*CARB Workflow README*

File specifics are contained in the header comments of each file. Most are self-contained, any extra needed files are specified below. **Some inputs/defaults at the top of each script will need to be edited.** Files are preceded by number indicating order to be run in, ordering is not absolute. Preprocessing and climate inputs are largely automated beyond changing inputs, sections 2, 3, and 4 will required more changing of inputs throughout and will depend more on the modeling objective.

Some specific notes on the preprocessing and climate input workflow:

1. 1.1\_Preproc\_get\_stream\_spatial\_data.R
   * Based on an input USGS gauge ID, retrieves an encompassing basin, DEM, soils data, and streamflow data. Encompassing basin may be the actual basin of interest or a larger basin, basin definition using GIS tools will likely still be needed.
   * Following this step, the user should preform their typical GIS map generation, an example of which is included using GRASS in the file ‘**1.2.3\_GRASS\_watershed\_preproc.sh’**, in order to get slope, aspect, horizon, stream, basin, and hillslope maps. Patch maps can be generated in a later step and zone map will be base on the netcdf.
     + NOTE: aspect is now being automatically changed from the default GRASS format into the standard format needed for RHESSys by the RHESSys Preprocessing (as of 9/2022)
2. 1.2.1\_Preproc\_pctcover2MSRrules.R
   * Automatically creates Multiscale Routing rules (in a rules file) and a rules map, to be used with RHESSys-MSR. This is based on input vegetation cover data, specifically the lifeform percent cover maps from Parra & Greenburg.
   * Based on an input basin map and the appropriate LPC maps (covering your region of interest), extracts the needed cover data, and bins to the nearest 10% (and accounts for issues arising form that binning). Outputs a text file of rules and a map of those same rule IDs.
   * Vegetation ID values may need to be changed depending on your vegetation parameter definition files.
3. 1.3\_Preproc\_make\_input\_maps.R
   * Automated generation of additional input maps, including a patch map (patches unique based on grid cells) and soils map reclassification (this is subjective and will need user input).
4. 1.4\_Preproc\_run\_preprocessing.R
   * Based on the above scripts (including the creation of maps via GRASS using the script in step 1 or via other methods), runs RHESSysPreprocessing and creates the world file and flowtable. Includes examples for running both standard and for use with MSR RHESSys.
5. 1.5\_clim\_ncdf\_processgridmet.R
   * Processes GridMet climate data, specifically temporally aggregated netcdf GridMet from THEDDS (<http://thredds.northwestknowledge.net:8080/thredds/reacch_climate_MET_aggregated_catalog.html>), subsets it based on an input basin raster file, and processes it to be compatible with RHESSys.
   * Requires NetCDF Operators (NCO, <http://nco.sourceforge.net/>) , can be downloaded or if on linux with apt via: sudo apt-get install nco
6. 1.6.1\_clim\_ncdf\_makebasestation.R
   * Requires the C file ‘createbaseinfo\_netcdf.c’, which should be included along with this workflow.
   * Using subset and processed netcdf climate data and a basin raster map, creates the climate grid, and then generates the appropriate basestation file needed for running netcdf climate with RHESSys using the compiled c program from createbaseinfo\_netcdf.c.
   * Assumes the use of extended climate inputs, if not all are being used the ‘netcdf\_XYZ\_filename’ and ‘netcdf\_var\_XYZ’, for the undesired climate inputs, can both be set as ‘NULL’ in the section starting at line 112.