

CALLBACK

From NASA's Aviation Safety Reporting System



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When VMC Turns IMC

The instrument rating found on a pilot certificate is both a prized possession and profound accomplishment. It comes with extreme responsibility, requires much discipline to master, and confers special privilege. With it, pilots may fly a properly equipped aircraft in Instrument Meteorological Conditions (IMC) and transition from Visual Meteorological Conditions (VMC) to IMC. Loosely speaking, these are two aviation achievements that most birds rarely attempt.

Hazards typically not seen in VMC flight are introduced during IMC flight and VMC to IMC transitions. Icing alters aircraft flight characteristics. Turbulence challenges flight control systems and automation. Human Factors can enter the mix as well. The human-machine interface, distractions, confusion, physiological factors, situational awareness, and workload are examples. In short, flight in or into IMC can add threats and stress to any pilot, instrument rated or not.

This month, *CALLBACK* shares incidents that resulted in hazards and subsequent domino issues from flying in or into IMC. The hazards and concerns represent significant threats to pilots, regardless of qualification, experience, or aircraft capability. Safety of flight, therefore, demands operations in IMC be conducted with knowledge, wisdom, strict planning, discipline, and the utmost respect for associated threats.

Part 91 – While Cruising in VMC

This experienced, corporate Bonanza pilot entered what was thought to be a benign cloud bank. What happened next was a stunning surprise and introduced another threat to quell.

■ *I was cruising at 8,000 feet in a Bonanza on an IFR flight...to ZZZ1.... Approximately 30 NM north of ZZZ2...I entered a benign cloud bank, and shortly after going IMC, I encountered localized extreme turbulence, hitting my head on the ceiling.... The AP disconnected. I was stunned momentarily, but then realized the plane was in an unusual attitude (dive) and with very strong downdrafts and heavy controls. I recovered from the unusual attitude, and I informed ATC that I had encountered extreme turbulence & downdrafts and could not hold altitude. Exiting IMC, the turbulence subsided, and I had lost several thousand feet of altitude. I requested and was cleared to 6,000 feet and completed the flight without further incident.*

I think that the extremely high temperatures (near 100 degrees) on the ground and flying in this afternoon heat cumulatively contributed to a localized turbulent weather condition. The weather picture on the avionics did not show...precipitation, lightning, or storm cell attributes at my position or on my projected path, however, there was evidently enough energy in the air to cause the extreme localized turbulence and downdrafts encountered.

Part 135 – While Deviating for Weather

An EMB145 pilot reported entering an active, developing cell while deviating around weather. The resulting problems and flight profile are nothing short of astonishing.

■ *Between waypoints ZZZZ and ZZZZ1 intersection at FL360, we had been keeping a close eye on a squall line passing through the sector. After some discussion, we decided we would stay the course, but look for an opening that would provide the least turbulence. We heard a radio call between an aircraft...and ATC advising them that storms were below FL330 and that FL360 was fine. Upon hearing that, we became sure of our decision to press on. About 10 to 15 minutes later, [that] aircraft...alerted ATC that they were experiencing moderate to severe turbulence and requested a deviation to the right. We checked our radar and saw...on our route that there was a section of the squall line with tops at FL400. We then discussed and agreed to also deviate to our right to avoid that section. About 10 minutes after [that], we encountered a severe updraft with severe turbulence, showing extensive airspeed fluctuations and a Vertical Speed (VS) of +6,000 feet per minute for...20 seconds. The Autopilot (AP) kicked off, and we were unable to maintain altitude to the point we briefly hit FL390 before immediately [being] pushed back down to FL360. We acted on training, and the pilot flying flew the aircraft while I handled all other responsibilities. We immediately asked ATC for altitude relief, which we got, and deviated to our left to avoid the situation. The Captain's...Primary Flight Display (PFD) lost airspeed, altitude, and VS information after about a minute with an Engine Indicating and Crew Alerting System (EICAS) message showing [two issues]. We consulted the QRH on [both] issues while hand-flying with the Integrated Standby Instrument System (ISIS). The*

problems did not resolve [themselves] by following the QRH. The First Officer's...instruments were working in conjunction with ISIS, so we selected Air Data Computer 2 (ADC2) and changed the AP coupling...to the First Officer side. We exited the storm and were able to continue enroute to our destination. No injuries were reported.

Cause: Inadvertent entry into an active developing cell with the information at hand. Suggestions: Choose the best path of least turbulence; stay at least 5,000 feet from tops of cells to clear the storm. Stay 20 NM away from storm cells. Make the decision to deviate for the best path as early as possible.

Part 135 – While Expediting the Arrival

This Caravan pilot was VFR-on-top, but experienced some undesirable consequences after choosing to cancel IFR.

■ *It was an IFR flight to ZZZ1. I was VFR-on-top for the whole route of flight. ZZZ1 was reporting 4,200 foot ceilings and 10 miles visibility. About 90 miles to the east of ZZZ1, there was a large opening in the cloud layer, so I opted to cancel my IFR and descend below the layer. I made a slow descent to about 700 feet AGL and saw in front of me that the layer continued to the ground. I initiated a climb away from surrounding terrain and went into IMC. I broke out of the layer again after a few minutes and was able to complete the flight under VFR. In retrospect I should have continued the flight under IFR for longer and most likely would have been able to cancel [IFR] closer to ZZZ1.*

Part 91 – From A Controller's Vantage

This Center Controller recounts a C182 pilot's plight during an IFR flight when the pilot attempted to climb through hazardous icing conditions. Significant aid was rendered.

■ *Aircraft X was a [westbound] ZZZ departure...coming out of...Approach. On initial check-in, he said he wanted to go as high as possible to get over icing. I climbed him to 17,000 [feet]. I got a report from an airliner, who departed ZZZ1 southbound, [stating] that he broke out of the cloud layer at FL190. I relayed the report to Aircraft X and clarified what it meant, as he was confused by the term 'breaking out.' A few minutes later I asked if he was getting icing in that area. He said a little bit on his windshield, a small amount. I filled out a PIREP with this information. Several minutes went by, and he then told me he had rime ice on his windshield. I described the precipitation areas on my scope, which were approximately 80 miles east of him and 50 miles southeast of him, and I noticed that his climb had stalled out at 12,000 feet. I asked him if he was still climbing or if he wanted to stay at 12,000 feet. He replied that he could see some blue*

sky and wanted to continue climbing. About 30 seconds later he declared, "In an uncontrolled descent." I told him about the Minimum IFR Altitude (MIA) in that area, 9,000 feet. I observed he was in a right turn and asked if he was able to maintain any control. He said, "Negative." He came back a short time later and had control. I told him to maintain at or above 9,000 feet. He responded he was out of control again. He was able to regain control and said he had icing on the wings. I [suggested] two nearby airports, and he opted to go to ZZZ2. Over the course of the next few minutes, I gave him an initial vector to ZZZ2, followed by another vector after he veered off course. I gave him the airport weather, elevation, runway length, and the three instrument approaches. He eventually descended to 9,000 feet, and then to 8,000 feet. By this point, he said the icing was starting to melt from his windshield and [that] he had control of the airplane enough to start the RNAV approach to Runway XX. After he passed the initial approach fix, he began descending to 7,500 feet. I gave a low altitude alert and reminded him the MIA was 8,000 feet in that area. I checked to see that he had pitot and carburetor heat turned on, and he did. By this point, he said the ice was melting and the temperature outside was 35 [degrees] F. The rest of the flight was pretty normal, all things considered, other than he stayed at 7,500 feet despite the minimum IAF altitude of 8,000 feet. He was well above the highest point in the area and he was between layers at the time. He ended up landing with no other issues.

There were several things looking back now that could have tipped me off to the danger he was in. The first was the extremely slow climb in icing conditions combined with a gradual reduction in his groundspeed. It was shortly after I told him about the stopped climb that he lost control. I do question whether I caused him to try a steeper climb that resulted in him stalling and losing control. I think also having him descend back to 9,000 feet, which was a safe altitude to get back into warmer air, could have been helpful, despite him wanting to climb above the layers of icing. Also, I was reminded several times by management that he was below the MIA, a fact which I had told the pilot already. I was extremely hesitant to give any indication to the pilot that he needed to immediately climb back to 8,000 feet out of fear that he would stall and lose control again.



NASA ASRS UAS/Drone Safety Reporting

Anyone involved in UAS/Drone operations can file a NASA ASRS report to describe close calls, hazards, violations, and safety related incidents.

ASRS Alerts Issued in November 2024	
Subject of Alert	No. of Alerts
Aircraft or Aircraft Equipment	6
Airport Facility or Procedure	6
ATC Equipment or Procedure	5
Hazard to Flight	2
Other	4
TOTAL	23

540
A Monthly Safety
Newsletter from
The NASA
Aviation Safety
Reporting System
P.O. Box 189
Moffett Field, CA
94035-0189
<https://asrs.arc.nasa.gov>

November 2024 Report Intake	
Air Carrier/Air Taxi Pilots	4,464
Flight Attendants	1,447
General Aviation Pilots	1,235
Military/Other	830
Controllers	199
Mechanics	198
Dispatchers	174
TOTAL	8,547