A short introduction to NCL used by E-TOOL-VIS

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In order to run E-TOOL-VIS you need to install NCL (NCAR Command Language) on your computer or workstation.
You can get the current version of NCL at http://www.ncl.ucar.edu/Download/

Choosing the right NCL binary for your Linux/UNIX system

In general follow these instructions: http://www.ncl.ucar.edu/Download/install.shtml

If you are installing pre-compiled NCL binaries on a Linux system, there are a number of binaries to choose from. To know which ones to select, type the following to get the type of system you have, and the version of gcc:

```
uname -m
gcc --version
```

If these two commands report "i686" and "4.1.2", then you should download the Linux binary for an i686 system running gcc version 4.1.2. If you don't have exactly this version of gcc, then try the closest in version (for example, download the 4.1.2 binary if you have 4.1.1).
Use the appropriate precompiled binaries for your system.

Optionally download the RANGS/GSHHS database if you need access to high-resolution map coastlines

You can get high-resolution coastlines in your NCL maps if you download and install the multi-resolution coastline database RANGS (Regionally Accessible Nested Global Shorelines), developed by Rainer Feistel from Wessel and Smith's GSHHS (Global Self-consistent Hierarchical High-resolution Shoreline) database.

To use this database, you must first download it from Rainer Feistel's website. Somewhere on this page you should see a table with ten *.zip files to download:

```
rangs(0).zip     gshhs(0).zip
rangs(1).zip     gshhs(1).zip
rangs(2).zip     gshhs(2).zip
rangs(3).zip     gshhs(3).zip
rangs(4).zip     gshhs(4).zip
```

You must download all ten of these files, unzip them, and either put them in the directory "$NCARG_ROOT/lib/ncarg/database/rangs" (which NCL will look in by default), or put them somewhere else and set the environment variable NCARG_RANGS to this directory. The files take up about 140 megabytes, unzipped.

Note that it is possible that after you unzip the files, the rangs(*n*).cat and rangs(*n*).cel files will get put in their own subdirectories. If this happens, you will need to move these files so they are in the same directory as the gshhs(*n*) files.

General information:

E-TOOL-VIS runs with NCL Version 6.0.0.

The NCL Homepage: http://www.ncl.ucar.edu/ provides many useful examples on how to use NCL.
You can copy and paste these examples and store them locally as your own *.ncl files.
Modifying theses *.ncl files can be done with every editor
To run a *.ncl program simply type
`ncl *.ncl`
from your prompt.

For examples see
http://www.ncl.ucar.edu/Applications/
or
http://www.ncl.ucar.edu/Document/Functions/
You may want to choose 'Meteorology' or 'Climatology' here.

NCL Manuals can be found at http://www.ncl.ucar.edu/Document/Manuals/

Files that come with the E-TOOL-VIS package:

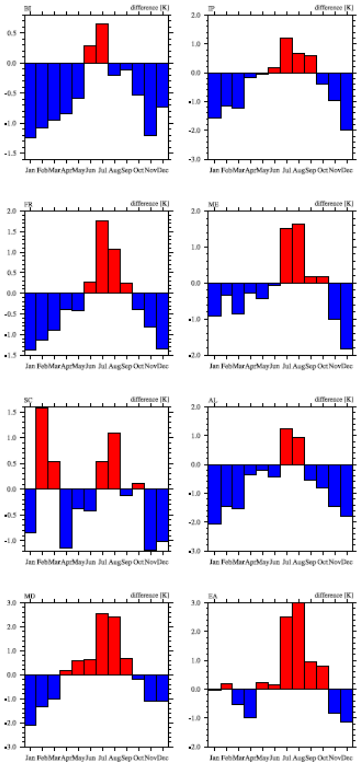
When you downloaded unzipped and untared the E-TOOL-VIS_v1.0.tar.gz file you will find four *.ncl programs as follows:
`calc_bias_t2m.ncl`
`plot_diff_t2m_whole.ncl`
`calc_bias_totprec.ncl`
and
`plot_diff_tot_prec_whole_sum.ncl`

The names should be self explaining.
These files are executed from the Shell-Script
`E-TOOL-VIS_v1.0.sh`
which controls the procedure.

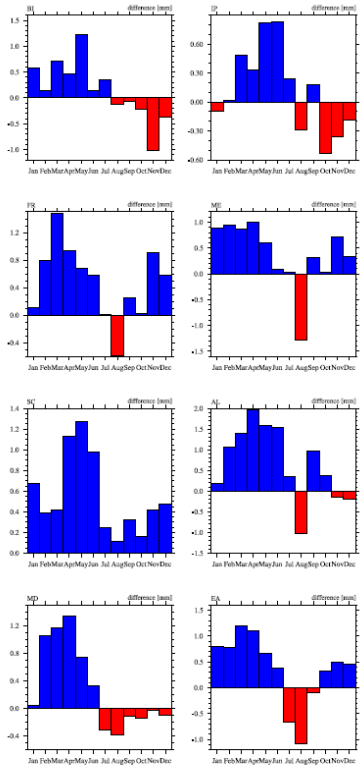
In order to perform the visualization the user has to add the following line into the E-Tool script:
`set R9 = T`
If "T" you will also need to specify the coordinates:
`setenv REGION_9 -30.0,30.0,55.0,70.0`
REGION_9 represents the whole modelling and E-OBS covered area and the visualization of seasonal and annual differences plot will be performed for this area only!
Visualization of the annual cycle of the bias for T2M and TOT_PREC will be performed for each REGION individually NOT for REGION_9!
This Script has to be run in SAV`path = ${CLMPath}/`ANA specified in the
E-TOOL script itself

If everything is properly installed/set, you will get 4 panel plots which look like these

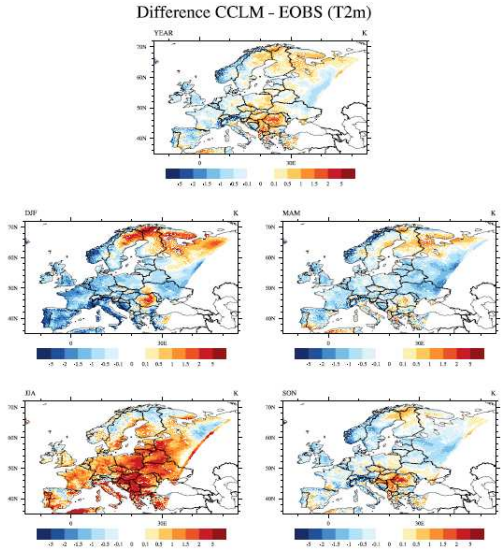
BIAS CCLM - EOBS (T2m)



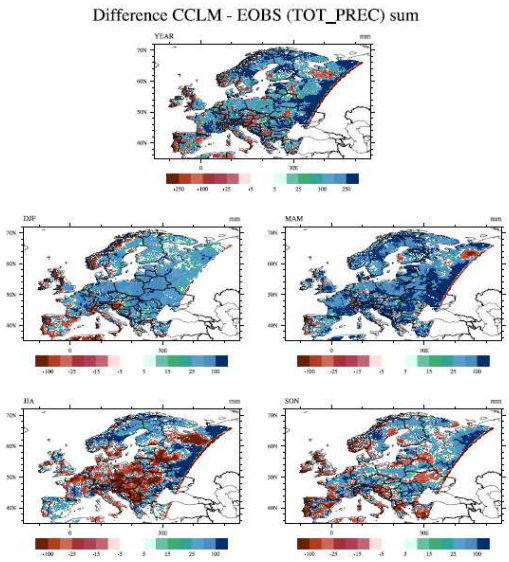
BIAS CCLM - EOBS (TOT_PREC)



Difference CCLM - EOBS (T2m)



Difference CCLM - EOBS (TOT_PREC) sum



Top Panel: BIAS for 8 PRUDENCE regions CCLM-EOBS (T2m left, total precipitation right). Lower panel: spatial differences (year and four seasons) for whole model domain.