

## Summary

- [?What is NetCDF?](#): network Common Data Form (NetCDF) is a self-describing, portable, scalable, appendable, sharable and archivable set of interfaces for array-oriented data access and a freely distributed collection of data access libraries for C, Fortran, C++, Java, and other languages.
- [?CF-Convention](#): climate and forecast (CF) metadata convention has been developed for use with climate and forecast data, and comparable observational datasets, to locate data in space?time as a function of other independent variables and to identify data sufficiently to enable users of data from different sources to decide what is comparable, and to distinguish variables in archives. Data should be self-describing?no external tables needed to interpret it. [?Slides of Jonathan Gregory \(Met Office\)](#).
- [?NetCDF Markup Language \(NcML\)](#): NcML is an XML representation of netCDF metadata. NcML is similar to the netCDF CDL (network Common data form Description Language), except, of course, it uses XML syntax. [?Schema](#).

## Links

- [?NcML Cookbook Examples](#)
- [?Standard Horizontal Coordinate Transforms \(Projections\)](#)
- [?Standard Vertical Transforms](#)
- [?NcML Aggregation](#)

## Examples

- **How to modify the values of a variable in a netcdf file?**

Ncml could be a useful tool to manipulate netcdf files. In this example, we are going to describe how to modify the values of a particular variable (rlat) in an existing netcdf file (tas.nc).

For this purpose it is necessary to generate a ncml that refers to that particular netcdf, by adding a location argument. Then, we just need to specify the variable name that we want to change, their values and the separator between them. The ncml file will look something like this:

```
<?xml version="1.0" encoding="UTF-8"?>
<netcdf xmlns="http://www.unidata.ucar.edu/namespaces/netcdf/ncml-2.2" location="tas.nc">
  <variable name="rlat">
    <values start="0.883846282958984" incr="0.22"/>
  </variable>
</netcdf>
```

In order to save the changes in a new netcdf file, we can use toolsUI.

```
java -cp /software/meteo/jar/toolsUI-4.6.5.jar ucar.nc2.write.Nccopy --input rlat_new.ncml --output tas_new.nc --format
```

### How to define new dimensions or correct/modify existing ones?

```
<?xml version="1.0" encoding="UTF-8"?>
<netcdf xmlns="http://www.unidata.ucar.edu/namespaces/netcdf/ncml-2.2" location="dods://opendap.knmi.nl/knmi/thredds/do
  <dimension name="rlon" length="464" />
  <dimension name="rlat" length="201" />
  <dimension name="time1" length="23922" isUnlimited="false" />
</netcdf>
```

### How to define new variables or correct/modify existing ones?

```
<?xml version="1.0" encoding="UTF-8"?>
<netcdf xmlns="http://www.unidata.ucar.edu/namespaces/netcdf/ncml-2.2" location="dods://opendap.knmi.nl/knmi/thredds/do
  <dimension name="rlon" length="464" />
  <dimension name="rlat" length="201" />
  <dimension name="time1" length="23922" isUnlimited="false" />
  <variable name="lon" shape="rlon" type="float">
    <attribute name="standard_name" value="longitude" />
    <attribute name="long_name" value="Longitude values" />
    <attribute name="units" value="degrees_east" />
  </variable>
</netcdf>
```

```

    <attribute name="axis" value="X" />
    <attribute name="_CoordinateAxisType" value="Lon" />
    <values separator=",">
        -40.375, -40.125, -39.875, -39.625, -39.375, -39.125, -38.875, -38.625, -38.375, -38.125, -37.875, -37.625
    </values>
</variable>
<variable name="lat" shape="rlat" type="float">
    <attribute name="standard_name" value="latitude" />
    <attribute name="long_name" value="Latitude values" />
    <attribute name="units" value="degrees_north" />
    <attribute name="axis" value="Y" />
    <attribute name="_CoordinateAxisType" value="Lat" />
</variable>
<variable name="time1" shape="time1" type="double">
    <attribute name="standard_name" value="time" />
    <attribute name="long_name" value="Time in days" />
    <attribute name="units" value="days since 1950-01-01 00:00:00" />
    <attribute name="calendar" value="standard" />
    <attribute name="_CoordinateAxisType" value="Time" />
    <values start="0" increment="1"/>
</variable>
</netcdf>

```

### How to aggregate datasets?

```

<?xml version="1.0" encoding="UTF-8"?>
<netcdf xmlns="http://www.unidata.ucar.edu/namespaces/netcdf/ncml-2.2" location="dods://opendap.knmi.nl/knmi/thredds/dodsC/e-obs_0.25regular/elev_0.25deg_reg_v10.0.nc" />
  <aggregation type="union">
    <netcdf location="dods://opendap.knmi.nl/knmi/thredds/dodsC/e-obs_0.25regular/elev_0.25deg_reg_v10.0.nc" />
    <netcdf location="dods://opendap.knmi.nl/knmi/thredds/dodsC/e-obs_0.25regular/pp_0.25deg_reg_v10.0.nc" />
    <netcdf location="dods://opendap.knmi.nl/knmi/thredds/dodsC/e-obs_0.25regular/rr_0.25deg_reg_v10.0.nc" />
    <netcdf location="dods://opendap.knmi.nl/knmi/thredds/dodsC/e-obs_0.25regular/tg_0.25deg_reg_v10.0.nc" />
    <netcdf location="dods://opendap.knmi.nl/knmi/thredds/dodsC/e-obs_0.25regular/tn_0.25deg_reg_v10.0.nc" />
    <netcdf location="dods://opendap.knmi.nl/knmi/thredds/dodsC/e-obs_0.25regular/tx_0.25deg_reg_v10.0.nc" />
      <variable name="tasmax" orgName="tx" />
    </netcdf>
  </aggregation>
</netcdf>

```

### How to aggregate files on an existing dimension?

```

<?xml version="1.0" encoding="UTF-8"?>
<netcdf xmlns="http://www.unidata.ucar.edu/namespaces/netcdf/ncml-2.2">
  <attribute name="svn_id" value="$Id: ncepReanalysis1_4xDaily.ncml 654 2015-03-05 17:27:46Z sixto $" />
  <dimension name="time" length="2924" isUnlimited="false" />
  <variable name="time" shape="time" type="float">
    <attribute name="units" value="hours since 1948-01-01 00:00:00" />
    <attribute name="_CoordinateAxisType" value="Time" />
    <values start="0" increment="6" />
  </variable>
  <aggregation dimName="time" type="joinExisting">
    <netcdf location="http://www.esrl.noaa.gov/psd/thredds/dodsC/Datasets/ncep.reanalysis/surface_gauss/air.1.0.nc" />
    <netcdf location="http://www.esrl.noaa.gov/psd/thredds/dodsC/Datasets/ncep.reanalysis/surface_gauss/air.1.0.nc" />
    <variable name="tas" orgName="air">
      <attribute name="_CoordinateAxes" value="time rlat rlon" />
    </variable>
    <dimension name="rlon" orgName="lon" />
    <variable name="rlon" shape="rlon" type="float">
      <attribute name="standard_name" value="longitude" />
      <attribute name="long_name" value="longitude" />
    </variable>
  </aggregation>
</netcdf>

```

```

        <attribute name="_CoordinateAxisType" value="Lon"/>
        <attribute name="units" value="degrees_east"/>
        <values>0.0 1.875 3.75 5.625 7.5 9.375 11.25 13.125 15.0 16.875 18.75 20.625 22.5 24.375 26.25 28.125 30.0
    </values>
</variable>
<dimension name="rlat" orgName="lat"/>
<variable name="rlat" shape="rlat" type="float">
    <attribute name="standard_name" value="latitude"/>
    <attribute name="long_name" value="latitude"/>
    <attribute name="_CoordinateAxisType" value="Lat"/>
    <attribute name="units" value="degrees_north"/>
    <values>88.542 86.6531 84.7532 82.8508 80.9473 79.0435 77.1394 75.2351 73.3307 71.4262 69.5217 67.6174 65.7131 63.8088 61.9045 60.0002
    </values>
</variable>
<remove name="lat" type="variable" />
<remove name="lon" type="variable" />
</aggregation>
</netcdf>

```

### How to aggregate files along a new dimension?

```

<?xml version="1.0" encoding="UTF-8"?>
<netcdf xmlns="http://www.unidata.ucar.edu/namespaces/netcdf/ncml-2.2">
  <attribute name="Conventions" value="CF-1.6, _Coordinates, UW-1.0"/>
  <attribute name="primary_variables" value="pr, psl, rls, rlut, tas, tasmax, tasmin"/>
  <attribute name="svn_id" value="$Id: day_GloSea5_12_members_seasonal_sfc.ncml 906 2015-12-30 07:43:37Z sixto $"/>
  <dimension name="member" length="4" isUnlimited="false"/>
  <variable name="member" type="string" shape="member">
    <attribute name="standard_name" value="realization"/>
    <attribute name="_CoordinateAxisType" value="Ensemble"/>
    <attribute name="ref" value="http://www.uncertml.org/samples/realisation"/>
    <values> 00 01 02 03 </values>
  </variable>
  <dimension name="time" length="20" isUnlimited="false"/>
  <variable name="time" shape="time" type="int">
    <attribute name="long_name" value="Forecast time for ForecastModelRunCollection"/>
    <attribute name="standard_name" value="time"/>
    <attribute name="units" value="hours since 1996-01-25T12:00:00"/>
    <attribute name="_CoordinateAxisType" value="Time"/>
    <values> 0 24 48 72 96 120 144 168 192 216 240 264 288 312 336 360 384 408 432 456</values>
  </variable>
  <variable name="latitude" type="float">
    <attribute name="_CoordinateAxisType" value="Lat"/>
  </variable>
  <variable name="longitude_0" type="float">
    <attribute name="_CoordinateAxisType" value="Lon"/>
  </variable>
  <variable name="longitude" type="float">
    <attribute name="_CoordinateAxisType" value="Lon"/>
  </variable>
  <variable name="pr" type="float" shape="member time latitude longitude">
    <attribute name="coordinates" value="member time latitude longitude"/>
  </variable>
  <remove name="bnds" type="dimension"/>
  <remove name="forecast_reference_time" type="variable"/>
  <remove name="realization" type="variable"/>
  <remove name="time_bnds" type="variable"/>
  <remove name="forecast_period_bnds" type="variable"/>
  <remove name="leadtime" type="variable"/>
  <remove name="longitude_0" type="dimension"/>
  <remove name="longitude_0" type="variable"/>
  <aggregation dimName="member" type="joinNew">
    <variableAgg name="pr"/>
  </aggregation>
</netcdf>

```

```
<netcdf>
  <aggregation dimName="time" type="joinExisting">
    <netcdf location="//oceanogmeteo/WORK/DATA/SPECS/output/MOHC/GloSea5/seasonal/ftp.ceda.ac.uk/ba
    <netcdf location="//oceanogmeteo/WORK/DATA/SPECS/output/MOHC/GloSea5/seasonal/ftp.ceda.ac.uk/ba
  </aggregation>
</netcdf>
<netcdf>
  <aggregation dimName="time" type="joinExisting">
    <netcdf location="//oceanogmeteo/WORK/DATA/SPECS/output/MOHC/GloSea5/seasonal/ftp.ceda.ac.uk/ba
    <netcdf location="//oceanogmeteo/WORK/DATA/SPECS/output/MOHC/GloSea5/seasonal/ftp.ceda.ac.uk/ba
  </aggregation>
</netcdf>
<netcdf>
  <aggregation dimName="time" type="joinExisting">
    <netcdf location="//oceanogmeteo/WORK/DATA/SPECS/output/MOHC/GloSea5/seasonal/ftp.ceda.ac.uk/ba
    <netcdf location="//oceanogmeteo/WORK/DATA/SPECS/output/MOHC/GloSea5/seasonal/ftp.ceda.ac.uk/ba
  </aggregation>
</netcdf>
  <aggregation dimName="time" type="joinExisting">
    <netcdf location="//oceanogmeteo/WORK/DATA/SPECS/output/MOHC/GloSea5/seasonal/ftp.ceda.ac.uk/ba
    <netcdf location="//oceanogmeteo/WORK/DATA/SPECS/output/MOHC/GloSea5/seasonal/ftp.ceda.ac.uk/ba
  </aggregation>
</netcdf>
</aggregation>
</netcdf>
```