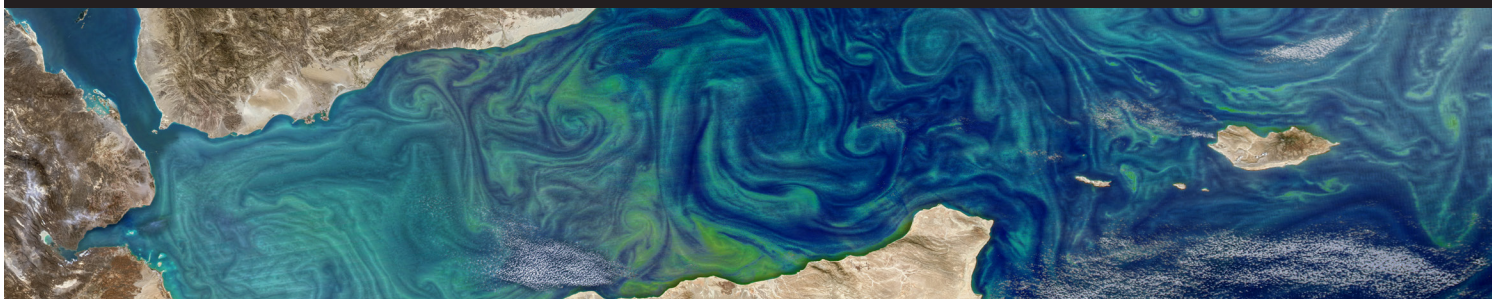
EOSDIS Update

National Aeronautics and Space Administration

SPRING 2018

Earth Science Data and Information System (ESDIS) Project

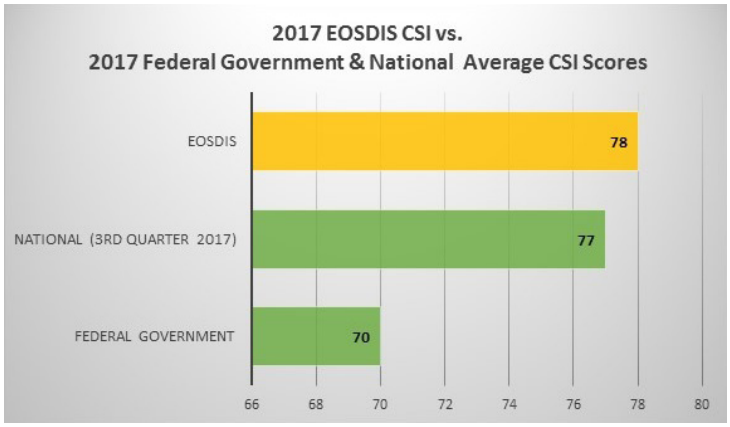
A PUBLICATION OF THE EARTH OBSERVING SYSTEM DATA AND INFORMATION SYSTEM (EOSDIS), CODE 423



TOP STORIES

EOSDIS High Customer Satisfaction Continues

Results from the annual American Customer Satisfaction Index (ACSI) survey for 2017 indicate continued high levels of satisfaction with EOSDIS products and services.



If you use services provided by NASA's Earth Observing System Data and Information System (EOSDIS) or download data from EOSDIS Distributed Active Archive Centers (DAACs), chances are you receive an email every fall seeking your participation in the EOSDIS' American Customer Satisfaction Index (ACSI) survey. The results of the 2017 survey are in, and for the 14th consecutive year the EOSDIS received high scores for customer satisfaction in all survey areas. In addition, all DAACs received strong individual evaluations.

The survey is administered by the CFI Group, an independent organization that is under contract to the federal government. This annual survey provides vital information that enables the EOSDIS and the DAACs to continually improve customer service and products as well as develop new services in response to data user needs.

IN THIS ISSUE:

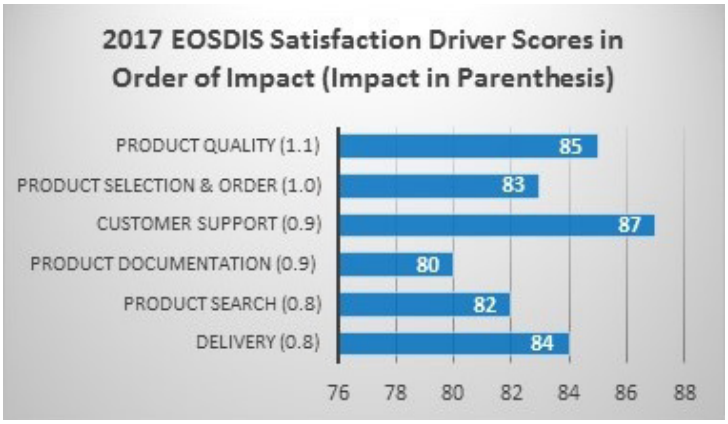
Unless otherwise noted, all articles written by Josh Blumenfeld, EOSDIS Science Writer.

The EOSDIS received an aggregate Customer Satisfaction Index, or CSI, of 78 out of 100 in the 2017 survey. This is one point higher than last year's score and an indication of strong, consistent performance. The EOSDIS CSI score is also eight points higher than the aggregate federal government 2017 CSI. EOSDIS has never received a CSI below 74 (in 2006) and has outscored the federal government every year the EOSDIS ACSI survey has been conducted.

The ACSI model is a set of causal equations linking customer expectations, perceived quality, and perceived value to customer satisfaction, which is reflected mathematically in the CSI score. Satisfaction, in turn, is further linked to a customer's likelihood to recommend products and services and their willingness to use products and services in the future. Because the CSI score is based on aggregate weighted scores in several factors that are calculated using the proprietary ACSI methodology, a score in the upper-70s can be considered an indication of "strong" performance. For a detailed description of the ACSI methodology, please see the *American Customer Satisfaction Index (ACSI): Methodology Report* (available online by clicking on the hyperlink).

One expected result of high customer satisfaction with services is user trust and loyalty. This is accounted for in the ACSI algorithm and reflected by a number indicating the likelihood of a respondent to recommend the evaluated products and services to others coupled with the likelihood of a respondent to use the services in the future. Respondents' likelihood to recommend EOSDIS and DAAC products and services (87, unchanged from 2016) and likelihood to use EOSDIS services in the future (89, a one point increase from 2016) remain very strong, and are consistent with previous EOSDIS ACSI surveys.

The CFI Group breaks EOSDIS services into six "Satisfaction Drivers" representing specific areas of performance affecting overall EOSDIS customer satisfaction. Each satisfaction driver is further evaluated by its weighted impact, which is a value indicating the leverage an individual driver has on customer satisfaction and the area or areas in which improvements matter the most to survey respondents. The 2017 order of EOSDIS satisfaction driver impacts is unchanged from 2016.



While Customer Support continues to be the primary driver of EOSDIS customer satisfaction (receiving a score of 87—two points higher than the 2016 score of 85), the driver with the greatest impact on EOSDIS customer satisfaction continues to be Product Quality (85, a two point increase from 2016). As noted by the CFI Group, maintaining a high Product Quality score is essential to maintaining a high CSI score due to the high impact of Product Quality (1.1) on overall satisfaction. The EOSDIS 2017 Product Quality score of 85 is the highest Product Quality score received by the EOSDIS since the EOSDIS survey was first conducted in 2004.

With the exception of Product Delivery (84), which is unchanged from 2016, all Satisfaction Driver scores increased from 2016. Product Quality, Customer Support, and Product Search all increased two points from 2016; Product Selection and Order and Product Documentation both increased one point from last year's survey.

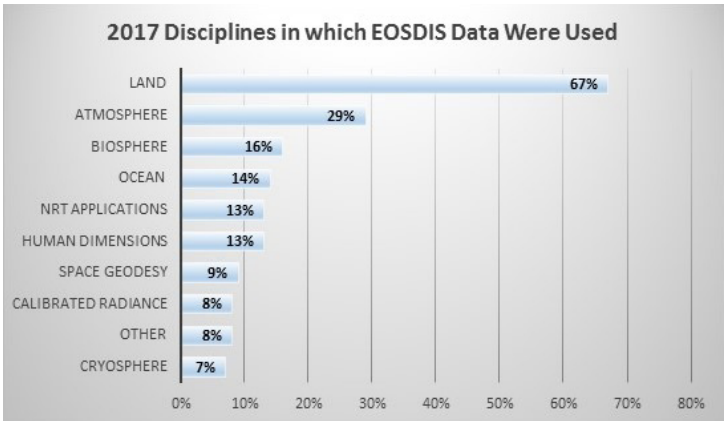
Outside of three survey questions asking respondents to rate their overall expectations, perceived quality, and perceived value of EOSDIS services and products on a 1 to 10 scale (which are required by the CFI Group and used to calculate the CSI score), the remaining questions on the EOSDIS survey are developed collaboratively by the EOSDIS, the DAACs, and the CFI Group. Respondents to the survey are asked to evaluate their experience with the specific DAAC or DAACs from which they receive data and products. In addition, the survey allows respondents to provide open-ended comments. These are some of the most valuable areas of the survey since they allow respondents to candidly express their specific likes, dislikes, satisfactions, and suggested improvements. These comments help DAAC and EOSDIS managers identify

strengths, highlight areas for improvement, and discover areas for potential new services and products.

The 2017 survey was conducted between September 7 and October 4. The CFI Group emailed 289,745 survey invitations to individuals who used EOSDIS data and/or products in the past year and received 7,505 completed surveys. This 2.6% response rate is seen as a good response by the CFI Group for calculating a statistically valid CSI score. In fact, NASA and the EOSDIS consistently see a higher participation in the ACSI survey than other government agencies or programs.

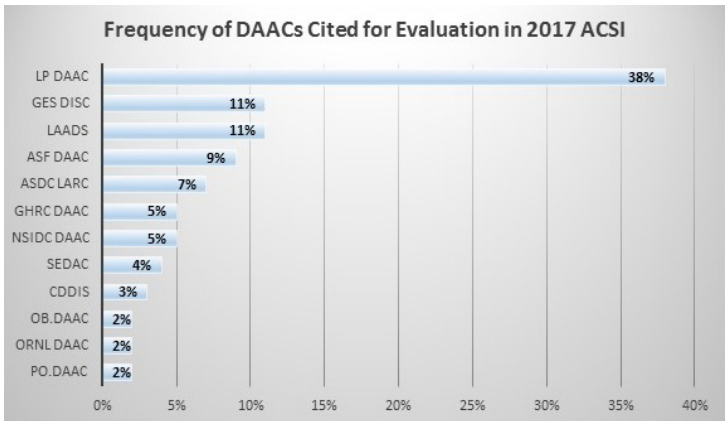
In the following summary tables, total percentages may not equal 100% due to multiple responses; all non-percentage values are out of 100.

Survey respondents self-identifying themselves as university students (38%)—which includes both undergraduate (9%) and graduate (29%) students—and Earth science researchers (32%) were the most common EOSDIS data users, followed by university professors (16%) and the general public (14%). The most common disciplines for which EOSDIS data are used are consistent with previous years: land and atmosphere, followed by biosphere, ocean, near real-time (NRT) applications, and human dimensions.

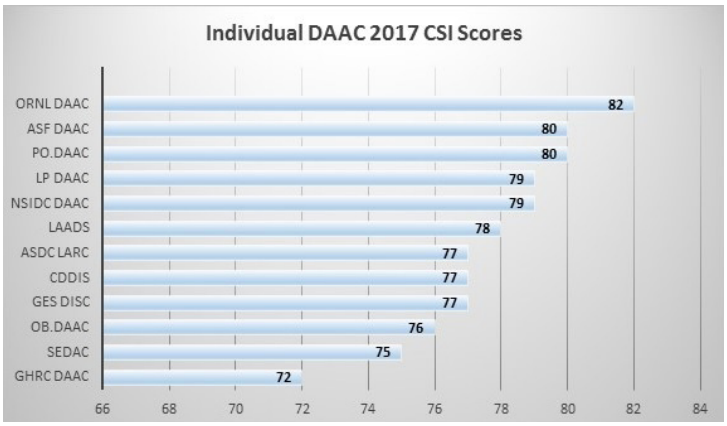


ACSI survey respondents are asked to evaluate their experience with the specific DAAC or DAACs from which they receive data and products. For links to the individual DAACs cited below, please see the Earthdata DAAC page.

The Land Processes DAAC (LP DAAC) continues to be the most frequent DAAC evaluated (38%). Since LP DAAC is the home for NASA Earth observing data



related to land-oriented disciplines (including land cover, topography, and vegetation indices), the high frequency of LP DAAC evaluation is in line with the high level of use of EOSDIS data in land-oriented disciplines. The 2017 LP DAAC evaluation frequency, though, is 2% lower than in 2016. The Alaska Satellite Facility DAAC (ASF DAAC) and the Goddard Earth Sciences Data and Information Services Center (GES DISC) were the only two DAACs that saw increases in their frequency of evaluation in 2017 when compared with 2016 (ASF DAAC: +3%; GES DISC: +2%).



CSI scores were computed for each DAAC based on individual DAAC survey responses. All DAACs achieved CSIs between 72 and 82, which are consistent with previous surveys and considered strong scores by the CFI Group. The Oak Ridge National Laboratory (ORNL) DAAC (82), ASF DAAC (80), and Physical Oceanography DAAC (PO.DAAC; 80) were the highest-scoring DAACs, and all three saw a +1 improvement over their 2016 CSI. The National Snow and Ice Data Center (NSIDC) DAAC (+3) and the Socioeconomic Data and Applications Center (SEDAC; +2) achieved the highest increases in CSI from 2016.

Summaries of all EOSDIS ACSI reports are available on the ACSI Reports page on the Earthdata website, and full reports are available upon request to the EOSDIS. Thanks to your participation, the data and comments from the 2017 EOSDIS ACSI survey are being incorporated into service and product enhancements you will see throughout 2018, including potential new services such as cloud-based services. Planning is already underway for the 2018 survey, and you can expect to receive your survey invitation this fall. ■

https://earthdata.nasa.gov/2017-acsi-survey-summary

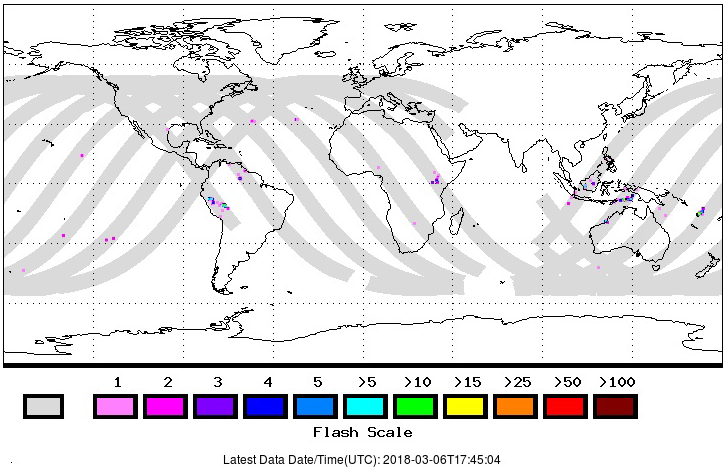
FLASH–A New Source for Global Lightning Data is Now Available

Provisional data from the Lightning Imaging Sensor (LIS) aboard the International Space Station (ISS) are now available through NASA's GHRC DAAC and LANCE.

A lightning flash is an amazing force of nature. Along with contributing to more than 24,000 fires each year leading to about $407 million in damages, these electrical discharges can heat the air they pass through to temperatures as high as 50,000 degrees Fahrenheit, according to the National Weather Service—that's about five times hotter than the surface of the sun. Knowing where and when lightning is occurring and being able to track the movement of severe storms with intense lightning, especially over oceans and other remote areas, is vital for protecting lives and property.

Provisional near real-time (NRT) and non-quality-controlled (NQC) standard data products from a new Lightning Imaging Sensor (LIS) installed aboard the International Space Station (ISS) in late February 2017 are now available through NASA's Global Hydrology Resource Center Distributed Active Archive Center (GHRC DAAC) and NASA's Land, Atmosphere Near real-time Capability for EOS (LANCE) system. These data are available in both HDF-4 and netCDF-4 formats; the ISS LIS data record starts on March 1, 2017.

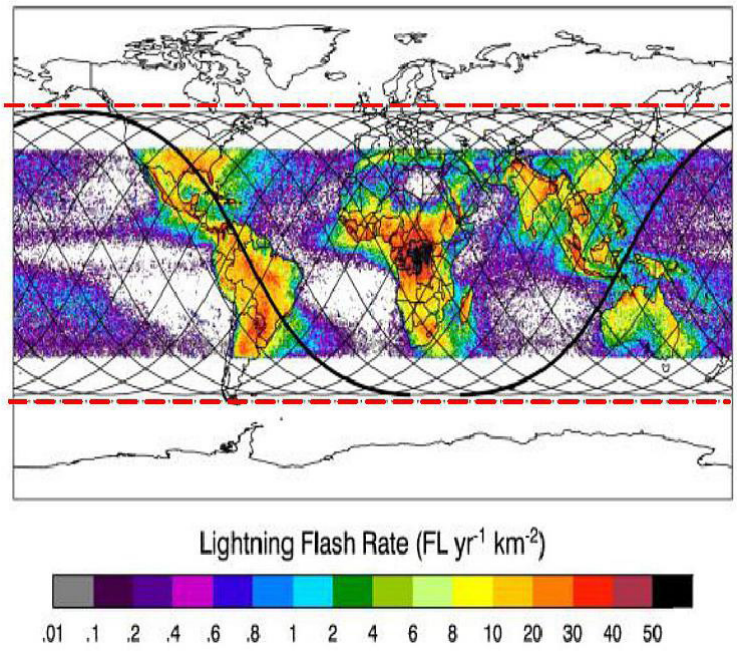
LIS NRT data are available rapidly after an observation (generally within two minutes) and are an excellent resource for applications requiring low data latency, such as tracking on-going severe storms or tracking lightning over oceans and other data-sparse regions. LIS standard data products, on the other hand, are created daily after all raw observations for the day have been acquired, which means they will be more complete than NRT data. It is important to note that the NQC standard data products have not undergone a review to assure data quality.



ISS LIS Near Real Time 12 Hour Browse Image from March 6, 2018, showing detected lightning flashes superimposed on the instrument's orbital track (gray lines). Colors indicate the number of flashes detected. Image provided by the GHRC DAAC; DOI: 10.5067/LIS/ISSLIS/DATA205. Accessed March 6, 2018.

To be accurate, the LIS on the ISS is not really a "new" instrument. In fact, it is the back-up LIS that is identical to the first LIS that orbited aboard NASA's Tropical Rainfall Measuring Mission (TRMM, operational 1997 to 2015). The TRMM LIS observed lightning flashes in the tropics between roughly 38° north and south of the equator. Data from the TRMM LIS complemented lightning data from NASA's Optical Transient Detector (OTD, operational 1995 to 2000), which was a space-qualified engineering model of the LIS that was flown aboard Orbital Science Corporation's Microlab-1 satellite (this name was later changed to OrbView-1). Data from the TRMM LIS and

the OTD established that about 45 lightning flashes occur over Earth every second, with about one-third (15 flashes per second) striking the planet as discharges to ground; the remaining flashes are cloud flashes.



A comparison of TRMM LIS coverage (colored areas between roughly 38° north and south latitude) and the increased global coverage of the ISS LIS (dashed red lines, roughly 48° north and south latitude). NASA GHRC DAAC image.

The LIS aboard the ISS not only continues the climatological data record started by the TRMM LIS and the OTD, it enhances this record by sensing lightning over a much greater area. By sensing lightning between approximately 48° north and south of the equator, the ISS LIS is able to detect 98% of Earth's annual lightning and provides new insights about thunderstorms occurring in the climatologically sensitive mid-latitudes. In addition, ISS LIS NRT data will be valuable as an aid for short-term weather and aviation forecasts, warnings, and situational awareness in data-sparse regions, such as over oceans.

By providing lightning flash data for most of Earth's population rapidly after a detected flash, the ISS LIS provides emergency managers and meteorologists with a powerful new tool for protecting lives and property. For researchers, ISS LIS data continue a valuable data record dating back to 1995 and provide new perspectives on an amazing force of nature affecting the planet. ■

https://earthdata.nasa.gov/iss-lis-provisional-data

Additional Resources:

Blakeslee, R. & Koshak, W. (2016). "LIS on ISS: Expanded Global Coverage and Enhanced Applications." *The Earth Observer,* 28(3): 4-14. Available online at https://eospso.nasa.gov/sites/default/files/eo_pdfs/May_June_2016_color%20508.pdf#page=4

ISS LIS Provisional NQC data sets, DOI: 10.5067/LIS/ISSLIS/DATA204

ISS LIS Provisional NRT data sets, DOI: 10.5067/LIS/ISSLIS/DATA205

LANCE ISS LIS data: https://earthdata.nasa.gov/earth-observation-data/near-real-time/download-nrt-data/lis-nrt

USER **PROFILES:**

NASA Earth Science Data User Profiles highlight our diverse end-user community worldwide and show you not only how these data are being used for research and applications, but also where these data are being used – from the plains of West Texas to the Sea of Oman and everywhere in between. You'll also learn where you can download the data sets in each feature. https://earthdata.nasa.gov/user-resources/who-uses-nasa-earth-science-data-user-profiles

Dr. Kristine M. Larson

Who uses NASA Earth science data? Dr. Kristine M. Larson, to explore new ways of using remote sensing technologies.

Dr. Kristine M. Larson, Professor of Aerospace Engineering Sciences, University of Colorado, Boulder, CO

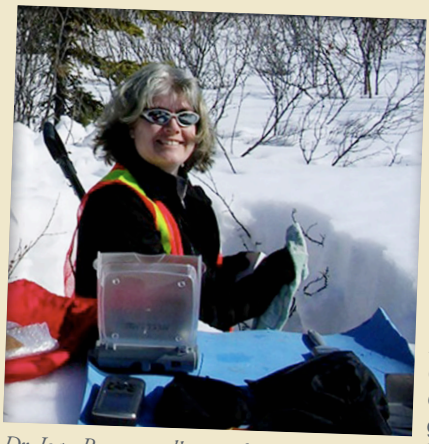
Research interests: Plate tectonics and geodesy, with work developing new ways of using the Global Positioning System (GPS) to study Earth and the water cycle.

Dr. Kristine M. Larson in front of her favorite GPS site (P041) near Boulder, Colorado. The gray object next to Dr. Larson is a GPS receiver antenna. Photograph by Glenn Asakawa, University of Colorado.

https://earthdata.nasa.gov/user-resources/who-uses-nasa-earth-science-data-user-profiles/user-profile-dr-kristine-larson

Dr. Joan Ramage

Who uses NASA Earth science data? Dr. Joan Ramage, to study glaciers and snowmelt.



Dr. Joan Ramage, Associate Professor of Earth and Environmental Science, Lehigh University, Bethlehem, PA

Research interests: Past glaciations and their impacts in North and South America, the distribution and change of modern glaciers around the world, and hydrologic impacts of snowmelt.

Dr. Joan Ramage collecting data from a snow pit near the town of Faro in the Yukon Territory, Canada. Image courtesy of Dr. Ramage.

https://earthdata.nasa.gov/user-resources/who-uses-nasa-earth-science-data-user-profiles/user-profile-dr-joan-ramage

Dr. Santiago Gassó

Who uses NASA Earth science data? Dr. Santiago Gassó, to study the concentration and global movement of dust.

Dr. Santiago Gassó, Associate Research Scientist, NASA Goddard Earth Sciences Technology And Research (GESTAR) program/ Morgan State University

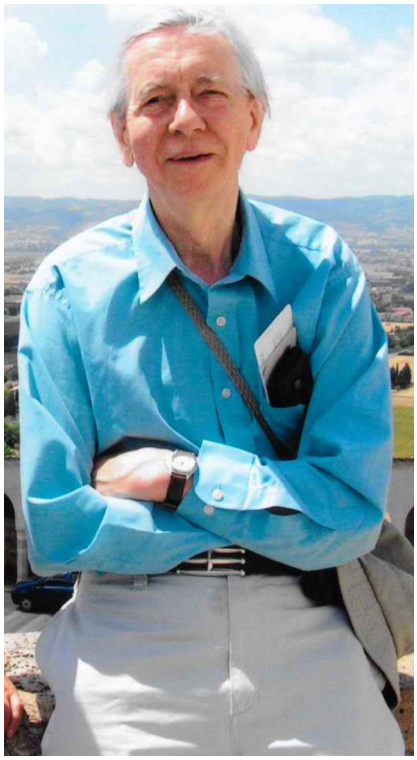
Research interests: Detection of smoke, dust, and other particles from space and the development of algorithms to derive pollution quantities from remotely-sensed imagery; dust transport at high latitudes and the interaction of volcanic emissions with clouds.

https://earthdata.nasa.gov/user-resources/who-uses-nasa-earth-science-data-user-profiles/user-profile-dr-santiago-gasso

In Memoriam: Dr. Roger Barry (1935–2018)

The cryosphere expert and University of Colorado Distinguished Professor of Geography was the founding director of the National Snow and Ice Data Center (NSIDC).

(Edited from a NSIDC memoriam written by Michon Scott, NSIDC)



Dr. Roger Barry in Assisi, Italy, in 2007. Photo by Walt Meier and courtesy NSIDC.

Dr. Roger Graham Barry, founding director of the National Snow and Ice Data Center (NSIDC), passed away on March 19, 2018, ending a distinguished career in the study of the cryosphere and mountain climates.

Born in 1935 in Sheffield, Dr. Barry grew up in the United Kingdom. As a teenager interested in weather, he began working as a scientific assistant at the UK Meteorological Office in 1952. Soon afterwards, he was plotting data at the Royal Air Force Station Workshop in Nottinghamshire while taking correspondence courses in math and physics in the evenings. Failing the military's eyesight test, he applied for a university program related to another early interest: geography. He earned his bachelor's degree from the University of Liverpool in 1957, his master's degree from McGill University in 1959, and his Ph.D. from the University of Southampton in 1965. In addition to his own coursework, he accepted a post as an assistant lecturer at the University of Southampton in 1960. He also began learning Russian through a BBC radio program, an endeavor that would later facilitate some of his international collaborations.

Dr. Barry in the cooking area of a research camp on Canada's Baffin Island in 1970. The photographer, former NSIDC DAAC manager Ron Weaver, was one of Dr. Barry's graduate students and recalls, "He was excited to see the research site, but, more importantly, to start data reduction immediately in the field. I was impressed by his focus and of course his ability to perform mathematical magic on the fly." Photo by Ron Weaver and courtesy NSIDC.

In the mid- to late-1960s, Dr. Barry hoped to train graduate students, but felt constrained by the UK's limited research funding. In 1968, he accepted a post in the United States at the University of Colorado Boulder as an assistant professor at the Institute of Arctic and Alpine Research (INSTAAR). When the university assumed control of a World Data Center (WDC) for Glaciology in 1976, Dr. Barry became the center's director.

The center started small, but grew quickly under Dr. Barry's leadership. At first, the WDC consisted of a library, a glacier photo collection, and a small staff. In 1980, the WDC became part of the Cooperative Institute for Research in Environmental Sciences (CIRES), which is a partnership between the National Oceanic and Atmospheric Administration (NOAA) and the University of Colorado Boulder. In 1982, NOAA designated the NSIDC as coexistent with the WDC, and the center adopted the NSIDC name.

In 1993, NSIDC became the location of a NASA Earth Observing System Data and Information System (EOSDIS) Distributed Active Archive Center (DAAC). The NSIDC DAAC provides data and information on snow, sea ice, glaciers, ice sheets, ice shelves, frozen ground, soil moisture, cryosphere, and climate interactions, in support of research in global change detection, model validation, and water resource management.

Along with training and recruiting a dedicated staff at NSIDC, Dr. Barry also fostered international collaboration. Between 1986 and 2005, several Russian scientists visited NSIDC for extended stays and research, and Dr. Barry's visits to Russia in the 1990s paved the way for multiple U.S./Russian data-rescue efforts. Meanwhile, one of Dr. Barry's visits to China helped facilitate China's establishment of its own WDC for Glaciology.

At NSIDC, Dr. Barry contributed to the Intergovernmental Panel on Climate Change (IPCC) assessments in 1990, 1995, and 2001. He served as a review editor for IPCC Working Groups 1 and 2 in 2007, an effort that contributed to the IPCC being awarded the 2007 Nobel Peace Prize.

Other honors for Dr. Barry include Lifetime Career Awards from the Climate and Mountain Specialty groups of the Association of American Geographers, a Fellowship from the American Geophysical Union, the Goldthwait Polar Medal from the Byrd Polar Research Center, the Founder's Medal from London's Royal Geographic Society, the Humboldt Prize from the Bavarian Academy of Sciences, a J.S. Guggenheim Memorial Fellowship, and designation as a Distinguished Professor of Geography by the University of Colorado Board of Regents.

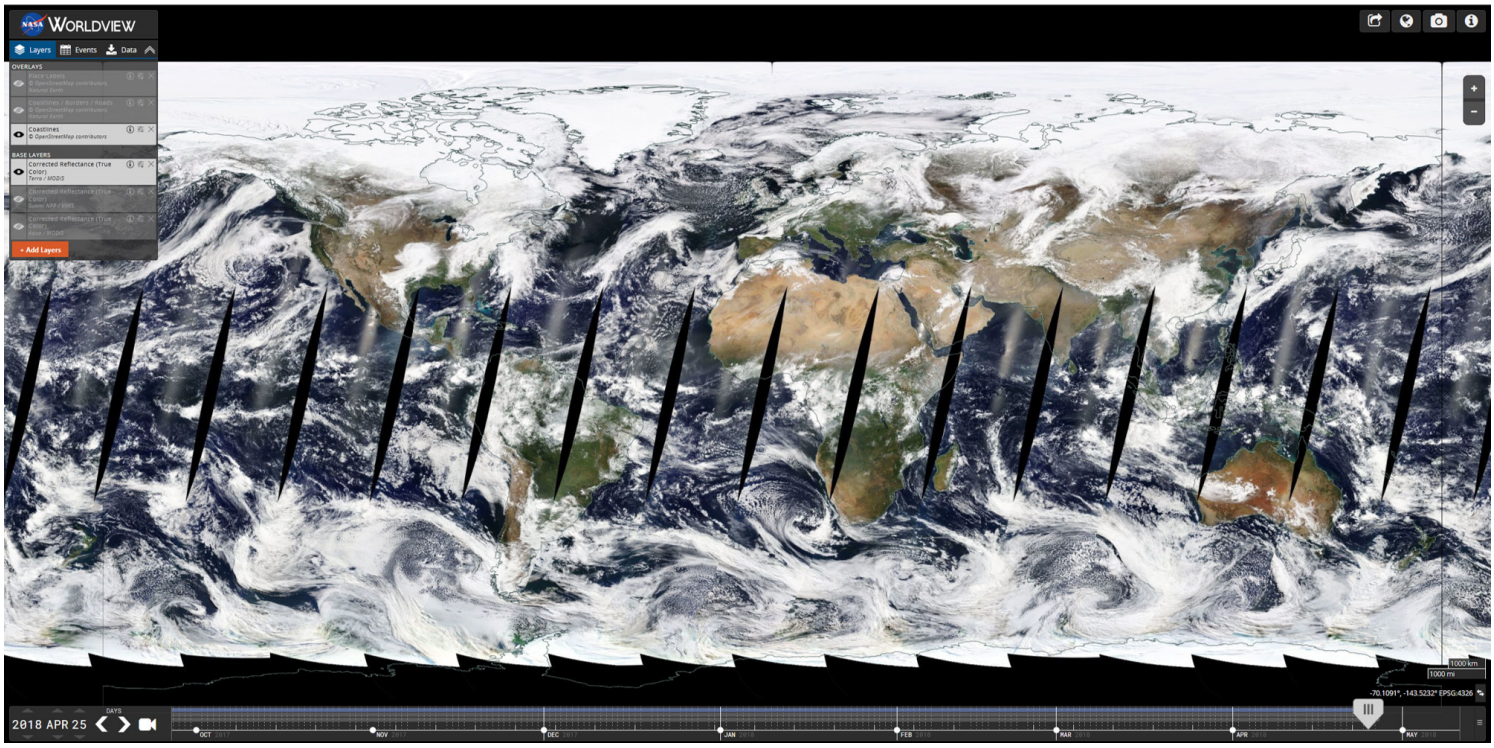
Between 1971 and 2011, Dr. Barry supervised 67 graduate students, 36 of whom earned Ph.D. degrees. Over the course of his career, he authored a substantial body of peer-reviewed research as well as numerous textbooks: *Atmosphere, Weather and Climate*; *The Global Cryosphere: Past, Present and Future*; *Mountain Weather and Climate*; *Microclimate and Local Climate*; *Essentials of the Earth's Climate System*; and *Synoptic and Dynamic Climatology*.

Dr. Roger Barry looks westward toward two outlet glaciers of the Penny Ice Cap on Canada's Baffin Island. The photo was taken during a research trip with his graduate students in the summer of 1970. Photo by Ron Weaver and courtesy NSIDC.

Dr. Barry retired as NSIDC director in 2008 and retired from teaching at the University of Colorado Boulder in 2010. Even after his official retirement, he continued to work part-time, along with teaching and writing about climate, weather, and the cryosphere. In a 2015 paper reviewing his life and work, Dr. Barry reflected, "Climatology is a young science, spanning barely half a century, and I have indeed been fortunate to be part of most of it." He counted among his greatest satisfactions "working with so many brilliant graduate students" and "establishing NSIDC as a worldwide resource."

For more information about Dr. Barry, his research, and his many accomplishments, please see Dr. Barry's NSIDC page: https://nsidc.org/research/bios/barry.html. ■

https://earthdata.nasa.gov/in-memoriam-dr-roger-barry-1935-2018



New NASA Worldview Tutorial Released

NASA's Worldview app lets you explore Earth as it looks right now or as it looked almost 20 years ago. See a view you like? Take a snapshot and share your map with a friend or colleague. Want to track the spread of a wildfire? You can even create an animated GIF to see change over time.

Written by Jennifer Brennan, NASA EOSDIS Communications Lead

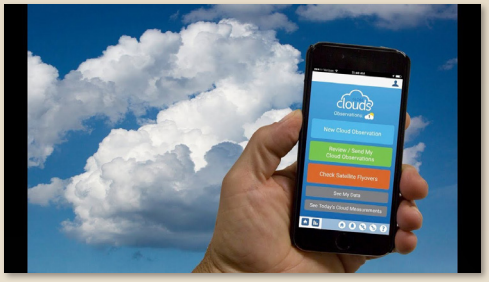
Through an easy-to-use map interface, you can watch tropical storms developing over the Pacific Ocean; track the movement of icebergs after they calve from glaciers and ice shelves; and see wildfires spread and grow as they burn vegetation in their path. Pan and zoom to your region of the world to see not only what it looks like today, but to investigate changes over time. Worldview's nighttime lights layers provide a truly unique perspective of our planet.

What else can you do with Worldview? Add imagery by discipline, natural hazard, or key word to learn more about what's happening on this dynamic planet. View Earth's frozen regions with the Arctic and Antarctic views. Take a look at current natural events like tropical storms, volcanic eruptions, wildfires, and icebergs at the touch of a button using the "Events" tab. ■

New Tutorial:
https://youtu.be/LI3aVTNhCKU

Explore the dynamic Earth with Worldview
https://worldview.earthdata.nasa.gov

Worldview is an open source project at NASA. All data, software and services are freely available to anyone for any purpose. You can participate in the software development by visiting https://github.com/nasa-gibs/worldview.



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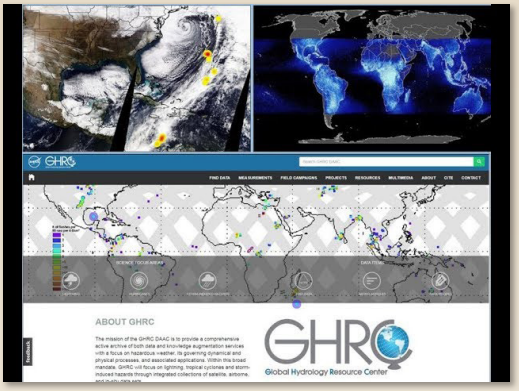
NASA GLOBE Clouds: Matching Cloud Observations from Citizen Scientists with NASA/NOAA Satellite Data

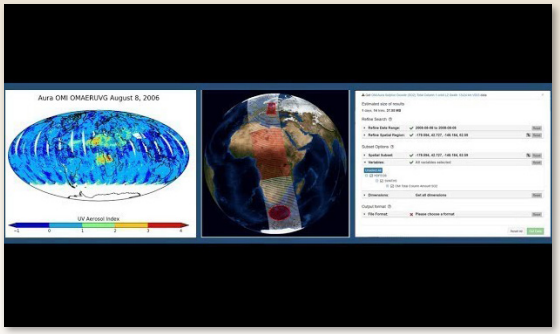
https://youtu.be/NmIx3s2I2rE



3/7/18

Striking New Spatial Bounds Using ISS LIS Data

https://youtu.be/m83cNoaMXUw



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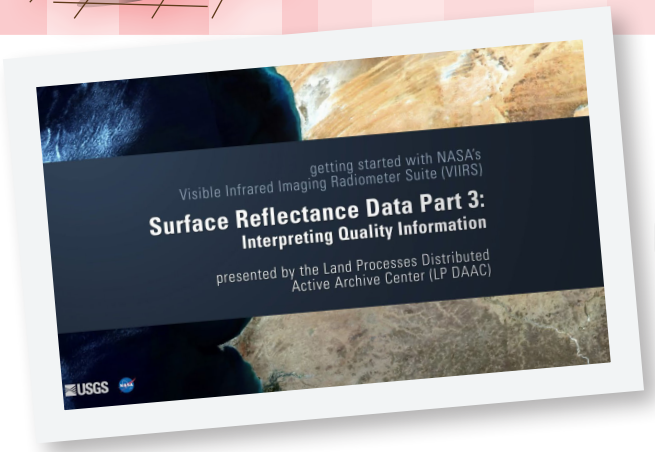
Subset NASA Ozone Monitoring Instrument Data with the GES DISC Level 2 Data Subsetter

https://youtu.be/5uV618KlBg0

DATA Recipes



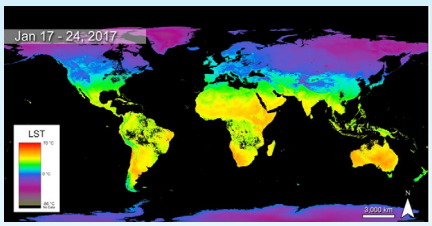
Getting Started with VIIRS Surface Reflectance Data

Part 3: Interpreting Quality Information
https://youtu.be/yzZl4Je3G2g

Extract Point and Area Samples of NASA SMAP Data with AppEEARS

https://nsidc.org/support/how/point-and-area-samples-smap-data-using-appeears

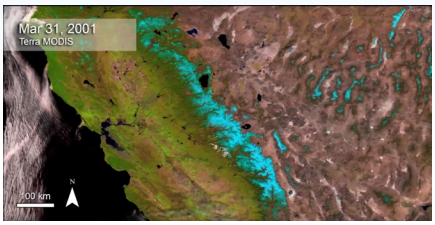
SPECIAL FEATURE VIDEOS



NASA Terra MODIS Global Land Surface Temperature 2017

Observe changes in land surface temperature over the course of 2017, with NASA Terra Moderate Resolution Imaging Spectroradiometer (MODIS) images. The images were created using the 8-day composite Terra MODIS Land Surface Temperature (LST) data product (MOD11C2).

https://youtu.be/PDfRVyEozIs



Observing Snowpack in the Sierra Nevada Mountain Range (2001-2018)

This video uses images produced from the NASA Terra MODIS sensor and from the joint Suomi National Polar-Orbiting Partnership (Suomi-NPP) Visible Infrared Imaging Radiometer Suite (VIIRS) instrument observations over the Sierra Nevada Mountain Range. The video shows changes in the amount of snowpack from 2001 to 2018.

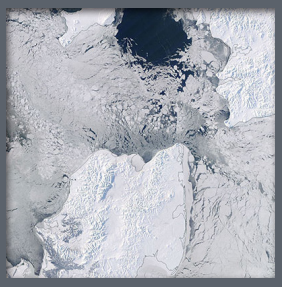
https://youtu.be/ncoIcUI_aAE

NASA LP DAAC Prospectus: 2017 to 2019

This short video features the NASA Land Processes Distributed Active Archive Center (LP DAAC), a key access point for global land remote sensing data. The video provides an overview of the significance of the DAAC's archive and distribution functions, explains the depth of the user community, and outlines future activities for increasing data use and access.

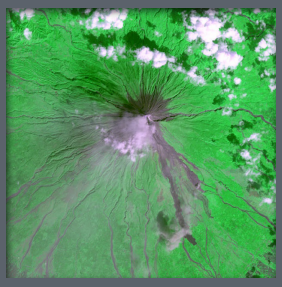
https://youtu.be/PqVouv1ywd8

Latest NASA Earthdata Images



Sea Ice in the Bering Strait

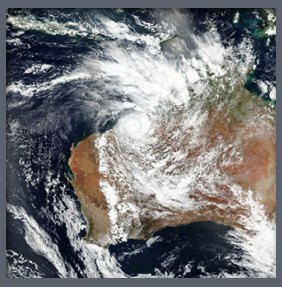
https://earthdata.nasa.gov/sea-ice-in-the-bering-strait



Mount Mayon, Philippines

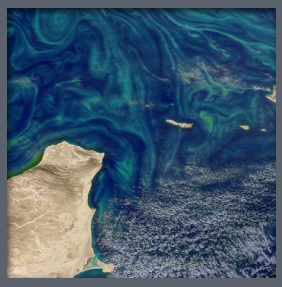
http://www.earthdata.nasa.gov/mastheads

(Published 2/5/18)



Cyclone Kelvin over Western Australia

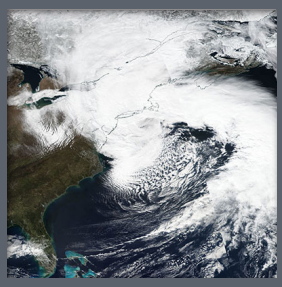
https://earthdata.nasa.gov/cyclone-kelvin-over-western-australia



Phytoplankton in the Gulf of Aden

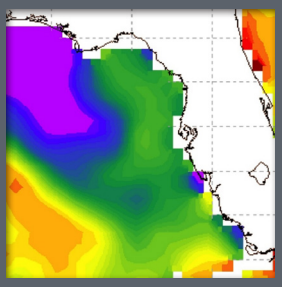
https://earthdata.nasa.gov/mastheads

(Published 2/26/18)



Nor'easter over the east coast of the U.S.

https://earthdata.nasa.gov/nor-easter-over-the-east-coast-of-the-usa



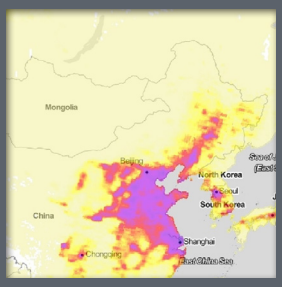
Sensing Sea Surface Salinity with SMAP

https://earthdata.nasa.gov/mastheads

(Published 3/12/18)

The Nile Delta from space

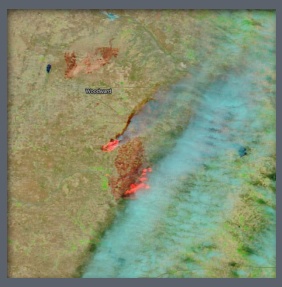
https://earthdata.nasa.gov/the-nile-delta-from-space



Human Exposure to Nitrogen Dioxide

https://earthdata.nasa.gov/mastheads

(Published 3/19/18)



Wildfires in western Oklahoma

https://earthdata.nasa.gov/wildfires-in-western-oklahoma

Aoba Volcano Eruption Plume

https://earthdata.nasa.gov/mastheads

(Published 4/2/18)

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