Data Deliverable Readme

Dataset: Standardized Fire Weather Research Database (sFWRD): HRRR_Historical

Abbreviation: sFWRD_HRRRHi

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NOAA Grant Title: Subseasonal Predictability of Fire Weather Metrics for Decision Support

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Deliverable Summary:

Data Overview: Raw data processed to reduce domain to relevant study area [25-50º N, 230-295º W], with 3km (~0.027º) spatial resolution. The hourly data available from the HRRR is also processed to the 24-hr minimum, maximum, and average for majority of variables where appropriate. Due to the shortened period of 2014-2018, standard climatological and anomaly analysis cannot be performed. Harmonics analysis was applied to develop a 'period average' for each variable for use in anomaly assessments. Each dataset is projected to represent variables on a standard coordinate system (time, latitude, longitude) for ease-of-use. Each variable file is provided in netCDF format, following the naming convention detailed

below. Variable names, descriptions, and units are also detailed below. Each file is compatible with the python sFWRD codebase.

Data File Naming Convention

<u>Baseline:</u>

o {VAR}_HRRR_HISTORICAL_Abs_YYYY.nc
        —Native dataset time series (hourly)
        —Format: (time, latitude, longitude)
o {VAR}_HRRR_HISTORICAL_{STAT}_Daily_YYYY.nc
        —Aggregated dataset time series (daily)
        —Format: (time, latitude, longitude)
        —STAT:
            +AVG: daily average value
            +MAX: daily maximum value
                +MIN: daily minimum value

<u>Harmonic:</u>

o {VARS}_{NORM}_HRRR_HISTORICAL_Abs_period.nc
        —Native dataset time series (hourly)
        —Period value from harmonic 1-5, representing a 'climatology' or 'anomaly' for analysis
        —Format: (time, latitude, longitude)
        —NORM:
            +ANOM: 'anomaly' value based on period normal
            +NORM: 'climatology' value based on period normal
o {VARS}_{STAT}_{NORM}_HRRR_HISTORICAL_Daily_period.nc
        — Aggregated dataset time series (daily)
        —Period value from harmonic 1-5, representing a 'climatology' or 'anomaly' for analysis
        —Format: (time, latitude, longitude)
        —NORM:
            +ANOM: 'anomaly' value based on period normal

+NORM: 'climatology' value based on period normal

—STAT:

+AVG: daily average value

+MAX: daily maximum value

+MIN: daily minimum value

Metadata: Each data file has the same standards for coordinate variables. The time variable is in datetime format, with hour values for the absolute time series. All other variables use float32 numerical format. Missing data is represented with a value of NaN.

Coordinates	Parameter Description	Units	Data Type
time	ABS: hourly value AVG/MIN/MAX: daily value	YYYY-MM-DD HH:MM:SS YYYY-MM-DD	datetime64
latitude	Degrees north	Decimal degrees	float32
longitude	Degrees east	Decimal degrees	float32

{VAR}	Variable Description	Units	Data Type
pbl	Boundary layer height	m	float32
cape	Convective available potential energy	Jkg^{-2}	float32
d2	2-m dew point	K	float32
ffwi	Fosberg fire weather index	N/A [0-100 scale]	float32
hdw	Hot-Dry-Windy surface value	$m\ s^{-1}\ hPa$	float32
gust	Instantaneous 10-m wind gust	$m\ s^{-1}$	float32
prate	Precipitation Rate	$kgm^{-2}s^{-1}$	float32
rh	Relative humidity	%	float32
sm	Soil Moisture	kgm^{-3}	float32

t2	2-m temperature	K	float32
tp	Total precipitation amount	m	float32
u10	10-m zonal wind component	m s^{-1}	float32
v10	10-m meridional wind component	m s^{-1}	float32
vpd	Vapor pressure deficient	hPa	float32
wd	10-m wind direction	Degrees (0-360)	float32
ws	10-m wind speed	m s^{-1}	float32

Database Citation:

Besong-Cowan, K., Fenske, T., Kramer, S. J., Huang, S., Benson, N., Kirtman, B., Potter, B., Lopez H., Perlin, N. (2024). Fire Weather Database and Sensitivities to Source Data. *In preparation*.

HRRR Source Citation:

Dowell, D. C., and Coauthors, 2022: The High-Resolution Rapid Refresh (HRRR): An Hourly Updating Convection-Allowing Forecast Model. Part I: Motivation and System Description. Wea. Forecasting, 37, 1371–1395, https://doi.org/10.1175/WAF-D-21-0151.1.

NOAA High-Resolution Rapid Refresh (HRRR) Model was accessed on 12/01/2023 from https://registry.opendata.aws/noaa-hrrr-pds.