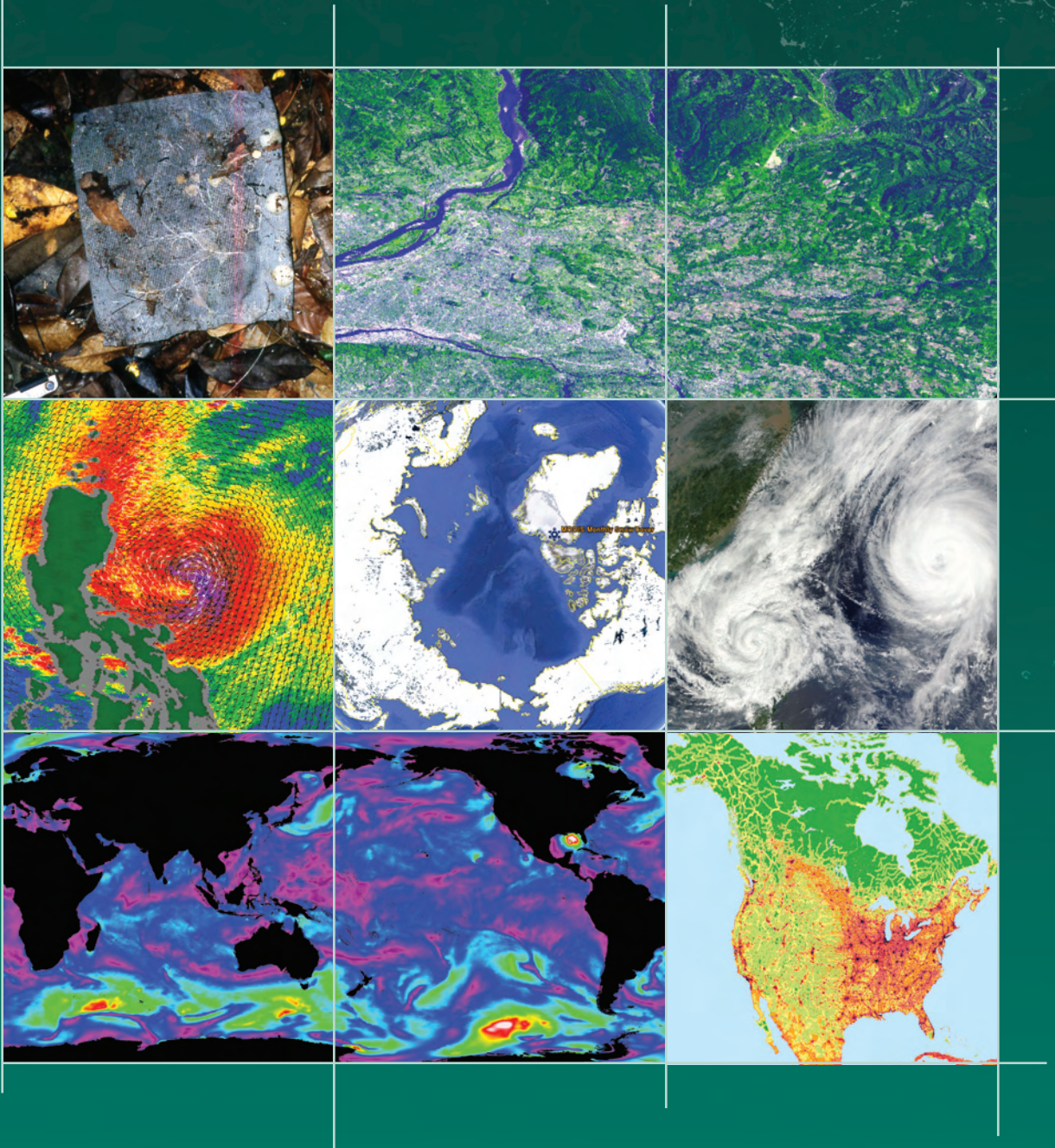National Aeronautics and Space Administration

Earth System Science Data Resources

tapping into a wealth of data, information, and services

Table of Contents

Introduction

Introduction

One of the primary objectives of NASA's Earth science program is to develop a scientific understanding of Earth's interrelated systems and its response to natural and anthropogenic changes.

NASA's Earth Observing System (EOS) comprises a series of satellites, a science component and a data system called the Earth Observing System Data and Information System (EOSDIS). EOSDIS provides command and control, scheduling, data processing, data archiving, and data distribution services for EOS missions. Mission operations coordinate the communications through the Space and Ground Network facilities of the Tracking and Data Relay Satellite System (TDRSS) and Polar Ground stations. The staff at the mission operations facilities perform the spacecraft and instrument control as well as the data capture and initial processing of the telemetry data.

NASA network capabilities transport the data to the science operations facilities. The EOSDIS science operations are performed within a distributed system of many interconnected nodes (Science Investigator-led Processing Systems and distributed data centers) with specific responsibilities for production, archiving, and distribution of Earth science data products. Twelve data centers distribute a breadth of Earth system science data products, data information, services and tools unique to each center's particular science discipline. The data centers provide an assortment of user services. Data support includes end-to-end product support, expert assistance in selecting and obtaining data, online data order and access, data set information discussion lists, referrals to other data resources, hands-on training and assistance, and support for data-handling and visualization tools.

2

Remote Sensing: An Overview

Remote Sensors: An Overview

Types of Remote Sensors

Remote sensing instruments are of two primary types—passive and active. Passive sensors detect natural energy (radiation) that is emitted or reflected by the object or scene being observed. Reflected sunlight is the most common source of radiation measured by passive sensors.

Active sensors, on the other hand, provide their own source of energy to illuminate the objects they observe. An active sensor emits radiation in the direction of the target to be investigated. The sensor then detects and measures the radiation that is reflected or backscattered from the target.

Types of passive and active remote sensors are described in the following paragraphs.

Passive Sensors

Passive sensors include different types of radiometers and spectrometers. Most passive systems used in remote sensing applications operate in the visible, infrared, thermal infrared, and microwave portions of the electromagnetic spectrum. Passive remote sensors include the following:

Accelerometer—An instrument that measures acceleration (change in velocity per unit time). There are two general types of accelerometers. One measures translational accelerations (changes in linear motions in one or more dimensions), and the other measures angular accelerations (changes in rotation rate per unit time).

Radiometer—An instrument that quantitatively measures the intensity of electromagnetic radiation in some bands within the spectrum. Usually, a radiometer is further identified by the portion of the spectrum it covers; for example, visible, infrared, or microwave.

Imaging radiometer—A radiometer that has a scanning capability to provide a two-dimensional array of pixels from which an image may be produced. Scanning can be performed mechanically or electronically by using an array of detectors.

Spectrometer—A device that is designed to detect, measure, and analyze the spectral content of incident electromagnetic radiation. Conventional imaging spectrometers use gratings or prisms to disperse the radiation for spectral discrimination.

Spectroradiometer—A radiometer that measures the intensity of radiation in multiple wavelength bands (i.e., multispectral). Many times the bands are of high-spectral resolution, designed for remotely sensing specific geophysical parameters

Hyperspectral radiometer—An advanced multispectral sensor that detects hundreds of very narrow spectral bands throughout the visible, near-infrared, and mid-infrared portions of the electromagnetic spectrum. This sensor's very high spectral resolution facilitates fine discrimination between different targets based on their spectral response in each of the narrow bands.

Sounder—An instrument that measures vertical distributions of atmospheric parameters such as temperature, pressure, and composition from multispectral information.

Active Sensors

The majority of active systems operate in the microwave portion of the electromagnetic spectrum, which makes them able to penetrate the atmosphere under most conditions. Active remote sensors include the following:

Ranging Instrument—A device that measures the distance between the instrument and a target object. Radars and altimeters work by determining the time a transmitted pulse (microwaves or light) takes to reflect from a target and return to the instrument. Another technique employs identical microwave instruments on a pair of platforms. Signals are transmitted from each instrument to the other, with the distance between the two determined from the difference between the received signal phase and transmitted (reference) phase. These are examples of active techniques. A passive technique views the target from either end of a baseline of known length. The change in apparent view direction (parallax) is related to the absolute distance between the instrument and target.

Radar—An active radio detection and ranging sensor that provides its own source of electromagnetic energy. An active radar sensor, whether airborne or spaceborne, emits microwave radiation in a series of pulses from an antenna. When the energy reaches the target, some of the energy is reflected back toward the sensor. This backscattered microwave radiation is detected, measured, and timed. The time required for the energy to travel to the target and return back to the sensor determines the distance or range to the target. By recording the range and magnitude of the energy reflected from all targets as the system passes by, a two-dimensional image of the surface can be produced.

Scatterometer—A high-frequency microwave radar designed specifically to measure backscattered radiation. Over ocean surfaces, measurements of backscattered radiation in the microwave spectral region can be used to derive maps of surface wind speed and direction.

Lidar—A light detection and ranging sensor that uses a laser (light amplification by stimulated emission of radiation) to transmit a light pulse and a receiver with sensitive detectors to measure the backscattered or reflected light. Distance to the object is determined by recording the time between transmitted and backscattered pulses and by using the speed of light to calculate the distance traveled.

Laser altimeter—An instrument that uses a lidar to measure the height of the platform (spacecraft or aircraft) above the surface. The height of the platform with respect to the mean Earth's surface is used to determine the topography of the underlying surface.

Sounder—An instrument that measures vertical distribution of precipitation and other atmospheric characteristics such as temperature, humidity, and cloud composition.

NASA Earth System Science Remote Sensors

The following tables list and describe many of the passive and active sensors whose data are supported by EOSDIS. Some of these sensors may overlap categories. Section 4 provides information about available data holdings within Earth science disciplines. (See Section 8 for the definitions of the acronyms and abbreviations used in these tables.)

Passive Sensors				
Instrument	Type	Platform	Data Center	Comments
Single Channel/Total Power Radiometers and Imagers				
ACRIM II	Total power radiometer	UARS	LaRC ASDC	Measures total solar irradiance.
ACRIM III	Total power radiometer	ACRIMSAT	LaRC ASDC	Measures total solar irradiance.
TIM	Total power radiometer	SORCE	GES DISC	Measures total solar irradiance.
LIS	Imager	TRMM	GHRC DAAC	Detects intracloud and cloud-to-ground lightning, day and night.
WFC	Wide Field Camera	CALIPSO	LaRC ASDC	Fixed, nadir-viewing imager with a single spectral channel covering the 620-270 nm region.
Multispectral Instruments				
AMPR	Microwave radiometer	ER-2 and DC-8	GHRC DAAC	Cross-track scanning total power microwave radiometer with four channels centered at 10.7, 19.35, 37.1 and 85.5 GHz. (FIRE ACE, Teflun-B, TRMM-LBA, CAMEX-4. TCSP, TC4 projects)
AMSR-E	Multichannel microwave radiometer	Aqua	NSIDC DAAC	Measures precipitation, oceanic water vapor, cloud water, near-surface wind speed, sea and land surface temperature, soil moisture, snow cover, and sea ice. Provides spatial resolutions of 5.4 km, 12 km, 21 km, 25 km, 38 km, 56 km, and 0.25 deg resolution.

Passive Sensors

Instrument	Type	Platform	Data Center	Comments
ASTER	Multispectral radiometer	Terra	LP DAAC ORNL DAAC	Measures surface radiance, reflectance, emissivity, and temperature. Provides spatial resolutions of 15 m, 30 m, and 90 m.
AVHRR	Multispectral radiometer	NOAA POES	GES DISC NSIDC DAAC ORNL DAAC PO.DAAC	Has four or six bands, depending on platform. Telemetried resolutions are 1.1 km (HRPT data) and 4 km (Pathfinder V5 and GAC data).
CERES	Broadband scanning radiometer	Aqua Terra TRMM	LaRC ASDC	Has four to six channels (shortwave, longwave, total). Measures atmospheric and surface energy fluxes. Provides 20 km resolution at nadir.
IIR	Imaging Infrared Radiometer	CALIPSO	LaRC ASDC	Nadir-viewing, non-scanning imager having a 64 km swath with a pixel size of 1 km. Provides measurements at three channels in the thermal infrared window region at 8.7 mm, 10.5 mm, and 12.0 mm.
MAS	Imaging spectrometer	NASA ER-2 aircraft	GES DISC GHRC DAAC LaRC ASDC ORNL DAAC	Has 50 spectral bands. Provides spatial resolution of 50 m at typical flight altitudes.
MISR	Imaging spectrometer	Terra	LaRC ASDC ORNL DAAC	Obtains precisely calibrated images in four spectral bands, at nine different angles, to provide aerosol, cloud, and land surface data. Provides spatial resolution of 250 m to 1.1 km.
MODIS	Imaging spectroradio-meter	Aqua Terra	GES DISC GHRC DAAC LP DAAC MODAPS LAADS NSIDC DAAC OBPG ORNL DAAC PO.DAAC	Measures many environmental parameters (ocean and land surface temperatures, fire products, snow and ice cover, vegetation properties and dynamics, surface reflectance and emissivity, cloud and aerosol properties, atmospheric temperature and water vapor, ocean color and pigments, and ocean biological properties). Provides moderate spatial resolutions of 250 m (bands 1 and 2), 500 m (bands 3–7), and 1 km (bands 8–36).
SSM/I	Multispectral microwave radiometer	DMSP	GHRC DAAC LaRC ASDC NSIDC DAAC PO.DAAC ORNL DAAC	Has seven channels and four frequencies. Measures atmospheric, ocean and terrain microwave brightness temperatures which are used to derive ocean near-surface wind speed, atmospheric integrated water vapor and cloud/rain liquid water content.
SMMR	Multispectral microwave radiometer	Nimbus-7	GES DISC LaRC ASDC NSIDC DAAC PO.DAAC	Ten channels. Measured sea surface temperatures, ocean near-surface winds, water vapor and cloud liquid water content, sea ice extent, sea ice concentration, snow cover, snow moisture, rainfall rates, and differential of ice types.
TMI	Multispectral Microwave Radiometer	TRMM	GES DISC	TMI measures the intensity of radiation at five separate frequencies: 10.7, 19.4, 21.3, 37, 85.5 GHz. TMI measures microwave brightness temperatures, water vapor, cloud water, and rainfall intensity.

Ranging Instrument

Instrument	Type	Platform	Data Center	Comments
ACC	Accelerometer	GRACE	PO.DAAC	The Onera SuperSTAR Accelerometer measures the non-gravitational forces acting on the GRACE satellites.

Hyperspectral Instruments

Instrument	Type	Platform	Data Center	Comments
AVIRIS	Imaging spectrometer	Aircraft	ORNL DAAC	Has 224 contiguous channels, approximately 10 nm wide. Measurements are used to derive water vapor, ocean color, vegetation classification, mineral mapping, and snow and ice cover (BOREAS Project).

Passive Sensors				
Instrument	Type	Platform	Data Center	Comments
SOLSTICE	Spectrometer	SORCE	GES DISC	Measures the solar spectral irradiance of the total solar disk in the ultraviolet wavelengths from 115 to 430 nm.
Polarimetric Instruments				
POLDER	Polarimeter	Aircraft	ORNL DAAC	Measures the polarization and the directional and spectral characteristics of the solar light reflected by aerosols, clouds, and the Earth's surface (BOREAS Project).
PSR	Microwave polarimeter	Aircraft	GHRC DAAC	Measures wind speed and direction (CAMEX-3 Project).
Sounding Instruments				
AIRS	Sounder	Aqua	GES DISC	Measures air temperature, humidity, clouds, and surface temperature. Provides spatial resolution of ~13.5 km in the IR channels and ~2.3 km in the visible. Swath retrieval products are at 50 km resolution.
AMSU	Sounder	Aqua	GES DISC GHRC DAAC	Has 15 channels. Measures temperature profiles in the upper atmosphere. Has a cloud filtering capability for tropospheric temperature observations. Provides spatial resolution of 40 km at nadir.
HAMSR	Sounder	DC-8	GHRC DAAC	Measures vertical profiles of temperature, water vapor, from the surface to 100mb in 2-4 km layers. (CAMEX-4, NAMMA projects)
HIRDLS	Sounder	Aura	GES DISC	Measures infrared emissions at the Earth's limb in 21 channels to obtain profiles of temperature, ozone, CFCs, various other gases affecting ozone chemistry, and aerosols at 1 km vertical resolution. In addition, HIRDLS measures the location of polar stratospheric clouds.
MLS	Sounder	Aura	GES DISC	Five broad band radiometers and 28 spectrometers measure microwave thermal emission from the limb of Earth's atmosphere to derive profiles of ozone, SO_2, N_2O, OH and other atmospheric gases, temperature, pressure, and cloud ice.
MOPITT	Sounder	Terra	LaRC ASDC ORNL DAAC	Measures carbon monoxide and methane in the troposphere. Is able to collect data under cloud-free conditions. Provides horizontal resolution of ~22 km and vertical resolution of ~4 km.
OMI	Multispectral radiometer	Aura	GES DISC	Has 740 wavelength bands in visible and ultraviolet. Measures total ozone and profiles of ozone, N_2O, SO_2, and several other chemical species.
TES	Imaging Spectrometer	Aura	LaRC ASDC	High-resolution imaging infrared Fourier-transform spectrometer that operates in both nadir and limb-sounding modes. Provides profile measurements of ozone, water vapor, carbon monoxide, methane, nitric oxide, nitrogen dioxide, and nitric acid.

Active Sensors

Instrument	Type	Platform	Data Center	Comments
Altimeters - Radar and Laser (Lidar)				
ALT-A, -B	Radar altimeter	TOPEX/ Poseidon	PO.DAAC	Dual-frequency altimeter that measures height of the satellite above the sea (satellite range), wind speed, wave height, and ionospheric correction.
CALIOP	Cloud and Aerosol Lidar	CALIPSO	LaRC ASDC	Two-wavelength polarization-sensitive lidar that provides high-resolution vertical profiles of aerosols and clouds.
GLAS	Laser altimeter	ICESat	NSIDC DAAC	The main objective is to measure ice sheet elevations and changes in elevation through time. Secondary objectives include measurement of cloud and aerosol height profiles, land elevation and vegetation cover, and sea ice thickness.
Poseidon-1	Radar altimeter	TOPEX/ Poseidon	PO.DAAC	Single-frequency altimeter that measures height of the satellite above the sea (satellite range), wind speed, and wave height.
Poseidon-2	Radar altimeter	Jason-1	PO.DAAC	Measures sea level, wave height, wind speed, and ionospheric correction.
Scatterometers				
NSCAT	Radar scatterometer	ADEOS-I	PO.DAAC	Dual Fan-Beam Ku Band that measures ocean vector winds at a nominal grid resolution of 25 km.
SASS	Radar scatterometer	Seasat	PO.DAAC	Dual Fan-Beam Ku Band that measures ocean vector winds at a nominal grid resolution of 25 km.
SeaWinds	Radar scatterometer	QuikSCAT ADEOS-II	PO.DAAC	Dual Pencil-Beam Ku Band that measures ocean vector winds at a nominal grid resolution of 25 km.
Imaging Radar/SAR				
SAR	Synthetic aperature radar	ERS-1 ERS-2 JERS-1 RADARSAT-1 PALSAR	ASF SDC NSIDC DAAC ORNL DAAC	Provides high-resolution surface imagery at 7 to 240 m.
Sounding Instruments				
CLS	Lidar	ER-2	LaRC ASDC	Determines vertical cloud structure. (FIRE Project).
LASE	Lidar	DC-8	GHRC	Measures water vapor, aerosols, and clouds throughout the troposphere (CAMEX-4, TCSP, NAMMA projects).
PR	Phased-array radar	TRMM	GES DISC ORNL DAAC	Measures 3-D distribution of rain and ice. Provides horizontal resolution of 250 m and vertical resolution of 5 km.
VIL	Lidar	Ground	LaRC ASDC ORNL DAAC	Determines vertical cloud structure (FIFE, FIRE and BOREAS Projects).
Ranging Instrument				
KBR	Ranging Instrument	GRACE	PO.DACC	The dual-frequency KBR instrument measures the range between the GRACE satellites to extremely high precision.

Data Terminology and Formats

Data Terminology and Formats

Data Processing Levels for EOSDIS Data Products

EOSDIS data products are processed at various levels ranging from Level 0 to Level 4. Level 0 products are raw data at full instrument resolution. At higher levels, the data are converted into more useful parameters and formats. All EOS instruments must have Level 1 products. Most have products at Levels 2 and 3, and many have products at Level 4.

Data Level	Description
Level 0	Reconstructed, unprocessed instrument and payload data at full resolution, with any and all communications artifacts (e.g., synchronization frames, communications headers, duplicate data) removed. (In most cases, the EOS Data and Operations System (EDOS) provides these data to the data centers as production data sets for processing by the Science Data Processing Segment (SDPS) or by a SIPS to produce higher-level products.)
Level 1A	Reconstructed, unprocessed instrument data at full resolution, time-referenced, and annotated with ancillary information, including radiometric and geometric calibration coefficients and georeferencing parameters (e.g., platform ephemeris) computed and appended but not applied to Level 0 data.
Level 1B	Level 1A data that have been processed to sensor units (not all instruments have Level 1B source data).
Level 2	Derived geophysical variables at the same resolution and location as Level 1 source data.
Level 3	Variables mapped on uniform space-time grid scales, usually with some completeness and consistency.
Level 4	Model output or results from analyses of lower-level data (e.g., variables derived from multiple measurements).

Data Formats

HDF

The Hierarchical Data Format (HDF) is designed to facilitate managing and sharing scientific data. HDF includes two formats (HDF4 and HDF5), software for accessing data in HDF formats, and applications for working with HDF data. HDF is designed for efficient storage and access of high volume, complex data, and for mixing varieties of data types in a single container. HDF libraries are used to read and write data, to define data types and structures for applications, and to control how data is stored. HDF applications include commercial and free software for viewing, creating, comparing, searching, analyzing and visualizing HDF data, and for converting between HDF and other formats. There are specialized libraries for HDF in application domains. These libraries promote the standard use of HDF, enabling data consumers to more easily share their data and applications. Some libraries, such as HDF-EOS, are broad in scope, and support a very wide range of applications. For more information about HDF as a scientific data format, see *http://hdfgroup.org*.

HDF-EOS

Hierarchical Data Format for the Earth Observing System (HDF-EOS) is NASA's primary format for standard data products derived from EOS instruments. Because many Earth science data structures need to be geolocated, NASA developed the HDF-EOS format with additional conventions and data types for HDF files. There are two versions of HDF-EOS: HDF-EOS2 and HDF-EOS5. HDF-EOS2 uses HDF4 and HDF-EOS5 uses HDF5.

HDF-EOS2 and HDF-EOS5 support three geospatial data types (grid, point, swath) and HDF-EOS5 also supports a "Zonal Average" datatype. HDF-EOS provides uniform access to diverse data types in a geospatial context. The HDF-EOS software libraries allow a user to query or subset the contents of a file by Earth coordinates and time if there is a spatial dimension in the data. HDF-EOS also provides a container for EOS inventory, archive and product specific metadata. HDF-EOS2 is used operationally by MODIS, MISR, ASTER, Landsat, AIRS and other EOS instruments. HDF-EOS5 is used by EOS Aura instruments.

Tools that process standard HDF files will also read HDF-EOS files; however, standard HDF library calls cannot access geolocation data, time data, and product metadata as easily as with HDF-EOS library calls. For an overview of data tools, see Section 6. For more information on HDF-EOS, see *http://www.hdfeos.org*.

netCDF

The network Common Data Form (netCDF) is an interface for array-oriented data access and a freely distributed collection of software libraries for C, FORTRAN, C++, Java, and Perl that provide implementations of the interface. The netCDF software was developed at the Unidata Program Center in Boulder, Colorado, and augmented by contributions from other netCDF users. The netCDF libraries define a machine-independent format for representing scientific data. Together, the interface, libraries, and format support the creation, access, and sharing of scientific data.

For more information or to obtain netCDF software, see *http://www.unidata.ucar.edu/software/netcdf*. (The above information on netCDF was taken from the Unidata Web site.)

ASCII

An American Standard Code for Information Interchange (ASCII) text file is one in which each byte represents one character according to the ASCII code. ASCII files are human-readable and are sometimes called plain text files. Files that have been formatted with a word processor should be transmitted as binary files to preserve the formatting.

Binary

A binary file is computer-readable but not human-readable. Binary formats are used for executable programs and numeric data, whereas text formats are used for textual data. Many files contain a combination of binary and text formats. Such files are usually considered to be binary. Binary files are dependent upon machine architecture.

Shapefile

A shapefile is a digital vector (non-topological) storage format for storing geometric location and associated attribute information. The shapefile format specified by ESRI can be used by ArcView, ArcInfo, ArcGIS and other widely used GIS software. A shapefile stores map (geographic) features and attribute data as a collection of files having the same prefix and several file extensions. Geographic features in a shapefile can be represented by points, lines, or polygons (areas). NOTE: An individual shapefile is actually a collection of files as described above that must be moved or distributed as a group otherwise the shapefile can be rendured unusable.

TIFF

A TIFF (Tagged Image File Format) is a raster data format for storage, transfer, display, and printing of raster images, such as clipart, logotypes, and scanned documents. The TIFF imagery file format can be used to store and transfer digital satellite imagery, scanned aerial photos, elevation models, scanned maps or the results of many types of geographic analysis. TIFF is a full-featured format in the public domain, capable of supporting compression, tiling, and extension to include geographic metadata.

GeoTIFF

GeoTIFF implements the geographic metadata formally, using compliant TIFF tags and structures. GeoTIFF refers to TIFF files which have geographic (or cartographic) data embedded as tags within the TIFF file. The geographic data can then be used to position the image in the correct location and geometry on the screen of a geographic information display. GeoTIFF is a metadata format, which provides geographic information to associate with the image data. But the TIFF file structure allows both the metadata and the image data to be encoded into the same file.

GeoTIFF makes use of a public tag structure which is platform interoperable between any and all GeoTIFF-savvy readers. GIS, CAD, image processing, desktop mapping and any other types of systems using geographic images can read any GeoTIFF files created on any system to the GeoTIFF specification.

JPEG

JPEG is the standard algorithm for the compression of digital images devised by the Joint Photographic Experts Group and having the filename extension jpg. The JPEG standard uses a 'lossy' Data Compression method in which some data is sacrificed (lost) to achieve greater compression. Files formatted using JPEG are not geolocated.

4

Earth System Science Data Centers

Earth System Science Data Centers

This section provides information on each of the EOSDIS data centers. Each data center archives and distributes data products related to its areas of Earth science expertise. They also provide assistance to users in finding and ordering data products, and many provide tools (see Chapter 6) for reading, manipulating, and/or displaying the data. User services contact information for each data center is given below.

Alaska Satellite Facility Synthetic Aperture RADAR (SAR) Data Center (ASF SDC)

The ASF SAR Data Center is located in the Geophysical Institute at the University of Alaska Fairbanks. The ASF SDC is supported by NASA to acquire, process, archive, and distribute Synthetic Aperture Radar (SAR) data from polar orbiting satellites to advance polar research (sea ice, polar processes) and geophysics. ASF is actively archiving data from the Canadian RADARSAT-1, European Remote Sensing Satellilte-2 (ERS-2) and the Japanese ALOS PALSAR. In addition, ASF archives heritage data from the ERS-1 and Japanese Earth Resource Satellite-1 (JERS-1). The majority of available data is considered restricted and available only to NASA-approved researchers. Interested users gain access to the data by submitting a proposal to asf@eos.nasa.gov. Guidelines on the structure of the proposal can be found at: *http://www.asf.alaska.edu/reference/daac_proposal_guidelines*

Extensive deforestation of the tropical rainforest in the central highlands of Madagascar has caused some of the highest erosion rates in the world. The eroding soils have filled the Betsiboka River Delta with silt. ASF's SAR archive is ideal for studying landscape changes over time. This RADAR-SAT-1 Standard Beam 4 image of the Delta was acquired on December 14, 1997.

ASF also provides unrestricted data products to users. For information see, *http://www.asf.alaska.edu/sardatacenter/getdata*

The ASF SDC archive contains data from around the world. All the satellites are owned by foreign flight agencies, therefore access to the data is restricted.

Data Access

Online access to ASF SAR Data Center data is available through the WIST data search and order system and through the URSA interface at ASF SAR Data Center https://ursa.asfdaac.alaska.edu/cgi-bin/login/guest (see section 5). For information on becoming an approved researcher, see the ASF web site: *http://www.asf.alaska.edu/reference/daac_proposal_guidelines*

Contact Information

ASF SDC User Services
Alaska Satellite Facility
University of Alaska Fairbanks
Phone: +1 907-474-6166
FAX: +1 907-474-2665
E-mail: *asf@eos.nasa.gov or uso@asf.alaska.edu*
URL: *http://www.asf.alaska.edu*

Crustal Dynamics Data Information System (CDDIS)

The CDDIS is NASA's data archive and information service supporting the international space geodesy community. For over 25 years, the CDDIS has provided continuous, long term, public access to the data (mainly GNSS-Global Navigation Satellite System, laser ranging, VLBI-Very Long Baseline Interferometry, and DORIS-Doppler Orbitography and Radiopositioning Integrated by Satellite) and products derived from these data required for a variety of science observations, including the determination of a global terrestrial reference frame and geodetic studies in plate tectonics, earthquake displacements, volcano monitoring, Earth orientation, and atmospheric angular momentum, among

others. The specialized nature of the CDDIS lends itself well to enhancement to accommodate diverse data sets and user requirements. The CDDIS serves as one of the primary data centers and core components for the geometric services established under the International Association of Geodesy (IAG), an organization that promotes scientific cooperation and research in geodesy on a global scale.

Data Access

Users can access the data and products available through the CDDIS via anonymous ftp (see below).
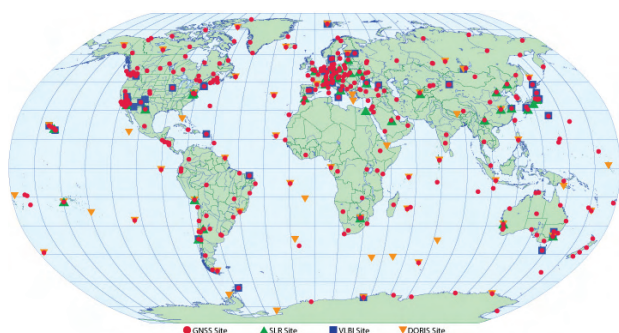
The figure illustrates the global networks of geodetic sites which consist of 425 GNSS receivers, 44 laser ranging sites, 45 VLBI stations, and 58 DO-RIS sites and provides the means of determining an accurate and global Terrestrial Reference Frame.

Contact Information

Carey Noll
NASA GSFC
E-mail: Carey.Noll@nasa.gov
URL: *http://cddis.gsfc.nasa.gov*
FTP: *ftp://cddis.gsfc.nasa.gov*

GSFC Earth Sciences Data and Information Services Center (GES DISC)

The NASA GES DISC is located within the Goddard Space Flight Center (GSFC) in Greenbelt, Maryland. It provides access to a wide range of global climate data, concentrated primarily in the areas of atmospheric composition, atmospheric dynamics, global precipitation, and solar irradiance. The DISC supports data from many heritage and EOS missions including Aqua, Aura, SORCE, TRMM, UARS, and Earth Probe (TOMS). The GES DISC also provides data subsetting, exploration, visualization, and access services.

Data Access

GES DISC data sets can be accessed through the online Data Holdings page which provides several search and order methods, including the keyword-based Mirador and OpenDAP, *http://disc.sci.gsfc.nasa.gov/data-holdings*. Ac-

cess to GES DISC data is also available through the WIST data search-and-order system (see section 5).
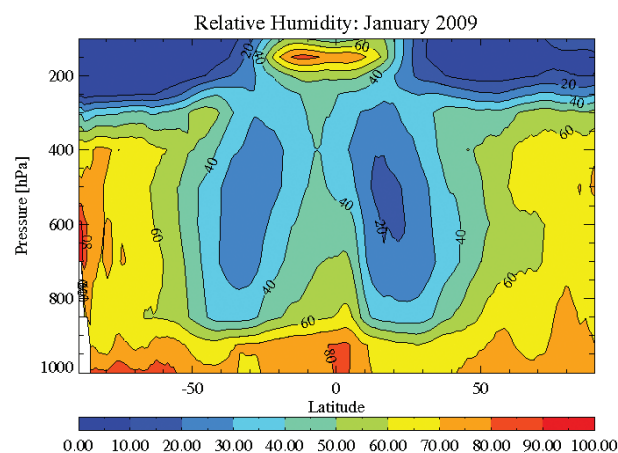

Zonally averaged Atmospheric Infrared Sounder (AIRS) relative humidity data are displayed for January 2009. The pressure range is from 1000 to 100 hPA, which extends from the Earth's surface to the top of the troposphere. This depiction of global atmospheric relative humidity shows the moisture being transported from the warm tropics to higher latitudes. The drier regions of the middle troposphere which occur at temperate latitudes are due to subsidence of cold dry air from high altitude.

Contact Information

GES DISC User Services
Goddard Space Flight Center
Phone: +1 301-614-5224
FAX: +1 301-614-5268
E-mail: help-disc@listserv.gsfc.nasa.gov
URL: *http://disc.sci.gsfc.nasa.gov*

Global Hydrology and Resource Center DAAC (GHRC DAAC)

The GHRC DAAC provides both historical and current Earth Science data, information, and products from satellite, airborne, and surface-based instruments. The GHRC acquires basic data streams and produces derived products from many of those instruments. The data center specializes in data involving the hydrological cycle, severe weather interactions, lightning, and convective processes.
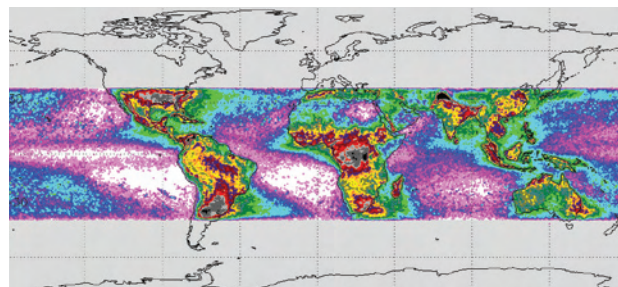
The Lightning Imaging Sensor (LIS) is a space-based lightning sensor aboard the EOS TRMM satellite. The LIS instrument records the time of occurrence of a lightning event, measures the radiant energy and estimates the location during both day and night conditions with high detection efficiency. Courtesy: GHRC DAAC

Data Access

GHRC data and information may be obtained from the GHRC search and order tool, HyDRO, the GHRC Data Pool, and WIST/ECHO (see section 5).

Contact Information

GHRC DAAC User Services
Global Hydrology and Climate Center
Phone: +1 256–961–7932
Fax: +1 256–961–7723
E-mail: ghrc@eos.nasa.gov
URL: *http://ghrc.msfc.nasa.gov*

Langley Research Center (LaRC) Atmospheric Science Data Center (ASDC)

The ASDC at NASA LaRC supports more than 40 projects and has more than 1800 archived data sets. These data sets were obtained from satellite measurements, field experiments, and modeled data products. ASDC projects are focused on the Earth science disciplines Radiation Budget, Clouds, Aerosols, and Tropospheric Chemistry. A complete list of data sets is available at *http://eosweb.larc.nasa.gov*

Data Access

There are multiple methods of obtaining data and information from the NASA Langley ASDC including ASDC ordering tools, Data Pool, Web download of renewable energy data (SSE), pre-packaged CDs, and WIST (see section 5).

Contact Information

User and Data Services
NASA Langley Research Center
Phone: +1 757–864–8656
Fax: +1 757–864–8807
E-mail: larc@eos.nasa.gov
URL: *http://eosweb.larc.nasa.gov*
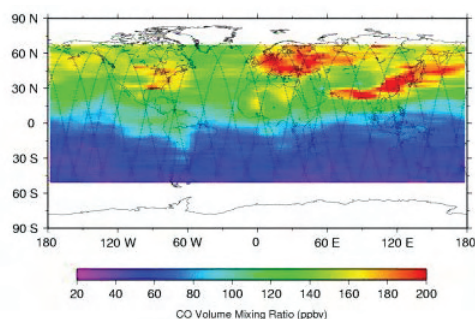
Tropospheric Emission Spectometer (TES) nadir observations on April 12 and 13, 2009 for surface carbon monoxide (CO). High levels of CO are shown near southern Alaska. Courtesy: TES Team
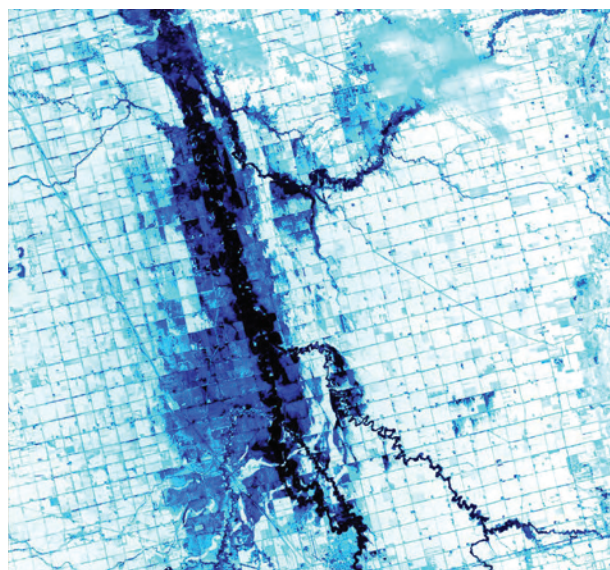
Fargo, North Dakota, experienced the most severe floods in its recorded history during March, 2009. This scene was acquired by the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) on April 2, 2009. The enlarged state of the Red River, shown in black, is readily visible. The grid pattern of the road network is evident in this scene amidst snow-covered fields.

Land Processes DAAC (LP DAAC)

The LP DAAC at the USGS Earth Resources Observation and Science (EROS) Center ingests, processes, archives, and distributes data products related to land processes derived from two EOS sensors, ASTER and MODIS. The LP DAAC provides data crucial to the investigation, characterization, and monitoring of biological, geological, hydrological, ecological, and related conditions and processes. In doing so, it promotes interdisciplinary study and understanding of Earth's integrated systems.

Data Access

There are several tools available to discover LP DAAC data. Selected ASTER and MODIS data products may be obtained through GLOVIS, LP DAAC Data Pool, and MRTWeb. These tools are listed in more detail on our website at *https://lpdaac. usgs.gov/lpdaac/get_data* (See Section 6). All LP DAAC Data holdings are available to search and order through ECHO WIST. See section 5 for more information. Data are available for FTP delivery.

Contact Information

LP DAAC User Services
U.S. Geological Survey
Earth Resources Observation and Science (EROS) Center
Phone: +1 605–594–6116
U.S. Toll Free: 1–866–573–3222
Fax: +1 605–594–6963
E-mail: LPDAAC@eos.nasa.gov
URL: *https://lpdaac.usgs.gov*

DJF, Y2005, without Deep Blue

0.0   AOD   1.0

With Deep Blue

0.0   AOD   1.0
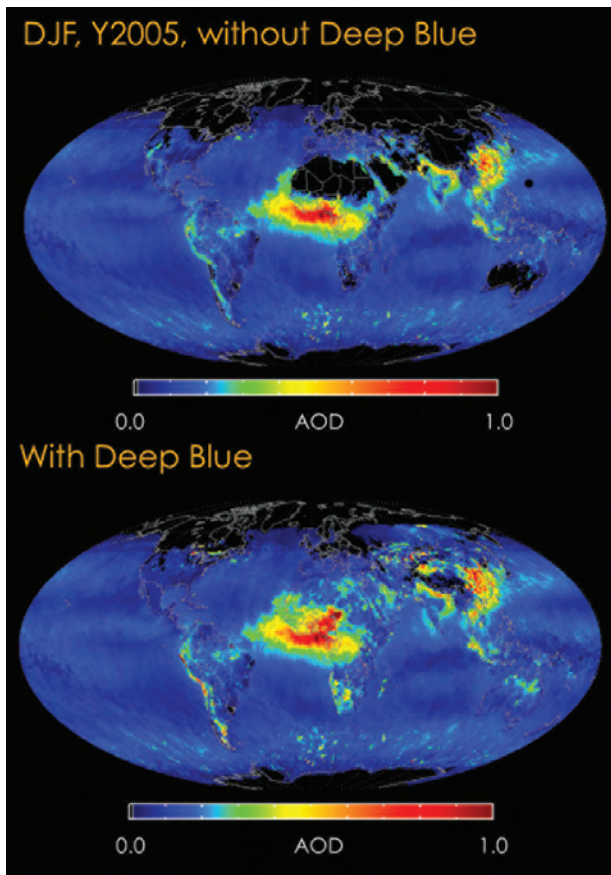
The MODIS Deep Blue Aerosol Algorithm extends the range of aerosol retrievals over land to include bright surfaces such as deserts. At left, average aerosol optical depth (AOD), a measure of aerosol concentration, is shown for December, January and February (DJF) of 2005 using the standard MODIS products over land and ocean. Black areas, with no available data, had covered many of the world's desert regions. At right, when Deep Blue information is added, most of these data gaps are now filled.

MODAPS Level 1 Atmosphere Archive and Distribution System (MODAPS LAADS)

MODAPS LAADS, located within GSFC, provides access to MODIS Level 1 data (geolocation, L1A, and radiance L1B) and Atmosphere (Level 2 and 3) data products. MODAPS supports MODIS data from both the Terra and Aqua platforms. Products may be subset by parameter, area, or band, and may be mosaiced, reprojected, or masked. Users may also visually browse MODIS level 1 and atmosphere data products.

Data Access

MODAPS provides access to its data holdings through its Level 1 and Atmosphere Archive and Distribution System (LAADS). The url for ladsweb is given below. Data searches may be conducted using product name, temporal window, collection, and spatial coordinates, or may be found and downloaded using the Level 2 and Level 3 browsers. A variety of subsetting and reprojection options are available to the user. Data may also be downloaded directly from the data pool using FTP.

Contact Information

MODAPS User Support
Phone: +1 301-352-2106
Toll Free Phone (U.S. Only): +1 866-506-6347
Email: modapsuso@sigmaspace.com
URL: *http://ladsweb.nascom.nasa.gov*

## National Snow and Ice Data Center DAAC (NSIDC DAAC)

The NSIDC DAAC provides data and information for snow and ice processes, particularly interactions among snow, ice, atmosphere, and ocean, in support of research in global change detection and model validation. It archives and distributes cryosphere and climate related products from several EOS sensors including MODIS, AMSR-E, and GLAS. NSIDC also provides general data and information services to the cryospheric and polar processes research community.

Data Access

Data orders may be placed at the NSIDC DAAC through the WIST, SNOWI, or Data Pool (see sections 5 and 6). Users may also access information about NSIDC data holdings through the online data catalog on NSIDC's Web site. NSIDC data products are available by FTP. NSIDC will provide data on other forms of media (DVD, CD) by special request.

Contact Information

NSIDC DAAC User Services
National Snow and Ice Data Center - University of Colorado at Boulder
Phone: +1 303–492–6199
Fax: +1 303–492–2468
E-mail: nsidc@eos.nasa.gov or nsidc@nsidc.org
URL: *http://nsidc.org*
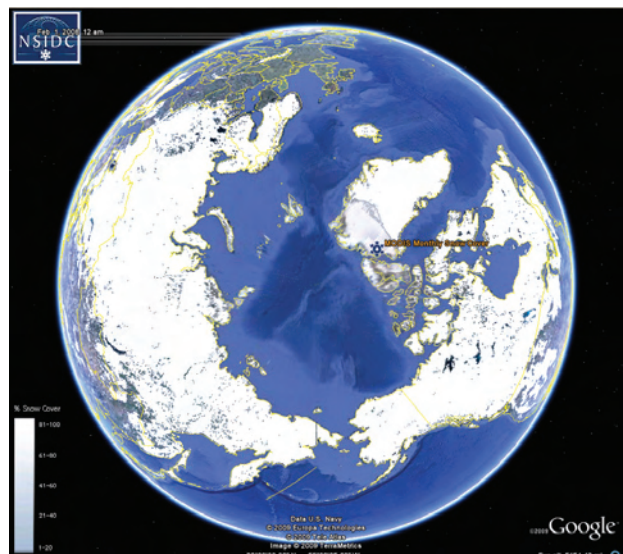
This image shows the MODIS/Terra global monthly average snow cover data for February 2008 displayed in Google Earth.

17
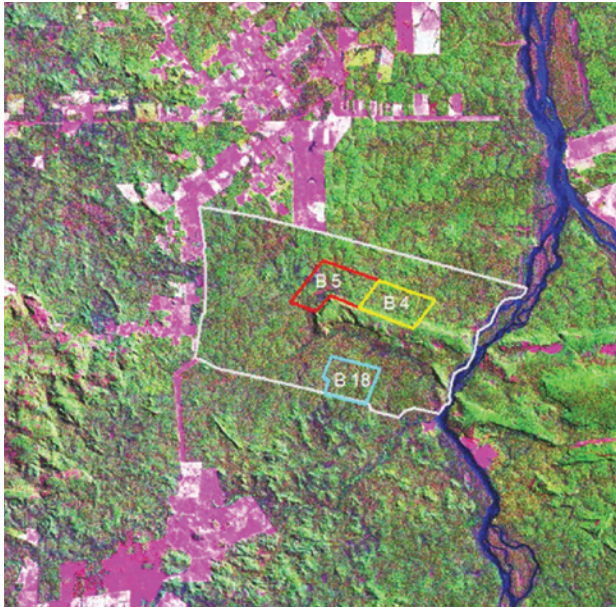
LANDSAT TM image acquired July 1996 showing location of the logging concession at Fazenda Rosahmar adjacent to the Rio Juruena in the country of Juruena in southern Amazonia, MT, Brazil.

Oak Ridge National Laboratory DAAC (ORNL DAAC)

The ORNL DAAC provides data and information relevant to biogeochemical dynamics, ecological data, and environmental processes, critical for understanding the dynamics relating the biological, geological, and chemical components of Earth's environment. These dynamics are influenced by interactions between organisms and their physical surroundings, including soils, sediments, water, rocks, and air. ORNL archives contain data from a large number of field campaigns, climate, vegetation, and soil collections, satellite validation campaigns, and model products. MODIS land product subsets are also provided.

Data Access

ORNL DAAC data are available through an online search-and-order system at *http://daac.ornl.gov* and through WIST(See Section 5).

Contact Information

ORNL DAAC User Services
Oak Ridge National Laboratory
Phone: +1 865–241–3952
Fax: +1 865–574–4665
E-mail: ornl@eos.nasa.gov or
ornldaac@ornl.gov
URL: *http://daac.ornl.gov*

Ocean Biology Processing Group

The OceanColor data facility at GSFC archives and distributes ocean color data from several sensors, including MODIS Aqua, SeaWiFS, OCTS, and CZCS, as well as sea surface temperature data from Terra and Aqua MODIS. SeaWiFS data access is restricted to authorized users; new users can request authorization using an online application form (see the Support Services link below).

Data Access

OceanColor provides access to data and information through the OceanColor Web. Users can visually search the ocean color data archive and directly download and/or order data from single files to the entire mission using the Level 1 and 2 Browser. Using the Level 3 Browser, users may also browse the entire Level 3 global ocean color data set for many parameters and time periods and download either PNG images or digital data in HDF format. In addition, the OceanColor Project maintains several FTP sites containing the most popular data products including the complete Level 3 data archive.

Contact Information

OceanColor Web: *http://oceancolor.gsfc.nasa.gov*
Support Services (and SeaWiFS authorization):
http://oceancolor.gsfc.nasa.gov/SUPPORT/register.html
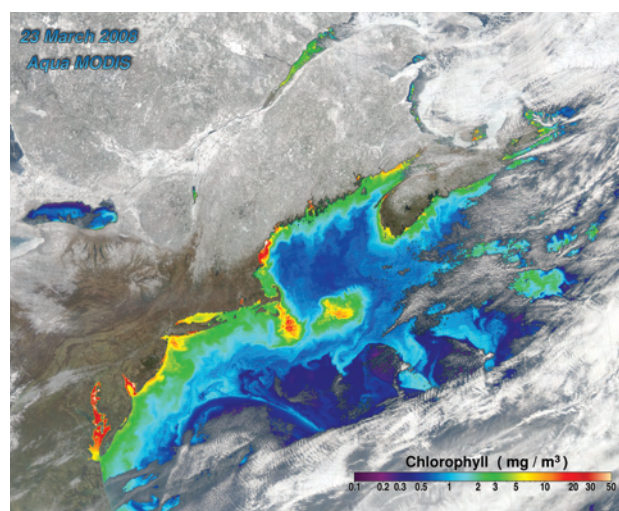
On March 23, 2008, snow still covers much of northern New England and the Canadian Maritimes. In this MODIS view of oceanic chlorophyll concentrations, however, the spring bloom is already under way over Nantucket Shoals and Georges Bank making those regions stand out at the southern end of the Gulf of Maine. Image Courtesy: Ocean Biology Processing Group
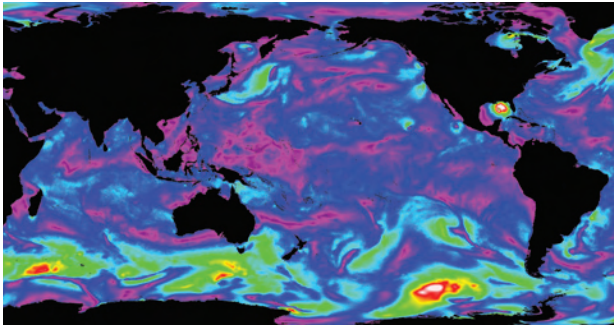
The image depicts ocean surface wind speeds (referenced to 10 meters) from the Cross-Calibrated Multi-Platform (CCMP) Level 3.0 product on 1200 UTC September 15, 2004. Warmer colors represent the highest wind speeds up to 30 m/s while the cooler colors represent calmer winds. The regional plot depicts the cyclonic flow characteristics of Hurricanes Ivan (Gulf of Mexico), Javier (East Pacific), and Isis (East Pacific).

Physical Oceanography DAAC (PO.DAAC)

The PO.DAAC facility at JPL provides data and related information pertaining to the physical processes and conditions of the global oceans, including measurements of ocean winds, temperature, topography, salinity, circulation and currents, and sea ice. The PO.DAAC ingests and archives data products from various projects, such as QuikScat, Jason-1, MODIS, GHRSST and AVHRR Pathfinder, creates value-added higher level products and distributes these products to the international ocean and climate research communities.

Data Access

The entire PO.DAAC data holdings are maintained online for instant download via standard FTP (ftp://podaac.jpl.nasa.gov). The PO.DAAC also hosts online search and access tools that give users the ability to identify and select the specific data that meets a particular need. In addition, the PO.DAAC web portal provides a forum for users to access information related to the data holdings and learn about the utility of the data for ocean and climate research (http://podaac.jpl.nasa.gov)

Contact Information

PO.DAAC User Services
Jet Propulsion Laboratory
E-mail: jpl@eos.nasa.gov or
podaac@podaac.jpl.nasa.gov
URL: *http://podaac.jpl.nasa.gov*
FTP: *podaac.jpl.nasa.gov*

## Socioeconomic Data and Applications Center (SEDAC)

SEDAC is operated by the Center for International Earth Science Information Network (CIESIN), a unit of the Earth Institute at Columbia University based at Lamont-Doherty Earth Observatory in Palisades, New York. SEDAC's missions are to synthesize Earth science and socioeconomic data and information in ways useful to a wide range of decision makers and other applied users, and to provide an "Information Gateway" between the socioeconomic and Earth science data and information domains. The data center has extensive holdings related to population, sustainability, and geospatial data, and provides access to a large number of multilateral environmental agreements.

Data Access

SEDAC datasets can be accessed via the SEDAC web site, by searching an Information Gateway of metadata, or by browsing the SEDAC Dataset Catalog. The gateway is available at *http://sedac.ciesin.columbia.edu/gateway*

Contact Information

SEDAC User Services
CIESIN at Columbia University
Phone: +1 845–365–8920
Fax: +1 845–365–8922
E-mail: sedac@eos.nasa.gov or
ciesin.info@ciesin.columbia.edu
URL: *http://sedac.ciesin.columbia.edu*
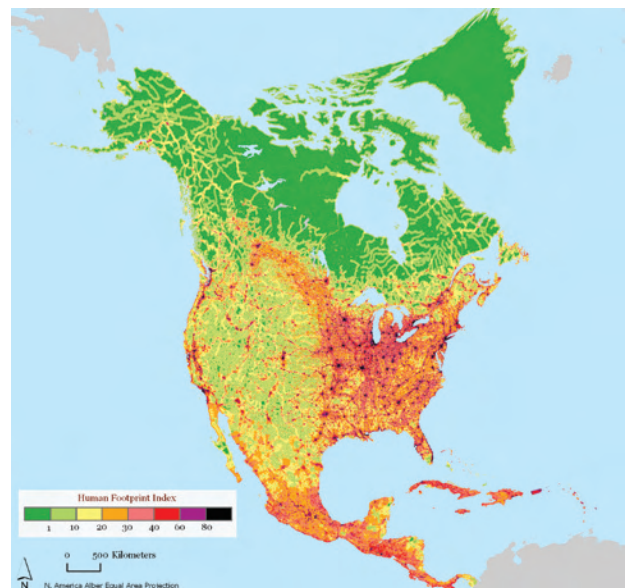
The Human Footprint Index (HF) expresses as a percentage the relative human influence in each terrestrial biome. HF values range from 0 to 100. A value of zero represents the least influenced—the "most wild" part of the biome with value of 100 representing the most influenced (least wild) part of the biome. Courtesy: SEDAC

Earth Science Data Disciplines

NASA's Earth Observing System (EOS) comprises a series of satellites, a science component and a data system which is called The Earth Observing System Data and Information System (EOSDIS). The data centers distribute more than 2,400 Earth system science data products and associated services for interdisciplinary studies. These data centers process, archive, document, and distribute data from NASA's past and current Earth system science research satellites and field programs. Each center serves one or more specific Earth science discipline and provides its user community with data products, data information, services, and tools unique to its particular science.

Atmosphere

Advanced Microwave Scanning Radiometer-Earth Observing System (AMSR-E) on Aqua

Resolution: 5.4 km, 12 km, 21 km, 25 km, 38 km, 56 km, and .25 deg
Availability: 19 June 2002 to Present
Coverage: Global
AMSR-E data include brightness temperatures, ocean products (water vapor, cloud liquid water, sea surface temperature), and rain, in both swath and gridded formats.

http://nsidc.org/data/amsre/data_summaries/index.html

AIRS/AMSU-A/HSB on Aqua

Resolution: AIRS IR at 13.5 km at nadir, 41 by 21.4 km at the scan extremes, and 1 km vertical; AIRS VIS/NIR at 2.3 km at nadir; AMSU-A at 40.5 km at nadir; HSB at 13.5 km at nadir.
Availability: AIRS and AMSU-A, September 1, 2002, to present; HSB, September 1, 2002, to January 31, 2003
Coverage: Global, twice daily swath (daytime and nighttime)

The Atmospheric Infrared Sounder (AIRS) is a high-spectral-resolution spectrometer with 2,378 bands in the thermal infrared (IR) and 4 bands in the visible and near infrared (VIS/NIR). AIRS and its two sounder partners—the Advanced Microwave Sounding Unit A (AMSU-A) and the Humidity Sounder for Brazil (HSB)—form the AIRS Sounding System. Since reaching polar orbit in May 2002, this system has been providing accurate measurements of air temperature, humidity, clouds, and surface temperature.

http://disc.gsfc.nasa.gov/AIRS/

Aura High Resolution Dynamics Limb Sounder (HIRDLS)

Resolution: 1 km vertical x 10 km across x 300 km along line of sight
Availability: August 22, 2004 to present
Coverage: Global

HIRDLS is an infrared limb-scanning radiometer designed to sound the upper troposphere, stratosphere, and mesosphere to determine temperature; the concentrations of O3, H_2O, CH_4, N_2O, NO_2, HNO_3, $N2O_5$, CFC11, CFC12, and aerosols; and the locations of polar stratospheric clouds and cloud tops.

http://disc.gsfc.nasa.gov/Aura/HIRDLS
http://disc.gsfc.nasa.gov/acdisc

Aura Microwave Limb Sounder (MLS)

Resolution: 3 km vertical x 165 km along the orbital track.
Availability: August 8, 2004 to present
Coverage: Near-global (82° N to 82° S)

The MLS on Aura measures microwave emissions from the Earth's limb at 118, 190, 240 and 640 GHz, and 2.5 THz. These measurements allow MLS to derive vertical profiles of ozone, water vapor, OH, HO_2, CO, HCN, N_2O, HNO_3, HCl, HOCl, ClO, BrO, and SO_2, as well as temperature, cirrus ice, relative humidity with respect to ice, and geopotential height.

http://disc.gsfc.nasa.gov/Aura/MLS
http://disc.gsfc.nasa.gov/acdisc

Aura Ozone Mapping Instrument (OMI)

Resolution: 13 x 24 km at nadir (nominal) and 13 x 12 km (zoomed)
Availability: August 9, 2004 to present
Coverage: Global, with a 2600 km orbital swath width (nominal)

The OMI aboard Aura employs hyperspectral imaging to observe solar backscatter radiation in the ultraviolet (264–383 nm) and visible (349–504 nm). OMI measures column amounts of ozone, NO_2, SO_2, BrO, HCHO, OClO, and ozone profiles, as well as UV-B radiation at the surface, aerosol and cloud properties.

http://disc.gsfc.nasa.gov/Aura/OMI
http://disc.gsfc.nasa.gov/acdisc

Convection And Moisture EXperiment (CAMEX)

A series of field research investigations sponsored by the Earth Science Directorate of the National Aeronautics and Space Administration (NASA). The third field campaign in the CAMEX series (CAMEX-3) was based at Patrick Air Force Base , Florida from 6 August to 23 September, 1998. CAMEX-3 successfully studied Hurricanes Bonnie, Danielle, Earl and Georges. The fourth field campaign in this series (CAMEX-4) ran from 16 August to 25 September, 2001 and was based out of Jacksonville Naval Air Station, Florida. Both CAMEX-3 and CAMEX-4 collected data for research in tropical cyclone development, tracking, intensification, and landfalling impacts using NASA-funded aircraft and surface remote sensing instrumentation.

http://tico.nsstc.nasa.gov/field

Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO)

Resolution: depending on data product, the resolution is 125 m, 333 m, 1 km, 5 km, 40 km.
Availability: May 1, 2006 to present
Coverage: Global

Lidar measurements of attenuated backscatter, lidar cloud and aerosol layer and profile products and vertical feature mask, imaging infrared radiometer (IIR) radiance and wide field camera (WFC) radiance data are available.

http://eosweb.larc.nasa.gov/PRODOCS/calipso/
table_calipso.html

Clouds and the Earth's Radiant Energy System (CERES)

Resolution: 1° Swath; 2.5° Zonal, Gridded Swath, and Equal Angle Grid
Availability: TRMM: December 27, 1997 to August 31, 1998 and March 2000; Terra: June 25, 2000 to present; Aqua: June 18, 2002 to present
Coverage: TRMM: 55° x -55° and 180° x -180°; Terra and Aqua: Global

Solar-reflected and Earth-emitted radiation from the top of the atmosphere to the Earth's surface, aerosols, UVA/UVB, and photosynthetically active radiation; cloud properties determined using simultaneous measurements from other EOS instruments. CERES data products are available from TRMM, Terra and Aqua. Several new CERES products are now available: Fast Longwave And SHortwave Radiative Fluxes (FLASHFlux) data products are near real-time surface and Top of Atmosphere (TOA) radiative fluxes. CERES ISCCP-D2like cloud products are designed to closely emulate the NASA-GISS ISCCP-D2 products, so that they meet the needs of the climate community and can easily be incorporated into GCMs, ISCCP simulators and other climate modeling studies. CERES ISCCP-D2like cloud products are on the CERES 1° nested grid, whereas the ISCCP D2 products are on a 2.5° equal area grid. The cloud retrievals have been stratified into 18 cloud types based on cloud top pressure, optical thickness and phase, similar to the ISCCP daytime 15 cloud types. CERES-MODIS-CALIPSO-CloudSat CCCM (C3M) data product integrates measurements from CERES, MODIS, CALIPSO, Cloud-Aerosol Lidar with Orthogonal Polarization (CALIOP), and CloudSat Cloud Profiling Radar (CPR) data. The CERES-MISR_MODIS data product integrates measurements from CERES, MISR, and MODIS.

http://eosweb.larc.nasa.gov/PRODOCS/ceres/
table_ceres.html
http://eosweb.larc.nasa.gov/PRODOCS/flashflux/
table_flashflux.html

First ISLSCP Field Experiment (FIFE) and FIFE Follow-On

Resolution: varied
Availability: Campaign data, 1987 to 1989 and 1987 to 1993; historical background data as early as 1858
Coverage: A 15 km x 15 km study area in Kansas, U.S.A.

As part of the International Satellite Land Surface Climatology Project (ISLSCP), FIFE characterized exchanges of radiation, moisture, and carbon dioxide between a prairie site and the atmosphere. Ninety-eight FIFE data sets (9 boundary layer fluxes, 11 vertical atmosphere profiles, 14 vegetation, 3 hydrology, 5 optical properties, 5 satellite and aircraft observations, 6 soil moisture, 6 soil properties, 12 surface fluxes, 8 surface meteorological measurements, and 19 surface radiation measurements) and sixteen FIFE Follow-On data sets are available.

http://daac.ornl.gov/FIFE/FIFE_Home.html

Global Flux Tower Network (FLUXNET)

Resolution: varied
Availability: Campaign data, 1990 to present
Coverage: Global

FLUXNET is compiling measurements of radiation, water vapor, carbon dioxide, and trace gas fluxes provided by regional networks and independent sites. Flux data are used to understand the mechanisms controlling the exchanges of carbon dioxide, water vapor, and energy across a spectrum of temporal and spatial scales to compare to EOS satellite products. Site data can be downloaded for more than 400 sites or viewed through a web map server. Three Fluxnet data sets are also available.

http://daac.ornl.gov/FLUXNET/fluxnet.html

Hydroclimatology Collections

Resolution: varied
Availability: 1951–1990
Coverage: U.S.A. and U.S. territories

Hydroclimatic characteristics (e.g., stream flow, wetlands, precipitation, temperature) were measured at various sampling sites.

*http://daac.ornl.gov/HYDROCLIMATOLOGY/
hydroclimatology.html*

International Satellite Cloud Climatology Project (ISCCP)

Resolution: equal area grid
**Availability:** July 1,1983 to June 30, 2007
Coverage: Global

Measurements include radiances, sea ice, snow cover, ice cover, cloud amount, cloud top pressure, ozone, percepitable water profiles, surface pressure, surface temperature, temperature profiles, tropopause pressure, tropopause temperature, cloud type, cloud top temperature, cloud optical thickness, and cloud water path.

*http://eosweb.larc.nasa.gov/PRODOCS/isccp/
table_isccp.html*

Kwajalein Experiment (KWAJEX)

This experiment was centered at the permanent Ground Validation site on Kwajalein Island in the Republic of the Marshall Islands from July 23 through September 15, 1999 and was designed to address scientific issues related to the generation of TRMM satellite products over the tropical open ocean.

http://ampr.nsstc.nasa.gov
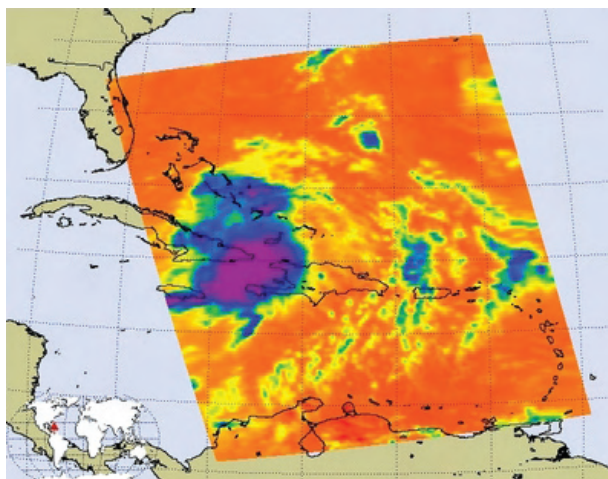
Hurricane Isabel as seen on September 13, 2003 by AIRS calibrated IR radiances (brightness temperatures). The warmest to coldest observed temperatures are represented by the color sequence reddish-orange, orange, yellow, green, blue, and purple. The coldest temperatures are from the tops of the towering clouds in the central part of the storm. Courtesy: GES DISC.

Lightning Imaging Sensor/Optical Transient Detector (LIS/OTD) 11 Year (1995-2005) v2.2. Climatology Datasets

Resolution: dataset dependent
Availability: 1995–2005
Coverage: Global

These data provide a global lightning and thunderstorm climatology from which changes (even subtle temperature variations) might be easily detected.

Release includes updates to the existing low and high resolution LIS/OTD full climatology gridded composite lightning build, Annual Climatology, diurnal climatology and low resolution time series datasets.

http://thunder.nsstc.nasa.gov/data/index.html#GRIDDED_DATA

LIS and OTD Science Data

Resolution: LIS, 4 km; OTD, 70 km
Availability: LIS, 1998 to present; OTD, 1995 to 2000
Coverage: LIS, 35° N to 35° S; OTD, 70° N to 70° S

The world's first space-based lightning sensors are capable of detecting and locating lightning events during day-and-night conditions with high detection efficiency. The LIS sensor contains a staring imager which is optimized to locate and detect lightning with storm-scale resolution of 3-6 km (3 at nadir, 6 at limb) over a large region (550-550 km) of Earth's surface. The field of view (FOV) is sufficient to observe a point on Earth or a cloud for 80 seconds, adequate to estimate the flashing rate of many storms. The instrument records the time of occurrence of a lightning event, measures the radiant energy, and estimates the location.

http://thunder.nsstc.nasa.gov/data

Measurements of Pollution In The Troposphere (MOPITT)

Resolution: 22 km horizontally, 4 km vertically
Availability: March 3, 2000 to present
Coverage: Global

Generates atmospheric profiles of carbon monoxide (CO) using thermal radiation at 4.7 μm. Column CO using channels at 2.4 μm to sense solar radiation from the surface. Gridded CO daily averages and monthly means are available.

http://eosweb.larc.nasa.gov/PRODOCS/mopitt/ table_mopitt.html

Moderate Resolution Imaging Spectroradiometer (MODIS) Atmosphere Products

Resolution: 1 km over a 2330 km orbital swath. Level 2 products are at varying resolutions 10 km, 5 km, and 1 km. Level 3 products are at 1-degree global (approx 100km).
Availability: February 2000 to present for MODIS on Terra; June 2002 to present for MODIS on Aqua
Coverage: Global (every 1 to 2 days depending on latitude)

MODAPS produces several atmosphere products from the MODIS instruments on the Terra and Aqua platforms and distributes these products through the MODAPS Level 1 and Atmosphere Archive and Distribution System (MODAPS LAADS). Level 2 products include data for aerosols, cloud properties (e.g., cloud fraction, cloud reflectance, cloud top temperature and pressure, cloud optical thickness), atmospheric temperature and moisture profiles, total water vapor, total ozone, and a cloud mask. Level 3 daily, 8-day, and monthly products for aerosols, cloud properties, and water vapor are also available.

http://ladsweb.nascom.nasa.gov

Modern Era Retrospective-Analysis for Research and Applications (MERRA)

Resolution: 0.5 degree Lat by 0.66 degree Lon or 1.25 degree; 42 atmospheric pressure levels
Availability: 1979-present
Coverage: Global

MERRA is a NASA reanalysis for the satellite era using a major new version of the Goddard Earth Observing System Data Assimilation System Version 5 (GEOS-5). The Project focuses on historical analyses of the hydrological cycle on a broad range of weather and climate time scales and places the NASA EOS suite of observations in a climate context.

http://disc.sci.gsfc.nasa.gov/mdisc

Multi-angle Imaging SpectroRadiometer (MISR)

Resolution: The swath products have varying resolutions depending on the parameter with resolutions ranging from 250 m to 70.4 km. The resolution of the gridded products is .5° x .5° or 1° x 1°.
Availability: February 2000 to present
Coverage: Global

Geolocated, co-registered, map-projected radiance, browse imagery, geometric parameters, cloud, aerosol, and land surface products on an orbit basis. Globally gridded statistical summaries of radiance, aerosol, land, albedo, surface, and cloud products on a daily, monthly, seasonal, and yearly basis in HDF-EOS and netCDF formats. (See also Calibrated Radiance.)

http://eosweb.larc.nasa.gov/PRODOCS/misr/table_misr.html

NASA African Monsoon Multidisciplinary Analyses (NAMMA) Campaign

Resolution: dataset dependent
Availability: August–September 2006
Coverage: Cape Verde, Africa; North Atlantic Ocean

This mission was based in the Cape Verde Islands, 350 miles off the coast of Senegal in west Africa. Commencing in August 2006, NASA scientists employed surface observation networks and aircraft to characterize the evolution and structure of African Easterly Waves (AEWs) and Mesoscale Convective Systems over continental western Africa, and their associated impacts on regional water and energy budgets. NASA will also make extensive use of its orbiting satellites (including Aqua, TRMM, and the recently-launched Cloudsat/CALIPSO) and modeling capabilities to improve its forecasts and flight plans.

http://namma.nsstc.nasa.gov

Prototype Validation Exercise (PROVE)

Availability: 1997
Coverage: Jornada Experimental Range near Las Cruces, New Mexico, U.S.A.

PROVE collected land and atmospheric measurements to develop methods for validating satellite data. Measurements include surface reflectance, surface temperature, albedo, and leaf area index.

http://daac.ornl.gov/PROVE/prove.html

Solar Radiation and Climate Experiment (SORCE)

Resolution: Full solar disk data at different spectral resolutions
Availability: January 2003 to present
Coverage: Full solar disk

SORCE carries four instruments: the Total Irradiance Monitor (TIM), the Solar Stellar Irradiance Comparison Experiment (SOLSTICE), the Spectral Irradiance Monitor (SIM), and the Extreme Ultraviolet Photometer System (XPS). SORCE data contain measurements of the incoming x-ray, UV, visible, near-infrared, and total solar radiation

http://disc.gsfc.nasa.gov/SORCE

Southern Great Plains (SGP) experiments

These experiments, in 1997 and 1999, were designed to examine the feasibility of estimating vertical profiles of soil moisture and temperature by combining in situ data, remote sensing measurements at the surface, and modeling techniques and to evaluate the influence of soil moisture on the local surface energy budget and the influence of mesoscale variability in the surface energy budget on the development of convective boundary layer.

http://disc.gsfc.nasa.gov/fieldexp/sgp.shtml

SSM/I

Resolution: 12.5 km at 85 GHz; 25 km all others
Availability:
F13: 1995-05-03 to present
F14: 1997-05-10 to 2008-08-23
F15: 2000-02-23 to present
Coverage: Global

Brightness temperatures (7 channels), water vapor, cloud liquid water, and ocean wind speed data products are available. (Also see Ocean.)

http://datapool.nsstc.nasa.gov

Stratospheric Aerosol and Gas Experiment (SAGE) I, II, and III

Availability: SAGE I: February 18, 1979 to November 18, 1981; SAGE II: October 24, 1984 to August 31, 2005; SAGE III: February 27, 2002 to December 21, 2005

SAGE I, II, and III obtain profile measurements of aerosol extinction. SAGE II and III obtain ozone, water vapor, and nitrogen dioxide. SAGE III also obtains nitrogen trioxide, chlorine dioxide, clouds, temperature and pressure. All measurements are obtained in the mesosphere, stratosphere, and upper troposphere with a vertical resolution of 0.5 - 1 km resolution.

http://eosweb.larc.nasa.gov/PRODOCS/sage1/table_sage1.html
http://eosweb.larc.nasa.gov/PRODOCS/sage2/table_sage2.html
http://eosweb.larc.nasa.gov/PRODOCS/sage3/table_sage3.html

Surface Meteorology and Solar Energy (SSE)

Resolution: 1° x 1° grid
Availability: July 1, 1983 to June 30, 2005
Coverage: Global

Contains parameters formulated for assessing and designing renewable energy systems. On-line plotting capabilities allow quick evaluation of potential renewable energy projects for any region of the world. The SSE data set is formulated from NASA satellite- and reanalysis-derived insolation and meteorological data for the 22-year period July 1983 through June 2005. Average daily and monthly measurements for 1195 World Radiation Data Centre ground sites are also available.

http://eosweb.larc.nasa.gov/PRODOCS/sse/table_sse.html

Surface Radiation Budget (SRB)

Resolution: Nested grid, with a spatial resolution of 1° in latitude (global) and longitude resolution ranging from 1° (tropics and subtropics) to 120° (poles).
Availability: July 1, 1983 to June 30, 2007
Coverage: Global

Global 3-hourly, daily and monthly averages of surface long-wave and shortwave radiative properties, cloud amount, and meteorology computed using models. The main input data for these models include cloud information, top-of-atmosphere radiances and profiles of atmospheric water vapor and temperature. Some of the input data include Earth Radiation Budget Energy (ERBE) top-of-atmosphere clear-sky albedo and International Satellite Cloud Climatology Project (ISCCP) radiances and cloud amount.

http://eosweb.larc.nasa.gov/PRODOCS/srb/table_srb.html

Texas Florida Underflights (TEFLUN)

The Texas Florida Underflights (TEFLUN) field experiments were designed to provide validation measurements for TRMM (Tropical Rainfall Measuring Mission) and for the enhancement of precipitation algorithms. TEFLUN-A took place from April 1–May 15,1998 and focused on eastern Texas.

TEFLUN-B was conducted between August 1 and September 30, 1998 in close coordination with the 3rd Convection And Moisture Experiment (CAMEX-3), and focused principally on eastern Florida to utilize the existing dense network of ground-based facilities.

http://ampr.nsstc.nasa.gov/missions.html

Lightning illuminates a funnel cloud forming during a storm near Huntsville, Alabama, in April 2006. Alabama's turbulent weather gives scientists frequent opportunities to study lightning and storm development. (copyright Wes Thomas Photography).

TOGA COARE (Tropical Ocean Global Atmospheres/Coupled Ocean Atmosphere Response Experiment)

An international research program investigating the scientific phenomena associated with the interaction between the atmosphere and the ocean in the warm pool region of the western Pacific. The field experiment phase of the program took place from November, 1992 through February, 1993 and involved the deployment of oceanographic ships and buoys, several ship and land based Doppler radars, multiple low and high level aircraft equipped with Doppler radar and other airborne sensors, as well as a variety of surface based instruments for in situ observations.

http://www.ncdc.noaa.gov/oa/coare/
http://disc.sci.gsfc.nasa.gov/fieldexp/TOGA

Total Ozone Mapping Spectrometer (TOMS)

Resolution: 1 by 1.25 deg
Availability: Nimbus-7, November 1978 to May 1993; Meteor-3, August 1991 to December 1994; ADEOS, September 1996 to June 1997; EP, July 1999 to December 2005
Coverage: Global

Data contain global column ozone amounts and UV reflectivity, and are available from the Nimbus-7 and Meteor-3 satellites, and the Advanced Earth Observing System (ADEOS) and Earth Probe (EP) missions

http://disc.sci.gsfc.nasa.gov/services/opendap/TOMS/toms_v8.shtml
http://mirador.gsfc.nasa.gov

Tropical Cloud Systems and Processes (TCSP) Research Experiment

Resolution: dataset dependent
Availability: June–August 2005
Coverage: Gulf of Mexico, Carribean, Western Atlantic, Eastern Pacific

This mission is a field research investigation focused on the study of the dynamics and thermodynamics of precipitating cloud systems, including tropical cyclones using NASA-funded aircraft and surface remote sensing instrumentation. TCSP research specifically addresses the following topical areas: 1) tropical cyclone structure, genesis, intensity change, moisture fields and rainfall; 2) satellite and aircraft remote sensor data assimilation and validation studies pertaining to development of tropical cyclones; and 3) the role of upper tropospheric/lower stratospheric processes governing tropical cyclone outflow, the response of wave disturbances to deep convection and the evolution of the upper level warm core.

http://tcsp.nsstc.nasa.gov

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Tropical Rainfall Measuring Mission (TRMM) Global Precipitation Climatology Project (GPCP) Merged Products

Resolution: 0.25°
Availability: 1998 to present
Coverage: 50°N to 50°S

Provides two final products, the combined satellite-gauge precipitation estimate and the combined satellite-gauge precipitation error estimate. The complete data set, which includes the input and intermediate data files, contains a suite of 27 products providing monthly, global gridded values of precipitation totals and supporting information for the period January 1979–January 2004.

http://disc.sci.gsfc.nasa.gov/precipitation

Tropospheric Emission Spectrometer (TES)

Resolution: Nadir: 0.5 x 5 km; Limb: 2.3 x 23 km
Availability: August 22, 2004 to present
Coverage: Global Survey: Global; Special Observation: Varies

Global Survey and Special Observation Nadir and Limb measurements and Global Survey Daily and Monthly measurements of water vapor, ozone, carbon monoxide, atmospheric temperature, methane, nitric acid, and heavy water; and Special Observation Spectra Low Resolution and Spectra High Resolution data. (Note: Global Survey limb observations were suspended after April 10, 2005.) Special observations are research measurements of localized or regional phenomena such as volcanoes, biomass burning, or air pollution events, or observations made to support field campaigns and other validation efforts.

http://eosweb.larc.nasa.gov/PRODOCS/tes/table_tes.html

Upper Atmosphere Research Satellite (UARS)

Resolution: Most atmospheric products at a 4° interval along track; solar spectral data at 1 nm
Availability: September 1991 to present
Coverage: Near global (80° N to 80° S)

The GES DAAC archives upper atmospheric data from nine UARS instruments (CLAES, HALOE, HRDI, ISAMS, MLS, PEM, SOLSTICE, SUSIM, and WINDII) and UARS correlative data. Data contain profiles of upper atmospheric chemical constituents, winds, solar irradiance, and energetic particle input. Products are available as time- and latitude-ordered data sets.

http://disc.sci.gsfc.nasa.gov/UARS
http://mirador.gsfc.nasa.gov

Calibrated Radiance

Active Cavity Radiometer Irradiance Monitor (ACRIM) II and III

Availability: ACRIM II: October 4, 1991 to November 1, 2001; ACRIM III: April 5, 2000 to present

These instruments monitor the total variability of solar irradiance with active cavity radiometer solar monitoring sensors.

http://eosweb.larc.nasa.gov/PRODOCS/acrimII/table_acrimII.html

Moderate Resolution Imaging Spectroradiometer (MODIS)

Resolution: 1 km, 500 m, and 250 m over a 2330 km orbital swath
Availability: Terra: February 2000 to present; Aqua: June 2002 to present
Coverage: Global (every 1 to 2 days depending on latitude)

MODIS instruments operate on both the Terra and Aqua spacecraft. MODIS detectors measure 36 spectral bands between 0.405 and 14.385 µm, and it acquires data at three spatial resolutions – 250 m, 500 m, and 1,000 m. MODAPS produces distinct Level 1B calibrated radiance products for each of those resolutions, with a 5-km subset for each instrument also available. The 1 km products contain data from all 36 MODIS spectral bands, the 500 m products contain MODIS bands 1-7, and the 250 m product contains data from bands 1 and 2. MODAPS distributes these products through the MODAPS Level 1 and Atmosphere Archive and Distribution System (LAADS).

http://ladsweb.nascom.nasa.gov

Multi-angle Imaging SpectroRadiometer (MISR)

Resolution: The resolution of the swath products is 250 m or 275 m. The resolution of the gridded products is .5° x .5° or 1° x 1°.
Availability: February 2000 to present
Coverage: Global

Geolocated, co-registered, map-projected radiance on an orbit basis. Globally gridded statistical summaries of radiance on a daily, monthly, seasonal and yearly basis in HDF-EOS and netCDF formats.

http://eosweb.larc.nasa.gov/PRODOCS/misr/table_misr.html

Cryosphere

Advanced Microwave Scanning Radiometer-Earth Observing System (AMSR-E) on Aqua

Resolution: 6.25 km, 12.5 km, 25 km
Availability: 19 June 2002 to Present
Coverage: Northern and Southern Hemispheres

AMSR-E data include brightness temperatures, snow, and sea ice in polar stereographic and EASE-Grid formats.

http://nsidc.org/data/amsre/data_summaries/index.html

ALOS PALSAR L-Band SAR System

Resolution: 10 to 100 m
Availability: October 2006 to present
Coverage: Global

PALSAR is an L-band SAR capable of detailed, all-weather, day and night observations and repeat-pass interferometry. It has multiple observation modes with variable polarizations, resolutions, swath widths, and off-nadir angles. PALSAR data are the property of the Japan Aerospace Exploration Agency (JAXA).

https://ursa.asfdaac.alaska.edu/cgi-bin/login/guest

The image is a portion of a RADARSAT-1 ScanSAR Wide B image of the collision between the Drygalski Ice Tongue and the B-15 iceberg in the Ross Sea, Antarctica during the spring of 2005. Courtesy: ASF DAAC and the Canadian Space Agency.

AMSR-E/Aqua Daily EASE-Grid Brightness Temperatures

Resolution: 25 km and .25 deg
Availability: 19 June 2002 to Present
Coverage: Northern and Southern Hemispheres, Global

AMSR-E data are interpolated to the output grids from swath space using an inverse-distance squared method. These data are provided in three EASE-Grid projections (north and south Lambert azimuthal and global cylindrical).These data sets compliment and extend NSIDC's SMMR and SSM/I 25 km EASE-Grid brightness temperature data sets.

http://nsidc.org/data/nsidc-0301.html
http://nsidc.org/data/nsidc-0302.html

AMSR-E Validation Data

Resolution: Variable
Availability: 2000 to 2005
Coverage: Arctic Ocean, Baffin Bay, Colorado, Wyoming, Iowa, Oklahoma, Georgia, Alabama, Arizona, Mexico, Brazil, Japan, Baltic Sea

The AMSR-E validation effort addresses data quality through comprehensive calibration and validation programs. These programs characterize the accuracy and precision of AMSR-E observations and their derived products, and provide for the assessment and refinement of algorithm performance for the standard AMSR-E products. A number of different campaigns addressed cryospheric, soil moisture, and precipitation data validations. Much of the data acquired is available to the general public. Data from Antarctic missions and recent Arctic missions are restricted to approved users.

http://nsidc.org/data/amsr_validation

AVHRR Polar Pathfinder Twice-Daily EASE-Grid Composites

Resolution: 5, and 25 km
Availability: 24 July 1981 to 30 June 2005
Coverage: Polar regions

These data sets are a collection of products for both poles, consisting of twice-daily gridded and calibrated satellite channel data and derived parameters. The parameters include average albedo and skin temperature, solar zenith angle, surface type mask, cloud mask, cloud fraction files, and others. Data are in 1-byte and 2-byte integer gridded format.

http://nsidc.org/data/avhrr

Cold Land Processes Experiment

Resolution: Variable
Availability: 2002 and 2003
Coverage: Northern Colorado and southern Wyoming

The Cold Land Processes Experiment (CLPX) is a multi-sensor, multi-scale field program designed to extend the current local-scale understanding of water fluxes, storage, and transformations to regional and global scales. Using ground, airborne, and spaceborne observations, the experiment emphasizes the development of a strong synergism between process-oriented understanding, land surface models, and microwave remote sensing.

http://nsidc.org/data/clpx

ERS-1 and ERS-2 C-Band SAR Systems

Resolution: 30 to 240 m
Availability: ERS-1, August 1991 to June 1996; ERS-2, October 1995 to present
Coverage: Within a circle of 3,000-km radius centered on ASF and another centered on McMurdo Station, Antarctica

The side-looking radar has an incidence angle of 23° and a 100-km swath width. ERS-2 is a current mission and new acquisitions are available within the stated coverage. ERS-1 and ERS-2 data are the property of the European Space Agency (ESA).

https://ursa.asfdaac.alaska.edu/cgi-bin/login/guest

Greenland 5 km DEM, Ice Thickness, and Bedrock Elevation Grids

Resolution: 5 km interpolated, but true horizontal resolution varies according to slope and surface characteristics
Availability: Collected between 1970s and 1990s
Coverage: Greenland

A Digital Elevation Model (DEM), ice thickness grid, and bedrock elevation grid of Greenland are available in ASCII text format at a 5 km grid spacing in a polar stereographic projection.

http://nsidc.org/data/nsidc-0092.html

Ice, Cloud, and Land Elevation Satellite (ICESat) Geoscience Laser Altimeter System (GLAS)

Resolution: 60-m spot size at nadir
Availability: Begins Feb. 2003; see schedule for availability
Coverage: Global, from 86° N to 86° S latitude

The ICESat mission measures ice sheet elevations and changes in elevation through time. Secondary measurements include cloud and aerosol height profiles, land elevation, vegetation cover, and sea ice thickness.

http://nsidc.org/data/icesat/data.html

JERS-1 L-Band SAR System

Resolution: 30 to 240 m
Availability: May 1992 to October 1998
Coverage: Global

The side-looking radar has an incidence angle of 35° and a 75-km swath width. Coverage outside the ASF mask is more limited but includes extensive rain forest and boreal forest data. JERS-1 data are the property of the Japan Aerospace Exploration Agency (JAXA).

https://ursa.asfdaac.alaska.edu/cgi-bin/login/guest

Moderate Resolution Imaging Spectroradiometer (MODIS) Snow and Sea Ice Products

Resolution: Snow cover at 500 m and 0.5 deg; sea ice extent at 1 km and 4 km
Availability: Terra, February 2000 to present; Aqua, July 2002 to present
Coverage: Global

NSIDC's MODIS holdings include several snow and sea ice extent products. These products consist of Level 2 swath data and Level 3 gridded composites.

http://nsidc.org/data/modis

Near Real-Time SSM/I EASE-Grid Daily Global Ice Concentration and Snow Extent

Resolution: 25 km
Availability: 04 May 1995 to present
Coverage: Global

This Near real-time Ice and Snow Extent (NISE) product provides daily, global near real-time maps of sea ice concentrations and snow extent. NSIDC uses SSM/I data to generate the NISE product, which is meant to provide a best estimate of current ice and snow conditions. Several EOS instruments use NISE data as inputs to their own data processing.

http://nsidc.org/data/nise1.html

Northern Hemisphere EASE-Grid Weekly Snow Cover and Sea Ice Extent, Version 3

Resolution: 25 km
Availability: Snow cover data- 03 October 1966 to 24 June 2007, Sea ice data- 23 October 1978 to 24 June 2007
Coverage: Northern Hemisphere

This data set combines snow cover and sea ice extent at weekly intervals. The data set is the first representation of combined snow and sea ice measurements derived from satellite observations for the period of record. Designed to facilitate study of Northern Hemisphere seasonal fluctuations of snow cover and sea ice extent, the data set also includes monthly climatologies describing average extent, probability of occurrence, and variance. Data are provided in the Northern Hemisphere a 25 km EASE-Grid projection.

http://nsidc.org/data/nsidc-0046.html

RADARSAT-1 C-Band SAR System

Resolution: 10 to 600 m
Availability: February 1996 to May 2, 2008
Coverage: Global

The side-looking radar has a range of incidence angles from approximately 20 to 60°. Swath widths range from approximately 50 to 500 km. RADARSAT-1 data are the property of the Canadian Space Agency (CSA).

https://ursa.asfdaac.alaska.edu/cgi-bin/login/guest

RADARSAT-1 SAR Mosaics of Antarctica

Resolution: 10 m to 800 m
Availability: October 1997, Fall 2000
Coverage: Antarctica

The first, most complete and detailed views of the Antarctic continent were obtained by RADARSAT-1 during Octo-

ber 1997. A follow-up mission occurred in the fall of 2000 that focused on interferometric mapping of the margins of the continent. The RADARSAT-1 SAR Mosaics of Antarctica were produced by the RADARSAT-1 Antarctic Mapping Project (RAMP). The mosaics are available by FTP from *http://www.asf.alaska.edu/sardatacenter/getdata*. The 25-m resolution product of the RAMP is considered restricted and available to NASA approved investigators. Interested users gain access to the data by submitting a proposal to asf@eos.nasa.gov. Guidelines on the structure of the proposal can be found at: *http://www.asf.alaska.edu/reference/daac_proposal_guidelines*. Specific images from the mapping missions are available through the ASF SAR Data Center IPY data pool. To gain access to the datapool, investigators are required to complete the data use agreement at *http://www.asf.alaska.edu/sardatacenter/getdata*.

RAMP Digital Elevation Model (DEM) Version 2

Resolution: 200 m, 400 m, and 1 km
Availability: Collected between 1940s and 2000
Coverage: Antarctica, from 60° S to 90° S latitude

This high-resolution RADARSAT Antarctic Mapping Project (RAMP) DEM combines topographic data from a variety of sources to provide consistent coverage of all of Antarctica.

http://nsidc.org/data/nsidc-0082.html

Scanning Multichannel Microwave Radiometer (SMMR) and Special Sensor Microwave/Imager (SSM/I) data

Resolution: 25 km
Availability: SMMR, 1978 to 1987; SSM/I, 1987 to present
Coverage: Northern and Southern Hemispheres

SMMR and SSM/I data include gridded brightness temperatures and sea ice extent and concentration in polar sterographic and EASE-Grid projections. The Bootstrap and NASA Team algorithms are used in the production of the sea ice data sets. NSIDC distributes a host of ancillary sea ice products, including ice extent, melt onset data, climatologies, ice persistence, total ice-covered area, and ocean masks.

SMMR and SSM/I brightness temperature and sea ice data sets are available from

http://nsidc.org/data/nsidc-0001.html
http://nsidc.org/data/nsidc-0007.html
http://nsidc.org/data/nsidc-0051.html
http://nsidc.org/data/nsidc-0079.html
http://nsidc.org/data/smmr_ssmi_ancillary

Human Dimensions

Anthropogenic Biomes

Resolution: 5-arc-minute grid
Availability: Circa 2005
Coverage: Global

Anthropogenic biomes describe the terrestrial biosphere in its contemporary, human-altered form using global ecosystem units defined by patterns of sustained direct human interaction. The data was developed by Ellis and Ramankutty (2008) who identified 21 anthropogenic biomes based on population density, land use, biota, climate, terrain and geology. The anthropogenic biomes are further grouped into six major categories: dense settlements, villages, croplands, rangeland, forested, and wildlands. Data are available in raster GeoTiff and GRID formats, and may be downloaded as one global grid or as grids for each of the six populated continents.

http://sedac.ciesin.columbia.edu/es/anthropogenicbiomes. html

China Dimensions Data Collection

Resolution: Includes administrative regions of China at 1:1,000,000
Availability: Varies by data set, from 1949 to 1991
Coverage: National, provincial, and county levels

China Dimensions is a rich collection of data resources for the People's Republic of China. Highlights include digital administrative boundaries, fundamental GIS layers, and county-level data on population, agriculture, economics, and hospitals.

http://sedac.ciesin.columbia.edu/china

Environmental Performance Index (EPI)

Resolution: National
Availability: 2008
Coverage: Global

The 2008 EPI centers on two broad environmental protection objectives: reducing environmental stresses on human health, and promoting ecosystem vitality and sound natural resource management. Environmental health and ecosystem vitality are gauged using 25 indicators tracked in six policy categories: Environmental Health, Air Pollution (effects on ecosytems), Water (effects on ecosystems), Productive Natural Resources, Biodiversity and Habitat, and Climate Change. The EPI utilizes a proximity-to-target methodology focused on a core set of environmental outcomes linked to policy goals. The 2008 EPI includes 149 countries based on data availability.

http://sedac.ciesin.columbia.edu/es/epi

Environmental Sustainability Index (ESI)

Resolution: National
Availability: Reports issued in 2000, 2001, 2002, and 2005
Coverage: Global

The ESI provides a benchmark for the ability of nations to protect the environment over the next several decades. It does so by integrating data sets related to tracking natural resource endowments, past and present pollution levels, environmental management efforts, and a society's capacity to improve its environmental performance —into a set of indicators of environmental sustainability. The indicators permit comparison across the following fundamental components of sustainability: Environmental Systems, Environmental Stresses, Human Vulnerability to Environmental Stresses, Societal Capacity to Respond to Environmental Challenges, and Global Stewardship. Variable, indicator, component and index data are available.

http://sedac.ciesin.columbia.edu/es/esi

Environmental Treaties and Resource Indicators (ENTRI)

ENTRI is a searchable relational database that contains international environmental treaties, treaty summaries, treaty status information, and global natural resource indicator data. A Conference of Parties (COP) decision search tool allows users to search decisions produced by the Parties of a selected number of multilateral environmental agreements.

http://sedac.ciesin.columbia.edu/entri

Gridded Population of the World (GPW)

Resolution: 2.5-arc-minute grid
Availability: 1990-2015 (in five year increments)
Coverage: Global, continental, and national

In the GPW data set, the distribution of human population is converted from national or subnational units to georeferenced quadrilateral grids. Land area, population counts, and densities for each 2.5-arc-minute grid cell are available for the world, six continental regions, and individual countries. In addition, estimates of population to 2015 are available for continents and the globe. GPW raster (grid) data are available in three formats: ASCII text, ArcInfo interchange files (.e00), and binary band interleaved by line (.bil). Maps of administrative boundaries and population density are in portable document format (.pdf).

http://sedac.ciesin.columbia.edu/gpw

Global Distribution of Poverty

Resolution: Ranges from national-level to 2.5 arc-minute, depending on data set
Coverage: Global

The Global Poverty Mapping Project seeks to enhance current understanding of the global distribution of poverty and the geographic and biophysical conditions of where the poor live. Additionally, the project aims to assist policy makers, development agencies, and the poor themselves in designing interventions to reduce poverty.

http://sedac.ciesin.columbia.edu/povmap

Global Rural Urban Mapping Project (GRUMP)

Resolution: 30 arc-second grid
Availability: 1990, 1995, and 2000
Coverage: Global, continental, and national

The Global Rural Urban Mapping Project (GRUMP) data collection consists of three databases that build upon population datasets mostly from national statistical offices, satellite data and other representations of settlements. GRUMP Human Settlements is a global database of cities and towns of 1,000 persons or more, each represented as a point, and includes information on population and latitude and longitude coordinates. Populations were estimated for 1990, 1995, and 2000. The GRUMP Urban Extent Mask is the first systematic global-scale attempt to portray the boundaries of urban areas with defined populations of 5,000 and larger. The GRUMP Population Grid represents the distribution of human population across the globe, accounting for urban population concentration more precisely than previous efforts. In addition to the data, maps of human settlements (continents only) and urban extents are available.

http://sedac.ciesin.columbia.edu/gpw

Human Appropriation of Net Primary Productivity

Resolution: ¼° latitude/longitude
Availability: Circa 1990s
Coverage: Global

How does the spatial distribution of human consumption of carbon (as embodied in food, fiber, and wood products) compare to the ability of land-based ecosystems to produce it? Research led by NASA scientists attempted to address this question by comparing satellite-derived maps of net primary productivity (NPP) with human appropriation of carbon, which is partly derived from SEDAC's Gridded Population of the World dataset. The resulting global spatial distribution of NPP, Human Appropriation of NPP (HANPP) and HANPP as a percentage of local NPP data are available for downloading in raster GRID and GeoTIFF formats. In addition, tabular data by country on total estimated consumption of NPP in the form of food, paper, wood, and fiber can be accessed.

http://sedac.ciesin.columbia.edu/es/hanpp.html

IPCC Socioeconomic Data Distribution Centre

Resolution: National
Availability: Circa 2000 to 2100
Coverage: Global

SEDAC hosts and maintains the socioeconomic section of the Data Distribution Centre (DDC) of the Intergovernmental Panel on Climate Change (IPCC), providing access to baseline and scenario data related to population, economic development, technology, and natural resources for use in climate impact assessments. Scenario datasets available include the IS92 and Special Report on Emissions Scenarios (SRES). Tabular baseline data in categories such as population and human development, economic conditions, land cover/land use, water, agriculture/food, energy and biodiversity are also available. Also available is the IPCC Fourth Assessment Report (AR4) Observed Climate Change database.

http://sedac.ciesin.columbia.edu/ddc

Last of the Wild, v2

Resolution: 30 arc-second grid cells
Availability: Circa 2000
Coverage: Global

Human influence is a global driver of ecological processes on the planet. The Last of The Wild, Version Two depicts human influence on terrestrial ecosystems using data sets compiled on or around 2000. Three data sets are in the collection. The Human Influence Index (HII) is a measure of direct human influence on terrestrial ecosystems using best available data sets on human settlement (population density, built-up areas), access (roads, railroads, navigable rivers, coastline), landscape transformation (landuse/landcover) and electric power infrastructure (nighttime lights). The Human Footprint Index expresses as a percentage the relative Human Influence Index in every biome on the land's surface. The Last of the Wild represents the 10% least influenced areas in each biome.

http://sedac.ciesin.columbia.edu/wildareas

Low Elevation Coastal Zone Urban-Rural Estimates (LECZ)

Resolution: National
Coverage: Global

Country-level estimates of urban, rural and total population and land area in a low elevation coastal zone (LECZ) were generated globally using Global Rural-Urban Mapping Project (GRUMP) alpha population and land area data products and a Digital Elevation Model (DEM) derived from Shuttle Radar Topographic Mission (SRTM) remote sensing data. The zone was derived from the DEM by selecting all land contiguous with the coast that was 10 m or less in elevation. Zonal statistics were generated for urban, rural and total population and land area for the country as a whole and within the LECZ. These LECZ data form the basis for the first global study to identify populations, particularly urban populations, at risk from rising sea levels and more intense cyclones linked to changing climate.

http://sedac.ciesin.columbia.edu/gpw/lecz.jsp

Population, Landscape, and Climate Estimates (PLACE)

Resolution: National
Availability: 1990 and 2000
Coverage: Global

In the PLACE data set, population and territorial extent are overlaid with biophysical parameters such as biome, climate, coastal proximity, elevation, population density, and slope.

The resulting data set consists of an estimate of population and area (expressed as counts and percentages) for each of these parameters and is suitable for researchers who require tabular data aggregated to the national level.

http://sedac.ciesin.columbia.edu/place

Thematic Guides on the Human Dimensions of Global Environmental Change

Thematic Guides offer overviews of several issues that pertain to human interactions in the environment and global change. They give researchers, policy makers, educators, and the public quick access to background materials on global change issues, and to locate data sets and information resources. Guides are available for Social Science Applications of Remote Sensing; Land-Use and Land-Cover Change; Global Population Projections; and Night-time Light Remote Sensing and Its Applications.

http://sedac.ciesin.columbia.edu/tg/guide_main.jsp
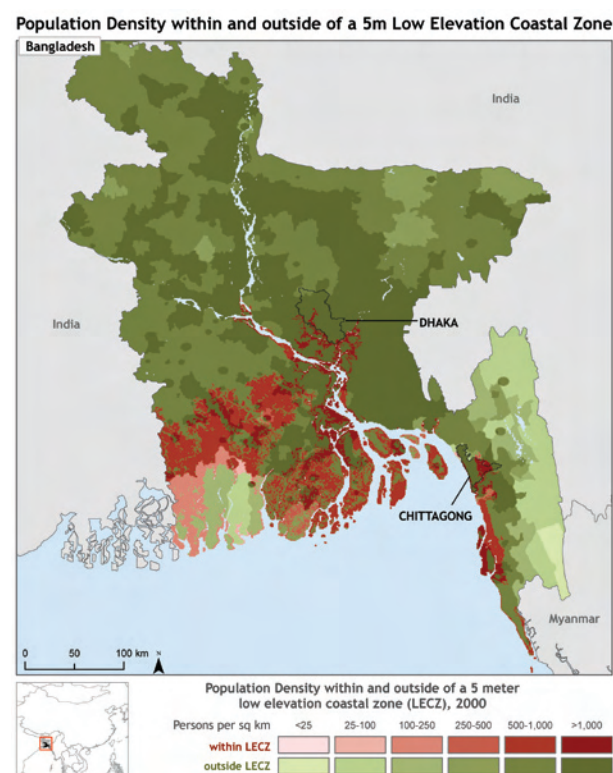
Population density distribution of Bangladesh within (red shading) and outside (green shading) a 5-meter Low Elevation Coastal Zone (LECZ). Population data are from SEDAC's Global Rural-Urban Mapping Project (GRUMP) dataset and elevation data is from the NASA Shuttle Radar Topographic Mission (SRTM). The LECZ helps identify populations at risk from flooding and tropical cyclones as well as sea level rise. Courtesy: SEDAC at CIESIN, Columbia University.

United States Census Grids

Resolution: 30-arc-seconds (~1 km) for country; 7.5-arc-seconds (~250 m) for 50 metropolitan statistical areas
Availability: 2000 (1990 and 2005 estimates forthcoming)
Coverage: United States

The U.S. Census Grids provide raster data sets that include not only population and housing counts, but a wide variety of socioeconomic characteristics. These gridded data sets transform irregularly shaped census block and block group boundaries into a regular surface – a raster grid – for faster and easier analysis. The raster format allows analysis at a higher resolution for a larger area than is feasible using Census statistical units. The gridding and reformatting also makes it easier to combine data to support vulnerability analysis; for example, studying how particular social groups were affected by Hurricane Katrina.

http://sedac.ciesin.columbia.edu/usgrid

Urban Remote Sensing Studies

The following Web page groups together SEDAC-sponsored publications and reports that focus on remote sensing applications in urban areas, and provides links to other resources.

http://sedac.ciesin.columbia.edu/urban_rs

When the Weather is Uggianaqtuq: Inuit Observations of Environmental Change

Uggianaqtuq (pronounced OOG-gi-a-nak-took) is a North Baffin Inuktitut word that means to behave unexpectedly, or in an unfamiliar way. From the perspective of many hunters and elders in the Arctic, the weather has been uggianaqtuq in recent years. In this interactive, multi-media CD-ROM, Inuit from two communties, Baker Lake (Qamani'tuaq) and Clyde River (Kangiktugaapik) in Nunavut, Canada, share their observations and perspectives on recent environmental changes.

http://nsidc.org/data/arcss122.html

Land

Accelerated Canopy Chemistry Program (ACCP)

Availability: Campaign data, 1992 to 1993
Coverage: Sites in the continental U.S.A.

ACCP used remote sensing to study the nitrogen and lignin content of the vegetation canopy in various ecosystems. Thirty-seven data sets are available on physical forest properties, climatology, phenology, and canopy reflectance.

http://daac.ornl.gov/ACCP/accp.html

Advanced Microwave Scanning Radiometer-Earth Observing System (AMSR-E) on Aqua

Resolution: 5 to 56 km
Availability: May 2002 to present
Coverage: Global

The AMSR-E land products contain interpretive information on vegetation roughness and water content. The Level 3 land product is produced daily on a 25-km EASE-Grid. Swath and gridded snow products are also available, with daily, 5-day, and monthly temporal resolutions.

http://nsidc.org/data/amsre/data_summaries.html

Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Level-3 Orthorectified Imagery

Resolution: VNIR at 15 m; SWIR at 30 m; TIR at 90 m
Availability: March 2000 to present
Coverage: Global (on demand)

The LP DAAC offers a suite of ASTER Level-3 on-demand Orthorectified Image products. An orthorectified image is similar to a map with near-vertical views for every location. These products are generated using ASTER Level-1A data and a DEM derived from the same data. Two product suites are available: 1.) AST14OTH is the short name of the ASTER on-demand Level-3 Orthorectified product, which includes fifteen orthorectified ASTER Level-1B calibrated radiance images, one per each band, including Band 3B. The distributed product is a zipped multi-file containing both a DEM, and fifteen orthorectified L1B calibrated radiance images, one per band.

http://lpdaac.usgs.gov/lpdaac/products/aster_products_table/on_demand/registered_radiance_at_the_sensor_orthorectified/v1ast_14oth

Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Products

Resolution: VNIR at 15 m; SWIR at 30 m; TIR at 90 m
Availability: March 2000 to present
Coverage: Global (on demand)

Of the instruments on board Terra, ASTER offers the highest resolution image data in visible and near-infrared (VNIR), shortwave infrared (SWIR), and thermal infrared (TIR) wavelengths. Routinely acquired data and data products generated include Level 1A reconstructed unprocessed instrument data. Higher-level products, which can be requested on demand, include brightness temperature, surface reflectance, decorrelation stretch, surface radiance, surface emissivity, surface kinetic temperature, polar cloud classification, orthorectified and digital elevation models.

https://lpdaac.usgs.gov
https://lpdaac.usgs.gov/lpdaac/products/aster_products_table/routine/global_digital_elevation_model/v1/astgtm

AIRSAR Data

Resolution: 12 to 100 m
Availability: 1990 to 2004
Coverage: Global

The AIRSAR dataset contains two modes, POLSAR and TOPSAR. The POLSAR mode acquires C-band, L-band and P-band polarmetric data. The TOPSAR mode acquires C-band DEM data , C-band VV, P-band polarithmetic data. The P-band data will be a slant-range POLSAR, if the P-Band is a 20 MHz data and the DEM is a 40 MHz data. AIRSAR data can be downloaded from the web through the URSA interface at *https://ursa.asfdaac.alaska.edu/cgi-bin/login/guest*, under search and order select AIRSAR and chose the search type.
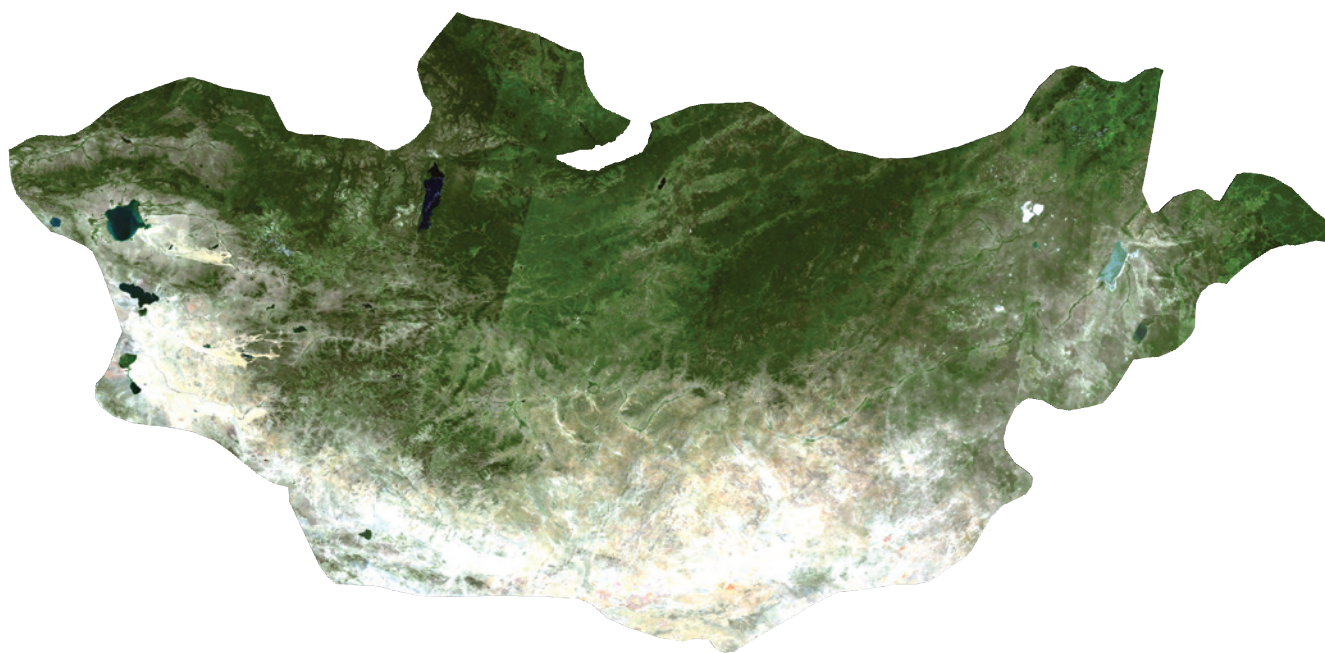
This image of Mongolia was created from the Surface Reflectance 8-day L3 Global 500 meter (MOD09A1) product of the Moderate Resolution Imaging Spectroradiometer Sensor (MODIS) on board the Terra Satellite. The image was created using 12 MODIS tiles (H 22-27, V 3-4) whose 8 day composite acquisition period began on August 4, 2008. It is a pseudo true-color image using MODIS Surface Reflectance bands 1, 4, 3. Courtesy: LP DAAC, at USGS EROS

Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Global Digital Elevation Model (GDEM)

Resolution: 30 m
Coverage: Global (between 83° Latitude)

Japan's Ministry of Economy, Trade and industry (METI) and NASA announced the release of the ASTER Global Digital Elevation Model (GDEM) on June 29, 2009. The GDEM was created by stereo-correlating the 1.3 million scene ASTER VNIR archive, covering the Earth's land surface between 83N and 83S latitudes. The GDEM is produced with 30 meter postings, and is formatted in 1 x 1 degree tiles as GeoTIFF files. Each GDEM file is accompanied by a Quality Assessment file, either giving the number of ASTER scenes used to calculate a pixel's value, or indicating the source of external DEM data used to fill the ASTER voids.

https://lpdaac.usgs.gov/lpdaac/products/aster_products_table/routine/global_digital_elevation_model/v1/astgtm

Boreal Ecosystem-Atmosphere Study (BOREAS) and BOREAS Follow-On

Resolution: Varied
Availability: Campaign data, 1993 to 1996 and 1993 to 1998; historical background data as early as 1937.
Coverage: A 1,000 km x 1,000 km study area with two sites in Manitoba and Saskatchewan, Canada.

Through remote sensing and field measurements, BOREAS investigated exchanges of energy, water, heat, carbon dioxide, and trace gases between a boreal forest and the atmosphere. Two-hundred and eighty-one Boreas data sets (24 airborne fluxes and meteorology, 33 hydrology, 40 remote sensing, 69 terrestrial ecology, 29 tower fluxes, 31 trace gas biogeochemistry, 42 staff science, and 13 miscellaneous science) and twenty-five Boreas Follow-On data sets are currently available.

http://daac.ornl.gov/BOREAS/boreas_home_page.html

Tree and vine diameters were measured in overlapping transects within the logging concession at Fazenda Rosahmar adjacent to the Rio Juruena in the country of Juruena in southern Amazonia, MT, Brazil, and used to validate LANDSAT TM imagery acquired in July 1996.

Boreal Forest Mosaics

Resolution: 100 m to 2 km
Availability: 1997 and 1998
Coverage: North America boreal forest

JERS-1 SAR mosaics of boreal North America (Alaska and Canada) are now available on DVD. Winter and summer mosaics were assembled under the North American component of the Global Boreal Forest Mapping (GBFM) project. The DVD includes imagery extending from northern Alaska to the northeastern United States. Backscatter and texture products are provided as complete summer and winter mosaics at both 500 m and 2 km resolution. Backscatter data at 100-m resolution are also provided as tiles of about 50 JERS-1 scenes each.

http://www.asf.alaska.edu/sardatacenter/data/unrestricted
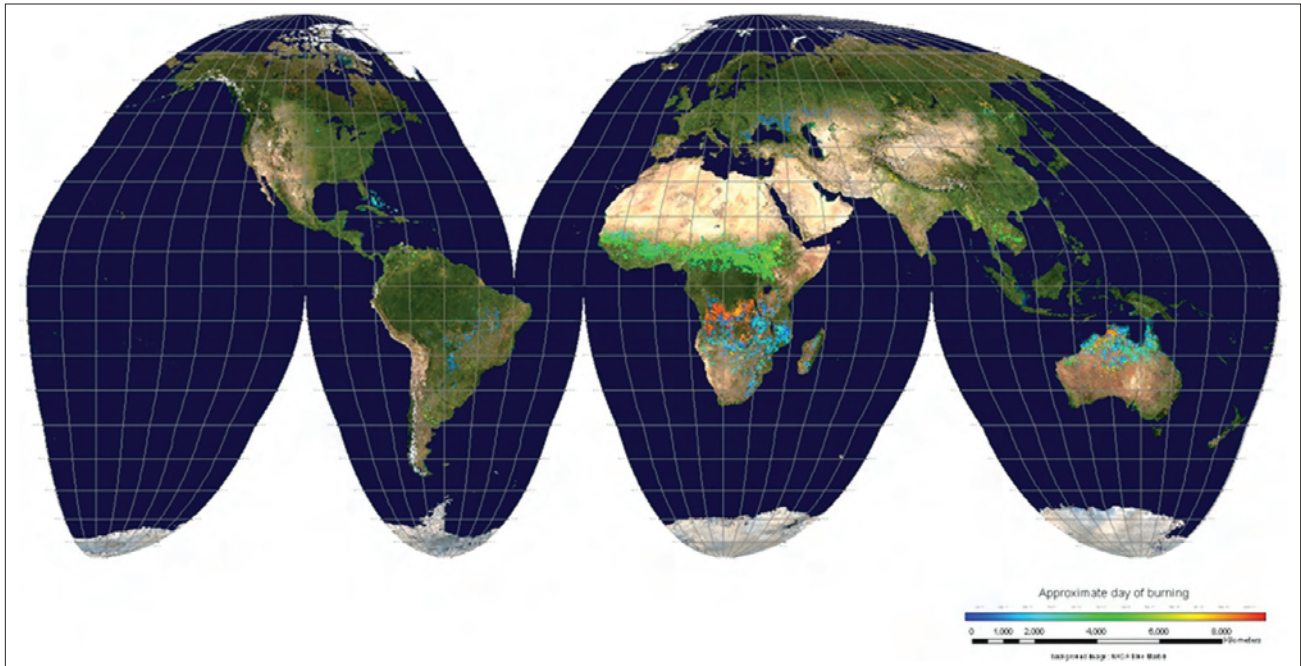
The image illustrates the new MODIS Global Burned Area Product (MCD45A1), introduced in the latest generation of MODIS land product processing. One year of global burned areas, from July 2001 to June 2002, is shown superimposed on MODIS true color composite surface reflectance. Each location burned during the year is color coded to show the approximate day of the year when the burn occurred. The MCD45 product is generated from time series of MODIS-derived surface reflectance observations from both Aqua and Terra at 500m spatial resolution; it improves on previous methods by applying a bidirectional reflectance distribution function (BRDF) model-based change detection approach to handle variations in the data due to the viewing and illumination geometry. Courtesy: University of Maryland, Department of Geography.

EOS Land Validation

Availability: Campaign data, 1999 to present
Coverage: Global

The EOS Land Validation project is using the ORNL DAAC's Mercury system for registering data sets from ground-based and airborne measurements to compare with EOS satellite products.

http://daac.ornl.gov/LAND_VAL/valid.html

Ice, Cloud, and Land Elevation Satellite (ICESat) Geoscience Laser Altimeter System (GLAS)

Resolution: 60-m spot size at nadir
Availability: Begins Feb. 2003; (see release schedule for availability)
Coverage: Global, from 86° N to 86° S latitude

Some of the secondary objectives of the ICESat mission include measurements of land parameters such as land elevations and vegetation cover. Using GLAS data to study vegetation has become a fruitful area of research. Data products useful to non-cryospheric land studies include the Land Surface Altimetry product and various Level 1 products, e.g., Level 1B Global Backscatter data. (See also Cryosphere)

http://nsidc.org/data/icesat/data.html

Large-Scale Biosphere-Atmosphere Experiment in Amazonia (LBA)

Resolution: Varied
Availability: 1995-2006
Coverage: Amazonia

The Large-Scale Biosphere-Atmosphere Experiment in Amazonia (LBA) was an international research initiative conducted from 1995-2006 and led by Brazil. The project focused on understanding how tropical forest conversion, regrowth, and selective logging influence carbon storage, nutrient dynamics, trace gas fluxes, and the prospect for sustainable land use in Amazonia. Seventy-three data sets (2 atmospheric chemistry, 19 carbon dynamics, 1 human dimensions, 25 land use and land cover change, 6 nutrient dynamics, 10 physical climate, 4 surface hydrology and water chemistry, and 6 trace gases) are currently available.

http://daac.ornl.gov/LBA/lba.html

Model Archive (MAPSS)

Resolution: Varied
Availability: Benchmark, PNet, and published research results
Coverage: Global

The ORNL DAAC currently archives and distributes the following model products: 3 benchmark model versions: BIOME-BCG, Integrated Biosphere Simulator (IBIS), and Land Surface Model (LSM), CENTURY, Version 4 (VEMAP), 2 PNet model products, and 2 models used in published research results associated with specific model implementations: BIOME-BCG (Law et al.) and BIOME-BGC.

http://daac.ornl.gov/model_intro.shtml

MODIS ASCII Subsets

Availability: February 2000 to present
Coverage: Global

Selected MODIS land products from the Terra and Aqua satellites are available for 1028 sites. The products are subset for 7 km x 7 km around the field sites. MODIS data are in sinusoidal projection in ASCII format. Subset data can be viewed for individual composite periods or as a time series.

http://daac.ornl.gov/MODIS/modis.html

MODIS Products from Terra and Aqua

Resolution: 250 m, 500 m, and 1 km
Availability: Terra, February 2000 to present; Aqua, August 2002 to present; combined Terra and Aqua products, July 2002 to present
Coverage: Global

The Moderate Resolution Imaging Spectroradiometer (MODIS) provides an integrated tool for observing a variety of terrestrial, oceanic, and atmospheric features of Earth. Data sets are Level 2 and higher and include surface reflectance, land surface temperature, vegetation indices, fire anomalies, leaf area index, bidirectional reflectance distribution function and albedo, land cover change, vegetation cover conversion, and net primary production.

These higher-level data products have been designed to remove the burden of certain common types of data processing from the user community and meet the more general needs of global-to-regional monitoring, modeling, and assessment.

https://lpdaac.usgs.gov/
https://lpdaac.usgs.gov/lpdaac/products/modis_products_table

Net Primary Productivity (NPP)

Availability: Varies, between 1930 and 2001
Coverage: Global

NPP holdings contain field measurements and NPP estimates for a variety of ecosystems. Eighty-two data sets are currently available (9 boreal forest, 1 US cropland, 37 grassland, 10 multi-biome, 4 temperate forest, 19 tropical forest and 2 Alaskan tundra).

http://daac.ornl.gov/NPP/npp_home.html

Oregon Transect Ecosystem Research (OTTER)

Resolution: Varied
Availability: Campaign data, 1989 to 1991; background data, 1989 to 1991
Coverage: Six sites in Oregon, U.S.A.

The OTTER project estimated fluxes of carbon, nitrogen, and water in three Oregon forests, using an ecosystem-process model and remote sensing data. Fourteen OTTER data sets on canopy chemistry, meteorology, field sunphotometer, airborne sun photometer, and timber measurements are available.

http://daac.ornl.gov/OTTER/otter.html

Rain Forest Mosaics

Resolution: 100 m
Availability: Central America, 1996; South America, 1995 and 1996; Africa, 1996 and 1997; Northern Australia, 1996; South-East Asia, 1997 and 1998
Coverage: Major rain forests

The goal of the Global Rain Forest Mapping (GRFM) project is to acquire contiguous SAR data sets of Earth's major rain forests using the JERS-1 satellite. ASF has available complete GRFM-produced mosaics of the Amazon, Central America, Africa, Pantanal region, Africa, Northern Australia, and South-East Asia. The mosaics are available on CD-ROM.

http://www.asf.alaska.edu/sardatacenter/data/unrestricted

River Discharge (RivDIS)

Availability: Varies, between 1807 and 1991
Coverage: Global

Holdings contain long-term monthly averaged values for river discharge measured at various stations.

http://daac.ornl.gov/RIVDIS/rivdis.html

Soil Collections

Availability: Varies, between 1940 and 1996
Coverage: Global

Soil characteristics were measured at sampling sites or estimated for grids of various sizes in ten data sets.

http://daac.ornl.gov/SOILS/soils_collections.html

Southern African Regional Science Initiative (SAFARI) 2000

Resolution: Varied
Availability: 1992-2000
Coverage: Southern Africa, 5° W to 60° E; 5° N to 35° S

The SAFARI 2000 project was an international regional science initiative conducted from 1992-2000 to develop a better understanding of the Earth-atmosphere-human system in Southern Africa. One-hundred and eight data sets (19 atmospheric, 11 land cover, 7 soils, 14 climate and meteorology, 26 field based measurements, 2 hydrology, 4 regional, and 25 remote sensing) are available.

http://daac.ornl.gov/S2K/safari.html

Superior National Forest (SNF)

Availability: Campaign data, 1983 to 1984;
weather data, 1972 to 1990
Coverage: 50 km x 50 km study area in northern Minnesota, U.S.A.

SNF research investigated the usefulness of remote sensing data in estimating the biophysical properties (e.g., biomass) of a boreal forest. Fourteen data sets on canopy chemistry, leaf area index, leaf reflectance, meteorology, optical thickness, and reflectance are available.

http://daac.ornl.gov/SNF/summary.html

Vegetation Collections

Availability: Varies, between 1932 and 2000
Coverage: Global and regional

Holdings pertain to vegetation characteristics, including the distribution of vegetation types, as well as leaf area index calculated from field measurements in thirteen data sets.

http://daac.ornl.gov/VEGETATION/ vegetation_collection.html

Vegetation/Ecosystem Modeling and Analysis Project (VEMAP)

Availability: Climate measurements, 1895 to 1993; climate scenarios, 1994 to 2100
Coverage: U.S.A.

VEMAP studied the global response of biogeography and biogeochemistry to variability in climate and other environmental factors (e.g., elevated atmospheric carbon dioxide concentrations). Fifteen VEMAP data sets are available.

http://daac.ornl.gov/VEGETATION/vegetation_collections.html

OCEAN

Advanced Microwave Scanning Radiometer-EOS (AMSR-E) on Aqua

Resolution: 5 to 56 km
Availability: May 2002 to present
Coverage: Global

AMSR-E data include brightness temperatures and ocean products (water vapor, cloud liquid water, sea surface wind speeds, sea surface temperature) in both swath and gridded formats.

http://nsidc.org/data/amsre/data_summaries.html

Gravity Recovery and Climate Experiment (GRACE)

Resolution: 500 km
Availability: March 2002 to present
Coverage: Global

The primary objective of the GRACE (Gravity Recovery and Climate Experiment) mission is to obtain accurate global models for the mean and the time variable components of the Earth's gravity field. Data includes monthly harmonic coefficients for Earth's gravitational potential, atmospheric and ocean de-aliasing, and barotropic ocean model output. It also contains information on how much water is in the oceans, land and ice.

http://podaac.jpl.nasa.gov and http://grace.jpl.nasa.gov

Group for High Resolution Sea Surface Temperature (GHRSST) Project

For L2P
Resolution: 1-25 km (depends on satellite)
Availability: Daily
Coverage: Global and regional (depends on satellite)

For L4
Resolution: 2-28 km
Availability: Daily
Coverage: Global and regional

An international collaboration to produce a new generation of global satellite-based SST measurements from infrared and microwave instruments. Near real-time Level-2 Preprocessed (L2P) and Level 4 merged SST products containing satellite-specific SST uncertainty statistics and other relevant ancillary information are available through a 30-45 day roll-ing store in netCDF format. L2P products are available within 6 hours of satellite overpass. The spatial resolution ranges from 1 km global coverage for MODIS and AATSR to 25 km global coverage for AMSR-E, and TMI. L4 blended products are available daily with both global and regional spatial coverages. All products are available through ftp://podaac.jpl.nasa.gov/GHRSST. Historical data that are 30 days or older can be found at the GHRSST Long Term Stewardship and Reanalysis Center (LTSRF) at:

http://ghrsst.nodc.noaa.gov
http://ghrsst.jpl.nasa.gov
http://www.ghrsst.org

Jason Data for Ocean Surface Topography Measurements

Resolution: Along track measurements are approximately 6 km apart and the ground tracks are 315 km apart at the equator.
Availability: January 2002–present
Coverage: Global

Jason, a follow-on mission to the highly successful TOPEX/POSEIDON mission, provides an extended continuous time series of high-accuracy measurements of the ocean surface topography. New version "C" Jason science data products are available. Improved algorithms include: orbits, altimeter instrument corrections, tide models, sea state bias, pseudo datation bias, mean dynamic topography, non-tidal high frequency corrections, ice flagging, and rain flagging.

http://podaac.jpl.nasa.gov

MODIS on Aqua and Terra

Resolution: L2 at 1 km, L3 at 4 km and 9 km
Availability: MODIS/Aqua: July 2002 to present, MODIS/Terra: February 2000 to present for sea surface temperature (SST) products and January 2007 to present for ocean color products
Coverage: Global

MODIS ocean products are distributed by the Ocean Biology Processing Group via the OceanColor Web. SST products are available over the MODIS operational lifetimes for both the Aqua and Terra instruments. Ocean color products include chlorophyll concentration, diffuse attenuation coefficient, water leaving radiances at 6 wavelengths, and aerosol parameters used in atmospheric corrections. The quality of MODIS/Aqua ocean color products is much higher than those for MODIS/Terra, which is why the availability of the

latter data is limited. The Level 2 swath products are given at full spatial resolution, with scene sizes approximately 2000 km by 2000 km. The mapped products are available at several temporal resolutions (daily, 8-day, monthly, seasonal, and yearly).

http://oceancolor.gsfc.nasa.gov

SeaWiFS on OrbView-2

Resolution: L2 at 1 km for local area coverage (LAC) and 4 km for global area coverage (GAC), L3 at 4 km and 9 km
Availability: September 1997 to present
Coverage: Global oceans

SeaWiFS ocean color products are similar to those produced from MODIS, but the instrument has no channels for retrieving SST. The products also are distributed by the Ocean Biology Processing Group via the OceanColor Web, and include chlorophyll concentration, diffuse attenuation coefficient, water leaving radiances at 6 wavelengths (slightly different from the MODIS wavelengths), and aerosol parameters used in atmospheric corrections. The Level 2 swath products are given at full spatial resolution. The swath widths depend on the coverage, approximately 2800 km for LAC and 1500 km for GAC. The mapped products are available at several temporal resolutions (daily, 8-day, monthly, seasonal, and yearly). Additional SeaWiFS products applicable to ocean biology include photosynthetically active radiation (PAR) reaching the ocean surface and a global biosphere browse product.

http://oceancolor.gsfc.nasa.gov

SeaWinds on QuikSCAT and SeaWinds on ADEOS-II

Resolution: Level 3 at 0.25 deg; Level 2B at 25 km or 12.5 km
Availability: QuikSCAT, July 1999 to present; ADEOS-II, April 2003 to October 2003
Coverage: Global

Level 3 data sets from the SeaWinds instrument on both QuikSCAT and ADEOS-II provide daily gridded wind vectors, comprising zonal and meridional components. The Level 2B data sets provide per-orbit, swathed wind vectors, comprising speed and direction. SeaWinds orbits more than 14 times a day. Both products have ancillary data, e.g., rain flags and quality indicators.

*http://podaac.jpl.nasa.gov*

TOPEX/POSEIDON

Resolution: Along track measurements are approximately 6 km apart and the ground tracks are 315 km apart at the equator
Availability: 1992 to 2005
Coverage: Global

Data include sea surface height (SSH), wind speed, significant wave height, tropospheric water vapor, ionospheric electron content, and ancillary information along the satellite's track, from both NASA and CNES (French space agency) altimeters and radiometer. Products include the complete Merged Geophysical Data Record-B (MGDR-B) as well as a reduced volume sea surface height anomaly (SSHA) product.

http://podaac.jpl.nasa.gov
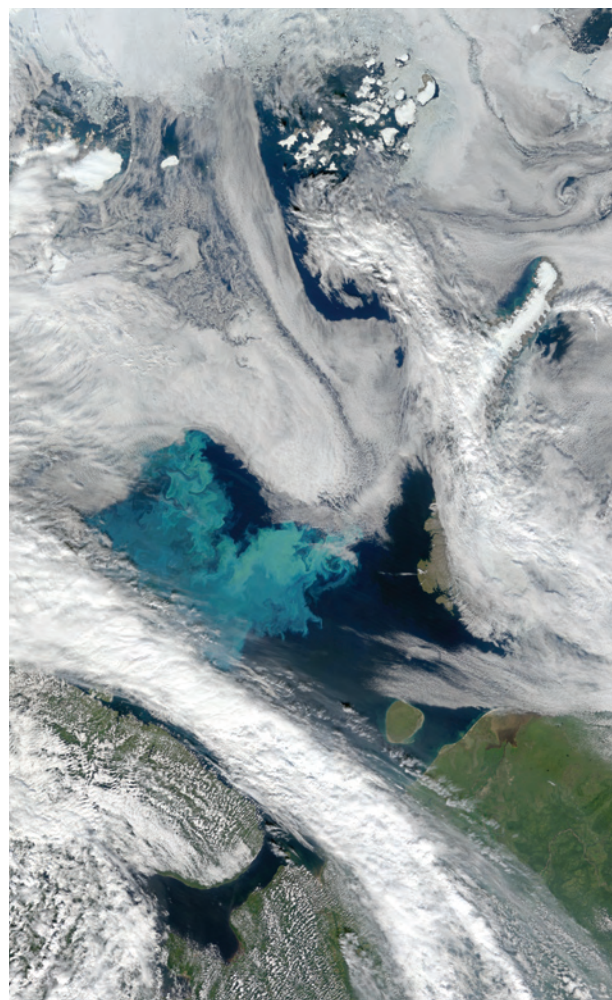
A break in the clouds over the Barents Sea on August 1, 2007 revealed a large, dense phytoplankton bloom to the orbiting MODIS aboard the Terra satellite. The bright aquamarine hues suggest that this is likely a coccolithophore bloom. The visible portion of this bloom covers about 150,000 square kilometers (57,000 square miles) or roughly the area of Wisconsin. Courtesy: The Ocean Biology Processing Group at GSFC.

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Space Geodesy Techniques and Solid Earth

Space geodesy data are utilized to precisely determine station positions and velocities of a network of stations. These solutions are then used to maintain the terrestrial reference frame, the set of points that realize an ideal reference system. This TRF provides the stable coordinate system that allows satellite and ground-based measurements to be linked over space and time. The TRF is a foundation by which scientists verify that observed temporal changes are geophysical signals rather than artifacts of the measurement system. The TRF provides for remote monitoring of key contributors to global change, e.g., sea level, sea surface and ice surface topography, crustal deformation, temporal gravity variations, etc. This reference frame provides the spatial and temporal link between missions.

Doppler Orbitography by Radiopositioning Integrated on Satellite (DORIS)

Resolution: Varied
Availability: Multi-day, daily 1990 to present
Coverage: Global

DORIS is a dual-frequency Doppler system developed by CNES in partnership with GRGS and IGN. The technology has been included as a host experiment on several space missions (SPOT series, TOPEX/Poseidon, Jason-1/-2, Envisat). DORIS data records contain a time-tagged range-rate measurement with associated ancillary information. An accurate measurement is made of the Doppler shift on dual-frequency radio signals emitted by the ground beacons and received on the spacecraft. Together with an ultra-stable satellite oscillator, satellite orbits can be determined with an accuracy of a few centimeters. The data also contain information about the various corrections (e.g., ionosphere, troposphere, satellite center of mass, etc.) that may be applied (or not) during processing phase. Measurements of ground pressure, temperature and relative humidity from co-located meteorological equipment are also included in the data record and are used for the calculation of the tropospheric correction. Products derived from DORIS data include precise satellite ephemerides, station positions and velocities (input to the derivation of a Terrestrial Reference Frame), Earth Orientation Parameters (EOP, polar motion, length-of- day), and derived vertical total electron content.

http://cddis.gsfc.nasa.gov/doris_summary.html
http://cddis.gsfc.nasa.gov/doris_datasum.html
ftp://cddis.gsfc.nasa.gov/pub/doris

Global Navigation Satellite System (GNSS)

Resolution: Varied
Availability: Weekly, daily, hourly, sub-hourly, 1992 to present
Coverage: Global

Global Navigation Satellite Systems, such as the U.S. Global Positioning System (GPS), Russia's GLObal NAvigation Satellite System (GLONASS), and the EU's Galileo, provide autonomous geo-spatial positioning with global coverage. Ground (or space-based) receivers collect the signals from orbiting satellites to determine their location in three dimensions and calculate precise time. These receivers detect, decode, and process both pseudorange (code) and phase transmitted by the GNSS satellites. The satellites transmit the ranging codes on two radio-frequency carriers, allowing the locations of GNSS receivers to be determined with varying degrees of accuracy, depending on the receiver and post-processing of the data. The GNSS data consist of the receiver's observation data, the broadcast orbit information of the tracked satellites, and supporting data, such as meteorological parameters, collected from co-located instruments. Products derived from these data include precise satellite ephemerides, station positions and velocities (input to the derivation of a Terrestrial Reference Frame), Earth Orientation Parameters (EOP, polar motion and rates, length-of-day), station and satellite clock solutions, zenith tropospheric path delay estimates, and global ionosphere maps.

http://cddis.gsfc.nasa.gov/gnss_summary.html
http://cddis.gsfc.nasa.gov/gnss_datasum.html
ftp://cddis.gsfc.nasa.gov/pub/gps

Satellite and Lunar Laser Ranging (SLR and LLR)

Resolution: Varied
Availability: Monthly, weekly, daily, hourly, 1976 to present
Coverage: Global

In laser ranging a short pulse of light generated by a laser is transmitted in a narrow beam to illuminate corner cube retroreflectors on a satellite (satellite laser ranging or SLR) or the Moon (lunar laser ranging or LLR). The station's telescope collects the return signal, typically a few photons, and the time-of-flight is measured. Using information about the satellite's orbit, the time-of-flight, and the speed of light, the location of the ranging station can be determined. Repetitive measurements over months and years yield the change in station position, or the motion of the Earth's crust. Currently, the global SLR network tracks over forty such satellites. Data are available in two forms: original observations (full-rate data) and condensed range observations generated from these original observations collected over several seconds to minutes (normal points). Products derived from these observations include precise satellite ephemerides, station positions and velocities (input to the derivation of a Terrestrial Reference Frame), Earth Orientation Parameters (EOP, polar motion and rates, length-of-day). SLR contributes to the determination of static and time-varying coefficients of the Earth's gravity field, total Earth mass, and temporal variations of the observing network origin with the respect to Earth's center of mass.

http://cddis.gsfc.nasa.gov/slr_summary.html
http://cddis.gsfc.nasa.gov/slr_datasum.html
ftp://cddis.gsfc.nasa.gov/pub/slr

Very Long Baseline Interferometry (VLBI)

Resolution: Varied
Availability: Daily, hourly, 1979 to present
Coverage: Global

VLBI is a geometric technique that measures the time difference between the arrival of a radio wavefront emitted by a distant quasar at two Earth-based antennas. Using large numbers of time difference measurements from many quasars observed with a global network of antennas, VLBI determines the inertial reference frame defined by the quasars and simultaneously the precise positions of the antennas. Because the time difference measurements are precise to a few picoseconds, VLBI determines the relative positions of the antennas to a few millimeters and the quasar positions to fractions of a milliarcsecond. Since the antennas are fixed to the Earth, their locations track the instantaneous orientation of the Earth in the inertial reference frame. The raw observables from telescopes involved in simultaneous measurements are correlated at a central facility to produce an experiment. The VLBI data consists of correlated experiments (databases) between these simultaneously observing stations and are organized by experimental session and frequency band. Each database also contains other information such as calibration data, solar system ephemerides, a priori parameter values, Earth orientation information, partial derivatives, and theoretical delays and rates. Products derived from VLBI measurements include correlated delay and delay rate of simultaneous observations as a function of time, station positions and velocities (input to the derivation of a Terrestrial Reference Frame), positions of quasars (input to the Celestial Reference Frame), Earth Orientation Parameters (EOP, polar motion and rates, length-of-day, UT1-UTC and long-term stability of nutation), and troposphere parameters.

http://cddis.gsfc.nasa.gov/vlbi_summary.html
http://cddis.gsfc.nasa.gov/vlbi_datasum.html
ftp://cddis.gsfc.nasa.gov/pub/vlbi

How to Find and Get Data

How to Find and Get Data

Data Center Data Search and Order

The data centers are responsible for data archival, product development and distribution, and user support. Each data center is distinguished from one another by their specific Earth system science discipline. In addition to the search-and-order capabilities provided by ECHO and WIST, the data centers have individual online systems that allow them to provide unique services for users of a particular type of data. The center-specific systems emphasize data products, services, and data-handling tools unique to the data center.

The data centers provide their users with the following services and information:

Data center services
- Center-unique search-and-order systems
- Specific Earth science discipline searches
- Specialized data set tools

User services
- Assistance in selecting and obtaining data
- Access to data-handling and visualization tools
- Notification of data-related news
- Technical support and referrals

For more information about the data centers and their data and services, see *http://nasadaacs.eos.nasa.gov*

ECHO

http://www.echo.nasa.gov

The EOS ClearingHouse (ECHO) is a metadata catalog of NASA's EOS data and a registry for related data services (e.g. reformatting, pattern recognition). ECHO's catalog contains more than 2800 data sets held at 12 EOSDIS data centers. Users can access the data and services by using general or community-tailored clients that access ECHO using a series of Application Program Interfaces (APIs) defined using web services.

ECHO's catalog is populated by Data Partners (e.g. NASA EOSDIS data center), who provide metadata that represent their Earth science data holdings to ECHO to make it available for discovery. Data Partners allow users to access their data holdings either by order distribution or online access. ECHO's services registry is populated by Service Partners, who provide access to functions that operate on Earth science data or information. ECHO advertises these services as well as brokers these services, as the Service Partner requests. Client Partners develop software applications that communicate with ECHO via its APIs to allow end users to access its metadata catalog and functionality. Some Clients provide a web application or other graphical user interface (GUI) to assist users in navigating and exploring ECHO for data and services. Other Clients may use ECHO's machine-to-machine interfaces.

To help science communities that need data from multiple organizations and multiple disciplines, ECHO provides a uniform view of NASA's data. It allows users to more efficiently search and access data and services and increases the potential for interoperability with new tools and services.

The core ECHO capabilities include the following:

- User Registration and Login
- Data Discovery
- Data Access (e.g. direct on-line access, order brokering, subscriptions)
- Service Registry
- Event Notification (e.g. automated messages re: catalog or service modifications)

WIST

https://wist.echo.nasa.gov

WIST, the Warehouse Inventory Search Tool, is the primary web-based client for discovering and ordering cross-discipline data from all of ECHO's metadata holdings. WIST allows users, including those without specific knowledge of the data, to search science data holdings, retrieve high-level descriptions of data sets and detailed descriptions of the data inventory, view browse images, and submit orders via ECHO to the appropriate data providers.

The WIST search-and-order tool has the following features:

- Data Discovery — Allows a user to discover data sets and granules based upon specific data criteria and view their temporal coverage, spatial coverage, attributes (metadata), related documents (guide search), and browse images.
- Order Creation — Allows a user to select data for ordering, choose packaging information, enter ordering information (such as shipping address), place an order, and view order status.

NASA Earth Observations (NEO)

http://neo.sci.gsfc.nasa.gov

NEO is an on-line Web-based image access and analysis tool targeted for designers in that it simplifies access to NASA remote-sensing data products in familiar file formats. NEO allows users to browse NASA satellite images with the ability to order matching data (for select products) via a single, integrated gateway. This resource is designed for educators, communicators, and citizen scientists who wish to export geo-referenced imagery into commonly used tools (i.e., Google Earth, MS Excel). Thus, all imagery are available at set temporal and spatial resolutions and the user can specify image size and file formats. NEO also allows the user to analyze the imagery quantitatively using standard techniques, such as value "probing," transect data plots, scatter plots, measurements of area and distance, histograms, and others.

Global Change Master Directory

http://gcmd.nasa.gov

A directory to Earth science data and services, the GCMD database currently holds more than 25,000 Earth science data sets and services covering all aspects of Earth and environmental sciences. One can use the search box or select from the available keywords to search for data and services. New features available on the GCMD website:

- Link checker tool integrated into docBUILDER allowing users to validate links.
- Improved NASA Data portal, including a more dynamic layout using disclosure sections for each Data Center.
- A Web 2.0 Platform/Instruments user interface providing a dynamic list of platforms and instruments, which allows users to easily sort, filter, and link directly to associated NASA data sets.
- A new Climate Diagnostics Directory, providing users direct links to climate visualizations.

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Data Tools

Data Tools

The data centers provide center-unique tools for functions such as searching and subsettting data. The table below lists and describes some of these available data-handling and service tools. The tools are grouped loosely into broad categories that indicate the primary function of each tool, for example, data handling, visualization and analysis, search and order, etc. Since many tools have multiple functions, a second summary table is included indicating the various uses of each tool.

Search and Order Tools		
Data Tool/Service	Data Center	Description
ASDC Data Pool	LaRC ASDC	An on-line, short-term data cache providing a Web interface and FTP access to select ASDC data products. Specially subsetted and/or reformatted data products supporting field campaigns are also available. • *http://eosweb.larc.nasa.gov/HPDOCS/datapool*
ASDC Order Tools	LaRC ASDC	These tools allow users to search our data holdings without logging in to the system. The user, however, must log in before ordering the data. Searches can be done by project, parameter, and data set, and searches can be refined by selecting a geographic region or time range. The ordering tool is available in both Java and HTML versions. Select CERES data products can be subset by latitude and longitude, start and end time, parameter, and criterion via the Java version of the ASDC Ordering Tool. • *http://eosweb.larc.nasa.gov/HBDOCS/langley_web_tool.html*
Coincidence Search Engine	GHRC DAAC	The Coincidence Search Engine may be used to search for times when up to four satellites were over or within the same geographic area simultaneously. Searches may be constrained by time, geographic area, and/or distance between the satellites. The output consists of a sequence of text lines listing the date, time, satellite name, and latitude and longitude. • *http://ghrc.nsstc.nasa.gov/orbit*
ENTRI	SEDAC	The Environmental Treaties and Resource Indicators (ENTRI) is a comprehensive database for accessing multilateral environmental treaty data. Using ENTRI you can find treaty texts and country and treaty status data. The ENTRI Conference of Parties (COP) decision search tool allows you to search the text of decisions produced by the Parties to a selected subset of multilateral environmental agreements. • *http://sedac.ciesin.columbia.edu/entri*
GHRC Data Pool	GHRC DAAC	The GHRC Data Pool provides on-line access to half a terabyte of passive microwave data. • Multiple views of available data, e.g. search, ftp and calendars • Data search based on product, instrument, platform and date • SSM/I, TMI, and AMSU-A Coarse Grain Subsetting • Shopping cart style order creation • Automated order packaging for FTP delivery • Integration with GHRC Order Tracking System for metrics and user services support • Direct FTP access to online data sets • Web Mapping Services • *http://datapool.nsstc.nasa.gov*
GHRSST Master Metadata Repository (MMR)	PO.DAAC	A Web-based interactive tool for data discovery and download for all Group for High Resolution Sea Surface Temperature (GHRSST) products. The MMR provides a simple spatial/temporal/product search interface to discover and directly access all GHRSST products, irrespective of their location at the PO.DAAC, NOAA NODC or regional data provider distribution node. • *http://ghrsst.jpl.nasa.gov/data_search.html* • *http://www.ghrsst-pp.org/Metadata-Records.html*

Search and Order Tools

Data Tool/Service	Data Center	Description
GloVis	LP DAAC	The USGS Global Visualization Viewer (GloVis) allows users to search, browse, and order ASTER and MODIS data. Users click on a global locator map to view ASTER or MODIS images for their selected geographic area. • *http://glovis.usgs.gov*
HyDRO	GHRC	The Hydrologic Data Search, Retrieval, and Order (HyDRO) system allows the user to search data set holdings at GHRC. HyDRO provides a list of GHRC data sets specific to the user's requirements. Users are able to browse the online information and tools or services for each data set. They can download online data sets by FTP or place an order. • *http://ghrc.nsstc.nasa.gov/hydro*
Land Processes Data Pool	LP DAAC	The Data Pool is the publicly available portion of the LP DAAC online holdings. Data Pool provides a more direct way to access files by foregoing their retrieval from tape storage devices. All Data Pool holdings are available at no cost to the user. MODIS Composites are all available online. A subset of the MODIS Daily products are available online and will be completely available in the near future. The most recent two years of ASTER Level-1B products for the U.S. and territories is available for Data Pool access. • *https://lpdaac.usgs.gov/lpdaac/get_data*
Mercury (Advanced Product Search)	ORNL DAAC	Mercury is a Web-based system for searching metadata and retrieving selected data. Data and documentation can reside anywhere on the Internet, including in a data center or, for a project, on the individual data providers' servers. Mercury keeps the central metadata current by updating its database every night. Mercury supports international metadata standards and is compatible with Internet search engines. • *http://mercury.ornl.gov/ornldaac*
Mirador	GES DISC	• Simplified web interface for searching, browsing, and ordering Earth science data at NASA Goddard Earth Sciences Data and Information Services Center (GES DISC). • Features include (quick response, data file hit estimator, Gazetteer, and interactive shopping cart. • Available data include AIRS, Aura (MLS, HIRDLS, OMI), SORCE, TOMS, TRMM, UARS, and MODIS subsets for A-Train. • *http://mirador.gsfc.nasa.gov*
MODAPS L1 and Atmospheres Archive and Distribution System (LAADS)	MODAPS LAADS	Online web-based data ordering for MODIS Level 1, Atmospheres, geo metadata and ancillary products. Capabilities include parameter, geographic, and temporal subsetting, metadata search, masking, channel subsetting, tile and granule reprojection, GeoTIFF reformatting and mosaicing. User friendly services including order tracking, data delivery options (ftp push, pull, direct download) and shopping cart function. Direct access is available at ftp://ladsweb/ for MODIS Level 1, Atmosphere, geo metadata and ancillary products. • *http://ladsweb.nascom.nasa.gov*
Multi-angle Imaging SpectroRadiometer (MISR) Order and Customization Tool	LaRC ASDC	• Allows users to order and customize data in a single interface. • Features include: non-consecutive path and orbit search, sorting search results by date, camera, path, orbit, and file version. • Customization options include: subsetting by parameter, block, and spatial coordinates, add latitude and longitude layers, unpacking and unscaling applicable fields. • Allows users to save searches and customizations. • Support EOS Validation site subsets. • Output data format in HDF-EOS stacked-block grid or conventional grid • *http://l0dup05.larc.nasa.gov/MISR/cgi-bin/MISR/main.cgi*

Search and Order Tools		
Data Tool/Service	Data Center	Description
NOESIS	GHRC DAAC	Noesis is a meta search engine and a resource aggregator designed specifically for Atmospheric Science. Noesis uses ontologies to guide users to refine their search query producing better search results and thereby reduces the user's burden to experiment with different search strings. Noesis also serves as an educational tool as it allows users to browse and traverse the different concepts in the ontology. Noesis provides users a single site to find all the right resources in the Atmospheric Science domain and these resources cover web pages, publications, datasets, educational materials, books etc. • *http://noesis.itsc.uah.edu*
OPeNDAP	LaRC ASDC, GES DISC and PO.DAAC	OPeNDAP (developed at the University of Rhode Island, P. Cornellion) provides software which makes local data accessible to remote locations regardless of local storage format. OPeNDAP also provides tools for transforming existing applications into OPeNDAP clients (i.e., enabling them to remotely access OPeNDAP served data). Access is provided to select MISR, TES, MOPITT, and CERES data products at the LaRC ASDC, select AIRS, TRMM, GLDAS, TOMS, and OMI data at the GES DISC as well as the following data held at the PO.DAAC– QuikSCAT, GHRSST, TOPEX/POSEIDON, SSM/I, and MODIS SST. • *http://eosweb.larc.nasa.gov/HPDOCS/datapool* (ASDC OPeNDAP) • *http://disc.gsfc.nasa.gov/services/opendap/index.shtml* (GES DISC OPeNDAP) • *http://dods.jpl.nasa.gov* (PO.DAAC OPeNDAP/DODS)
Snow and Ice Data Pool	NSIDC DAAC	The NSIDC Data Pool is a data cache that provides FTP access to AMSR-E, ICESat/GLAS, MODIS, and NISE products. A simple Web search interface helps you quickly locate data of interest. The Data Pool provides some reformatting, reprojecting, and subsetting capabilities for AMSR-E and MODIS data. • *http://nsidc.org/data/data_pool*
SNOWI	NSIDC DAAC	The Search 'N Order Web Interface (SNOWI) enables users to search for and order data from NSIDC and other EOSDIS data centers. Only NSIDC EOS data and NISE data are searchable through SNOWI. • *http://nsidc.org/data/snowi*
URSA	ASF SDC	URSA (User Remote Sensing Access) is a search and order interface designed for the ASF SAR data archive. All SAR data products available through the ASF SDC can be ordered through URSA. The interface provides the ability to search for data geographically and by date range. Express orders are also possible if orbit information is known. Search results can be exported as .kml files for display in Google Earth. AirSAR data can be downloaded directly from search results. • *https://ursa.asfdaac.alaska.edu/cgi-bin/login/guest*

Data Handling Tools (Read/Ingest, Format Conversion, Data Manipulation)		
Data Tool/Service	Data Center	Description
ASF MapReady Tool Suite	ASF SDC	• Supports ASF SAR data and CEOS data from a variety of other SAR facilities. • Enables a user to geocode the data using a variety of projections and standard datums. • Enables user to terrain correct (orthorectify) the data. • Enables a user to export the images as geotiffs for use in GIS programs. • Enables a user to export the images as tiffs, jpegs, or pgm files for easy viewing. • Includes a CEOS metadata viewer. • Displays thumbnails of imagery as it is loaded. • Displays thumbnails of imagery that it has processed. • Includes a simple image viewer. • *http://www.asf.alaska.edu/sardatacenter/softwaretools*
ASF SAR Training Processor	ASF SDC	• Enables user to follow the steps as a SAR image is processed from Level 0 raw data to a Level 1 image via the range-Doppler technique. • Writes and displays images at each selected processing stage, giving user visibility into the intermediate steps of the process. • Enables user to modify various parameters as well as steps that are performed to visualize the impact of each on the final product. • *http://www.asf.alaska.edu/sardatacenter/softwaretools*
Earth Science Markup Language (ESML)	GHRC DAAC	ESML is an interchange technology that enables data (both structural and semantic) interoperability with applications without enforcing a standard format within the Earth science community. Users can write external files using ESML schema to describe the structure of the data file. Applications can utilize the ESML Library to parse this description file and decode the data format. As a result, software developers can now build data format independent scientific applications utilizing the ESML technology. Furthermore, semantic tags can be added to the ESML files by linking different domain ontologies to provide a complete machine understandable data description. This ESML description file allows the development of intelligent applications that can now understand and "use" the data. • *http://esml.itsc.uah.edu*
hdfscan	LaRC ASDC	A data browser for files in Hierarchical Data Format (HDF), and HDF Earth Observing System (EOS) extension (HDF-EOS) formats. It is specifically written to facilitate access to Terra MISR data products. In particular, many MISR-unique functions are incorporated into the tool, such as data scaling, reformatting, unpacking, fill value recognition, and flag value interpretation. However, because of the standard formats provided by HDF and HDF-EOS, hdfscan can also serve as the general purpose tool for use with any other files making use of these formats. • *http://eosweb.larc.nasa.gov/PRODOCS/misr/tools/hdfscan.html*
MISR ENVI Tool	LaRC ASDC	Imports MISR Level 1B2 Ellipsoid and Terrain stacked block data into ENVI, allows automatic geolocation and correctly interprets band information. The tool consists of a set of routines written in IDL programming language which implement an ENVI User Function for working with MISR L1B2 data. MISR map projection definitions are provided for augmenting the ENVI defined map projections file, and a sample ENVI menu file which adds a menu item to invoke this tool is also included. • *http://eosweb.larc.nasa.gov/PRODOCS/misr/tools/envi_tool.html*
MISR Toolkit	LaRC ASDC	A simplified programming toolkit to access MISR Level 1B2, Level 2, and ancillary data products. The collection of routines that can be used as command line tools or in the development of larger software applications. The toolkit also handles the MISR conventional format. Features include: • specifying regions to read based on geographic bounding box, geographic location and extent, or the MISR path and block range • mapping between path, orbit, block, time range and geographic location • automatically stitching, unpacking and unscaling MISR data • performing coordinate conversions between lat/lon, SOM x/y, block/line/sample and line/sample of a data plane, which means geo-location can be computed instantly without referring to an ancillary data set lookup • *http://eosweb.larc.nasa.gov/PRODOCS/misr/tools/misr_toolkit.html*

Data Handling Tools (Read/Ingest, Format Conversion, Data Manipulation)		
Data Tool/Service	Data Center	Description
NGAT MapReady tool	NSIDC DAAC	The NSIDC GLAS Altimetry elevation extractor Tool (NGAT) extracts elevation and geoid data from GLAS altimetry products (GLA06 and GLA12-15) and outputs latitude, longitude, elevation, and geoid in ASCII columns. • *http://nsidc.org/data/icesat/tools.html*
READ_HDF	GES DISC	This command-line program allows a user to view the contents of an HDF file, as well as subset the data therein. Data can be subset along any dimension, or the entire data can be dumped if no subset options are given. There is also a mode to print a hierarchical tree list of the objects in the file. Data can be sent to an ASCII text file, a set of flat binary files, or displayed on the screen (default). • *http://disc.sci.gsfc.nasa.gov/services/tools/tools.shtml*
Spatial Data Access Tool (SDAT)	ORNL DAAC	SDAT is a web-based tool that enables users to visualize biogeochemical data sets in Google Earth, explore metadata, or customize and download data by specifying projection, resolution, format, spatial extent, time period, band(s), and interpolation method. • *http://webmap.ornl.gov/wcsdown*
TES Read Software	LaRC ASDC	The TES L1B and L2 read software packages allow users to access the parameters in TES data files. • *http://eosweb.larc.nasa.gov/PRODOCS/tes/tools/read_software.html*
Tool for Working with MISR Data	LaRC ASDC	Tools are available for Orbit/Date and Latitude/Longitude to Path/Block Conversion, extracting data and metadata and calculating block center times. • *http://eosweb.larc.nasa.gov/PRODOCS/misr/tools/misr_tools.html*

Subsetting and Filtering Tools (Temporal, Spatial, Parameter, Channel)		
Data Tool/Service	Data Center	Description
Coarse Grain Subsetter	GHRC DAAC	With the use of special internal coverage files, this tool provides a very quick retrieval of the passes in the user's area of interest. The subsetter can be used on SSM/I, AMSU-A, and TMI data. It is available on the GHRC Data Pool and through User Services for SSM/I data that is not available on the Data Pool. • *http://datapool.nsstc.nasa.gov*
GISMO	NSIDC DAAC	The GISMO (Graphical Interface for Subsetting, Mapping, and Ordering) allows users to search for and order gridded data sets by collection, parameter (channel), and date. Additionally, users can specify an area of interest and spatially subset data to reduce the total volume of delivered data. • *http://nsidc.org/data/gismo*
HEW Subsetter	GHRC DAAC	HEW (HDF-EOS Web-based subsetter) can extract a subset of any grid or swath data file that is in HDF-EOS format. Subsetting can be performed on • Latitude and longitude (rectangular areas) • Date and time span (swath data) • Dataset parameter, e.g., instrument or sensor HEW is also capable of subsampling by extracting every Nth point of data. As a stand-alone subsetter, HEW uses a user-friendly web-based front-end to gather the user's subsetting criteria and then submits the subsetting job to the batch queue. The subsetter engine (back-end) can also be used separately by substituting a site-specific front-end in place of HEW's web-based interface. • *http://www.subset.org/tools_docs/sds-hew.html*

Subsetting and Filtering Tools (Temporal, Spatial, Parameter, Channel)

Data Tool/Service	Data Center	Description
Hurricane/Typhoon Tracker	PO.DAAC	The Hurricane/Typhoon Tracker provides subsets of PO.DAAC data holdings for major oceanographic events such as hurricanes and typhoons. • *http://podaac.jpl.nasa.gov/hurricanes*
ICESat/GLAS Subsetter	NSIDC DAAC	ICESat/GLAS data users are able to subset GLAS data products by area of interest and time period, as well as enter multiple sets of spatial coordinates. • *http://nsidc.org/data/icesat/order.html*
MODIS Interactive Subsetting Tool (MIST)	NSIDC DAAC	The MODIS Interactive Subsetting Tool (MIST) allows users to search for and receive certain Version 5 (V005) MODIS data products over the Greenland Climate Network (GC-Net) and the International Arctic Systems for Observing the Atmosphere (IASOA) stations. MIST also provides limited online analysis capabilities that include generating time series and scatter plots. • *http://nsidc.org/data/mist*
MODIS Land Subsets (Fixed Sites)	ORNL DAAC	Users can select subsets of selected land products from the MODIS (Moderate Resolution Imaging Spectroradiometer) sensor or 1052 Collection 5 field sites. These subsetted products, which are in ASCII format for a 7 x 7 km area centered on the field sites, are useful for tracking seasonal dynamics and for validating remote sensing products. Currently, 18 MODIS Land Products from MODIS sensors onboard the Terra and Aqua platforms are offered, along with a tool for creating graphs of single composite periods or time series of the entire period of record. • *http://daac.ornl.gov/MODIS/MODIS-menu/MODIS_fixedsite_intro.html*
On-Demand Subsetting	GES DISC	On-demand subsetting services are available for many AIRS data products and other datasets provided by the GES DISC via our online search and order interface. The following URL is for the data product online access page. For the products listed under the AIRS, MLS, and OMI links, information is provided on the types of subsetting available for each product. • *http://disc.sci.gsfc.nasa.gov/services/index.shtml*
SAGE II Binary File Subset Tool	LaRC ASDC	This software subsets SAGE II binary format files. The tool is written in IDL programming language. It can be run either with a licensed version of the IDL package or by using the IDL Virtual Machine freeware at: • *http://www.ittvis.com/idlvm* Subsets may be specified by latitude and longitude regions and/or by parameter. The selected subset is written to an ASCII output file along with header information for profiles that match the subset criteria. • *http://eosweb.larc.nasa.gov/PRODOCS/sage2/tools/subset_sage2_tool.html*
Spatial Data Access Tool (SDAT)	ORNL DAAC	SDAT is a web-based tool that enables users to visualize biogeochemical data sets in Google Earth, explore metadata, or customize and download data by specifying projection, resolution, format, spatial extent, time period, band(s), and interpolation method. • *http://webmap.ornl.gov/wcsdown*
SPOT	GHRC DAAC	A companion program to HSE, SPOT can be used to check HDF-EOS files for subsettability by HSE. SPOT is invoked using a simple command-line interface. It checks that: • The file exists and is readable • The file is in HDF format • The file is in HDF-EOS format • The file contains valid HDF-EOS structures • The file contains the metadata needed for subsetting • *http://www.subset.org/tools_docs/sds-spot.html*

Geolocation, Reprojection, and Mapping Tools		
Data Tool/Service	Data Center	Description
AS2GT	NSIDC DAAC	Use this suite of software tools to subset and grid Level-1B and Level-2A AMSR-E swath data. These tools make it easy to process data into custom grids with any temporal or spatial resolution. AS2GT is not a standalone toolkit, but is part of the NSIDC Passive Microwave Swath Data Tools (PMSDT). • *http://nsidc.org/data/tools/pmsdt/as2gt.html*
Atlas of the Cryosphere	NSIDC DAAC	This National Snow and Ice Data Center web site allows visitors to explore and dynamically map the Earth's frozen regions. Viewed from a polar perspective, the available scenes include snow cover, sea ice extent and concentration, glaciers, permafrost, and other critical components of the Earth's cryosphere. • *http://nsidc.org/data/atlas*
EASE-Grid Geolocation Tools	NSIDC DAAC	EASE-Grid tools include IDL routines and map projections for geolocation and conversion tools to use with EASE-Grid data sets. • *http://nsidc.org/data/ease/tools.html*
MRT	LP DAAC	The MODIS Reprojection Tool (MRT) enables users to read MODIS Level 2G, Level 3, and Level 4 land products in HDF-EOS format. The software supports spatial subsetting and spectral subsetting, performs geographic transformation to a different coordinate system or cartographic projection, and writes the output to file formats other than HDF-EOS (GeoTIFF, raw, binary). The MRT is supported on several platforms including SGI and Sun UNIX, Windows and Linux. • *https://lpdaac.usgs.gov/lpdaac/tools/modis_reprojection_tool*
MRTSwath	LP DAAC	The MODIS Reprojection Tool Swath (MRTSwath) provides the capability to transform MODIS Level 1B and Level 2 land products from HDF-EOS swath format to a uniformly gridded image that is geographically referenced. The software supports spatial subsetting and spectral subsetting, performs geographic transformations, and writes the output to file formats other than HDF-EOS (GeoTIFF, raw, binary). The MRTSwath is supported on several platforms including SGI and Sun UNIX, Windows and Linux. • *https://lpdaac.usgs.gov/lpdaac/tools/modis_reprojection_tool_swath*
MRTWeb	LP DAAC	MRTWeb 2.0 combines familiar capabilities of the USGS Global Visualization Viewer (GloVis) and the downloadable MODIS Reprojection Tool (MRT). The MRTWeb interface organizes GloVis and MRT functionality into three main tabs: Selection, Process, and Download. Submitted jobs are run with MRT 4.0 processing software across multiple servers at the LP DAAC. Output data sets are staged on a job-specific ftp directory for user download. No media options are available with MRTWeb. • *http://mrtweb.cr.usgs.gov*
MS2GT	NSIDC DAAC	The MODIS Swath-to-Grid Toolbox (MS2GT) is a set of software tools that read HDF-EOS files containing MODIS swath data and produce flat binary files with gridded data in a variety of map projections. MS2GT consists of three Perl programs that make calls to several standalone IDL and C programs. • *http://nsidc.org/data/modis/ms2gt*
Spatial Data Access Tool (SDAT)	ORNL DAAC	SDAT is a web-based tool that enables users to visualize biogeochemical data sets in Google Earth, explore metadata, or customize and download data by specifying projection, resolution, format, spatial extent, time period, band(s), and interpolation method. • *http://webmap.ornl.gov/wcsdown*
WebGIS	ORNL DAAC	Two Web map servers enable users to access net primary productivity, FLUXNET, and MODIS Land Products Fixed Sites data at the ORNL DAAC, one with global coverage and the other coverage of North America. Users "Query" the map and select a site or group of sites; the server provides links to the data sets associated with that site. Users can view various biogeochemical related map layers, zoom in on areas of interest, and query multiple sites. • *http://daac.ornl.gov/mapserver.shtml*

Data Visualization & Analysis Tools

Data Tool/Service	Data Center	Description
Algorithm Development and Mining System (ADaM)	GHRC DAAC	The Algorithm Development and Mining (ADaM) system is designed with the goal of mining large scientific data sets for geophysical phenomena detection and feature extraction, and has continued to be expanded and improved for over 10 years. ADaM's mining and image processing toolkits consist of over 100 interoperable components that can be linked together in a variety of ways for application to diverse problem domains. ADaM includes not only traditional data mining capabilities such as pattern recognition, but also image processing and optimization capabilities, and many supporting data preparation algorithms that are useful in the mining process. Each component is provided with a C, C++, or other application programming interface (API), an executable in support of generic scripting tools (e.g. Perl, Python, shell scripts) and SOAP web service interfaces to support distributed architectures including web and grid applications. The ADaM toolkit is also available as a suite of SOAP web services. WSDL documents are available at • *http://www.itsc.uah.edu/mws/services.html*

Giovanni	GES DISC	Giovanni is a Web-based application developed by the GES DISC that provides a simple and intuitive way to visualize, analyze, and access vast amounts of Earth science remote sensing data without having to download the data. Giovanni features currently available include:
		• Plot Types for Single Parameters
		• Area plots of time-averaged parameters
		• Time series plots of area-averaged parameters
		• Meridional averages
		• Zonal averages
		• Vertical profiles
		• Longitude-latitude-pressure-time cross sections
		• Plot Types for Multi-Parameter Intercomparisons:
		    o Area plots of overlain time-averaged parameters
		    o Time series plots of area-averaged parameters
		    o Difference plots
		    o Scatter plots with regression
		    o Temporal correlation maps
		    o Animations
		    o Climatology and anomalies
		    o ASCII output for maps and plots
		    o Web services for downloading subsetted data
		Giovanni supports an ever growing set of EOS and heritage data collections. Examples of these include aerosol data from MODIS (both Aqua and Terra), MISR, and GOCART models; precipitation data from TRMM, multi-satellite analyses, and ground observations; atmospheric chemistry data from OMI, MLS, TOMS, and HALOE; ocean color data from Aqua MODIS and SeaWiFS; and atmospheric temperature and humidity profiles from AIRS. In addition, Northern Eurasia Earth Science Partnership Initiative (NEESPI) monthly products are available, as well as CloudSat cloud and MODIS Aqua temperature and humidity data along the A-Train track.
		• *http://disc.sci.gsfc.nasa.gov/giovanni*

GLAS Visualizer	NSIDC DAAC	The IDL Visualizer reads data from an ICESat/GLAS file making the file viewable as graphical summaries of variables. • *http://nsidc.org/data/icesat/tools.html*

Data Visualization & Analysis Tools

Data Tool/Service	Data Center	Description
Hurricane Portal	GES DISC	This Hurricane Data Portal is designed for viewing and studying hurricanes in the Atlantic region by utilizing various measurements by the NASA remote-sensing instruments. The portal consists of four main components: • Current Conditions (in pre-selected regions and updated daily): the latest maps and profiles from NASA satellites, such as, TRMM, AIRS, etc. • Event based: the latest maps and profiles for an active tropical storm or hurricane • Science focus: Examples/stories describing the data usage in hurricane monitoring and research • Archives: maps and profiles from past tropical storms and hurricanes There are three main tools within the Hurricane Portal: **1) The Hurricane Viewer-**Application for animating hurricane path, their varying levels of intensity and atmospheric information occurring at the time of the event. Available as a beta(experimental) version, with additional features and animation options to be added. **2) The Hurricane Analysis Tool-** allows users to overlay various data products relevant in the study of hurricanes in an area plot, a time plot or animation using an interactive tool. The data products being offered include selected sea surface temperature data, rainfall data, sea level pressure, and near surface wind vectors. This tool is beneficial for users to obtain a visualization of a single product, animation or a comparison of two products during a hurricane event. **3) Hurricane Archive-** provides data information, data sets, animations, hurricane imagery, maps and profiles for past tropical storms and Atlantic hurricanes. • *http://disc.sci.gsfc.nasa.gov/hurricane*
Image Gallery	LaRC ASDC	The ASDC Imagery Gallery provides access to images and color graphics of AirMISR, CERES, MISR, NVAP, POAM II, and SSM/I data products. • *http://eosweb.larc.nasa.gov/HPDOCS/imagery.html*
MISR Browse Tool	LaRC ASDC	The MISR Browse Tool allows easy access to images from the MISR instrument. The browse images are produced from the ellipsoid product for each camera, reduced to 2.2 km resolution. The MISR red, green, and blue bands are used to create a color image, which are intentionally clipped and gamma-stretched to make cloud, ocean, and land features visible. The images are in JPEG format. Features of the new browse tool are: • Searching for images by latitude/longitude region, date, path, and orbit. • Displaying crossing paths • Displaying block range for selected latitude/longitude region • The browse image is overlaid on a map which can be turned on and off • *http://eosweb.larc.nasa.gov/MISRBR*
MISR INteractive eXplorer (MINX)	LARC ASDC	MINX is an interactive application written in IDL that functions both as a general-purpose tool to visualize MISR data and as a specialized tool to retrieve detailed plume heights and wind velocities from wildfire smoke, volcanic, and dust plumes. MINX includes high-level options to: • Interactively digitize plumes in order to automatically retrieve heights and winds from MISR multi-angle imagery • Make scrollable, single-camera and multi-camera true-color and false-color images of MISR radiance data • Create animations of the nine MISR camera images providing a 3-D perspective of MISR scenes • Display plots of top-of-atmosphere Bidirectional Reflectance Factor (BRF) vs. camera angle for selected pixels • Difference images acquired on MISR orbits that share the same ground track • Create map views of MISR orbit locations • Save images and animations to disk in various formats • *http://www.openchannelsoftware.com/projects/MINX*

Data Visualization & Analysis Tools

Data Tool/Service	Data Center	Description
MISR Level 3 Imagery	LaRC ASDC	Visualization of parameters contained in the MISR Level 3 global data products such as radiances, aerosol optical depth, surface reflectance, and vegetation indices are available. The Level 3 products are averages of select Level 1 and Level 2 parameters over daily, monthly, seasonal and annual time periods. MISR Level 3 data are available for viewing, animating, and downloading from the Web. • *http://eosweb.larc.nasa.gov/PRODOCS/misr/level3/overview.html*
misr_view	LaRC ASDC	A freely available IDL-based display and analysis tool, can be used with many types of MISR and AirMISR data. It was specifically designed for use with files that use the HDF-EOS "grid" interface. • *http://eosweb.larc.nasa.gov/PRODOCS/misr/tools/misr_view.html*
MODIS LDOPE Tools	LP DAAC	The MODIS Land Data Operational Product Evaluation (LDOPE) software tools were developed to assist in the quality assessment of MODIS land products. These tools are invoked as standalone executables from a command-line interface. The software is supported on Irix, Solaris, Linux, and Windows operating systems. • *https://lpdaac.usgs.gov/lpdaac/tools/ldope_tools*
MODIS Land Product Subsets (Global Tool)	ORNL DAAC	Web-based tool to obtain data for any location on earth. Users select a site either from a pick list or by entering geographic coordinates, and the area surrounding that site, from 1 pixel up to 201 X 201 km. Selected data can be viewed in Google Map, Google Earth, MODIS-WebGIS, or Tile Mapper. The tool provides time series plots of the selected measurement, an ASCII file of the pixel values for the selected product along with quality information, average and standard deviations for the selected area, and a file that can be imported directly into GIS software. A land cover grid (IGBP classification) of the area, and an estimate of heterogeneity (Shannon richness and evenness) is also provided. Additional features are in development. • *http://daac.ornl.gov/MODIS/MODIS-menu/MODIS_global_intro.html*
MOPITT Level 2 Viewer	LaRC ASDC	IDL-based tool for creating plots of MOPITT Level 2 data products. • *http://eosweb.larc.nasa.gov/PRODOCS/mopitt/tools/ moppitt_level2_viewer.html*
POET	PO.DAAC	Data subsetting and visualization for many PO.DAAC products are available from the PO.DAAC Ocean ESIP Tool (POET) Web-based interface. Output is returned as a latitude-longitude map, animation, time-series graph, or space-time profile. Output formats include: Image (GIF, PNG, JPEG), scientific (HDF, netCDF), GIS (GeoTIFF, ArcGrid), binary and ASCII. Users can also create and download MPEG movies. POET data also can be accessed by any Web Map Server (WMS) viewer. This feature enables you to combine or overlay POET data with data from any other source that complies with this standard. POET was developed by the Ocean ESIP (Earth Science Information Partner). A sample viewer of POET data is available at • *http://poet.jpl.nasa.gov*
Real Time Mission Monitor (RTMM)	GHRC DAAC	The NASA Real Time Mission Monitor (RTMM) is a situational awareness tool that integrates satellite, airborne and surface data sets; weather information; model and forecast outputs; and vehicle state data (e.g., aircraft navigation, satellite tracks and instrument field-of-views) for field experiment management using Google Earth. RTMM optimizes science and logistic decision-making during field experiments by presenting timely data, graphics and visualizations to the users to improve real time situational awareness of the experiment's assets. • *http://rtmm.nsstc.nasa.gov*
SeaWiFS Data Analysis System (SeaDAS) 5.05	OBPG	SeaDAS is a comprehensive image analysis package for the processing, display, analysis, and quality control of ocean color data. Supported sensors are MODIS, SeaWiFS, OCTS, and CZCS. Key features include variety of data processing, data visualization, and data projection capabilities and selection of data output formats. • *http://oceancolor.gsfc.nasa.gov/seadas*

Data Visualization & Analysis Tools

Data Tool/Service	Data Center	Description
SEDAC Map Client	SEDAC	The SEDAC Map Client is an online global spatial data visualization tool. Users can map data that is held by SEDAC. The mapping tool also supports Web Map Context (WMC) specification of the Open Geospatial Consortium (OGC), which means users can store data layers and geographical extent for future use, and load predefined contexts from other clients. • *http://sedac.ciesin.columbia.edu/wdc*
view_hdf	LaRC ASDC	A freely available IDL-based display and analysis tool for accessing data stored in HDF and HDF-EOS format. Variables from either Science Data Sets or vdata structures in a HDF file, can be subset, rendered as two and three-dimensional graphics, and plotted as geolocated data onto various world map projections. Other features include multiple variable plots, difference plots, and simple statistics. • *http://eosweb.larc.nasa.gov/HPDOCS/view_hdf.html*

An Alphabetized List of Tools (showing the various uses for each tool)

Data Tool/Service	Data Center	Search & Order	Data Handling	Subsetting & Filtering	Geolocation, Reprojection, & Mapping Tools	Data Visualization & Analysis Tools
AIRS Online Channel/ Variable Subsetter	GES DISC			X		
Algorithm Development and Mining System (ADaM)	GHRC DAAC					X
AS2GT	NSIDC DAAC				X	
ASDC Data Pool	LaRC ASDC	X		X		
ASDC Order Tool	LaRC ASDC	X		X		
ASF MapReady Tool	ASF SDC		X		X	
ASF SAR Training Processor	ASF SDC		X			
Atlas of the Cryosphere	NSIDC DAAC				X	X
Atmospheric Composition Data and Information Services Center (ACDISC)	GES DISC	X				
Coarse Grain Subsetter	GHRC DAAC			X		
Coincidence Search Engine	GHRC DAAC	X				
EASE-Grid Geolocation Tools	NSIDC DAAC				X	
ENTRI	SEDAC	X		X		
ESML	GHRC DAAC		X			
GHRSST Master Metadata Repository	PO.DAAC	X				
Giovanni	GES DISC					X
GISMO	NSIDC DAAC	X		X	X	
GloVIS	LP DAAC	X				X

An Alphabetized List of Tools (showing the various uses for each tool)						
Data Tool/Service	Data Center	Search & Order	Data Handling	Subsetting & Filtering	Geolocation, Reprojection, & Mapping Tools	Data Visualization & Analysis Tools
GLAS Visualizer	NSIDC DAAC		X			X
HDF-EOS Subsetter	GHRC DAAC			X		
hdfscan	LaRC ASDC		X			X
HE5Subset	GES DISC			X		
Hurricane Archive	GES DISC					X
Hurricane Portal	GES DISC					X
Hurricane/Typhoon Tracker	PO.DAAC			X		X
Hurricane Viewer	GES DISC					X
HyDRO	GHRC DAAC	X				
Hydrology Data Pool	GHRC DAAC	X				
ICESat/GLAS Subsetter	NSIDC DAAC			X		
Image Gallery	LaRC ASDC					X
Land Processes Data Pool	LP DAAC	X		X	X	
Map Server	ORNL DAAC	X	X	X	X	
Mercury (Advanced Product Search)	ORNL DAAC	X				
Mirador	GES DISC	X				
MISR Browse Tool	LaRC ASDC					X
MISR ENVI Tool	LaRC ASDC		X		X	X
MISR INteractive eXplorer (MINX)	LaRC ASDC					X
MISR Level 3 Imagery	LaRC ASDC	X				X
MISR Toolkit	LaRC ASDC		X	X	X	X
misr_view	LaRC ASDC			X		X
MIST	NSIDC DAAC	X		X		X
MODIS L1 and Atmospheres Archive and Distribution System (LAADS)	MODAPS LAADS	X		X	X	X
MODIS Land Products Subsets	ORNL DAAC	X	X	X	X	X
MODIS Land Product Subsets, Collection 5	ORNL DAAC	X	X	X	X	X
MODIS LDOPE Tools	LP DAAC					X
MODIS Subsetting and Visualization Tool for North America	ORNL DAAC	X		X	X	
MOPITT Level 2 Viewer	LaRC ASDC					X
MRT	LP DAAC			X	X	
MRTSwath	LP DAAC			X	X	
MRTWeb	LP DAAC	X		X	X	X
MS2GT	NSIDC DAAC				X	

An Alphabetized List of Tools (showing the various uses for each tool)						
Data Tool/Service	Data Center	Search & Order	Data Handling	Subsetting & Filtering	Geolocation, Reprojection, & Mapping Tools	Data Visualization & Analysis Tools
Multi-angle Imaging SpectroRadiometer (MISR) Order and Customization Tool	LaRC ASDC	X	X	X	X	
NAMMA Real Time Mission Monitor (RTMM)	GHRC DAAC					X
NGAT	NSIDC DAAC		X			
NOESIS	GHRC DAAC	X				
OPeNDAP	PO.DAAC	X	X	X		
POET	PO.DAAC		X	X	X	X
READ_HDF	GES DISC		X	X		
SAGE II Binary File Subset Tool	LaRC ASDC			X		
SeaWiFS Data Analysis System (SeaDAS) 5.4	OBPG	X	X	X	X	X
SEDAC Map Client	SEDAC				X	X
Snow and Ice Data Pool	NSIDC DAAC	X		X	X	
SNOWI	NSIDC DAAC	X				
Spatial Data Access Tool (SDAT)	ORNL DAAC	X	X	X	X	X
SPOT	GHRC DAAC			X		
TES Read Software	LaRC ASDC		X			
URSA	ASF SDC	X				
view_hdf	LaRC ASDC		X	X	X	X
WHOM	GES DISC	X		X		

Related NASA Resources and Web Sites

Related NASA Resources and Web Sites

General Information

NASA Portal

http://www.nasa.gov

Explore the many facets of NASA, from our administration and leadership, to our mission and vision for the future, to business, research, and career opportunities.

NASA Science Mission Directorate

http://nasascience.nasa.gov

The Science Mission Directorate (SMD) engages the Nation's science community, sponsors scientific research, and develops and deploys satellites and probes in collaboration with NASA's partners around the world to answer fundamental questions requiring the view from and into space. SMD seeks to understand the origins, evolution, and destiny of the universe and to understand the nature of the strange phenomena that shape it. SMD also seeks to understand:

- the nature of life in the universe and what kinds of life may exist beyond Earth;
- the solar system, both scientifically and in preparation for human exploration; and
- the Sun and Earth, changes in the Earth-Sun system, and the consequences of the Earth-Sun relationship for life on Earth.
- the history of Mars and the formation of the solar system.
- Search for Earth-like planets and habitable environments around other stars. SMD pursues multiple research strategies with the goal of developing effective astronomically-detectable signatures of biological processes.
- Explore the solar system for scientific purposes while supporting safe robotic and human exploration of space.

NASA Applied Sciences Program

http://nasascience.nasa.gov/earth-science/applied-sciences

NASA produces research results, such as observations from satellites, predictions from models, and knowledge from scientific research. These research results have the potential to serve society beyond their intended purpose of answering pressing Earth system science questions.

NASA's Applied Sciences Program systematically evaluates the potential of these research results to serve society by conducting projects with regional and national scale operational partners. The partners have the responsibility to provide information to decision makers for a specific aspect of the Earth system. These projects address NASA's areas of National Applications: Agriculture, Air Quality, Ecological Forecasting, Natural Disasters, Public Health, Water Resources and Weather.

NASA Earth Science Technology Office (ESTO)

http://esto.nasa.gov

The Earth Science Technology Office (ESTO) demonstrates and provides technologies that can be reliably and confidently applied to a broad range of science measurements and missions as well as facilitate practical applications that benefit society at large. As the lead technology office within the Earth Science division of the NASA Science Mission Directorate, ESTO is focused on the technological challenges inherent in space-based investigations of our planet and its dynamic, interrelated systems.

Through flexible, science-driven technology strategies and a competitive selection process, ESTO-funded technologies have supported numerous Earth and space science missions as well as commercial applications. Currently, we hold a broad portfolio of well over 400 past and active investments at over 70 institutions nationwide. From next generation sensors and instruments to communication systems and computer modeling, ESTO technologies will enable the future of many NASA missions.

NASA's Earth Observing System Project Science Office

http://eospso.gsfc.nasa.gov

The Earth Observing System (EOS) is a coordinated series of polar-orbiting and low inclination satellites for long-term global observations of the land surface, biosphere, solid Earth, atmosphere, and oceans. EOS is a major component of the Earth Science Division of NASA's Science Mission Directorate. EOS enables an improved understanding of the Earth as an integrated system. The EOS Project Science Office (EOSPSO) is committed to bringing program information and resources to program scientists and the general public alike.

NASA Earth Science Data and Information System Project (ESDIS)

http://esdis.eosdis.nasa.gov

The Earth Science Data and Information System (ESDIS) Project is a part of the Earth Science Projects Division under the Flight Projects Directorate at Goddard Space Flight Center. The ESDIS Project is responsible for processing, archiving, and distributing Earth science satellite data (e.g., land, ocean and atmosphere data products); providing tools to facilitate the processing, archiving, and distribution of Earth science data; collecting metrics and user satisfaction data to learn how to continue improving services provided to users; ensuring scientists and the public have access to data to enable the study of Earth from space to advance scientific understanding and meet societal needs.

The ESDIS Project manages the science systems of the Earth Observing System Data and Information System (EOSDIS). EOSDIS provides interdisciplinary Earth system science data, information and services, to a wide community of users for NASA's Science Mission Directorate.

Education and Public Outreach

NASA Education Program

http://education.nasa.gov

NASA's journeys into air and space have deepened humankind's understanding of the universe, advanced technology breakthroughs, enhanced air travel safety and security, and expanded the frontiers of scientific research. These accomplishments share a common genesis: education. NASA will continue the Agency's tradition of investing in the Nation's education programs and supporting the country's educators who play a key role in preparing, inspiring, exciting, encouraging, and nurturing the young minds of today who will be the workforce of tomorrow.

In 2006 and beyond, NASA will continue to pursue three major education goals:

- Strengthening NASA and the Nation's future workforce
- Attracting and retaining students in science, technology, engineering and mathematics, or STEM, disciplines
- Engaging Americans in NASA's mission

NASA's Science Education Program

http://nasascience.nasa.gov/educators

The Science Mission Directorate has an essential role in NASA's education mission "to inspire the next generation of explorers" and is committed to utilizing NASA resources to foster the broad involvement of the Earth and space science communities in education and public outreach (E/PO) with the goal of enhancing the nation's formal education system and contributing to the broad public understanding of science, mathematics and technology. NASA's Science Education Program creates products using NASA's results in Earth-Sun system science, solar system research, universe exploration, and the development of new technologies to support learning. The program sponsors educational activities at all levels of formal and informal education to provide opportunities for learners to investigate their world and their universe using unique NASA resources.

This Earth Observatory image of the day, Glacier Outlet, Southern Patagonian Ice Field, Chile for October 5, 2009 is an astronaut photograph (ISS020-E-39083)acquired on September 6, 2009, and is provided by the ISS Crew Earth Observations experiment and Image Science & Analysis Laboratory, Johnson Space Center. Courtesy: the Expedition 20 crew

NASA Earth Observatory

http://earthobservatory.nasa.gov

Provides NASA science data images, stories, and discoveries about Earth's climate and the environment.

NASA Visible Earth

http://visibleearth.nasa.gov

A catalogue of NASA data imagery and animations focused on planet Earth.

This Visible Earth image represents one example of Earth science data imagery that are featured. This image from the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Aqua satellite shows some of the largest, most rapidly growing fires burning in Yukon Flats region of east-central Alaska in mid-June 2004. Areas where MODIS detected fires are outlined in red. Courtesy: Jacques Descloitres, MODIS Rapid Response Team, NASA/GSFC

This high-resolution image represents a recent animation completed by NASA Goddard Space Flight Center(GSFC) Scientific Visualization Studio(SVS). NASA's TRMM spacecraft observed this view of Hurricane Bill on August 17, 2009 at 1133 UTC. The cloud cover in this animation is taken by TRMM's Visible and Infrared Scanner(VIRS) and the GOES spacecraft. The rain structure is taken by TRMM's Tropical Microwave Imager (TMI) and TRMM's Precipitation Radar(PR) instruments.   Courtesy: NASA GSFC SVS

NASA Goddard Scientific Visualization Studio

http://svs.gsfc.nasa.gov

The mission of the Scientific Visualization Studio is to facilitate scientific inquiry and outreach within NASA programs through visualization. To that end, the SVS works closely with scientists in the creation of visualization products, systems, and processes in order to promote a greater understanding of Earth and Space Science research activities at Goddard Space Flight Center and within the NASA research community. All the visualizations created by the SVS (currently totalling over 2,900) are through this Web site. More recent animations are provided as MPEG-4s, MPEG-2s, and MPEG-1s. Some animations are available in high definition as well as NTSC format. Where possible, the original digital images used to make these animations have been made accessible. Lastly, high and low resolution stills, created from the visualizations, are included, with previews for selective downloading.

NASA Multimedia Gallery

http://www.nasa.gov/multimedia/index.html

Provides a selection of images, video, and interactive features.

Science Mission Directorate
Multimedia Gallery

http://science.hq.nasa.gov/multimedia/index.html

This web site links to all other core NASA Earth science and Space science image galleries. For example, it includes the NASA GSFC Scientific Visualization Studio (SVS) and the Visible Earth.

Funding/Research Opportunities

NASA Postdoctoral Program

http://nasa.orau.org/postdoc

The NASA Postdoctoral Program offers research fellowships to highly talented national and international scientists and engineers to engage in ongoing NASA research pro¬grams at a NASA Center, NASA Headquarters, or at a NASA-affiliated research institu¬tion. These highly competitive fellowships are awarded for one year and are renewable for up to a total of three years, depending on NASA's needs and availability of funds. Deadlines for applying are March 1, July 1, and November 1 each year. Approximately 50 fellowships are awarded annually in the fields of space science, earth science, aero¬nautics, space operations, exploration systems, and astrobiology.

NSPIRES- NASA Research Opportunities

http://nspires.nasaprs.com/external

This site facilitates the search for NASA research opportunities and provides information about NASA research announcements, proposals selected for closed solicitations, and results of NASA research. This information is intended to assist you in your proposal preparation. In order to create and submit a proposal to NASA, you and your institution must be registered with NSPIRES. See Registration Information for more details on registering users and institutions.

SARA- Service and Advice for Research and Analysis

http://nasascience.nasa.gov/researchers/sara

Provides information about the Data Analysis, Research, and Technology Development programs in NASA's Science Mission Directorate (SMD). These programs (which are referred to as "R&A") are composed of projects being performed by scientists, engineers and educators from NASA centers, universities, non-profits, other government labs, and for profit corporations all across the United States of America. NASA solicits proposals for projects covering a very wide range of subjects and they are evaluated by peer review. Here you will find information about existing opportunities, recently funded projects, and available student programs.

Other Opportunities

For NASA jobs see, *http://www.nasajobs.nasa.gov*

For additional NASA grants and fellowships see, *http://www.nasa.gov/audience/foreducators/postsecondary/programs/index.html*

For internships and other student opportunities see, *http://nasajobs.nasa.gov/studentopps/employment/programs.htm*

8

Acronyms and Abbreviations

Acronyms and Abbreviations

AATSR Advanced Along-Track Scanning Radiometer

ACCP Accelerated Canopy Chemistry Program

ACDISC Atmospheric Composition Data and Information Services Center

ACRIM Active Cavity Radiometer Irradiance Monitor

ADaM Algorithm Development and Mining System

ADEOS Advanced Earth Observing Satellite

AirMISR Airborne Multi-angle Imaging SpectroRadiometer

AIRS Atmospheric Infrared Sounder

AIRSAR Aircraft SAR (JPL imaging radar system)

ALT Altimeter (TOPEX/POSEIDON)

ALOS Advanced Land Observing Satellite

AMSR-E Advanced Microwave Scanning Radiometer-EOS

AMSU Advanced Microwave Sounding Unit

AMSU-A Advanced Microwave Sounding Unit A

API Application Program Interface

ASCII American Standard Code for Information Interchange

AS2GT AMSR-E Swath-to-Grid Toolkit

ASDC Atmospheric Science Data Center

ASF Alaska Satellite Facility

ASTER Advanced Spaceborne Thermal Emission and Reflection Radiometer

AVHRR Advanced Very High Resolution Radiometer

AVIRIS Airborne Visible/Infrared Imaging Spectrometer

BADC British Atmospheric Data Centre

BGC BioGeochemical Cycles

BIL Band Interleaved by Line

BIOME Biogeochemical Information Ordering Management Environment

BOREAS Boreal Ecosystem-Atmosphere Study

BRDF Bi-Directional Reflectance Distribution Function

BRF Bidirectional Reflectance Factor

CAD Computer Aided Design

CALIOP Cloud-Aerosol Lidar with Orthogonal Polarization

CALIPSO Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations

CAMEX Convection and Moisture Experiment

CDDIS Crustal Dynamics Data Information System

CEOS Committee on Earth Observation Satellites

CERES Clouds and the Earth's Radiant Energy System

CFC Chlorofluorocarbons

CIESIN Center for International Earth Science Information Network

CLAES Cryogenic Limb Array Etalon Spectrometer

CLPX Cold Land Processes Experiment

CLS Cloud Lidar System

CMG Climate Modeling Grid

CNES Centre National d'Etudes Spatiales

CODMAC Committee on Data Management, Archiving, and Computation

CSA Canadian Space Agency

CZCS Coastal Zone Color Scanner

DAAC Distributed Active Archive Center

DDC Data Distribution Centre (of the IPCC)

deg Degree

DEM Digital Elevation Model

DHR Directional Hemispheric Reflectance

DIF Directory Interchange Format (GCMD)

DISC Data and Information Services Center

DMSP Defense Meteorological Satellite Program

DN Distribution Notice

DORIS Doppler Orbitography and Radiopositioning Integrated by Satellite

EASE Equal Area Scalable Earth

ECHO EOS Clearinghouse

ECS EOSDIS Core System

EDOS EOS Data and Operations System

ENTRI Environmental Treaties and Resource Indicators

ENVI Environment for Visualizing Images

EOS Earth Observing System

EOP Earth Orientation Parameters

EOSDIS EOS Data and Information System

EP Earth Probe

EPI Environmental Performance Index

ERBE Earth Radiation Budget Experiment

EROS Earth Resources Observation Systems

ERS European Remote Sensing Satellite

ESA European Space Agency

ESI Environmental Sustainability Index

ESIP Earth Science Information Partner

EVI Enhanced Vegetation Index

FIFE First ISLSCP Field Experiment

FIND Federation Interactive Network for Discovery

FIRE First ISCCP Regional Experiment

FLASHFlux Fast Longwave And SHortwave radiative Fluxes

FLUXNET Global Flux Tower Network

FM1 Flight Model 1 (CERES)

FM2 Flight Model 2 (CERES)

FOV Field Of View

FPAR Fraction of Photosynthetically Active Radiation

FTP file transfer protocol

GAC global area coverage

GBFM Global Boreal Forest Mapping

GCI Global Cloud Imagery

GCMD Global Change Master Directory

GEDEX Greenhouse Effect Detection Experiment

GES GSFC Earth Sciences

GHRC Global Hydrology Resource Center

GHRSST-PP GODAE High Resolution Sea Surface Temperature Pilot Project

GHz gigahertz

GIF Graphics Interchange Format

Giovanni GES-DISC Interactive Online Visualization and Analysis Infrastructure

GIS Geographic Information System

GISMO Graphical Interface for Subsetting, Mapping, and Ordering

GLAS Geoscience Laser Altimeter System

GLONASS GLObal NAvigation Satellite System

GloVis Global Visualization Viewer

GNSS Global Navigation Satellite System

GPS Global Positioning System

GODAE Global Ocean Data Assimilation Experiment

GPCP Global Precipitation Climatology Project

GPW Gridded Population of the World

GRACE Gravity Recovery and Climate Experiment

GRFM Global Rain Forest Mapping

GRUMP Global Rural Urban Mapping Project

GSFC Goddard Space Flight Center

GUI Graphical User Interface

HALOE Halogen Occultation Experiment

HANPP Human Appropriation of Net Primary Productivity

HDF Hierarchical Data Format

HDF-EOS HDF for the Earth Observing System

HE5Subset HDF-EOS5Subset

HEG HDF-EOS to GeoTiff

HIRDLS High Resolution Dynamics Limb Sounder

HRDI High Resolution Doppler Imager

HRPT High Resolution Picture Transmission

HSA HDF-EOS Subsetting Appliance

HSB Humidity Sounder for Brazil

HSE HDF-EOS Subsetting Engine

HyDRO Hydrologic Data Search, Retrieval, and Order (tool)

IAG International Association of Geodesy

IBIS Integrated Biosphere Simulator

ICESat Ice, Cloud, and Land Elevation Satellite

IDL Interactive Digital Language

IFREMER Institut français de recherche pour l'exploitation de la mer (French Research Institute for Exploitation of the Sea)

IFREMER MED IFREMER Mediterranean

IIR Imaging Infrared Radiometer

IPCC Intergovernmental Panel on Climate Change

IR Infrared

ISAMS Improved Stratospheric and Mesospheric Sounder

ISCCP International Satellite Cloud Climatology Project

ISLSCP International Satellite Land Surface Climatology Project

IWG Investigator Working Group

JAXA Japan Aerospace Exploration Agency

JERS Japanese Earth Remote Sensing

JPEG Joint Photographic Experts Group

JPL Jet Propulsion Laboratory

km Kilometer

KWAJEX Kwajalein Experiment

LAADS MODAPS Level 1 and Atmospheres Archive and Distribution System

LAC Local Area Coverage

LAI Leaf-Area Index

LaRC Langley Research Center

LBA Large-Scale Biosphere-Atmosphere Experiment in Amazonia

LDOPE Land Data Operational Products Evaluation

LECZ Low Elevation Coastal Zone

LIDAR Light Detection and Ranging

LIS Lightning Imaging Sensor

LLR Lunar Laser Ranging

LP Land Processes

LTSRF Longterm Stewardship and Reanalysis Facility

m Meter

MAS MODIS Airborne Simulator

MCSST Multi-Channel Sea Surface Temperature

MCST MODIS Characterization Support Team

MGDR-B Merged Geophysical Data Record-B

MHz Megahertz

MISR Multi-angle Imaging SpectroRadiometer

MIST MODIS Interactive Subsetting Tool

MLS Microwave Limb Sounder

MMR Master Metadata Repository

MODAPS MODIS Adaptive Processing System

MODIS Moderate Resolution Imaging Spectroradiometer

MOPITT Measurements of Pollution In The Troposphere

MPEG Moving Picture Experts Group

MRDC Moderate Resolution Data Center

MRT MODIS Reprojection Tool

MS2GT MODIS Swath-to-Grid Toolbox

NACP North American Carbon Program

NAMMA NASA African Monsoon Multidisciplinary Analyses

NASA National Aeronautics and Space Administration

NAVOCEANO Naval Oceanographic Office

NCSA National Center for Supercomputing Applications

NCDC National Climate Data Center

NDVI Normalized Difference Vegetation Index

netCDF network Common Data Form

NGAT NSIDC GLAS Altimetry elevation extractor Tool

NIR Near Infrared

NLDN National Lightning Detection Network

nm Nanometer

NOAA National Oceanic and Atmospheric Administration

NODC National Oceanographic Data Center

NPP NPOES Prepatory Project

NSCAT NASA Scatterometer

NSIDC National Snow and Ice Data Center

NVAP NASA Water Vapor Project

OCTS Ocean Color and Temperature Scanner

OGC Open Geospatial Consortium

OMI Ozone Monitoring Instrument

ORNL Oak Ridge National Laboratory

OSDR Operational Sensor Data Records

OTD Optical Transient Detector

OTTER Oregon Transect Ecosystem Research

PALSAR Phased Array type L-band Synthetic Aperture Radar

PAR Photosynthetically Active Radiation

PB Petabyte

PDS (NASA) Planetary Data System (file format)

PEM Particle Environment Monitor

PLACE Population, Landscape, and Climate Estimates

PMSDT Passive Microwave Swath Data Tools

PNet Photosynthesis, evapotranspiration, and net primary productivity model

PNG Portable Network Graphics

POAM Polar Ozone and Aerosol Measurement

PO.DAAC Physical Oceanography Distributed Active Archive Center

POES Polar Operational Environmental Satellite

POET PO.DAAC Ocean ESIP Tool

POLDER Polarization and Directionality of Earth's Reflectances

POLSAR Polarimetric SAR (JPL AIRSAR observing mode)

PR Precipitation Radar

PROVE Prototype Validation Exercise

PSR Polarimetric Scanning Radiometer

QuikSCAT Quick Scatterometer

RAMP RADARSAT Antarctic Mapping Project

RivDIS River Discharge

RTMM Real-Time mission Monitor (tool)

SAFARI Southern African Regional Science Initiative

SAGE Stratospheric Aerosol and Gas Experiment (I, II, and III)

SAR Synthetic Aperture Radar

SCF Scientific Computing Facility

SDP Standard Data Product

SDPS Science Data Processing Segment

SeaDAS SeaWiFS Data Analysis System

SeaWiFS Sea-viewing Wide Field-of-view Sensor

SEDAC Socioeconomic Data and Applications Center

SERF Service Entry Resource Format (GCMD)

SFTP secure ftp

SGP Southern Great Plains

SIM Spectral Irradiance Monitor

SIPS Science Investigator-led Processing System

SLR Satellite Laser Ranging

SMMR Scanning Multichannel Microwave Radiometer

SNF Superior National Forest

SOAP Simple Object Access Protocol

SOLSTICE Solar Stellar Irradiance Comparison Experiment

SORCE Solar Radiation and Climate Experiment

SOM Space Oblique Mercator

SPOT Système Pour l'Observation de la Terre

SRB Surface Radiation Budget

SRTM Shuttle Radar Topography Mission

SSE Surface Meteorology and Solar Energy

SSH Sea Surface Height

SSHA Sea Surface Height Anomaly

SSM/I Special Sensor Microwave/ Imager

SST Sea Surface Temperature

SUSIM Solar Ultraviolet Spectral Irradiance Monitor

SWIR Shortwave Infrared

TB Terabyte

TCSP Tropical Cloud Systems and Processes

TEFLUN Texas Florida Underflights

TES Tropospheric Emission Spectrometer

TIFF Tagged Image File Format

TIM Total Irradiance Monitor

TIR thermal infrared

TMI TRMM Microwave Imager

TOA Top Of Atmosphere

TOMS Total Ozone Mapping Spectrometer

TOMS-EP Total Ozone Mapping Spectrometer-Earth Probe

TOPEX TOPography Experiment

TOPSAR Topographic SAR (JPL AIRSAR observing mode)

TRF Terrestrial Reference Frame

TRMM Tropical Rainfall Measuring Mission

UAH University of Alabama in Huntsville

UARS Upper Atmosphere Research Satellite

URSA User Remote Sensing Access (tool)

USGS U.S. Geological Survey

UV Ultraviolet

UVA Ultraviolet-A (0.32-0.40 micron band)

UVB Ultraviolet-B (0.29-0.32 micron band)

VEMAP Vegetation/Ecosystem Modeling and Analysis Project

VI vegetation index

VIL Volume Imaging Lidar

VIRS Visible/Infrared Scanner

VIS Visible

VIS/NIR Visible and Near Infrared

VLBI Very Long Baseline Interferometry

VNIR Visible and Near Infrared

WFC Wide Field Camera

WHOM Web-based Hierarchical Ordering Mechanism

WINDII Wind Imaging Interferometer

WIST Warehouse Inventory Search Tool

WMC Web Map Context

WMS Web Map Server

XML Extensible Markup Language

XPS Extreme Ultraviolet Photometer System

ZA Zonal Average