Overview of Pyregence Data Archive (https://data.pyregence.org)

Files on this web server are grouped into subfolders that contain data related to the following items:

1. Fire weather forecast
2. Fire spread forecast
3. Fire risk forecast
4. Fuels and topography
5. Fire detection data
6. Fire history

Fire weather forecast

Root directory: `/fire_weather_forecast`

Description: CONUS 5-day hybrid forecast derived from 3 operational weather models created by ELMFIRE's weather analytics pipeline. A new 5-day forecast is generated every 6 hours.

Forecast is derived from operational weather models as follows:
- Forecast hour 0 – 36: Average values from High Resolution Rapid Refresh (HRRR) and North American Mesoscale Forecast System (NAM) at 3 km resolution
- Forecast hour 37 – 60: Values from NAM forecast at 3 km resolution
- Forecast hour 61 – 120: Values from Global Forecast System (~13 km resolution resampled to same projection, resolution, and extents as the HRRR/NAM).

Filenames and units:

The convention for timestamps in subdirectories is `YYYYMMDD_CC` where:
- `YYYY` = 4 digit year
- `MM` = 2 digit month
- `DD` = 2 digit day
- `CC` = 2 digit forecast cycle (00, 06, 12, or 18)

All times are in UTC. Within each subdirectory is a series of GeoTiff files with filenames that are named similarly as `QUANTITY_YYYYMMDD_HH0000.tif` where HH is hour. Available quantities are summarized in the table below:

QUANTITY	Units	Description
apcp01	kg/m^2	Precipitation accumulated in previous hour
wfwi	-	Fosberg fire weather index
weq	%	Equilibrium dead fuel moisture content
rh	%	2 m relative humidity
tmpf	°F	2 m temperature
wd	degrees	20 ft wind direction, meteorological convention
wg	mph	20 ft gust wind speed
Ws	mph	20 ft sustained wind speed

Fire spread forecast

<u>Root directory:</u> `/fire_spread_forecast`

<u>Description:</u> Burned area forecasts from fire modeled active fires, including both initial attack and campaign fires.

<u>Directory structure/compressed archive naming convention</u>

Forecasts are organized using the following directory structure and file naming convention:

`ca-dome/20200817_212400/elmfire/landfire/50/burned-area_20200819_150000.tif`

state   fire name   forecast start time   fire model   fuel inputs   burn probability   timestamp

In the above example, the GeoTiff file is the 50% burn probability[1] burned area forecast of the Dome Fire perimeter on 8/19/2020 at 15:00:00 UTC generated using the ELMFIRE spread model and LANDFIRE inputs and initialized at 8/17/2020 at 21:24 UTC.

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[1] Isochrones are generated from ensemble fire spread forecasts with ~1,000 ensemble members.

Fire risk forecast

Root directory: `/fire_risk_forecast`

Description: Outputs near-term fire risk forecast. These rasters are generated from Monte Carlo fire spread analyses where ignitions are distributed randomly across the landscape to mimic anthropogenic fires and fires caused by overhead electrical lines. Ignition density patterns are a function of intermediate to long-term dryness as quantified by Energy Release Component (ERC). Two types of ignition patterns are currently modeled:

1. *Natural and anthropogenic fires from all causes excluding fires ignited by the electrical grid.* Spatial ignition density pattern is a function of human presence on the landscape (as quantified by road density).
2. *Fires ignited by the electrical grid.* Here, the spatial ignition distribution pattern follows powerlines and increases with wind speed. For initial testing purposes, the ignition pattern is constrained to fires ignited within a buffer surrounding transmission line corridors as identified from publicly-available GIS data.

Although statewide fire spread runs are conducted at a resolution of 30 m, rasters are resampled to 150 m. New 5-day forecasts with hourly outputs are generated nominally twice per day but can be generated every six hours during high risk weather events.

Directory structure naming convention

Forecasts are organized using the following directory structure and file naming convention:

20200817_18/elmfire/all/landfire/fire-area_20200818_090000.tif

forecast cycle   fire model   ign. pattern   fuel input   quantity   timestamp
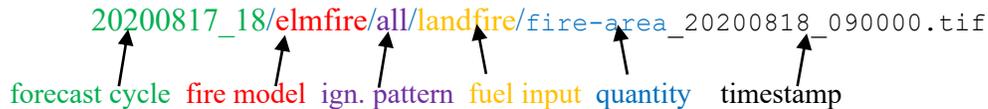
Here, ignition pattern is either "all" or "tlines" defined as follows:
*   all: natural and anthropogenic from all causes except the electrical grid
*   tlines: fires ignited by the electrical grid – currently transmission lines only

File naming convention

The convention for filenames is `quantity_YYYYMMDD_HH000000.tif` where `YYYYMMDD_HH000000` is the UTC timestamp and `quantity` is described in the table below:

Quantity	Units	Description
fire_area	acres	Fire area
fire_volume	acre-ft	Fire volume
impacted_structures	structures	# of structures within fire perimeter
times_burned	-	# of times burned

Fuels and topography

Root directory: `/fuels_and_topography/landfire_2.0.0`

Description: LANDFIRE Remap (LF 2.0.0) CONUS static fuels and topography inputs (2020 field conditions).

Filenames and units:

Filename	Units	Description
asp.tif	Degrees	Topographical aspect
cbd.tif	$100 \times kg/m^3$	Canopy bulk density
cbh.tif	$10 \times m$	Canopy base height
cc.tif	%	Canopy cover
ch.tif	$10 \times m$	Canopy height
dem.tif	m	Elevation
fbfm13	Categorical	Fuel model (Anderson 13 system)
nonburnable_mask.tif	-	Nonburnable raster
fbfm40	Categorical	Fuel model (Scott/Burgan 40 system)
slp.tif	Degrees	Topographical slope

Real-time fire detection

1. <u>CALFIRE active incidents</u>

    <u>Root directory:</u> `/fire_detections/calfire-incidents`

    <u>Description:</u> Location of large fires tracked by CAL FIRE and updated in real-time.

    <u>Filenames:</u> Every time a change is made to this list, a new GeoPackage is generated and timestamped with its time of creation using the following naming convention:

    ```
    calfire-incidents_YYYYMMDD_HHMMSS.gpkg
    ```

2. <u>NIFC Large Fires</u>

    <u>Root directory:</u> `/fire_detections/nifc-large-fires`

    <u>Description:</u> Location of large fires tracked by the National Interagency Fire Center (NIFC) and updated in real-time.

    <u>Filenames:</u> Every time a change is made to this list, a new GeoPackage is generated and timestamped with its time of creation using the following naming convention:

    ```
    nifc-large-fires_YYYYMMDD_HHMMSS.gpkg
    ```

Fire history

<u>Root directory:</u> `/fire_history`

<u>Description:</u> Fire history from various sources as described in the table below:

Filename	Description
calfire-fire-history.gpkg	California fire history through 2019
geomac-fire-history.gpkg	CONUS fire history through 2019