The NASA MEaSUREs-2006 Science Datasets Distributed at GES DISC

A23E-0303

NASA/Goddard EARTH SCIENCES DATA and INFORMATION SERVICES CENTER (GES DISC)

" Seven Science Datasets Contributing to Advancing the NASA Earth System 'Missions to Measurements' Concept and Goal "

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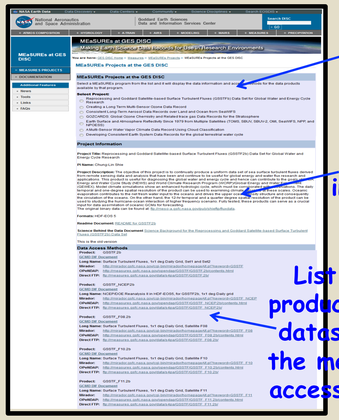
Where to Get the Seven Datasets

The NASA **MEaSUREs** (**M**aking **Ea**rth **S**ystem data records for **U**se in **R**esearch **E**nvironments) Portal at the GES DISC (**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.



How to Access the Data

The **MEaSUREs datasets** have been 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://mirador.gsfc.nasa.gov/**

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/**

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/**

Datasets and Science

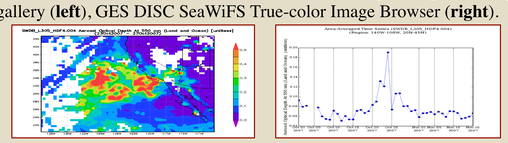
1. Aerosol Data over Land and Ocean

Project: Consistent Long-Term Aerosol Data Records over Land and Ocean from SeaWiFS (PI: Christina Hsu)

Global aerosol products derived from SeaWiFS with the Deep Blue algorithm (SWDB) are available for the entire mission (1997-2010). The products retrieves aerosol properties over bright desert surfaces, vegetated surfaces, oceans, and inland water bodies. Comparisons with AERONET observations have shown that the data are suitable for quantitative scientific use. The products include Level 2 of 13.5 x 13.5 km^2 at the center of the swath, Level 3 daily, monthly, and monthly climatology of both 0.5°x0.5° and 1.0°x1.0°.

California Wildfire

The smoke seen from MODIS-Aqua 20:45 UTC (**left**) and SeaWiFS on October 24, 2007 (**right**). Credit: NASA EOSDIS Rapid Response image gallery (**left**), GES DISC SeaWiFS True-color Image Browser (**right**).

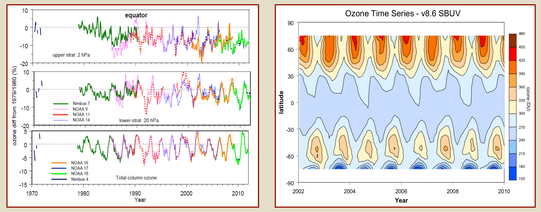


Total aerosol optical thickness daily product from SWDB version 4 Level 3 at 5x5 deg, averaged from Oct 21-27 (**left**). Area averaged time series shows the elevated AOT during the fire event (**right**).

2. Ozone Data

Project: Creating a Long Term Multi-Sensor Ozone Data Record (PI: Richard McPeters)

This long term (May 1970-July 2013) ozone dataset is a consistent and calibrated Earth Science Data Record (ESDR) by merging retrievals from multiple instruments aboard various satellites (i.e., BUV on Nimbus-4; SBUV on Nimbus-7; SBUV/2 on one of NOAA-9, -11, -14, -16, -17, -18, or -19). The ESDR includes two major products: (1) the Solar Backscattered Ultraviolet (SBUV) Ozone (O3) Nadir Profile and Total Column Daily L2 products, (2) the SBUV Level 3 Monthly Zonal Mean (MZM) products. The ozone time series can be used for scientific studies such trend analyses and climate changes.

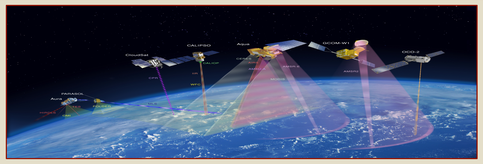


Left: Ozone changes at the Equator relative to the 1979-1980 period [in percent] as observed by different SBUV instruments. The top panel shows data for the upper stratosphere (2 hPa), the middle panel shows data for the lower stratosphere (20 hPa), and the bottom panel shows total column ozone data; **Right:** Level 3 Monthly Zonal Mean Time Series of Total Column Ozone from SBUV/2 on NOAA-17 (Courtesy of McPeters et al, 2013)

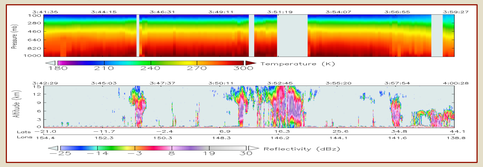
3. Water Vapor Climate Data

Project: A Multi-Sensor Water Vapor Climate Data Record Using Cloud Classification (PI: Eric Fetzer)

This project produces a long term (Jun 2006-Dec 2012), credible WVCC (Water Vapor Cloud Climatology) AIRS-CloudSat merged dataset. The basic task is bringing together retrievals of water vapor and cloud properties from multiple "A-train" instruments (AIRS & CloudSat), classify each "scene" (instrument look) using the cloud information, and develop a merged, multi-sensor climatology of atmospheric water vapor as a function of altitude, stratified by the cloud classes.



Artist's Concept of the A-Train constellation of satellites. **Credit:** NASA

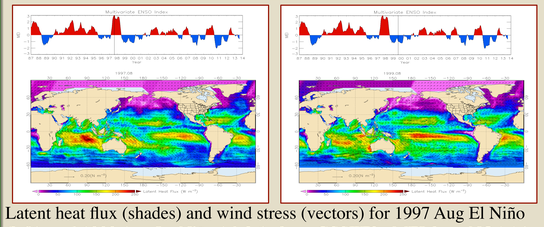


The collocated AIRS temperature profiles (**top**), and profiles of reflectivity from CloudSat's Cloud Profiling Radar (CPR) (**bottom**). The AIRS standard retrievals at AMSU footprint (~45 km) are collocated with the CPR soundings. Data are from Sep 15, 2009, when A-Train happen to fly exactly over typhoon Choi-wan.

4. Air-Sea Surface Turbulent Fluxes Data

Project: Reprocessing of Goddard Satellite-based Surface Turbulent Fluxes (GSSTF) Data Set for Global Water and Energy Cycle Research (PI: Chung-Lin Shie)

The GSSTF3 dataset: 21.5-year (1987/07-2008/12) series of global (0.25°x0.25°) daily, monthly and climatology fluxes of momentum, latent and sensible heat fluxes, along with the air specific humidity. These flux measurements are crucial to: Understanding global water and energy cycles; improving prediction of oceanic circulation and transport, owing to better estimation of global oceanic fresh water and momentum flux.



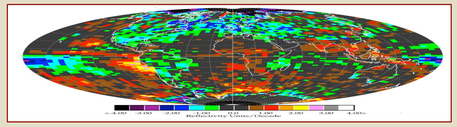
Latent heat flux (shades) and wind stress (vectors) for 1997 Aug El Niño (**left**), and 1999 Aug La Niña (**right**), from GSSTF3. MEI from NOAA/ESRL, Wolter and Timlin, 1993.

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.

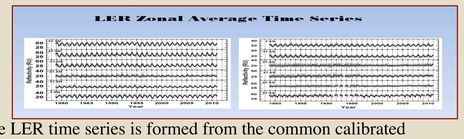
5. Earth Surface and Atmosphere Reflectivity Data

Project: Earth Surface and Atmosphere Reflectivity Since 1979 from Multiple Satellites (TOMS, SBUV, SBUV-2, OMI, SeaWiFS, NPP, and NPOESS) (PI: Jay Herman)

This project produces both the gridded mean and zonal mean data products from the Earth Surface and Atmosphere Reflectivity from Multiple Satellites (Nov 1978-Dec 2012). The scene reflectivities of the Earth at blue and ultraviolet wavelengths (320 nm to 415 nm) are low over most surfaces (except ice and snow), almost independent of the seasonal changes in vegetation on land and in the oceans. This makes it ideal for examining changes in radiation reflected back to space from changes in cloud and aerosol amounts, especially as affected by the start of climate change.



The Lambertian Equivalent Reflectivity (LER) linear trends as a function of latitude and longitude (Reflectivity Units/Decade). (Courtesy of Herman et al. 2013)

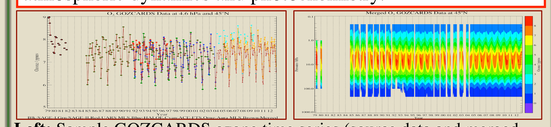


The LER time series is formed from the common calibrated overlapping N7-SBUV and SBUV-2 series of instruments. Where the LER time series overlap, the values are averaged to form a 33-year continuous data set. The light grey color corresponds to daily LER, while the black solid lines are a 30-day low-pass filter of the daily data. (Courtesy of Herman et al. 2013)

6. Ozone Chemistry and Trace Gas Data

Project: GOZCARDS: Global Ozone Chemistry and Related Trace Gas Data Records for the Stratosphere (PI: Lucien Froidevaux)

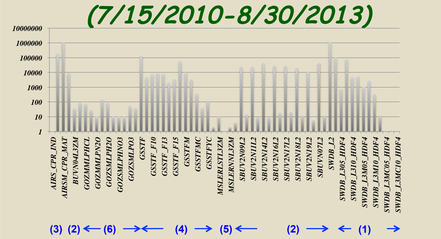
This GOZCARDS ESDR (monthly, 1979-2012, zonal average on pressure/latitude grid) consists of products generated with a focus on stratospheric ozone and related chemical species such as N_2O, HNO_3 and HCl. High-quality long-term ozone and related trace gas data records are needed to a) evaluate and understand composition changes in the atmosphere and b) constrain model representations of atmospheric dynamics and photochemistry.



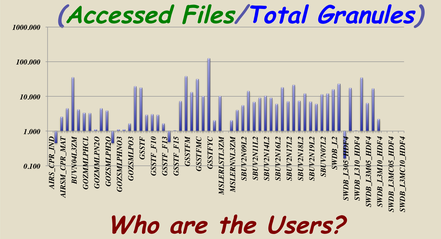
Left: Sample GOZCARDS ozone time series (source data and merged data) from 1979 through 2012 at 4.6 hPa and 45°N; SAGE-I (source) data are shown in black (under the merged brown values), and SAGE-II, HALOE, UARS MLS, ACE-FTS, and Aura MLS source data points are shown in green, blue, red, cyan, and orange, respectively. The merged (brown) dataset is a subset of the GOZCARDS ozone profile ESDR; **Right:** Sample contour plot for the GOZCARDS merged ozone field (ppmv) from the 45°N latitude bin (40°N-50°N average) as a function of pressure and time (1979-2012) (Courtesy of Froidevaux et al, 2013)

Data Usage Metrics

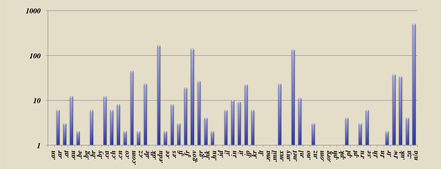
Accessed Files of the Datasets (7/15/2010-8/30/2013)



Data Use Ratio (Accessed Files/Total Granules)



Who are the Users?



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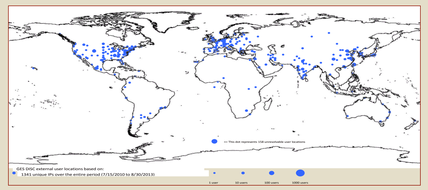

7. Consistent Earth System Data

Project: Developing Consistent Earth System Data Records for the Global Terrestrial Water Cycle (PI: Eric Wood)

This project proposed to develop consistent, long term ESDRs for the major components (storages and fluxes) of the terrestrial water cycle at 0.5 degrees (lat-long) for 1950 to near-present. The ESDRs are intended to provide a consistent basis for estimating the mean state and variability of the land surface water cycle at the spatial scale of the major global river basins. The ESDRs will include a) surface precipitation, air temperature, humidity, wind), b) surface downward radiation and c) derived and/or assimilated fluxes and storages such as surface soil moisture storage, total basin water storage, snow water equivalent, storage in large lakes, reservoirs, and wetlands, evapotranspiration, and surface runoff. No products are available for public access yet. Please check back in the near future.