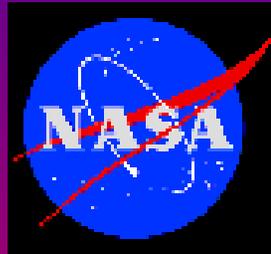


# The Direct Broadcast System: Status



MODIS Science Team Meeting  
January 24-25, 2001

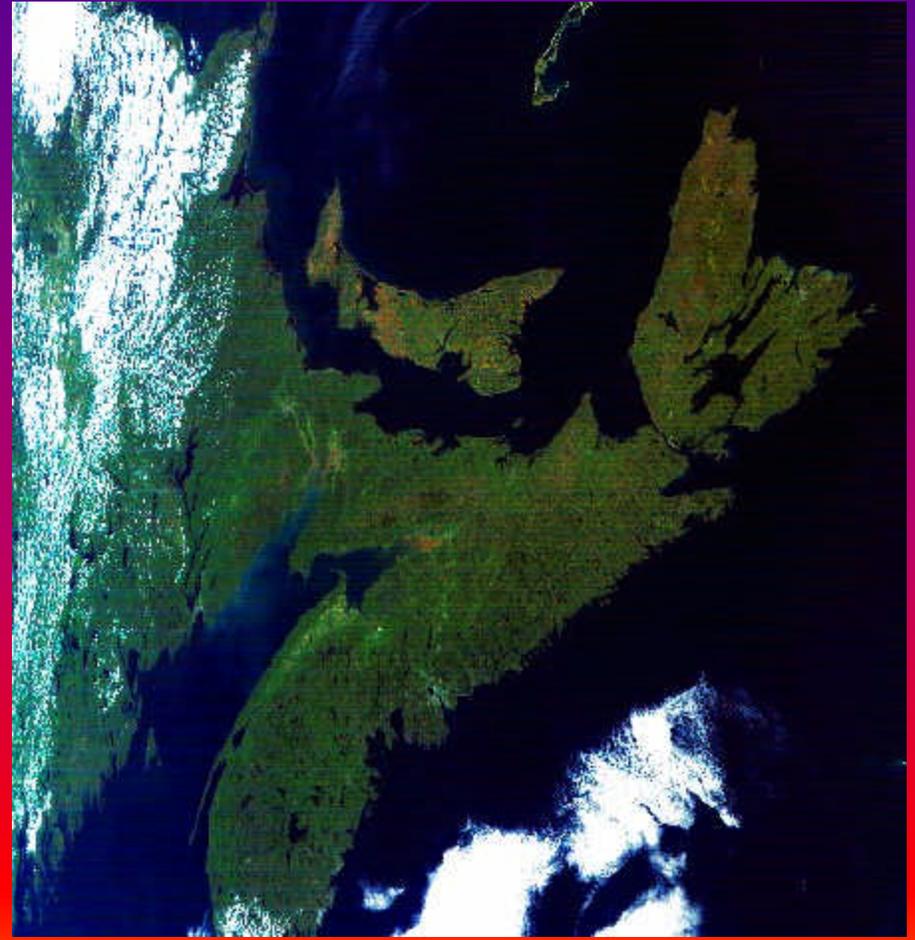
**Dr. James C. Dodge**  
**NASA Headquarters**  
**Washington, DC**

# 1km RGB Real-time MODIS Images from GSFC Site

## Florida Straits



## Nova Scotia



## Contrasts along the MODIS Swath

Labrador Current at Goose Bay

Bahamas - Florida View



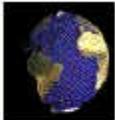
# EOS DB Internet Site <http://rsd.gsfc.nasa.gov/eosdb/>



EOS Direct Broadcast - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://rsd.gsfc.nasa.gov/eosdb/> Go

 **EOS**  **DB** 

## Earth Observing System, Direct Broadcast

TABLE OF CONTENTS: [Purpose](#) || [Pictures](#) || [Documents](#) || [Meetings](#) || [People](#) || [Links](#)

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 **Purpose**

The Direct Access System for the Earth Observing System (EOS) spacecraft provides a means of transmitting some, or all, of the EOS science data directly via X-band to ground. The Direct Access System, or some portions thereof, will fly on the EOS-AM, EOS-PM, and some subsequent Office of Earth Science spacecraft. Included in this Direct Access System is a Direct Broadcast Service which will transmit real-time data from the satellite to anyone within line-of-sight during most of the orbit.

The Direct Broadcast service will be particularly useful to people who need science data quickly (sooner than the normal 24-hour availability through the EOS Data and Information System, EOSDIS) or who are unable to obtain the data easily from the EOSDIS. It will require, however, a sophisticated ground station to receive and process those data.



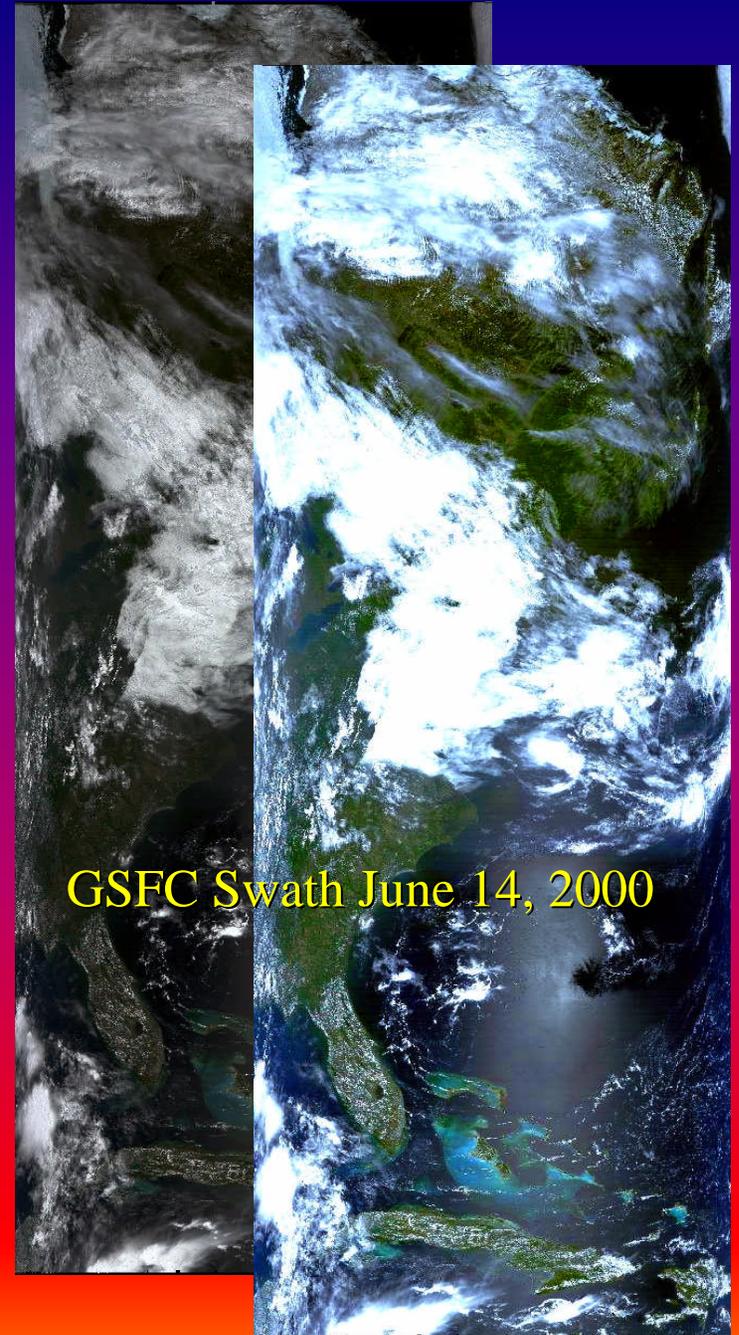
## Contents of the GSFC EOS DB Internet Site

- System descriptions
- Interface manuals
- Users Guides
- Software Technical Notes
- Software access procedures
- Past meeting summaries
- Status reports
- Links to other DB sites
- RGB MODIS Images



## Handling Data and Products

- Each full swath is ~1 Gigabyte.
- Regional products do not need to be created for each full swath.
- Some study regions are only 1000x1000 pixels in area but contain all available recent environmental satellite channels.
- Full-swaths online for ~ 1 month.
- Specialized regional products longer
- RGB imagery of special events



## Operational Activities of U.S. DB Sites

- Acquire and decode raw data for full swaths of available environmental satellite sensor bands.
- Calibrate and navigate selected agreed portions of data.
- Generate selected products for limited regions for public interest or applications.
- Provide reasonable amounts of raw data to requesting scientists and other users.
- Maintain a Web site of selected interesting real-time products for the public and educational purposes.
- Maintain a regional database of selected products having longer-term variability interest.

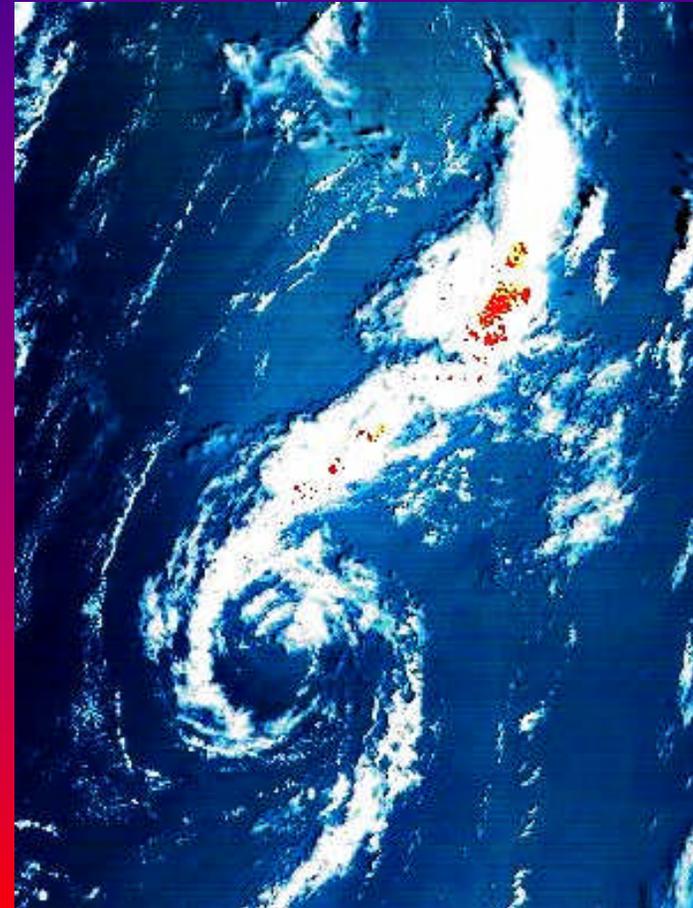
## MODIS Products Most Applicable for Real Time

- RGB images - water pollution, spills, ice conditions, large fires, smoke trails, storm and front locations, surface flooding
- Cloud types - nowcasting
- Ocean color - algal blooms
- Surface/Cloud temperatures - local weather prediction
- Snow area - water availability
- Vegetation greenness/cover - agriculture and forest health



## Severe Weather Close-ups in Mapped RGB Images

- Tropical storms
- Hurricanes
- Floods
- Pollution/dust episodes
- Severe storms/convection
- Sea/river/lake ice conditions
- Heat damaged vegetation
- Drought coverage



MODIS View of Atlantic Low

## Possible Web Site Contents of a DB Facility

- Raw satellite sensor data for the recent past (~ 1 month)
- Calibrated, navigated radiances for selected areas (~1 month)
- Limited area products from various satellites (~2 months)
- Official ATBD EOS algorithm products (~2 months)
- Experimental and application-oriented (~2 months)
- RGB gallery of interesting areas and severe weather (~ 1 year)
- Time sequences of regional area like SST and NDVI (years)
- Explanations of products and their generation procedures

## SSEC UW-Madison EOS Direct Broadcast

### Goals:

Acquire and process MODIS and AIRS data from Terra and Aqua in near real-time.

### Highlights:

- SeaSpace auto-tracking 4.4 m antenna installed August 2000,
- 500 Terra passes (day and night) acquired as of January 20, 2001,
- Software for processing MODIS data released in May 2000,
- Automated processing to Level-1B is now operational at SSEC,
- Most recent 7 days of data and quick-looks will be available via FTP by end of January.

### More Information:

<http://cimss.ssec.wisc.edu/~gumley/IMAPP/IMAPP.html>

# HAWAII EARTH OBSERVING STATION



[Satellite Image Products](#)

[Ground Systems](#)

[Latest Images](#)

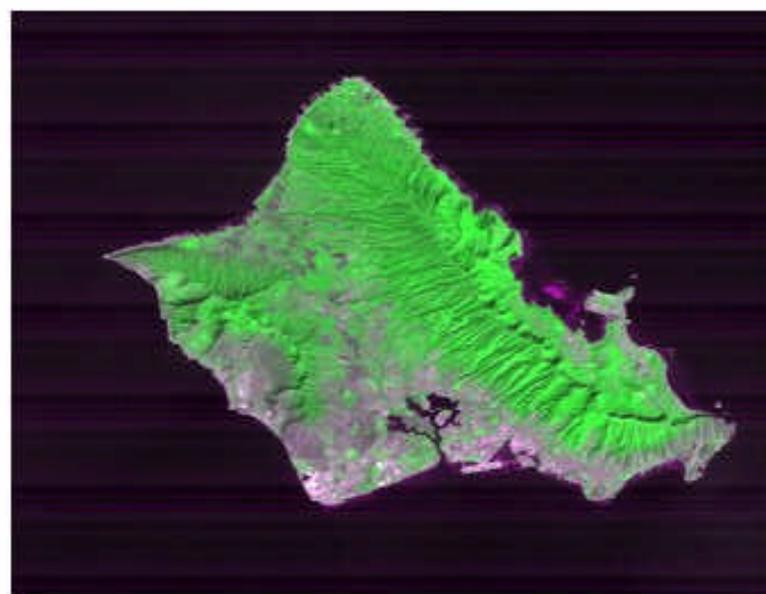
## HOME

## SATELLITES

- [Terra](#)
- [SeaWiFS](#)
- [NOAA/TIROS](#)
- [FY-1C](#)
- [FY-2B](#)
- [GOES-8](#)
- [GOES-10](#)
- [GMS-5](#)
- [METEOSAT-7](#)

## PRODUCTS

- [Atmosphere](#)
  - [Aerosol](#)



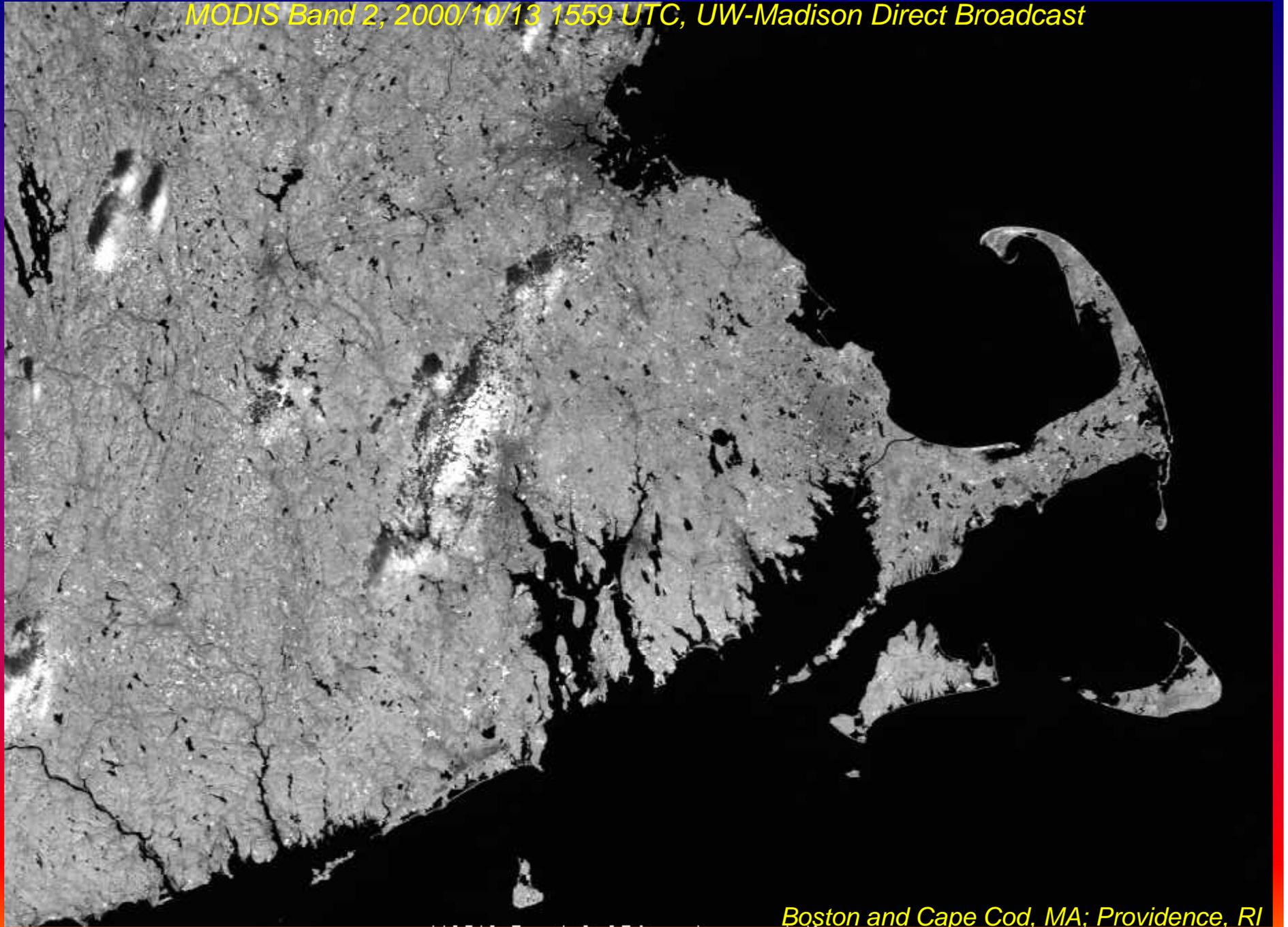
250m MODIS image of Oahu, December 19, 2000 (Ch 1 & 2)

# UW-Madison EOS Direct Broadcast Groundstation

TeraScan SX-EOS 4.4 m antenna: First pass acquired 2000/08/18

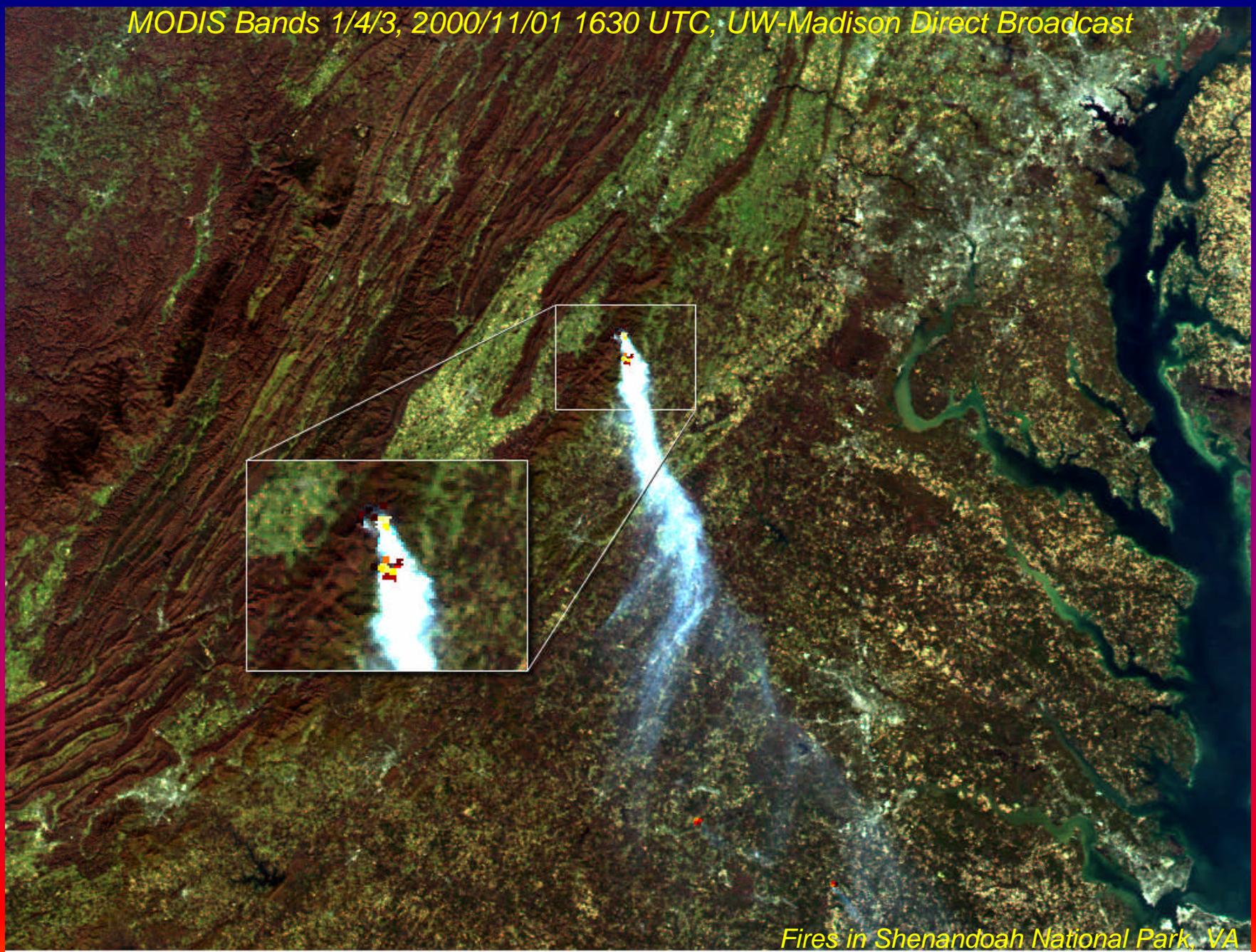


*MODIS Band 2, 2000/10/13 1559 UTC, UW-Madison Direct Broadcast*



*Boston and Cape Cod, MA; Providence, RI*

MODIS Bands 1/4/3, 2000/11/01 1630 UTC, UW-Madison Direct Broadcast

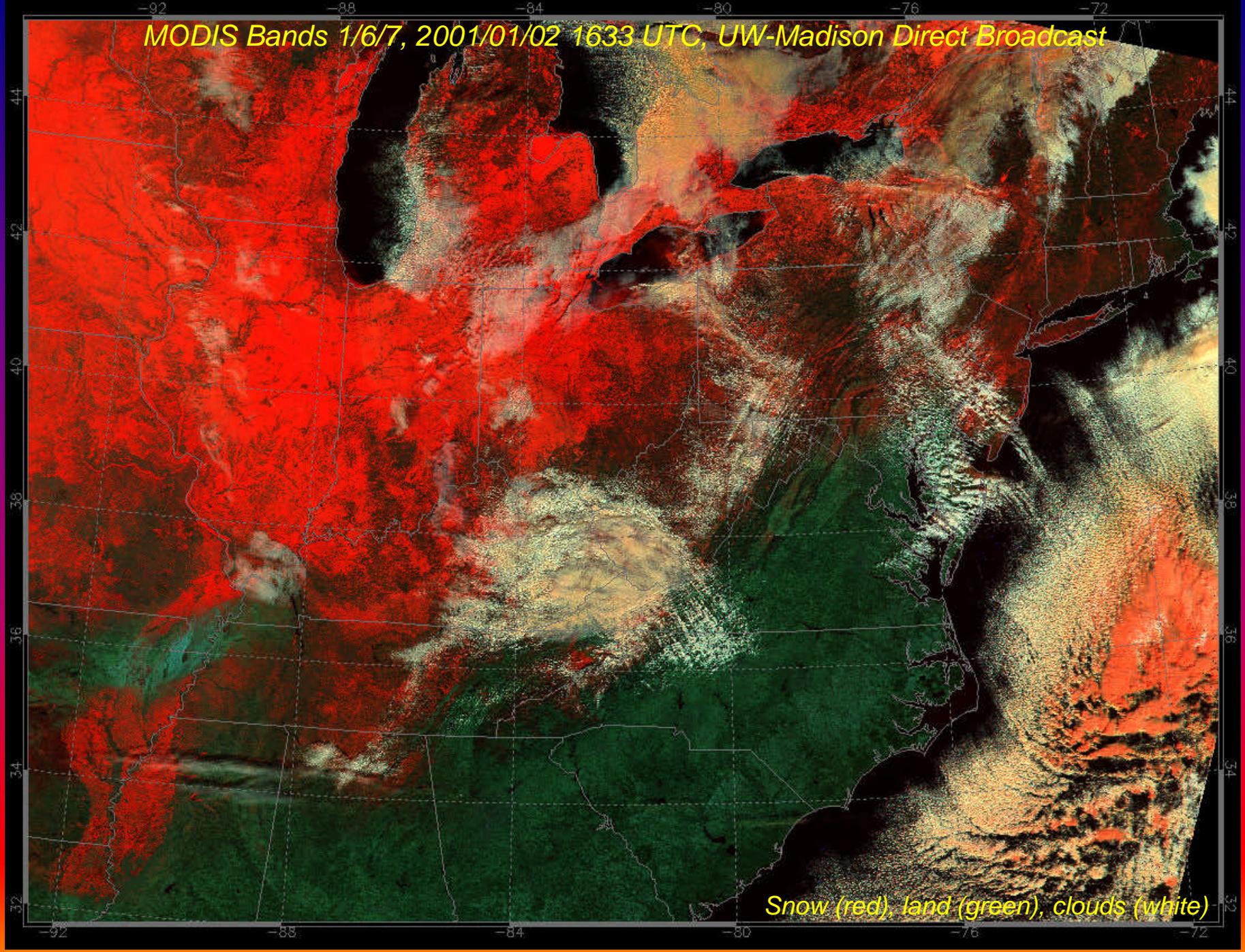


*Fires in Shenandoah National Park, VA*





MODIS Bands 1/6/7, 2001/01/02 1633 UTC, UW-Madison Direct Broadcast



Snow (red), land (green), clouds (white)

**RealPlayer: Satellite Dish Installation**

File Play View Channels Stations Favorites Help

Location: <http://jelly.oce.orst.edu/video/sd1200b.ram>

**My Channels**

Updated 10:04 am

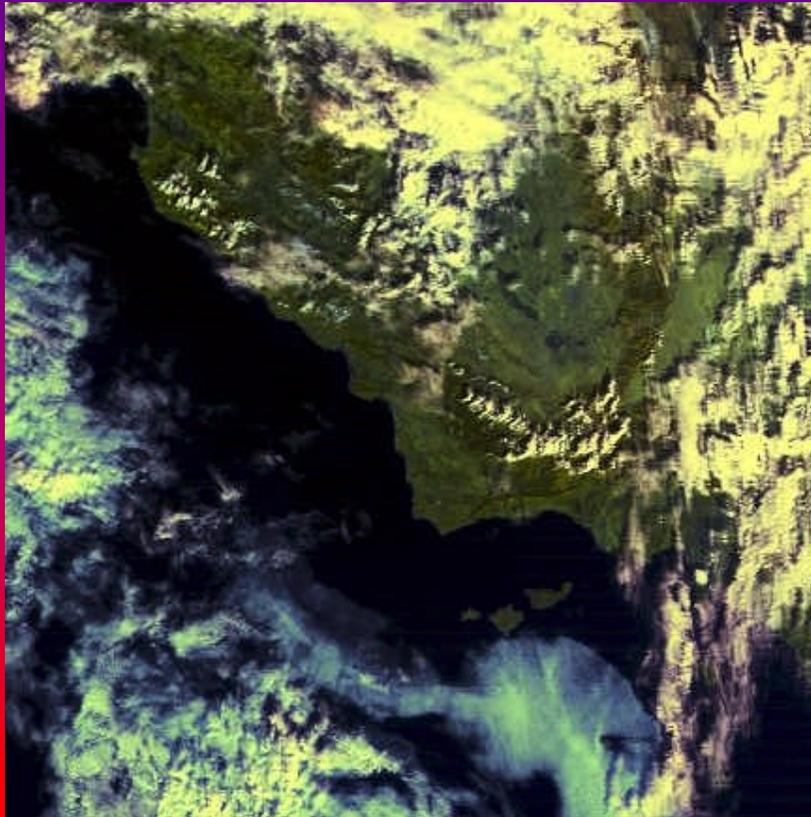
225.0 Kbps SureStream Stereo G2 01:57.6/03:06.9



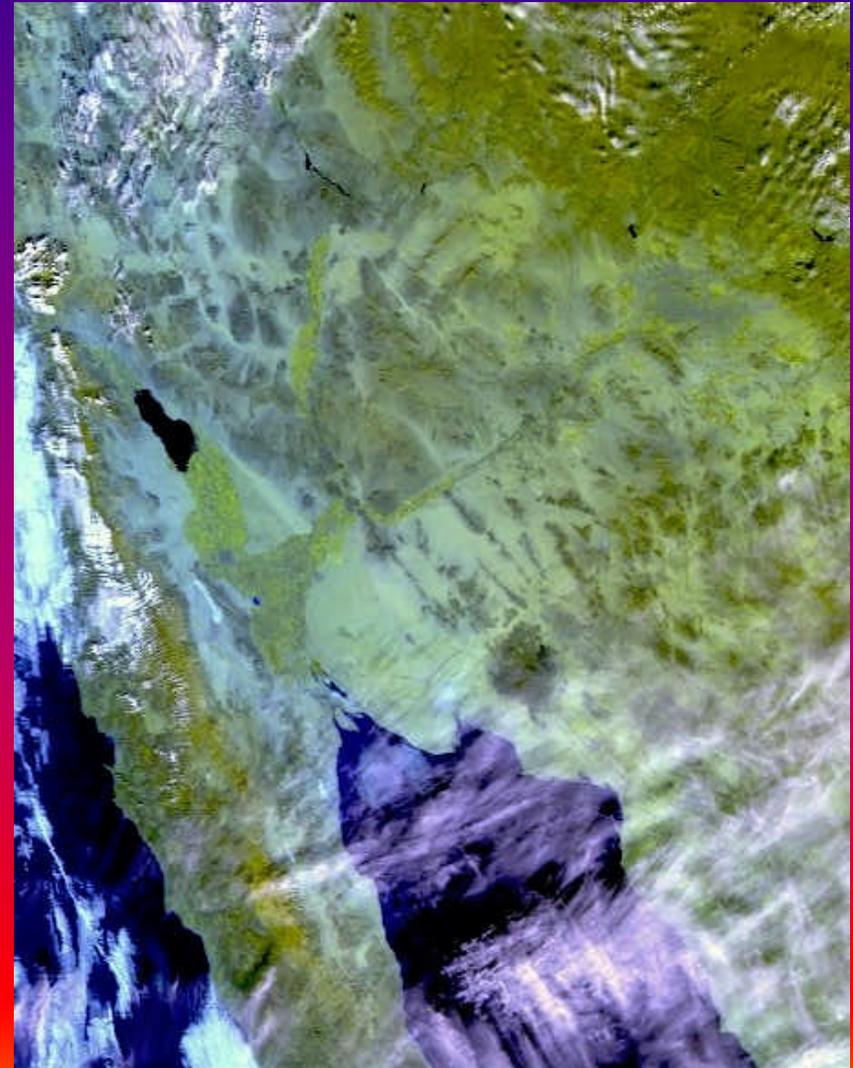
The screenshot displays the RealPlayer interface. At the top, the title bar reads 'RealPlayer: Satellite Dish Installation'. Below it is a menu bar with 'File', 'Play', 'View', 'Channels', 'Stations', 'Favorites', and 'Help'. A control bar contains play/pause, stop, previous, and next buttons, along with a progress slider. The address bar shows the location 'http://jelly.oce.orst.edu/video/sd1200b.ram'. The main video area shows a satellite dish against a blue sky. To the left is a 'My Channels' sidebar with a 'Subscribe To Free Channels' button and logos for ON.com, Comedy Central, ABC News, and Screening Room. The bottom status bar shows '225.0 Kbps SureStream', 'Stereo G2', and a progress indicator '01:57.6/03:06.9'.

# Some MODIS Views from Oregon State

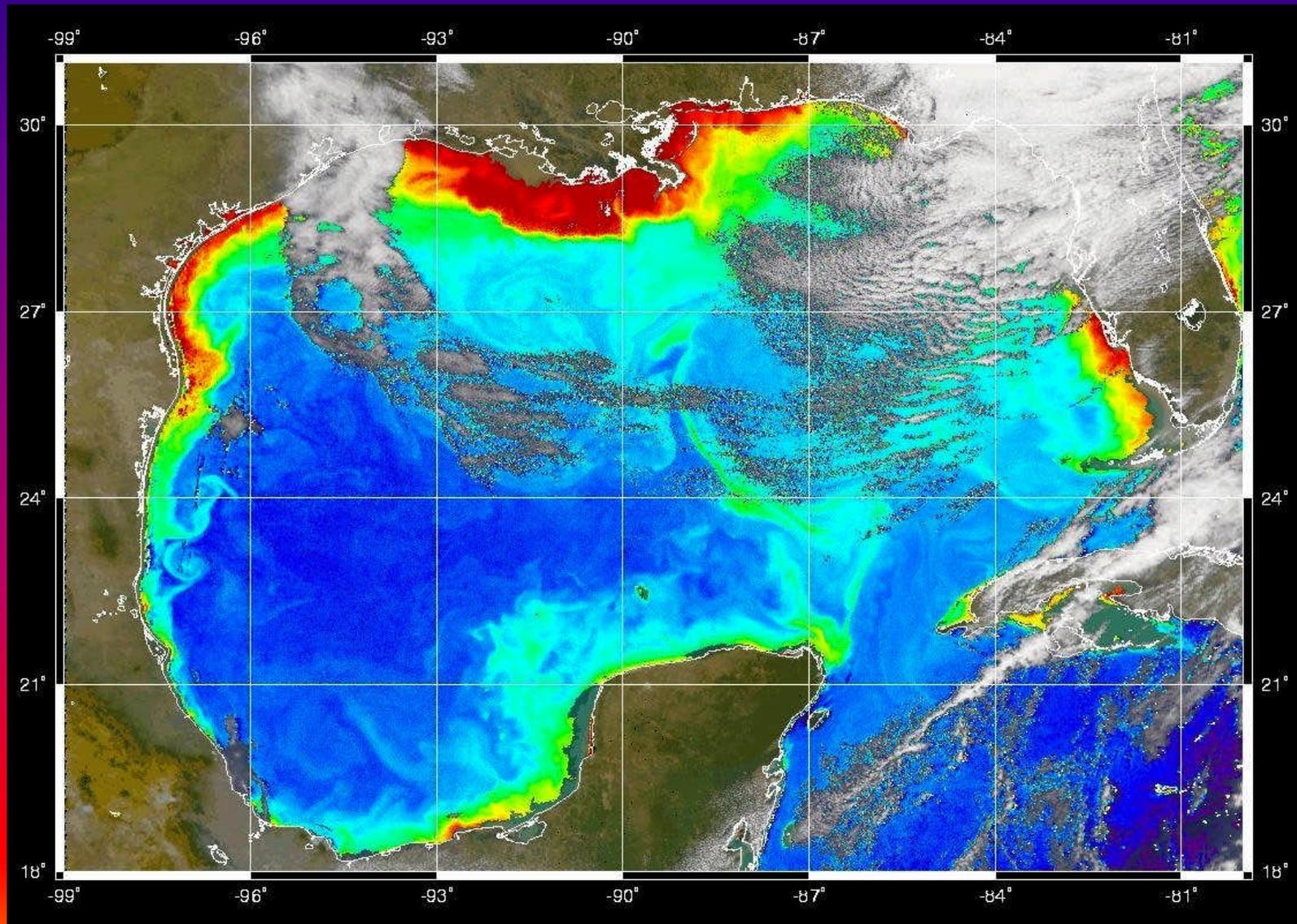
California Coast - Santa Cruz



Baja - Salton Sea Area



# SeaWiFS-based Candidate Product for Univ. S. Florida Clouds- Ocean Color - Vegetation Index



File Edit View Favorites Tools Help



Address [p://www.seaspace.com/main/about.html](http://www.seaspace.com/main/about.html)

Go



# ABOUT SEASPACE

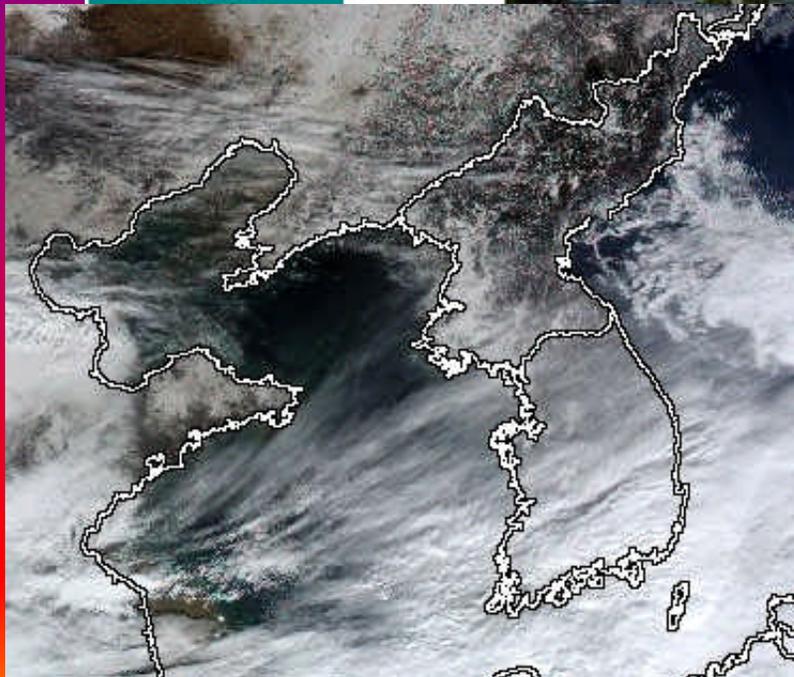
[About SeaSpace](#)

[Announcements](#)

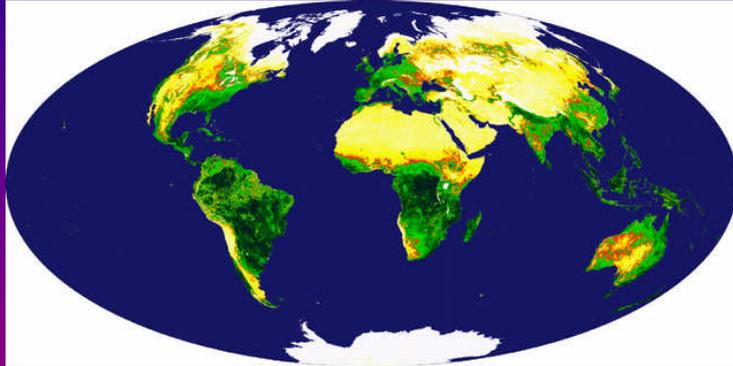
[Products](#)

[Sample Images](#)

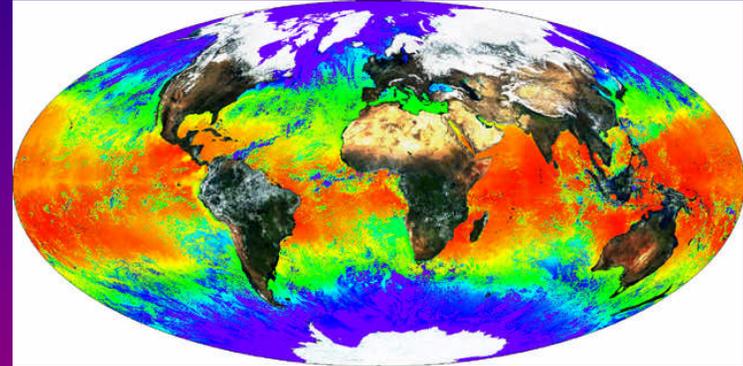
New: MODIS



## Linking U.S. DB Ground Stations



Vegetation Index

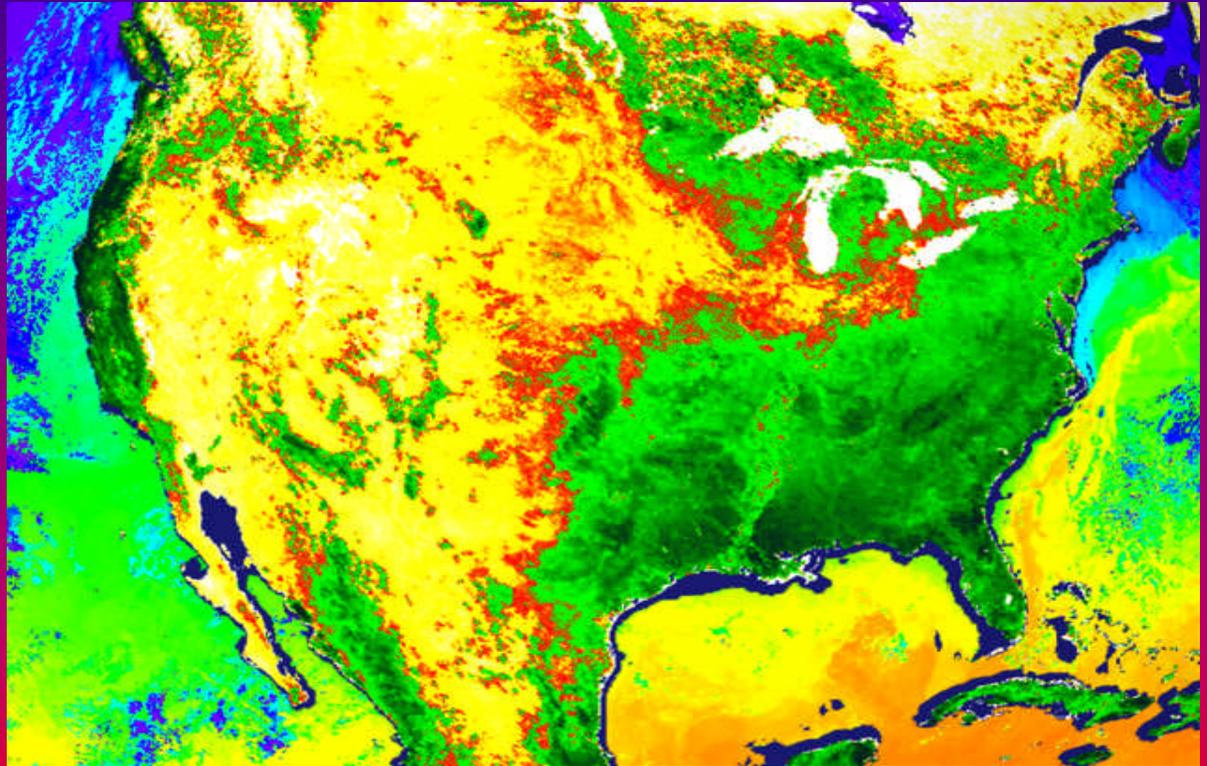


Surface Reflectance and SST

- Global products will be generated by the EOS investigators and data centers (Samples above are from Terra Web page.)
- DB ground stations will be generating a few products in near-real time for short-term applications, forecast and warning use, and algorithm intercomparisons.
- Events of interest are not always observed completely or for their entire duration by a single DB ground station.

## Possible DB Network Real-Time RGB Composite

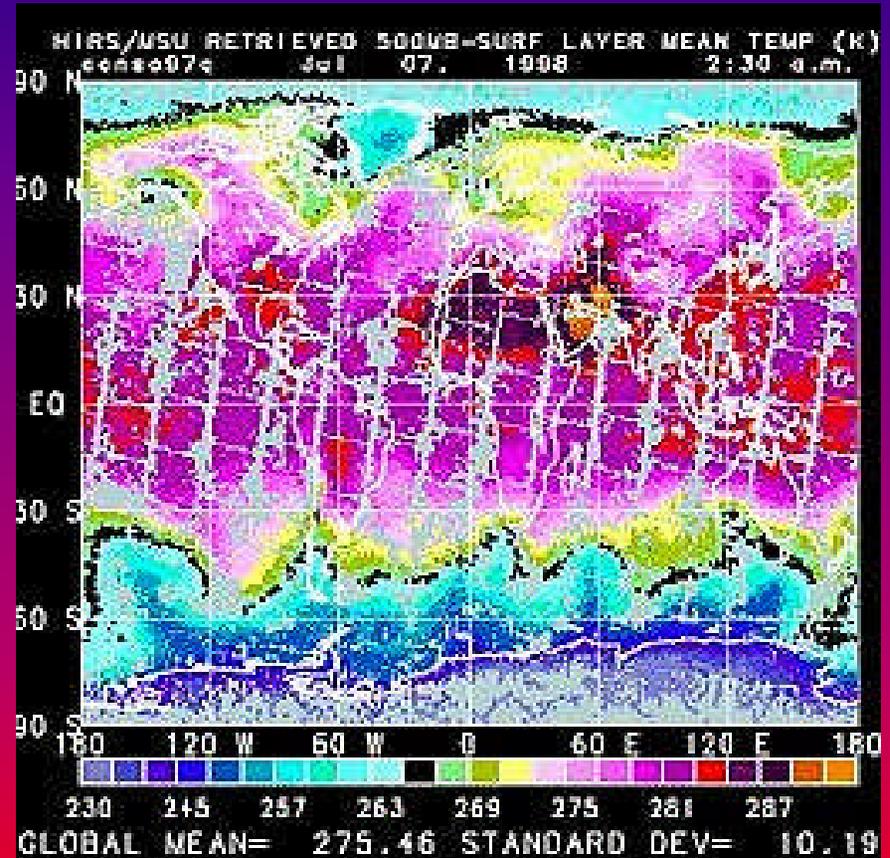
- U.S. sites may send their swath data to a common site, allowing a U.S. composite of mapped RGB images.
- Clouds would still be included; however, a time-stepped U.S. map of real-time products could be developed.



Multiple-day vegetation index, SST composite eliminates clouds, storms, and short-term variations.

# Real-Time Temperature and Moisture Profiles Beginning with AIRS/AMSU/HSB on AQUA

- Will use AIRS on AQUA and CrIS on NPP/NPOESS
- May not be calculated at all DB ground stations.
- Software being developed by JPL and the University of Wisconsin.
- International MODIS/AIRS Processing Package (IMAPP)
- Will be used for regional weather modeling and forecasting.



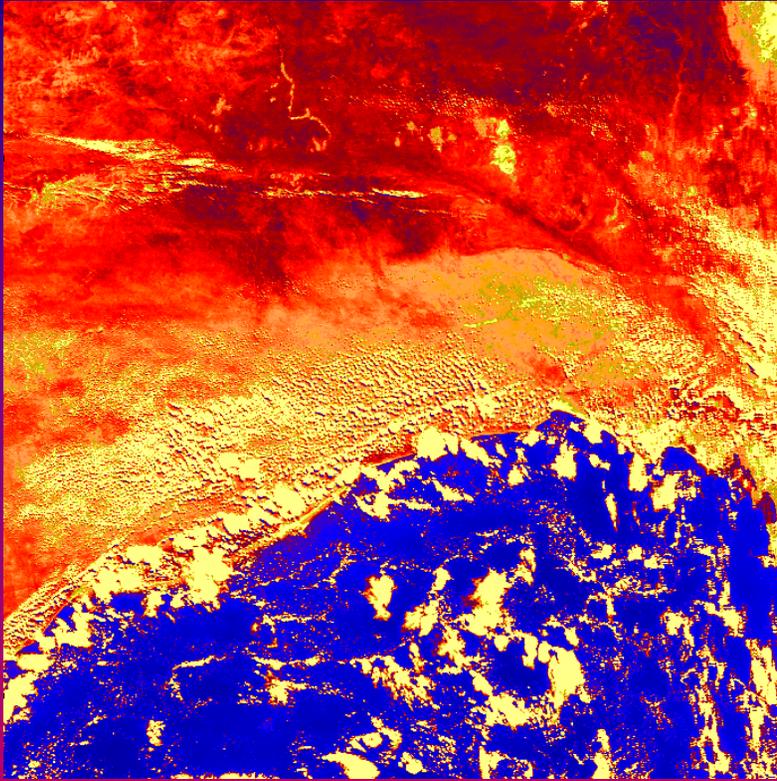
TOVS Mean Temp (Surf-500mb)

## Possible AMSR-E Products from Aqua

PARAMETER	ACCURACY	SPATIAL RESOLUTION
Brightness Temperature	0.2 - 0.7 K	6 - 76 km
Ocean Wind Speed	1.5 m/s	12 km
Water Vapor Over Ocean	0.2 g/cm <sup>2</sup>	23 km
Cloud Liquid Water Over Ocean	3 mg/cm <sup>2</sup>	23 km
Sea Surface Temperature	0.5 K	76 km
Surface Soil Moisture	0.06 g/cm <sup>3</sup> where vegetation is less than 1.5 kg/m <sup>2</sup>	25 km (Equal Area Earth Grid)
Global Rainfall	Ocean: 1 mm/hr or 20% (whichever is greater) Land: 2 mm/hr or 40% (whichever is greater)	10 km
Global Rain Type (Convection fraction)	N/A	10 km

- International DB sites should contact NASDA for software

# International Participation



Australia

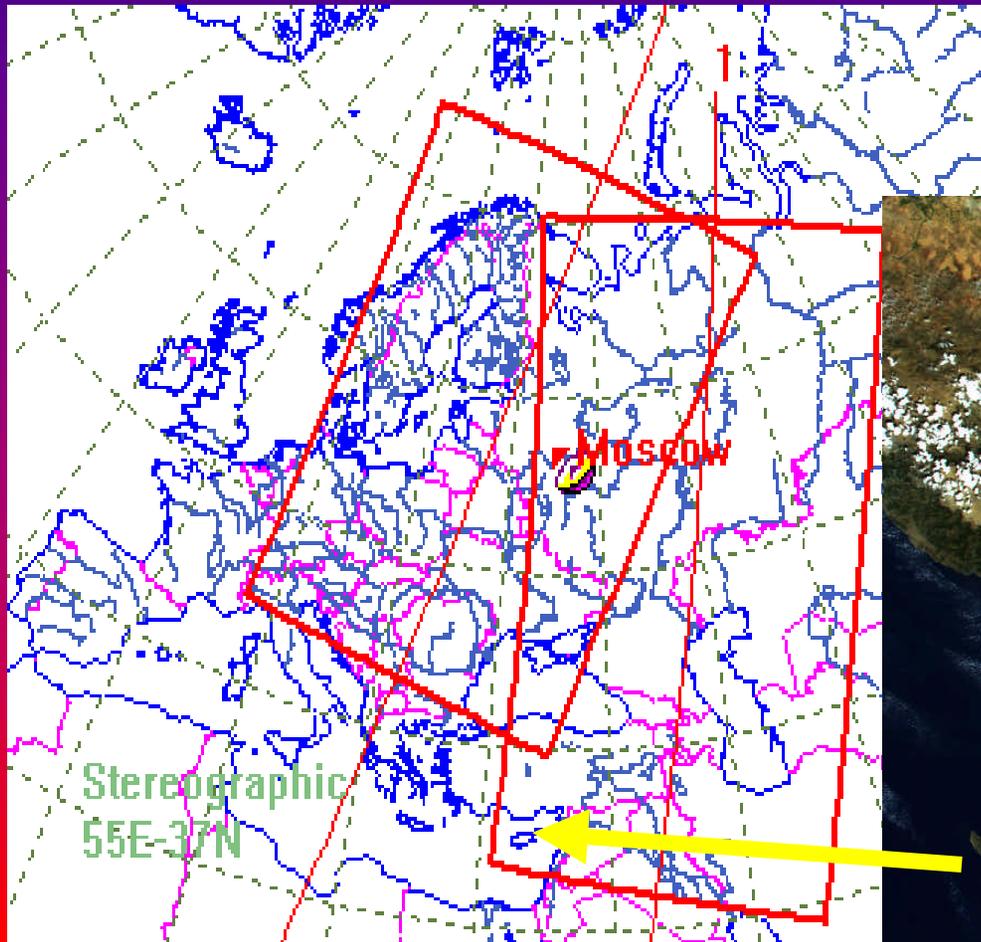


Scotland

- Interest expressed by many other countries, including Japan, Brazil, Argentina, Finland, Sweden, Denmark, France, Russia, Italy, Germany, South Africa, India, Korea, and China.

# ScanEx DB Site Moscow

Cyprus





## International MODIS/AIRS Processing Package (IMAPP) at ScanEx

The International MODIS/AIRS Processing Package (IMAPP) is a suite of programs that lets anybody to process MODIS (and in future releases AIRS ) data from level-0 to level-1A and 1B products. This processing includes following operations

- reformatting data from a sequence of CCSDS packets (level-0 data) into an level-1A HDF file
- calculation of geolocation parameters for each 1km pixel
- calibration of earth view raw MODIS digital counts into radiance values

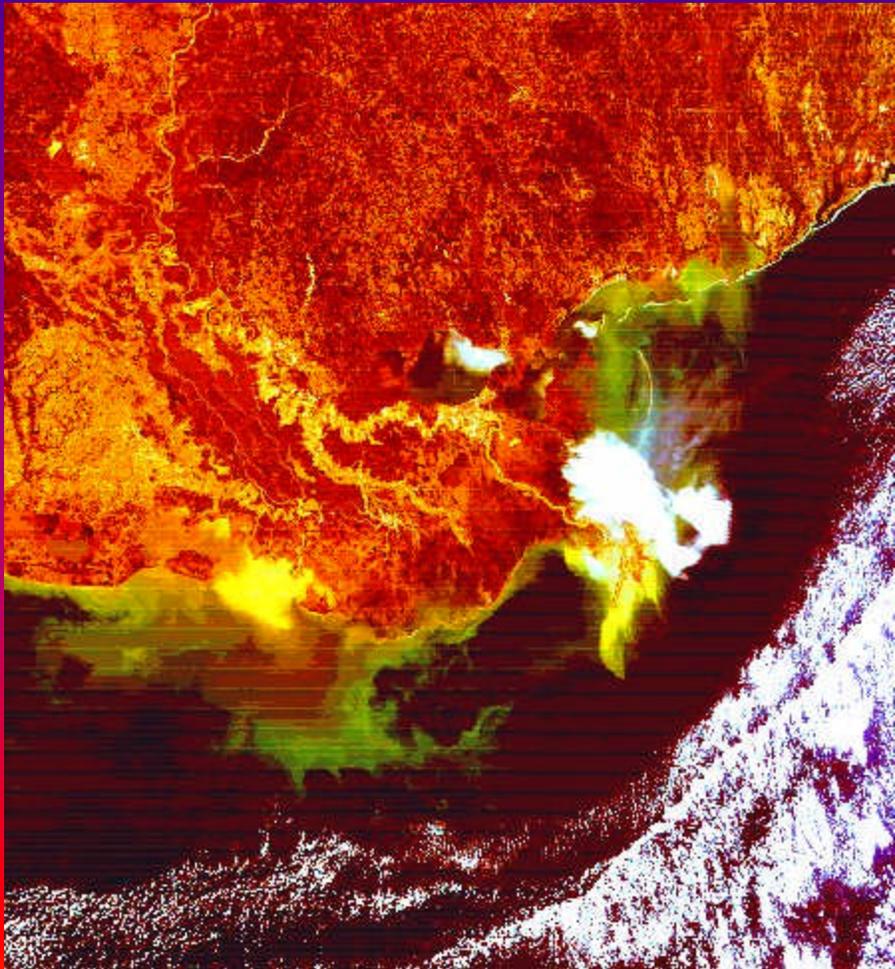
The package has been derived at [Space Science and Engineering Center](#) (SSEC, University of Wisconsin-Madison) from the operational MODIS processing software developed at NASA GSFC. It is distributed freely under the terms of GNU [General Public License](#). Package description and source distribution can be found at the primary SSEC's site (<http://cimss.ssec.wisc.edu/~gumley/IMAPP/IMAPP.html>). R&D center ScanEx has adopted it to run on Microsoft Windows platform. You can freely download the source code patch and ready to run binary distributions directly from this page.

Download IMAPP for windows (IMAPPW) either as full installation package or split into separate binaries and ancillary data archives.

<a href="#">IMAPPW User's manual</a>	36 kB	User's manual (HTML)
<a href="#">IMAPPW User's manual (rus)</a>	135 kB	User's manual in Russian (RTF format)
<a href="#">IMAPPWfull.zip</a>	17 MB	Full binary installation package including all needed ancillary data

# MODIS Real-time Monitoring

Mississippi Delta



Mauna Loa

