https://ntrs.nasa.gov/search.jsp?R=20090027060 2019-08-30T07:35:34+00:00Z

Customer-oriented Data Formats and Services for Global Land Data Assimilation System (GLDAS) Products at the NASA GES DISC

Hongliang Fang[1,3], Hiroko K. Beaudoing[2,4], Matthew Rodell[2], Bill Teng[1,3], Bruce Vollmer[1]
[1]Goddard Earth Sciences Data and Information Services Center, Code 610.2, Goddard Space Flight Center, NASA, Greenbelt, MD 20771, United States
[2]Hydrological Sciences Branch, Code 614.3, Goddard Space Flight Center, NASA, Greenbelt, MD 20771, United States
[3]Wyle Information Systems, Inc., 1651 Old Meadow Road, McLean, VA 22102, United States
[4]Earth System Science Interdisciplinary Center, University of Maryland, College Park, MD 20742, United States

AGU 2008 Fall Meeting, San Francisco, CA, December 15-19, 2008

http://disc.gsfc.nasa.gov/hydrology/index.shtml
Email: Hongliang.Fang.1@nasa.gov

The Global Land Data Assimilation System (GLDAS) is generating a series of land surface state (e.g., soil moisture and surface temperature) and flux (e.g., evaporation and sensible heat flux) products simulated by four land surface models (CLM, Mosaic, Noah and VIC). These products are now accessible at the Hydrology Data and Information Services Center (HDISC), a component of NASA Goddard Earth Sciences Data and Information Services Center (GES DISC).

Hydrology Data and Information Services Center (HDISC)

HDISC supports data products generated by GSFC's Hydrological Sciences Branch. The first suite of products hosted is that from the Global Land Data Assimilation System (GLDAS). HDISC has the capability to support more hydrology data products and provide more advanced data access and visualization tools. The goal is to develop HDISC as a data and services portal that supports weather and climate forecast, and water and energy cycle research.

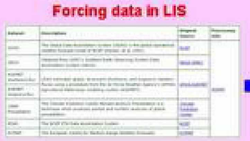
Content	Water and energy budget data, forcing data
Spatial extent	All land north of 60 degree south
Spatial resolution	1 degree and 0.25 degree
Time period	Jan 1, 1979 to present for the 1.0° data Feb 24, 2000 to present for the 0.25° data
Temporal resolution	3-hourly, daily, and monthly
Forcing	Multiple data sets derived from satellite measurements and atmospheric analyses
Land surface models	CLM, Mosaic, Noah, VIC
Output format	GRIdded Binary (GRIB)
Elevation definition	GTOPO 30
Vegetation definition	University of Maryland, 1 km

http://disc.gsfc.nasa.gov/hydrology/index.shtml

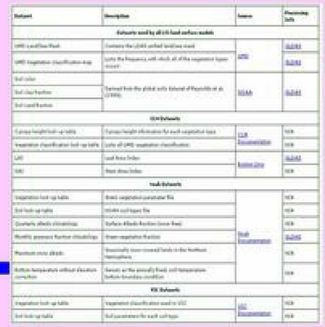
Global Land Data Assimilation System (GLDAS)

GLDAS drives multiple, offline (not coupled to the atmosphere) land surface models, integrates a huge quantity of observation based data, and executes globally at high resolutions (2.5° to 1 km), enabled by the Land Information System (LIS), in order to generate optimal fields of land surface states (e.g., soil moisture and surface temperature) and flux (e.g., evaporation and sensible heat flux).

Forcing data in LIS



Parameter data in LIS



Geophysical parameters

FDS IDs	Full Name	Unit
001	Surface pressure	Pa
011	Near surface air temperature	K
032	Near surface wind magnitude	m/s
051	Near surface specific humidity	kg/kg
057	Total evapotranspiration	kg/m^2/s
065	Snow water equivalent	kg/m^2
071	Total canopy water storage	kg/m^2
085	Average layer soil temperature	K
086	Average layer soil moisture	kg/m^2
099	Snowmelt	kg/m^2/s
111	Net shortwave radiation	W/m^2
112	Net longwave radiation	W/m^2
121	Latent heat flux	W/m^2
122	Sensible heat flux	W/m^2
131	Snowfall rate	kg/m^2/s
132	Rainfall rate	kg/m^2/s
138	Average surface temperature	K
155	Ground heat flux	W/m^2
204	Surface incident shortwave radiation	W/m^2
205	Surface incident longwave radiation	W/m^2
234	Subsurface runoff	kg/m^2/s
235	Surface runoff	kg/m^2/s

Access HDISC Data

- Anonymous http and ftp data downloading
- Mirador - a Google-like search and order tool that provides discovery of, and access to, data based on keywords

HDISC data holdings

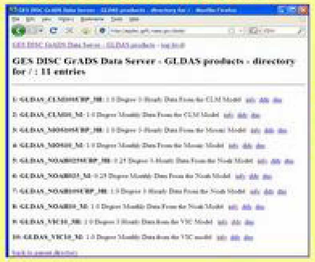
Mirador search interface

Mirador search example

GrADS Data Server (GDS)

GDS (formerly known as GrADS-DODS Server) is a stable, secure data server that provides subsetting and analysis services across the internet. The core of the GDS is OPeNDAP. The GDS supports any operation that can be expressed in a single GrADS expression.

GES DISC GDS for GLDAS products



Perform global averaging analysis for soil moisture content

```
sdfopen
http://agdisc.gsfc.nasa.gov/dods/_expr_(GLDAS_
MOS10SUBP_3H)(aave(soilm3.1,lon=
180,lon=180,lat=-60,lat=90))(0:360,-
60:90,1:1,00z22jan1980:21z22jan1980)
Result value = 443.626 mm
```

Compare the difference of ET from two LSMs: Mosaic and CLM

```
'sdfopen
http://agdisc.gsfc.nasa.gov/dods/_expr_(GLDAS_C
LM10SUBP_3H,GLDAS_MOS10SUBP_3H)(aave(evapsfc.1=
evapsfc.2,time=00z1jan1980,time=21z1jan1980))(0
:360,-60:90,1:1,00z22jan1980:21z22jan1980)'
'set gxout grfill'
'set grads off'
'd result'
```

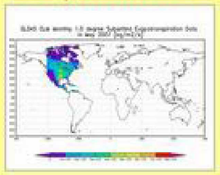
On-The-Fly Spatial and Parameter Subset

A. User selects data sets of interest

C. Download subsetted files on-the-fly

B. User selects OTF subset options: spatial and/or parameter

D. Sample subsetted data



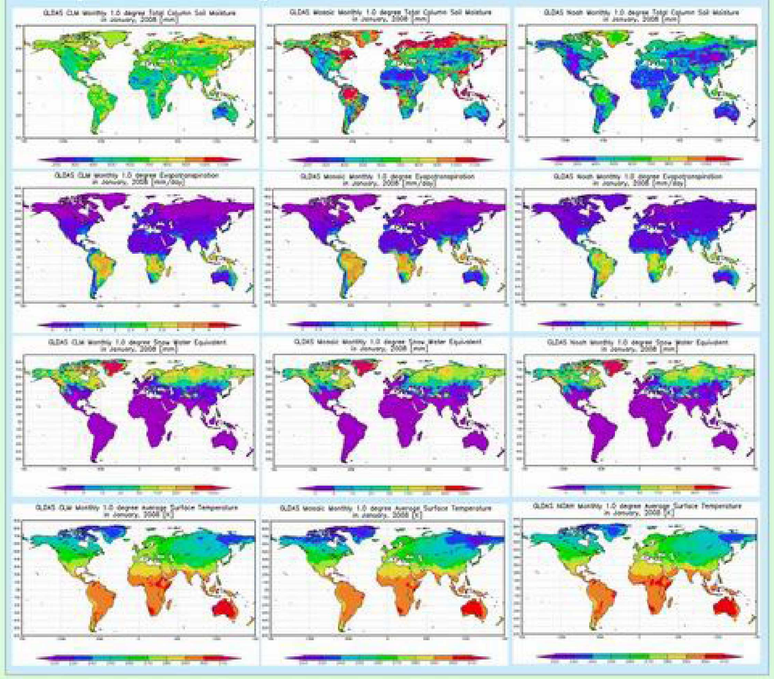
On-The-Fly Conversion to NetCDF

GLDAS products will be available in the netCDF format.

A. Convert –to-netCDF service soon to be available for selected data sets

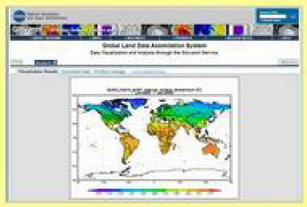
B. Run conversion and download netCDF files

Sample GLDAS Output



Online Visualization and Analysis

Giovanni, - a simple and intuitive way to visualize, analyze, and access Earth science remote sensing data online (http://disc.sci.gsfc.nasa.gov/techlab/giovanni)



Further Development

- Provide daily GLDAS products through time-averaging of the current 3-hourly dataset.
- Support products from the North American Land Data Assimilation System (NLDAS).
- Make GLDAS and NLDAS products available on Google Earth.

Reference

Rodell, M., P. R. Houser, U. Jambor, J. Gottschalck, K. Mitchell, C.-J. Meng, K. Arsenault, B. Cosgrove, J. Radakovich, M. Bosilovich, J. K. Entin, J. P. Walker, D. Lohmann, and D. Toll, 2004. The Global Land Data Assimilation System. *Bull. Amer. Meteor. Soc.*, 85(3): 381-394.