**Hawaii Weather Research Forecast Model Data Processing Instructions**

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## Getting Started

This workflow requires R and ArcGIS 10.X. R is free, ArcGIS is not. For working with R, I highly recommend using RStudio (<https://posit.co/> now called posit, apparently).

This guide will cover 2D and 3D data products. The 2D data products are available from the USGS via the internet. The 3D data products are on physical hard-drives at the University of Hawaii Manoa. It will require a person to physically access the hard drives to extract any desired data.

All scripts (and this User’s Manual!) are available on GitHub: [www.github.com/akeyel/HI\_WRF](http://www.github.com/akeyel/HI_WRF).

In file names, ok indicates Oahu/Kauai and hm indicates Hawaii Big Island and Maui. Unfortunately the data conventions for the download differ between the two sets of islands, but once they are converted to daily files, the four islands should all use the same processing steps.

## Processing Notes

* January 1 1996 was missing from the present day runs.
  + For rainfall, this day was interpolated by assigning the rainfall that fell on Jan 1 and Jan 2 over the two day period evenly to the intervening hours.
* Data were processed on Hawaii time rather than GMT time.
  + Due to the GMT offset of 10 hours, the last year was missing 10 time steps.
  + These timesteps were filled in using the 364th day of the 2009 run to capture recent synoptic conditions.

## Overview of Scripts

Workflow.R This is the main script for processing the 2D data. It will call other scripts in the required order. It is best run interactively with one section at a time, as sometimes a step will result in error or may take some time for processing, in which case it may need to be re-run or corrected before attempting the next step. See 2D Data below for details on the scripts used by this workflow.

Variables.R: This script provides an overview of the 2D variables in the WRF file available for use.

Workflow\_hlpr.R This script contains the functions used by the other scripts. It is best navigated by searching for the desired function, as the functions are present in no particular order, and I navigate it using the search option.

## 2D Data

To download the precipitation data, the workflow is laid out in Workflow\_ppt.R.

The workflow will need to be run separately for each island.

The workflow consists of the following major tasks:

Load Functions: (Workflow\_hlpr.R), loads functions into memory but does not perform any actions

Load Settings (e.g., 000b\_PrecipSettings.R) Runs a settings file, , which contains instructions on how to run the rest of the processing. This will load variables into the active session.

Make a grid (was only run once, no need to run again) #\*\*# Pull out into a separate script then!

Download the chosen variable(s) for each scenario (0000\_Data\_Downloader.R). Downloads the data for an island. The speed of this script will depend on your internet connection, and may take several hours per island and scenario. The resulting data download may be large (10’s of GB)

#\*\*# DO WE NEED AN ANNUAL HOURLY FILE? #\*\*#

Process the downloaded hourly data into a daily file (001c\_ExtractAnnual\_hm.R)

Convert the daily files to .csv format (Daily\_to\_geotif.R)

Convert the .csv format to raster using ArcGIS tool 003c\_CSV\_to\_Rainfall\_Atlas\_Daily.py (add the ArcGIS Toolbox and the script tool should be available)

Process the daily data into aggregates (monthly and annual climatologies) (#\*\*# ProcessAnnual? Needs re-evaluation now that daily files are created differently)

## 3D Data

## Troubleshooting

**How to add an ArcGIS toolbox to ArcGIS and run it?**

Open ArcGIS

Right click on white space on the Toolbox

(if the toolbox is not open, it can be found XXXX)

Select “Add Toolbox”

Navigate to where the XXXX toolbox is stored. (if you did not download it from GitHub, you will need to download it. If you copied all the files from GitHub, it should be wherever you copied them)

Open the toolbox and find the tool that you want to use!

**I have ArcGIS Pro. Will the Toolbox tool still work?**

No. ArcGIS Pro uses Python 3 and ArcGIS 10.X uses Python 2. The Toolbox tool is written in a different version of Python, and would need to be adapted to Python 3 and ArcGIS Pro. Please contact me if this is something that is needed.

## Acknowledgements