

Useful Meteorological/Climate Data Sets/Archives

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1. NOAA Operational Model Archive and Distribution System (NOMADS)

<https://nomads.ncep.noaa.gov/>.

For realtime NCEP operational weather, climate, ocean model analyses and forecasts, including GFS, GEFS, NAM, HRRR etc.

- Data are available via https/ftp with option to select variables and regions, and via OpenDAP service. Forecasts are only available for limited times (2 days to 2 weeks). Historical forecasts are available at NCEI archive site (see next), but often at lower resolution and lower frequency. For example, GFS forecasts are only available at 1 and 0.5 degree resolution, not at 0.25 degree.

2. National Centers for Environmental Information (NCEI) historical data archives

<https://www.ncei.noaa.gov/>

NCEI manages one of the largest archives of atmospheric, coastal, geophysical, and oceanic research in the world.

The NCEI archive and backup copy contains more than 37 petabytes of data.

The product list is <https://www.ncei.noaa.gov/products>.

For example, historical **GFS forecasts** are at <https://www.ncei.noaa.gov/products/weather-climate-models/global-forecast>.

NAM data sets are at <https://www.ncei.noaa.gov/products/weather-climate-models/north-american-mesoscale>.

<https://www.ncei.noaa.gov/products/weather-climate-models/global-data-assimilation> has GFS global analyses as well as **global observational data** (BUFR files) used by the data assimilation system.

3. Climate reanalysis data sets

NCEP North American Regional Reanalysis (**NARR**) data – daily 3-hourly gridded analyses for north America domain from Jan 1979 – October 2014. 32 km grid spacing. Useful for regional climate and weather process studies, and for initializing regional model simulations.

NCEP/NCAR/DOE global reanalysis-2 (**R2**) data set. 6 hourly 2.5 degree global gridded data from Jan 1979 through now.

- 6-hourly reanalysis grids between Jan 1979 – Sept. 2005 archived as NECI.
- CPC reanalysis-2 <https://www.cpc.ncep.noaa.gov/products/wesley/reanalysis2/index.html>
- has latest reanalysis data.

ECMWF 5th-generation global reanalysis data (**ERA5**): 1979-present time (within 3 months of real time) quality-assured, and 1950-1978 preliminary dataset. Hourly data at 0.25°x0.25° resolution or ~30km grid spacing with 137 levels up to 80 km height.

<https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5>

- Need to register a free CDS (Climate Data Store account) in order to download data.
- Example python script is available at the website to download subset data and save in NetCDF format. Need to install cdsapi python package (Linux: pip install cdsapi).
- A presentation on working with ERA5 data: <http://serbiaforexcell.com/wp-content/uploads/2018/12/Analysis-and-visualization-of-ERA5-data-with-Python.pdf>

Climate monitoring and data at Climate Prediction Center (CPC)/NCEP.

https://www.cpc.ncep.noaa.gov/products/monitoring_and_data/

- daily and monthly data, time series, and maps for various climate parameters, such as precipitation, temperature, snow cover, and degree days for the United States, Pacific Islands, and other parts of the world.

4. NEXRAD radar data

- Level II and Level-III radar data from individual radar sites and radar reflectivity images and other products: <https://www.ncdc.noaa.gov/nexradinv/>. Need to place requests/data orders via web interface.
- Interactive radar maps for current time <https://www.ncei.noaa.gov/maps/radar/>.
- Realtime (current day only) 3D gridded **MRMS** radar data are available at <https://mrms.ncep.noaa.gov/data/>

5. Satellite data at NOAA Satellite and Information Service

<https://www.avl.class.noaa.gov/saa/products/welcome>

6. NCAR Research Data Archive

The Research Data Archive (RDA) (<https://rda.ucar.edu/>)

at NCAR contains a large and diverse collection of meteorological and oceanographic observations, operational and reanalysis model outputs, and remote sensing datasets to support atmospheric and geosciences research.

This site is more complete in archiving past NCEP forecasts.

Other popular data sets available at the site:

- Ocean and Atmospheric Reanalysis
- NCEP GDAS Observations and Analysis
- NCEP GFS Model Analysis and Forecasts (0.25x0.25 degree GFS forecasts are available from 2015).
- Hourly Surface Station Air Temperature Observations Over Land
- GridRad-Severe - Three-Dimensional Gridded NEXRAD WSR-88D Radar Data for Severe Events

7. Field Projects and Deployment Data Catalog and Access

NCAR EOL (Earth Observing Lab) field experiment data archive:

<https://www.eol.ucar.edu/all-field-projects-and-deployments> - EOL manages and archives most field experiment data sets such as VORTEX, TORUS.

8. Unidata data catalog and achieves

<https://www.unidata.ucar.edu/data/>. The Unidata Program helps researchers and educators acquire and use earth-related data. Unidata also provides mechanisms for accessing some archived data sets and case studies.

Unidata makes a variety of data available from its remote access server thredds.ucar.edu. It is not an operational center, although it has an excellent “uptime” record for its service.

https://www.unidata.ucar.edu/publications/factsheets/current/factsheet_data.pdf is an overview.

THREDDS serve data catalog: <https://thredds.ucar.edu/thredds/catalog.html>

E.g., realtime Metar station data in netCDF format

(<https://thredds.ucar.edu/thredds/catalog/nws/metar/ncdecoded/files/catalog.html>)

Unidata data discovery resources: <https://www.unidata.ucar.edu/data/#help>

9. Upper air sounding and surface data archives

University of Wyoming maintains a complete global upper air sounding archive that is commonly used. <https://weather.uwyo.edu/upperair/sounding.html>

Integrated Global Radiosonde Archive (IGRA) at NECI from 1905:

<https://www.ncei.noaa.gov/access/metadata/landing-page/bin/iso?id=gov.noaa.ncdc:C00975>

Oklahoma Mesonet data can be requested at

https://www.mesonet.org/index.php/weather/mesonet_data_files.

10. IOWA State University data archive

<https://mesonet.agron.iastate.edu/archive/> has a listing of many data sources/archives, and actual archives of many data sets. For example:

Recent data of the national 3D radar mosaic or MRMS (<https://www.nssl.noaa.gov/projects/mrms/>) gridded radar data.

Shape files for National Weather Service watch, warning, and advisory events from 1986.

Recent Weather Maps from NCEP in PDF format (<https://www.wpc.ncep.noaa.gov/dailywxmap/pdffiles.html>)

11. SPC Storm Reports

SPC tornado, hail and wind reports for the U.S. in CVS and KML formats can be found at <https://www.spc.noaa.gov/climo/online/>. KML data can be overlaid on Google Earth.

SPC site (<https://www.spc.noaa.gov/exper/soundings/>) has Skew-T plots of recent soundings for U.S.

12. Unidata Siphon Python package for downloading/accessing remote data services

See <https://www.unidata.ucar.edu/software/siphon/>. It is still under development. Currently available features include:

- Reading catalogs from a THREDDS Data Server
- Querying the NetCDF Subset Service (NCSS)
- Communicating with the THREDDS Data Server using the CDM Remote protocol
- Clients for downloading data from the University of Wyoming, Iowa State (Iowa Environmental Mesonet), and IGRA2 upper air data archives

13. CMIP6 - Coupled Model Intercomparison Project Phase 6 – for global climate projections

The latest climate projections organized by WCRP (World Climate Research Program, <https://www.wcrp-climate.org>) of WMO for different future climate change scenarios from different modeling centers and organizations. Widely used for climate change research.

<https://pcmdi.llnl.gov/CMIP6/> lists a number of servers for the complete dataset.