

# Accessing NASA Earth Science Data / Open Data Policy



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# U.S. Data Policy

## NATIONAL SPACE POLICY *of the* UNITED STATES *of* AMERICA

***U.S. data policy is full and open sharing at no more than marginal cost. In the U.S. EO community, satellite data are provided routinely and many other data are available under a free and open policy.***

The NASA and NOAA Administrators and the Director of the USGS shall:

- Ensure that civil space acquisition processes and capabilities are not unnecessarily duplicated; and
- Continue to develop civil applications and information tools based on data collected by Earth observation satellites. These civil capabilities will be developed, to the greatest extent possible, using known standards and open protocols, and the applications will be made available to the public.

The Secretary of Commerce, through the Administrator of NOAA, shall provide for the regulation and licensing of the operation of commercial sector remote sensing systems.

### Environmental Earth Observation and Weather

To continue and improve a broad array of programs of space-based observation, research, and analysis of the Earth's land, oceans, and atmosphere:

- The NASA Administrator, in coordination with other appropriate departments and agencies, shall conduct a program to enhance U.S. global climate change research and sustained monitoring capabilities, advance research into and scientific knowledge of the Earth by accelerating the development of new Earth observing satellites, and develop and test capabilities for use by other civil departments and agencies for operational purposes.
- The Secretary of Commerce, through the National Oceanic and Atmospheric Administration (NOAA) Administrator, and in coordination with the NASA Administrator and other appropriate departments and agencies, shall, in support of operational requirements:
  - Transition mature research and development Earth observation satellites to long-term operations;
  - Use international partnerships to help sustain and enhance weather, climate, ocean, and coastal observation from space; and
  - Be responsible for the requirements, funding, acquisition, and operation of civil operational environmental satellites in support of weather forecasting, climate monitoring, ocean and coastal observations, and space weather forecasting. NOAA will primarily utilize NASA as the acquisition agent for operational environmental satellites for these activities and programs.
- The Secretary of Commerce, through the NOAA Administrator, the Secretary of Defense, through the Secretary of the Air Force, and the NASA Administrator shall work together and with their international partners to ensure uninterrupted, operational polar-orbiting environmental satellite observations. The Secretary of Defense shall be responsible for the morning orbit, and the Secretary of Commerce shall be responsible for the afternoon orbit. The departments shall continue to partner in developing and fielding a shared ground system, with the coordinated programs operated by NOAA. Further, the departments shall ensure the continued full sharing of data from all systems.

# US Earth Satellite Data Types

- Clarity of data policy approach has evolved over time
- US Government Civil Satellite Data
  - Satellites flown for public use benefits
  - Mid resolution for global capability: 15/30 m (Landsat) and lower
  - Available on full and open basis – NASA, NOAA, USGS data free and open, distribution at no charge
- US Commercial Satellite Data
  - Private sector flies, data available for purchase
  - Customer base found through market research
  - Mostly 4 bands or less, very high resolution :  $\frac{1}{2}$  - 3 m





# Space Agencies: full and open data

- NASA, NOAA, USGS, INPE, ESA ...
- Studies on data policy effects, and experience of practicing or not this full and open and nondiscriminatory policy for EO data access has provided the following lessons learned:
  - The cost of satellites and their instrumentation dwarfs any small income that is gained by selling data (successful commercial satellites fly very high-resolution imagers)
  - Ability to use Earth Observation data fully and openly for scientific, educational, operational, and societal benefit purposes garners a huge recognition and appreciation for the agency and country that makes it possible.
  - Data are more useful if they can be aggregated and re-used.
  - Full and open access increases the use of the data by orders of magnitude, within the country of origin as well as around the world, helping to save lives, making people's lives better, and enhancing economic development.





# The 2010 GEO Ministerial Declaration

*Commit(ed GEO Members) to:*

- (i) maximize the number of documented datasets made available on the basis of full & open access;
- (ii) create the GEOSS Data Collection of Open Resources for Everyone (GEOSS Data CORE), a distributed pool of documented datasets with full, open and unrestricted access at no more than the cost of reproduction and distribution; and
- (iii) develop flexible national and international policy frameworks to ensure that a more open data environment is implemented, thus putting into practice actions for the implementation of the GEOSS Data Sharing Principles;





# The Challenges of Earth System Science

## SCIENTIFIC

- Documenting the status and behavior of the Earth system and its multiple, interacting components
- Documenting the evolution of the Earth system and providing understanding of the sources of that evolution
- Predicting the future evolution of the Earth system
- Making Earth system science data easily available to users for both scientific and societal purposes

## ARITHMETIC

- *Satellite Data:* consider a global imager with 250 m resolution measuring once per day at 30 wavelengths for a year -  $\sim 10^{14}$  pixels/year
- *Model Output:* consider a chemistry/climate model, with  $1^\circ \times 1^\circ$  resolution and 50 layers, writing out 30 parameters at hourly intervals for a year -  $\sim 10^{12}$  results written/year

## COMMUNITY

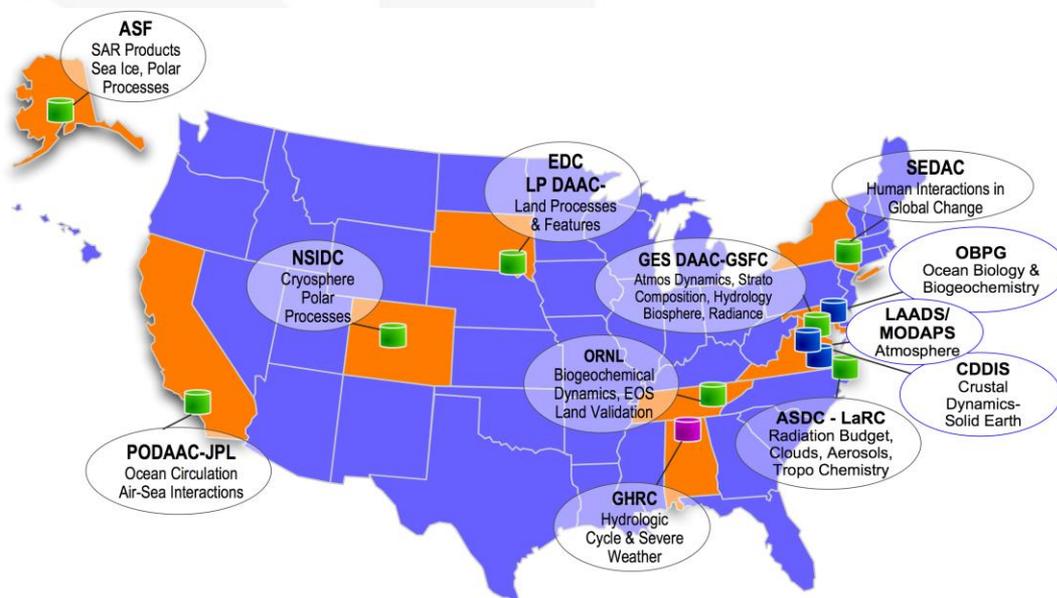
- *Research Community:* scientific researchers looking to answer fundamental questions about the Earth
- *Assessment Community:* researchers of all types looking to document information about prior and future evolution of the Earth system to inform long-term policy and decision making
- *Forecasting Community:* operational scientists and others looking to provide forecasts to the general public
- *Applications Community:* research, corporate, and non-governmental organizations looking to inform nearer term decisions for management and planning





# NASA Earth Science Data –Related Investments

- ESD Data are held at set of Distributed Active Archive Centers (DAACs) to provide knowledgeable curation and community availability
- NASA provides connectivity to allow community access to data
- NASA helps develop tools that communities can use to obtain needed information while minimizing burden associated with information not needed
- NASA engages with broader, multi-agency efforts to facilitate use of data by broadest possible community with minimal effort and maximal consistency with other data sources



Some overall statistics:  
7.4 PB  
400 million files!





# Online Data Search, Browse, and Download

## Reverb

<http://reverb.echo.nasa.gov>

Reverb | ECHO  
National Aeronautics and Space Administration  
EOSDIS NASA's Earth Observing System Data and Information System  
The Next Generation Earth Science Discovery Tool

Search Options  
Spatial Bounding Box: 7.014, 61.523, 74.020, -95.977  
Search Terms: sea ice  
Temporal Start: 2000-05-25 00:00:00, End: 2002-05-25 23:59:59  
Platforms & Instruments  
Campaigns  
Processing Levels  
Science Keywords  
Feedback? Tell us what you think.

Step 1: Select Search Criteria  
Spatial Search: Bounding Box: 7.014, 61.523, 74.020, -95.977  
Search Terms: sea ice  
Temporal Search: START: 2000-05-25 00:00:00, END: 2002-05-25 23:59:59  
Date Range: Annual Repeating Dates

Step 2: Select Datasets  
Found 43 datasets, Total Query Time: 6.204s

- AMSR-E/Aqua Daily L3 12.5 km Tb, Sea Ice Conc., & Snow Depth Polar Grids V002
- AMSR-E/Aqua Daily L3 25 km Tb and Sea Ice Concentration Polar Grids V002
- AMSR-E/Aqua Daily L3 6.25 km 89 GHz Brightness Temperature (Tb) Polar Grids V002
- AMSR-E/Aqua Daily L3 6.25 km Sea Ice Drift Polar Grids V001
- AMSR-E/Aqua Daily L3 Global Ascending/Descending 25x25 deg Ocean Grids V002
- AMSR-E/Aqua L2B Global Swath Ocean Products derived from Wentz Algorithm V002

## EarthData

<http://earthdata.nasa.gov>

EOSDIS - Earth Data Website  
National Aeronautics and Space Administration  
EOSDIS NASA's Earth Observing System Data and Information System

Home About EOSDIS Data Our Community User Resources Labs  
Search EOSDIS

DISCOVER DATA & SERVICES  
Data and Service Access Client Reverb  
Dataset Directory GCMD  
Search & Order Tools  
EOSDIS Data Service Directory

Hurricane Bud (02E) off the coast of Mexico  
Hurricane Bud (02E) off the coast of Mexico near Jalisco, pictured on May 23, 2012, from Aqua/MODIS. Visit LANCE for more near-real-time data products from EOSDIS.

EOSDIS WATCH EOSDIS distributed 835,894 products on 2012-05-25

EARTH SCIENCE EVENTS  
5/20/2012 Association of State to Floodplain Managers 36th Annual Conference  
5/25/2012 Annual Conference  
5/23/2012 Odyssey of the Mind 2012

EOSDIS NEWS  
Terra MODIS Near Real-Time Data Loss 2012-05-11  
Gaps in AIRS near real-time data for day 2012-04-17

EOSDIS DATA CENTER NEWS  
Arctic Sea Ice News & Analysis (NSIDC)  
NSIDC Press Room

ABOUT EOSDIS

For more information on NASA Earth Science Data Systems and Policy  
**HQ Earth Science Data Systems Program**

<http://science.nasa.gov/earth-science/earth-science-data/>

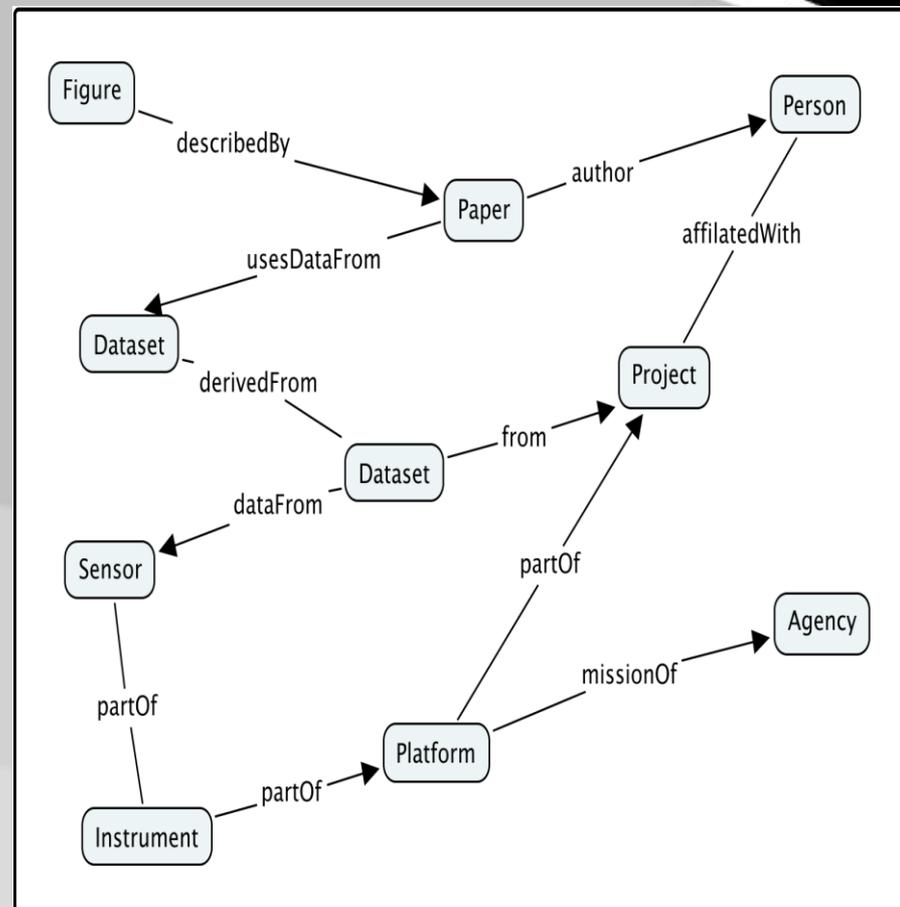


# US Global Change Research Program (USGCRP) Global Change Information System (GCIS)

## Long Term Vision:

A unified web based source of **authoritative**, **accessible**, **usable**, and **timely** information about climate and global change for use by scientists, decision makers, and the public.

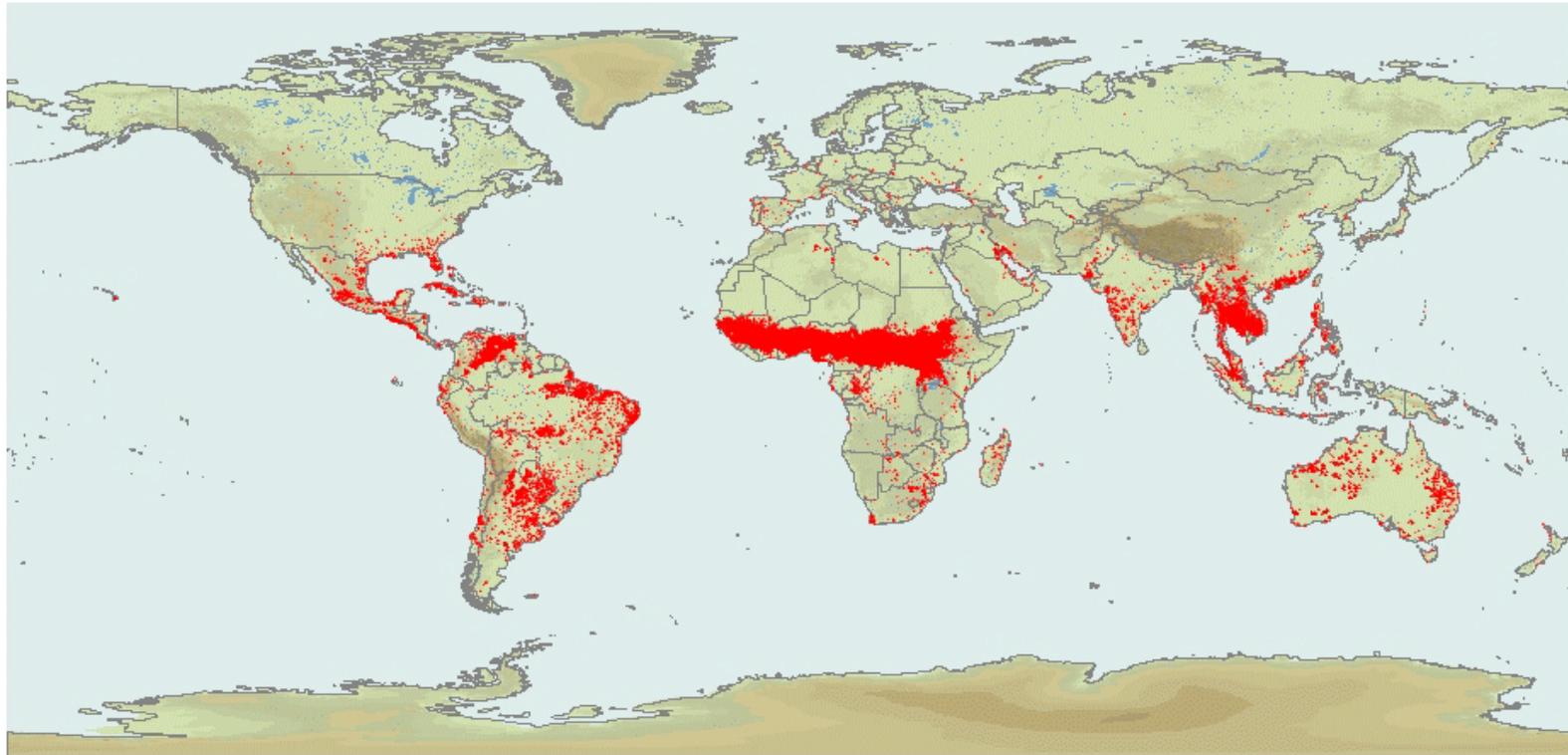
Support for the **National Climate Assessment** documenting the **evidence base** behind the findings described in the report to be released next year.



<http://globalchange.gov>

# MODIS Active Fires Seasonal Variability

MODIS Rapid Response Fire Detections for 2005



JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER



● MODIS Active Fire Detections  
□ World Countries

Active fires are detected using MODIS data from the Terra satellite.  
Source: MODIS Rapid Response <http://rapidfire.sc.gsfc.nasa.gov>  
Web Fire Mapper <http://maps.geog.umd.edu>





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## Back-Up

# NASA Earth Science Data and Information Policy



# NASA Earth Science Data and Information Policy

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## NASA Earth Science Statement on Data Management

NASA's Earth Science program was established to use the advanced technology of NASA to understand and protect our home planet by using our view from space to study the Earth system and improve prediction of Earth system change. To meet this challenge, NASA promotes the full and open sharing of all data with the research and applications communities, private industry, academia, and the general public. The greater the availability of the data, the more quickly and effectively the user communities can utilize the information to address basic Earth science questions and provide the basis for developing innovative practical applications to benefit the general public.

A common set of carefully crafted data exchange and access principles was created by the Japanese, European and U.S. International Earth Observing System (IEOS) partners during the 1990s and the early years of the 21st century. From these principles, NASA has adopted the following data policy (*in this context the term 'data' includes observation data, metadata, products, information, algorithms including scientific source code, documentation, models, images, and research results*):



# NASA Earth Science Data and Information Policy

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- NASA will plan and follow data acquisition policies that ensure the collection of long-term data sets needed to satisfy the research requirements of NASA's Earth science program.
- NASA commits to the full and open sharing of Earth science data obtained from NASA Earth observing satellites, sub-orbital platforms and field campaigns with all users as soon as such data become available.
- There will be no period of exclusive access to NASA Earth science data. Following a post-launch checkout period, all data will be made available to the user community.
- NASA will make available all NASA-generated standard products along with the source code for algorithm software, coefficients, and ancillary data used to generate these products.
- All NASA Earth science mission, projects, and grants and cooperative agreements shall include data management plans to facilitate the implementation of these data principles.
- NASA will enforce a principle of non-discriminatory data access so that all users will be treated equally. For data products supplied from an international partner or another agency, NASA will restrict access only to the extent required by the appropriate Memorandum of Understanding (MOU).



# NASA Earth Science Data and Information Policy

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- The applicable U.S. policy Office of Management and Budget (OMB) Circular A-130 states that its Departments and Agencies will charge for distribution of data no more than the cost of dissemination. In cases where such dissemination cost would unduly inhibit use, the distribution charge will generally be below that cost. (NASA does not charge distribution costs for NASA-produced data. NASA charges the marginal distribution costs for data NASA distributes in partnership with international partners, according to the particular international agreement.)
- NASA will ensure that all data needed for Earth system science research are archived. Data archives include easily accessible information about the data holdings, including quality assessments, supporting relevant information, and guidance for locating, obtaining, and using data.
- NASA will engage in ongoing partnerships with other Federal agencies to increase the effectiveness and reduce the cost of the NASA Earth science program.
- NASA will negotiate and implement arrangements with its international partners, with an emphasis on meeting the data acquisition, distribution, and archival needs of the U.S.
- NASA will collect a variety of metrics intended to measure or assess the efficacy of its data systems and services, and user satisfaction. Consistent with applicable laws, NASA will make those data available for review.



# NASA Earth Science Data and Information Policy

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The data collected by NASA represent a significant public investment in research. NASA holds these data in a public trust to promote comprehensive, long-term Earth science research. Consequently, NASA developed policy consistent with existing international policies to maximize access to data and to keep user costs as low as possible. These policies apply to all data archived, maintained, distributed or produced by NASA data systems.

- Published in Earth Science Reference Handbook, NP-2006-5-768-GSFC



## References

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1. The National Aeronautics and Space Act of 1958, as amended, 42 U.S.C. § 2451, et seq.
2. The Land Remote Sensing Policy Act of 1992, 15 U.S.C. § 5601, et seq.
3. The Paperwork Reduction Act, 44 U.S.C. § 3501, et seq.
4. The Freedom of Information Act, as amended, 5 U.S.C. § 552 (1994), amended by P. L. 104-231.
5. OMB Circular A-130 (February 8, 1996)
6. National Space Policy (NSTC-8, September 19, 1996).
7. Presidential Directive (NSPD-7), Space-Based Global Change Observation (May 28, 1992).
8. Statements on Data Management for Global Change Research (Office of Science and Technology Policy, July 1991).
9. Mission to Planet Earth Commercial Strategy (March 1997).
10. IEOS Data Exchange Principles.