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Technical Implementation Notice 14-24 Amended
National Weather Service Headquarters Washington DC
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From: Tim McClung
            Chief, Science Plans Branch
            Office of Science and Technology

Subject: Amended: New North American Land Data Assimilation System
(NLDAS): Effective August 5, 2014

Amended to change the implementation date from July 29, 2014, to August 5,
2014.

Effective on or about Tuesday, August 5, 2014, the National Centers for
Environmental Prediction (NCEP) will begin to run and disseminate data
from the North American Land Data Assimilation System Version 2.0.0
(NLDAS-2).

NLDAS is a multi-model land modeling and assimilation system run in an
uncoupled mode on a common one-eighth degree grid covering the Continental
United States (CONUS) along with northern Mexico and southern Canada, and
driven by atmospheric forcing.

NLDAS provides retrospective and real-time high-resolution water and
energy cycle products, such as surface fluxes, soil moisture, snow cover,
and runoff/streamflow, along with the near-surface atmospheric and
precipitation data sets used as forcings for the NLDAS land models. These
products support drought monitoring, seasonal hydrological prediction,
weather and climate forecasting, model evaluation, and land-hydrology
research within these communities.

NLDAS has become a mature system and is being implemented into real-time
NCEP operations in the near future. The retrospective component of Phase
2 of NLDAS (NLDAS-2; Ek et al, 2011) was completed in 2008:

http://www.emc.ncep.noaa.gov/mmb/nldas

Since then, NLSDA has continued in near real time. NLDAS-2 was developed
at the National Oceanic and Atmospheric Administration (NOAA)/NCEP
Environmental Modeling Center (EMC) in collaboration with its NOAA Climate
Program Office (CPO) Climate Prediction Program of the Americas (CPPA)
partners. These partners include the National Aeronautics and Space
Administration/Goddard Space Flight Center (NASA/GSFC), Princeton

University, the University of Washington (UW), the NWS Office of Hydrologic Development (OHD), and the NCEP Climate Prediction Center (CPC). It can be considered as the follow-on to Phase 1 of NLDAS (Mitchell et al, 2004), which was supported through the NOAA Office of Global Programs (now CPO) GEWEX Americas Prediction Project (GAPP) and the NASA Terrestrial Hydrology Program.

Ek, M. B., and co-authors, 2011: North American Land Data Assimilation System Phase 2 (NLDAS-2). Development and Applications, GEWEX News, May, 21(2), 6-7, 20:

www.gewex.org/gewexnews/May2011.pdf

Mitchell, K. E., and co-authors, 2004: The multi-institution North American Land Data Assimilation System (NLDAS): Utilizing multiple GCIP products and partners in a continental distributed hydrological modeling system. J. Geophys. Res., 109, D07S90, doi:10.1029/2003JD003823.

For references, see NLDAS publications in NASA NLDAS-2 website:

http://ldas.gsfc.nasa.gov/nldas/NLDASpublications.php

NLDAS-2 Data and Their Distribution:

NLDAS Version 2 generates hourly surface forcing at standard model boundary layers (e.g., 2 m air temperature and specific humidity, 10 m wind speed, surface pressure, downward shortwave and longwave radiation, precipitation) and the NCEP Regional Climate Data Assimilation System (RCDAS) lowest model layer. NLDAS also provides hourly simulation for energy fluxes (e.g., sensible heat flux, latent heat flux, ground heat flux, net radiation, etc.), water fluxes (e.g., evapotranspiration, total runoff/streamflow, precipitation, etc.), and state variables (e.g., soil moisture, soil temperature, snow water equivalent, land surface temperature, snow cover, etc.) listed below from the four land surface models, once per day for the 1200 Coordinated Universal Time (UTC) cycle.

The NLDAS-2 output will be available in gridded binary version two (GRIB2) format on a 1/8th x 1/8th degree output grid. The NLDAS output will be disseminated via the ftp/http server:

http://www.ftp.ncep.noaa.gov/data/nccf/com/nldas/
ftp://ftp.ncep.noaa.gov/pub/data/nccf/com/nldas

NLDAS produces the forcing files with a 3.5-day lag and the output from the four LSMs with a 4-day lag. Therefore, NLDAS output generated today will be available in directories dated three and four days ago. Output files and their contents include:

NLDAS-2 Forcing:

NLDAS produces "a" and "b" forcing files. The "a" files are the primary NLDAS forcing files. The "b" files are directly downscaled from the NARR/RCDAS reanalysis at the lowest prognostic model level with a spatial variation for diverse terrain.

File a: nldas.t12z.force-a.grb2f$HR, where HR = 00, 01,..., 23

2D products include:
TMP at 2 m: 2-m air temperature (K)
SPFH at 2 m: Specific Humidity (kg/kg)
PRES on the surface: surface pressure (pa)
UGRD at 10 m: 10 m u component (m/s)
VGRD at 10 m: 10 m v component (m/s)
DLWRF on the surface: downscaled RCDAS downward longwave radiation
(W/m^2),
FRAIN on surface: convection precipitation fraction to total precipitation
(--)
CAPE: Convective Available Potential Energy (J/kg)
PEVAP Potential Evaporation (kg/m^2)
APCPN: Gauge-based total precipitation (kg/m^2)
DSWRF: Bias-corrected RCDAS Downward Short-Wave Radiation Flux (W/m^2)

File b: nldas.t12z.force-b.grb2$HR, where HR=00, 01,..., 23

2D products include:
DSWRF: downscaled RCDAS Downward Short-Wave Radiation Flux [W/m^2]
APCPN: Downscaled RCDAS Total precipitation [kg/m^2]
ACPCP: Convective Precipitation [kg/m^2]
ACOND: Aerodynamic conductance [m/s]
TMP: The lowest model layer Temperature [K]
SPFH: the lowest model layer Specific Humidity [kg/kg]
PRES: The lowest model layer Pressure [Pa]
UGRD: The lowest model layer U-Component of Wind [m/s]
VGRD: The lowest model layer V-Component of Wind [m/s]
HGT: Geopotential Height [gpm].

Output from the Four Land Surface Models:

$model.t12z.grbf$HR, where model=Mosaic, Noah, SAC, and VIC; HR=00, 01,
02, ..., 23

Model outputs include hourly energy fluxes, water fluxes, and states
variables. For details, see the Model Output tab on the NCEP/EMC NLDAS
website:

http://www.emc.ncep.noaa.gov/mmb/nldas

NASA NLDAS website:

http://ldas.gsfc.nasa.gov/faq/#NLDAS_NASAvsEMC

Details are also in NLDAS-2 publications (Xia et al., 2012a). It should
be noted that soil moisture in SAC model is not for any specific soil
layer rather than six components of two reservoirs (shallow upper and
deeper lower). A post-process algorithm can be used to generate soil
moisture for a specific soil layer (Xia et al., 2012a, Xia et al., 2014).
Soil moisture and temperature for VIC model are not for a specific soil
layer for the second and third soil layer, as soil layers for these two
layers vary from grid cell to grid cell. Similar to the SAC model, a

post-process algorithm developed by Princeton University can be used to generate soil moisture and temperature for a given soil layer (Xia et al., 2012a).

Routed Streamflow from the Four Land Surface Models:

The River Routing Model developed by Lohmann et al. (2004) was used to generate gridded streamflow over the CONUS. The results from NLDAS-2 have been comprehensively evaluated using long-term observed streamflow from 961 U.S. Geological Survey (USGS) basins (Xia et al., 2012b). The output data include routed streamflow:

$model.t12z.STRM.grbf$HR, where model=Mosaic, Noah, SAC, and VIC; HR=00, 01, 02,..., 23; STRM: routed streamflow (m^3/s)

NLDAS-2 Operational Run:

A consistent parallel feed of data is currently available on the NCEP server at:

ftp://ftp.ncep.noaa.gov/pub/data/nccf/com/nldas/para
or
http://www.ftp.ncep.noaa.gov/data/nccf/com/nldas/para

Users: Please note that NLDAS-2 products are encoded in GRIB2 using a relatively-new GRIB template. Users should download the latest versions of wgrib2 and the other NCEP GRIB utilities to use the NLDAS-2 output products. Users can access the NCEP GRIB utilities from this URL:
http://www.nco.ncep.noaa.gov/pmb/codes/nwprod/util/exec

A website containing more information about GRIB2 can find at:
http://www.nco.ncep.noaa.gov/pmb/docs/grib2/grib2_doc.shtml

For questions regarding the scientific content of the NLDAS system, please contact:

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National Technical Implementation Notices are online at:

https://www.weather.gov/notification/archive

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