



ACT>>>
GLOBAL

ICAO: UNITING AVIATION ON CLIMATE CHANGE

ICAO Colloquium on Aviation and Climate Change

Atlantic Interoperability Initiative to Reduce Emissions - AIRE

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founding members



EUROPEAN COMMISSION

EUROCONTROL

AIRE



Atlantic Initiative to Reduce Emissions = agreement between the European Commission and the US FAA

18 partners - airlines, airports, air navigation service providers and manufacturers

More than 1152 commercial flight trials performed in 2009

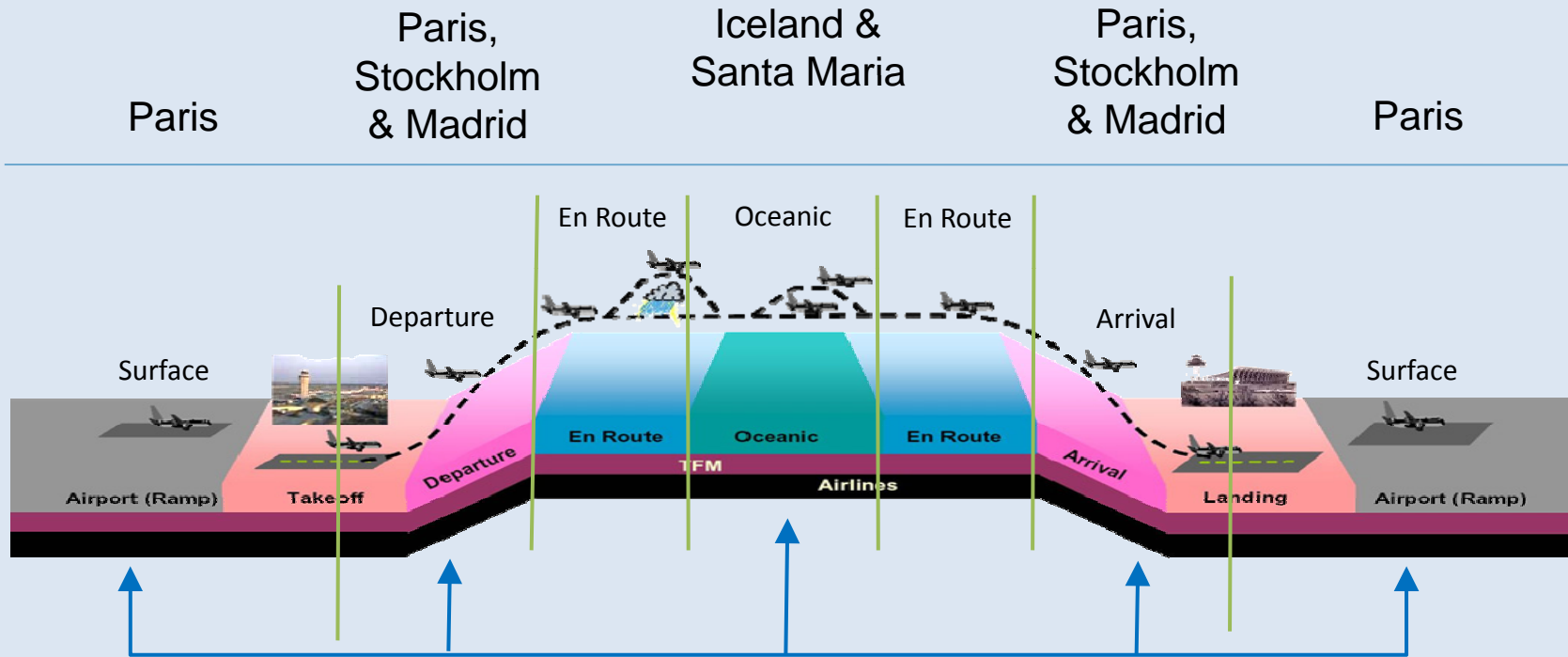
AIRE demonstrated that 135.000 tons of CO₂ per year can be saved on Air France flights to/from North America



Federal Aviation
Administration



AIRE domains – 2009 trials



3 domains, 5 pioneer locations, 18 partners



353 trials in Paris

Surface

Reduced taxi operations, taxiing with 1 or 2 engines off

- Linked to better taxi time predictability, measure the benefits associated to “Departure Taxiing with one or two engines off”, while assessing the impact:
 - On pilot/ATC procedures including safety;
 - On surrounding traffic in terms of taxi disturbance and on the surrounding vehicles and staff in terms of jet blast.

AIRFRANCE 

 dgac

DSNA


AÉROPORTS DE PARIS



✓ CO₂ savings of 190 – 950 kg per flight



353 trials in Paris

Surface

Minimising departure taxi time

- Perform first tests for decision support tool connected with real traffic;
- Test the procedure and coordination between actors;
- Approve start-up and manage taxiing of the flight according to the sequence calculated by the pre-departure sequencing system.

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 AÉROPORTS DE PARIS



- ✓ Taxi time reduction 45 seconds – 1 min per flight
- ✓ departure throughput was not impacted
- ✓ 6 tons fuels saved – 19 tons of CO₂



353 trials in Paris

Surface

Minimising arrival taxi time

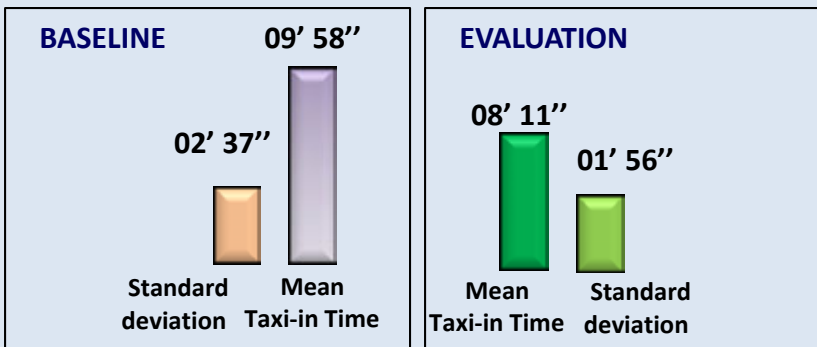
- Provide the ATCO arrival coordinator with the parking stand information at least 30' before landing (earlier than today)
- Without negative impact on aircraft approach trajectory, use this information on ATC side to improve the landing runway allocation when possible
- Measurements concentrated on flights arriving on stand area H, during low/medium traffic conditions when 'minimum taxi time strategy' can apply

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AÉROPORTS DE PARIS



- ✓ Taxi-in time reduction 1 min 45 s.
- ✓ 30 s. savings for the approach trajectory
- ✓ 60 tons of fuel – 190 kg CO₂



82 flight trials in Paris

Terminal

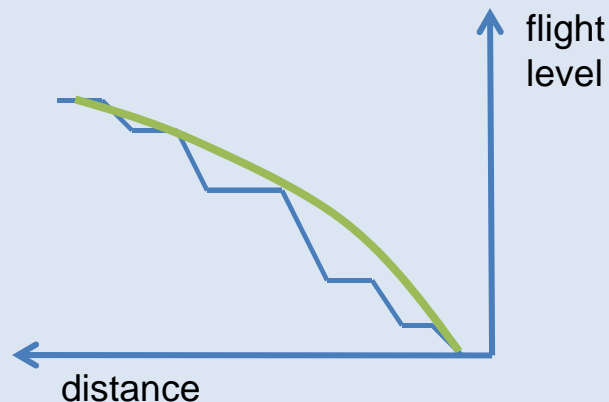
Continuous Climb Departures

- Performed from Charles-De-Gaulle (flight to the USA) and Orly (flights to the Caribbean/West Indies).
- During low density, day time operations.
- Strict adherence to published SIDs. Flights were collaboratively transferred from ATC center to ATC center always cleared to the requested flight level to allow a continuous climb. At first contact with ATC centers pilots forward the estimated FL and time over the next two waypoints based on the FMS.

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- ✓ CO₂ savings of 80 – 310 kg per flight
- ✓ Partners in discussion on how to best bring CCD into day-to-day operations



82 flight trials in Paris

Terminal

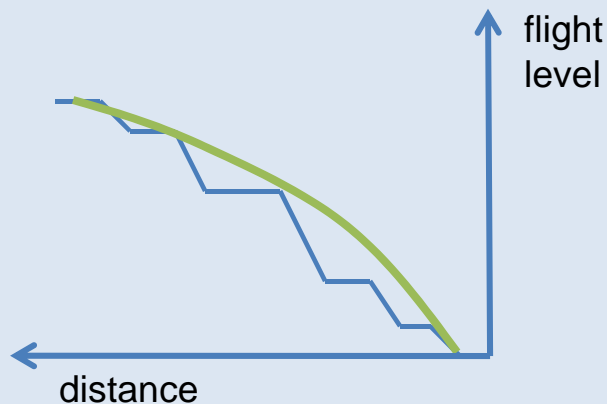
Tailored Arrivals and Continuous Descent Approaches

- Performed on transatlantic flights arriving into Charles-De-Gaulle (Tailored Arrivals only) and Orly (Tailored Arrivals and CDA), during low density operations (night, early morning).
- Specially designed new arrival procedures.
- Commenced from Top of Descent.
- Pilots provided ATC accurate estimated time and flight level over waypoints. Optimization was performed through collaborative decision making (several centers involved including Military)

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- ✓ CO₂ savings of 550 – 1250 kg per flight
- ✓ CDA procedure will be published shortly



11 trials in Stockholm

Terminal

Continuous Descent Approach procedure using RNP-AR

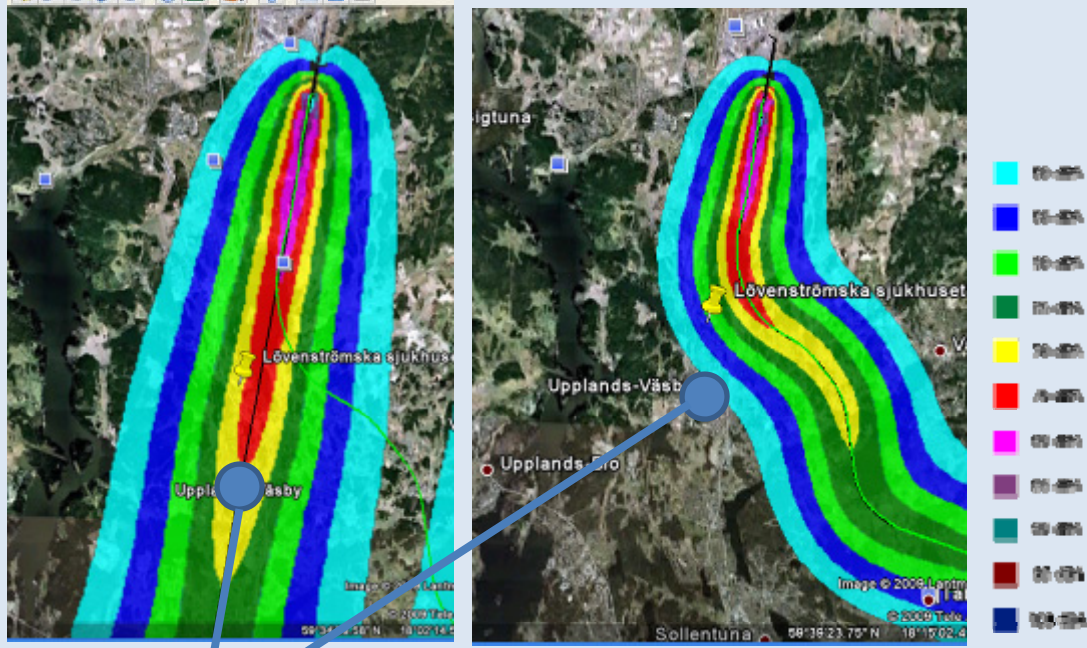
- Achieve the minimum CO₂ emission by addressing both the lateral as well as the vertical parts of the approach;
- Minimize track miles while considering noise sensitive areas;
- Uplink of individual flight selected descent wind information to enable the aircraft Flight Management System (FMS) to select the best possible Top of Descent (ToD) point in order to achieve an idle continuous descent approach;
- Demonstrate that this procedure could be flown in combination with a time constraint to a point inside the TMA in order to demonstrate the aircraft capabilities to fly an efficient descent while also supporting a time request from ATC for sequencing.



11 trials in Stockholm

Terminal

Noise impact traditional approach (left) vs. new approach (right)



Noise sensitive area

- ✓ CO₂ savings of 450 – 950 KG per flight
- ✓ Noise reduction
- ✓ Procedure expected to be put into operation during 2010

- novair
- LFV
- AVTECH.
- AIRBUS
- egisavia
- THALES
- SAS
Scandinavian Airlines

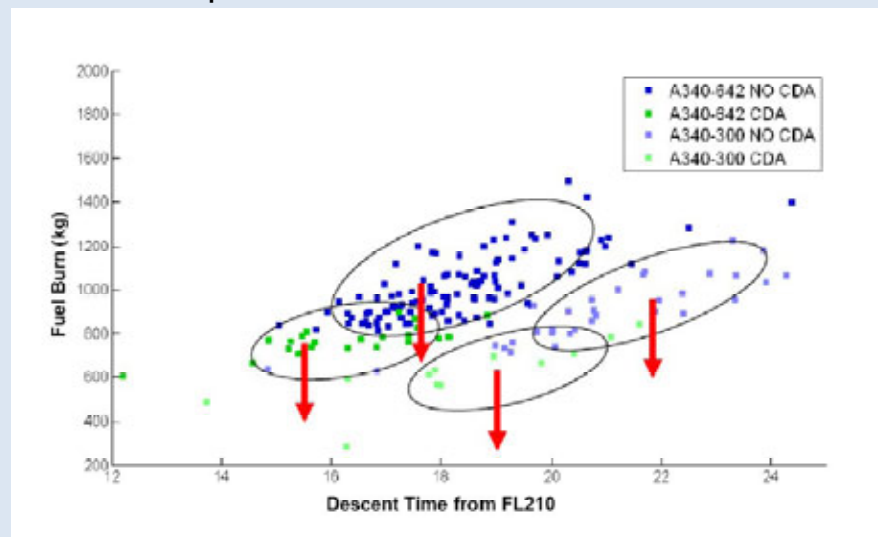


620 trials in Madrid

Terminal

Continuous Descent Approach procedure

- During night time operations.
- On the aircraft, the expected STAR was selected by the pilots in FMS before descent. When cleared CDA by ATC, pilots checked the cleared STAR in FMS and deselected speed and altitude restrictions associated to the STAR.
- Procedure formally started at FL210 (96% from Top of Descent) up to ILS intercept at 3000 ft.



- ✓ CO₂ savings of 250 – 800 kg per flight
- ✓ 25% fuel burn reduction during descent
- ✓ Procedure expected to be put into day to day operation during 2010

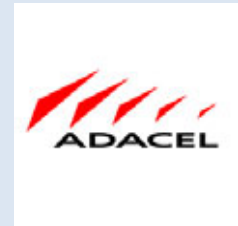


48 trials in Santa Maria, Portugal

Oceanic

Lateral, Vertical and Longitudinal optimization

- On Air France flights from Paris to Caribbean West Indies (B777) and also TAP flights between Portugal and North, Central and South America (A330).
- Vertical:
 - Cruise climb at Mach 0.80, with an average climb rate of 250 ft/min, from flight level 370 to 390, over a distance flown of around 1600 NM.
- Lateral:
 - the pilot was allowed to optimize the route with the most up-to-date meteorological information. After the update of met data, a new flight plan was calculated while the aircraft was in-flight. At this point, in some cases, the route could be optimized and thus a different route was flown.
- Longitudinal:
 - the study used the comparison of the flight plans computed with derived constant Mach number and with the actual Cost Index (CI).



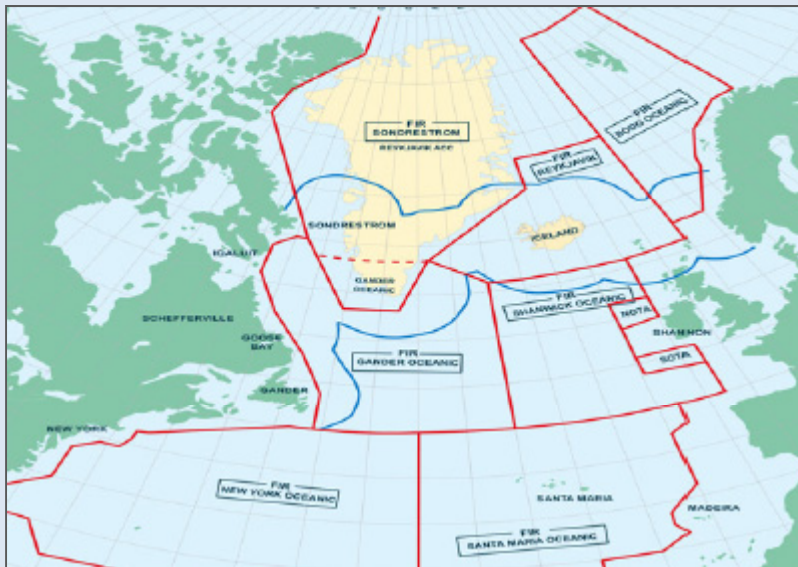
- ✓ CO₂ savings of 90 – 650 kg per flight
- ✓ The FAA coordination on some of the trails allowed the extension of the flight profile optimisation from Santa Maria FIR to New York Oceanic FIR.
- ✓ Procedure is now available for use in day-to-day operation

38 trials in Reykjavik, Iceland

Oceanic

Lateral, Vertical and Longitudinal optimization

- Flight trials on the route Reykjavik to Seattle (B757)
- Icelandair's flight control evaluated each flight and executed step climb with reduced rate of climb (approximation of optimized cruise climb), direct routing, and variable speed when desirable.



- ✓ CO₂ savings of 250 – 1050 kg per flight
- ✓ Procedure for cruise climb is available for operations



2 transatlantic AIRE flights in 2010

- 6 April - Air France flight (AFR690) from Paris-Charles de Gaulle to Miami – 2-3 tons of fuel saved - CO₂ emissions by 6 -9 tons. Minimized noise levels by up to 7dB (arrival & departure);
- 7 April - American Airlines flight (AAL63) from Charles de Gaulle to Miami;
- Gate to gate green flights included (for AFR690):
 - Shorter taxiing times, coordinated with Aéroports de Paris at Paris-Charles de Gaulle and with the FAA at Miami airport;
 - Continuous ascent, coordinated with DSN, the French air traffic control service provider;
 - During the cruise phase, optimum altitude and speed were selected to reduce fuel consumption in conjunction with en route air traffic control centres in France (DSNA), the UK (NATS), Portugal (Nav-Portugal) and the US (FAA);
 - Continuous descent, coordinated by US air traffic control (FAA).



Federal Aviation
Administration

AIRE
Gate-to-Gate
Green Flight
Demonstration
April 2010

Aéroports de Paris
Taxi to runway with
1 or 2 Engines off

Aéroports de Paris
Coordinated departure from
gate to reduce taxi time

DSNA/Nav Portugal
Optimized mach speed block
During en route transit

FAA
Optimized oceanic procedures
within the New York FIR

FAA
Transition to an optimized
arrival procedure into MIA

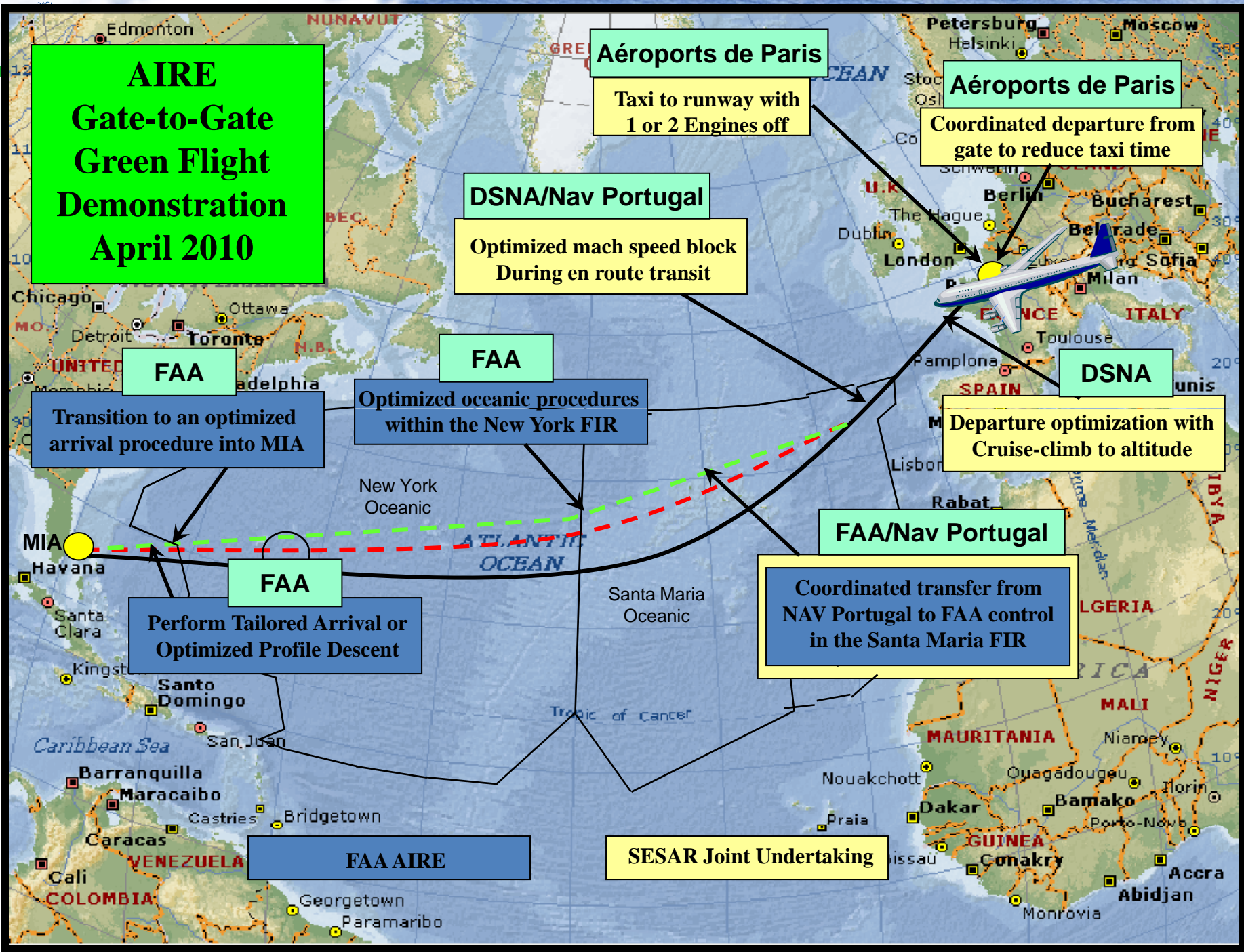
DSNA
Departure optimization with
Cruise-climb to altitude

FAA/Nav Portugal
Coordinated transfer from
NAV Portugal to FAA control
in the Santa Maria FIR

FAA
Perform Tailored Arrival or
Optimized Profile Descent

FAA AIRE

SESAR Joint Undertaking



Summary of results

- ✓ 1152 trials performed;
- ✓ Demonstrated CO₂ saving/flight ranging from 90 to 1250 kg;
- ✓ Accumulated savings during trials equivalent to 400 Tons of CO₂;
- ✓ Integrated project structure and strong environmental focus, boosted crew and controller motivation to pioneer new ways of working together;
- ✓ Most of the solutions are already in operation or will be introduced within short;
- ✓ 2 gate-to-gate successful cross Atlantic flights.





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Thank you for your attention!

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