

WECHO: A Water and Energy Cycle EOS Clearing House Client

*NASA-ROSES 2006 A.19: Advancing Collaborative
Connections for Earth System Science*

P. Houser and C. Larko

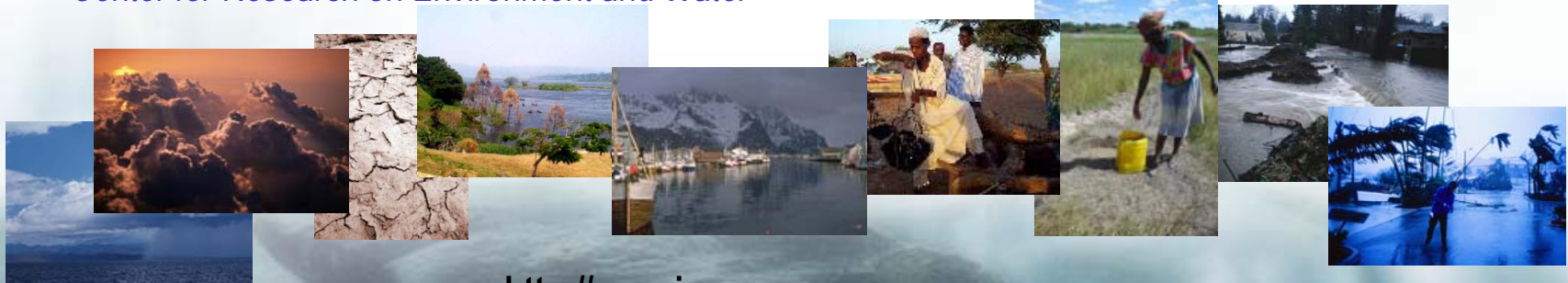
Center for Research on Environment and Water



CREW
Center for Research on
Environment and Water



Water Cycle Research Making a Difference



<http://crew.iges.org>

Paul R. Houser, 6 February 2008, Page 1

The Water and Energy Cycle

Water in the climate system functions on all time scales: From hours to centuries

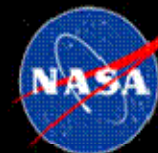


The Energy and Water Cycles are tightly intertwined – Solar radiation drives and feedbacks with the water cycle, and energy is transferred through water movement and phase change.

Importance of global water and energy cycling

1. Water exists in *all three phases* in the climate system and the *phase transitions* are a *significant factor in the regulation of the global and regional energy balances*
2. Water vapor in the atmosphere is the *principal greenhouse gas* and clouds at various levels and composition in the atmosphere represent both positive and negative feedback in climate system response
3. Water is the *ultimate solvent* and global biogeochemical and element cycles are mediated by the dynamics of the water cycle
4. Water is the element of the Earth system that most *directly impacts and constraint human society and its well-being.*

Earth System Science



Sun- Earth
Connection

Climate Variability
and Change

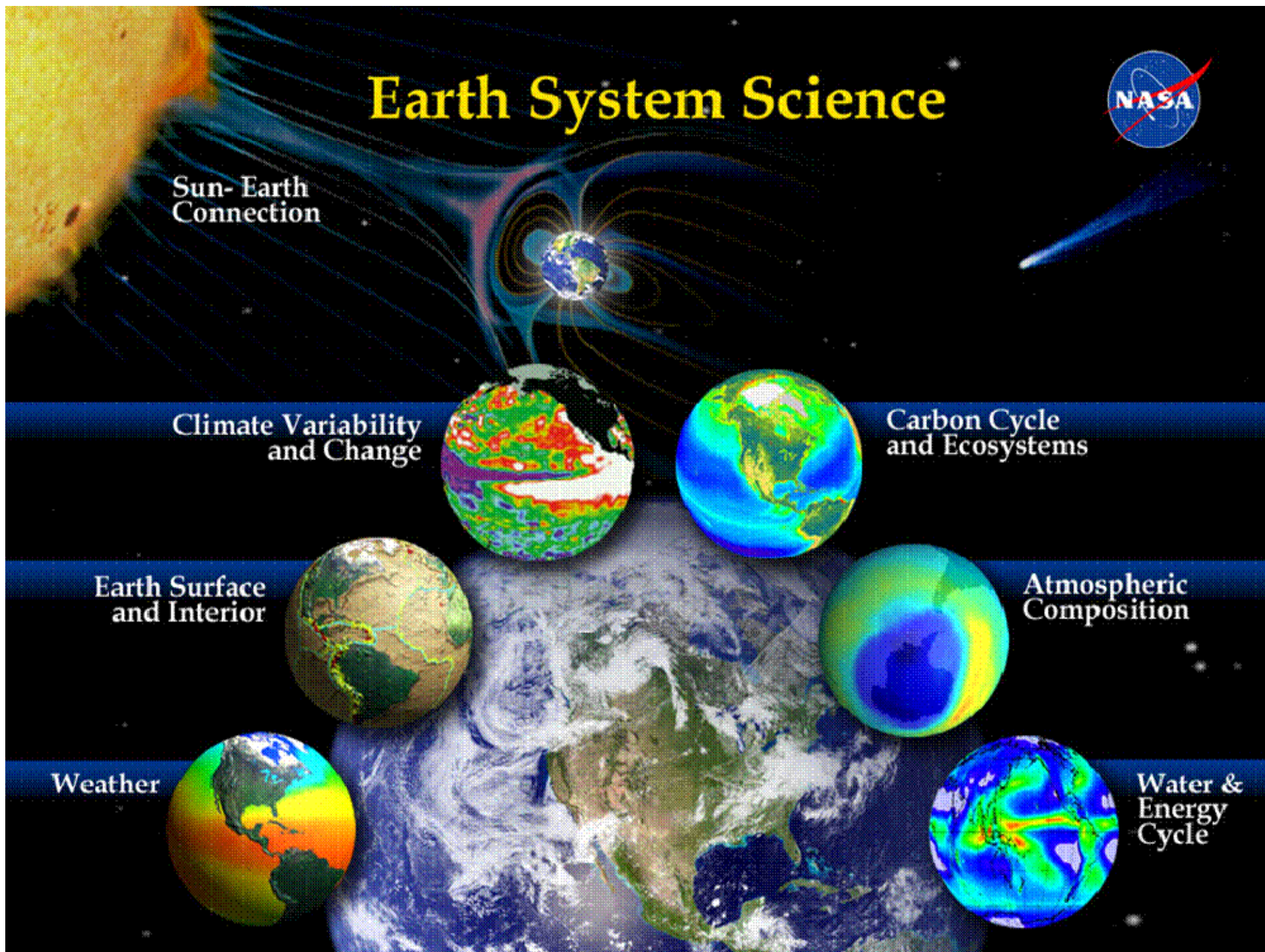
Carbon Cycle
and Ecosystems

Earth Surface
and Interior

Atmospheric
Composition

Weather

Water &
Energy
Cycle



Why study the water and energy cycle?...

Variations in greenhouse gases, aerosols, and solar activity force changes in climate...

...but, *consequences of climate change are realized through the water cycle.*

Thus, we must characterize, understand, and predict variations in the global water cycle.

Water and Energy is linked to all 12 Science Application Themes.



Carbon Management



Public Health



Energy Forecasting



Aviation Safety



Water Management



Homeland Security



Invasive Species



Coastal Management



Disaster Preparedness

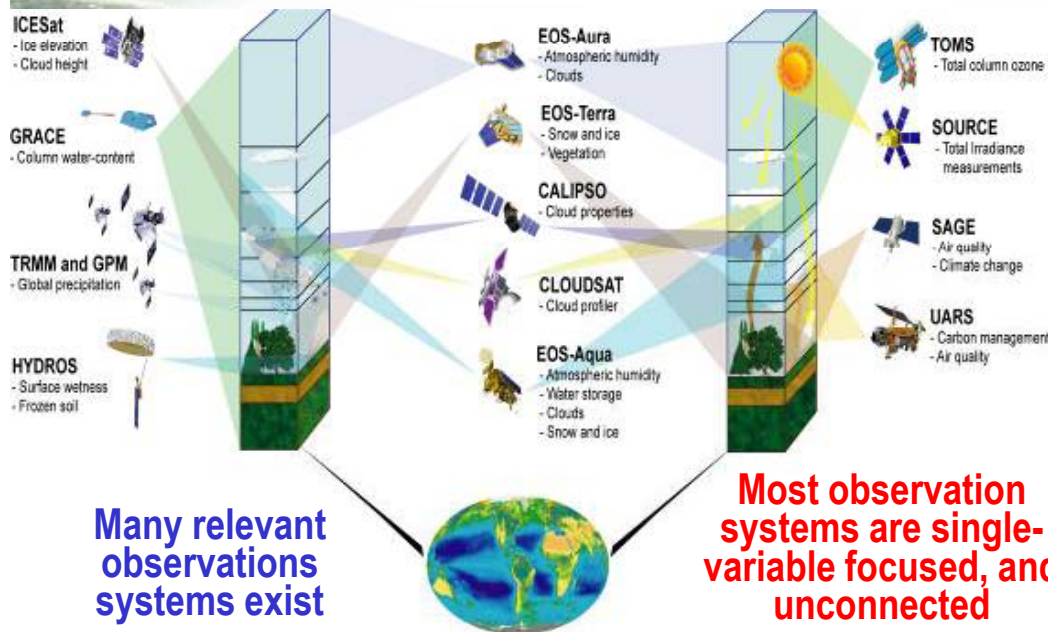
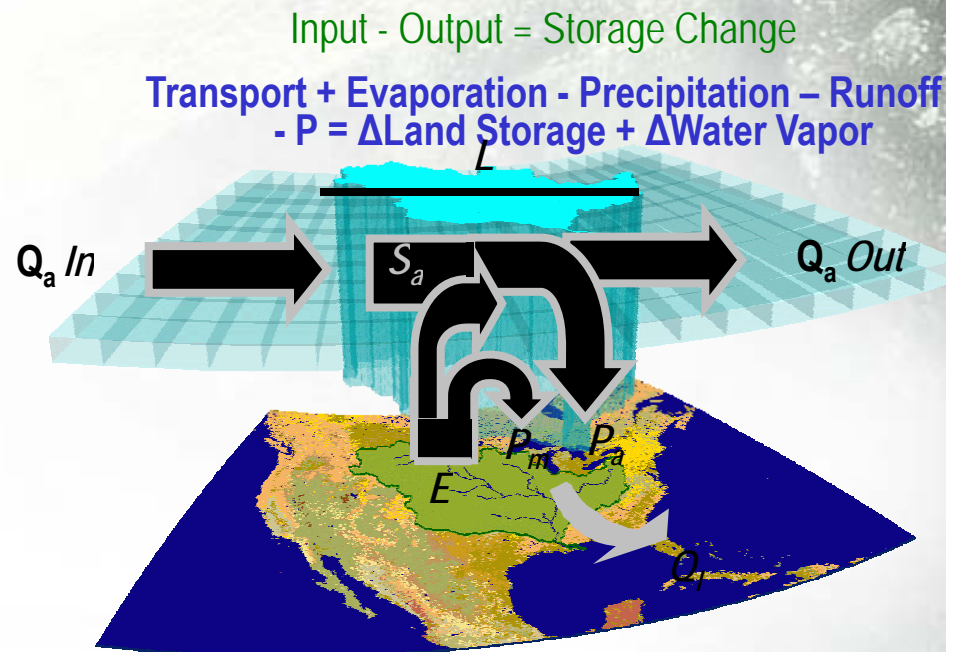
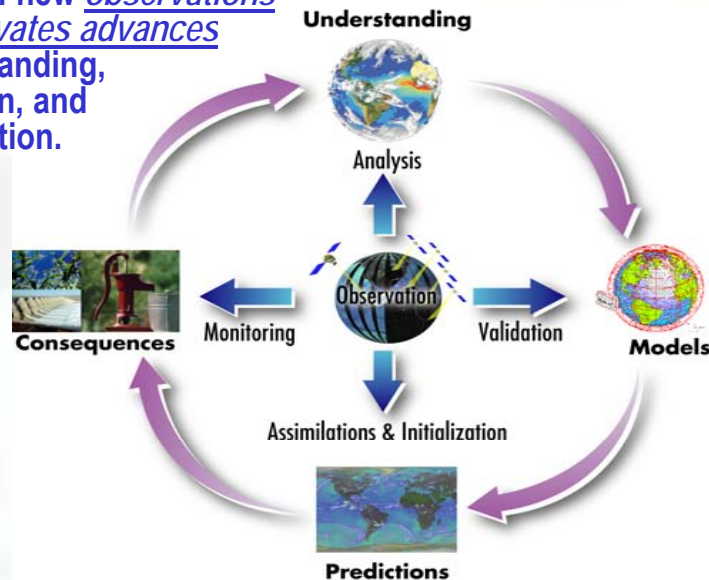
Agricultural Competitiveness

Ecological Forecasting

Air Quality

NASA WEC Observation Capabilities

The availability of new observations strongly motivates advances in understanding, prediction, and application.

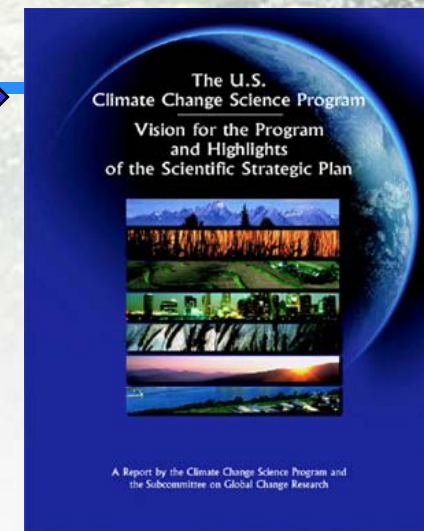
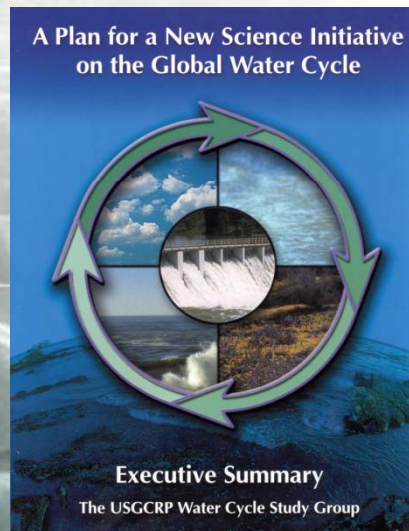


We must define and develop an integrated user-focused water observation system that can not only detect **climate trends** but also **local variation of extremes**

We must preserve critical in-situ benchmark observations that enable us to detect trends & extremes.

Variable ↓ Sphere →	Ocean	Land	Atmosphere
Internal or State Variable	sea level/surface topography (I/S) surface salinity (I/S) subsurface salinity structure (I) upper ocean currents (I/S) mid- and deep-ocean currents (I) sea ice (I/S) wave characteristics (I/S) sea surface temperature (I/S) subsurface thermal structure (I)	topography/elevation (I/S) land cover characteristics (I/S) permafrost (I) water runoff (I/S) snow/ice cover (I/S) glacier ice (I/S) subsurface moisture (I/S) surface temperature (I/S) subsurface temperature (I/S)	Wind profile (I/S) pressure profile (I) water vapor profile (I/S) precipitation (I/S) clouds (I/S) liquid water content (I/S) air temperature profile (I/S)
Forcing or Feedback Variable	ocean surface wind & stress (I/S) surface air humidity (I/S) precipitation (I/S) fresh water flux (I/S) sublimation & evaporation (I/S) geothermal heat flux (I) incoming SW radiation (I/S) incoming LW radiation (I/S) surface air temperature (I/S)	albedo (I/S) land use (I/S) surface winds (I) surface humidity (I/S) precipitation (I/S) sublimation & evapotranspiration (I/S) incoming SW radiation (I/S) incoming LW radiation (I/S) sensible heat flux (I/S)	surface topography (I/S) land surface vegetation (I/S) snow/ice cover (I/S) surface soil moisture (I/S) evapotranspiration (I/S) sea surface temperature (I/S) surface soil temperature (I/S) surface radiation budget (I/S) solar irradiance (S)

LUE=Water Cycle Variable; RED=Energy Cycle Variable; BLACK=Boundary condition



What are the causes of water cycle variations?

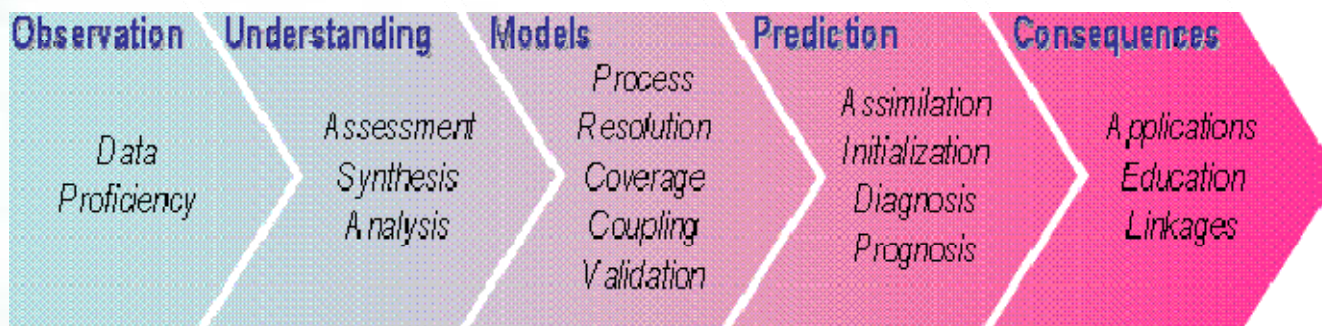
Are variations in the global and regional water cycle predictable?

How are water and nutrient cycles linked?

NEWS Integrated Water and Energy Cycle Research Challenge:

Document and enable improved, observationally-based, predictions of water and energy cycle consequences of Earth system variability and change.

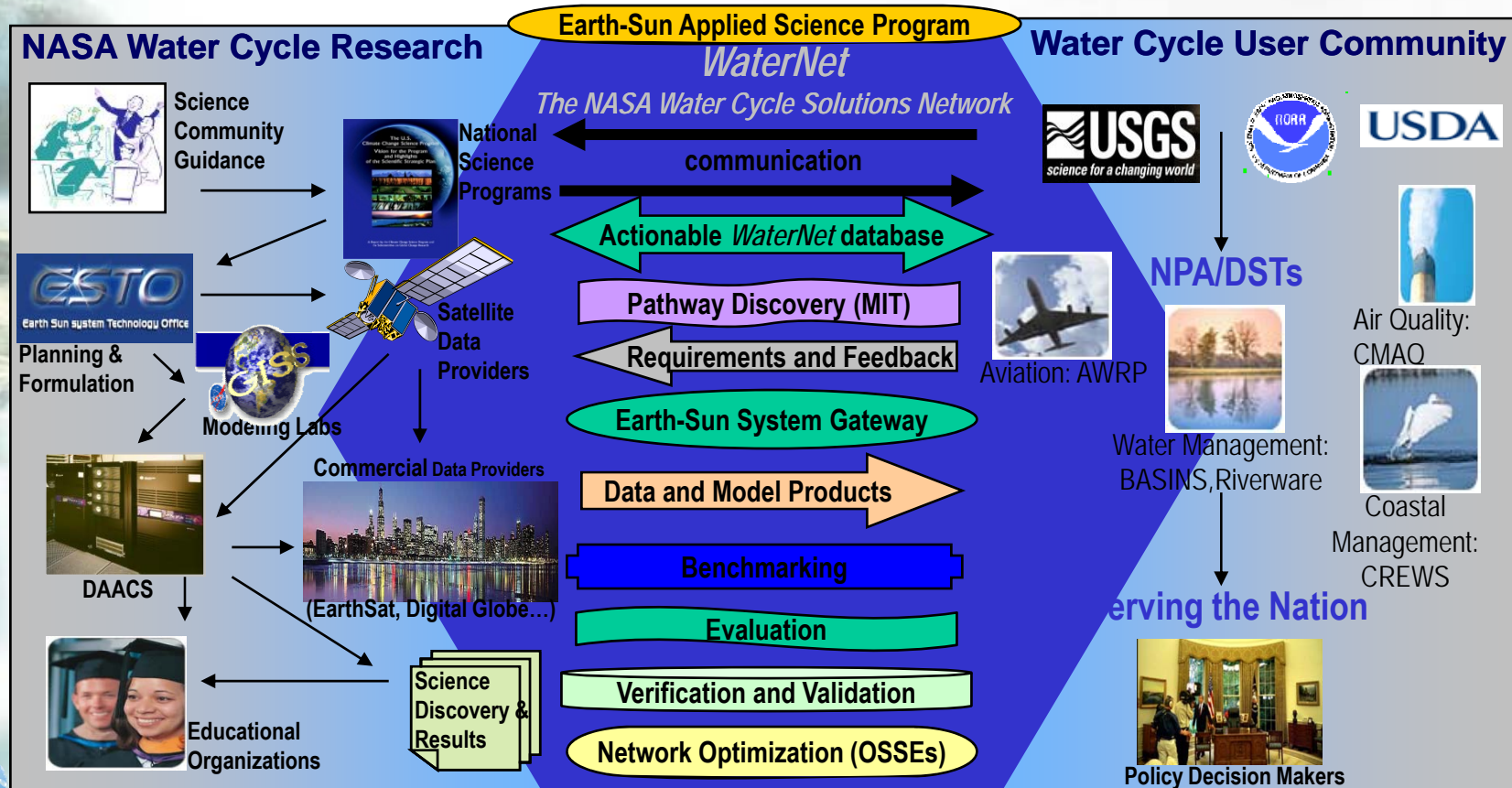
The NEWS challenge is **global** in scale and requires the integration of NASA **system components** to **make decisive progress toward the NEWS challenge** in an **end-to-end program**



WaterNet: Concept

Improve and optimize the sustained ability of water cycle researchers, stakeholders, organizations and networks to interact, identify, harness, and extend NASA research results to augment decision support tools.

1. *Evolve a network of partners:* identify and analyze partner organizations to define collaboration pathways.
2. *Routinely identify, prioritize, mine and communicate relevant research products and results.*
3. *Optimize water cycle partner access* to research results and products to create a self-sustaining network.
4. *Analyze and document* the network effectiveness through metrics, resource estimates and documentation.
5. *Education and outreach* is important to help society understand and use the research in every-day application.



CREW/NEWS Data Resources

CREW Data Services:

OpenDAP/GDS Server: <http://crew.iges.org:9090>

FTP Server: <ftp://crew.iges.org>

Real-Time WaterCycle Data Viewer:<http://crew.iges.org/climatedata>

Future services: interactive WECHO viewer, WMS, etc.

Data being served: ~18tb → ~50tb soon → 200tb future

1AFWA_3hr_0.5, AGRMET, CLIMATE.DATA, CMAP, CMORPH, CPC4kmIR, CloudSat, EDAS3, ETA3, ETA6, GDAS, GEOS5, GLDAS, GPCP.v2, GPI, GSSTF2, HDISC, HOAPS2, HYDROS, ISCCP_D2, LIS.GSFC, LIS4.0.2, MODIS_1km, MODIS_NPP, MODIS_SNOW, NAM, NCEPprecip, NCEPstageIIgag, NCEPstageIV, NDAS, NEWS, NLDAS, NLDAS.tempest, NRL, NVAP, PERSIANN, PINKER.PAR, PINKER.STP, PINKER.SW, PINKER.reprocess, PugetSound, RUC, Saprecip, SCRIPTS, SFCMAP, SGP_ARM, TRMM, Usprecip,, Idas_precip_valid, mid_atlantic

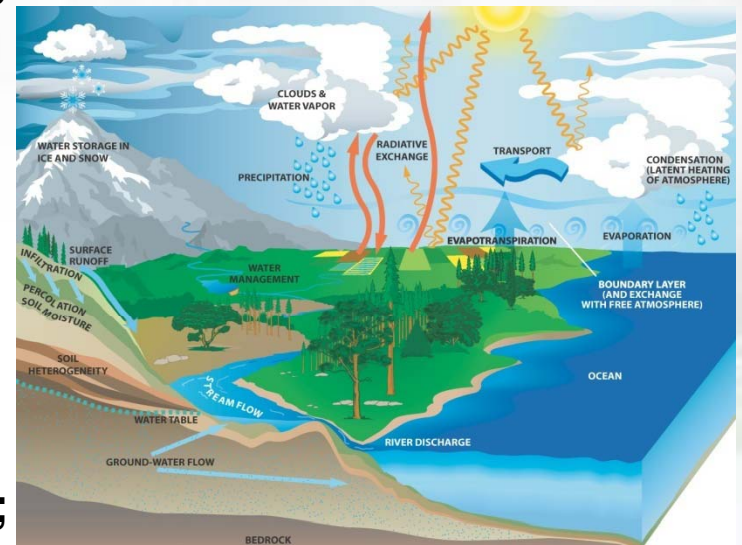
COLA Data Services: *weather/climate focus*

Project Motivation and Goal

Project Goal: develop a new Water and Energy Cycle (WEC) EOS Clearing House (ECHO) client (WECHO) that will use ECHO middleware technology to provide access to and discovery of data resources related to the NASA Global Water and Energy Cycle Focus Area (WECFA).

Objectives:

- provide a web portal customized to the needs of NASA's WECFA user community.
- maximize NASA investments by facilitating the integration of WECFA research results;
- optimize the use of research satellites and revolutions in modeling capability;
- provide physical linkages to NASA data (WEC balances)
- allow users to integrate disparate WEC information;
- promote an improved understanding of WEC processes;
- allow evaluation of WEC predictions;
- facilitate portal usability by researchers, stakeholders, educators and the general public.



WECHO Flow Chart

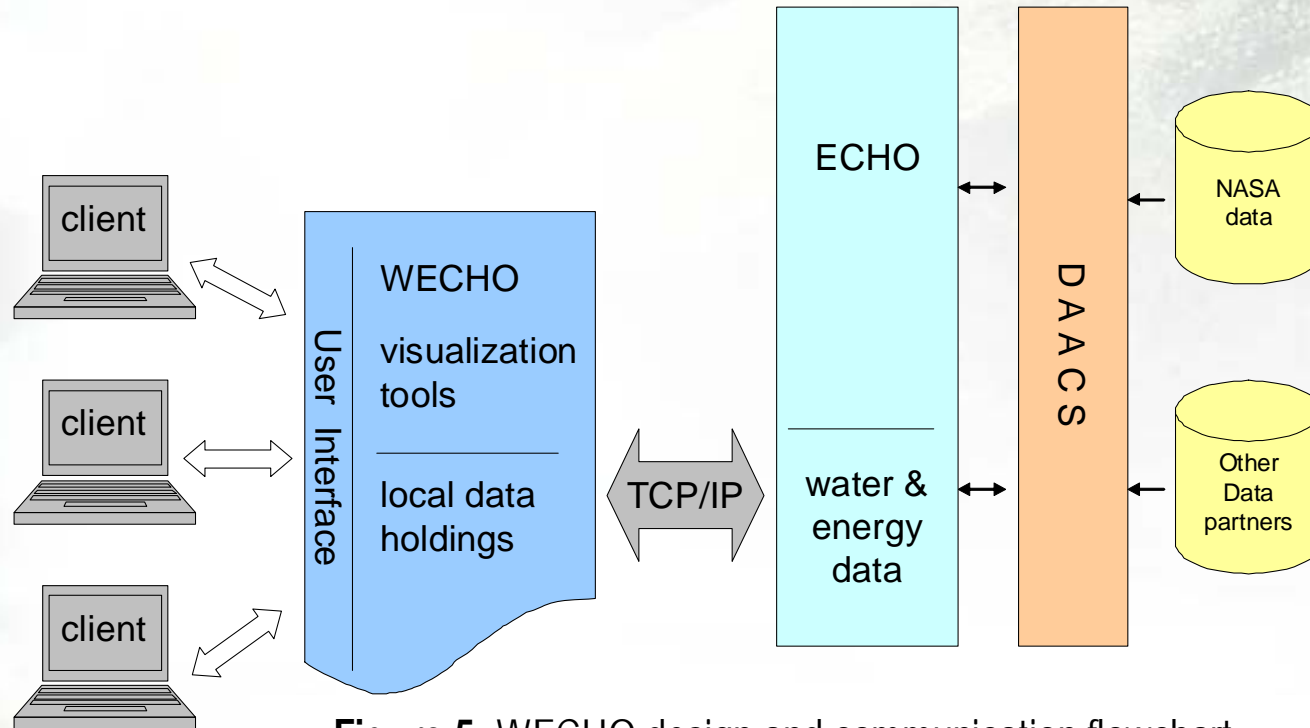


Figure 5: WECHO design and communication flowchart.

Work Plan Steps

- Establish the WECHO portal design and functionality.
- Implement the portal design, including the required software engineering and visualization extensions.
- Enable some education and outreach components in WECHO, making it useful to a broader audience.
- Document and disseminate the WECHO for easy user access and future adaptation.

WECHO Data Browsing

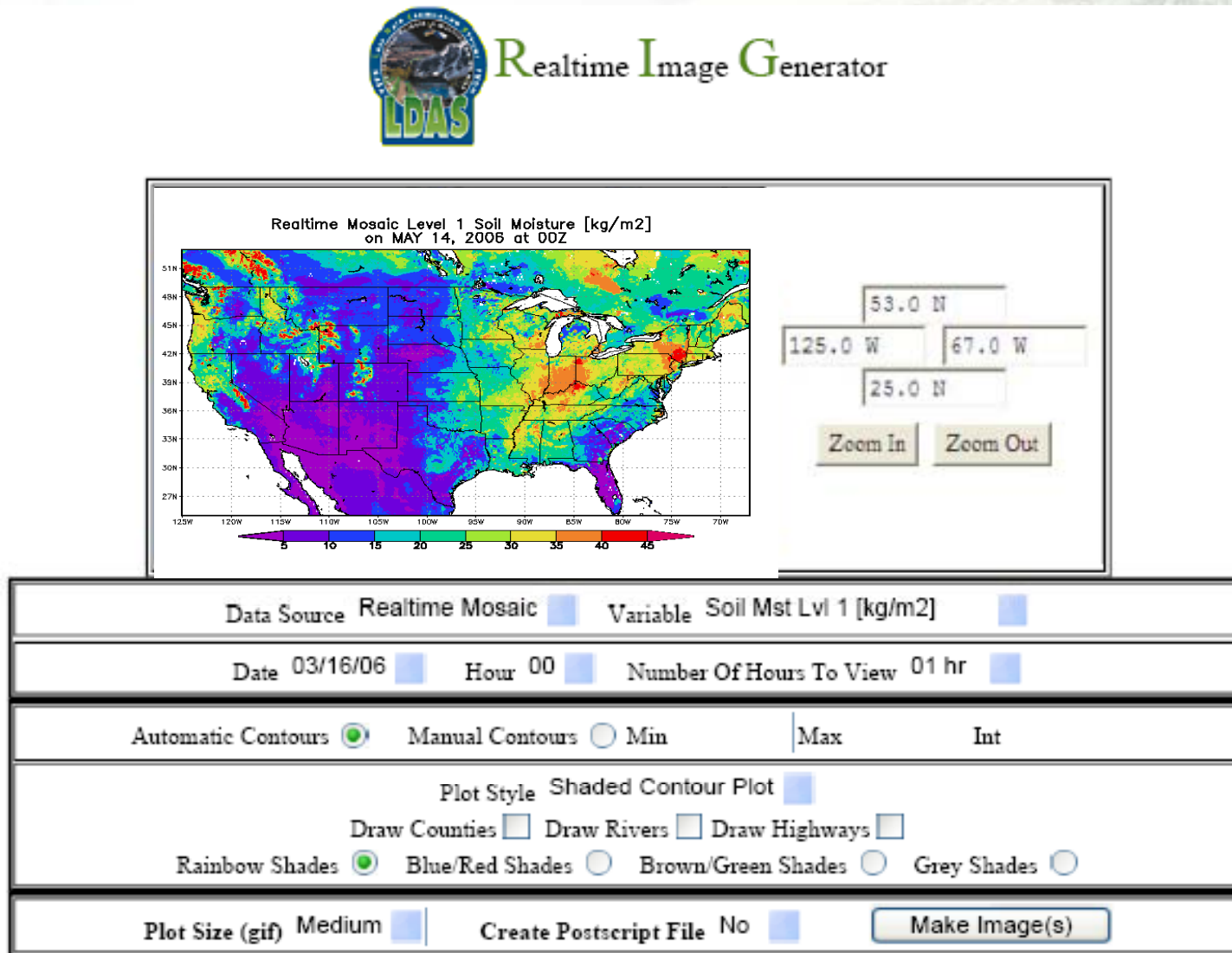


Figure 6: Example of the NLDAS Real-Time Image Generator.

WECHO Work Plan

July 1, 2007 ↓

Now ↓

WECHO: Water & Energy Cycle EOS Clearing House					1 year: January - December 2007											
Task					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Portal design formulation																
-design backend software interface																
-design user interface and functionality																
Portal implementation																
- backend software implementation																
- user interface implementation																
Portal extensions																
- develop water and energy cycle data alias and lookup functions																
- develop a local ECHO metadata cache & WEC data holdings																
- develop a visualization capability																
Portal documentation & dissemination																
- develop on-line user guide																
- develop links to/from other web water & energy cycle resources																
- web registration & negotiation links																
- interact with users to optimize WECHO functionality																
Education and outreach																
- Links to GMU students																
- Worked examples and scenarios																
Portal sustainability																
- maintenance plan																
- extension plan																
Note that degree of shading indicates effort level, with darker shading indicating more intensive effort.																

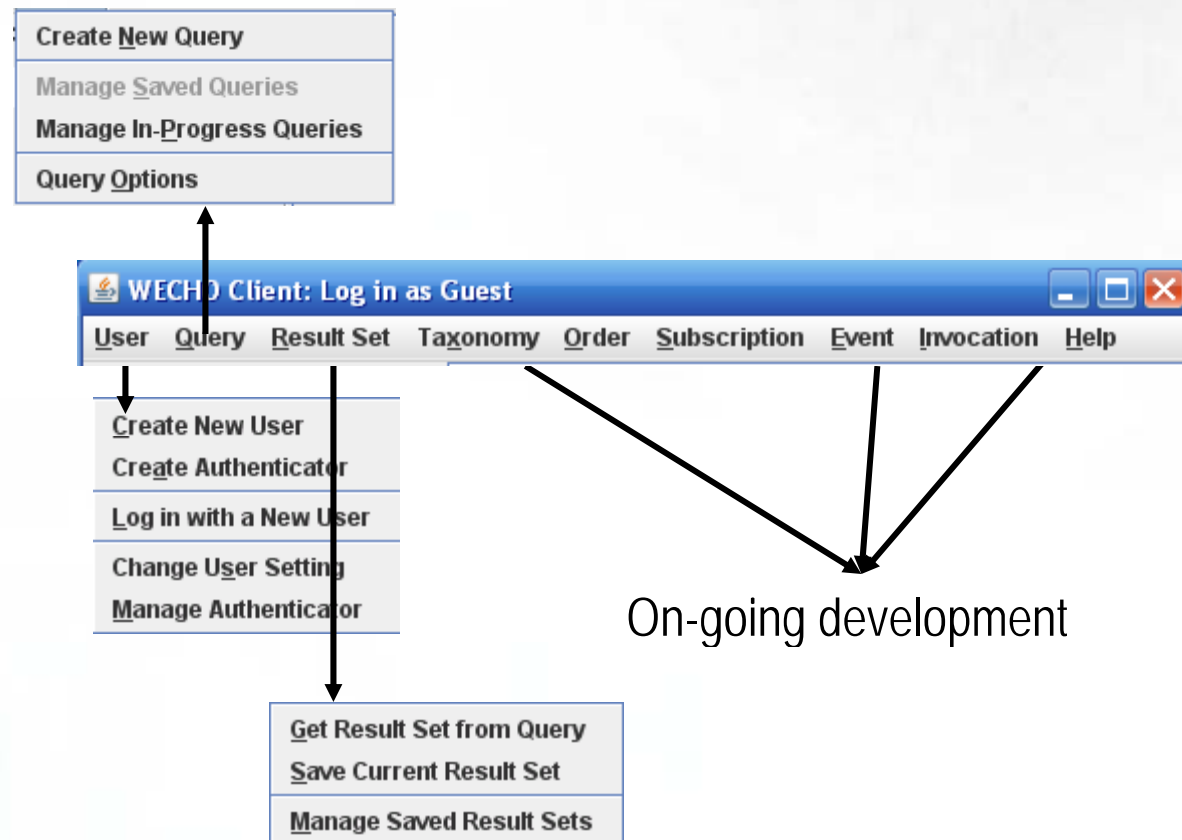
Note that degree of shading indicates effort level, with darker shading indicating more intensive effort.

Approach

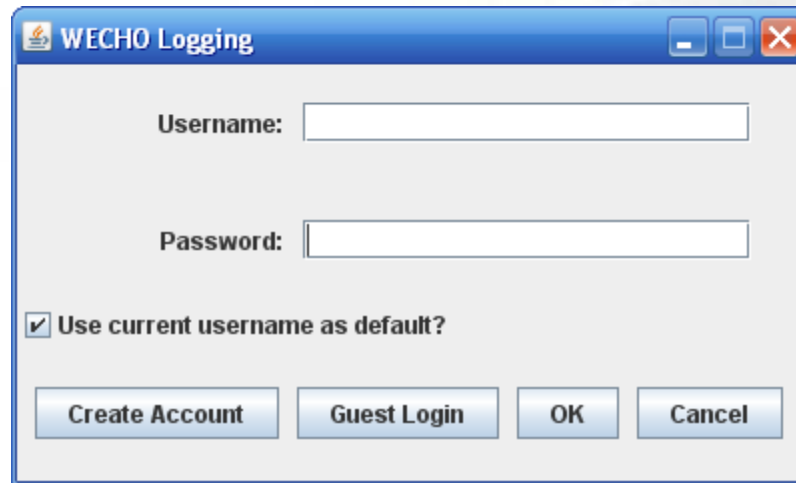
- Analyze the ECHO services
- Standalone Client
- Water ontology supported by ECHO
- Integrate with semantic search
- Integrate with web services
- Support Water Portal

Services Analyzed and Desktop Client Design

- All services will be available on the WECHO client as follows:



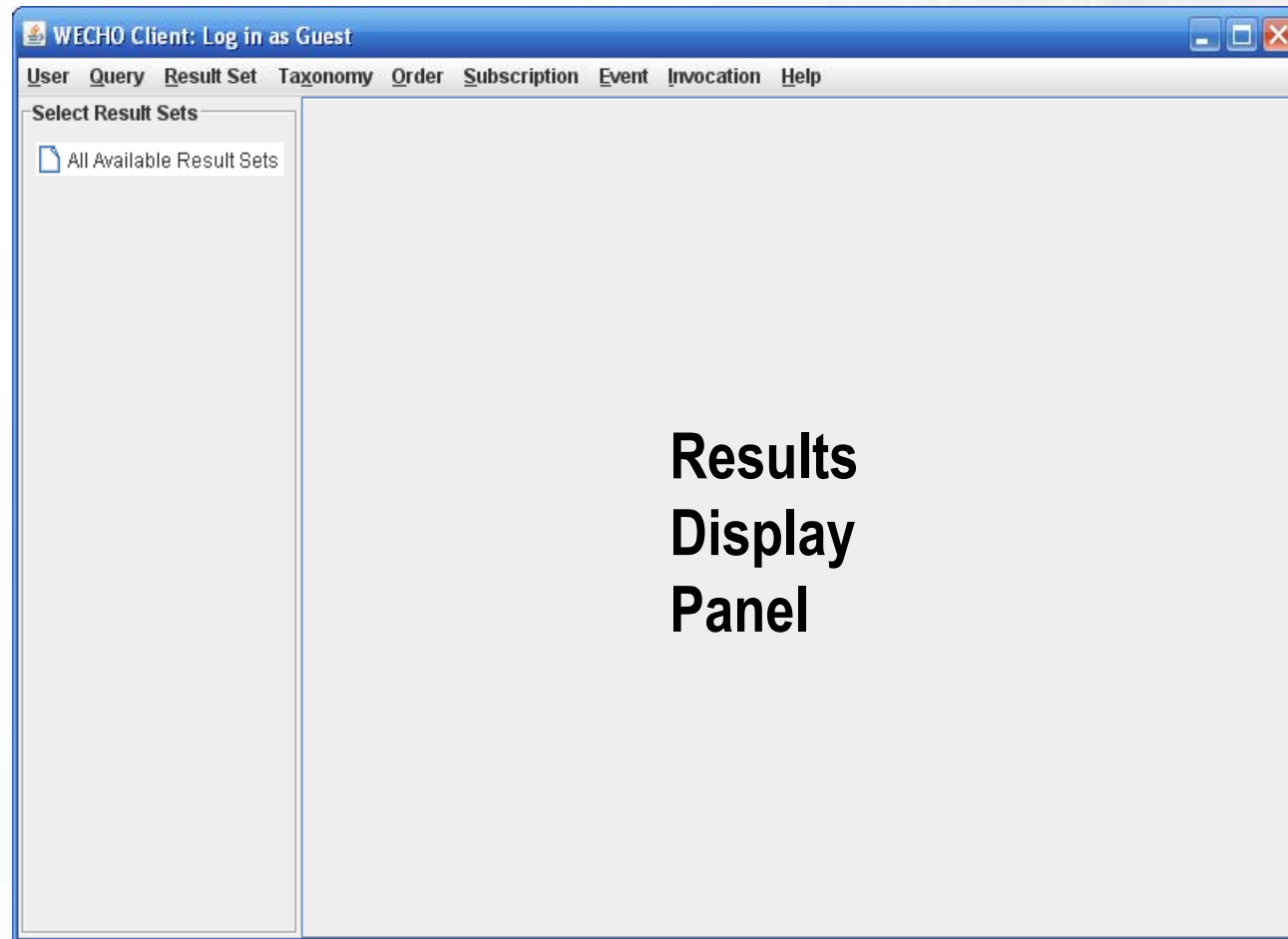
Standalone Client



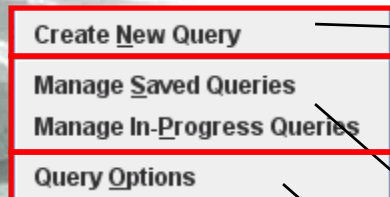
A screenshot of a Windows-style dialog box titled "WECHO Logging". The dialog has a blue title bar with standard minimize, maximize, and close buttons. Inside, there are two text input fields: "Username:" and "Password:". Below the password field is a checkbox labeled "Use current username as default?" which is checked. At the bottom, there are four buttons: "Create Account", "Guest Login", "OK", and "Cancel".

(an example with Query)

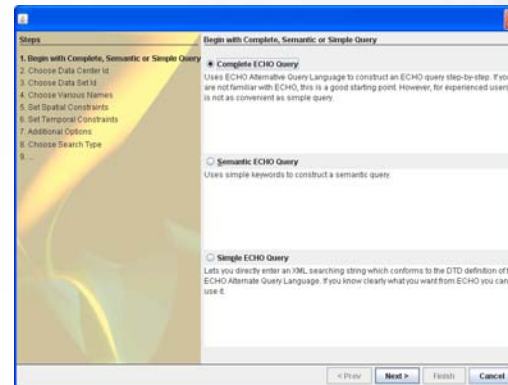
Main Interface



Query Menu Item

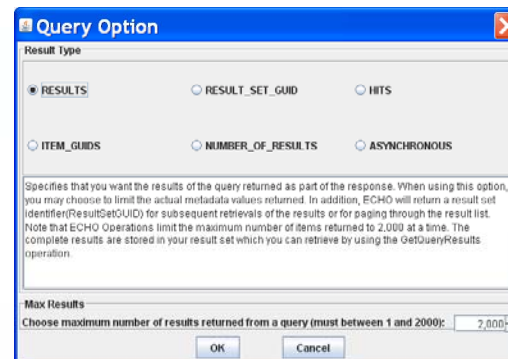


To create a new query. Under development.



For managing saved and in-progress queries.
On-going development.

For setting query options. Under development.



Query Example

The dialog box has a 'Steps' list on the left with 9 items. Step 2, 'Choose Data Center Id', is highlighted. The main area contains instructions: 'Input the data center Id you are interested. You can select from the drop list or input by yourself. Select "all" to indicate you want all the data centers searched.' Below the text is a dropdown menu with 'all' selected. At the bottom are buttons for '< Prev', 'Next >', 'Finish', and 'Cancel'.

1. Specify Data Center

The dialog box has a 'Steps' list on the left with 9 items. Step 3, 'Choose Data Set Id', is highlighted. The main area contains instructions: 'dataSetId specifies the universal name of a collection. You can select a dataSetId from the drop list, or input a keyword to let ECHO searching all matched dataSetIds for you.' Below the text is a dropdown menu. At the bottom are buttons for '< Prev', 'Next >', 'Finish', and 'Cancel'.

2. Specify Dataset ID

The dialog box has a 'Steps' list on the left with 9 items. Step 4, 'Choose Various Names', is highlighted. The main area contains three sections: 1. 'Use sensorName to search for collections or granules based on the name of the sensor. You can select a sensorName from the drop list, or input a keyword to let ECHO searching all matched sensorNames for you.' with a dropdown menu showing 'LANDSAT-7'. 2. 'CampaignShortName is the name(s) of the campaign or project that gathered data associated with the collections or granule. You can select a CampaignShortName from the drop list, or input a keyword to let ECHO searching all matched CampaignShortNames for you.' with a dropdown menu showing 'Lake'. 3. 'Use sourceName to search for collections or granules based on the name of the source. You can select a sourceName from the drop list, or input a keyword to let ECHO searching all matched sourceNames for you.' with a dropdown menu showing 'TERRA'. At the bottom are buttons for '< Prev', 'Next >', 'Finish', and 'Cancel'.

3. Specify Data Source

The dialog box has a 'Steps' list on the left with 9 items. Step 5, 'Set Spatial Constraints', is highlighted. The main area contains instructions: 'Describe the spatial constraints you need in the following:' followed by a text input field containing '-23,-40,23,40'. At the bottom are buttons for '< Prev', 'Next >', 'Finish', and 'Cancel'.

4. Specify Spatial Constraints

Query Example

The dialog box shows a 'Steps' list on the left with 9 items. Step 6, 'Set Temporal Constraints', is highlighted. The main area is titled 'Set Temporal Constraints' and contains the text 'Describe the temporal constraints you need in the following:' followed by a text input field containing '2004-2-14 to 2005-2-14'. At the bottom are buttons for '< Prev', 'Next >', 'Finish', and 'Cancel'.

5. Specify Time Constraints

The dialog box shows a 'Steps' list on the left with 9 items. Step 7, 'Additional Options', is highlighted. The main area is titled 'Additional Options' and contains several sections: 'Do you want to search only collections/granules online?' with an 'OnlineOnly' checkbox; 'Specify a search for collections/granules based on their insertion date into E' with a text input field; 'Specify a search for collections/granules based on the date of their last update wi' with a text input field; 'Specify a search for collections/granules that are available for ordering' with an 'Orderable Items' checkbox; and 'Specify a search for collections/granules based on the version identifier of the' with a text input field. At the bottom are buttons for '< Prev', 'Next >', 'Finish', and 'Cancel'.

6. Specify Additional Options

The dialog box shows a 'Steps' list on the left with 11 items. Step 8, 'Choose Search Type', is highlighted. The main area is titled 'Choose Search Type' and contains two radio button options: 'Collections ECHO Query' (selected) and 'Granules ECHO Query'. Below each option is a descriptive paragraph. At the bottom are buttons for '< Prev', 'Next >', 'Finish', and 'Cancel'.

7. Specify Collection or Granules

The dialog box shows a 'Steps' list on the left with 11 items. Step 11, 'Miscellaneous for Collections', is highlighted. The main area is titled 'Miscellaneous for Collections' and contains several sections: 'Specify a parameter to specify the geophysical terms associated with a collecti' with a text input field; 'Specify a processingLevel to specify the level at which the data has been proces' with a text input field; and 'Specify a center to search for collections based on the center where a collections' with a text input field. At the bottom are buttons for '< Prev', 'Next >', 'Finish', and 'Cancel'.

8. Specify Collections Constraints

Query Example

The screenshot displays the WECHO Client interface with a query result table and a linked web browser window. The browser window shows the 'Forest Biophysical Parameters (SNF)' page, which includes a summary and detailed metadata.

WECHO Client: Log in as Guest

Select Result Sets

Unnamed Result Set 1

Click on this field will bring up relevant web page.

OnlineAccessURL	Start Date	End Date	Complete Metadata	Select
http://daac.ornl.gov/...	2007-08-29 14:08:2...	2007-12-17 21:28:4...	Browse Full Metadata	<input type="checkbox"/>
http://daac.ornl.gov/...	2007-08-29 14:09:0...	2007-12-17 21:29:4...	Browse Full Metadata	<input type="checkbox"/>
http://daac.ornl.gov/...	2007-08-29 14:09:1...	2007-12-17 21:29:5...	Browse Full Metadata	<input type="checkbox"/>
http://daac.ornl.gov/...	2007-08-29 14:09:4...	2007-12-17 21:30:1...	Browse Full Metadata	<input type="checkbox"/>
http://daac.ornl.gov/...	2007-08-29 14:08:3...	2007-12-17 21:29:0...	Browse Full Metadata	<input type="checkbox"/>
http://daac.ornl.gov/...	2007-08-29 14:08:4...	2007-12-17 21:29:1...	Browse Full Metadata	<input type="checkbox"/>
http://daac.ornl.gov/...	2007-08-29 14:09:0...	2007-12-17 21:29:3...	Browse Full Metadata	<input type="checkbox"/>
http://daac.ornl.gov/...	2007-08-29 14:08:3...	2007-12-17 21:29:0...	Browse Full Metadata	<input type="checkbox"/>
http://daac.ornl.gov/...	2007-08-29 14:08:5...	2007-12-17 21:29:2...	Browse Full Metadata	<input type="checkbox"/>
http://daac.ornl.gov/...	2007-08-29 14:09:3...	2007-12-17 21:30:0...	Browse Full Metadata	<input type="checkbox"/>

Click on this field will bring up Full Metadata in the bottom display area.

Forest Biophysical Parameters (SNF): Data Set Guide Document - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://daac.ornl.gov/SNF/guides/forest_biophys...

Forest Biophysical Parameters (SNF)

Summary:

The purpose of the SNF study was to improve our understanding of the relationship between remotely sensed observations and important biophysical parameters in the boreal forest. A key element of the experiment was the development of methodologies to measure forest stand characteristics to determine values of importance to both remote sensing and ecology. Parameters studied were biomass, leaf area index, above ground net primary productivity, bark area index, and ground coverage by vegetation. Thirty-two quaking aspen and thirty-one black spruce sites were studied.

Sites were chosen in uniform stands of aspen or spruce. Aspen stands were chosen to represent the full range of age and stem density of essentially pure aspen, of nearly complete canopy closure, and greater than two meters in height. Spruce stands ranged from very sparse stands on bog sites, to dense, closed stands on more productive peatlands. Diameter breast height (dbh), height of the tree and height of the first live branch were measured. For each plot, a two-meter diameter subplot was defined at the center of each plot. Within this

21-30 31-40 41-50 >>

UNDERSTORY FLUX, METEOROLOGICAL, AND SOIL TEMPERATURE DATA

UNDERSTORY FLUX, METEOROLOGICAL, AND SOIL TEMPERATURE DATA

0.0

9.0

UNDERSTORY FLUX, METEOROLOGICAL, AND SOIL TEMPERATURE DATA

ioxide, and momentum flux data collected under the canopy along with meteorological and soils data at the mid-November of 1993 and throughout all of 1994.

SuggestedUsage1:
ProcessingCenter: ORNL DAAC
ProcessingLevelId: 3
ProcessingLevelDescription: Data or retrieved environmental variables that have been spatially and/or temporally resampled (i.e., derived from Level 1 or Level 2 data products). Such resampling may include averaging and compositing
ArchiveCenter: ORNL DAAC
CitationforExternalPublication: Black, T. A. 2000. BOREAS TF-01 SSA-OA Understory Flux, Meteorological, and Soil Temperature Data. Data set.
Available on-line [http://www.daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A.
CollectionState: ONLINE
MaintenanceUpdateFrequency: As Needed
RestrictionComment: NOT_ACCESS_RESTRICTED

9. The Query Results

Web WECHO Client (Preliminary)

WECHO Client

Query Results

You query has finished. [Update Result Set](#) [Cancel Current Query](#)

DatasetID	Provider	OnlineAccess	StartDate	StopDate	Select
BOREAS TF-01 SSA-OA UNDERSTORY FLUX, METEOROLOGICAL	ORNL_DAAC	http://daac.ornl.gov/BOREAS/guides/TF01_UnderCanopy_Flux.html	2007-08-29 13:47:00.0	2007-12-17 21:11:19.0	<input type="checkbox"/>
BOREAS TE-11 SAP FLOW DATA	ORNL_DAAC	http://daac.ornl.gov/BOREAS/guides/TE11_Sapflow.html	2007-08-29 13:47:11.0	2007-12-17 21:11:32.0	<input type="checkbox"/>
RLC VEGETATIVE COVER OF THE FORMER SOVIET UNION, 1990	ORNL_DAAC	http://daac.ornl.gov/RLC/guides/RLC_veg_cover_1990.html	2007-08-29 13:47:20.0	2007-12-17 21:11:44.0	<input type="checkbox"/>
SAFARI 2000 LEAF MEASUREMENTS OF DOMINANT TREES, KALAHARI SITES, WET SEASON 2000	ORNL_DAAC	http://daac.ornl.gov/S2K/guides/kt_leaf_meas.html	2007-08-29 13:47:52.0	2007-12-17 21:12:22.0	<input type="checkbox"/>
BOREAS LANDSAT MSS IMAGERY: DIGITAL COUNTS	ORNL_DAAC	http://daac.ornl.gov/BOREAS/guides/LANDSAT_MSS.html	2007-08-29 13:47:38.0	2007-12-17 21:12:06.0	<input type="checkbox"/>

Done

Water Ontology (Preliminary)

Microsoft Excel - water.xls								
File Edit View Insert Format Tools Data Window Help						Type a question for help		
C29								
	A	B	C	D	E			
1					key word	datasetID		
2	water	liquid water	surface water	precipitation	rain rate/type	AMSR-E L2B Global Swath Rain Rate/Type		
3					rain rate/type	AMSR-E L2B Global Swath Rain Rate/Type		
4					rain rate/type	TRMM Precipitation Radar(PR) Level 2 Rain		
5					rain gauge	BOREAS 1994 HYD-09 BELFORT RAIN GA		
6					rain gauge	BOREAS FOLLOW-ON HMET-01 MERGED		
7					rainfall	AMSR-E/Aqua Monthly L3 5x5 deg Rainfall A		
8					rainfall	30 MINUTE RAINFALL DATA(FIFE)		
9					rainfall	TRMM Combined Precipitation Radar(PR) ar		
10					rainfall	TRMM Combined Precipitation Radar(PR) ar		
11					rainfall	TRMM Precipitation Radar(PR) Gridded Rain		
12					rainfall	SAFARI 2000 DAILY RAINFALL TOTALS FO		
13					rainfall	SAFARI 2000 DAILY RAINFALL ESTIMATES		
14					precipitation	AMAZON RIVER BASIN PRECIPITATION, 19		
15					precipitation	SAFARI 2000 GPCP DAILY PRECIPITATION		
16					precipitation	GLOBAL MONTHLY PRECIPITATION, 1900-		
17						water flow/discharge	flow	STREAM FLOW DAILY DATA:(USGS FIFE)
18							discharge	LBA REGIONAL RIVER DISCHARGE DATA
19			soil moisture	AMSR-E/Aqua Daily L3 Surface Soil Moisture				
20			soil moisture	BOREAS HYD-01 VOLUMETRIC SOIL MOIS				
21			soil moisture	AMSR-E/Aqua L2B Surface Soil Moisture, Ar				
22			freshwater	freshwater	SAFARI 2000 FRESHWATER WETLANDS,			
23		ground water						
24	solid water	surface water	sea ice	sea ice	AMSR-E/Aqua Daily L3 12.5km Tb, Sea Ice C			
25			precipitation	snow	AMSR-E/Aqua 5-Day L3 Global Snow Water			
26			snow	BOREAS HYD-03 SNOW DEPTH DATA: 19				
27			precipitation	GLOBAL MONTHLY PRECIPITATION, 1900-				
28		ground water						
29	water vapor		precipitable	precipitable	MODIS/Terra Total Precipitable Water Vapor			
30			precipitable	precipitable	MODIS/Aqua Total Precipitable Water Vapor			
31			cloud water vapor	cloud water vapor	MODIS/Terra Aerosol Cloud Water Vapor Oz			
32				cloud water vapor	MODIS/Aqua Aerosol Cloud Water Vapor Oz			
33			ground water					

Integrate with NOESIS Semantic Search

Semantic Search - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Water Semantic Search

Powered by [SWEET](#) and [NOESIS](#):

EARTH SCIENCE Water

Precipitation [Advanced Search](#)

Web Number of results: 15 for **Precipitation** [\[definition\]](#).

TRMM_2A25
echo
The TRMM Precipitation Radar (PR), the first of its kind in space, is an electronically scanning radar, operating at 13.8 GHz that measures the 3-D rainfall distribution over both land and ocean, an...

TRMM_2A23
echo
The Tropical Rainfall Measuring Mission (TRMM) is a joint U.S.-Japan satellite mission to monitor tropical and subtropical precipitation, and to estimate its associated latent heating. TRMM was succe...

TRMM_G2A12
echo
The TRMM Microwave Imager (TMI) Gridded Orbital rainfall data, a special product derived from the TRMM standard product, TMI rain profile (2A-12), and mapped to a 0.5 degree x 0.5 degree latitude/lo...

TRMM_3A25
echo
The primary objective of algorithm 3A25 is to compute various rainfall statistics over a month from the level 2 PR products. The statistics are derived at two spatial resolutions: (1) a standard sp...

TRMM_1C21
echo
The Tropical Rainfall Measuring Mission (TRMM) is a joint U.S.-Japan satellite mission to monitor tropical and subtropical precipitation and to estimate its associated latent

Resources

- ☐ NOAA NCDC - 9 ✓
- ☐ NASA GCMD - 15 ✓
- ☐ FGDC GDS - 15 ✓
- ☒ NASA ECHO - 15 ✓

Refine Your Search Here:

- +Surface Water
 - +Precipitation
 - ☐ Rainfall
 - ☐ Gouge

Related Terms

- +Phenomena
 - ☐ Cloud
 - ☐ Precipitation
 - ☐ Wind
- +Property
 - ☐ Temperature
 - ☐ Pressure
- +Earthrealm
 - ☐ Land
 - ☐ Hydrosphere
 - ☐ Atmosphere

javascript:specialcheck('Precipitation')

WECHO will be utilized to support the ESIP Earth Information Exchange

The screenshot shows a web browser window titled "Semantic Search - Mozilla Firefox". The page header includes the "Earth Information Exchange" logo and navigation links: Overview, Find/View, Collaboration, Opportunities, and About Us. A "Sign In" link is also present. Below the header, a "Navigation" bar shows the path: Overview » Water » Semantic Search. The main content area is titled "Water Semantic Search" and includes a search bar with the text "Precipitation" and a "Search" button. To the right of the search bar is a link for "Advanced Search". Below the search bar, the page displays search results for "Precipitation". The results are organized into two columns: "Web" and "Resources". The "Web" column lists three results: TRMM_2A25, TRMM_2A23, and TRMM_G2A12, each with a brief description. The "Resources" column lists four resources: NOAA NCDC - 9, NASA GCMD - 15, FGDC GDS - 15, and NASA ECHO - 15, each with a checkbox and a green checkmark. Below the resources, there is a section titled "Refine Your Search Here:" with links for "+Surface Water", "+Precipitation", and "-Rainfall". At the bottom, there is a "Related Terms" section with a link for "+Phenomena". The browser's status bar at the bottom shows "Done".

Powered by [SWEET](#) and [NOESIS](#); Developed by [CISC](#).

Earth Science Water

Precipitation Search [Advanced Search](#)

Web Number of results: 15 for **Precipitation** [\[definition\]](#).

TRMM_2A25
echo
The TRMM Precipitation Radar (PR), the first of its kind in space, is an electronically scanning radar, operating at 13.8 GHz that measures the 3-D rainfall distribution over both land and ocean, an...

TRMM_2A23
echo
The Tropical Rainfall Measuring Mission (TRMM) is a joint U.S.-Japan satellite mission to monitor tropical and subtropical precipitation, and to estimate its associated latent heating. TRMM was succe...

TRMM_G2A12
echo
The TRMM Microwave Imager (TMI) Gridded Orbital rainfall data, a special product derived from the TRMM standard product, TMI rain profile (2A-12), and mapped to a 0.5 degree x 0.5 degree latitude/lo...

Resources

- ☐ NOAA NCDC - 9 ✓
- ☐ NASA GCMD - 15 ✓
- ☐ FGDC GDS - 15 ✓
- ☒ NASA ECHO - 15 ✓

Refine Your Search Here:

- +Surface Water
- +Precipitation
 - ☐ Rainfall
 - ☐ Gouge

Related Terms

- +Phenomena
 - ☐ Cloud

Conclusion

- **Started 6 months late (funding delay)**
- **Established the WECHO portal design and functionality.**
- **Implementation of the portal design, including the required software engineering is progressing well.**
- **Established education and outreach components, inc. links to ESIP.**
- **To do:**
 - Implement ontology search tools
 - Implement visualization connector