Feeding WIMS with ASOS Observation Documentation

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**Introduction**

Fire danger maps are produced daily based on weather station data collected by the National Fire Danger Rating System (NFDRS) and published in the Weather Information Management System (WIMS). The NFDRS processor in WIMS produces an adjective fire danger rating based on fuels, weather, and topography at each weather station. Additional information is produced and published daily as part of the national curobs (current observations) and cufcst (current forecast) databases. Data is queried from WIMS and used as is or with percentile ranges to produce meaningful maps.

**Software Requirements**

As of Version 20150703, scripts are written to be compatible with ArcGIS 10.2.2 and Python 2.7.5 32 bit or 64 bit.

**General Data Processing**

The WIMS database is queried for a total of 77 RAWS stations. 72 of the 77 sites are currently used to produce map data for the state of Texas. Observation and Forecast data are processed individually with an output table for each. For each variable of interest, inverse distance weighted (IDW) interpolation produces a continuous output surface for the state of Texas. Interpolated outputs are reclassified from a gradient of values to whole numbers, 1 through 5. Finally, maps are produced and rasters and maps are archived.

**Folder Structure**

The general folder structure of the Fire Danger Maps must remain the same unless the associated scripts are modified to reflect changes. In its current form, the process includes the main folder (Fire\_Danger\_Maps\_Direct) with 6 subfolders, 2 scripts, 1 bat file, 1 readme file, and 1 documentation file. The two scripts within the main folder must be run to produce daily map outputs. These scripts must additionally remain within the main folder in order for path based functions to work correctly. This applies to all files excluding the readme and documentation files. The main folder (Fire\_Danger\_Maps\_Direct) can be placed anywhere. The folder structure is further outlined below.

Fire Danger Maps (folder):

Archive (folder):

Stores archived maps, rasters, and input tables

Fire\_Danger.py (python script):

Script used to produce daily maps from WIMS data

Fire\_Danger\_Maps\_Documentation\_2015 (word document):

This document

Inputs (folder):

Location where inputs must be placed or written to

Mapping\_Data (folder):

Location of map templates, shapefiles, layer files, and colormap file used in map production

Readme.txt (text file):

General instructions for running “Master\_fd.py” or “WIMS\_Query.py”

Results (folder):

Location where daily map outputs are stored

WIMS\_Query.py (python script):

Script used to query WIMS system and produce input tables

**Inputs**

Queried tables from the curobs and curfcst databases are split into 9 separate text files and copied to the inputs folder each day. While the files are technically comma-delimited format, they are stored without a “.txt” extension.

|  |  |
| --- | --- |
| **Inputs** | |
| **File Name** | **Full Name** |
| tx\_nfdr\_obs.csv | Daily WIMS Observations |
| tx\_nfdr\_fcst.csv | Daily WIMS Forecasts |

**Percentile Lookup Table**

A Lookup table is used for observed and forecast 10hr, 100hr, 1000hr, and ERC values to determine where the observed values fall within percentiles based on historical occurrence. For mapping purposes, original values are reclassified to values of 1 through 5 based on the percentile range.

**Template Files**

Daily maps are produced using map template files in the form of ArcGIS Map Document files (“.mxd”). The map templates store layouts, legends, and symbology information. There are a total of 10 template files, one for each map to be produced. Template layers are stored in the ESRI layer file format (“.lyr”). The layer files are used to preserve the symbology of cities, county boundaries, and WIMS sites. Symbology for the rasters is stored in as single colormap file. A colormap is used to assign specific colors to values within an integer grid. Colormaps do not store modified labels to values. To store labels, the values need to be changed in the mxd file or a raster layer file can be created in addition to the colormap. At this time, the labels are only stored in the legends.

**Scripts**

The bat file calls the two python scripts to query and map the data. Using the bat file ensures that the data is collected and processed correctly. However, the scripts can be run individually as necessary although modification would be required to add more flexibility. At this time, the ‘WIMS\_Query’ script is designed to look for data in the WIMS system from the current day or the previous day depending on the time of day. If the script is run at or after 3:00 p.m. central time, it will query data from the current day. If the script is run before 3:00 p.m., it will collect the previous day’s data. This is done because data for the current day is not available until late afternoon (~ 4:30).

**Script Logs**

Both scripts produce log files in the main folder (‘Fire\_Danger\_log’ and ‘WIMS\_Query\_log’). The log files are overwritten during the first run of the process each day and appended to during each additional run. The logs allow the user to track the number of stations returned in the WIMS\_Query as well as the number of stations used to produce maps. The log files will also indicate other issues such as if the WIMS system is down or inputs for mapping do not exist.

**Outputs**

Outputs are stored in the results folder each day and copied to the archive. Only “.png” maps are stored as final results and are overwritten each day. Archived results include each map and raster with the observation date or forecast date appended to the file name.

|  |  |  |
| --- | --- | --- |
| **Outputs** | | |
| **Intermediate File Name** | **In Archive (Y/N)** | **Full Name** |
| DRY | Y | Fuel Dryness |
| DRYFCST | Y | Forecast Fuel Dryness |
| ERCPER | Y | ERC Percentile |
| ERCFCSTPER | Y | Forecast ERC Percentile |
| HUNDPER | Y | 100 Hour Fuel Moisture Percentile |
| HUNDFCSTPER | Y | Forecast 100 Hour Fuel Moisture Percentile |
| RAWSD | Y | Fire Danger |
| RAWSFCST | Y | Forecast Fire Danger |
| TENFCSTPER | Y | Forecast 10 Hour Fuel Moisture Percentile |
| THOUPER | Y | 1000 Hour Fuel Moisture Percentile |

**Issues and Potential Changes**

As of Version 20150706:

**Changelog**

Version20150703:

The scripts and overall process have been given a facelift. Instead of 13 scripts, 2 scripts are used to Query data directly from WIMS and produce 10 output maps.