A Quick March Around the Calendar and Arizona's Weather Hazards

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For most of the country, springtime brings the opportunity for pilots to get their aircraft out from the snowbound restrictions they've been watching all winter. Meanwhile, desert dwelling Arizonans have had the luxury of enjoying the pleasant weather winter brings. We find our best flying season to be the opposite of our northern pilots where our winter is their summer and our summer is their winter. Through spring and summer the constant parade of Pacific storm systems continue their easterly trek but their track is gradually moving northward. What that means for us, is a gradual increase in temperatures on the way to the inevitable daily 100 plus degree heat and the almost zero chance of precipitation until the monsoon season begins in July. So let us take a walk through the calendar and look at what each season will bring to the Copper State's flyers. At the end of each section, you will find a footnote references to Nation Transportation Safety Board (NTSB) fatal accidents that have occurred in the state during the last ten years and for the months I am discussing. Only the fatal accidents where weather was a contributing factor are referenced.

Late March, April, and May

As spring progresses, the storm systems that come off the Pacific tend to track along the northern borders of Arizona and New Mexico. As I write this in late April, Figure 1 shows the current surface depiction for just such a system.

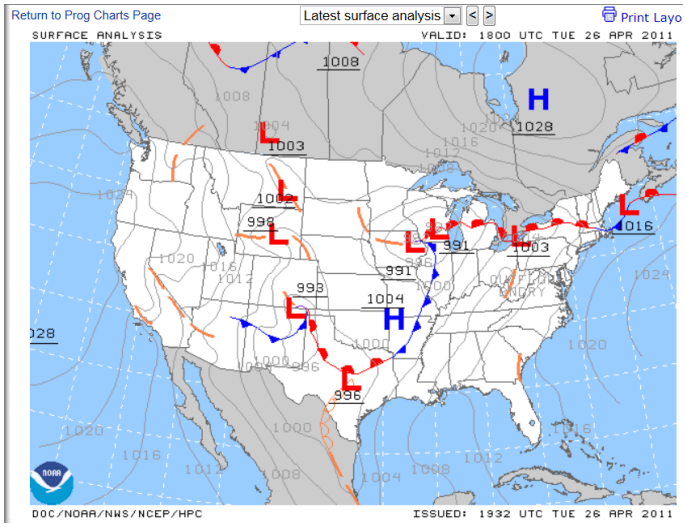


Figure **1**

Most of these systems have very little moisture, but they bring plenty of wind. Southern Arizona tends to be under the influence of higher pressure and the tracking low pressure brings a decrease in the spacing of the isobars. This is plainly obvious in the depictions in Figure 2.

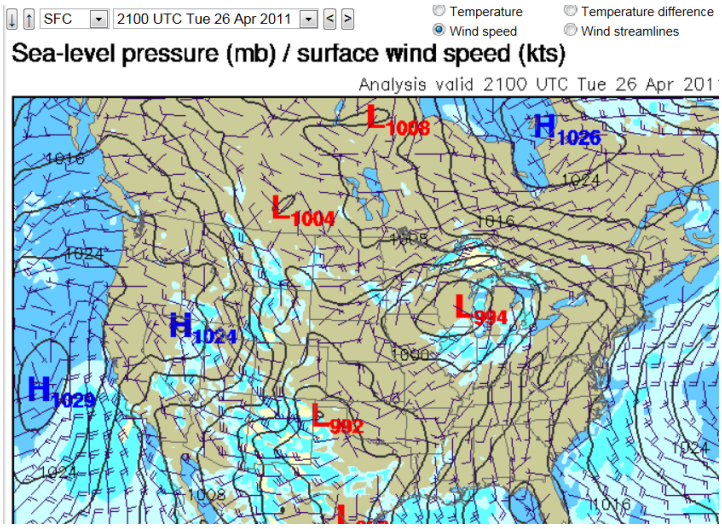


Figure 2

Figure 3 and Figure 4 depict the increasing wind velocity with increase in altitude. Notice these plots are in feet above mean sea level (MSL). This is significant because most of the elevations in northern Arizona are 5000 feet MSL and above. At 6000 feet MSL, the winds are roughly in the 25 knot range and mostly out of the west as shown in Figure 3.

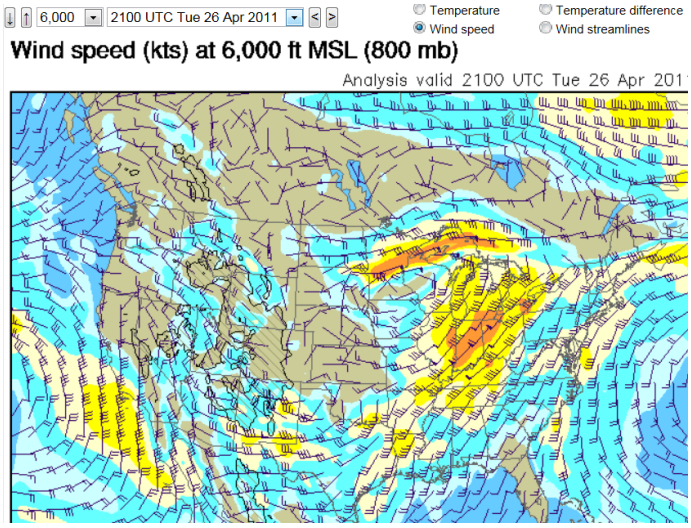


Figure 3

At 12000 feet MSL, roughly 6000 feet above ground level (AGL), the winds through northern Arizona are trending through the 50 to 60 knot range and out of a more northwesterly direction as shown in Figure 4.

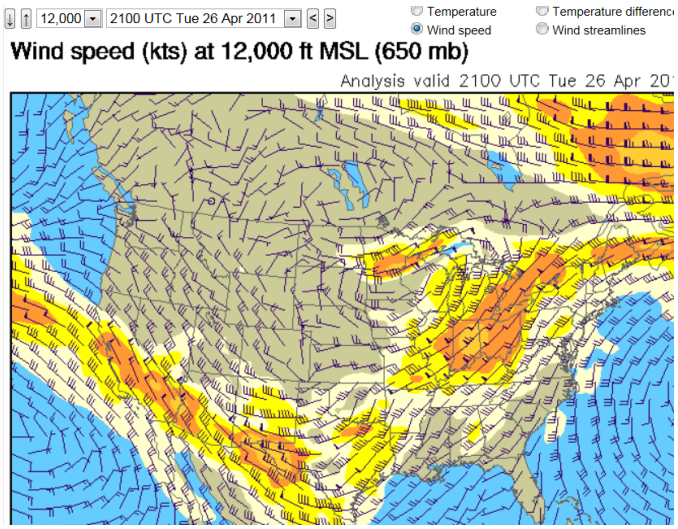


Figure 4

For the general aviation pilot is this is a very turbulent day to be flying. The pilot reports as plotted in Figure 5 are indicating moderate turbulence through northern Arizona.

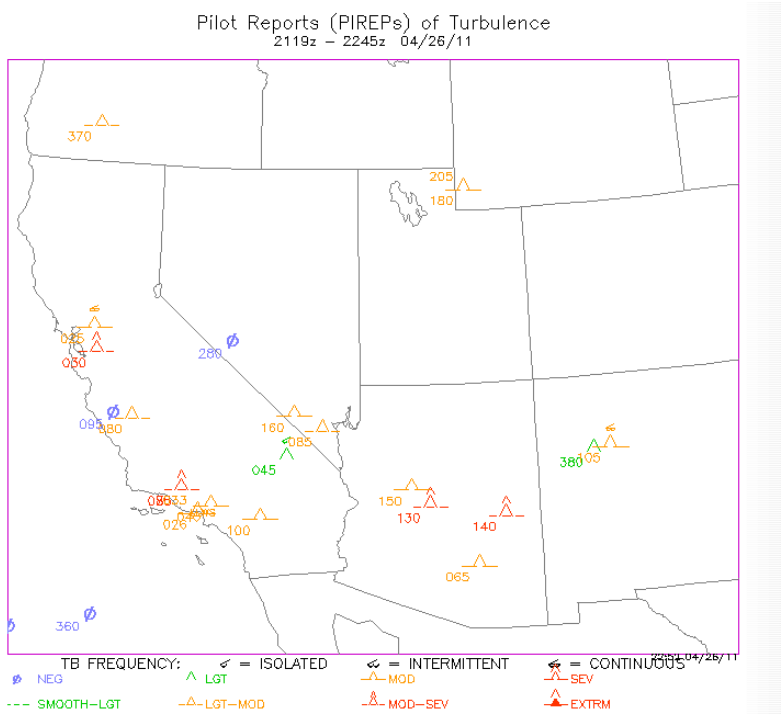


Figure 5

Those of you familiar with the terrain of northern Arizona know it is characterized with multiple deep river valleys, canyons, mountains, and some broadly spaced flat plateau regions. The entire region is considered part of the Colorado Plateau uplift. As the wind interacts with the wide variety of rough terrain it will create a tremendous amount of mechanical turbulence. Visibility reducing dust storms are also a real possibility, especially along the northern half of Mohave, Coconino, Navajo, and Apache counties. (See Figure 6 and Figure 7)

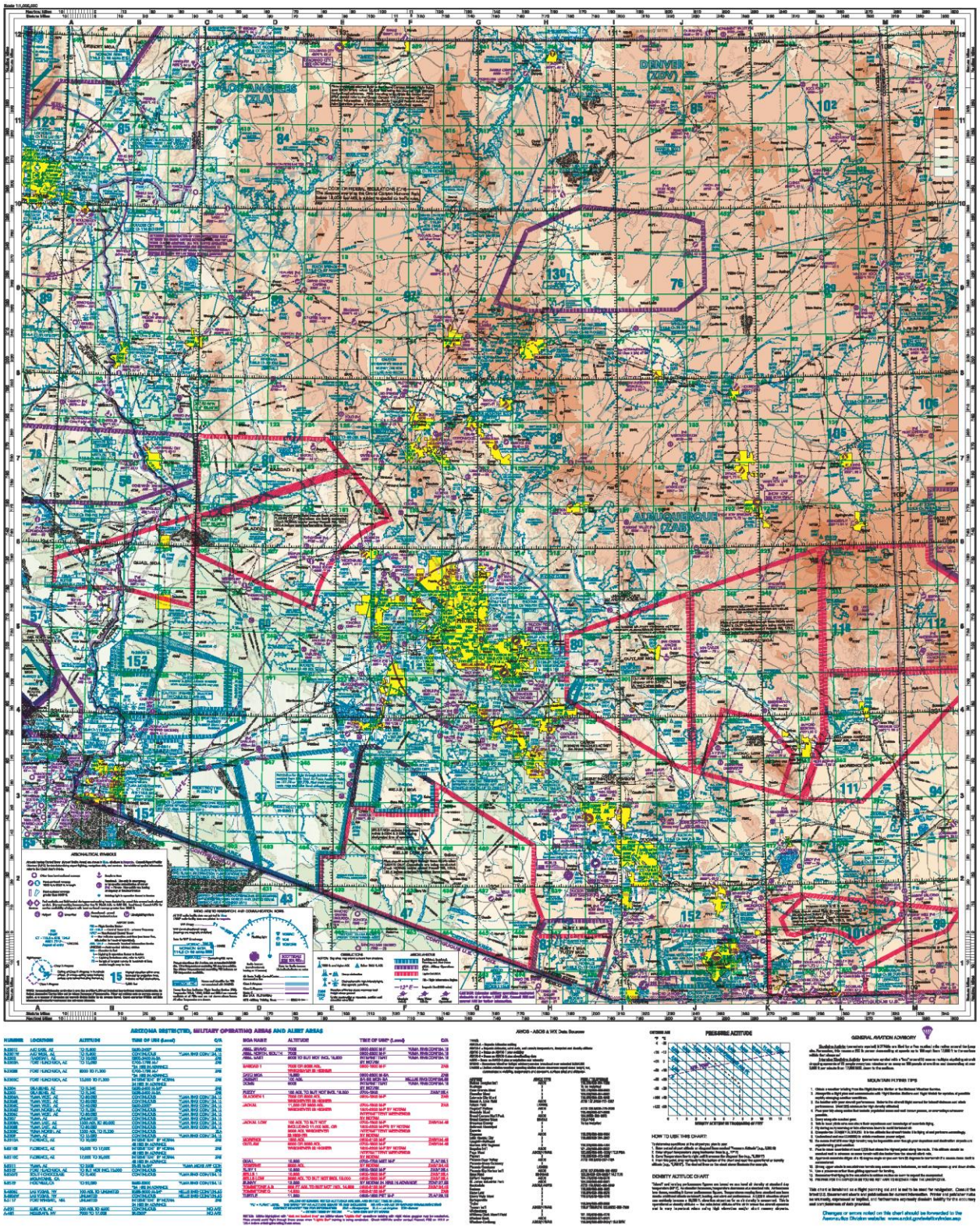
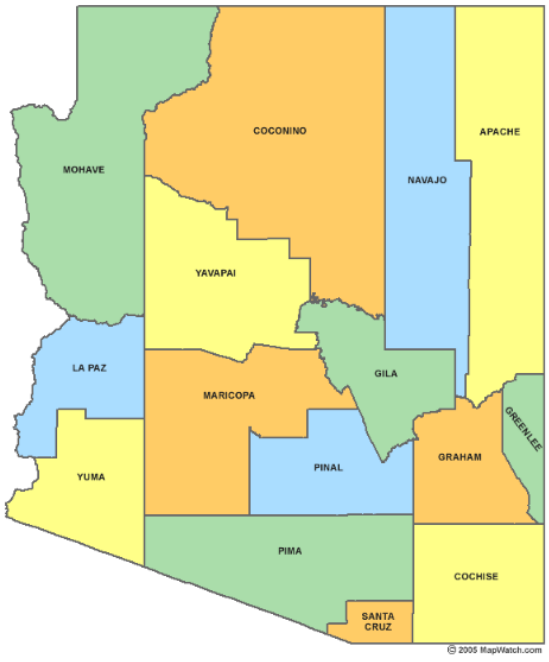


Figure 6

[1] http://www.azdot.gov/MPD/Airport_Development/library/pdf/Aero_chart_1.pdf



[2]

Figure 7

Notice also that there is a rapid increase in wind velocity from the 6000 feet MSL, to the 12000 feet MSL, to 18000 feet MSL (Figure 8) and finally to the 36000 feet MSL charts in Figure 9. Figure 9 shows the heart of the jet stream core is over Arizona and I expect rough "rides" are present throughout the atmosphere since there is a considerable amount of shear in wind velocities in both vertical and horizontal directions.

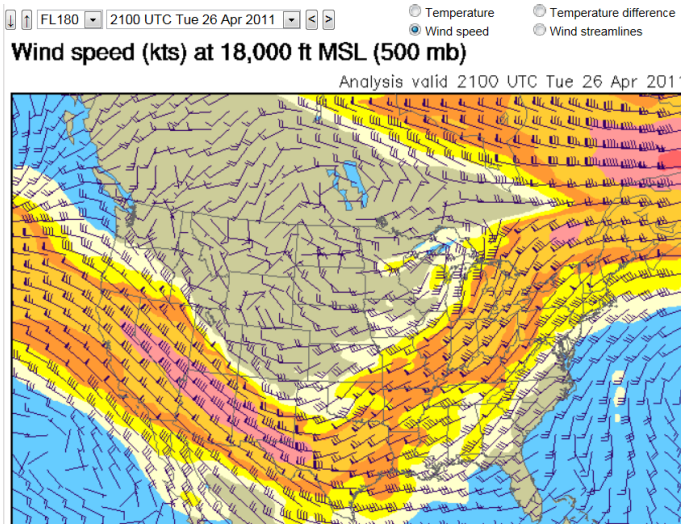


Figure 8

[2] http://www.mapwatch.com/multi-maps/full/arizona-county-map.gif

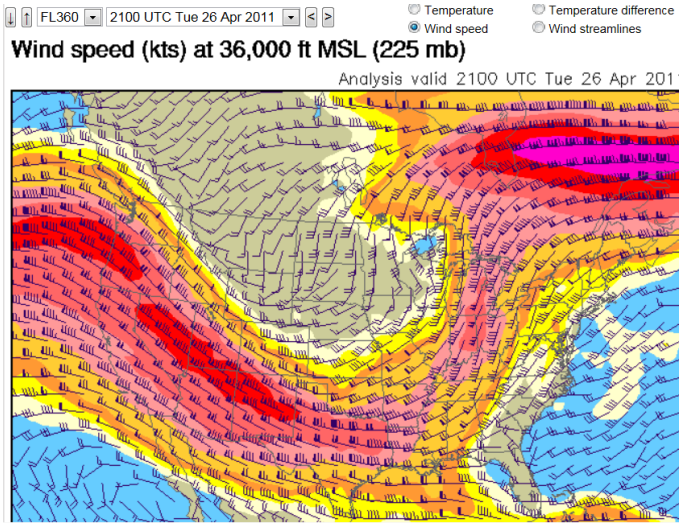


Figure 9

Besides looking at the weather charts and noticing this type of scenario, what can you see in the sky? Depending on the amount of moisture in the system, perhaps, very little. If there is enough moisture to form clouds, you can expect to see lenticular and truncated cumulous clouds pulled out by the winds into wisps. Downwind from the lenticular clouds or mountain ridge lines, you may also see rotor clouds, clouds that have a rolling motion. If you do see rotor clouds, expect strong down draft currents in these conditions and ***avoid them***. These shots were taken on a very windy day in Prescott several days earlier, when a similar system to the one depicted in the previous charts was tracking through the area.

So what else can we gleam from the information available to us? The following METAR and TAF reports for Phoenix, Prescott, Kingman, Flagstaff, Page, Winslow, and Show Low indicate within another three to four hours the winds will begin to diminish.

Aviation Digital Data Service (ADDS)

Output produced by METARs form (2332 UTC 26 April 2011)
found at http://aviationweather.gov/adds/metars/index.php

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KPHX 262251Z 28024G34KT 10SM CLR 31/M19 A2971 RMK AO2 PK WND 28034/2249 SLP042 T03111194 $
KPHX 262324Z 2700/2724 28023G32KT P6SM SKC
     FM270300 29011KT P6SM SKC
     FM271000 02005KT P6SM SKC
     FM271300 09005KT P6SM SKC
     FM272100 30006KT P6SM SKC

KPRC 262253Z 33019G27KT 10SM CLR 19/M24 A2989 RMK AO2 PK WND 32032/2225 SLP062 T01891244 $
KPRC 261734Z 2618/2718 31019G27KT P6SM SKC
     FM270230 30009KT P6SM SKC
     FM270600 VRB04KT P6SM SKC

KIGM 262248Z AUTO 36014G28KT 10SM CLR 20/M13 A2993 RMK AO2 PK WND 35028/2240 SLP085 T02001133 TSNO
KFLG 262257Z 31012G23KT 270V340 10SM CLR 12/M15 A2992 RMK AO2 SLP064 T01221150
KFLG 262230Z 2623/2718 30011G19KT P6SM SKC
     FM270230 29008KT P6SM SKC
     FM270700 VRB05KT P6SM SKC

KPGA 262253Z AUTO 32018G27KT 10SM CLR 16/M13 A2986 RMK AO2 PK WND 32028/2239 SLP074 T01611128
KPGA 261734Z 2618/2718 31012G20KT P6SM SCT070
     FM270400 VRB04KT P6SM SKC

KINW 262256Z AUTO 29025G36KT 10SM CLR 20/M21 A2982 RMK AO2 PK WND 30039/2236 SLP046 T02001211
KINW 261734Z 2618/2718 29021G29KT P6SM SKC
     TEMPO 2619/2623 29027G37KT
     FM270300 30010KT P6SM SKC
     FM270800 VRB05KT P6SM SKC

KSOW 262315Z AUTO 29019G29KT 10SM CLR 18/M12 A2986 RMK AO2
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Simply waiting towards sunset when the atmosphere begins to calm will result in a much smoother ride. Of course flying in mountainous terrain at night brings a host of new hazards many pilots should not attempt. Often the best course of action is to plan your flight for the early morning before surface temperatures start to rise and wind speeds increase. As spring turns to summer and the monsoon approaches, this will become even more important.[3]

June

June is frequently the hottest and driest month of the year for those of us in the desert. High pressure tends to park along the four corners region pushing any storm systems, that do manage to come off the Pacific, to track well to the north into the northern tier states. Temperature/dew point spreads can be as much as a 70 to 80F degree difference. This is the time of year when you clean your windshield at the gas station and before you can turn the squeegee over, all the water has evaporated off the glass, leaving your window a streaky mess! I have seen temperatures in the Phoenix area north of 114F in June. In the northern part of the state this means temperatures approaching the upper 80s and low 90s. Because the humidity levels are low, the temperatures in the high country drop quickly after sunset, falling into the low 40s and even low 30s. If you are flying through this area, survival equipment should always include plenty of water and clothes for the cooler night temperatures.

Frankly, I don't find flying during this time of the year very enjoyable and judging from the activity around the airport, many of my fellow pilots feel the same way. The heat of the desert doesn't really get bearable until around the 8000 to 9000 foot level. Remember the dry adiabatic lapse rate is 5 ½ degrees F per 1000 feet of altitude, so when it is 110 degrees at Deer Valley at roughly 1500 feet MSL, I would need to climb up to 7500 feet to reach an outside temperature of 77 degrees.[4] The air will remain turbulent from the rising air currents up to above 10,000 feet, often extending up to around 14,000 feet. If you have to fly, a light pair of flight gloves is a great idea because the yokes are hot and the hands perspire. A hat, sun glasses, towel for sweat, and plenty of water are also advisable. If your carry passengers, you will never regret having a good supply of air sick bags. The secret to enjoyable flying this time of year is do it early in the morning or later in the evening.

The heat can be a killer, but it insidiously diminishes your mental skills long before it becomes life threatening. The Air Force recognized this many years ago and developed the Fighter Index of Thermal Stress Charts, recently upgraded to a more readable format as shown in Table 1.[5] The chart defines three zones, Normal, Caution and Danger. These zones are determined by using the dry temperature in combination with humidity to determine an index level. It is this index level that determines whether conditions fall within one of the three zones. The Normal Zone does not have any precautions associated with it, whereas the Caution and Danger Zones have increasing levels of restrictions. While the levels of restrictions are designed for military operations, civilian pilots, instructors, and students operating in similar conditions would be wise to follow similar precautions. Notice from the temperatures and dew points on the chart, pilots operating from desert locations will be in the Caution to Danger Zones most of the time throughout the day from mid-May to October.

[3] http://www.ntsb.gov/aviationquery/brief.aspx?ev_id=20001205X00336&key=1
http://www.ntsb.gov/aviationquery/brief.aspx?ev_id=20070418X00434&key=1
[4] http://www.tpub.com/content/aerographer/14312/css/14312_47.htm
[5] http://www.af.mil/shared/media/epubs/AFPAM48-151.pdf

FIGHTER INDEX THERMAL STRESS (FITS) REFERENCE VALUES AND ADVISORY FLAG COLORS

Table A3.1. Fighter Index of Thermal Stress (FITS) Reference Values and Flag Colors.

Dry Bulb Temperature	Zone	Dew Point Temperature								
(F)		30	40	50	60	70	80	90	100	>110
70		70	73	76	81	86	X	X	X	X
75		74	77	80	84	89	X	X	X	X
80	NORMAL	77	80	83	87	92	98	X	X	X
85		81	83	86	90	95	101	X	X	X
90		84	87	90	93	98	104	110	X	X
95		88	90	93	96	101	108	112	X	X
100		91	93	96	99	104	109	115	122	X
105	CAUTION	94	96	99	102	107	112	118	124	X
110		97	99	102	105	109	114	120	126	133
115		100	102	105	109	112	117	123	129	136
120	DANGER	104	105	108	111	115	120	125	131	138

Table 1

Caution Zone

The following procedures should be implemented:

Be Alert for symptoms of heat stress.

Drink plenty of non-caffeinated fluids

Avoid exercise 4 hours prior to takeoff.

Limit ground operations time to 90 minutes outside an air conditioned environment

Danger Zone

In addition to the above procedures:

Minimum recovery time, landing to next take off between flights is 2 hours.

Limit ground operations to 45 minutes for fighter/trainer aircraft types; time outside an air conditioned environment.

If possible wait in a cool shaded area if the aircraft is not ready to fly.

Complete a maximum of 2 aircraft inspections, 2 exterior inspections on initial sorties and 1exterior inspection on subsequent sorties for fighters and trainers.

Undergraduate Flying Training solo students are to complete 1 exterior aircraft inspection per sortie.

If the heat is hard on the body, think what it does to your engine. My oil temperatures are usually about 100 degrees warmer than the ambient temperature. This means on a 110 to 115 degree day my oil temp will be near 215 degrees.

High angle climb outs will decrease the airflow through the engine and the oil temperature can approach the operating limit. If you have to "break-in" a new engine or a new cylinder, early morning would be the wisest choice. Even with established "broken-in engines," limit ground idle times as much as possible. This can be a challenge at some of the Phoenix area airports that have a large volume of training activity and subsequently a congested traffic pattern that preventing controllers from expediting departures. I would also limit traffic pattern work to early morning and late evenings to avoid the heat of the day. In my plane, I don't have the luxury of knowing my cylinder head temperatures (CHT), but for those pilots who do, monitor your CHTs. If field conditions permit, this might be one time when leaving the mixture a little rich providing cooling fuel may be advisable. I would rather sacrifice peak performance on the engine than risk having a cylinder or valve seize, bending a push rod, and effectively flying with one dead cylinder on departure. A friend of mine had that happen on a freshly overhauled O-320H engine and he was lucky to get the aircraft back on the runway safely. Co-incidentally, he did the exact opposite of everything I just recommended! **Always** follow your aircraft or engine manufacturer's published guidelines for leaning procedures and if you can't do that for a safe takeoff, delay your departure until conditions are more favorable.

Besides the obvious hazard of the heat, a couple of insidious hazards deserve special mention: Dust Devils and Density Altitude.

Dust Devils become increasingly prevalent in the desert region in April but they can occur any time we have a warm day. Although it is not related to severe weather, a dust devil is like a small tornado occurring in dry conditions, is usually benign, but can be destructive. They are also not limited to the desert. In September, 2000 a dust devil swept through the Coconino Fairgrounds, which are just west of the Flagstaff airport, destroying tents and splitting a large wooden beam. It was estimated the winds were in excess of 75 mph.[6] Dust Devils are very transitory, moving along rapidly, sweeping dust and debris several hundred feet in the air. Depending upon how much dust is in the vortex, they can be very difficult for a pilot or a tower controller to visually identify.

Even if the wind in the Dust Devil is only 10 to 20 mph, the rapid change in velocity and direction during a landing situation can be very undesirable, as a visiting Short Wing Piper Pilot to Glendale (GEU) experienced several years ago during the month of May. The pilot was on rollout when a Dust Devil enveloped him, swinging the airplane off the edge of the runway, into a runway edge light and resulting in a ground loop. The left wing, left wing struts, and left elevator were damaged enough that they had to be replaced. Winds at the time of the incident were reported as calm. Perhaps a little awareness of the phenomena would have spared the hapless pilot the expense of a new wing and control surfaces, the embarrassment of the incident, and not to mention the additional emotional experience of having to take a check ride with his local FSDO inspector!

Density Altitude, the effect temperature has on pressure altitude directly influences aircraft performance. Many other factors affect density altitude but for simplicity, I will address only temperature and altitude.[7] Most pilots recognize that high altitude airports place them in a high density altitude situation, but many do not realize the high temperature in the desert will also place them in a high density situation. For example, an airport at 1,500 feet MSL, and an altimeter of 29.78, pressure altitude of 1,640 feet, with a temperature of 110 degrees F, results in a density altitude of 5,137 feet. My aircraft Pilot Operating Handbook recommends leaning the engine when above 5,000 feet MSL to get the best performance. It certainly applies here, but how many pilots would recognize this unless they check for density altitude.

Using the Density Altitude Chart in Figure 10 requires the pilot to know the pressure altitude. If you don't remember how to obtain the pressure altitude, set your aircraft altimeter to 29.92, read the pressure altitude and enter the left side of chart with that number. If you are not in your plane, you can calculate the pressure altitude by taking the difference from 29.92 and the actual altimeter, multiplying it times 1000, and adding or subtracting the result to the field elevation. In this example, 29.92 - 29.78 = .14 x 1000 = 140 feet. Add 140 feet to the 1,500 feet MSL field elevation to get a pressure altitude of 1640. If we had an altimeter setting above 29.92 like 30.12, you still subtract that from 29.92 (29.92 - 30.12 =

[6] http://www.wrh.noaa.gov/fgz/science/dustdvl.php?wfo=fgz
[7] http://en.wikipedia.org/wiki/Density_altitude

-.20 x 1000 = -200 feet.) Subtract 200 feet from the 1,500 feet field elevation and the Pressure Altitude is 1,300 feet. A higher pressure reading above 29.92 is performance enhancing, while a lower altimeter setting is performance robbing. [8]

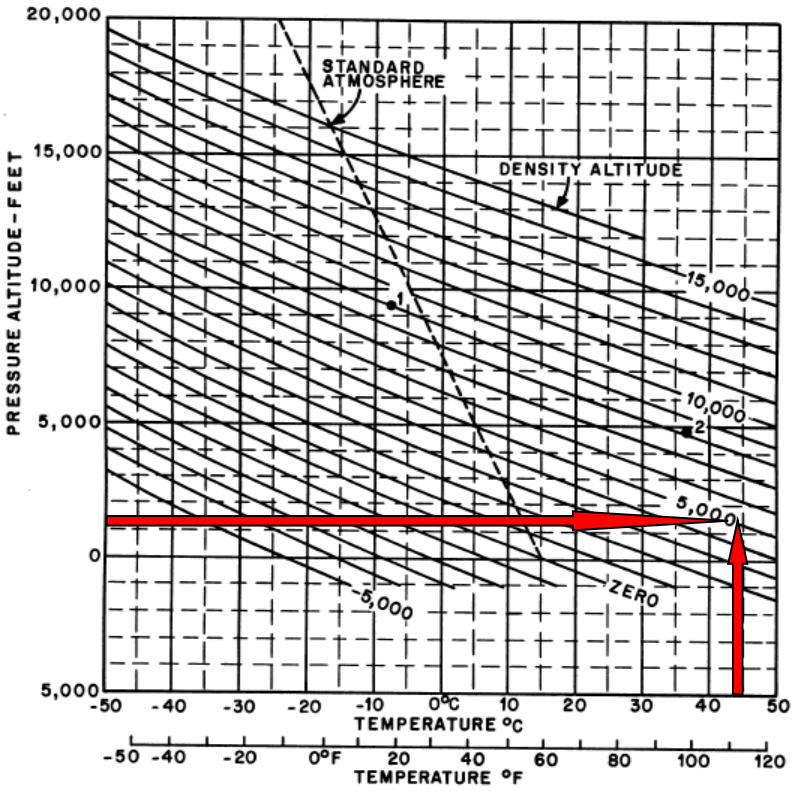

Figure 10

As long as I am discussing altimeter settings, let me discuss a common summer time phenomenon. The summer heat results in a large thermal low pressure area situated along the Colorado River and extending throughout the hot desert floors. This low can cause significant differences in altimeter readings between the desert and the cooler higher altitude regions of northern Arizona. The Aeronautical Information Manual procedures in Section 7-2-2.a.1, recommends setting your altimeter to a station within 100 nautical miles of your aircraft, but that technique may not be adequate with large changes in altimeter readings. If you are flying in these areas, it is an excellent idea to get the closest altimeter setting along your route of flight to avoid having a significant altitude deviation. When possible I use Flight Following from the appropriate Air Traffic Control Center; the controller can provide the altimeter along your route. However, there are some areas north of Flagstaff where you will be too low to be in radio contact, for instance if you are remaining below the Sunny MOA between the Tuba City VOR and Flagstaff (Figure 11). A good preflight brief and knowing the altimeter settings in the area may keep you from inadvertently being in the bottom of the MOA. Many airports also have Automated Weather Observation or Airport Surface Observation Systems one can monitor along your route of flight or even listen to via a telephone.

[8] http://www.faa.gov/library/manuals/aviation/pilot_handbook/media/PHAK%20-%20Chapter%2010.pdf, pp10-2 to 10-4

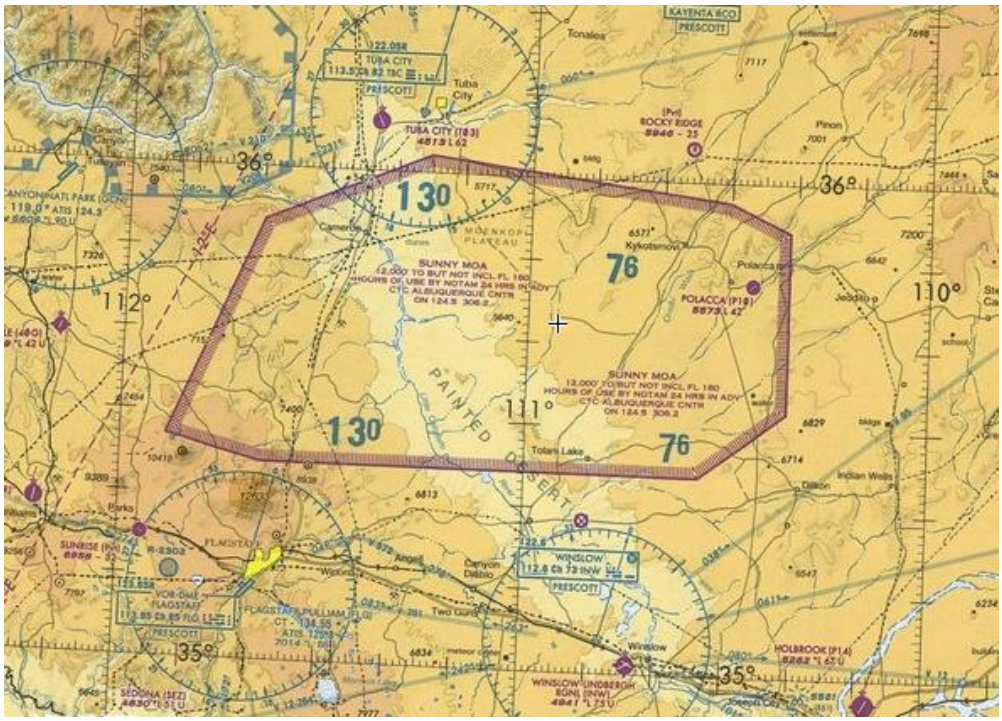

Figure 11

Along with the warmer and dry period of late May and June comes the increase danger of wildfires. The Cave Creek Complex Fire, June 21, 2005, was the second largest fire in Arizona history burning almost 244,000 acres north of the Phoenix area and was large enough to create its own weather patterns.

Pyrocumulus clouds rising from the heat and smoke[9]. Photo used by permission Pepper Ridge Weather Web Site, J. Summers

[9] http://amsglossary.allenpress.com/glossary/search?p=1&query=pyrocumulus&submit=Search

These fires can develop very fast and result in Temporary Flight Restrictions (TFRs) for the area surrounding the fire. Avoiding the TFR, and in some situations the smoke and clouds, may require extensive deviations to your planned route. Even though you may not see smoke, the TFR can remain enforce for several days following the successful suppression of the blaze, in case fire fighting aircraft have to extinguish flare ups and hot spots. The only way to ensure your route will be clear of TFRs is to get a briefing from the Flight Service Station.

A Small Fire just north of Payson, Arizona, May 16, 2010

July, August, and September

The Monsoon Season begins in earnest during these months. The "Locals" like to say from 4th of July to Labor Day is the Monsoon Season and that is usually pretty close. High pressure sits along the four corners region causing the upper level wind patterns across the southern states and Mexico to become a weak easterly flow, carrying Gulf of Mexico moisture with it. Sometimes the monsoon begins earlier and sometimes later, but it will make its presence known by the line of build-ups forming along the Mogollon Rim (the Rim) as moisture moves up from Mexico and the Gulf of Mexico. Thunderstorms will usually start appearing towards the southern end of the Rim towards Clifton and work their way northward toward the White Mountains, increasing in intensity a little bit each day (Figure 12).

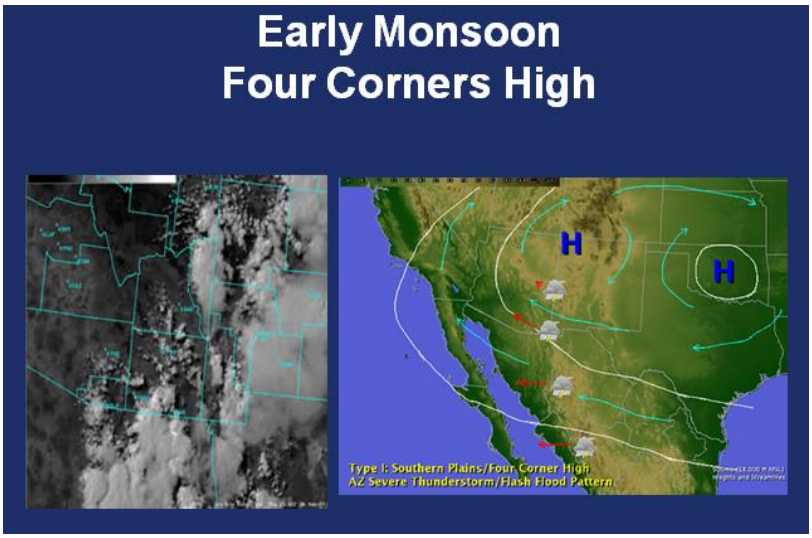

Figure 12

The National Weather Service web site has a good discussion on the monsoon[10] and the Pepper Ridge Weather site has some excellent information as well.[11] Once the monsoon moisture has infiltrated the state, the build-ups will begin by about 10 a.m. If you are flying in northern Arizona during the late morning hours when the build-ups begin, you'll find it hard to maintain altitude. One minute you'll be in a rising column of air and the next in a sinking column of air. I've seen two thousand feet per minute climbs in my Pacer while I'm at 10,000 feet, and within several minutes had it reversed, unable to stop the descent at full power. Fortunately, one can fly through the column of air quickly. They are controllable events but definitely a sign the atmosphere is unstable. If you see a cloud starting to form, anticipate a column of rising air under it. Within a matter of hours, sometimes minutes, what started out as a clear blue sky becomes a solid wall of boiling white, to grey, to black, towering thunderstorms. By noon to early afternoon, the mountain areas often get a significant amount of precipitation (Figure 13).

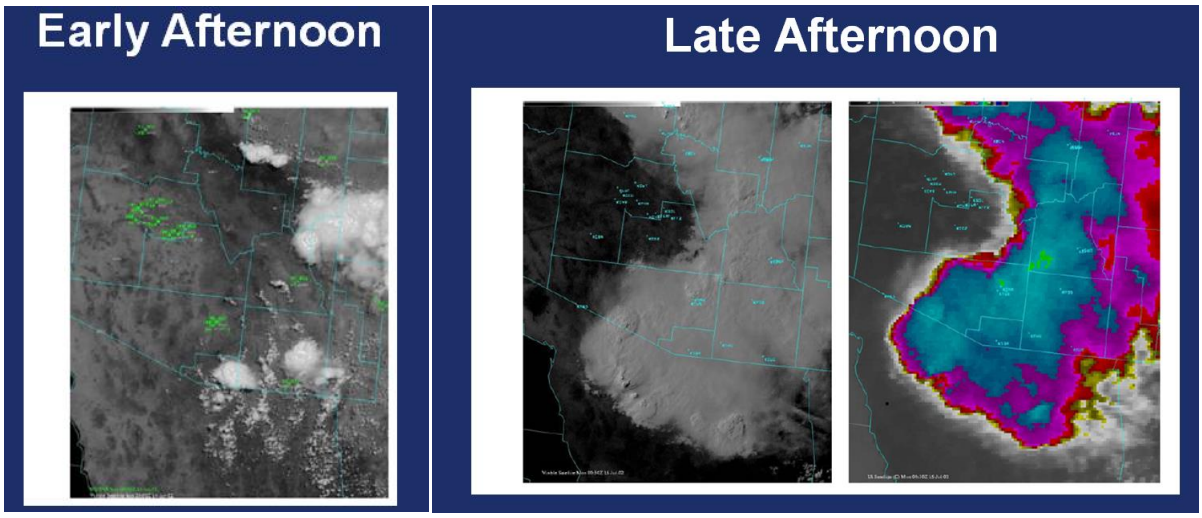

Figure 13

Some of the storms may play themselves out if the moisture layer has not yet fully engulfed the state. But, if the desert areas have dew points above 55 degrees, there is a good possibility the outflows from the storms along the Rim will generate new lines of storms that begin to move down into the desert region by late afternoon and early evening. The heat of the desert will generate enough lifting action to produce significant thunderstorms (Figure 14).

[10] http://newweb.wrh.noaa.gov/twc/monsoon/monsoon_info.php
[11] http://www.pepperridgenorthvalley.com/monsoon.php

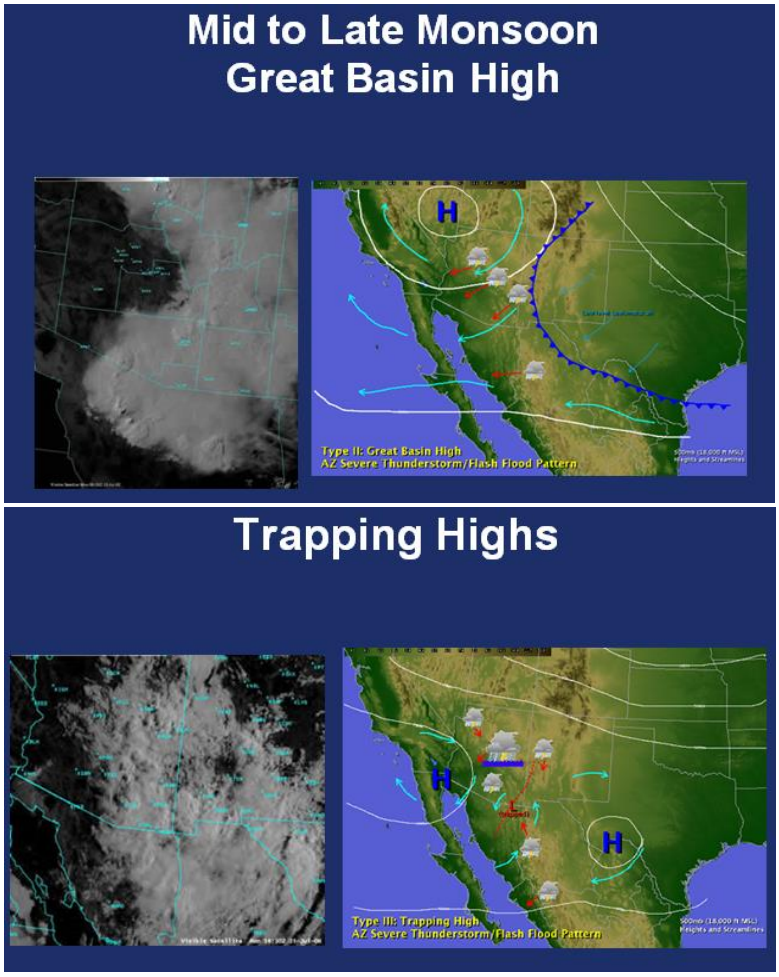

Figure 14

Usually the storms will dissipate by midnight, but occasionally a hot patch of desert can form a heat island and you will see a rogue build-up form above it in the middle of the night. Those build-ups are usually short lived but can be a hazard to flying when you think the threat for the day is over. Don't trust the debris clouds to be armless either. I flew through one in a T-37 and it was like flying into a snow ball as the airplane was instantly covered with rime ice. Usually by midnight the skies begin to clear and remain so until the heat of the sun starts the process all over.

During one of our FAA Safety Seminar's, an attendee asked Ed Daror, the ASAG Vice President and an FAA Safety Lead Representative, if he could suggest a route that would be the safest during the monsoon. To second Ed's answer, there simply is no route along the Rim that is better than another, nor safe, once the build-ups have matured into fully developed thunderstorms (See Figure 13). If your aircraft is radar equipped, don't expect it to be an effective or safe way to pick your way between cells. Western thunderstorms have less moisture content than a similar storm would have in the plains or southeast and may not appear as a serious threat. Do not be lulled into this trap; the storm will contain all of the dangers of any thunderstorm. The AOPA Air Safety Foundation has some practical information for thunderstorm avoidance.[12]

If you are planning to fly during the monsoon season, the safest period is very early morning. Flying anywhere along the Rim after about 1200 may be impossible and dangerous. In the desert valleys, you usually have until late afternoon before the storms roll-in, but beware that a significant dust storm can precede a thunderstorm event by several hours.

[12] http://www.aopa.org/asf/publications/sa26.pdf

Dust Storm from Monsoon Thunderstorm Downdrafts

I watched a Husky land on a crossing taxiway at Deer Valley, when he got trapped in the pattern and the winds came up so suddenly he could not land safely on the runway. As I watched him circling the airport, I ran up to the tower (this was pre 9/11 when you could still do such things) to see how this was going to end. The Tower cleared the pilot to land on the taxiway aligned with the wind at his own risk; his ground roll was less than 200 feet. I was surprised he was able to taxi the aircraft back to Cutter Aviation. I bet the seat cushion was hard to find after that flight!

An August 2010 Monsoon Storm in North Scottsdale

Not every day will result in monsoon storms as the moisture ebbs and flows in and out of the state. Weak Pacific systems can cause a change in upper level wind patterns pushing the moisture back down into Mexico or out into the eastern states. Generally, if the upper level winds are out of the west, it will cut off the monsoon production. The westerly pattern

may diminish and the monsoon return, but by mid-September a westerly wind flow will become the dominant wind pattern. I've seen the monsoon pattern disappear from California to the Gulf of Mexico in as little as a day and that was the end of the season (Figure 15).[13]

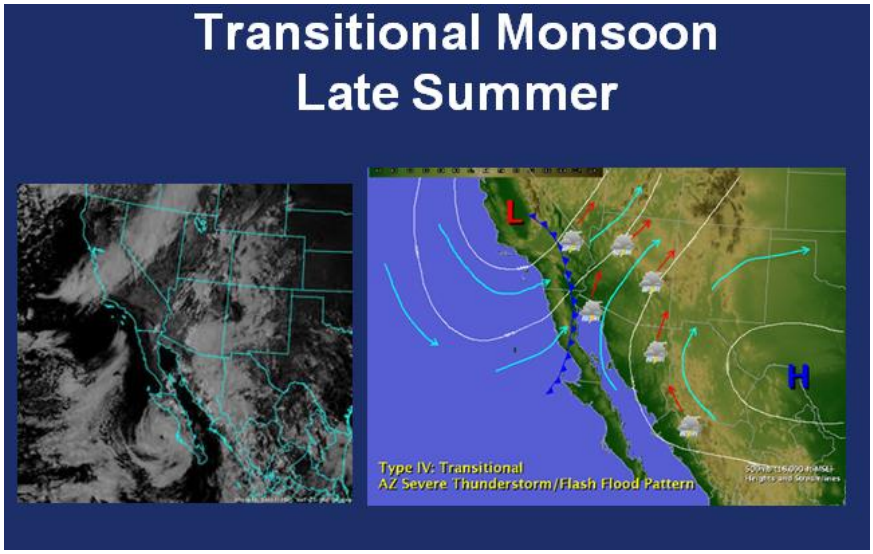

Figure 15

October

October is again a season of transition. The heat and humidity of the summer finally start to break but temperatures can still reach into the 100s in the month. While the monsoon moisture is gone, there still remains a threat of significant rain events. Very rarely, in late summer or early autumn, a decaying tropical depression can work its way up the Gulf of California bringing prodigious amounts of rain (Figure 15). Usually these storms tend to track across northern and central Mexico and move into Texas or New Mexico by-passing Arizona, but when they do find their way into the state, they can cause significant thunderstorms and wide spread flooding. These storms may last for several days and when they move in, the best place to be is on the ground.

We also may start to see the parade of Pacific systems return. These early storms are usually moisture starved producing little in the way of precipitation besides a light dusting of snow on the very top of the White Mountains and the San Francisco Peaks.

It is usually during this period when the U.S. Forest Service will conduct controlled burns of the forest undergrowth. Since the atmosphere is stable, the smoke from these fires can linger throughout large areas of the state reducing in-flight visibility. If you are counting on unlimited visibility you may be disappointed; smoke can obscure the lights from towns at night.[14]

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[13] http://www.ntsb.gov/aviationquery/brief.aspx?ev_id=20080825X01303&key=1
http://www.ntsb.gov/aviationquery/brief.aspx?ev_id=20080818X01259&key=1
http://www.ntsb.gov/aviationquery/brief.aspx?ev_id=20001212X21758&key=1
http://www.ntsb.gov/aviationquery/brief.aspx?ev_id=20001212X19546&key=1
http://www.ntsb.gov/aviationquery/brief.aspx?ev_id=20020913X01598&key=1
http://www.ntsb.gov/aviationquery/brief.aspx?ev_id=20001212X21999&key=1

[14] http://www.ntsb.gov/aviationquery/brief.aspx?ev_id=20091005X83514&key=1
http://www.ntsb.gov/aviationquery/brief.aspx?ev_id=20061031X01585&key=1

November, December, January, February, and March

Undoubtedly our best flying weather occurs during this period. Unfortunately some of our most dangerous flying weather also occurs. When storm systems move into the state, they are usually cold Pacific systems laden with moisture. Wintertime flying outside of the desert regions during these storms brings two dangerous hazards – *Ice* and *Rocks*. The cold Pacific system will have conditions conducive for ice formation. We do not get benign stratus clouds, useful for IFR training seen along the west coast or back east. Winter systems are fast moving events bringing rapidly decreasing ceilings along the higher elevations entrapping pilots flying across the northern regions of the state. Whether they are in New Mexico heading west, or from California or Nevada heading east, pilots fail to take into account the raising terrain through northern Arizona. In an effort to stay out of the ice laden clouds, they continue to get lower and closer to the ground until inevitably they can't do either. When coming from the east, a pilot is flying into a storm that he may not have anticipated the severity of, and in the case of the pilot coming from the west, he might have thought the storm had passed or it was not as significant when it went through his location. Winter storm conditions can linger in the northern half of the state for a day or two after conditions in the southern and western half of the state have cleared. IFR flight in Arizona during this time is not a good idea unless the aircraft is equipped for flight into known icing; most general aviation aircraft are not so equipped. It is better to wait out the system or plan a southern route, but beware that winter conditions can also exist along the mountains of Southern Arizona. Judging from the number of NTSB reports, this is undoubtedly the most dangerous time to fly in the state.[15]

Well that brings us through the whole calendar. I encourage you to read some of the NTSB reports and think about what you would have done differently than the pilots that ended up as statistics. Hopefully, you now have a little better understanding of the changing weather patterns across the wide variety of terrain that makes our state so beautiful to fly in, but also so dangerous when weather is a factor. I also hope I have given you a few tools you can use to be a better educated and safer pilot in the Copper State.

Fly Safe.

Cary, the son of a Mining Engineer, lived in Silver City, New Mexico, Kingman and Tucson, Arizona. He graduated from Northern Arizona University, Flagstaff, Arizona in 1977 with a Bachelor of Science Degree in Data Processing, Business Administration, and later earned a Master's of Aeronautical Science from Embry-Riddle Aeronautical University. Cary retired from the U.S. Air Force in 1997 as a Lieutenant Colonel having been a Flight Examiner/Instructor Pilot in the T-37B based at Williams AFB, Arizona, the C-141B out of McGuire AFB, New Jersey, and the C-20A (Gulfstream III) based at Ramstein AB, Germany, where he also served on the North Atlantic Treaty Organization Air Staff. He currently flies the Airbus A320 out of Los Angeles, California and before transitioning into the A320 in 2002, he flew the Boeing B-737/300 and 500. He is a proud owner of a Piper PA-22/20 which constantly challenges his pilot skills. He is also a volunteer ASAG member and FAA Safety Team Lead Representative.

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http://www.ntsb.gov/aviationquery/brief.aspx?ev_id=20051019X01693&key=1

[15] http://www.ntsb.gov/aviationquery/brief.aspx?ev_id=20070109X00028&key=1
http://www.ntsb.gov/aviationquery/brief.aspx?ev_id=20010423X00798&key=1
http://www.ntsb.gov/aviationquery/brief.aspx?ev_id=20070109X00028&key=1
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