Volume 21 Number 4
April 2005

IFR

The Magazine for the Accomplished Pilot

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CONVECTIVE SIGMETS

Ah, spring. Warm breezes, fresh air, and thunderstorms ready to swat you like a pesky mosquito. Here's what goes into those WSTs.

by Scott C. Dennstaedt

Convective SIGMETs are just as numerous in the spring and summer as icing AIRMETs are in the late fall and winter. On average, Convective SIGMETs will be much smaller in the area they cover, but don't let that fool you. There will be a greater number of Convective SIGMETs issued on any given day during the warm season.

Last summer I visited the Convective SIGMET unit at the Aviation Weather Center (AWC) in Kansas City. The AWC is the heart of aviation weather. Local Weather Forecast Offices (WFOs) provide pilots with a valuable service by constructing and amending the Terminal Forecasts (TAFs) and the Transcribed Weather Broadcasts (TWEBs). The AWC is responsible for issuing the Area Forecasts (FA), the Significant Weather Prognostic Charts (SIGWX) and Winds and Temperatures Aloft (FD), and the three weather advisories that include AIRMETs (WA), SIGMETs (WS) and Convective SIGMETs (WST). I'll use the reference WST instead of saying Convective SIGMET from here on.

The Convective SIGMET unit doesn't even look at pilot reports.

The Convective SIGMET unit at the AWC provides two basic products: Convective Outlooks and WSTs. One forecaster has the responsibility for issuing all of the WSTs for the entire continental U.S. and coastal waters for the duration of his or her shift.

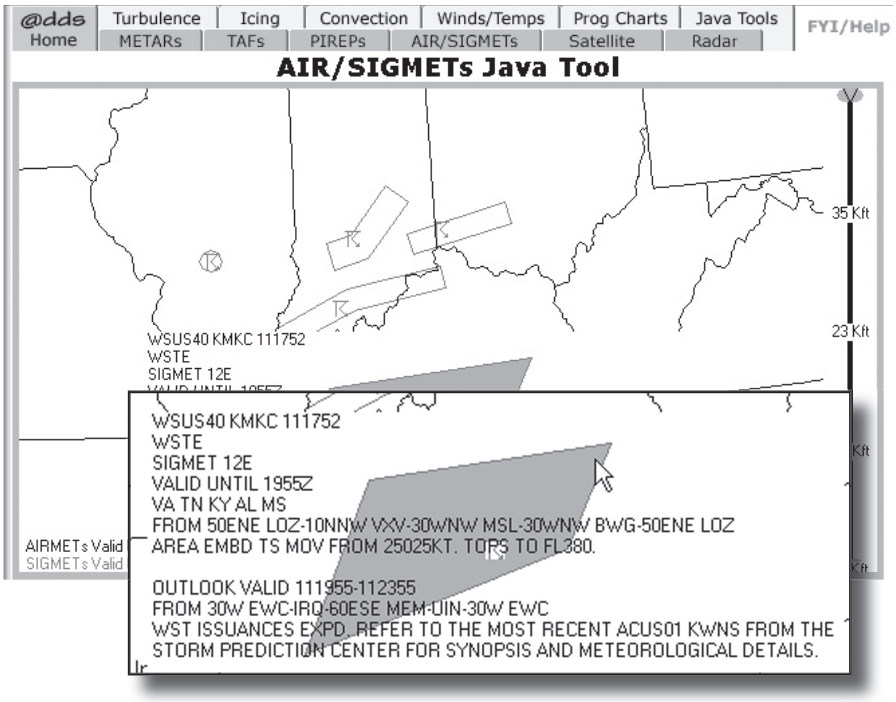
The Convective Outlook is a forecast valid for a six-hour period. These Outlooks indicate larger areas that are likely to contain an issuance for WSTs during the next six hours. During a convectively active day, the forecaster may spend no more than five minutes constructing the Outlook, so don't put too much faith in them. In addition, WSTs could still be issued outside of these areas during the valid time of the Outlook, especially near the boundaries. Also keep in mind that thunderstorms that don't meet the Convective SIGMET criteria could also appear outside of these Outlook areas.

The product of more interest to you as a pilot is the WSTs themselves. They are divided into three geographical areas to include east, central, and west, and are sequentially numbered over a 24-hour period starting at 0000 UTC. For example, the 43rd WST for the east is labeled Convective SIGMET 43E.

Busy Forecasters

At 55 minutes past each hour, the forecaster must transmit the next set of WSTs, although the forecaster can issue them as early as 40 minutes past the hour. Even if no activity exists that meet the WST criteria at a given hour for a given area (east, central, or west), a bulletin indicating "NONE" must still hit the wire. Besides the required "no activity" bulletin, there have been days when no Convective SIGMETs were issued. But when it gets busy, the Convective SIGMET unit is not the place to be. One day in the east, 192 Convective SIGMETs were issued and the largest number of Convective SIGMETs issued on a particular day was 343. Since the inception of the Convec-

Left: *A single forecaster issues all convective sigmets in the continental U.S. and coastal waters. On a convectively active day, this person is perhaps the busiest forecaster in the country.*



Right: *The areas of the Convective SIGMET are easily depicted graphically as on Aviation Digital Data Service (http://adds.aviationweather.gov). Drag your mouse over the thunderstorm symbol to see the graphical area highlighted and the text for that WST displayed.*

tive SIGMET, there have been two noticeable spikes in the number of Convective SIGMETs issued. The first spike in the data occurred when lightning detection was introduced in the 1980s and the second spike occurred when weather radar from the WSR-88D (NEXRAD) was introduced in the early 1990s.

In order for a WST to be issued, a set of minimum criteria must be met. Note that a WST does not imply a line or area of severe thunderstorms. In other words, thunderstorm severity is not the sole criteria.

On the other hand, any isolated thunderstorm that is labeled by a Local Weather Forecast Office as severe must also be issued a WST. If the local WFO says it is dangerous, the AWC must also say it is significant for aviation operations by issuing a WST for this isolated severe cell. These WSTs are typically drawn as a little circle around the isolated cell of concern, unless the isolated cell is already part of an area or line of thunderstorms covered by a current WST.

A line of thunderstorms of significant radar echoes (40 dBZ and greater) that is longer than 60 nm with at least 40-percent coverage qualifies for the issuance of a WST. You will see these drawn as a line segment or small rectangular area with the possibility of one or more bends in the line. An area of thunderstorms of significant radar echoes that is greater than 3000 square miles (about 60 x 60 nm) that has 40-percent or greater coverage will be issued a WST. These will be typically identified by a polygon with five or less vertices.

Embedded thunderstorms should also prompt the issuance of a WST. A thunderstorm is defined as embedded when it occurs within a larger area of rain or rain showers, or is hidden in multi-layered clouds and/or IMC conditions, or is otherwise obscured such that its presence is not visually apparent. A good example of an embedded thunderstorm is one that is triggered along a warm front. Most of the non-tropical thunderstorms in the cold season will be classified as embedded.

Finally, a forecaster is also given the discretion to issue (at any time) a WST even when these minimal conditions don't exist based solely on the forecaster's judgment. Even though WSTs are issued every hour, they are valid for two hours with a two- to six-hour outlook (forecast) issued for each WST. This outlook is specific to the individual WST and should not be confused with the larger six-hour overall Convective Outlook mentioned earlier. That overall Convective Outlook does not reflect individual WSTs.

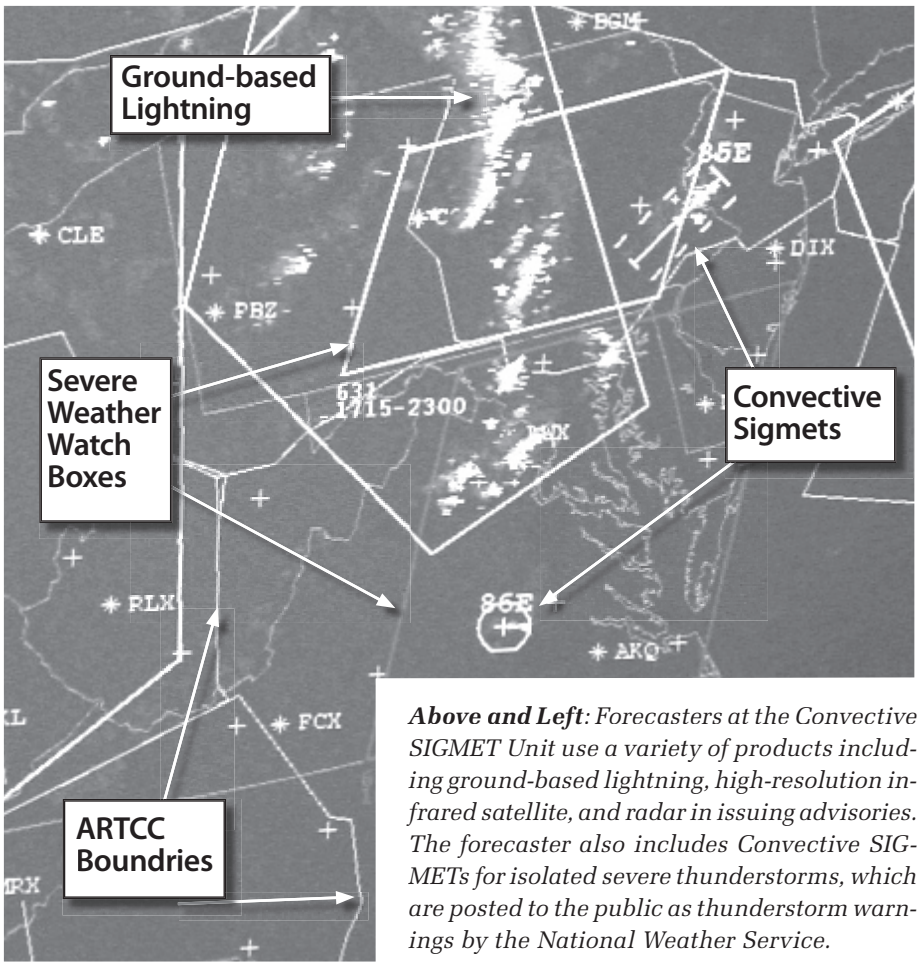
The forecaster always makes an attempt to keep the area of the WST defined by four points or less and usually never more than five. Even though these are represented graphically on many Web sites, there are still a significant number of pilots that obtain these advisories through Automated Flight Service Stations (AFSS) and through the Enroute Flight Advisory Service (EFAS), better known as Flight Watch. As a pilot you should remember that this policy can make WSTs a little larger than they need to be, thus chewing up more airspace that is not necessarily convectively active.

If you venture into an area covered by a WST, remember they imply severe or greater turbulence, severe icing, low level wind shear, and possible IMC. Be sure to stay in visual conditions and always try to circumnavigate around the back side of the cell. (See *Plan IFR Around Thunderstorms* in June 2004 *IFR* for more information.)

Specials

Once the WSTs are issued, the forecaster continues to monitor the situation. If an area or line of thunderstorms suddenly meets the following criteria, a "special WST" can be issued. These criteria must be met or be forecast to be met for more than 30 minutes of the scheduled WST's valid period:

a. Tornado, hail greater than or equal to 3/4 inch, or wind gusts greater than or equal to 50 knots is reported or indicated when the previous WST did not mention severe thunderstorms.



***Above and Left**: Forecasters at the Convective SIGMET Unit use a variety of products including ground-based lightning, high-resolution infrared satellite, and radar in issuing advisories. The forecaster also includes Convective SIGMETs for isolated severe thunderstorms, which are posted to the public as thunderstorm warnings by the National Weather Service.*

b. Indications of rapidly changing conditions, if, in the forecaster's judgment, they are not sufficiently described in existing WSTs.

Keep in mind that if a line or area of thunderstorms doesn't meet these criteria by 25 minutes past the hour, you typically won't see any WSTs issued until 55 minutes past the hour. This leaves approximately 30 minutes of time where a serious line or area of thunderstorms may "unofficially" meet one or more of the criteria above, but won't get its own WST.

This is why it is important to read and pay attention to the Center Weather Advisories (CWAs). CWAs are the front lines of the convective world and are not scheduled. When the satellite shows a quick buildup of towering cumulus, you can expect a CWA to be issued no matter what time it is in the cycle. CWAs are issued by forecasters at the Center Weather Service Unit (CWSU) within the Air Route Traffic Control Centers (ARTCCs). These CWAs are typically also coordinated with the Convective SIGMET unit at the AWC by a simple phone call from the CWSU. CWAs can also be issued for smaller scale (area coverage) and shorter duration storms. If there was anything that I'd like to see added to the various weather units on the market it would be CWAs.

Pilot Reports

From a WST perspective, are pilot reports important? The AWC normally begs for pilot reports and AIRMETs and SIGMETs typically live and die by them. The Convective SIGMET unit at the AWC doesn't even look at pilot reports. In fact, when the going gets rough, the forecaster has barely enough time to cover their current WSTs. The Convective SIGMET unit depends mostly on CWAs and their close cousin, the Meteorological Impact Statement (MIS).

Between 25 minutes after the hour and 55 minutes after the hour, the forecaster is busy doing two things. First, the forecaster is crafting the next round of WSTs by determining if the previous WST area needs to be modified (enlarged, moved, etc.,) or allowed to expire. Also the forecaster is looking for new areas that now meet the WST criteria.

We can't forget that a WST is just a "snapshot" of the current convective picture. Forecasters like to call this *nowcasting*. They are more representative of a warning area versus a watch area. Even though it is valid for two hours, you will never see a WST disseminated for an area that is void of thunderstorms. It must meet the minimum criteria outlined above, all of which require the presence of active thunderstorms.

As one would expect, lightning data is by far the most important piece of data used in determining if a Convective SIGMET should be issued or updated. Satellite imagery is used to determine the approximate tops and the extent of the area. This is done by random sampling of the high-resolution infrared satellite image with several quick clicks of the mouse. The software returns an average of this sampling, making it quick and easy for the forecaster to build the Convective SIGMET text. Also with the help of software, the forecaster determines the direction and speed of movement and adds this to the advisory.

Convective SIGMETs are issued specifically for thunderstorms that will impact aviation operations. This means thunderstorms don't have to be labeled as severe, but will likely chew up a significant amount of airspace making for the potential of significant diversions. When the AWC issues a Convective SIGMET in your flight path, it likely means there's a brick wall ahead.

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