EDEN NetCDF Data Format

NetCDF (Network Common Data Form) is a set of freely-distributed software libraries and machine-independent binary data formats that support the creation, access, and sharing of large array-oriented scientific data. This format replaces the bulky file structure and difficult file management of ESRI GRIDS for EDEN data. It also allows EDEN applications to run on computers without ArcGIS installations.

NetCDF was originally created for climatological datasets and is used by groups such as NOAA, Los Alamos National Laboratory, and Woods Hole Oceanographic Institution. The netCDF software was developed out of the NASA CDF data model by the Unidata Program Center, sponsored by the National Science Foundation, and with contributions from the netCDF user community. An increasing number of commercial and free software applications and utilities support netCDF including ESRI ArcGIS(as of version 9.2) and MATLAB. Some of the features of netCDF that add to its popularity include:

1. Support for time-series of array-oriented data sets.
2. Direct access of data allows for efficient access of small subsets of large datasets.
3. A netCDF file can be self-describing. That is, it can include information about the data it contains.
4. NetCDF files are portable and can be accessed by computers with different methods of storing values.
5. One writer and multiple readers may simultaneously access the same netCDF file in a shared network.
6. Data may be appended to a properly structured netCDF file without copying the dataset or redefining its structure.

ArcGIS users can easily use EDEN netCDF datasets. EDEN netCDF datasets follow the climate and forcasting (CF) metadata conventions which specify spatial and temporal attributes included in the files (Table 1). This is the critical element in netCDF that allows integration with geographic information systems (GIS) such as ArcGIS. ArcGIS (versions 9.2 and later) has the ability to read CF-compliant netCDF files. The most important thing for users to know about EDEN water stage data files is that each file contains 3 months (a quarter) of daily datasets. So, for example, the data for every day in 2002 will be stored in 4 files: 2002_q1.nc, 2002_q2.nc, 2002_q3.nc, and 2002_q4.nc.

Table 1. CF-compliant metadata in the header of EDEN water stage netCDF files provides spatial information for projecting the data in a GIS as well as the start date and time step for the time-series of data in the file.

Attribute	Example Value in EDEN stage data files
Creation Date	October 2007
Conventions	CF-1.0
Source	JEM NetCDF writer
Layer name	stage
Spatial Reference	NAD_1983_UTM_Zone_17N
Datum	North_American_1983
Spheroid	GRS_1980
Prime Meridian	Greenwich, 0.0
Angular Units	Degree (0.0174532925199433)
Projection	Transverse_Mercator
Linear Units	Meter (1.0)
False Easting	500000
False Northing	0
Central Meridian	-81
Scale Factor	0.9996
Latitude of Origin	0
Grid Mapping Units	cm
Starting Date	2000-01-01T12:00:00Z
Time Step Units	days

References and additional sources of information:

About netCDF: http://www.unidata.ucar.edu/software/netcdf/

About CF Conventions: http://cf-pcmdi.llnl.gov/documents/cf-conventions/

NetCDF FAQ: http://www.unidata.ucar.edu/software/netcdf/docs/faq.html

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