

Events Guide for

Forecast Event Awareness Tool

A GFE Procedure within CAVE
Updated February 2017

—
Prototype release

Outline

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Event Rules

The purpose and function of the *Forecaster Event Awareness Tool (FEAT)* is to alert the forecaster via *visual cues* to weather events of significance within the forecast grids. The application window shows the occurrence of significant weather events with color. The small boxes, representing gridded forecast data, show areas of the possibility of significant weather events occurring. Rules are used to process the forecast models grids. When the rule is satisfied, the grid box has a distinct color indication. See [FEAT User Guide](#).

If the rule is met for a grid area, the color of the grid box is flagged.
For example:

- The rule for Dense Fog is defined by: *Visibility* \leq .25
- High Wind rule is: *Wind* \geq 40.0 or *Wind Gust* \geq 58.0

The rules are associated with an event name. Any number of rules can be added to the database of events. Each event entry includes a *Name*, a *Description* of the event, a *Rule* to evaluate the event, a *Priority* rank (1-high to 5-low), and a *Category* type.

Look here: `Is $LOCALAPPS_RUN/FcstEventAwareness/src/*`

Edit the file *FcstEventConfig.py*. It's the code that preprocess the Forecaster Event Awareness data.


```
# List of Rules, surround each expression to be logic and/ logic or with PARENTHESIS, e.g. '(T < 30) & (Wind > 30)'.
# You can also have multiple compare operators in one expression. For example, writing '(30 < T < 50)' is valid.
# Note that the weather element is always first, on the left side.
# And remember, 'and' (&) is evaluated before 'or' (|).
# Final note: Spaces are IMPORTANT!! Space everything properly, look at examples.

eventDef = [
  { 'name' : 'HighWind',
    'Rule' : '(Wind >= 40.0) | (WindGust >= 58.0)',
    'Category' : 'Wind',
    'Priority' : 2,
```

```

'Description': '',
'EditAreas': ['siteID', ],
'EventWWA': 'Warning',
},
{ 'name': 'DenseFog',
  'Rule': '(Visibility <= .25)',
  'Category': 'Visibility',
  'Priority': 3,
  'Description': 'widespread fog to reduce visibilities to 1/4 mile or less over area',
  'EditAreas': ['siteID', ],
  'EventWWA': 'Warning',
},
{ 'name': 'RedFlag',
  'Rule': '(T > 80.0) & (Wind > 25.0) & (RH < 15.0)',
  'Category': 'Fire Wx',
  'Priority': 1,
  'Description': 'a fire warning, conditions are ideal for wildland fire combustion, and rapid spread',
  'EditAreas': ['siteID', ],
  'EventWWA': 'Warning',
},
}

```

Use the GFE "Edit Area and Query Dialog", at the icon , to test out the simpler rules you would like to add to the FEAT events definition Rules.

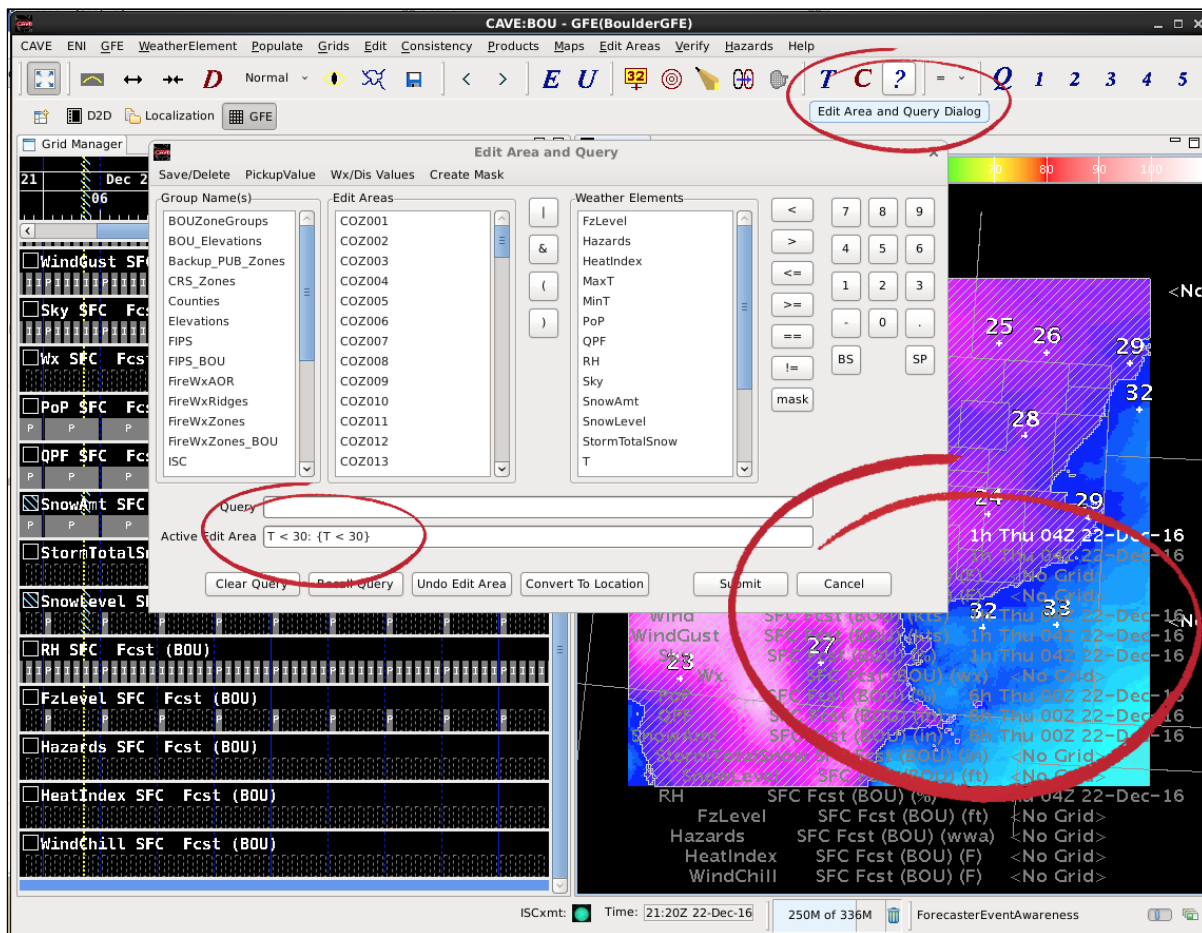


Figure: Image of the GFE "Edit Area and Query Dialog" to test out the simple query rules.

Ideas for Event Rules

"How can we find interesting events over time? ...with massive amounts of data to explore?" One answer is this tool. The following are a few ideas from an enthusiastic forecaster ...that are Not Yet Implemented. These require code enhancements. Think *possibilities*.

- *Look for gradients* — As you know where the weather is changing is most important, the suggestion is that we look for places with unusually high gradients in temperature, humidity or wind.
- *QPF over some standard time period* — Models have different time resolutions so we need to come up with a clever way to sum up the QPF over a 24-hour time period and create FEAT event records based on the sum.
- *Differences between model forecasts and the current forecast* — This involves comparing the Fcst elements (T, Td, Wind, etc.) to each model forecast (primarily subtracting them) and then generating events based on the magnitude of the difference.
- *Chance for freezing precip* — This involves comparing the maximum wet bulb temperature forecast (something that's already being calculated) against the surface temperature forecast. Certain thresholds will generate various FEAT events.

Rules using Edit Area

The Rules using various Edit Area options changes the answer of the grids and thus the percentage of grids that are indicated as a hazard.

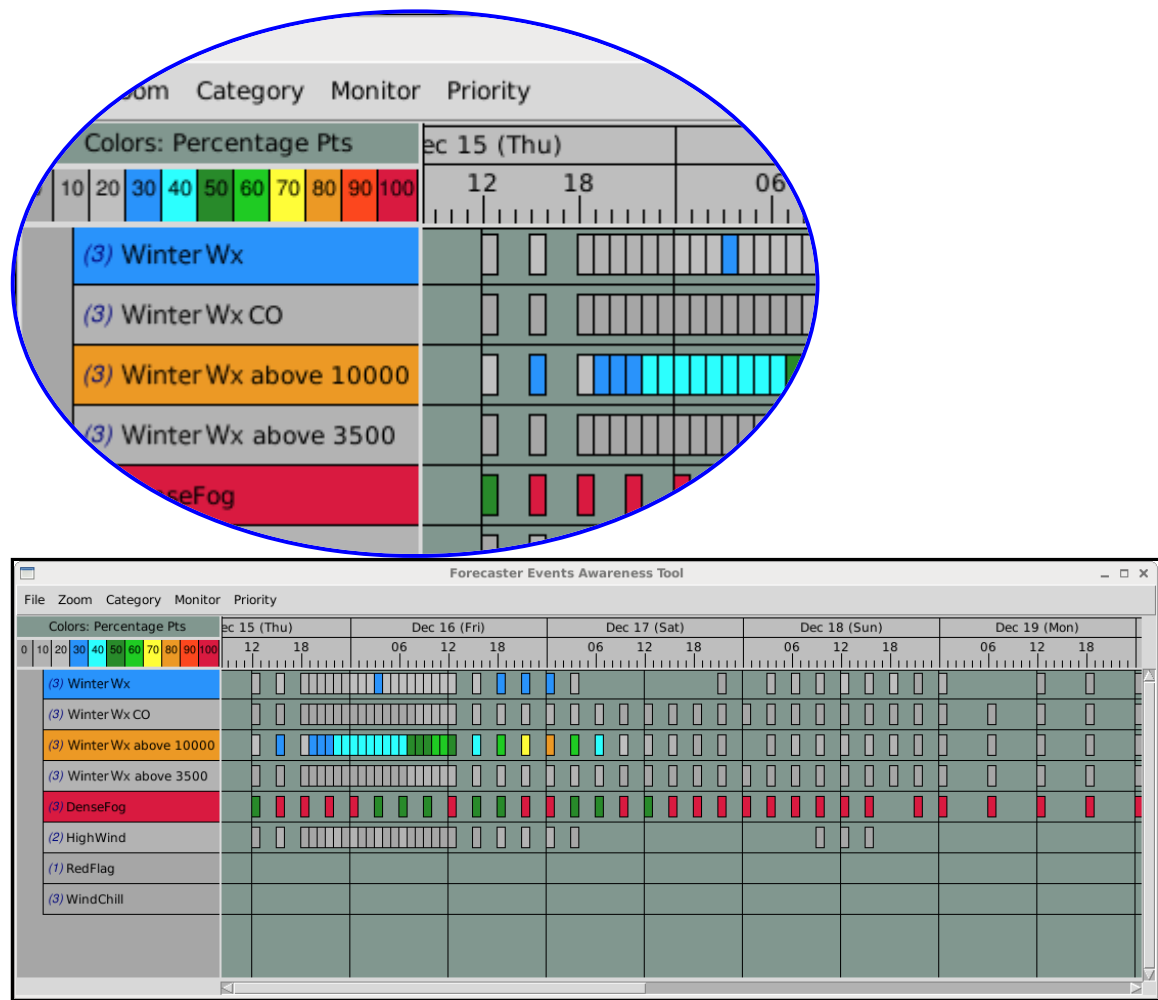


Figure: FEAT: Demonstration of 'Winter Wx' rules applied on 15 Dec 2016 to a variety of domains in Colorado, where the value for the EditAreas change. See corresponding **Rule entries** below.

Rule entries below that correspond to the image above, to illustrate the connection.

```

eventDef = [
  { 'name': 'Winter Wx',
    'Rule': '(T < 32.0) & (Wind > 20.0)',
    'EditAreas': ["COZ030", "COZ031", "COZ032", "COZ033", "COZ034", "COZ035", "COZ036",
    "COZ037", ],
    'Category': 'Winter',
    'Priority': 3,
    'EventWWA': 'Warning',
  },
  { 'name': 'Winter Wx CO',
    'Rule': '(T < 32.0) & (Wind > 20.0)',
    'EditAreas': ["Entire_Domain", ],
    'Category': 'Winter',
    'Priority': 3,
    'EventWWA': 'Warning',
  },
  { 'name': 'Winter Wx above 10,000 ft',
    'Rule': '(T < 32.0) & (Wind > 20.0)',
    'EditAreas': ["Above_10000", ],
    'Category': 'Winter',
    'Priority': 3,
    'EventWWA': 'Warning',
  },
  { 'name': 'Winter Wx above 3,500 ft',
    'Rule': '(T < 32.0) & (Wind > 20.0)',
    'EditAreas': ["Above_3500", ],
    'Category': 'Winter',
    'Priority': 3,
    'EventWWA': 'Warning',
  },
  { 'name': 'Dense Fog',
    'Rule': '(Visibility <= 0.25)',
    'EditAreas': ["siteID", ],
    'Category': 'Winter',
    'Priority': 3,
    'EventWWA': 'Warning',
  },
]

```

Gathering Edit Areas

The installation script (csh) runs and will install the code necessary to run the tool.

Note, *the edit areas for your WFO need to be extracted into a series of files* for the python scripts to read on and on-going basis. The installation script attempts to do this step for you, if no errors, then your system environment variable values and profiles are properly set for this action.

Look here to see if files are available: **ls**

\$LOCALAPPS_RUN/FcstEventAwareness/data/editAreas/*

Sub-sample of files for Colorado zones.

```

ls $LOCALAPPS_RUN/FcstEventAwareness/data/editAreas/COZ00*
COZ001.npz
COZ002.npz
COZ003.npz
COZ004.npz
COZ005.npz
COZ006.npz
COZ007.npz
COZ008.npz

```

COZ009.npz
 COZ010.npz
 COZ011.npz
 COZ012.npz
 COZ013.npz
 ...

If the above editAreas/ directory is empty, then this can easily be done manually.

From the GFE *Edit* menu, select 'Edit Areas Make Repo'. This step needs to be completed (*once*).

However, if or when your site creates a new edit area and uses that site with the Event Rules (above) **OR** your domain size is changed, the 'Edit Areas Make Repo' simply needs to be re-run in the manner described here.

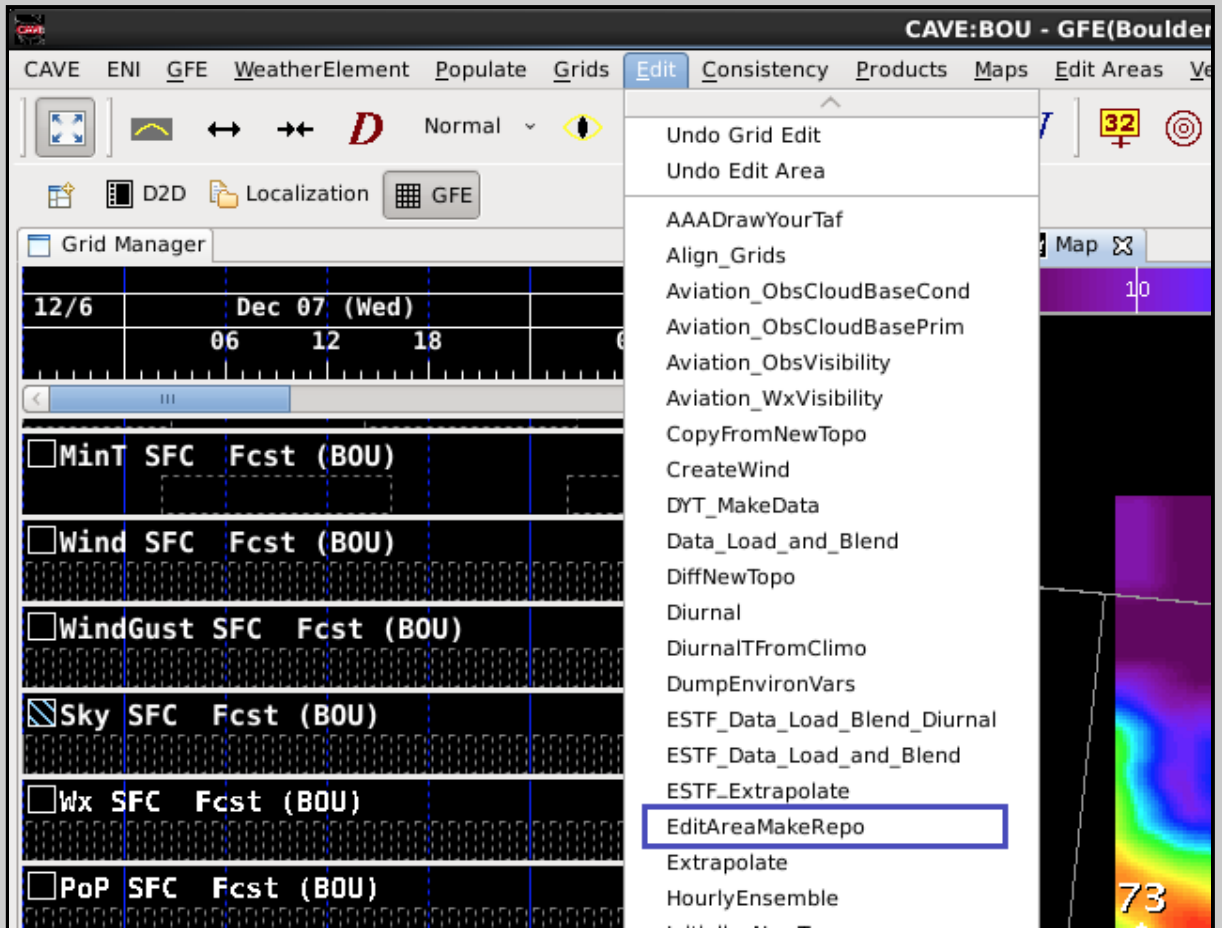


Figure: How to start the (simple) GFE Procedure to create edit area data files for Forecast Events Awareness Tool (FEAT).