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maîtriser le risque
pour un développement durable



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Atmosphere
Monitoring Service

atmosphere.copernicus.eu



copernicus
Europe's eyes on Earth

In Dust Workshop

AsSISt

Aircraft Support & Maintenance Services

Author : N. Estival & C. Ball

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Introduction



Context

- CAMS : Copernicus Atmosphere Monitoring Service
- Part of Copernicus program to provide multi-source data
- ECMWF in collaboration with European commission and ESA
- CAMS 95 : propose an original and smart use case for CAMS data

The idea



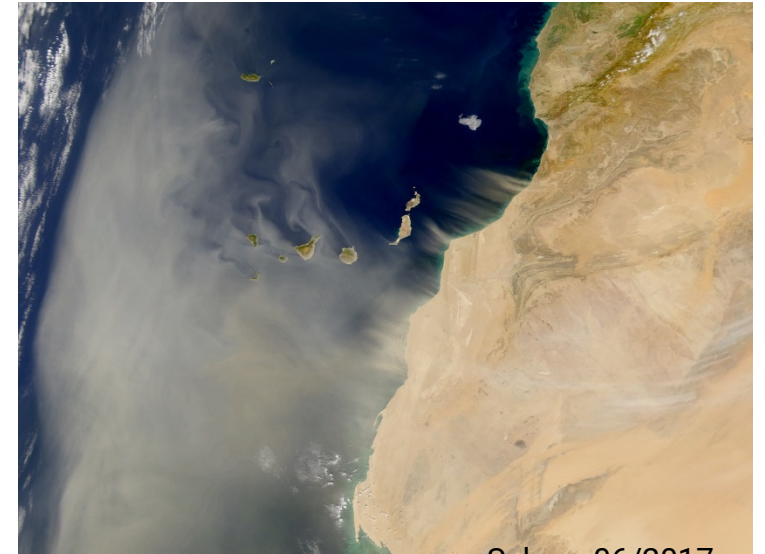
- Use CAMS data to improve aircraft maintenance focusing on the impact of particles over plane bodies
- Provide indicators of plane exposure to harmful particles
- Develop a service compiling CAMS data over a plane's track
- Present the added value service to potential users



Observation



Atmospheric particles coming from various sources can cause significant problems in aviation such as rerouting due to poor visibility, disturbance in airport operations, massive canceling of scheduled flights and mechanical problems such as erosion, corrosion or abrasion (engine flame out in flight). Remarkable events such as **volcano eruptions**, **sand & dust storms**, or **forest fires** can have dramatic consequences for air traffic



Sahara 06/2017



Iceland 04/2011

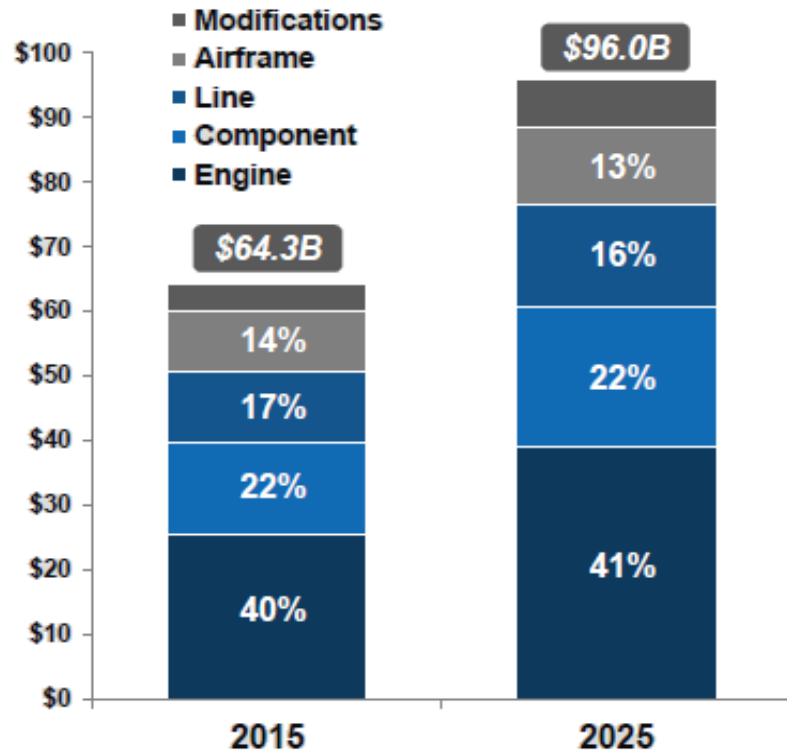


Portugal 06/2017



Maintenance, Repair and Overhaul

10 Year Global MRO Demand Growth



As an indirect consequence, they also have an impact on **Maintenance, Repair and Overhaul** (MRO) expenses for airlines and aircraft manufacturers
On their side they intend to optimize their aircraft maintenance plans



What is AsSISt for?

AsSISt is an innovative way to highlight the need for maintenance of an aircraft, through its two services:

- **Park AsSISt service** to evaluate the evolution of **corrosion** on the different metal parts of the plane (**Steel, Zinc, Copper and Aluminium**), while parked at airports
- **En-route AsSISt service** to evaluate the **abrasive** (windshield, empennage, body and wing) and **clogging** (turbine engines) effects of particles during their flights

It is also an interesting tool to evaluate statistically the air corridors that will require more frequent maintenance for airlines



Who are our users?



Airlines



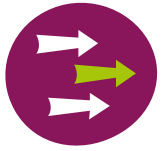
**Aircraft
Suppliers**



**Aircraft
Manufacturers**



Benefit from
AsSist service
reliability



Use of CAMS data (1/2)

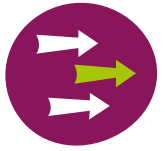
Particle Corrosive impact (at parking only):

Park AsSISt to be scientifically accurate scales the atmospheric corrosive impact according to the description of the ISO 9223 methodology

It uses the following data:

- Relative humidity and temperature from regional or global model at parking position
- SO₂ Concentration in µg/m³ from a regional or global model at parking position
- Cl⁻ deposit rate in mg/m².d from a regional or global model at parking position

Results are given per metal (**Steel, Zinc, Copper, Aluminum**) and only at parking level, as the corrosion will be given per aircraft as a range of values with regards to the time spent on ground and as a cumulated version along a period for all its parking stays



Use of CAMS data (2/2)

Particle Abrasive and Clogging impact (en route):

En-route AsSISt includes the **abrasive** (windshield , empennage, body and wing) and **clogging** (turbine engines) effects of particles all along a flight track on an aircraft and cumulated since the last aircraft maintenance.

To be scientifically accurate the calculation design is guided by information from the *ROMATSA project* (Eurocontrol funded, 2011).

It is calculated per plane en route cumulated along all plane trajectories along a period, the concentrations employed, are:

- Black carbon
- Sea salt
- Mineral dust
- Sulfates
- Organic biogenic



What does AsSISt address?

Parts / Occupants	Cause	Effect
Turbine engines	clogging the turbine cooling vents	overheating
Turbine engines	abrasion with hard particles	wear of fan, compressor, turbine, transmission
Pneumatic controls	clogging the vents	failure
Windshield, body, wings, empennage	cracks, abrasion with hard particles	wear, opaqueness
Turbine engines, body and instruments metallic parts	acidity, exposure to associated SO ₂ and sulfurous acid	corrosion (in time)

Information from the ROMATSA project (Eurocontrol funded, 2011).



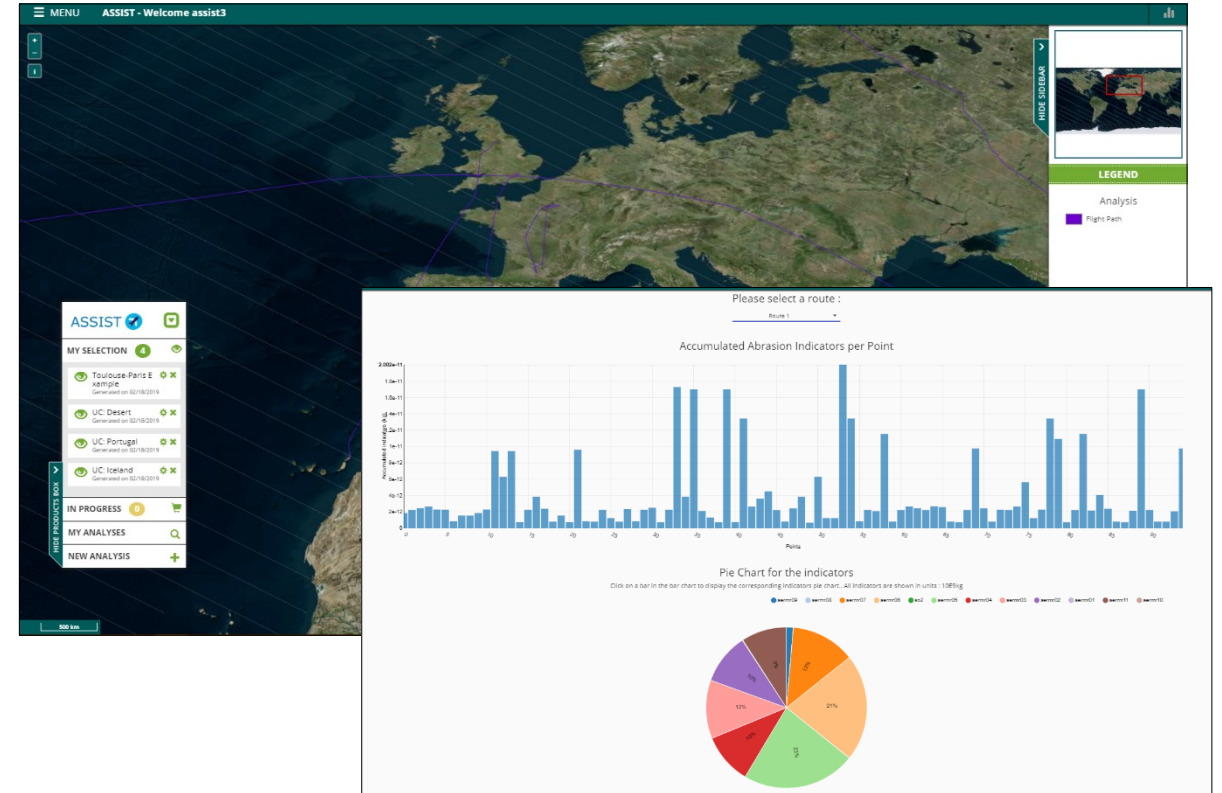
Architecture Workflow

From user connection to KPI and map rendering

User actions

Server Actions

Browser Actions





Demonstration

Thanks for your participation





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