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65 Years of Reprocessed GLDAS Version 2.0 Data and Their Exploration Using the NASA GES DISC Giovanni

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

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GLDAS-2.0 data have been reprocessed with updated Princeton meteorological forcing data within the Land Information System (LIS) Version 7, and temporal coverage have been extended to 1948 ~ 2012.

Reprocessed GLDAS-2.0 Data

- Global Land Data Assimilation System Version 2 (GLDAS-2) has two components:
  GLDAS-2.0: entirely forced with the Princeton meteorological forcing data
  GLDAS-2.1: forced with atmospheric analysis and observation-based data after 2001
- In order to create more climatologically consistent data sets, NASA GSFC's Hydrological Sciences Laboratory (HSL) has recently reprocessed the GLDAS-2.0, by using updated Princeton meteorological forcing data within the LIS Version 7.
- GLDAS-2.0 data and data services are provided at NASA GES DISC Hydrology Data and Information Services Center (HDISC), in collaboration with HSL.

Basic Characteristics of Reprocessed GLDAS-2.0

Latitude extent	-60° to 90°
Longitude extent	-180° to 180°
Spatial resolution	1.0° x 1.0° and 0.25° x 0.25°
Temporal resolution	3-hourly and monthly
Temporal coverage	January 1, 1948 – December 31, 2012
Dimension	150 (lat) x 360 (lon) for the 1.0° data
	600 (lat) x 1440 (lon) for the 0.25° data
Origin (1st grid center)	(-59.5S, -179.5) for the 1.0° data
	(-59.875, -179.875) for the 0.25° data
Land surface model (LSM)	Noah 3.3
Format	NetCDF

What's New about GLDAS-2.0

- **Updated Princeton forcing data**
- **Upgraded Land Information System**
  - LSM Noah 3.3
  - MODIS-based land surface parameters
- **Archived in NetCDF**
  - Self-describing and CF compliant
  - Works with commonly used tools
- **Additional model output fields**
  - See the variable list table (Orange highlighted are new to GLDAS-2.0)
- **Extended to 1948 ~ 2012**
  - 1948 ~ 2010 data are available now
  - 2011 ~ 2012 are being checked for data integrity and will be available early 2016.

Access to GLDAS-2.0 Data

- **Mirador** search and download
- **OPeNDAP**
  - Parameter and spatial subsetting
  - Output Types: NetCDF and ASCII
- **HTTP downloading**
  - Quick access and batch processing
  - Navigation based on date
- **Giovanni**
  - Online visualization and analysis
  - Output Types: HDF, NetCDF, csv, and Image (GeoTIFF/PNG/KMZ)

Variables for Reprocessed GLDAS-2.0

Variable short name	Description	Unit
Swnet_tavg	Net short wave radiation flux	W m-2
Lwnet_tavg	Net long-wave radiation flux	W m-2
Qle_tavg	Latent heat net flux	W m-2
Qh_tavg	Sensible heat net flux	W m-2
Qg_tavg	Heat flux	W m-2
Snowf_tavg	Snow precipitation rate	kg m-2 s-1
Rainf_tavg	Rain precipitation rate	kg m-2 s-1
Evap_tavg	Evapotranspiration	kg m-2 s-1
Qs_acc	Storm surface runoff	kg m-2
Qsb_acc	Baseflow-groundwater runoff	kg m-2
Qsm_acc	Snow melt	kg m-2
AvgSurfT_inst	Average surface skin temperature	K
Albedo_inst	Albedo	%
SWE_inst	Snow depth water equivalent	kg m-2
SnowDepth_inst	Snow depth	m
SoilMoi0_10cm_inst	Soil moisture	kg m-2
SoilMoi10_40cm_inst	Soil moisture	kg m-2
SoilMoi40_100cm_inst	Soil moisture	kg m-2
SoilMoi100_200cm_inst	Soil moisture	kg m-2
SoilTMP0_10cm_inst	Soil temperature	K
SoilTMP10_40cm_inst	Soil temperature	K
SoilTMP40_100cm_inst	Soil temperature	K
SoilTMP100_200cm_inst	Soil temperature	K
PotEvap_tavg	Potential evaporation rate	W m-2
ECanop_tavg	Canopy water evaporation	W m-2
Tveg_tavg	Transpiration	W m-2
ESoil_tavg	Direct evaporation from bare Soil	W m-2
RootMoist_inst	Root zone soil moisture	kg m-2
CanopInt_inst	Plant canopy surface water	kg m-2
Wind_f_inst	Wind speed	m s-1
Rainf_f_tavg	Total precipitation rate	kg m-2 s-1
Tair_f_inst	Temperature	K
Qair_f_inst	Specific humidity	kg/kg
Psurf_f_inst	Pressure	Pa
SWdown_f_tavg	Downward short-wave radiation flux	W m-2
LWdown_f_tavg	Downward long-wave radiation flux	W m-2

"_tavg": past 3-hr averaged
"_acc" : past 3-hr accumulated
"_inst" : instantaneous
Orange color highlighted are new variables.

Questions?

Please email gsfc-help-disc @lists.nasa.gov.

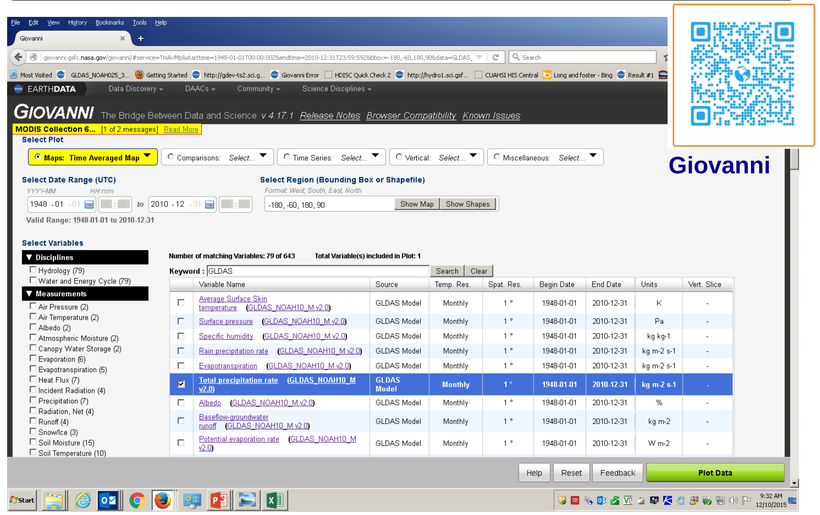
GES DISC Hydrology Data Holdings

HSL LDAS Project Site

Giovanni Visualization and Analysis System

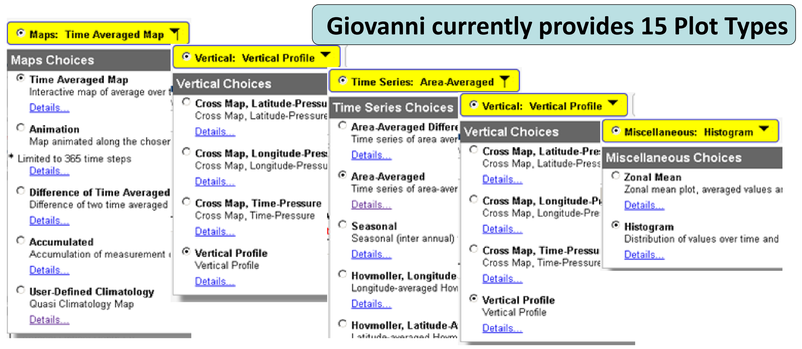
Giovanni is a Web application developed by the GES DISC to provide a simple, intuitive way to visualize, analyze, and access vast amounts of Earth science remote sensing data, particularly from remote sensing and model, without having to download the data.

Reprocessed GLDAS-2.0 Variables in Giovanni
http://giovanni.gsfc.nasa.gov/giovanni/#dataKeyword=GLDAS



Giovanni

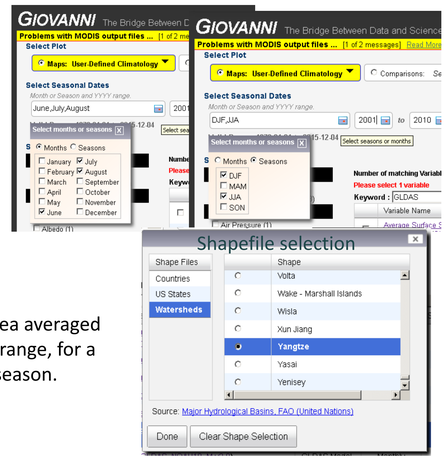
Giovanni currently provides 15 Plot Types



User Defined Climatology

For "Months" option, users can further specify a month or multiple months and a year range, and get Lat-Lon Maps of user-defined monthly climatology.

For "Seasons" option, users can further specify a season or multiple seasons and a year range, and get Lat-Lon Maps of user-defined seasonal climatology.



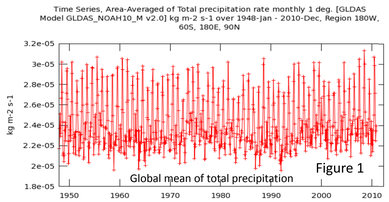
Seasonal Time Series

The Seasonal Time Series computes an area averaged time series, over the user's selected year range, for a given month or 3-month meteorological season.

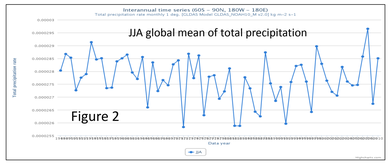
Region Selection

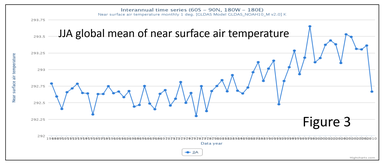
Bounding Box or Shapefile

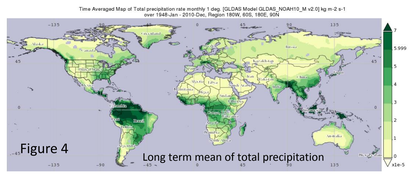
GLDAS-2.0 Climatology Explored by Giovanni

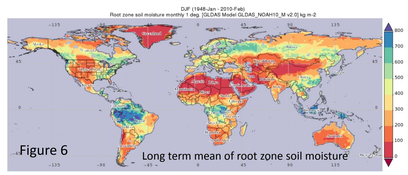


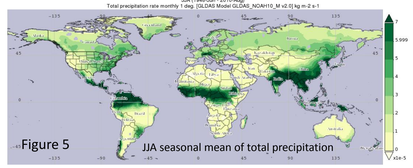
- Most of the reprocessed GLDAS-2.0 monthly variables are incorporated into Giovanni.
- GLDAS-2.0 data can be visualized and analyzed via Giovanni.
- GLDAS major climatology characteristics can be explored with Giovanni.
- GLDAS-2.0 data can be inter-compared with other data sets such as GPM/TRMM, AIRS, and MERRA, etc.

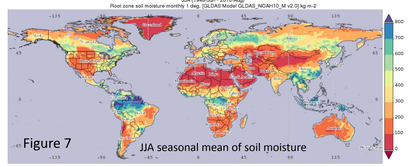


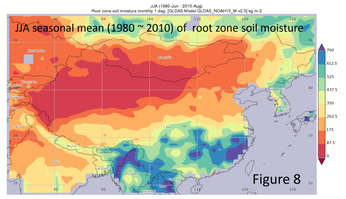


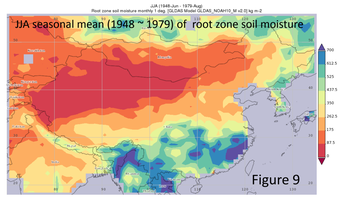


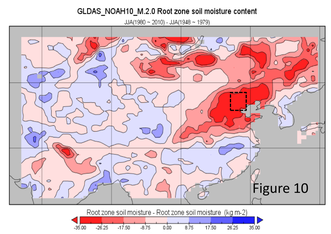




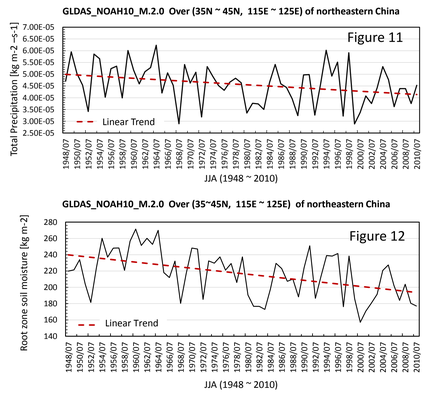








- Users can download the Giovanni output files in NetCDF for further analyses and visualizations.
- Fig. 10 shows the loss of soil moisture content over northeastern China.
- Figures 11 & 12 show the time series of GLDAS-2.0 Total Precipitation and Root Zone Soil Moisture for summer (JJA) and their downtrend.
- All figures are generated via Giovanni, except Fig 10 is generated by Panoply and Fig. 11&12 are generated by Excel, based on the data downloaded from Giovanni.



GLDAS-2.1 data will be generated from 2001 to near-present (1.5 month latency), replacing GLDAS-1.