

MODIS Vegetation Indices (MOD 13)

Product Description

The MODIS Vegetation-Index (VI) products will provide consistent spatial and temporal comparisons of global vegetation conditions that will be used to monitor the Earth's terrestrial photosynthetic vegetation activity in support of change detection and phenologic and biophysical interpretations. Gridded vegetation-index maps depicting spatial and temporal variations in vegetation activity are derived at 8-day, 16-day, and monthly intervals for precise seasonal and interannual monitoring of the Earth's vegetation. The MODIS VI products will improve upon currently available indices and will more accurately monitor and detect changes in the state and condition of the Earth's vegetative cover. The vegetation-index products are made globally robust with enhanced vegetation sensitivity and minimal variations associated with external influences (atmosphere, view and sun angles, clouds) and inherent, non-vegetation influences (canopy background, litter), in order to serve more effectively as a "precise" measure of spatial and temporal vegetation change.

Two vegetation-index (VI) products are to be produced globally for land at launch. One is the standard normalized difference vegetation index (NDVI), which is referred to as the "continuity index" to the existing NOAA-AVHRR-derived NDVI. The other is an enhanced vegetation index (EVI) with improved sensitivity in high biomass regions and improved vegetation monitoring through a decoupling of the canopy background signal and a reduction in atmosphere influences. The two VIs complement each other in global vegetation studies and improve upon the extraction of canopy biophysical parameters. A new compositing scheme that reduces angular, sun-target-sensor variations is also utilized. The gridded vegetation-index maps will use as input MODIS Terra and Aqua surface reflectances, corrected for molecular scattering, ozone absorption, and aerosols, and adjusted to nadir and standard sun angles with use of BRDF models. The gridded vegetation indices will include quality-assurance (QA) flags with statistical data, indicating the quality of the VI product and input data. The MODIS vegetation-index products will include:

- 250-m NDVI and QA as 8-day, 16-day, and monthly products (high resolution)

- 1-km NDVI, EVI, and QA as 8-day, 16-day, and monthly products (standard resolution)
- 25-km NDVI, EVI, and QA as 8-day, 16-day, and monthly products (coarse resolution)

Research and Applications

Due to their simplicity, ease of application, and widespread familiarity, vegetation indices are widely used by the broader user community from global circulation climate modelers and EOS instrument teams and interdisciplinary projects in hydrology, ecology, and biogeochemistry to those making regional- and global-based applications involving natural-resource inventories, land-use planning, agricultural monitoring and forecasting, and drought forecasting. Some of the more common applications of the vegetation index concern:

- Global warming/climate
- Global biogeochemical and hydrologic modeling
- Agriculture; precision agriculture; crop stress, crop mapping
- Rangelands; water supply forecasting; grazing capacities; fuel supply
- Forestry, deforestation, and net primary production studies
- Pollution/health issues (Rift valley fever, mosquito-producing rice fields)
- Desertification
- Anthropogenic-change detection and landscape disturbances.

Data Set Evolution

At the time of the launch of Aqua, there will be a 20-year NDVI global data set (1981-2000) from the NOAA-AVHRR series, which could be extended by MODIS Terra and Aqua data to provide a long-term data record for use in operational monitoring studies. The MODIS Terra and Aqua data set can readily be composited to provide 16-day, cloud-free time-series maps of vegetation activity. When both Terra and Aqua data are combined, higher frequency, 8-day, cloud-free time-series data will be readily made available.

Suggested Reading

Cihlar, J.C. *et al.*, 1997.

Huete, A.R. *et al.*, 1994.

Huete, A.R. *et al.*, 1997.

Huete, A.R. *et al.*, 1999.

Myneni, R.B. *et al.*, 1997a,b.

van Leeuwen, W.J.D. *et al.*, 1999.

MODIS Vegetation Indices Summary

Coverage: Global land surface

Spatial/Temporal Characteristics: 250 m, 1 km, and 0.25° resolutions/8-day, 16-day, and monthly

Key Science Applications: Global vegetation monitoring, biogeochemical and hydrologic modeling, health and food security, range and forestry monitoring, agriculture management

Key Geophysical Parameters: Vegetation indices (NDVI & EVI)

Processing Level: 2,3

Product Type: Standard, at-launch

Maximum File Size: 277 MB

File Frequency: 289/16-day (16-day), 289/month (Monthly)

Primary Data Format: HDF-EOS

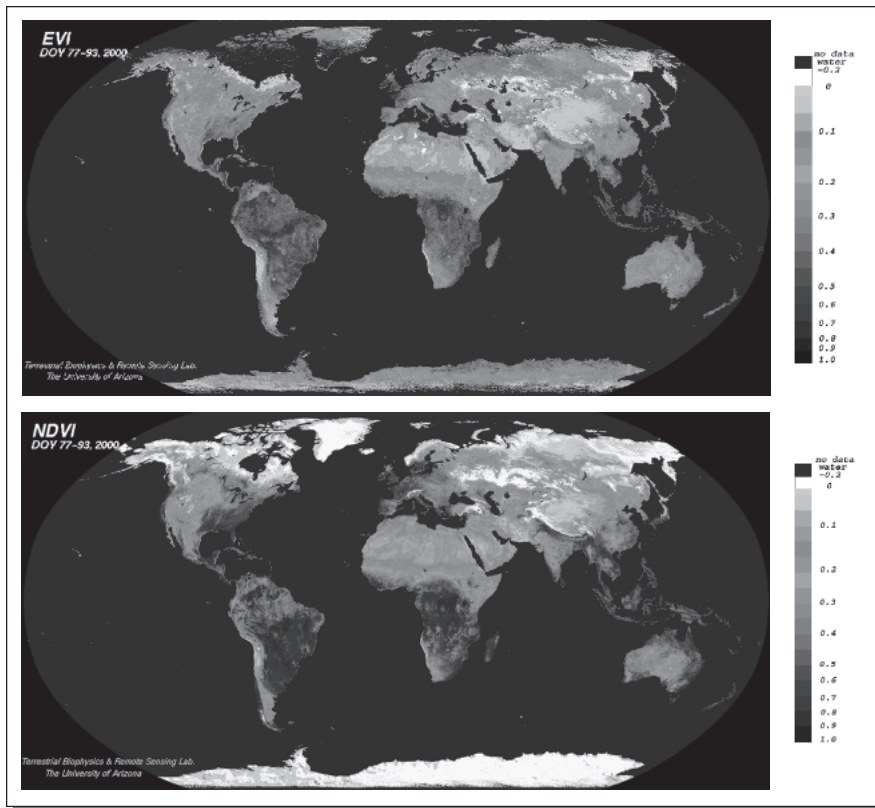
Additional Product Information:

<http://modis-land.gsfc.nasa.gov/products/products.asp?ProdFamID=6>

DAAC: EROS Data Center

Science Team Contact:

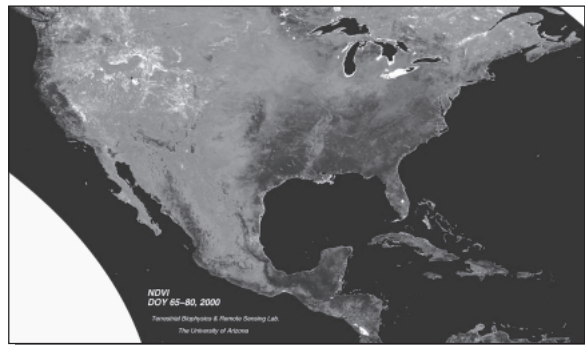
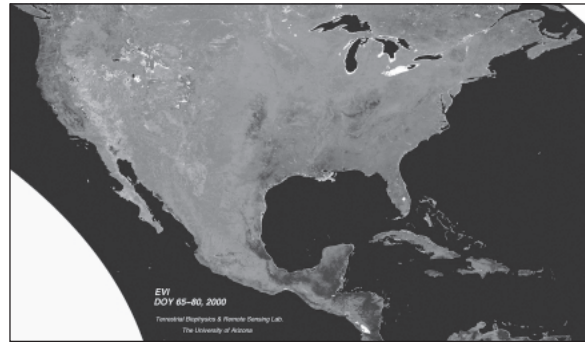
A.R. Huete



Global Composite of MODIS Enhanced Vegetation Index (top) and Normalized Difference Vegetation Index (bottom), both from data of the Terra MODIS for March 17 - April 2, 2000.



High Resolution (500 m) Composite of the Normalized Difference Vegetation Index for North and South America, from data of the Terra MODIS instrument for April 22 - May 7, 2000.



High Resolution (1 km) Composite of MODIS Enhanced Vegetation Index (top) and Normalized Difference Vegetation Index (bottom) for North America, from data of the Terra MODIS instrument for March 5 - March 20, 2000.