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# ZSE Weather Watch

A newsletter from your Seattle ARTCC Center Weather Service Unit

Inside this issue:



## TEMPO Groups in TAFs *by Allen Kam, Meteorologist, NWS Seattle*

The TEMPO group in a Terminal Aerodrome Forecast (TAF) is used to identify significant weather conditions that may temporarily differ from prevailing conditions. TEMPO means exactly that, temporary. A good example of this would be a weather pattern where showers are expected behind a cold front. In a common showery weather pattern over Western Washington, the prevailing weather is frequently VFR with the dominant cloud layer anywhere from 3,000 to 6,000 feet. But if one of the scattered showers moving across the region manages to reach the TAF airport, the dominant cloud layer could briefly lower to below 3,000 feet, which would result in marginal VFR conditions (MVFR). Once the shower goes by conditions usually improve back to close to the prevailing weather.

A TAF forecast for a showery weather pattern may look like this:

**FM 151800 23006KT P6SM SCT030 BKN050**
**TEMPO 1518/1522 -SHRA BKN025 BKN050**

The decoded TEMPO group says, on the 15th day of the month, from 18Z to 22Z, light rain showers (-SHRA) may occur with broken cloud layers at 2,500 feet and 5,000 feet (BKN025 BKN050). The prevailing conditions are for just scattered clouds at 3000 feet and broken clouds at 5000 feet (SCT030 BKN050) and no rain showers.

In TAFs prepared by the National Weather Service, a TEMPO group may be used if: (1) the temporary condition has greater than 50% chance of occurring; (2) the temporary condition is expected to last less than one hour for each individual occurrence; and (3) the total duration of the temporary condition is less than half the forecast period.

Furthermore, the duration of a TEMPO group must not exceed four hours.

For many years, NWS forecasters have been directed to use TEMPO groups with care, since air carriers are bound to flight plan according to the lowest forecast conditions at any given time in a TAF. NWS guidelines strongly discourage the use of TEMPO groups beyond 10 hours in any TAF.

In the previous example, the TEMPO group was used for lower conditions. A less common use of the TEMPO group is to highlight conditions that will be temporarily better than prevailing. An example might be when low stratus clouds blanket the greater Puget Sound region during the summer. The stratus usually breaks up in the afternoon, but sometimes it lasts all day, except for a brief few hours late in the afternoon and early evening when the clouds may become scattered (SCT). This TAF might be written as:

**FM162300 21007KT P6SM BKN030**
**TEMPO 1623/1702 SCT030**

TEMPO groups are used to indicate significant changes in sky condition and surface visibility that change the flight category (VFR, MVFR, IFR, LIFR) or other threshold changes like the IFR alternate requirement. They are also used to indicate weather changes like showers (SHRA) and thunderstorms (TS).

The NWS TAF forecasting software includes monitoring routines that check current conditions to see if a TEMPO group is working out, or if an amendment is needed to remove the TEMPO group.

For AWC's TAF Java Tool go to : aviationweather.gov/tafs/java

# SPC's Convective Outlooks *by John Werth*

*National Weather Service offices issued **124** tornado warnings during April 14, 2012 severe thunderstorm outbreak across Kansas, Oklahoma, Nebraska, and Iowa.*

The **Storm Prediction Center** (**SPC**) in Norman, OK, is responsible for forecasting the risk of severe thunderstorms and tornadoes in the contiguous United States. **SPC** is part of the National Centers for Environmental Prediction (NCEP) and is operated by the National Weather Service (NWS). Day 1 convective outlooks, describing the general threat of severe convective storms, are issued five times a day. **Figure 1** is the Day 1 Convective Outlook issued 1942 UTC April 14, 2012.

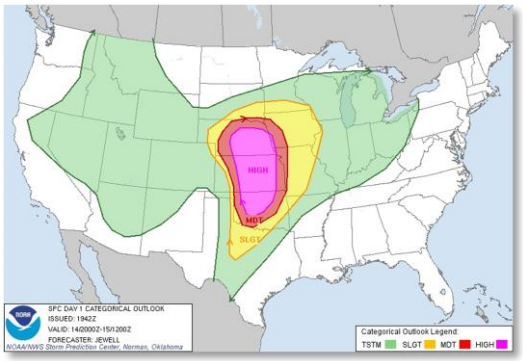


***Figure 1*** *– SPC's Day 1 Convective Outlook issued 1942 UTC April 14, 2012.*

Categorical descriptions used in the Day 1 Outlook are "**SLGT**" for slight chance of severe thunderstorms (yellow shaded area), "**MDT**" for moderate chance of severe thunderstorms (red shaded area), and "**HIGH**" for high chance of severe thunderstorms (pink shaded area). Areas shaded green indicate where general (non-severe) thunderstorm activity is expected. NWS defines severe thunderstorms as those producing one or more of the following; 1) tornadoes, 2) hail 1" diameter or larger, and 3) winds greater than or equal to 50 knots (58 mph).

**ENHANCED FUJITA (EF) TORNADO SEVERITY SCALE**

| SCALE | WIND SPEED |
|---|---|
| EF0 | 65-85 mph |
| EF1 | 86-110 mph |
| EF2 | 111-135 mph |
| EF3 | 136-165 mph |
| EF4 | 166-200 mph |
| EF5 | >200 mph |

**SPC** also issues probabilistic forecast graphics for tornadoes, thunderstorm wind gusts greater than 50 knots, and hail 1" diameter or larger. Each forecast is issued in conjunction with the Day 1 Convective Outlook. **Figure 2** is the Day 1 Tornado Outlook issued 1942 UTC April 14, 2012. Color shaded areas depict the probability (percent chance) of a tornado occurring within 25 miles of any point within the shaded area. The hatched area indicates a 10% or greater probability of an EF2 to EF5 tornado occurring within 25 miles of any point within the hatched area.

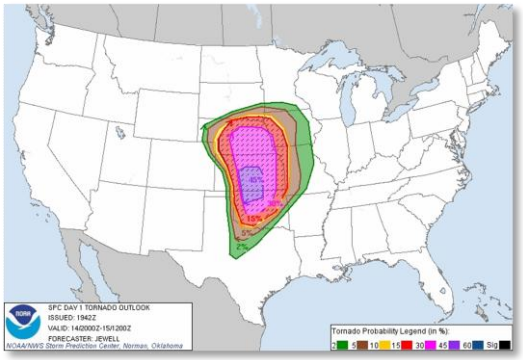


***Figure 2*** *– SPC's Probabilistic Tornado graphic issued 1942 UTC April 14, 2012.*

***Day 1 Outlooks** can be an effective strategic planning tool for aviators, dispatchers, and ATC personnel.*

Following the event, **SPC** uses Local Storm Reports (LSRs) to verify their Day 1 Convective Outlooks. **Figure 3** shows LSRs of tornadoes, large hail, and strong winds overlaid Day 1 Outlook issued 20 UTC April 14, 2012. There were 173 reports of large hail, 91 reports of strong winds, and 131 reports of tornadoes ending 12 UTC April 15, 2012. Notice how the vast majority of storm reports occurred in the severe thunderstorm outlook area.

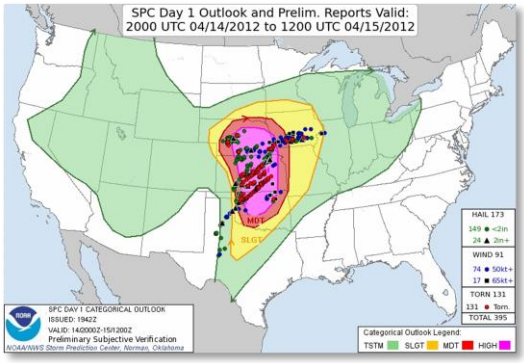


***Figure 3*** *– SPC's Day 1 Outlook issued 1942 UTC with preliminary storm reports 20 UTC 14 April, 2012 through 12 UTC April 15, 2012.*

For more SPC products and info go to
**http://www.spc.noaa.gov**

# AWC's CCFP Forecasts *by John Werth*

During the convective season (March-October), the **Aviation Weather Center** (**AWC**) in Kansas City, MO, issues a strategic planning forecast called the Collaborative Convective Forecast Product (CCFP). **AWC** is part of the National Centers for Environmental Prediction (NCEP) and is operated by the National Weather Service (NWS).

The purpose of the CCFP is to support strategic, system-wide planning in an effort to reduce traffic flow disruptions caused by convective weather during the en-route phase of flight. CCFP is a package of 3 forecast maps with lead times of 2, 4, and 6 hours. Except for 03 and 05 UTC, the forecast is updated every 2 hours throughout the day. CCFP forecasts reduce the weather-related impact of convection by creating a common situational awareness which improves coordination and cooperation among participants.

**AWC** issues preliminary CCFP forecasts every 2 hours; however, the final CCFP product is the result of collaboration between NWS forecasters at **SPC**, **AWC**, and the **CWSUs**, along with forecasters from Meteorological Service of Canada and several major airlines.

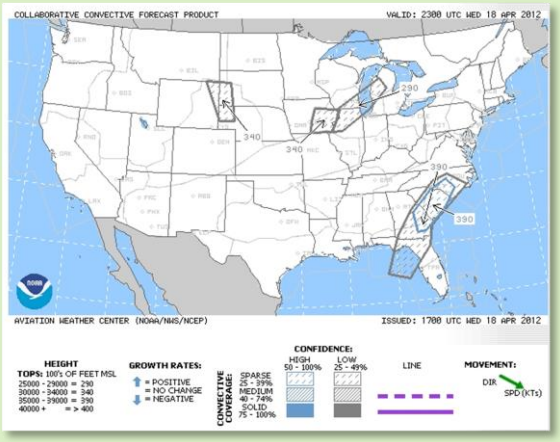


***Figure 4*** *– CCFP 6 hour forecast valid 23 UTC 18 April 2012*

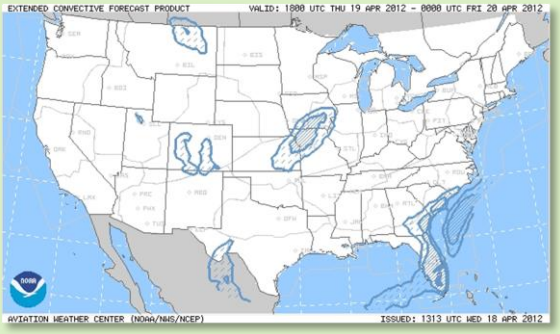


***Figure 5*** *– ECFP Day 2 forecast valid 19 April 2012*

**Figure 4** is a six hour CCFP forecast valid 2300 UTC April 18, 2012. For the CCFP, convection is defined as a polygon of at least 3,000 square miles that contains:

- At least 25% echo coverage of 40dBZ or greater composite reflectivity,
- At least 25% coverage of echo tops 25,000 feet MSL or greater, and
- Forecaster confidence of at least 25% that minimum CCFP criteria will occur

All three of these criteria are required for an area of convection to be included in a CCFP forecast.

Various combinations of color and types of fill are used to communicate forecaster's confidence the event will occur and the expected coverage of the convective activity.

Lines of convection can be included in CCFP forecasts, either separately or within the forecast polygons. Lines must be at least 100nm long with a width of at least 20nm on either side. Solid purple lines indicate 75-100% echo coverage while dashed purple lines designate 40-74% echo coverage.

CCFP forecasts include information on the expected echo tops within each polygon. Echo tops are broken into 4 categories between 25,000 and 40,000 feet MSL. Echo tops are defined as the maximum 25% of echo tops within the polygon with the highest level of at least 18.5 dBz.

**Figure 5** shows an Extended Convective Forecast Product (ECFP) which is now an operational product from **AWC**. The automated forecast is created from the Short Range Ensemble Forecast (SREF) Calibrated Thunderstorm output and has no forecaster input. Contours are drawn at 40, 60, and 80% probability of "thunderstorms" (not convection) using CCFP-like shading. ECFP forecasts are available 24/7 and are updated by 1800 UTC each day. The forecasts identify where thunderstorms are likely tomorrow afternoon (Day 2).

**We're on the Web!**

**Main web page**

www.wrh.noaa.gov/zse

**Mobile page**

www.wrh.noaa.gov/zse/mobile.htm

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CCFP forecasts
www.aviationweather.gov

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"*Protecting Life and Property*"

# AWC's Convective SIGMETs *by Linnae Neyman*

The convective SIGMET desk at the Aviation Weather Center began after a bad aircraft accident that occurred in April 1977. Southern Airways flight 242 entered a severe thunderstorm over Rome, GA. Both engines failed and couldn't be restarted, and although an emergency landing was attempted, of the 85 people aboard Flight 242, 63 were killed, as well as 9 people on the ground.

Convective SIGMETs are issued for the following reasons: (1) a severe thunderstorm is occurring; (2) a thunderstorm is embedded within other obscuring clouds or weather; (3) a line of thunderstorms is at least 60 miles long with 40 percent coverage; and/or (4) an area of active thunderstorms affects at least 3000 square miles with at least 40 percent coverage.


***Figure 6*** *– Convective SIGMETS and outlooks issued 1855 UTC 7 May 2012 valid until 2055 UTC 7 May 2012. Convective SIGMETS (red), outlooks (orange).*

Convective SIGMET bulletins and graphics are issued around 55 minutes after each hour and are valid for 2 hours or until superseded by the next hourly issuance. A sample graphic is shown **Figure 6**. Each update replaces all the previously issued convective SIGMETs from the previous hour. SIGMETS are not cancelled or amended, only updated. If there is no significant convection, the hourly bulletin will read "CONVECTIVE SIGMET…NONE". Convective SIGMETS are numbered consecutively. Each SIGMET number includes the letter **W** for west, **C** for central, or **E** for east to indicate what part of the CONUS the convective SIGMET is valid for.

There is only one forecaster writing **ALL** the convective SIGMETs for CONUS. On active days there can be 15 or more Convective SIGMETS issued per hour. Most places in the continental US have more thunderstorms than the Pacific Northwest. ZSE airspace has its most thunderstorms in July and August, mostly from the Cascades east. (For more information on Convective SIGMET climatology, see the May 2010 issue of this newsletter.)

A good website to view the location of SIGMETs with an easy mouse-over for the text is: http://aviationweather.gov/adds/airmets/java/

A convective Center Weather Advisory (CWA) is an aviation weather advisory issued by your local Center Weather Service Unit for your local ARTCC airspace. These are issued as needed for convective activity of concern to the local Air Traffic Control Center which is not covered by a SIGMET.

A CWA is issued for the following reasons:

- There is no existing AWC advisory in effect.
- To define a line of thunderstorms within a larger area covered by the AWC advisory.
- To better define hazards expected at a major terminal already within an AWC advisory.
- Anything that in the judgment of the CWSU forecaster will add value to an existing advisory.
- ***In the forecaster's judgment, the conditions listed above exist or any others that may adversely impact the safe flow of air traffic exist***.

In short, a convective SIGMET is issued for a fairly strict set of reasons once per hour. A CWA is issued as needed to cover the holes that a convective SIGMET does not cover, to enhance what a SIGMET does cover, and to warn about local conditions that we know our center needs to know about.