



General Aviation and Low Level Weather

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IAOPA (Europe) and General Aviation



➤ IAOPA

- Represents 470 000 GA pilots and owners in 73 nations across the world
- In existence for 57 years
- IAOPA (Europe) represents members in 31 European nations:
 - EU EASA Member States
 - Non-EU EASA Member States
 - Other European nations

➤ What does IAOPA consider General Aviation to be?

- Flight operations which are not CAT, charter or military
- Personal business, flight training, private recreational, aerial survey flying
- Significant airspace user
- Most operations are at FL100 / 10 000ft or less

Low Level Weather



➤ Visual Meteorological Conditions

- Defined under SERA.5001
- Flight under Visual Flight Rules not permitted in Class A airspace
- VMC limits are generally:
 - 5km in-flight visibility;
 - 1500m horizontally and 1000ft vertically clear of any cloud;
- Below 3000ft amsl, 140 KIAS and in Class G airspace, may be as low as:
 - 1500m in-flight visibility;
 - Clear of cloud (no specific minima) and in sight of the surface

➤ 'Scud running' under VFR into non-VMC conditions:

- Usually attempted by pilots without formal instrument flying qualifications;
- Will probably lead to fatal loss of control or controlled flight into terrain

Threat Mitigation



➤ Instrument Ratings

- Will assist pilots to cope with poor weather conditions
- Part-FCL IR is more suitable for CAT operations than for private GA
- Require at least 40 hrs of instrument flight instruction
- Require passes in 7 examinations
- Forthcoming simpler, lighter, better 'Basic IR' should widen appeal for GA pilots

➤ Avoidance of known hazardous conditions:

- Low cloud
- Poor visibility
- Precipitation
- Turbulence
- Icing
- Strong winds

However, even sound pre-flight planning and an IR may be insufficient

GA Flight Management



➤ Pre-flight

- Increasing reliance on computers, internet sources and automatic calculations
- Surface pressure charts, winds aloft and area forecasts often overlooked
- Forecast weather graphics may mislead during extended / delayed flights
- Many pilots unaware of TAF / METAR area limits

➤ In-flight weather updates:

- Few single pilot GA aircraft have autopilots, weather radar or data link systems
- Using second radio for ATIS, VOLMET or FIS imposes high workload in IFR
- Use of tablet computer for internet connection cannot be relied upon in flight

➤ 21st Century system for in-cockpit real-time weather delivery needed

- To increase flight safety while reducing pilot workload
- To reduce the need for FIS and VOLMET updates

In-cockpit Weather



➤ Basic architecture needs

- Freely available international meteorological information
- Ground infrastructure including transmitter sites
- Airborne receiver
- Cockpit display system

➤ In-cockpit system:

- Low workload
- Intuitive display graphics
- Cloud and precipitation overlay on navigation display
- METARs in text or user-specified 'aerodrome state' icons, e.g. :
 - At least 5 km visibility and no significant cloud below 1500 ft a.a.l.
 - At least 1500m visibility and no significant cloud below 600 ft a.a.l.
 - Cloud or visibility below VMC limits

UK UAT Trial



➤ Universal Access Transceiver technology

- Funded by uAvionix
- Data uplink using protected 978 MHz aeronautical frequency
- 7 sites in southern UK
- Weather radar imagery \approx 200nm; TAF/METAR \approx 250nm from sites
- Successful trial ended 1st June 2019, pending funding decision

➤ uAvionix SkyEcho 2 in-cockpit system:

- 1090 MHz ADS-B in/out electronic conspicuity device
- 978 MHz UAT receiver
- Integrated GPS
- No external antennae or power cables
- Small size/weight (8 x 6 x 3 cm, 120 gram)
- Bluetooth link typically to iPad Mini with SkyDemon software
- Cost approx. €500

Conclusion



- In-flight near real time weather updates significantly enhance GA safety
- Trials have successfully demonstrated UAT weather uplink feasibility
- In-cockpit equipment options:
 - Low cost portable UAT device linked to pilot's tablet computer
 - Replacement panel mounted avionic system
- UAT FIS-B weather services already freely available across USA
- European limitations:
 - Free availability of weather data across all European borders
 - Approval *and funding* of transmitter sites and ground infrastructure

"We have the technology, but who's going to provide this GA safety system?"