Current Practices in Quantitative Assessment of the Earth System - Weather and Climate

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Reanalyses

- North American Regional Reanalysis (NARR)
- NCAR-NCEP Reanalysis
- ECMWF Reanalysis
North American Regional Reanalysis

http://www.emc.ncep.noaa.gov/mmb/rreanl/
Highlights of NARR

- ETA model and assimilation system (EDAS)
- 32 km resolution over the North and Central America
- R-2 horizontal boundary conditions
- New land surface model (NOAH)
- Precipitation assimilation
- 8x daily analyses from October 1978 onwards
- 5 TB for basic set of analyses and fluxes
- Oct 1978-Nov 2002 done

http://www.emc.ncep.noaa.gov/mmb/rreanl/NARR_Reno.ppt#258,3,
- assimilation of hourly precipitation
  -- hourly 4-km radar/gage analysis (Stage IV)
- cold season processes (Koren et al 1999)
  -- patchy snow cover
  -- frozen soil (new state variable)
  -- snow density (new state variable)
- bare soil evaporation refinements
  -- parameterize upper sfc crust cap on evap
- soil heat flux
  -- new soil thermal conductivity (Peters-Lidard et al 1998)
  -- under snowpack (Lunardini, 1981)
  -- vegetation reduction of thermal cond. (Peters-Lidard et al 1997)
- surface characterization
  -- maximum snow albedo database (Robinson & Kukla 1985)
  -- dynamic thermal roughness length refinements
- vegetation
  -- deeper rooting depth in forests
  -- canopy resistance refinements

NOAH LSM tested in various land-model intercomparison projects, e.g., GSWP, PILPS 2a, 2c, 2d, 2e, Rhone, and (near-future) DMIP.

http://www.emc.ncep.noaa.gov/mmb/rr Heal NARR_Reno.ppt#261,6
Comparison of N/N Reanalysis and NARR

Model

- Global
- Spectral
- ~250 km resolution
- 28 sigma levels
- Land sfc (Pan and Marht, 1987)
- One soil type (sandy loam)
- Two soil levels
- Simplistic snow depth, fn(T)
- 6 hour analyses time steps

- N. Am. Sector
- Grid point
- 32 km resolution
- 45 pressure levels
- NOAH model (2002)
- Realistic soil types
- 4 soil layers
- Snow depth, modeled/observed
- 3 hour analyses time steps

http://www.emc.ncep.noaa.gov/mmb/rreanl/NARR_Reno.ppt#264,9,
Comparison of N/N Reanalysis and NARR

**Input observations**

- Sondes, aircraft
- TOVS temperature retrievals
- Satellite winds
- Land sfc: prs
- Ocean sfc: prs, q, t, winds
- Snow cover: old is low res
- Reynold's SST
- Sea ice from R. Grumbine

- Sondes, aircraft, profilers
- Direct assimilation of radiances
- Satellite winds
- Land sfc: prs, q, winds
- Ocean sfc: prs, q, t, winds
- Precipitation
- USAF snow depth (hi res)
- Reynold's SST + lakes
- Sea ice from R. Grumbine + lakes

[Link](http://www.emc.ncep.noaa.gov/mmb/rreanl/NARR_Reno.ppt#265,10)


FIGURE 1-1 The climate system, consisting of the atmosphere, oceans, land, and cryosphere. Important state variables for each sphere of the climate system are listed in the boxes. For the purposes of this report, the Sun, volcanic emissions, and human-caused emissions of greenhouse gases and changes to the land surface are considered external to the climate system.
No High Quality Reanalysis Exists For Climate Although This Has Been Recommended
Other Reanalysis Type Products For Other Aspects of the Climate System Besides Weather
Lana Data Assimilation Systems (LDAS)

North American (NLDAS) and Global (GLDAS) LDAS systems are being developed that will lead to more accurate reanalysis and forecast simulations by numerical weather prediction (NWP) models. Specifically, these systems will reduce the errors in the stores of soil moisture and energy which are often present in NWP models and which degrade the accuracy of forecasts. NLDAS is currently running retrospectively and in near real-time on a 1/18th-degree grid while GLDAS is running at 1/4 degree resolution. The systems are currently forced by terrestrial (NLDAS) and space-based (GLDAS) precipitation data, space-based radiation data and numerical model output. In order to create an optimal scheme, the projects involve several LMDs, many sources of data, and several institutions. Data from the project can be accessed on the NEDAS and GLDAS forcing pages, the NEDAS and GLDAS model output pages, as well as on the NEDAS Realtime Image Generator page.

Find out: Who we are!

What's New With GLDAS

Website Developed and Maintained at NASA/GSFC

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Last updated: 10/26/06

http://ldas.gsfc.nasa.gov/

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http://arctic.atmos.uiuc.edu/cryosphere/
A leading source of land information for exploring our changing planet.

Global Land Survey 2003 (GLS2003) Data Released
Landsat 9 Release: Data on January 22, 2008
U.S. Release: A Plan For A National Land Imaging Program
Website Release (PDF) — Readiris PDF
http://edc.usgs.gov/

State Land Cover Descriptions

USGS Land Cover Institute announces the availability of the State Land Cover Descriptions (SLCD), an interactive map of the contiguous United States providing access to simple State, County, and land use maps. Descriptional data included many land use issues, such as forest, urban, and agricultural land types. The data are distributed from the National Land Cover Database 2001 (NLCD 2001). These State descriptions have been compiled to provide a general overview for scientific researches, policy makers, and educators to gain a better understanding of a State's land use and land use characteristics.

Access the State Land Cover Descriptions web page

MRCC and NALC Release

The USGS is now offering a collection of National Resolution Land Characterization (MRCC) data for the United States. These data were acquired by the MRCC Collaboration and created from the National Land Cover Dataset (NLCD) and Landsat 7 Enhanced Thematic Mapper Plus (ETM+) data.

MRCC 2006 data are available from the USGS at no charge via a web-enabled file download on or media for $20 per file.

The NALC 2001 data cover the conterminous United States, Alaska and Hawaii. Most of the images are of high quality and cloud coverage is generally less than 10 percent. A 20 meter Digital Elevation Model (DEM) is included for all areas that do not include international border areas.

The NALC collaboration is a group of federal agencies who joined together to acquire Landsat imagery and create nationally consistent land cover data. The data are available to the public through Earth Explorer, NASA, or the NALC Collaboration.

North American Landscape Characterization (NALC) data consist of Landsat Multi-Spectral Scanner (MSS) images that were acquired in 1972, 1985, and 1992 prior to the year. NALC data cover coastal locations throughout the conterminous United States and Mexico.

NALC data are available from the USGS via web-enabled file downloads. The data are also available on media at $20 per site and can be reviewed, downloaded, and ordered through Earth Explorer or NALC.

For more information, please contact USGS Customer Services, ERG, 800-252-6060 or northern@usgs.gov

http://edc.usgs.gov/
Albedo: 1650, 1850, 1920, 1992

Historical Patterns of Broadband Solar Albedo:
(a) 1650
(b) 1850
(c) 1920
(d) 1992


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Surface Roughness Length: 1650, 1850, 1920, 1992

Historical Patterns of Surface Roughness Length (cm):

(a) 1650
(b) 1850
(c) 1920
(d) 1992

CONCLUSION

There are a variety of disciplines in climate that perform quantitative assessments. What is needed is closer integration between the diverse sets of data. The weather and hydrology communities (e.g., Variable Filtration Capacity - VIC) analyses have been particularly effective at completing assessments using coupled models and observations. The drought monitor provides an example of a type of integration.
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://drought.unl.edu/dm

http://www.drought.unl.edu/DM/monitor.html

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Background Photograph Courtesy of Mike Hollingshead

http://www.extremeinstability.com/index.htm