

# VFR INTO IMC

## Part Two

Why is it that VFR pilots – including experienced ones – continue to enter instrument meteorological conditions?



## No worries, mate – done it before

Human factors research indicates that if a VFR pilot has had a previous brush with IMC and lived to tell the tale, they're more likely to feel confident about it happening again<sup>1</sup> – perhaps even deliberately risking it to save time, finish the journey or meet clients' expectations.

The pilots in two recent VFR into IMC accidents in New Zealand had both had an encounter with IMC not long before their fatal flights.

And, according to the magazine *Vanity Fair*<sup>2</sup>, the pilot who died with the American basketball star, Kobe Bryant, had earlier claimed to a fellow pilot that he sometimes deliberately climbed through overcast to get into clear air above.

So what should have been a 'last card' emergency procedure had seemingly, for him, become a more regular manoeuvre.

## It's spatial disorientation that kills

Since he kept doing it, it's clear that on those occasions, the pilot, Ara Zobayan, didn't suffer spatial disorientation. Perhaps he was only on the fringes of IMC and maintained a reference point.

"One of the key elements contributing to VFR pilots not appreciating the risk associated with inadvertent IMC," says Massey Lynch – who trains VFR pilots to avoid IIMC – "is that they're not aware of how significant the likelihood is of this form of incapacitation following the complete loss of visual reference."

It's spatial disorientation that kills. With a last reference point disappearing in the swirling white outside the aircraft, the lack of visual information can lead to powerful and disorienting sensory illusions, leading to a loss of control. One of the more common is a sense of ascending, when in fact, the aircraft is descending.

This is what the American National Transportation Safety Board (NTSB) found had happened in Zobayan's last flight<sup>3</sup>.

The investigators found that the pilot, climbing through cloud to get to clear air above, had almost made it when spatial disorientation is believed to have hit, convincing him he was continuing to ascend when in fact he'd begun

to descend. The white surrounding his Sikorsky S-76B would have been so thick he'd have lost all cues as to how close to terrain he was, or even which way was 'up'.

Massey, who's the operations manager for the Hamilton-based Westpac Air Ambulance, says it's likely that the two New Zealand VFR pilots who died in IMC conditions, but who'd had a previous brush with them, are also likely not to have experienced full spatial disorientation in their earlier encounter.

"A review of NTSB accident reports indicates there are varying degrees of spatial disorientation," he says, "and VFR pilots who've never experienced it, or experienced its full effects, do not appreciate how severely incapacitating it can be.

"They likely don't understand the physiological factors in loss of reference – the effects on the body and mind, and how quickly this can lead to a loss of control.

"With this understanding, pilots are better able to assess the risk IIMC represents and put more effective mitigation and avoidance measures in place.

"If possible, instrument training for VFR pilots should include exposure to spatial disorientation in a controlled situation. This will allow pilots to recognise it, and learn to manage the conflicting vestibular sensations, while maintaining a safe flight path by reference to instruments."

## A lack of planning

CAA safety investigation reports indicate that one of the surest ways of a VFR pilot dying in an IIMC encounter is a lack of robust planning.

Time and again, the reports find the pilot concerned didn't check the weather, gave it only a cursory check, or did check the weather and flew anyway.

One recent tragedy in New Zealand illustrates how casually even an experienced pilot can treat this essential part of flight planning.

A CAA safety investigation found the 2300-hour pilot couldn't get into their destination aerodrome because of fog, couldn't get into a nearby aerodrome for the same reason, so turned for home. Having turned on the GPS and autopilot, the aircraft flew into terrain after entering cloud only a few minutes from the pilot's home aerodrome.

There was no evidence of the pilot checking predicted weather, nor undertaking a threat and error management process. »

1 Mark W. Wiggins, David R. Hunter, David O'Hare, Monica Martinussen. (2012). Characteristics of pilots who report deliberate versus inadvertent visual flight into Instrument Meteorological Conditions. *Safety Science* 50(1), 472–477.

2 "Kobe Bryant's tragic flight" *Vanity Fair*, 25 January 2021.

3 NTSB Report AAR2101.

» “Good weather conditions at his destination (home aerodrome), and familiarity with the route being flown, may have encouraged the pilot to continue his flight with a reliance on the aircraft’s sophisticated technology,” the report concludes.

“[But] this accident also serves as a timely reminder of the risks associated with reliance on technology for flight into deteriorating weather conditions.”

## Weather ‘cues’

Getting MET information is only part of weather planning, according to the online aviation library, SKYbrary.

It urges pilots to consider alternative courses of action should the weather deteriorate, and to decide *when* those courses of action should be taken<sup>4</sup>.

“For example, what would be the minimum visibility or cloud base needed to continue on track?”

“Once airborne, these decisions are likely to be made under stress, so pilots must also be aware of their own abilities and limitations, which may well be more limiting than the local regulations may require or the law demand.”

Massey Lynch says this ‘cue-based’ decision-making is key to pilots choosing life-saving options on days where the weather is marginal.

“They should be undertaking a formal threat and error management process vis-a-vis the conditions on the day.

“For instance, is IIMC or loss of visual reference, a possibility in today’s conditions? If the answer is yes, then what mitigations are appropriate to put in place?”

<sup>4</sup> SKYbrary – *Inadvertent VFR Flight Into IMC*.

‘What is my ‘area safe altitude’?, Is the freezing level a factor? Where is there better weather to divert to, to complete an instrument let-down to regain VMC?’

“Considering these options achieves two things. First, the pilot has a basic plan that can be executed in the unlikely event visual reference is lost, and hopefully they will commit to flight by reference to instruments before disorientation or an unusual attitude occurs.

“And second, having considered this option, and the associated risks, the pilot takes a more conservative decision-making approach, identifying alternative options to ensure loss of visual reference is avoided.”

SKYbrary says the first cue to deteriorating weather can often be “the need to gradually reduce cruising level to maintain VMC. This provides the first ‘cue’ alerting the pilot that a diversion is needed”.

But aviation accident investigations indicate that pilots frequently receive cues of deteriorating or hazardous weather conditions during the flight, yet continue.

“This may be due to the fact that weather conditions generally deteriorate gradually from minimum VFR conditions to IMC,” says Alaska White, CAA Chief Advisor, Human Factors. “This makes it difficult for pilots to accurately discriminate when conditions become unsafe, and a decision to discontinue is needed.”

That’s why CAA Aviation Safety Advisor – and former agricultural pilot – Mark Houston says the best time to make a decision to avoid IMC is on the ground, well before take-off – not as the weather deteriorates once in the air.

“Avoiding IMC,” says Mark, who’s had his own encounter with IIMC, “should be the start and finish of any decision about whether to fly.”



// Cap Cloud, Christchurch, May 2021.

## But if you do get ensnared in IMC

For CAA Flight Examiner (helicopter) Andy McKay, the IIMC occurrence described at the beginning of “VFR into IMC – Part One”, (*Vector* Winter 2022) is a classic illustration of much pilot behaviour, and results from a lack of currency and a lack of threat and error management.

“Training in handling startle and emergency situations is key,” he says.

“Pilots need to practise their response to any possible emergency situation, to the point where it’s ingrained in their brain. Then when they’re startled by suddenly finding themselves in IMC, they’ll immediately go to the procedure they recall so well – maybe only three or four steps – that they know will offer the best odds of getting them out of difficulty.

“If they get overwhelmed by the magnitude of the situation they’re suddenly in, pilots can do irrational things. But if they’ve practised what to do, so that it’s automatic, they have a fighting chance of getting out alive – unlike the pilot unskilled in handling startle, who’s going to make it up as they go along.”

Massey Lynch agrees with Andy that VFR pilots need to anticipate the possibility of loss of visual reference and create a plan of action should it happen.

“IIMC has also been fatal for a number of IFR-trained pilots. The common factor seems to be an event with a significant startle factor combined with the lack of any planning. This results in an attempt to transition to instruments too late, and after spatial disorientation starts to take effect.” <sup>2</sup>

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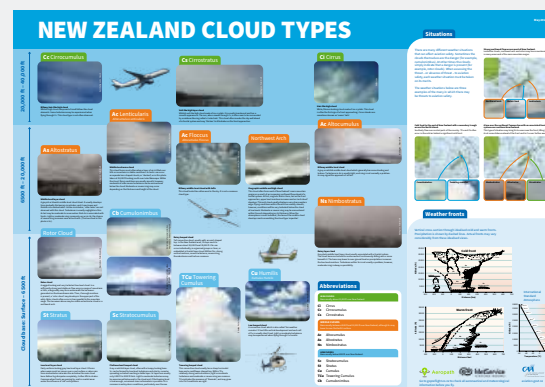
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The ‘golden hour’ is real. It may not be strictly an hour – it might be two hours or just 30 minutes – but it refers to the critical and limited time after an accident when treatment from paramedics and hospital clinicians has the greatest chance of saving your life.

So, if outdated contact details attached to your emergency locator transmitter delay help getting to you, you reduce your chances of survival.

A full half of ELT activations with the Rescue Coordination Centre are for aircraft with out-of-date contact details.

The RCCNZ says that when the ELT is unregistered, or registered to a previous owner, there can be a “considerable delay” in sending help.

So do yourself a possibly life-saving favour and **update your details at [beacons.org.nz](http://beacons.org.nz)**. <sup>3</sup>