

CAMS data AsSISt airline maintenance

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Travelling by aeroplane is something many of us take for granted, and every day around the world more than **100,000 flights** carry passengers to their destinations. A new project called AsSISt - Aircraft Support & Maintenance Services – is using Copernicus Atmosphere Monitoring Services (CAMS) data to bring something new to the aircraft maintenance market: accurate information about atmospheric conditions that affect aviation.

The air around us is filled with particulate matter – microscopic flecks of solid or liquid material suspended in the air, for example dust or soot. These atmospheric particles are transported by air flows and weather conditions. Sometimes dramatic events can hugely increase the number of atmospheric particles present in flight paths. The Eyjafjallajökull eruption in Iceland is a particularly memorable example. Tens of thousands of flights across Europe were cancelled, and the airline industry worldwide lost €1.3 billion.



In 2017, two flights had to perform emergency landings due to the combination of Hurricane Ophelia, dust and sand from the Sahara, and debris from wildfires in Portugal. Major events like these have obvious effects on airlines and their passengers, but flying through normal levels of atmospheric particles also has an adverse impact over time and necessitates extra aircraft maintenance. For example, atmospheric particles can:

- Clog turbine engines and cooling vents, leading to overheating
- Crack the body, wings, and windshields
- Block the vents on pneumatic controls
- Corrode metallic parts of machinery

Airlines are keenly aware of these dangers, and consider them when performing routine aircraft maintenance to ensure that their fleets operate safely. However, without reliable data on atmospheric particles it is difficult to plan maintenance efficiently. This is where AsSISt comes in.

Developed and built as part of a CAMS Use Case, AsSISt uses atmospheric datasets obtained from CAMS, which is implemented by the European Centre for Medium-Range Weather Forecasts (ECMWF) on behalf of the EU. The datasets contain everything needed to compute three key indicators of atmospheric conditions: abrasion, clogging, and corrosion. CAMS data cover the entire planet, with particularly high resolution over Europe. With these data, AsSISt can provide indicators to help airlines and manufacturers to save costs, thanks to precise monitoring of aeroplanes' exposure to harmful particles, thereby allowing airlines to build their maintenance plans around the expected damage.



Nicolas Estival is a software engineer and project manager for AsSISt. He explains, "Our first goal for AsSISt is to help airlines and aircraft manufacturers to optimise their plans for Maintenance, Repair, and Overhaul. We know that maintenance plans are adapted to each aircraft according to the location of their work. An aeroplane flying a Paris to Toulouse route is not maintained as often as an aeroplane flying Dubai to Cairo. What we can do with AsSISt is provide accurate indicators with the information of concentrations of each particle, and also statistical and historical values for airspace in different locations. This could be used to support airlines to re-route flights in order to improve maintenance to cost ratios, or to implement rotation between aircraft to mitigate maintenance costs."

Aircraft are also exposed to atmospheric conditions when on the ground between flights. As well as providing data for aircraft in the air, CAMS can help predict the corrosive effect aircraft experience when parked, in addition to the impact of temperature and humidity. AsSISt could even be used to plan the best places to hangar or park aeroplanes, to store spare parts, and assess strategic geographical repositioning of maintenance centres.

AsSISt brings together European scientific experts and skilled IT developers across the entire chain, from research and development to operational service. AsSISt has been developed by Capgemini, world leaders in technology services and digital transformation. Also lending their expertise and acting as project partners are INERIS, French specialists in industrial and environmental risk management; and the Barcelona Supercomputing Center, with strong experience in aerosols and atmosphere modelling.

AsSISt's design and development stage was completed in March 2019, and now Estival and his team are busy talking with the aerospace industry. "Feedback has been great," he says, "and we're getting useful suggestions for improvements. We've met with many potential users and presented at the Paris Air Show. There's a lot of interest!"

The AsSISt team are currently in contact with several aircraft manufacturers and suppliers, with the system potentially in routine use by the end of 2019. Ideas for spin-offs are already being floated, such as determining a global air quality index, allowing insurance companies to plan fairer policies for airlines, and widening the pool of potential users to include helicopters and unmanned aerial vehicles.



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