AVIATION INTELLIGENCE+

European Aviation Trends

22 December 2023

EUROCONTROL

Summer 2023: High weather impacts on the network

Summer 2023 was encouraging in terms of traffic recovery – reaching 93% of 2019 levels. However, air traffic flow management (ATFM) delays were again high, with in particular a significant increase in weather-related delays. In terms of ATFM delay per flight, weather delays increased in Summer 2023 by 59% compared to Summer 2022.

The EUROCONTROL Network Manager (NM) worked closely this summer with all operational stakeholders – making use of the Cross-Border Weather Procedure, which integrates forecasts from European meteorological organisations to help plan and coordinate mitigating actions.

Despite these efforts, this summer demonstrates that there is room for improvement, and NM has made weather one of its main priorities for 2024. A new approach has been agreed with NM's operational partners, with the objective of increasing safety and stability, reducing delay and improving predictability in the network.

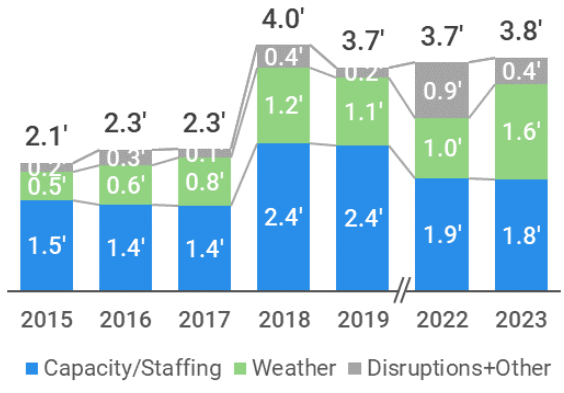
Summer 2023 overview

Summer 2023 (Jun-Aug) saw **traffic** recover to 93% of 2019 levels, increasing by 7% with respect to 2022, in line with EUROCONTROL forecasts.

Despite the extra traffic, operations proved less complex than in 2022, as ANSPs planned for the impact of the ongoing war in Ukraine and provided extra capacity, flexibility and improved procedures for military operations.

Figure 1 shows how **Air Traffic Flow Management (ATFM) delays** were similar to the previous summer with 3.8 minutes per flight (3.7 in 2022). But we can see how weather delays increased significantly (+59%), in contrast to delays due to capacity/staffing and other causes, which decreased. Without the weather element, ATFM delays per flight were actually 18% lower than in 2022 (2.3 min/flight vs 2.7) – even if overall, ATFM delays are still far from the desired level.

FIGURE 1: Evolution of ATFM delay per flight, per year (Jun-Aug, in min/flight)



Impact of extreme weather

ATFM delays attributed to adverse weather occurred with particularly high frequency this summer. **In 22 out of the 92 days considered (almost 1 in 4), weather delays represented more than 50% of total ATFM delays**. This compares to only 7 days in Summer 2022 (1 in 13 days).

However, different regions were unevenly affected. For example, the Balkans were more impacted by bad weather events this year, whereas the Alps and Italy were less impacted – as can be seen in Figure 2 (red areas show an increase in the number of days with forecasted convective weather compared to 2022; green areas show a decrease).

FIGURE 2: Days of convective weather, Summer 2023 vs 2022 (forecast)

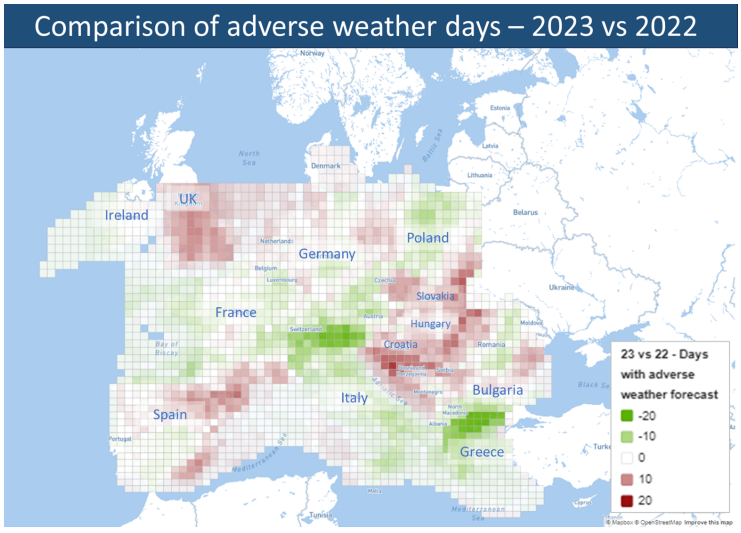
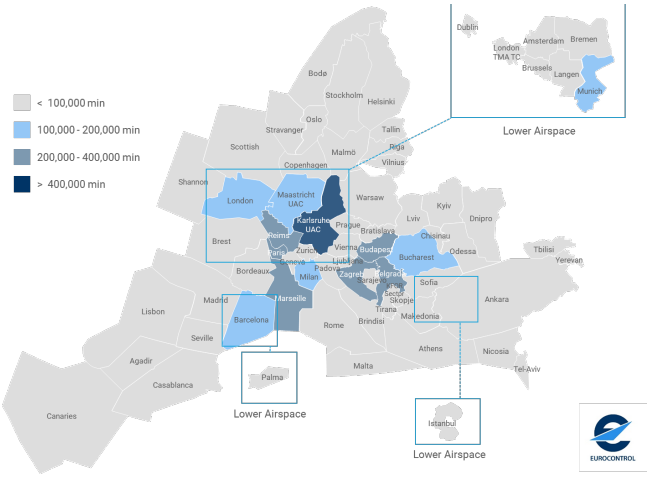


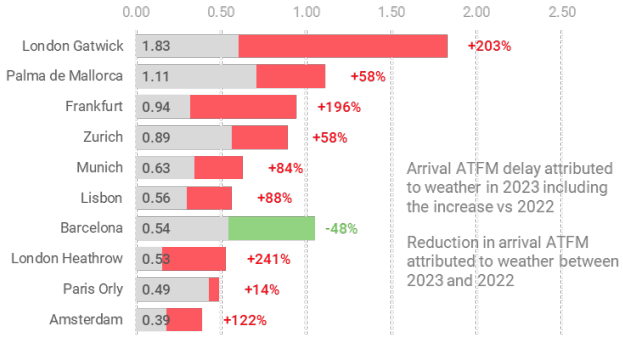
Figure 3 shows the distribution of ATFM weather delays among the different **Area Control Centres** (ACCs) this summer.

FIGURE 3: Minutes of ATFM weather delays at ACCs, Jun-Aug 2023



Within the top 40 **airports** in Europe, the worst-hit by weather events (in terms of minutes per flight) are shown in Figure 4. We can see how, except for Barcelona, weather delays increased significantly, tripling at Gatwick and Frankfurt, and increasing even more at Heathrow.

FIGURE 4: Top 10 airports in weather arrival ATFM delay per flight (Jun-Aug, in min/flight)



Coordination and planning

Extreme weather events, even when localised, can have a significant knock-on network impact and require extensive cross-border cooperation.

The **EUROCONTROL Network Manager** (NM) has worked closely with stakeholders to collaboratively forecast, plan and coordinate mitigation actions.

As part of its Collaborative Decision Making (CDM) processes, the Network Manager Operations Centre (NMOC) leads the **Cross-Border Weather Procedure** that integrates forecasts from all meteorological organisations across Europe that are coordinated by **EUMETNET**.

Regular **cross-border weather conferences** were held this summer to prepare for bad weather conditions. This facilitated coordinated actions to alleviate the impact of these on the network.

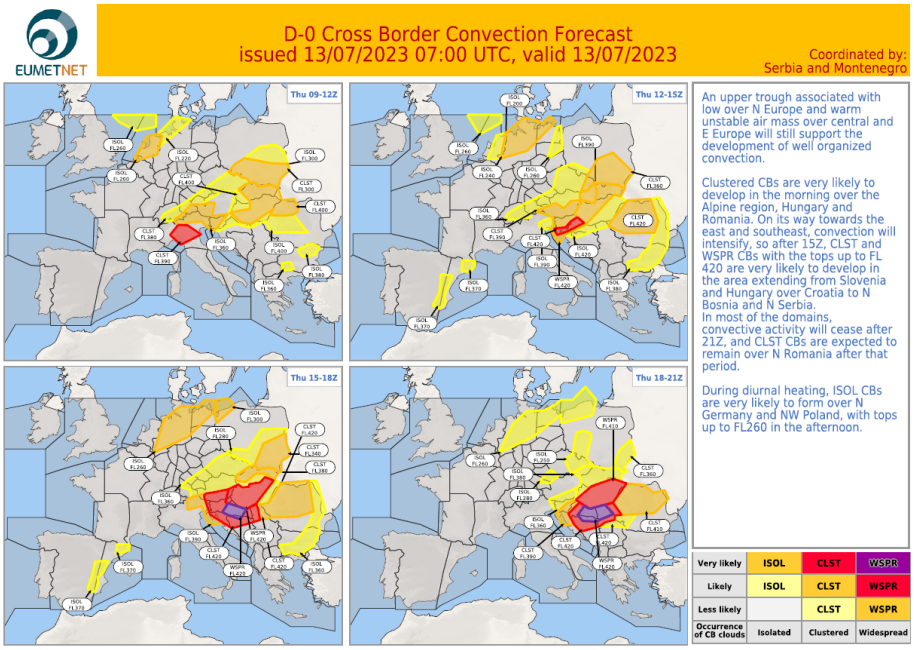
In addition, over the summer, NMOC tested a new application (ISOBAR-**iFlow**), incorporating cross-border weather features (artificial intelligence and flow features). The application displays EUMETNET predictions and impacted traffic volumes, and uses AI to estimate capacity reductions; in addition, it allows proposed approaches to handle convective weather (by means of regulations, scenarios or rerouting) to be simulated.

The early application of a regulation the day before operations is not always welcomed by ANSPs, as it may potentially result in unnecessary delays if the forecasted weather does not materialise. However, the **early application of measures** always brings more stability to the network – which is a key NM objective.

The Cross-Border Weather Procedure also enables monitoring of the **allocation of ATFM weather delays**. This fits in well with an initiative by the independent Performance Review Commission (PRC), which aims at further improving transparency in the attribution of ATFM delays. PRC trials with various ANSPs have found that a proportion of the regulations attributed to adverse weather could sometimes also have a capacity/staffing component.

The correct allocation of delays is crucial in order to be able to identify the real causal factors of delays, and thus implement effective corrective/mitigating actions.

FIGURE 5: Example of a convective cross-border weather forecast (EUMETNET) used to initiate coordination processes



Preparing for 2024

Despite efforts by the EUROCONTROL NM and operational stakeholders, which did reduce the impact of Summer 2023 weather, the overall results demonstrate that there is still room for improvement.

Five years on from the initial implementation of the Cross-Border Weather procedure, a more proactive network approach to cope with adverse weather situations is needed.

NM considers weather as one of the main priorities in Summer 2024 preparations. This includes building on improvements developed in recent years, and working with operational stakeholders to implement further enhancements to network coordination practices for mitigating weather impacts on the aviation network.

In this respect, a different approach for Summer 2024 has been agreed, mirroring the procedure followed with other mitigation measures. The "Cross-Border Weather Wash-Up" event organised in Croatia in November 2023 was crucial in determining the evolution of this procedure.

The definition of a common forecast approach, a variable decision-making time, and the use of ATFM mechanisms such as a pre-agreed playbook of restrictions or scenarios, are proposed as key aspects that could bring more stability to the network. Such "**playbooks**" will be applied in specific situations and areas with the intention of shifting traffic flows to avoid areas impacted by weather. This process will be validated during Summer 2024.

The objective is to increase safety and stability, to reduce delay, and to improve predictability across the network.

SUPPORTING EUROPEAN AVIATION