Making Earth Science Data Records for Use in Research Environments (MEaSUREs) Projects Data and Services at the GES DISC

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

Overview of MEaSUREs at the GES DISC

NASA's Earth Science Program is dedicated to advancing Earth remote sensing and pioneering the scientific use of satellite measurements to improve human understanding of our home planet. Through the MEaSUREs Program, NASA is continuing its commitment to expand understanding of the Earth system using consistent data records. Emphasis is on linking together multiple data sources to form coherent time-series, and facilitating the use of extensive data in the development of comprehensive Earth system models.

A primary focus of the MEaSUREs Program is the creation of Earth System Data Records (ESDRs). An ESDR is defined as a unified and coherent set of observations of a given parameter of the Earth system, which is optimized to meet specific requirements for addressing science questions. These records are critical for understanding Earth System processes; for the assessment of variability, long-term trends, and change in the Earth System; and for providing input and validation means to modeling efforts. Seven MEaSUREs projects will be archived and distributed through services at the Goddard Earth Sciences Data and Information Services Center (GES DISC).

MEaSUREs Projects at the GES DISC

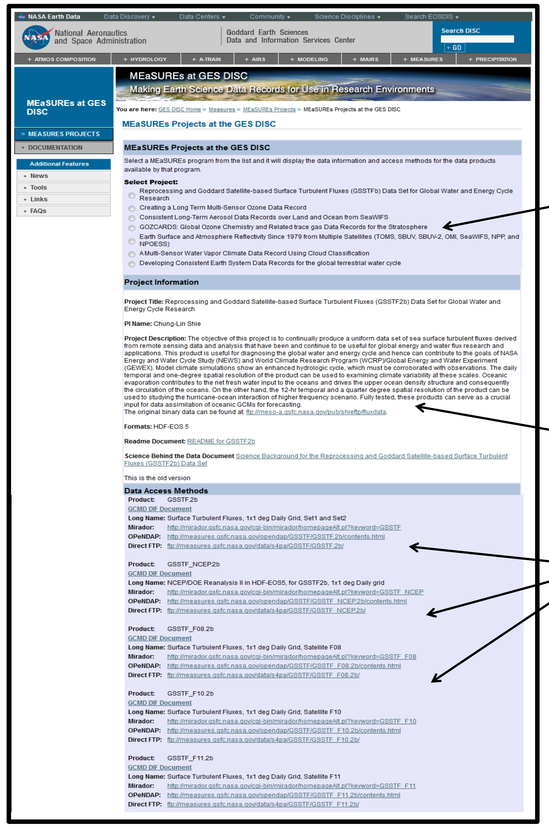
- Reprocessing and Goddard Satellite-based Surface Turbulent Fluxes (GSSTF) Data Set for Global Water and Energy Cycle Research; PI: Chung-Lin Shie
- Creating a Long Term Multi-Sensor Ozone Data Record; PI: Richard McPeters
- Consistent Long-Term Aerosol Data Records over Land and Ocean from SeaWiFS; PI: Christina Hsu
- GOZCARDS: Global Ozone Chemistry and Related Trace Gas Data Records for the Stratosphere; PI: Lucien Froidevaux
- Earth Surface and Atmosphere Reflectivity Since 1979 from Multiple Satellites (TOMS, SBUV, SBUV-2, OMI, SeaWiFS, NPP, and NPOESS); PI: Jay Herman
- A Multi-Sensor Water Vapor Climate Data Record Using Cloud Classification; PI: Eric Fetzer
- Developing Consistent Earth System Data Records for the Global Terrestrial Water Cycle; PI: Eric Wood

MEaSUREs Information Portal

The MEaSUREs Portal (**http://disc.sci.gsfc.nasa.gov/measures**) is a Web interface that compiles all the information available on each MEaSUREs project serviced through the GES DISC.

The portal is an easy-to-navigate Web interface offering the following:

- Data set documentation
- Data set access methods
- Latest news on projects
- Tools to read the data
- Links to related Web sites
- Frequently Asked Questions



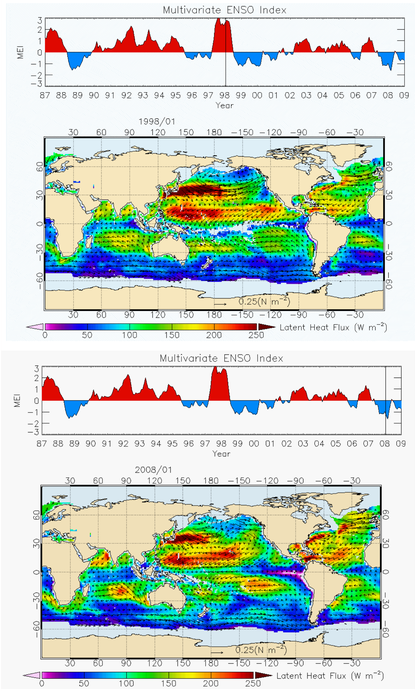
Project selection

Data set information, Readme and Science Behind the Data Documentation

List of all the products in the data set, with all the methods available to access the data

Public Released Data Sets

Goddard Satellite-based Surface Turbulent Fluxes (*GSSTF*) Data Set for Global Water and Energy Cycle Research



Latent heat flux (shades) and wind stress (vectors) for 1998 El Niño, and 2008 La Niña, from GSSTF 2c. MEI from NOAA/ESRL, Wolter and Timlin, 1993

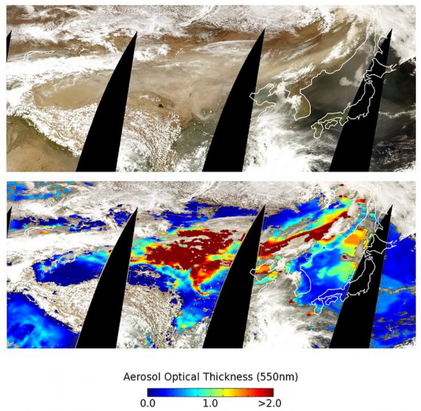
Wolter, K., and M.S. Timlin, 1993: Monitoring ENSO in COADS with a seasonally adjusted principal component index. Proc. of the 17th Climate Diagnostics Workshop, Norman, OK, NOAA/NMC/CAC, NSSL, Oklahoma Climate Survey, CIMMS and the School of Meteorology, University of Oklahoma, 52-57.

- 20-year (1987/07-2008/12) series of fluxes of momentum and heat, and air-sea interface characteristics, such as gradient of humidity, temperature, and precipitable water vapor.
- These flux measurements are crucial to:
  - Understanding global water and energy cycles
  - More accurate prediction of oceanic circulation and transport, owing to better estimation of global oceanic fresh water and momentum flux

AVAILABLE:

- Individual Special Sensor Microwave/Imager (SSM/I) daily data.
- Merged estimates on Daily and Monthly scales; Monthly, Seasonal and Yearly Climatology.
- Services and documentation available at **http://disc.sci.gsfc.nasa.gov/daac-bin/DataHoldingsMEASURES.pl?PROGRAM_List=ChungLinShie**

Consistent Long-Term Aerosol Data Records over Land and Ocean from SeaWiFS



Aerosol data products span the length of the SeaWiFS mission (1997-2010).

Long-term climate data records of aerosols are critically needed to form a consensus among the science community regarding the impact of aerosols on the global radiation budget. Towards this goal, this new data set was created using radiances from the long-running and well-calibrated SeaWiFS mission, in conjunction with a new ocean retrieval algorithm and an extended Deep Blue retrieval algorithm over land, covering both bright desert as well as vegetated surfaces.

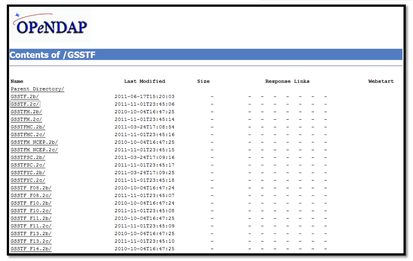
- Daily swath (Level 2) and gridded (Level 3) products (including aerosol optical thickness and Ångström exponent, with coverage over both land and ocean)
- The Level 3 products are available at both 0.5° and 1.0° grid resolutions.
- Services and documentation available at **http://disc.sci.gsfc.nasa.gov/daac-bin/DataHoldingsMEASURES.pl?PROGRAM_List=ChristinaHsu**

More Data from other Projects Coming Soon

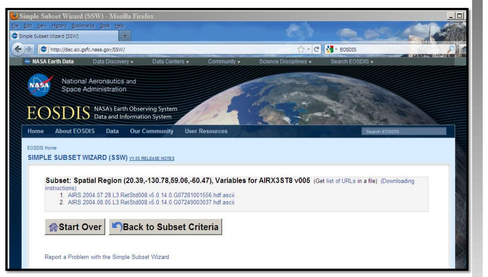
MEaSUREs Services

The MEaSUREs data sets will be available through multiple services such as Mirador, OPeNDAP, and the Simple Subset Wizard.

Mirador is a drastically simplified interface that employs the Google mini appliance for metadata keyword searches. Other features include quick response, spatial and parameter subsetting, data file hit estimator, Gazetteer (geographic search by feature name capability), and an interactive shopping cart. **http://http://mirador.gsfc.nasa.gov/**



The ***Simple Subset Wizard (SSW)*** is designed to provide a simple, unified user interface for submitting subset requests for data. **http://disc.gsfc.nasa.gov/SSW/**

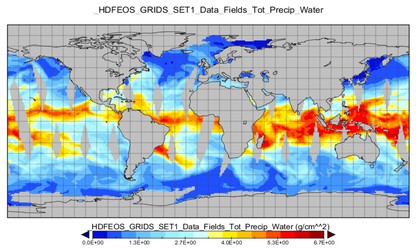


The ***Open Source Project for a Network Data Access Protocol (OPeNDAP)*** provides remote access to individual variables within datasets in a form usable by many tools, such as IDV, McIDAS-V, Panoply, Ferret and GrADS. **http://measures.gsfc.nasa.gov/opendap/**

Data Interoperability, Provenance and Citation

To provide some consistency and uniformity of MEaSUREs data produced by a variety of data providers (Principal Investigators), the GES DISC has established guidelines for metadata, data formats, and filenames used for MEaSUREs data sets archived and distributed through the GES DISC. A set of standard conventions on metadata and data format will facilitate data management, improve archiving and search methods to improve data sharing, and ultimately, optimize the information available within the data.

- The goal is to have MEaSUREs data available and increase its utility to a broad user community, compatible with a wide array of tools (e.g., Panoply) and protocols (e.g., OPeNDAP).
- GES DISC is working with data producers to capture and retain information on data provenance in metadata and documentation to enhance interpretation of data and contribute to reproducibility.



The GSSTF2b total precipitable water (g/cm²) globally for 1990-01-01 accessed through the OPeNDAP service in Panoply

- New initiatives to use Data Citation standards: Data from each project will have a permanent citation URL* with a Web page that contains all the necessary information on how to cite the data sets and any additional relevant information including documentation and data access methods.

Chung-Lin Shie, Long Chiu, Robert Adler, I-I Lin, Eric J. Nelkin, and Joe Ardizzone, 2010. *Surface Turbulent Fluxes, 1x1 deg Monthly Grid, Set1 and Set2*. Edited by A. Savtchenko. Greenbelt, MD: Goddard Earth Sciences Data and Information Services Center, accessed October 31, 2010 at http://disc.sci.gsfc.nasa.gov/datacite/GSSTFM.2b.html.

N. Christina Hsu, Corey Bettenhausen, and Andrew Sayer, 2011. *SeaWiFS Deep Blue Optical Depth and Angstrom Component Daily Level 2 Data*. Greenbelt, MD: Goddard Earth Sciences Data and Information Services Center, accessed July21, 2011 at http://disc.sci.gsfc.nasa.gov/datacite/GES_DISC_SWDB_L2_V002.html.

* Digital Object Identifiers (DOIs) to replace URLs (2012)