saercosafety

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Ready...

saerco
the safe way

The editorial

Aviation meteorology

Aviation safety is a top priority for SAERCO. This bulletin aims to provide information about the different components of the system responsible for monitoring and analyzing meteorological conditions at airports, an essential aspect for ensuring both the safety and efficiency of air operations.

The international standards and methodologies for collecting and using meteorological data in civil aviation are established in Annex 3 of the International Civil Aviation Organization (ICAO), titled 'Meteorological Service for International Air Navigation.' This document plays a key role within the global regulatory framework, as it outlines in detail the provisions for observing, preparing, sharing, and using meteorological information in support of international air navigation.

ICAO establishes a set of Standards and Recommended Practices (SARPs) that member States are expected to implement or justify if they choose not to. These SARPs are organized into 19 Annexes. In the case of Annex 3, in addition to the SARPs, there is a section made up of Appendices and Attachments that provides complementary technical information and practical examples to support the uniform implementation of meteorological standards.

In Spain, AEMET (the State Meteorological Agency) is the body responsible for providing meteorological services in support of air navigation, in accordance with ICAO Annex 3 and the applicable national regulations.

The meteorological information collected is presented through various types of reports, each serving a specific purpose.

Observation Reports

METAR reports are routine aerodrome reports.

SPECI reports are special aerodrome reports.

Forecast Reports

TREND reports provide information on expected changes in aerodrome weather conditions and form part of the landing forecast. They are appended at the end of a METAR or SPECI report.

TAF reports contain forecasts of expected weather conditions at the aerodrome. They include scenarios considered significant for aircraft operations.

Warnings

Aerodrome warnings provide precise information about weather conditions that may affect aircraft on the ground, facilities, and aerodrome services.

Lightning warnings at aerodromes notify of the presence of lightning at various levels.

Thunderstorm warnings at aerodromes alert to storms approaching the aerodrome.

Area forecast reports

GAMET messages provide area forecasts for flights below flight level FL 150.

Significant Weather Low-level (SWL) charts graphically display hazardous meteorological phenomena at low altitudes (from the surface up to FL 150). These charts offer visual support for safe flight planning

SIGMET, AIRMET, and special AIREP reports

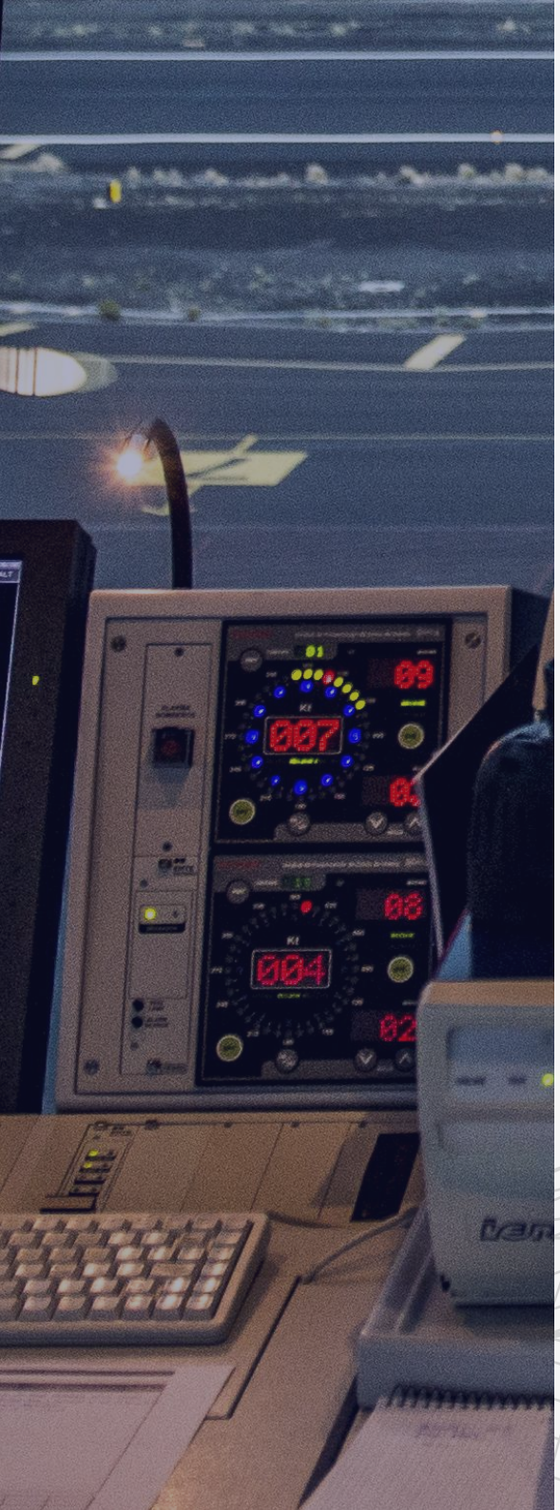
SIGMET reports cover severe en-route weather phenomena that threaten the safety of all aircraft operations.

AIRMET reports cover weather phenomena not included in Section I of the GAMET that may affect the safety of low-level flights (below FL 150).

AIREP and special AIREP reports

AIREP reports are routine meteorological reports communicated by an aircraft.

Special AIREP reports, unlike routine ones, are made by an aircraft when it detects a meteorological phenomenon that may pose a risk to safety.



METAR AUTO reports

An important tool to highlight is the METAR AUTO reports. This service generates METAR reports fully automatically, without human observer intervention, in contrast to conventional (semi-automatic) METAR reports. Primarily, these reports are issued when the aerodrome is not operational, although some units are designed to issue only METAR AUTO reports.

This tool is widely used because it allows the collection of information beyond the aerodrome's operational hours. This information can be used not only for meteorological research or studies but also for emergency operations.

While METAR AUTO and METAR reports contain practically the same information, the former has limitations due to the lack of human intervention. Among these limitations is the absence of certain information in METAR AUTO reports, such as wind shear phenomena or the preparation of TREND or SPECI reports.

Another limitation is the way certain information is reported differently in these types of reports. Some meteorological phenomena and descriptors cannot be detected by METAR AUTO, such as the presence of volcanic ash or dust, which reduces the accuracy of the report. Regarding visibility, it is detected by sensors, and if there is a situation of heterogeneous obscuration at the aerodrome, the information provided by the sensors may not be representative. A similar issue occurs in the detection of clouds and their base heights in cases of sparse or stationary cloud cover.

Despite these limitations, it is not unreasonable to believe that in the future it is very likely that all units will issue METAR AUTO reports. Technological advances are driving the development and improvement of data collection methods, and soon they will be able to cover the current shortcomings.

Aeronautical Meteorological Self-Service (AMA)

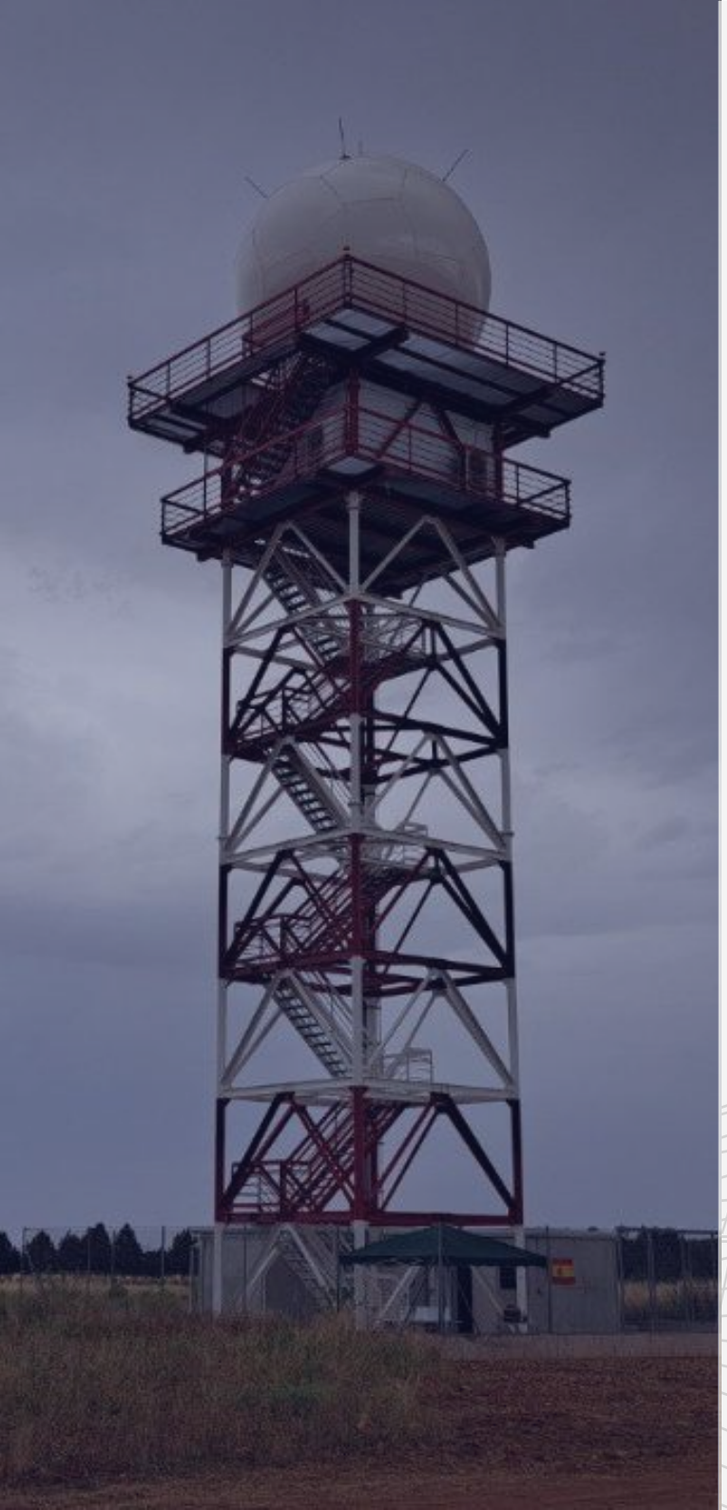
This is a widely used tool among aviation users, provided by AEMET. It is a digital platform that delivers updated and automated meteorological information to aeronautical services. Rather than collecting data, it distributes information, enabling quick access to reliable and essential data needed for the planning and execution of safe flights.

The information available through AMA includes METAR, SPECI, TAF, AIRMET, SIGMET, and GAMET reports, aerodrome warnings, satellite images, lightning network and radar data, airport climatology, and the MET GUIDE.

The ICARO XXI system

The ICARO XXI system (Integrated COM/AIS/AIP & Reporting Office Automated System) is an automated platform developed by ENAIRE that provides aeronautical and meteorological information in compliance with the standards implemented by ICAO to facilitate the planning of safe flights. The information is sourced from official channels, such as AMA, which ensures the reliability of the data.

ICARO XXI automatically generates Pre-Flight Information Bulletins (PIB), including all the necessary information that could impact the safety of air operations. The content of these documents includes NOTAMs, updated meteorological data, aerodrome operational conditions, and temporary airspace restrictions.



Meteorological Offices

The facilities provided by the MET service dedicated to the collection of meteorological data for use in aeronautical activities according to ICAO Annex 3 are the following:

Aeronautical Meteorological Station (EMAe)
This unit's function is to provide the precise meteorological information to control towers and, if present at the aerodrome, to the approach control office (APP). It is mandatory that this information be communicated in Spanish.

Main Aeronautical Meteorological Office (OMAe)
This unit is responsible for producing TREND and TAF forecast reports, as well as aerodrome warnings. It also handles the transmission of information from EMAe or AMA to the associated TWR and APP units that request such data.

Meteorological Surveillance Office (OVM)
This unit is responsible for monitoring meteorological conditions that may affect air operations within its area of responsibility. Additionally, it prepares and distributes SIGMET reports and other meteorological information when required.

ACC Meteorological Office (OMACC)
This unit provides support in area and aerodrome surveillance and advises Area Control Centers (ACC).

VOLMET Stations

VOLMET stations are broadcasting offices that transmit updated meteorological information. These transmissions are broadcast in English and are widely used by pilots on international routes.

VMC

An important factor to consider in air operations is VMC (Visual Meteorological Conditions). This refers to the weather conditions that ensure VFR (Visual Flight Rules) flights can be conducted safely, meeting minimum visibility and cloud clearance requirements. The following table outlines the distances that must be complied with:

<table>
<tr><th rowspan="2">ALTITUDE</th><th rowspan="2">AIRSPACE CLASSES</th><th rowspan="2">FLIGHT VISIBILITY</th><th colspan="2">DISTANCE FROM CLOUDS</th></tr>
<tr><th>HORIZONTAL</th><th>VERTICAL</th></tr>
<tr><td>At and above 3050 m (10000 ft) AMSL (*)</td><td rowspan="2">A (**) B C D E F G</td><td>8 km</td><td rowspan="2">1500 m</td><td rowspan="2">300 m (1000 ft)</td></tr>
<tr><td>Below 3050 m (10000 ft) AMSL and above 900 m (3000 ft) AMSL, or above 300 m (1000 ft) above the ground, whichever is the higher</td><td>5 km</td></tr>
<tr><td rowspan="2">At and below 900 m (3000 ft) AMSL, or 300 m (1000 ft) above the ground, whichever is the higher</td><td>A (**) B C D E</td><td rowspan="2">5 km (***)</td><td colspan="2" rowspan="2">Clear of cloud and with the surface in sight.</td></tr>
<tr><td>F G</td></tr>
</table>

(*) When the height of the transition altitude is lower than 3050 m (10000 ft) AMSL, FL100 shall be used in lieu of 10000 ft.

(**) The VMC minima in class A airspace are included for guidance to pilots and do not imply acceptance of VFR flights in class A airspace.

(***) When so prescribed by the Competent Authority:

a) flight visibilities reduced to not less than 1500 m may be permitted for flights operating:

1) at speeds of 140 kt IAS or less to give adequate opportunity to observe other traffic, or any obstacles, in time to avoid collision; or
2) in circumstances in which the probability of encounters with other traffic would normally be low, e.g. in areas of low volume traffic and for aerial work at low levels.

b) Helicopters may be permitted to operate in less than 1500 m but not less than 800 m flight visibility, if manoeuvred at a speed that will give adequate opportunity to observe other traffic or any obstacles in time to avoid collision.

Special VFR

Special VFR (SVFR) refers to a VFR flight authorized by ATC to operate in controlled airspace under conditions below VMC. The additional conditions for granting an SVFR clearance, except for helicopters under special circumstances when authorized by the competent authority, according to ENAIRE, are as follows:

- Flights may only be conducted during daylight hours.
- For the pilot:
  - The surface must be visible and free of clouds.
  - Flight visibility must not be less than 1500 meters for airplanes and 800 meters for helicopters.
  - Speed must be equal to or less than 140 Kt IAS to allow the pilot to observe other traffic or obstacles and avoid collisions.
- An SVFR clearance will not be issued for takeoff or landing at any aerodrome within a control zone, nor to enter or operate in the aerodrome traffic zone or circuit if the reported meteorological conditions at the aerodrome do not meet the following minima:
  - Ground visibility less than 1500 meters for aircraft and 800 meters for helicopters.
  - Cloud ceiling less than 180 meters.

The statistics: reporting

As shown in the graph, from 2021 to 2024 the number of ATS operational safety notifications received has increased annually. This rise coincides with the growth in the number of air operations and reflects the development of the reporting culture established at SAERCO in recent years.

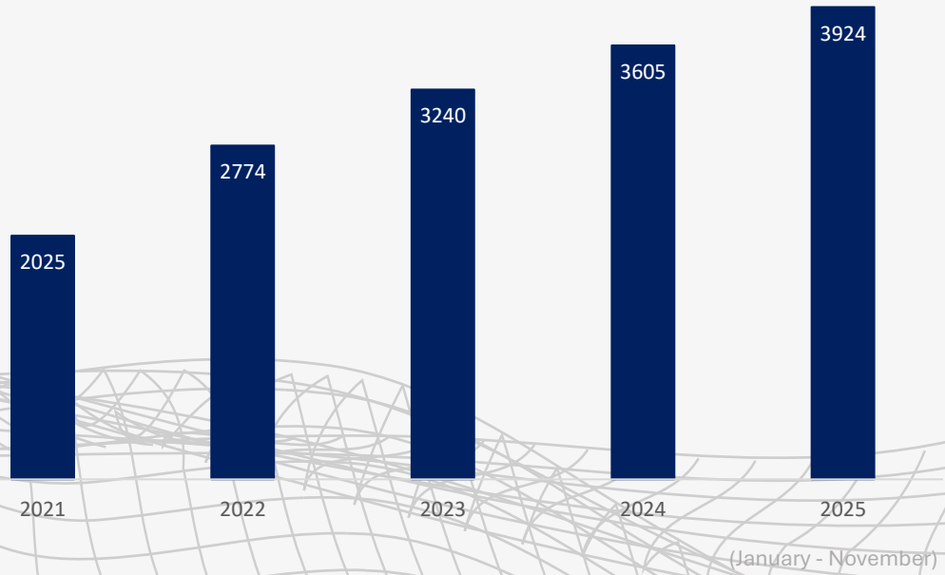
Specifically observing the first half of 2025, it is noticeable that the number of incidents is higher compared to previous years. Based on this trend, it could be expected that the total number of notifications will surpass the 2024 figures.

On the other hand, analyzing the average reporting time reveals a decrease compared to other years, complying with the deadlines set by AESA. This demonstrates that despite the increased volume of notifications, the system developed by SAERCO has managed to reduce response times each year.

MOR: Mandatory Report
VOR: Voluntary Report

Safety reports ATS SAERCO 2025		
MOR/VOR	**Average time to report**	**Average time to MOR/VOR**
3924	2:29:15	29:23:37

Reports evolution ATS 2021 - 2025



"Achieving a notification system where proactivity is the usual practice is not easy; it requires the effort and commitment of the entire organization, especially the operational staff"

Lessons learned

Air Accidents/Incidents Caused by Severe Weather Conditions

Over the years, extreme weather phenomena have been the main cause or have significantly contributed to various air incidents and accidents. Some of the most notable ones have been:

1983 Collision at Barajas

A Boeing 727 collided with a McDonnell Douglas DC-9 at Adolfo Suárez-Madrid Barajas Airport. While the Boeing was taxiing on the runway for takeoff, the DC-9 became disoriented due to low visibility and accidentally entered the active runway. Despite the 727's attempts to avoid the DC-9, the rear fuselage of the former struck the latter.

The investigation concluded that both aircraft collided due to low visibility caused by thick fog and inadequate taxiway signage. Since then, measures have been developed to assist in preventing accidents of this kind.

Flight Incident - 2025

A flight was forced to perform a go-around maneuver when attempting to land at Tenerife South Airport. This procedure involved interrupting the landing and climbing again due to the aircraft's instability during the final phase of landing. No injuries were reported, and the aircraft successfully landed on the subsequent attempt after the weather conditions improved.

The cause of the incident was the presence of wind shear, a phenomenon characterized by rapid changes in wind speed and/or direction over short distances. This can have catastrophic effects on aircraft performance, especially during critical maneuvers such as takeoff or landing.

In conclusion, the analyzed accidents highlight the importance of maintaining precise monitoring and understanding of meteorological conditions, as well as implementing measures to reduce associated risks. These cases demonstrate the need for the development of technology aimed at detecting and preventing such accidents to ensure the safety of all air operations.

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