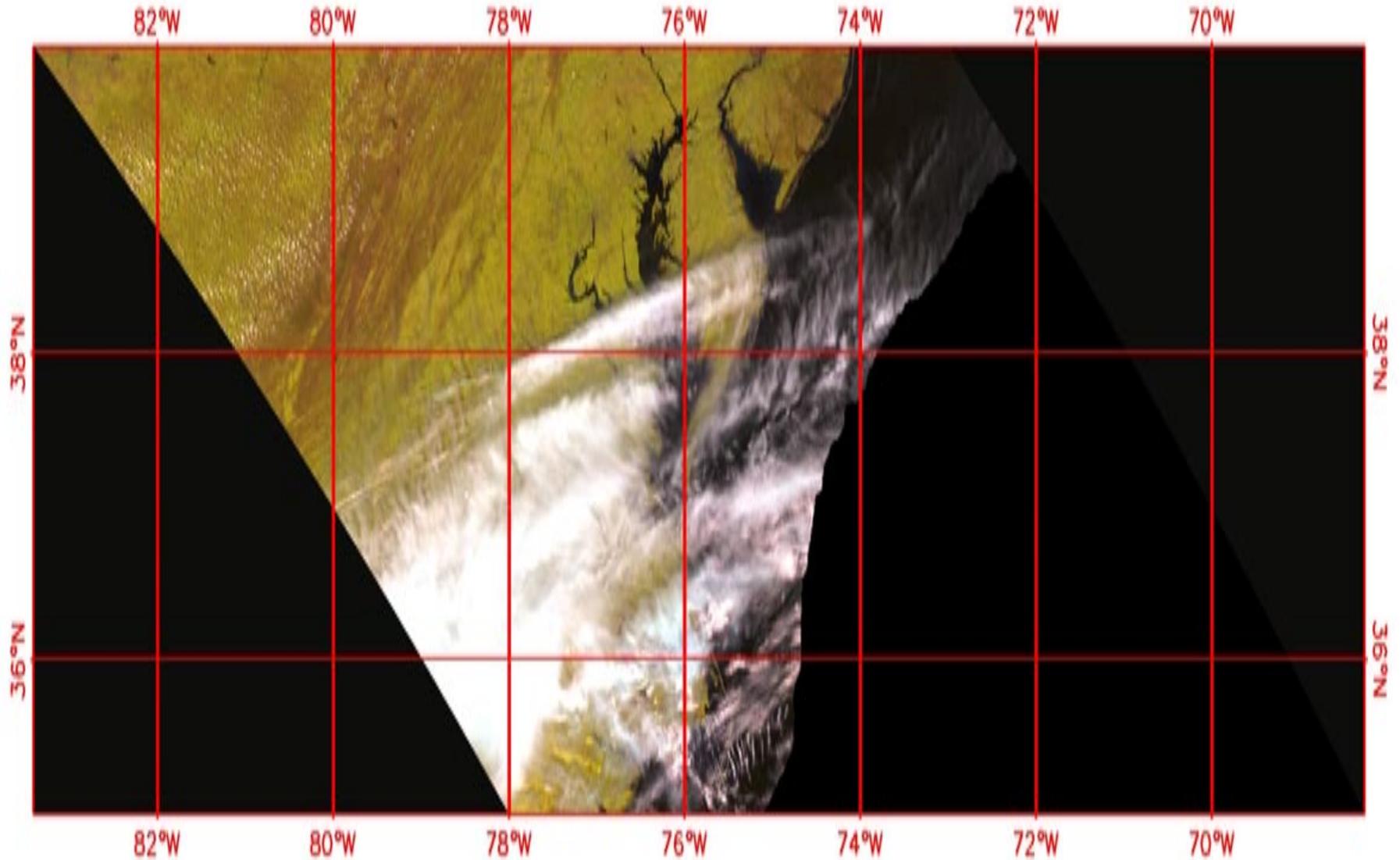
# Mt. Etna Eruption: MISR L1B Swaths: Stitched



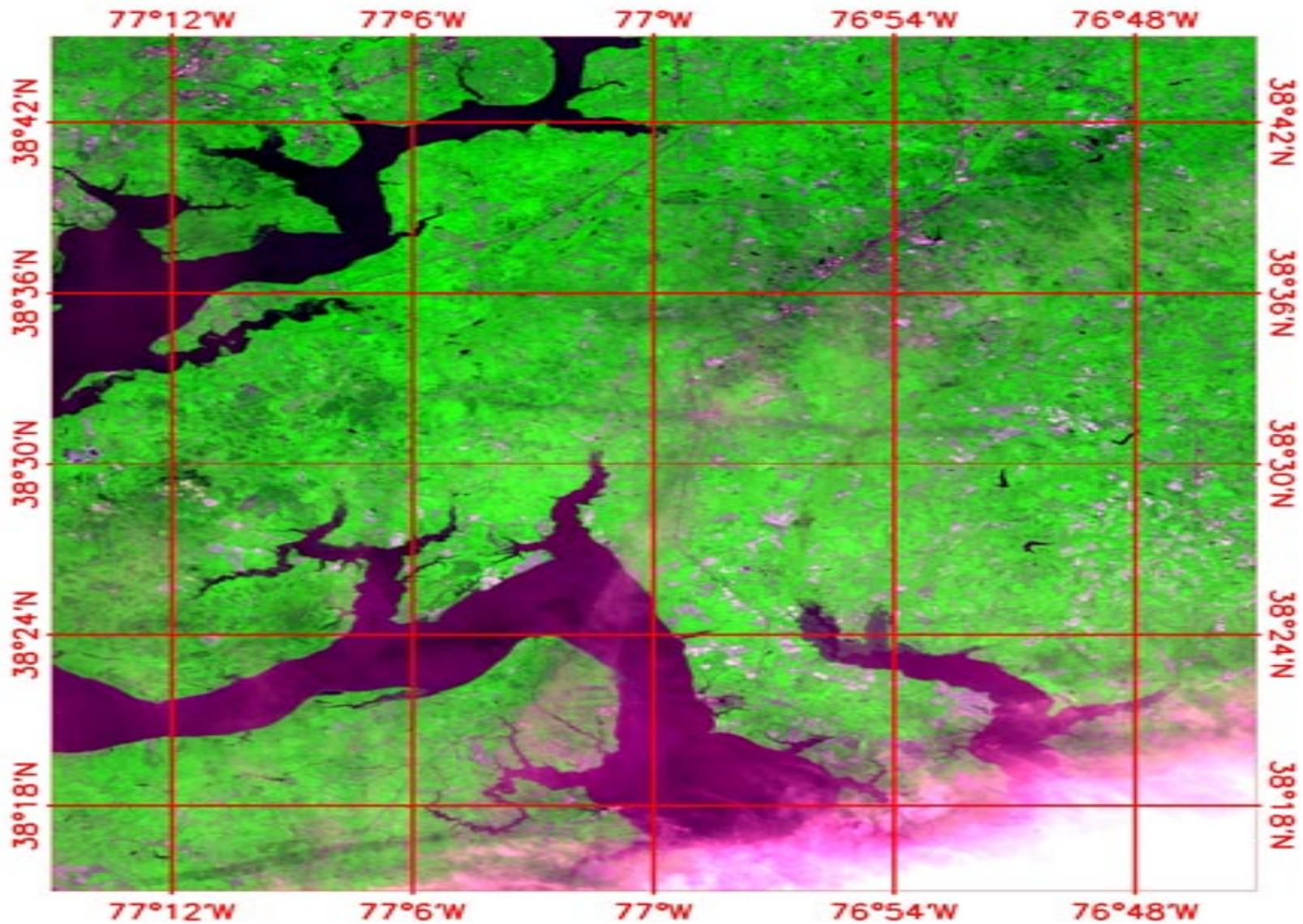
# Mt. Etna: Stitched, Subsetted ASTER L1B



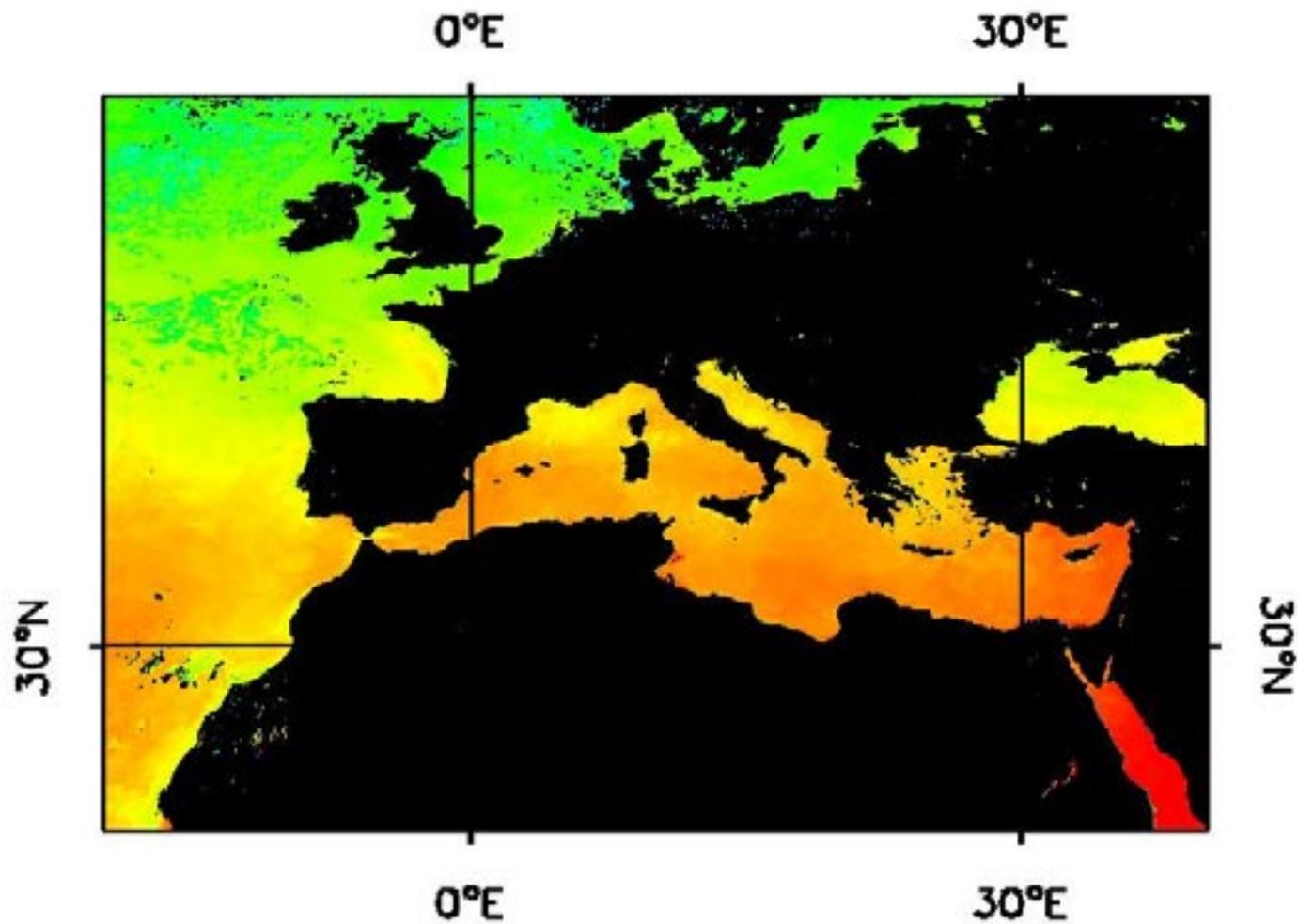
# MODIS L1B: Reprojected, Co-Registered with ASTER, La Plata Tornado



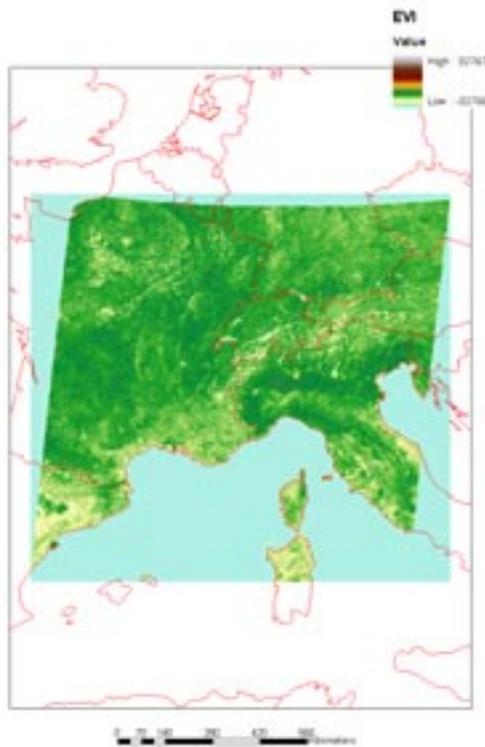
# La Plata Tornado Damage: ASTER L1B reprojected/stitched/subsetted



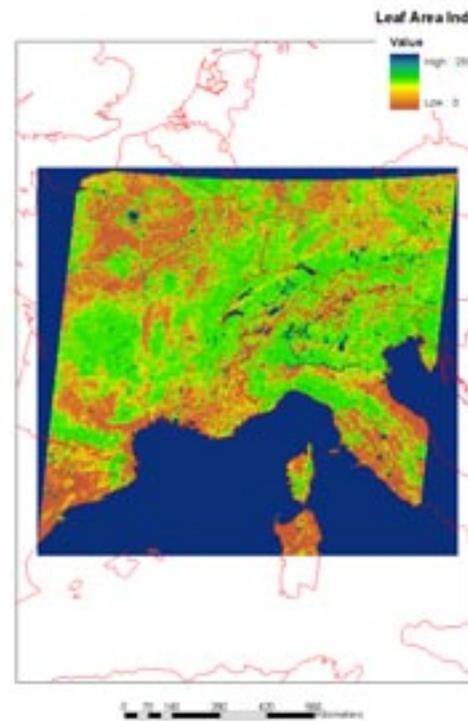
## MODIS SST Subset from Global Map



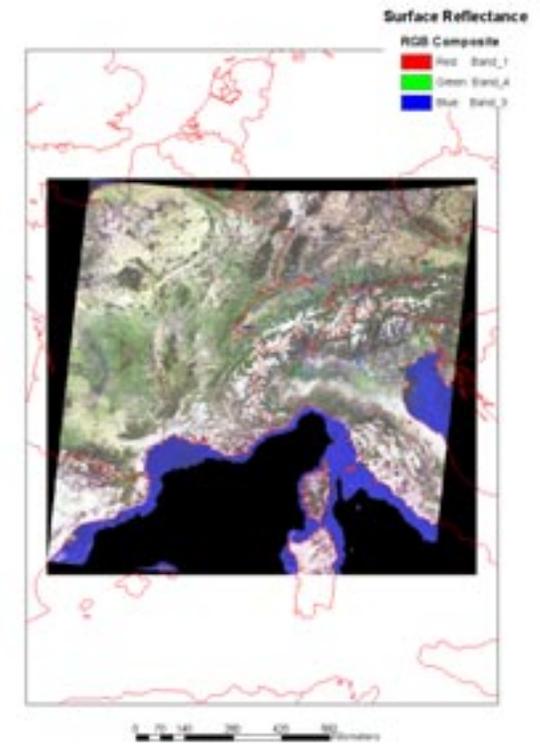
# MODIS Land Products: Reprojected, Co-registered, Processed in ArcInfo/ArcMap



Vegetation Index



Leaf Area Index



Surface Reflectance