COSMO-REA6 Starting Example

(for use within UNIX/Linux)

1. Download,
2. Unpack,
3. Convert to netcdf,
4. Illustrate and
5. Cut model area
6. Find right coordinates

Using the example of hourly 10m u-component:
U_10M.2D.199501.grb.bz2

1. Download

For UNIX/Linux access via console:

```
ftp ftp-rea.dwd.de
```

Login with user: anonymous, password: own email adress

```
cd pub/REA/COSMO_REA6/hourly/2D/U_10M/
```

```
get U_10M.2D.199501.grb.bz2
```

2. Unpack

with bzip2 (this can take some second or minutes):

```
bunzip2 U_10M.2D.199501.grb.bz2
```

3. Convert to netcdf

The use of Climate data operators (CDO) is suggested, look at [1] and [2].

```
cdo -f nc copy U_10M.2D.199501.grb U_10M.2D.199501.nc
```

4. Illustrate

After a conversion to netcdf the reanalysis data can be represented with `ncview`:

```
ncview U_10M.2D.199501.nc
```

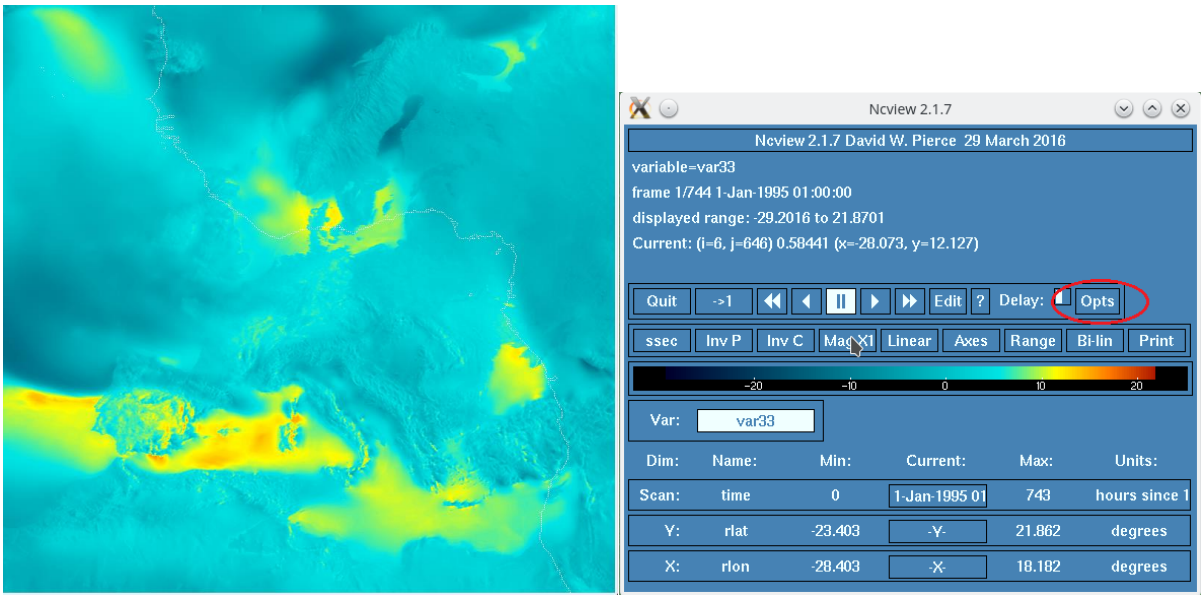

Figure 1: Illustration of U_10M.2D.199501.nc with `ncview` and the corresponding menu window

Concerning the rotated longitude-latitude field of COSMO-REA6 one can see the coastline of Africa (white line) instead of the European borders. The borders can be turned off during the *opts* function, which is highlighted in Figure 1. Here one can set the option *overlays* to *none*.

5. Cut out specific region

Cutting out a rectangle through the selection of only specific indices of whole:

```
cdo selindexbox,300,500,350,550 U_10M.2D.199501.nc myselection_
U_10M.2D.199501.nc
```

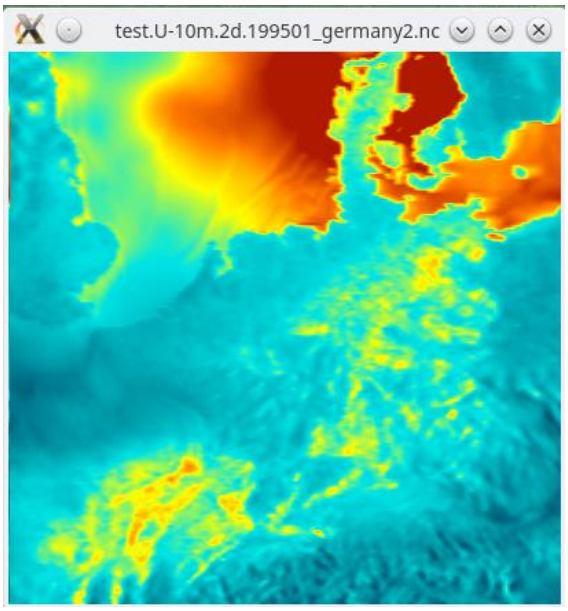

Figure 2: Illustration of myselection_U10M.2D.199501.nc by ncview; the coastlines are turned off and the color scheme was adapted due to the option *Range.* The maximum value is defined to be 10m/s

6. Find correct coordinates

COSMO-REA6 uses a rotated longitude-latitude grid with a shifted pole. This grid has no influence on scalar values compared to the geographical grid on which evaluations are performed, since scalar values are invariant to a rotation of the grid. However, the (vectorial) values U, V, U_100 and V_100 are only valid on the rotated grid, so they must not be used for evaluation on the geographical grid.

The following grid information is provided by ***cdo griddes*:**

gridtype = lonlat	xsize = 848
gridsize = 698752	ysize = 824
xname = rlon	xnpole = -162
xlongname = longitude in rotated pole grid	ynpole = 39.25
xunits = degrees	xfirst = -28.403
yname = rlat	xinc = 0.05500118
ylongname = latitude in rotated pole grid	yfirst = -23.403
yunits = degrees	yinc = 0.05500122

The non-rotated coordinates of COSMO-REA6 are saved in COSMO_REA6_CONST_withOUTsponge.grb.bz2 with the variable names **RLAT** and **RLON**. The variables **rlat** and **rlon** in the .nc file are only saved for technical reasons and don't need any further attention.

In order to identify further variable names, the following commands are helpful:

wgrib -V myselection_CONST.grb with wgrib [3]

grib_ls myselection_CONST.grb with Grib Api [4]

ncdump -h myselection_CONST.nc with ncdump

The non-rotated, geographical coordinates of the selected area in figure 2 can be selected with the following command:

cdo selindexbox,300,500,350,550 COSMO_REA6_CONST_withOUTsponge.grb myselection_CONST.grb

It is also possible to select only one grid point instead of a data field. The coordinates of the lower left corner of Figure 2 can be saved to corner.grb with following command:

cdo selindexbox,300,300,350,350 COSMO_REA6_CONST_withOUTsponge.grb corner.grb

Links:

[1] https://code.mpimet.mpg.de/projects/cdo/files

[2] https://code.mpimet.mpg.de/projects/cdo/embedded/cdo_refcard.pdf

[3] http://www.cpc.ncep.noaa.gov/products/wesley/wgrib.html

[4] https://software.ecmwf.int/wiki/display/ECC/ecCodes+Home