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THE BRIEF

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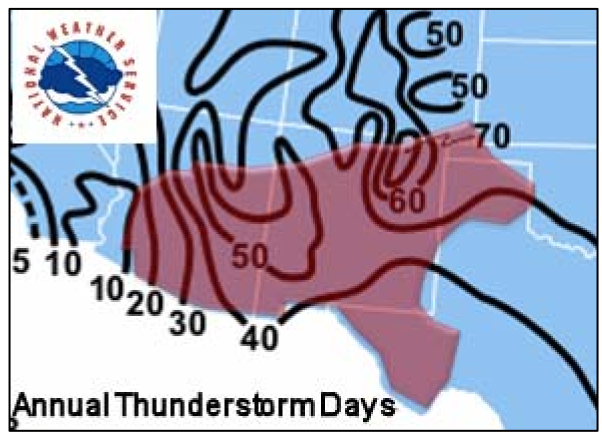
In this second full issue of *"The Brief"* we will address "Monsoonal" thunderstorm trends, NEXRAD Radar Coverage, A review of PIREP requirements, and Wind Barbs.

"Monsoonal" Thunderstorm Trends

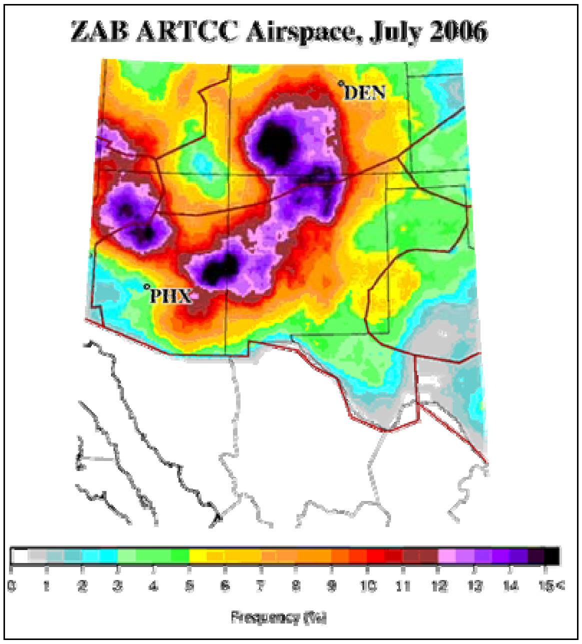


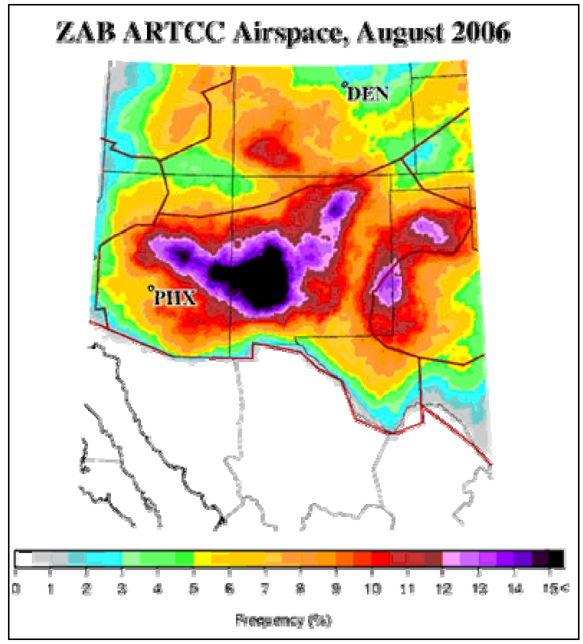
During July and August the Desert Southwest slowly begins to receive low level moisture. Areas east of the Continental Divide primarily receive Gulf of Mexico moisture while areas west rely on Pacific moisture. This low level moisture combined with the higher topography and summertime heating combines to produce the "Monsoon". Technically, a monsoon is described as a seasonal change in wind direction, but the processes that create that wind shift are complex. In comparison to the Southwest India Monsoon, our season is significantly shorter, with later onset and an earlier transition to the drier autumn climate regime.

In an average year, about two-thirds of ZAB airspace experiences ≥ 40 thunderstorm days per year, while the Mogollon Rim and Sangre de Cristos can have 50 or more. There is also an impressive maximum of 70+ days around Cimarron, NM. These numbers are comparable to those over major portions of Texas. Some important notes about thunderstorms:

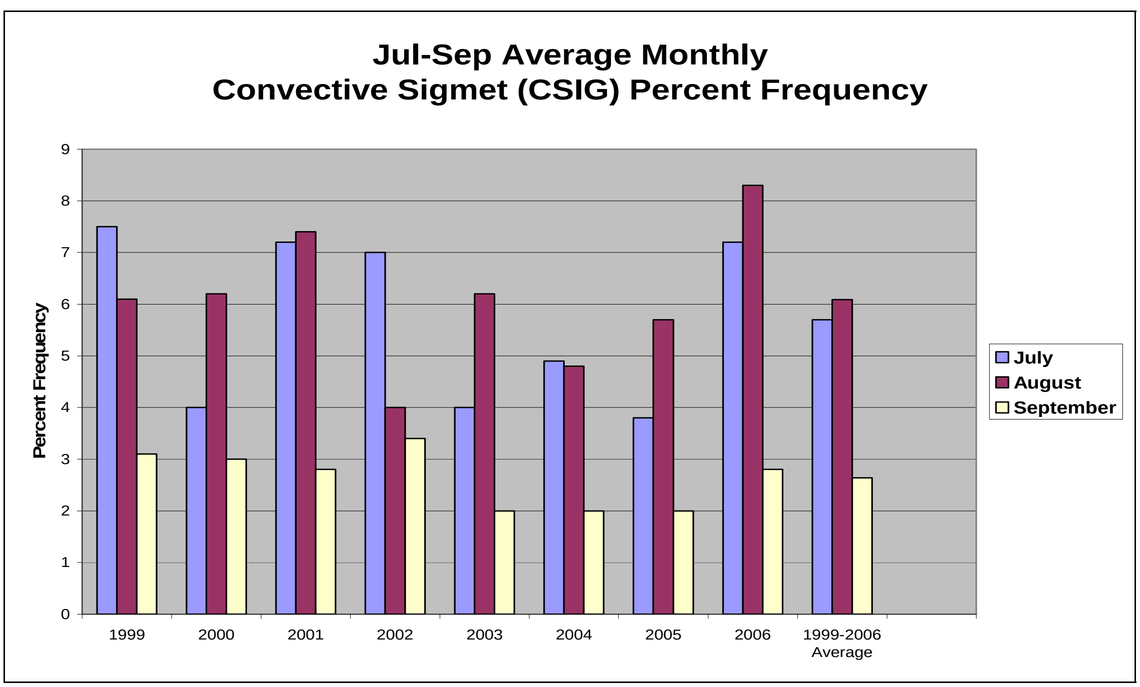
- Location, Time, Coverage and Intensity of thunderstorm activity affects ZAB in several ways.
- Thunderstorms in the Vicinity of PHX affect more than one specialty.
- Thunderstorms at PHX generate a domino effect and may impact all ZAB specialties; if prolonged, adjacent centers. Plans for accommodating PHX thunderstorms include:
  - Arrival/Departure route changes
  - Possibly coordinating use of Military Airspace?
  - What Routes will ZAB TMU create with adjacent centers?
    - Coded Departure Routes (CDR) - PHX
  - How does it affect my staffing? Extra stress, Overtime, Etc.

The images below (ZAB ARTCC Airspace, July 2006 and August 2006) show last season's very active Monsoon, depicting how often an area was covered by an Aviation Weather Center Convective SIGMET. Note that the areas correlate well with the depiction of Annual Thunderstorm Days on the previous page.



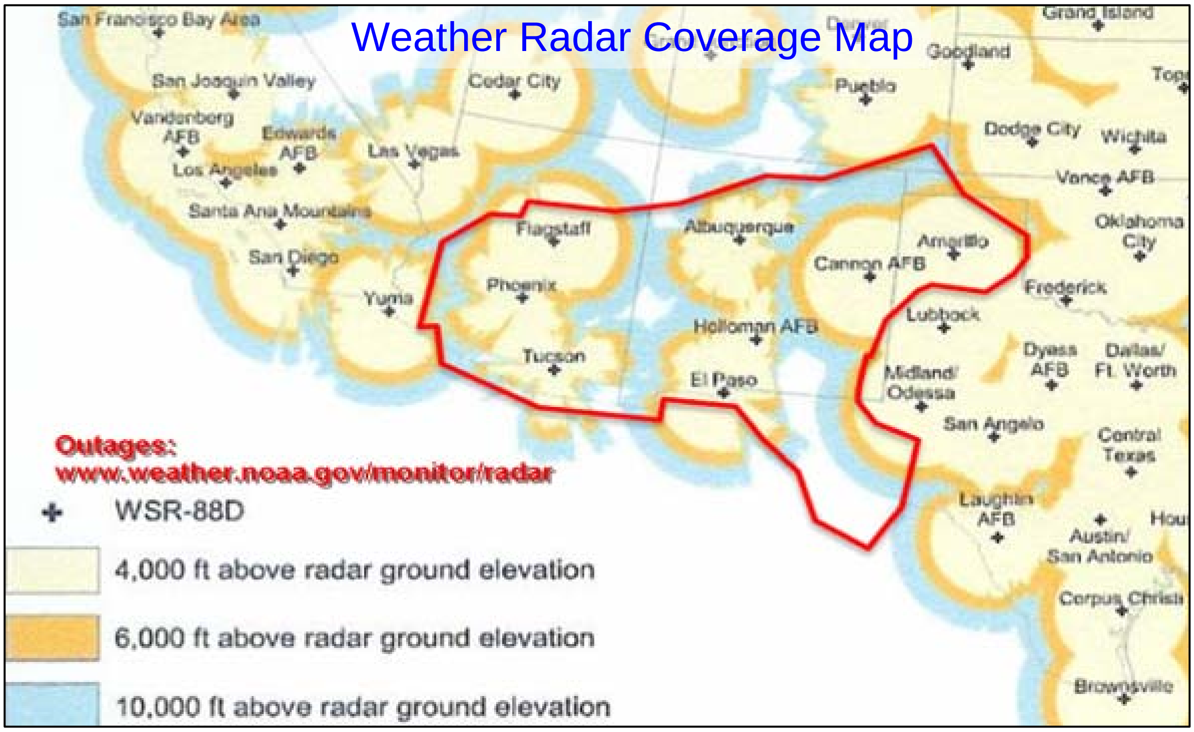


To further illustrate thunderstorm activity, the following graph shows the annual trend of Convective SIGMETs for July through September in the ZAB airspace. September was included to illustrate the significant decline in thunderstorms across ZAB.



NEXRAD Radar Coverage

When discussing area thunderstorm activity, it is important to consider National Weather Service Radar Coverage. Significantly variable topography presents challenges for accurately interrogating and displaying thunderstorms in ZAB airspace, as shown in the following image.



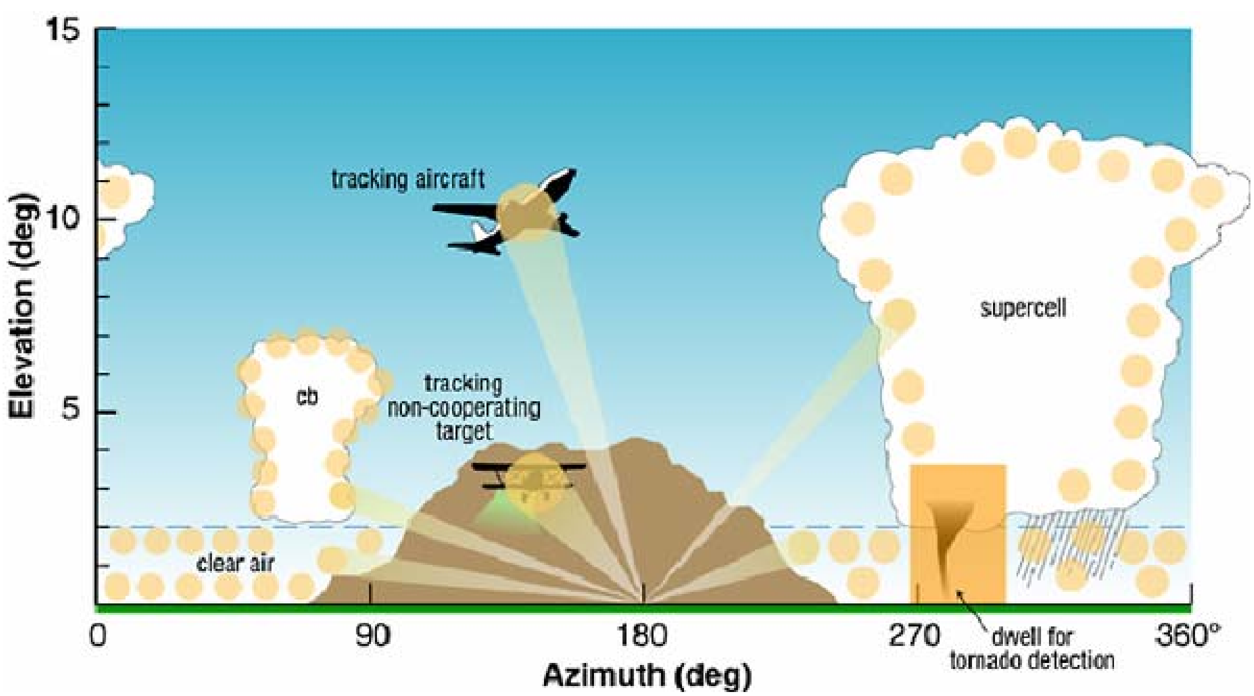
Areas that have issues in coverage include much of the NM/AZ border, particularly the Four-Corners region, the St. John's region, and Southeast of Tucson. Other areas include Southeast New Mexico/Southwest Texas, east of the Sandia Mountains, and the Sangre de Cristos Mountains. The CWSU meteorologists are highly knowledgeable about these areas and vigilantly monitor Satellite and Lightning Data in order to keep the specialties and TMU apprised of inclement or hazardous conditions developing in our "blind spots".

Another important fact to remember with NWS NEXRAD Doppler weather radar is that complete informational updates take at least 5 minutes to complete. Current WSR-88D radars transmit one beam of energy at a time and listen for the returned energy while rotating the antenna at a given elevation angle. The radar then mechanically tilts up to a higher elevation angle and samples other sections of the atmosphere while rotating the antenna 360 degrees. When the radar has sampled the entire volume of atmosphere, from bottom to top, the process starts over again to collect another volume of data. A volume scan of desired portions of the atmosphere takes around four to six minutes to complete, depending on the Volume Coverage Pattern selected.

When weather is particularly bad for a specific location, updates may take even longer due to increased requests for the data degrading bandwidth capabilities. This delay might be one explanation for a pilot-requested deviation when weather returns do not appear problematic on the scope, or when aircraft appear to be flying through level 2 and 3 storms and not reporting any convective activity.

The future of radar technology is very bright, early tests of the phased array radar system show that the technology has the potential to vastly improve upon the capabilities of the national NEXRAD radar network for all weather radar applications. Current WSR-88D radars transmit one beam of energy at a time and listen for the returned energy while rotating the antenna at a given elevation angle. A four-faced phased array system, on the other hand, can use multiple beams and never needs to tilt or rotate the antenna. The beams of energy are steered electronically and thus the radar has no moving parts. Using multiple beams and frequencies, phased array radar reduces the scan time of weather from four or five minutes for NEXRAD radar to less than one minute. This allows faster updates of weather data. In addition to faster updates, the new system can re-scan areas of severe weather very quickly, potentially increasing forecasters' warning lead times as storms rapidly transition to severe modes. This technology has the potential to increase the average lead time for tornado warnings well beyond the current average of 13 minutes.

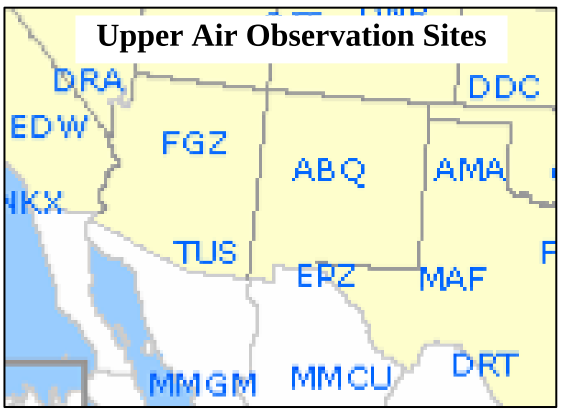
Phased array radar's rapid scanning ability gives it the potential to be a multi-mission, adaptively scanning radar, meaning it is used for weather, wind profiling, and aircraft tracking and can adaptively change its scans to look at the most important features.



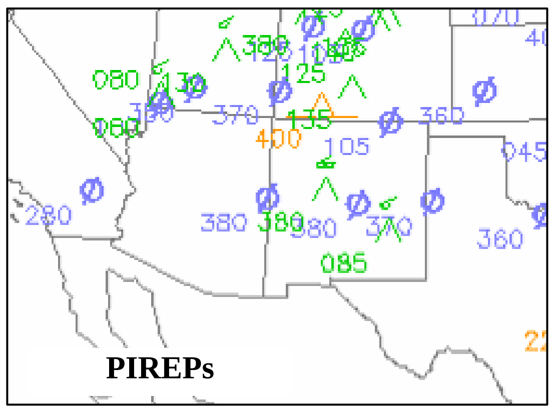
Pilot Reports...when should they be Solicited and/or reported?

Pilot Report (PIREP) encoding and dissemination can be time consuming, especially at times of high volume. Yet, the value of the PIREP to both forecasters and aviators cannot be underestimated. When compared to actual flight level data received daily by forecasters, PIREPs are an invaluable tool, see the bulleted comparison and images below:

- Upper Air (UA) Observations - Weather Balloons
  - Very limited, only 6 regular sites in ZAB airspace
  - Only 2 UA observations per day 00Z and 12Z
- Aircraft
  - Several Thousand aircraft transit ZAB airspace daily
  - Can provide current reports of turbulence, icing, weather conditions, etc.
  - PIREPs enhance local and national AIRMET/SIGMET forecasts
  - PIREPs are assimilated into model runs and directly affect forecast accuracy



Upper Air Observation Sites



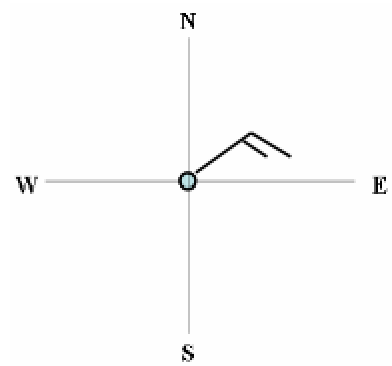
PIREPs

According to FAAO ***7110.65, PIREP Information, Para 2−6−3 & 7110.10S CHG 1*** PIREP's should be taken when requested by a pilot desiring to report information as follows:

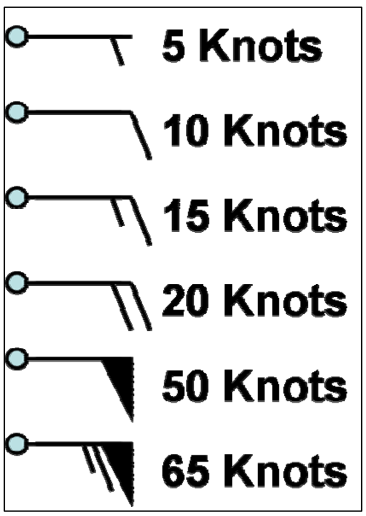
1. Ceilings at or below 5,000 feet. These PIREPs shall include cloud base/top reports when feasible.
   1. TERMINAL. Ensure that at least one descent/climb out PIREP, including cloud base/s, top/s, and other related phenomena, is obtained each hour.
   2. EN ROUTE. When providing approach control services, the requirements stated in TERMINAL above apply.
2. Visibility (surface or aloft) at or less than 5 miles.
3. Thunderstorms and related phenomena.
4. Turbulence of moderate degree or greater.
5. Icing of light degree or greater.
6. Wind shear.
7. Volcanic ash clouds.

How to Read Wind Barbs

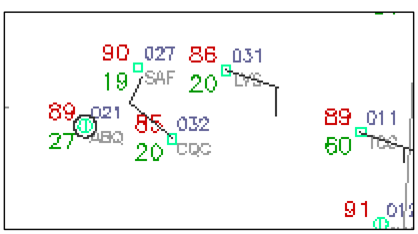
Wind barbs for surface observations and for flight level winds can be a little confusing. When CWSU personnel refer to winds in a forecast or briefing, they will say "winds are northeast at 15 knots…" Well what does that mean exactly, are they blowing to the northeast or blowing from the northeast? In weather terminology, all winds are described by which direction they are coming from, unless specifically described differently. The wind barb shown here represents a northeast wind at 15 knots. The wind is blowing from the northeast toward the southwest, as the "arrow" indicates.



Now let's tackle the speed issue. For determining wind speeds from the wind barb, refer to the image below (if there is only a circle and no wind barb, the report indicates calm winds):



For practice please complete the following exercises:



1. On the image to the left circle the northwest winds blowing at 10 knots.

2. What wind is being shown at ABQ? ___________________

3. In the spaces provided below draw a wind barb showing southwest winds at 35 knots and another wind barb showing south winds at 85 knots.