Forcing Hands On

For this exercise, the NCAR Command Language (NCL) will be utilizing underlying Earth System Modeling Framework (ESMF) regridding tools for processing forcing files to the Front Range modeling domain. For this exercise, we will be regridding 12 km North American Land Data Assimilation (NLDAS) forcings to the modeling domain.

The forcing regridding exercise is located in the following directory:

~/ClassMaterials/data/forcing_regridding

Under this directory, you will see the following files:

- ESMF_genWgts_NLDAS2WRFHYDRO_forcing.ncl
- NLDAS2WRFHYDRO_forcing_regridder_ESMFregrid.ncl
- README_ESMF_regridding_NLDAS2_2_WRF_HYDRO
- geo_em.nc
- bashRegrid.sh

Additionally, there are two subdirectories:

- input_files
- output_files

The geo_em.nc file is the same domain file used for the previous hands-on exercises. The two ncl scripts are used the generate the necessary weight file for regridding, along with the actual regridding process. The README file is a text file with more detailed information on how to execute the ncl exercises for the regridding. The bashRegrid.sh script is a program that will run the necessary ncl scripts to regrid the NLDAS forcing files to the WRF-Hydro Front Range domain. The input_files subdirectory contains the necessary input NLDAS files in NetCDF format. The output_files subdirectory is an empty directory where regridded files will be placed.

The ESMF regridding process is a two-step workflow that starts with the generation of a weight file. The ncl script ESMF_genWgts_NLDAS2WRFHYDRO_forcing.ncl takes an input NLDAS forcing, along with the geo_em.nc file to generate a weight file, which will be used to regrid subsequent files. This script only needs to be ran once. The weight file generated from this first step is used, along with the input NLDAS forcing files to run the NLDAS2WRFHYDRO_forcing_regridder_ESMFregrid.ncl program. This last step runs the actual regridding to generate output files.

For this exercise, the first two steps have been combined into a single bash script bashRegrid.sh. In order to run the regridding exercise:

- cd ~/ClassMaterials/data/forcing_regridding
- ./bashRegrid.sh

Upon execution of this script, you will see a significant amount of standard output to the screen that is normal for ncl execution. Once the script is complete, if you run `echo $?`, you should see a return value of 0. A value not equal to 0 indicates potential errors. Upon successful completion, the output directory will be populated with regridded NetCDF files. Feel free to run NetCDF utility routines to get a better feel for the structure of the output files, along with what the fields look like.