UTC Standardization for the GFE

In order to streamline the ISC process between WFOs and minimize workload associated with the coordination of grid edits, a regional policy has been drafted requiring all WR WFOs to convert from local time to UTC time by May 31, 2005. This policy change was approved by the Regional Director on April 25, 2005. In addition to streamlining the coordination/collaboration process, this conversion to UTC will pave the way for the standardization of grid time-constraints in the future which will allow for further reduction of unnecessary workload.

Regional MOD note WR05-003 details the installation of overrides to the regional formatter files required at **ALL** WR WFOs. These formatter overrides will allow the local formatters to properly convert data from GFE grids on UTC time to text products based on local time. Further information pertaining to methodology and examples of how these changes will affect formatter output can be obtained by reading the following **UTCvsLT documentation.** In addition, all offices should make sure that any non-hourly grids (except Max/Min T) are defined using UTC time constraints in their local configuration.

All WR WFOs must install and test the regional overrides in their regional formatter files. Ideally this should be done on a local development server to minimize impact to operations. Local offices that already have in place local overrides designed for UTC time are welcome to continue using those overrides, however they must still install and test the regional overrides. WFOs that are using local overrides tailored for local time must either fall back to the attached regional overrides or modify their local overrides to work for UTC time.

In general, the impact of aligning grids by UTC instead of LT should have little if any affect on routine grids and local formatters. Differences can manifest themselves mainly in instances where small grids of 1-6 hours in length are present in the gridded database (see attached training documentation).

UTC vs Local Time Documentation

This documentation

- Gives an overview of the issues surrounding aligning grids by UTC vs Local Time.
- Explains how this affects the GFE formatters.
- Describes the modifications made to a few GFE formatter routines.
- Shows several examples of how the formatter will handle different scenarios. This section along with the flow-chart diagram can be used to help with forecaster training.
- Discusses other GFE products and what affect the UTC grids have on them.

- Gives instructions how to install the formatter overrides.

Background

- The NWS 10-503 directive states that the valid times for the ZFP periods are 6am-6pm and 6pm-6am Local Time.
- Model and MOS Guidance is all based on UTC time.
- Intersite Coordination between WFOs is complicated by time zones when offices are using local time. For example:
    - Office A on MDT starts their tonight grid at 00Z (6pm MDT).
    - Office B on PDT starts their tonight grid at 01Z (6pm PDT).
    - Thus at 00Z, ISC comparison is between Office A's TONIGHT grid and Office B's TODAY grid.

Using UTC time in GFE

In IFPS, the variable "temporalCoverage_percentage" controls how much of a grid is considered for inclusion in the wording of the ZFP. For example in PST:

```
12Z                        00Z                        12Z
    | 20% Chc Rain        | 80% Chc Rain        | 30% Chc Rain |
--4am----------------------4pm---------------------------4am------------------------
--------6am------TODAY------------6pm-------TONIGHT------6am----TOMORROW----
```

The 80% Chc of Rain begins at 4pm, which is technically still the TODAY period. However, most forecasters would agree that this is not what they want. In order to get GFE to ignore this, you would set the temporalCoverage_percentage to 20% (baseline default). Thus, the 2 hours of "overlap" from 4pm to 6pm is on 2/12^{ths} or 17% of the TODAY period, and is thus ignored.

However, say it's now 11am and you run an updated ZFP. Now instead of 12 hours, your TODAY period only has 7 hours (11am – 6pm), and the 2 hour overlap is now 2/7^{ths} or 29% of the period. Thus the 80% Chc of Rain, while ignored in the initial issuance of the ZFP, would suddenly appear in the ZFP Update without having changed the grids.

Sub-Periods in GFE

The above example assumed that you were only looking at 12 hour periods. Many offices use 6-hrly or 3-hrly sub-periods to better define the weather in their ZFP (e.g. morning fog, afternoon showers). When doing the temporalCoverage checks, GFE uses these sub-periods.

Say for example you have your formatter configured to allow 6-hourly sub-periods.

12Z 00Z 12Z

20% Chc Rain	80% Chc Rain	30% Chc Rain

--4am----------4pm----------4am----------
--------6am------12pm----------6pm----------12am----------6am--------12pm-----

You have temporalCoverage_percent=20%. For the AFTERNOON period, there is the 2 hour overlap of 80% Chc Rain, and the afternoon period is 6 hrs. Thus, even on the initial ZFP issuance, 2/6 = 33% which is greater than 20%, so the formatter would give you an 80% Chc Rain in the AFTERNOON.

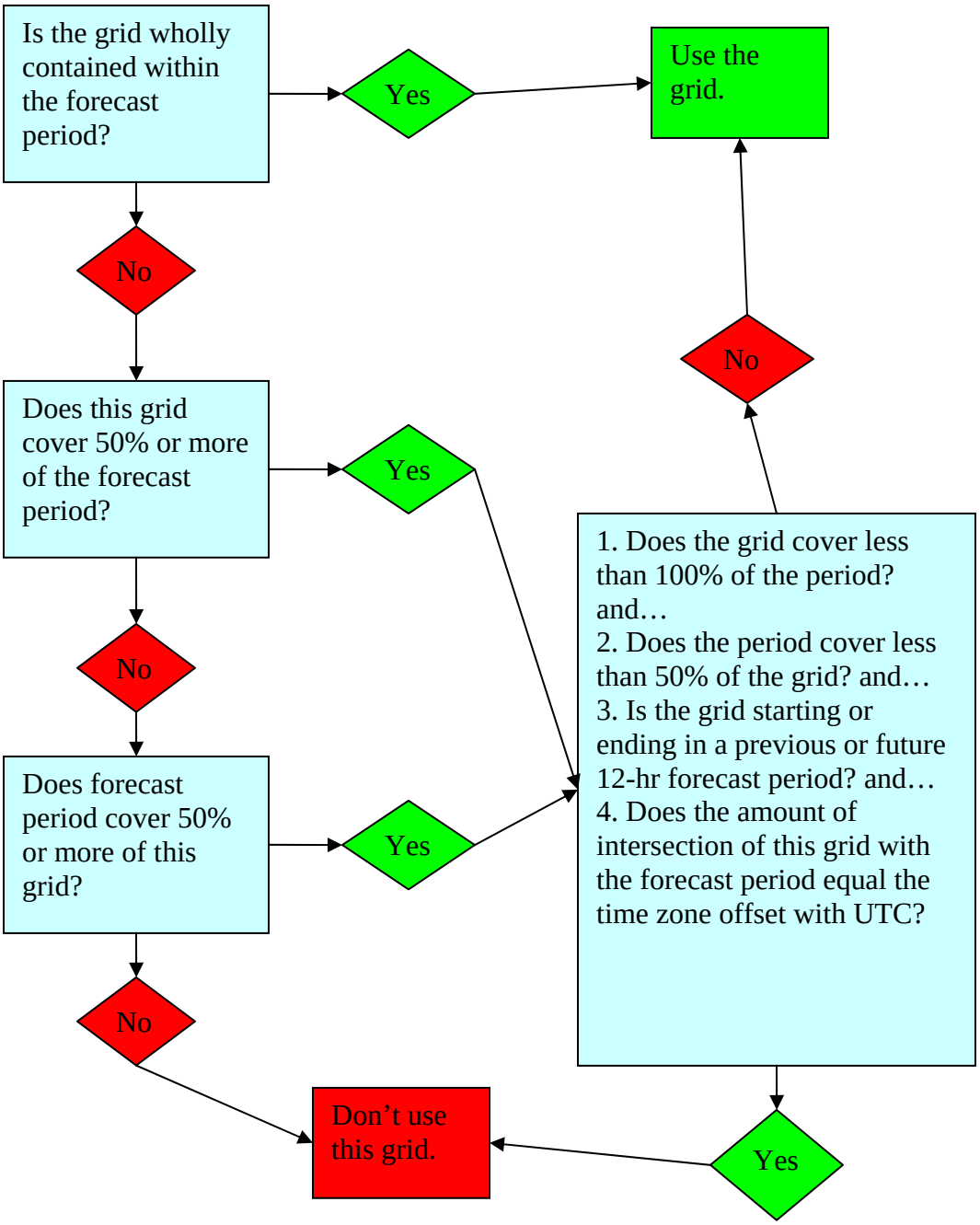
New temporalCoverage_flag routine

A number of new features have been incorporated into a new temporalCoverage_flag override. There are now 4 tests that are applied to determine if a particular grid should be used in a given forecast period (or sub-period). The first 2 tests are from the baseline code.

1. Is the grid wholly included within the forecast period? If yes, then use the grid. In otherwords, if the start and end of a grid are both within the forecast period, then the grid will be used regardless of the remaining checks. For example, the forecast period is noon-6pm. A grid of any length (up to 6 hours) will automatically be used if it starts at noon or later and ends at 6pm or earlier.
2. Does the grid cover at least temporalCoverage_percentage of the forecast period? If yes, the grid may be used (see test #4 below). The idea here is that we have a grid that is overlapping the start or end (or both) ends of the forecast period. We want to make sure that this grid actually covers enough of the forecast period to be worth considering.
3. Does the forecast period cover 50% or more of the grid? If yes, the grid may be used (see test #4 below). This test is applied if the grid failed test #2. Like test #2, we have a grid that is overlapping more than one forecast period. But even if it failed test #2, we would still want to use it if most (50% or more) of the grid is contained in this period. This prevents short grids from being ignored by both forecast periods. For example, for 12-hour periods say we have a grid that goes from 4pm-7pm. The 2 hours in the afternoon would fail test #2 for the DAY grid (2/12 = 17% < 20%) as well as the NIGHT grid, and thus would never be mentioned. But such a grid was likely created by the forecaster on purpose and thus should be included in at least one forecast period. Note that if the grid was 4pm-8pm, it would be included in both the DAY and NIGHT period because the test #3 check is for <u>equal to</u> or greater than 50%.
4. This test is applied if test #2 or test #3 was passed. It ensures that the grid is not a “slop-over” grid that is really intended for the earlier or later 12-hour period. It does this by checking to see if the grid is covering both sides of the 6am or 6pm time. If it is, then it also checks to see if the amount of slop-over is equal to the expected slop-over for that time zone. The expected slop-over is computed from the time zone offset from UTC, modulated by 6 hours. So PST has a slop-over of 2 hrs, as does EDT, Alaska DT, and Puerto Rico. EST, CDT, MST, and PDT have

a 1 hour slop-over. Alaska DT has 3 hours of slop-over and Hawaii Time has 4 hours. If the grid slopping over from an earlier or later period by this number of hours (and it's already going to be mentioned in that earlier/later period), then it's assumed that this is due to the UTC vs Local Time situation and was not created intentionally by the forecaster.

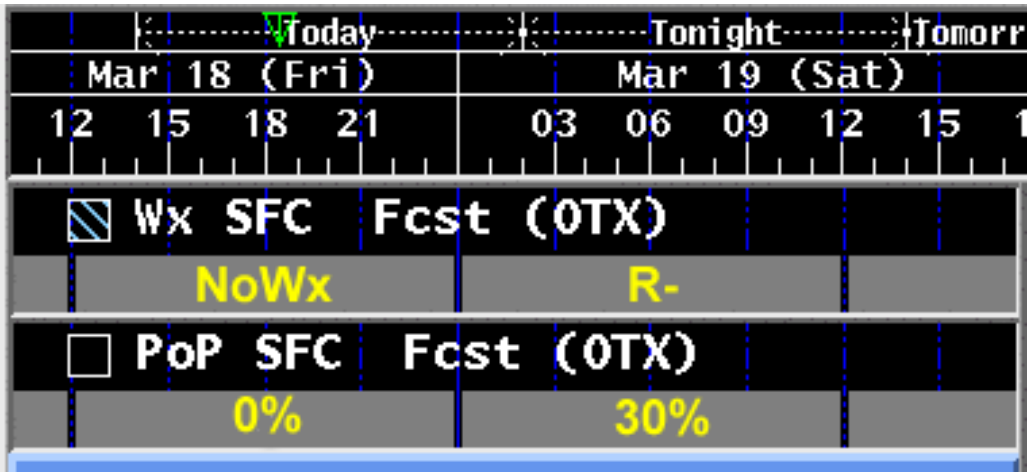
Flowchart


Is the grid wholly contained within the forecast period?
Yes
Use the grid.
No
Does this grid cover 50% or more of the forecast period?
Yes
No
Does forecast period cover 50% or more of this grid?
Yes
No
1. Does the grid cover less than 100% of the period? and…
2. Does the period cover less than 50% of the grid? and…
3. Is the grid starting or ending in a previous or future 12-hr forecast period? and…
4. Does the amount of intersection of this grid with the forecast period equal the time zone offset with UTC?
No
Yes
Don't use this grid.

Examples

Sub-periods refer to the formatter splitting a 12 hour period (e.g. TODAY) into shorter time chunks in order to add timing to the wording (e.g. AFTERNOON, EARLY EVENING, etc). Your IFPS Focal Point will be able to tell you what your formatter settings. Typically, the first period has 3-hour sub-periods, periods 2-6 have 6-hourly sub-periods, and Days 4-7 have 12-hourly periods.

Example 1:

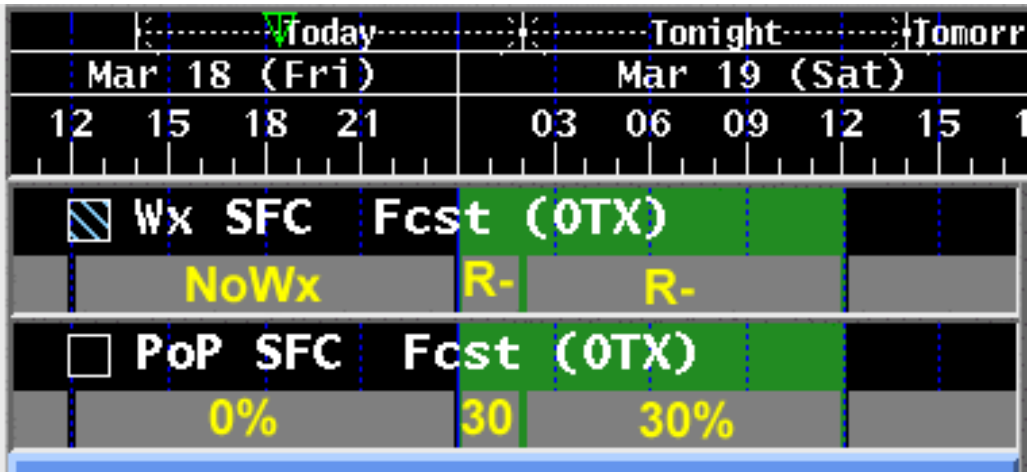


No matter what your sub-period setup is (3, 6, or 12 hours) you will get:

TODAY…SUNNY.
TONIGHT…A 30% CHANCE OF RAIN.

Even though the R- and 30% grids extend into the TODAY period, they are not used in the TODAY wording since this is an effect of the slop-over problem and the formatter will ignore it.

Example 2:



Now the forecaster has intentionally split the grid at 02Z (6pm PST). The result will be the following:

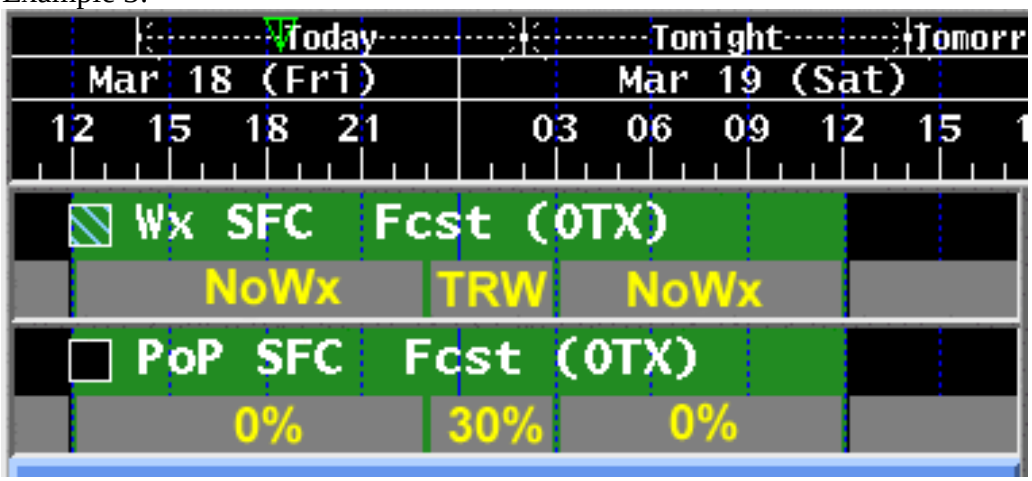
12 hour sub-periods
TODAY…A 30% CHANCE OF RAIN.
TONIGHT…A 30% CHANCE OF RAIN.

6 hour sub-periods
TODAY…SUNNY…THEN A 30% CHANCE OF RAIN IN THE AFTERNOON.
TONIGHT…A 30% CHANCE OF RAIN.

and for 3 hour sub-periods
TODAY…SUNNY…THEN A 30% CHANCE OF RAIN IN THE LATE AFTERNOON.
TONIGHT…A 30% CHANCE OF RAIN.

Since this 00Z-02Z grid is wholly contained within the TODAY period, the formatter must use it. The setting of the sub-period (set by your IFPS focal point) dictates how the timing of that 2 hour grid is rendered in the wording.

Example 3:



Similar to example 2, but the forecaster has put a 30% chance of thunderstorms between 23Z-03Z (3pm-7pm PST), with no chance of precipitation for the remainder of the TODAY and TONIGHT periods. The result would be:

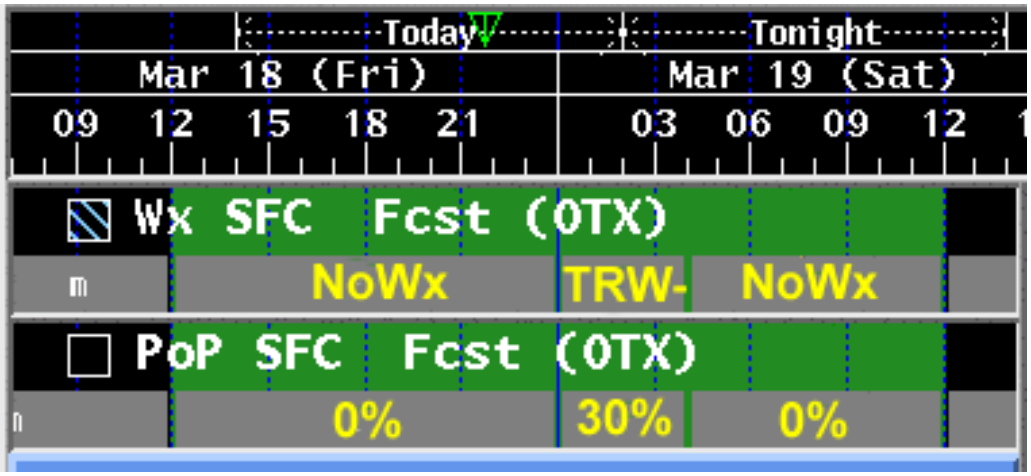
12 hour sub-periods
TODAY…A 30% CHANCE OF THUNDERSTORMS.
TONIGHT…CLEAR.

6 hour sub-periods
TODAY…SUNNY…THEN A 30% CHANCE OF THUNDERSTORMS IN THE AFTERNOON.
TONIGHT…CLEAR.

and for 3 hour sub-periods
TODAY…SUNNY…THEN A 30% CHANCE OF THUNDERSTORMS IN THE LATE AFTERNOON.
TONIGHT…CLEAR.

The formatter sees that 3 hours of the TRW- grid are in the TODAY period, and only 1 hour of the TRW- is in the TONIGHT period. The 3 hours is a sufficient portion of TODAY to mention, but 1 hour is insufficient to mention for TONIGHT.

Example 4:



Instead of the TRW- between 23Z and 03Z as in the previous example, now the TRW- grid is from 00Z-04Z (4pm-8pm PST). The result would be:

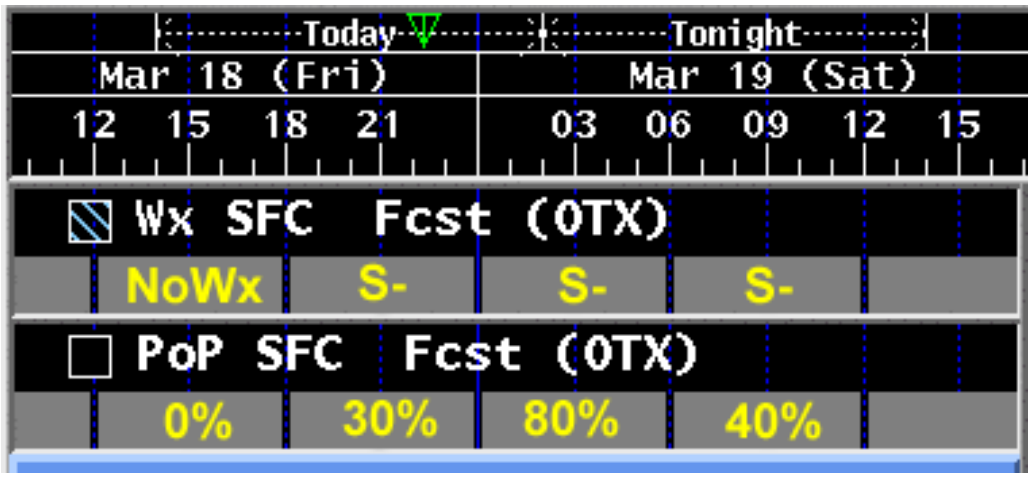
12 hour sub-periods
.TODAY…A 30% CHANCE OF THUNDERSTORMS.
.TONIGHT… A 30% CHANCE OF THUNDERSTORMS.

6 hour sub-periods
.TODAY…SUNNY…THEN A 30% CHANCE OF THUNDERSTORMS IN THE AFTERNOON.
.TONIGHT… A 30% CHANCE OF THUNDERSTORMS IN THE EVENING THEN CLEAR AFTER MIDNIGHT.

and for 3 hour sub-periods
.TODAY…SUNNY…THEN A 30% CHANCE OF THUNDERSTORMS IN THE LATE AFTERNOON.
.TONIGHT… A 30% CHANCE OF THUNDERSTORMS IN THE EARLY EVENING…THEN CLEAR LATE EVENING AND OVERNIGHT.

There are 2 hours of the TRW- grid in both the TODAY and the TONIGHT period. Thus, the formatter can't ascribe them to only one period and places the Thunderstorm wording in both TODAY and TONIGHT periods. Also note that the TRW- grid could be mistaken as a slop-over grid, since it starts at 00Z and extends into the tonight period. But the formatter sees that at least 50% of the grid is in the TODAY period, so it includes it anyway. If the TRW- grid was from 00Z-05Z (4pm-9pm PST), then less than 50% of it would be in the TODAY period and so it would only be mentioned in the TONIGHT period.

Example 5:



12 hour sub-periods
.TODAY…A 30 PERCENT CHANCE OF SNOW.
.TONIGHT…SNOW.

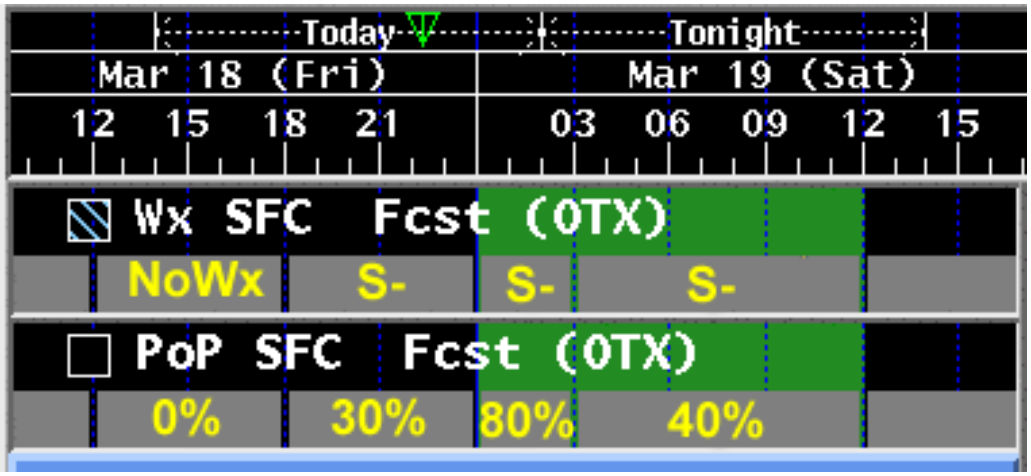
6 hour sub-periods
.TODAY…A 30 PERCENT CHANCE OF SNOW.
.TONIGHT…SNOW IN THE EVENING…THEN A CHANCE OF SNOW AFTER MIDNIGHT.

The subperiods are assigned as follows:

- 6am-noon – 30% Chc Snow, because the 18Z-20Z (2 hrs) is 33% of the subperiod (greater than 20% threshold), and this is not a slop-over from the next 12-hour period.
- noon-6pm – 30% Chc Snow. The 00Z-02Z of 80 PoP is ignored because it's just slopping over from the TONIGHT period.
- 6pm-midnight – 80% Chc Snow.
- midnight-6am – 40% Chc Snow.

3 hour sub-periods
.TODAY…A 30 PERCENT CHANCE OF SNOW IN THE LATE MORNING AND AFTERNOON.
.TONIGHT…SNOW IN THE EVENING…THEN A CHANCE OF SNOW AFTER MIDNIGHT.

Example 6:



Same as Example 5, but now the 80% Chc Snow only lasts until 03Z (7pm PST).

12 hour sub-periods
.TODAY…SNOW.
.TONIGHT…A 40% CHANCE OF SNOW.

The subperiods are assigned as follows:

- 6am-6pm – 80% Chc Snow. The 00Z-03Z S- grid is put in the TODAY period because 2 of the 3 hours are before 6 pm.
- 6pm-6am – 40% Chc Snow. The remaining hour of the 00Z-03Z of 80 PoP is ignored because it's too short (only 6-7pm) and it's less than 50% of the grid.

6 hour sub-periods
TODAY…A CHANCE OF SNOW IN THE MORNING…THEN SNOW IN THE AFTERNOON.
TONIGHT…A 40% CHANCE OF SNOW.

The subperiods are assigned as follows:

- 6am-noon – 30% Chc Snow, because the 18Z-20Z (2 hrs) is 33% of the subperiod (greater than 20% threshold), and this is not a slop-over from the next 12-hour period.
- noon-6pm – 80% Chc Snow. The 00Z-02Z of 80 PoP is <u>not</u> ignored because although it's slopping over from the TONIGHT period, more than 50% of the grid is in the TODAY period (i.e. it won't get mentioned in the TONIGHT period because it's too short (only 6-7pm)).
- 6pm-midnight – 40% Chc Snow. The 02Z-03Z is ignored because it's too short and less than 50% of the 00-03Z grid.
- midnight-6am – 40% Chc Snow.

3 hour sub-periods

.TODAY…A 30 PERCENT CHANCE OF SNOW IN THE LATE MORNING AND EARLY AFTERNOON. WIDESPREAD SNOW IN THE LATE AFTERNOON.
.TONIGHT…40% CHANCE OF SNOW.

Forcing wording

The first test in the GFE temporal check routine that allows the forecaster to "force" a grid into a period regardless of the remaining logic tests. The formatter will use any grid that grid is ***wholly*** contained in the ZFP period, regardless of its length.

This allows the forecaster to control situations such as early morning fog or early evening thunderstorms. For example, say you have the following:

12Z 18Z 00Z 03Z 12Z 18Z

0% Chc Rain	30% Chc Tstms	0% Chc Rain	0% Chc Rain	30% Chc Rain

--4am----------4pm----------4am----------
--------6am------TODAY--------6pm-------TONIGHT----------6am----TOMORROW----

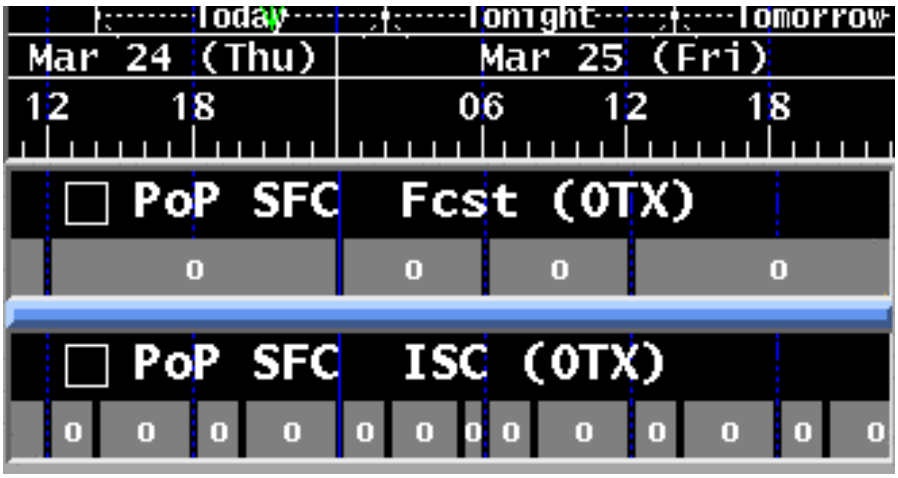
The forecaster expects the thunderstorms to end by 03Z (7pm). The formatter would see the 6pm-7pm segment of the TONIGHT period, but would ignore it since it is less than 20% of the period. But if the forecaster wants to have a mention of evening thunderstorms, he/she can simply split the grid at 6pm (02Z). Then the 6pm-7pm thunderstorm grid is wholly contained within the tonight period and will be included regardless of its length.

Another option that the forecaster has is choosing the Morning or Afternoon "with Pre-1st Period" in the initial ZFP dialog box when starting the formatter. For example, you have thunderstorm grid running from noon until 7pm and you're producing your afternoon package. If you use the normal "Afternoon" choice on the ZFP dialog box, the formatter will start "looking" at grids at 6pm. The noon-7pm thunderstorm grid will be ignored because only one hour of the grid (6-7pm) would be considered for the starting TONIGHT period. While splitting the grid at 6pm would solve this problem, another way to get the thunderstorm wording into the 1st period is choosing the "Afternoon with Pre-1st Period" option. This starts the formatter2 hours earlier (i.e. at 4pm), and thus the early evening thunderstorms would now be included in the TONIGHT period.

Running a Formatter on the ISC database

Another issue concerns running a formatter from the ISC database instead of Fcst or Official. This is fairly common in Western Region where each office's Fire Wx area overlaps into another CWA. Running from ISC can cause problems. Here's why:

The ISC database has to manage grids on differing time-scales. If one (or more) neighbors have a different time scale than your grids, ISC will make a “mini” grid to cover that time span.



This can cause problems for the formatter because the formatter will consider any grid wholly contained in the period. So in the example above, the PoP grid in the Fcst database is split at 00Z, and the 00Z-06Z grid will not be used for the TODAY period. But in the ISC database, due to differences with the grid alignment in neighboring WFOs, the 00Z-02Z time period has been split into it’s own grid, and thus will be used by the formatter, which essentially defeats the work done to the temporalCoverage_flag.

When all offices are aligned on UTC, this problem will largely go away. However, it could still arise in some situations where at least one office has a non-UTC aligned grid to account for something like evening convection or morning fog.

Other Products

FWF

The above modification to the temporalCoverage_flag routine will also work for the FWF. However, there is one exception to this. The Baseline FWF code uses sub-periods of [0] for the analysis list of the Sky, PoP, Wx, and LAL. This allows the UNTIL phrasing in the first 3 or 4 periods of the FWF to put the exact time of a change (e.g. MOSTLY SUNNY UNTIL 1300…THEN PARTLY CLOUDY).

Unfortunately, this will also detect changes that are due only to the difference between UTC and Local Time. For example, say you’re in PDT or MST, so 00Z = 5pm. Then if you start a new grid at 00Z, your wording will likely come out something like PARTLY CLOUDY UNTIL 1700…THEN MOSTLY CLEAR.

The best solution to this is to change the sub-periods to [3] for the Sky, PoP, Wx, and LAL. Then the temporalCoverage_flag routine will ignore these slop-over grids as it

does with the ZFP. By using sub-periods of 3 hours, you can still get UNTIL phrasing. The only difference is that it will now be rounded to the nearest 3 hours in local time (e.g. PARTLY CLOUDY UNTIL 2100, or CHANCE OF SHOWERS AFTER 1500).

Of course, you can choose sub-periods of 6 or 12 hours in length if desired. Also, you can turn off the UNTIL phrasing as well.

CWF

The CWF formatter also uses the temporalCoverage_flag routine. So long as the sub-period for any element is set to 3 hours or greater, then the CWF should behave similar to the ZFP.

PFM

The PFM displays data in 3-hourly snapshots aligned with local time. Thus, depending on time zone or daylight savings time, the UTC portion of the timeline will change.

Local Time	03	06	09	12	15	18	21	00	03	06
UTC Times										
PST	11	14	17	20	23	02	05	08	11	14
MST/PDT	10	13	16	19	22	01	04	07	10	13
MDT	09	12	15	18	21	00	03	06	09	12

Since the largest UTC/LT offset in the CONUS is 2 hours (PST and EDT), this won't cause a "displacement" of the Sky/PoP/Wx to a different time period than what was intended. Thus, there are no impacts to the Baseline PFM in the CONUS.

SFT

The SFT analyzes the 6am-6pm period for Sky/PoP/Wx. The Baseline code uses StdDevMinMax for PoP, DominantWx for Wx, and Avg for the remaining weather elements. The largest UTC/LT offset in the CONUS is 2 hours (PST and EDT). Thus 10 of the 12 hours come from the 12Z-00Z time range. The StdDevMinMax and DominantWx routines will use the 10 hours of PoP and Wx, and ignore the remaining 2 hours. So there are no impacts to the Baseline SFT in the CONUS.

CCF

This product was already aligned by UTC (i.e. PoPs are 00Z-12Z and 12Z-00Z). So the CCF actually works better when aligning grids according to UTC vs LT.

NDFD Grids

The NDFD checks for Day 8 grids out to 00Z on Day 9. Since this new paradigm of aligning grids by UTC would typically have the last grid ending at 00Z, the 00Z-01Z time slot that NDFD is checking would be missed. Thus, offices have 2 choices:

1. Stretch the last Wind, Sky, PoP, Wx grids out to 01Z on Day 8. This would have to be fixed when the new Day 8 is added on the following day.
2. Have a 00Z-12Z grid (i.e. Day 8 and ½).

Western Region Web Page

Text Generated from Grids

WR Web text formatters are configured to be very similar to the baseline GFE formatter. The formatter works as follows:

1. Look specifically at the 6am-6pm and 6pm-6am forecast period in Local Time.
2. Ignore any grid that covers less than 20% of the forecast period (i.e. 2 hours or less)
3. Include any grid that is wholly contained in the forecast period.
4. For PoP and Sky, use the greatest value in the grids that passed the above checks.

Thus, the shift from LT to UTC should have no effect on the web page text, since a 1 or 2 hour slop over will be ignored.

Installation Instructions

1. Ensure that you aren't already overriding the following routines in any of your overrides files. If you are, you'll have to decide whether to merge your changes with these UTC overrides, or just remove your changes entirely.
    a. temporalCoverage_percentage
    b. temporalCoverage_dict
    c. temporalCoverage_flag
    d. getDominantValues
2. Copy the UTC_Overrides.TextUtility file into your formatter overrides file.
    a. ZFP: ZFP_xxx_Overrides
    b. CWF: CWF_xxx_Overrides
    c. FWF: FWF_xxx_Overrides
    d. any other locally developed formatters that are similar to the above three narrative formatters (e.g. SFP, SAF).
3. The first line of the UTC_Overrides.TextUtility file has an "import TimeDescriptor" line. Move this line up to the top section of your override file, putting it in the same section as the rest of the imports.

If you're on IFPS17.3, you ***must*** remove the getDominantValues override. This override was a bug