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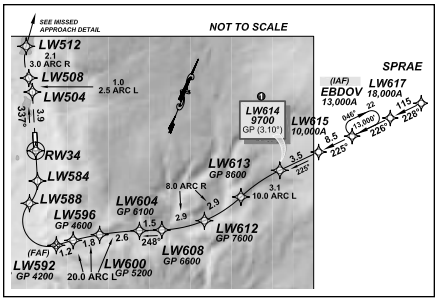

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THE CONVECTIVE DAY

Even when convective activity is the daily special, you can pick your way around the rough spots and through the system.

by Scott C. Dennstaedt

You've got a long flight planned for this summer day — six hours of flight time, including one pit stop. Your winter flying companion, AIRMET Zulu for icing, is on vacation but you know that Convective SIGMET may happily step in to add spice to your trip.

First stop in your preflight research this morning is the latest Mean Sea Level Pressure Chart (see sidebar for all Web addresses). This chart paints the meteorological "big picture" of high- and low-pressure systems as well as fronts. An approaching cold front appears a bit stronger this morning than it did on The Weather Channel last night.

Next you take a look at the Aviation Weather Center's (AWC) convective outlook. A Convective outlook is an area ripe for the issuance of Convective SIGMETs over a six-hour forecast window. Keep in mind it is possible that a Convective SIGMET or two could be issued outside of these areas, 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 (See "Convective SIGMETs," April 2005 *IFR*). The second leg of your route takes you into an area of potential thunderstorms as indicated by the freshly issued convective outlook.

The next thing you pull up is the AWC's area forecast (FA) for your route of flight. The FA is a 12-hour, broad-brush forecast of clouds and weather significant to flight operations. That cold front has earned a line in the FA saying: ISOL SHRA/TSRA POSS SEV. CB TOP FL300. This FA also notes potential isolated rain showers and thunderstorms, some of which may be severe.

As you look through the TAFs, only one station 50 miles west of the second leg of your route is forecasting VCTS (thunderstorms in the vicinity of the terminal area). The absence of thunderstorms in the terminal forecast does not imply the absence of thunderstorms while en route. It is possible to have an area forecast sprinkled with ISOL -SHRA/-TSRA and the TAFs that fall within this same geographical region be completely void of thunderstorms.

CWAs are the front lines when it comes to convective activity.

With no returns on the radar composite and not a single cloud along your route, you file your IFR flight plan to your first stop and head to the airport.

First Leg Ends

At 2 p.m. you're in the pilot briefing room at your planned stop and the NEXRAD picture is starting to light up. Not surprising, the AWC Convective SIGMET unit has been busy and has issued Convective SIGMET 13E for an isolated severe storm and Convective SIGMET 16E for a line of thunderstorms, both moving east toward your planned route of flight.

It's decision time. The area forecast remains the same and no significant amendments to the terminal forecasts exist, but those Convective SIGMETs have your attention. Now it is time to bring in some help from the Center Weather Advisory (CWA).

CWAs are the front lines when it comes to convective activity. They are always unscheduled; they can be issued at any time the Center Weather Service Unit (CWSU) at the ARTCC (center) feels that thunderstorms will impact flight operations even when the area of thunderstorms doesn't meet Convective SIGMET criteria.

Sure enough, an outflow boundary has triggered a line of rain showers and isolated thunderstorms that don't meet the Convective SIGMET

Right: *At 10,000 feet above the cumulus field use Flight Watch and ATC to help circumnavigate these cells.*

Left: *When face-to-face with one of these convective giants, fly around the backside (upwind side) of the cell.*

criteria and are threatening the area just to the north of your destination. CWA 101 was just issued for:

LINE OF SHRA AND ISOL TS ... 15NM WIDE ... SCT LVL 2-4 ... ISOL LVL 5 ... MOV FROM 29015-20KT. MOST TOPS BTN 15 THSD FT AND FL200. ISOL TOPS TO FL380.

Fly High

The thunderstorms are all of an isolated variety, leaving plenty of outs, so you file a more westerly route at 10,000 feet to negotiate around the back side of the thunderstorms as they move eastward. You get your clearance from ground control and depart into VFR conditions.

During the late afternoon and early evening hours, fly as high as you can in thunderstorm season. This keeps you above the cumulus field that may be building along your route, the haze layer that frequently exists in an inversion-capped atmosphere, and the turbulent thermals resulting from unstable air near the surface.

Clouds, rain, turbulence, gust fronts, downdrafts, microbursts, outflow boundaries, and wind shear are all greater hazards at lower altitudes. Most importantly, high flying reveals where the cumulus field penetrates the capped atmosphere.

While still outside of ASOS range of your destination, you listen to the Hazardous In-Flight Weather Advisory Service (HIWAS) over the voice portion of a nearby VOR. HIWAS is a continuous broadcast of in-flight weather advisories including summarized alert severe weather watch bulletins (AWW), SIGMETs, convective SIGMETs, CWAs, AIRMETs, and urgent PIREPs. Using your handy-dandy advisory plotting chart, you figure that Convective SIGMET 23E, issued for isolated severe storms, covers the area just to the west of your destination. It's also moving northeast at 25 knots.

Closer to your destination, Center warns you of an area of intense echoes moving northeast (probably the convective SIGMET broadcast over HIWAS). This is not news to you. Three distinct cells exist at your 11, 12 and one o'clock. With ATC's permission to leave the frequency, you give Flight Watch a call.

Flight Watch

Without any kind of in-cockpit weather, Enroute Flight Advisory Service (EFAS) — better known as Flight Watch — is one of your greatest assets. Flight Watch is available from 6 a.m. to 10 p.m. for aircraft flying 5,000 feet AGL to 17,500 feet MSL on 122.0 MHz.

When you call, use the name of the ARTCC facility identification serving the area of your location, followed by your aircraft identification, and the name of the nearest VOR to your position. For example, if you were in the vicinity of the Richmond VOR, contact Washington Flight Watch by saying, "Washington Flight Watch, Lancair Three Two Kilo, Richmond V-O-R, over." This allows the specialist to reply using the closest remote transmitter. Many GPS units give you the bearing and distance to the nearest VOR.

If there's no answer on 122.0 MHz, you can try contacting them on discrete EFAS frequencies that have been established to ensure communications coverage from 18,000 through 45,000 MSL serving in each

TAFS MISS THE BIG PICTURE

Before you scan through the Terminal Aerodrome Forecasts (TAFs) looking for "TSRA," remember that a TAF shows the expected meteorological conditions within five statute miles of the airport's center. If the forecaster believes that a thunderstorm is unlikely to roll through this very tiny area, he will not include it in the terminal forecast.

As a result, it is very possible for the area forecast to be littered with ISOL SHRA/TSRA, without a single honorable mention in the TAFs for the same area. Consider the area forecast for a more complete picture of the convective potential.

specific ARTCC area. These frequencies can be found on the inside back cover of the Airport/Facilities Directory (A/FD) as well the Web.

Flight Watch delivers the bad news that your destination is reporting a thunderstorm in the vicinity with lightning distant southwest. The good news is that the storms should move through by the time you reach your destination and there doesn't appear to be any additional cells behind these.

In general, a line of thunderstorms associated with a cold front moves northwest to southeast. The individual thunderstorm cells within the line, however, tend to move northeasterly. The line moves in the direction the air mass is moving and the cells follow the winds aloft.

Of course, this isn't always the case. Embedded cells in a warm front, cells in bands around a tropical storm, and air mass thunderstorms (now called pulse thunderstorms) all don't follow the normal movement rules. It is important to understand the triggering mechanism of the thunderstorms.

GOOD CONVECTIVE DAY WEB SITES

Internet access makes any computer into a decent flight planning tool. Here are the addresses of Web sites used on this convective trip.

U.S. Radar Composite:
http://aviationweather.gov/obs/radar/radarpu.html
AWC's Convective Outlook:
http://adds.aviationweather.gov/data/airmets/airmets_CB.gif
AWC's Area Forecasts (FA):
http://aviationweather.gov/products/fa
Mean Sea Level Pressure Chart:
http://www.hpc.ncep.noaa.gov/sfc/awc90f.gif
High-Altitude Flight Watch Frequencies:
http://www.abqafss.jccbi.gov/efas.htm
Center Weather Advisories (CWA):
http://aviationweather.gov/products/cwsu
Advisory Plotting Chart:
http://aviationweather.gov/static/images/maps/vorn.gif

The "Sucker Hole"

Twenty minutes later you are staring at some very tall and dark clouds. ATC indicates that your destination airport is now VFR and several other pilots made it through a hole in the convective activity. You see nothing but ugly, dark clouds ahead.

Be careful when ATC says that "there's a hole that everybody is gittin' through." If several pilots have been "getting through" this hole, it's probably real, but how useful is it to you? How long ago did the last pilot make it through? More importantly, is the hole you see outside the cockpit the same hole that ATC is telling you about?

Holes don't follow airways and can change their speed and location. Moreover, a controller may or may not be painting weather on his scope and he certainly won't be seeing the towering cumulus clouds that are beginning to build to the southwest of the active cells.

Don't be afraid to ask for vectors around the weather if you are not sure about the exact location of this hole. A course deviation of 90 degrees or more isn't that big of a deal — especially if you are the only one crazy enough to challenge the elements. This may not be the case in a busy terminal environment but then there are many more aircraft to verify the location of holes and bad weather.

Individual cells generally track in the same direction as the winds aloft. Higher winds aloft equate to faster moving cells. Weak flow means little or no movement. Terrain-induced thunderstorms may hardly move. Thunderstorms forming along mountain ridges perpendicular to the winds often stay nearly stationary along the ridge line.

Remain in visual conditions at all costs. Stay out of the clouds in a convective environment and you will most likely stay out of any severe turbulence. If at all possible, navigate around the back side of the thunderstorm (upwind side) when approaching it. This will keep you out of most hazardous winds and potential hail shafts, not to forget that the storm will be moving away from you, not toward you.

Cheated Death Again

With a little vectoring help from ATC, you land on a wet runway. Isolated thunderstorms are flyable with a bit of planning, a few simple rules, and a lot of constructive feedback from ATC and Flight Service.

Flying in the morning is still your best tool. Thunderstorms are more likely to be active between the hours of 2 p.m. and 9 p.m. due to the daytime heating near the surface. Of course, they can happen anytime and can linger into the night, so stay cognizant of the synoptic picture and the forecast. Thunderstorm season is here, so fly high and fly safe.

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