



# aerodays2015

Aviation in Europe – Innovating for Growth

The 7<sup>th</sup> European Aeronautics Days



## IMPACT

**A Web-Based Modelling Platform for SESAR Environmental Assessments**

Laurent Cavadini – EUROCONTROL

L O N D O N



20 – 23 OCTOBER 2015

# IMPACT at a glance

- **IMPACT** is not an acronym... just a name!
- A modelling platform to perform noise and fuel/emissions assessments of civil aviation
- Accessible via a secured web portal



# Background: the SESAR context

Need to quantify (demonstrate!) the environmental benefit of the Operational Improvements (OIs) delivered by SESAR

- Reduce fuel burn (hence emissions) and possibly mitigate noise exposure around airports
- SESAR 16.06.03 Project specifically set up to ensure that environmental impact assessments be consistently performed within SESAR
  - **Environment Reference Material (ERM)** document

**Need to develop an environment modelling capability which accompanies the ERM and meets specific requirements set up by 16.06.03 Project**



# SESAR environment modelling requirements

Fuel burn/emissions & noise assessments to be performed in a relative way

- SESAR Operational Improvements Vs a Baseline
- Need for appropriate level of modelling sensitivity/granularity

Robust interdependency analyses

- Noise vs fuel & emissions in the vicinity of airports

Support different phases of flight and study scales



# SESAR environment modelling requirements

Handle different types of input data including:

- Fast-time, real-time simulated trajectories
- Real trajectories (FDR data from flight trials)
- “Theoretical” definition of operational concepts

Modelling capability to be easily accessible by different SESAR projects



# Development strategy

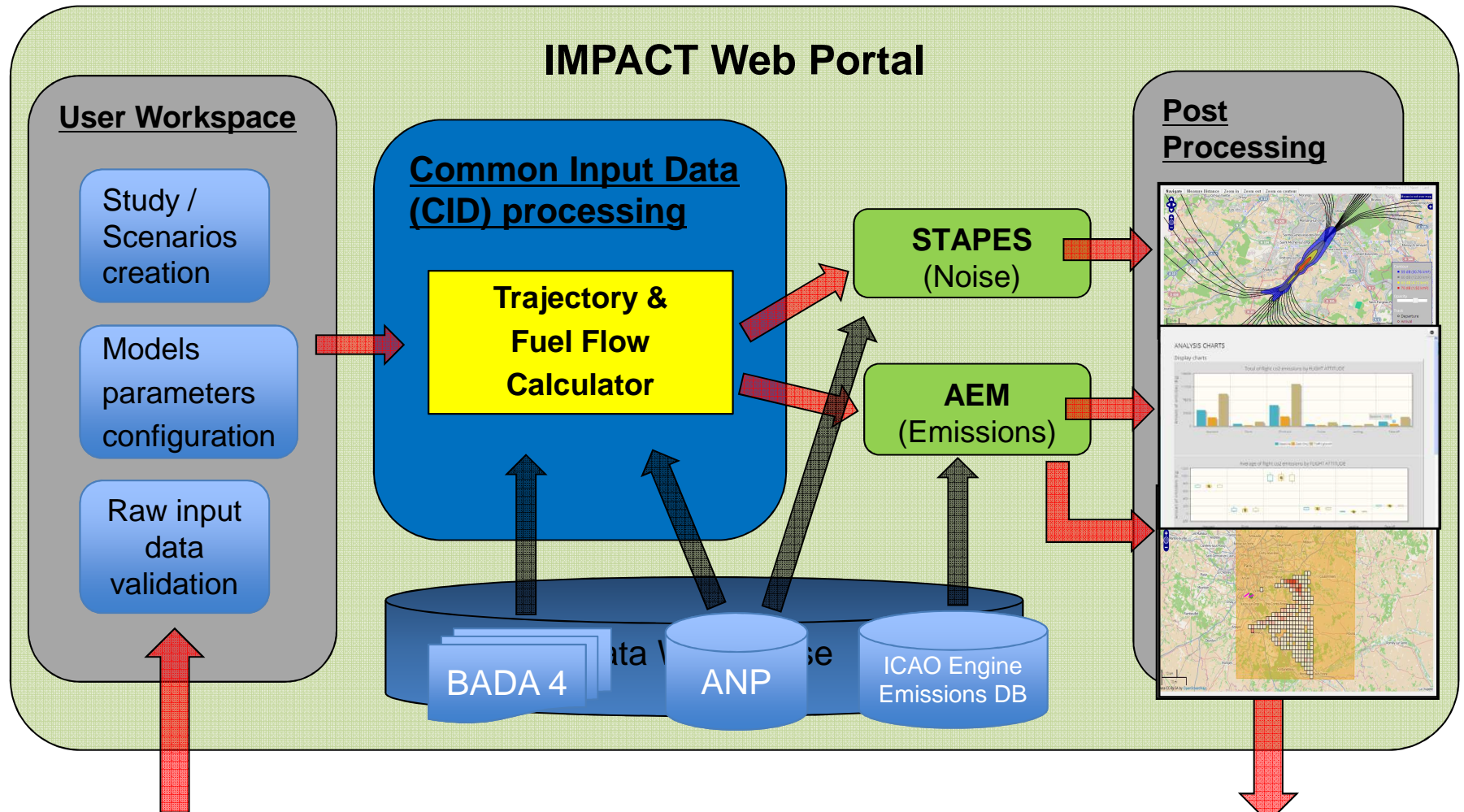
Build on the environmental models already developed by EUROCONTROL:

- The **STAPES** multi-airport noise model
- The Advanced Emissions Model (**AEM**)
- Both models apply international modelling best practice and are ICAO/CAEP-approved environmental models

Make the necessary developments within and around these models to address the SESAR-specific requirements



# IMPACT modelling workflow

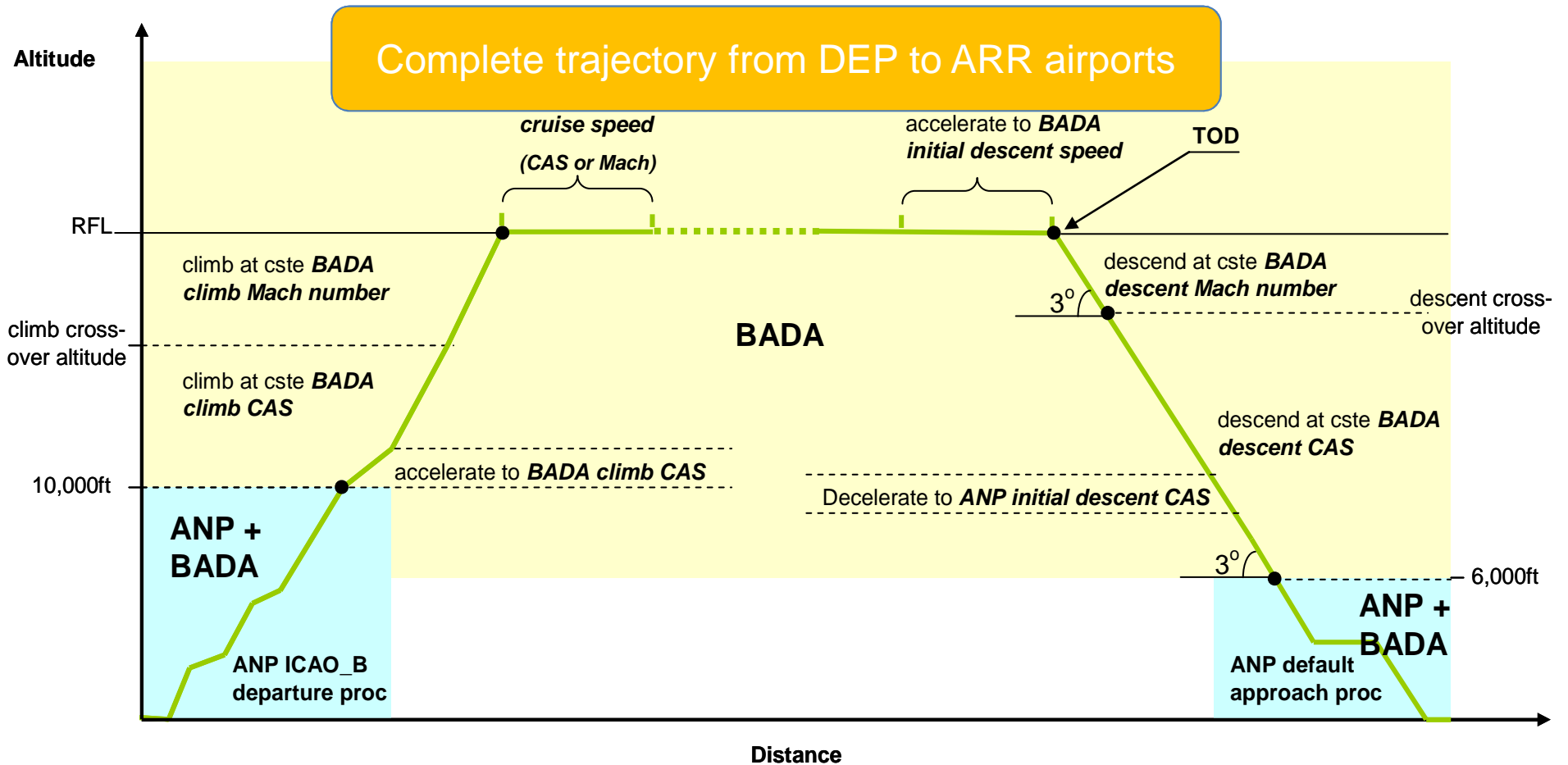


**Upload Raw Input Data**  
(runways, routes, operations, etc.)

**Download Results**

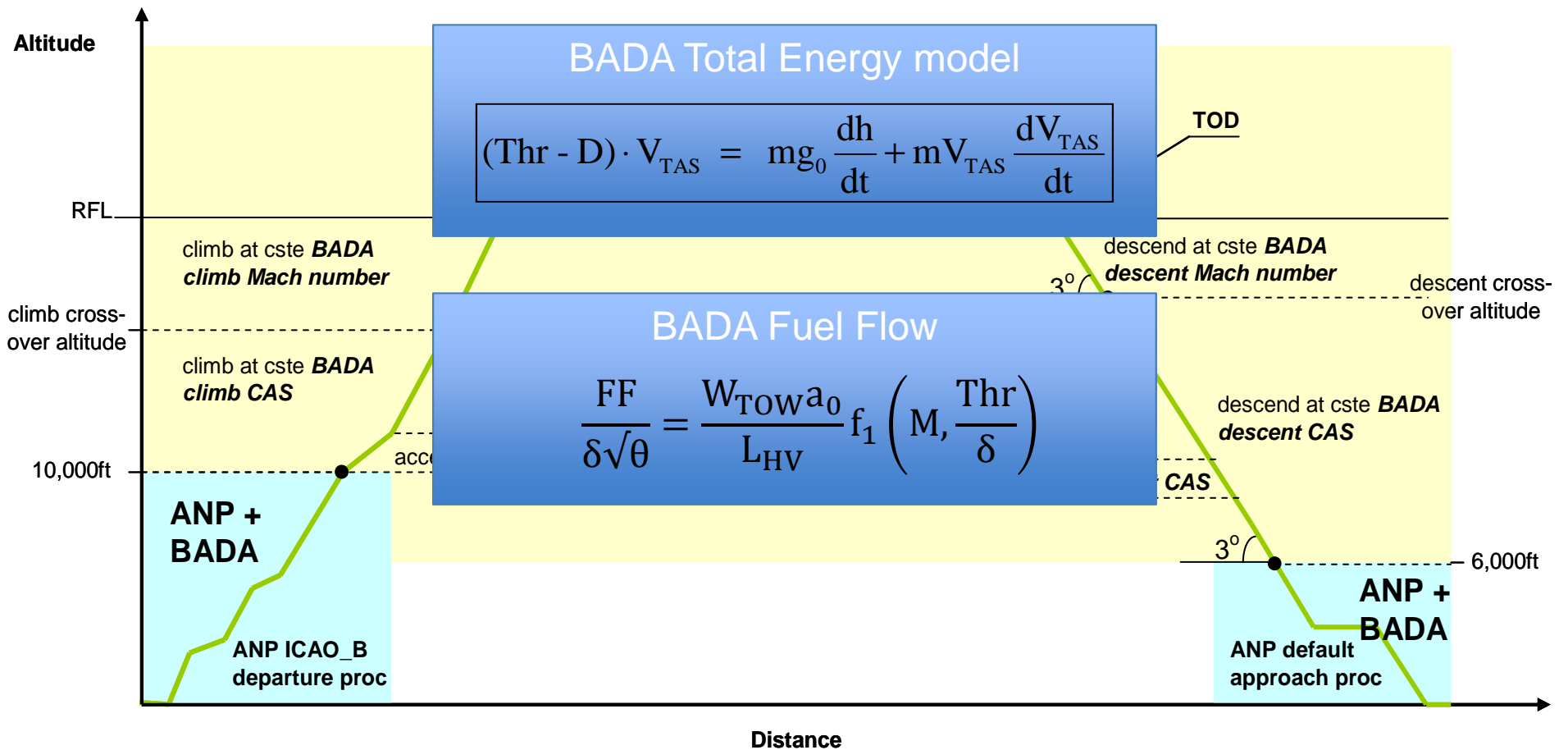


# A key component: the common trajectory calculator...

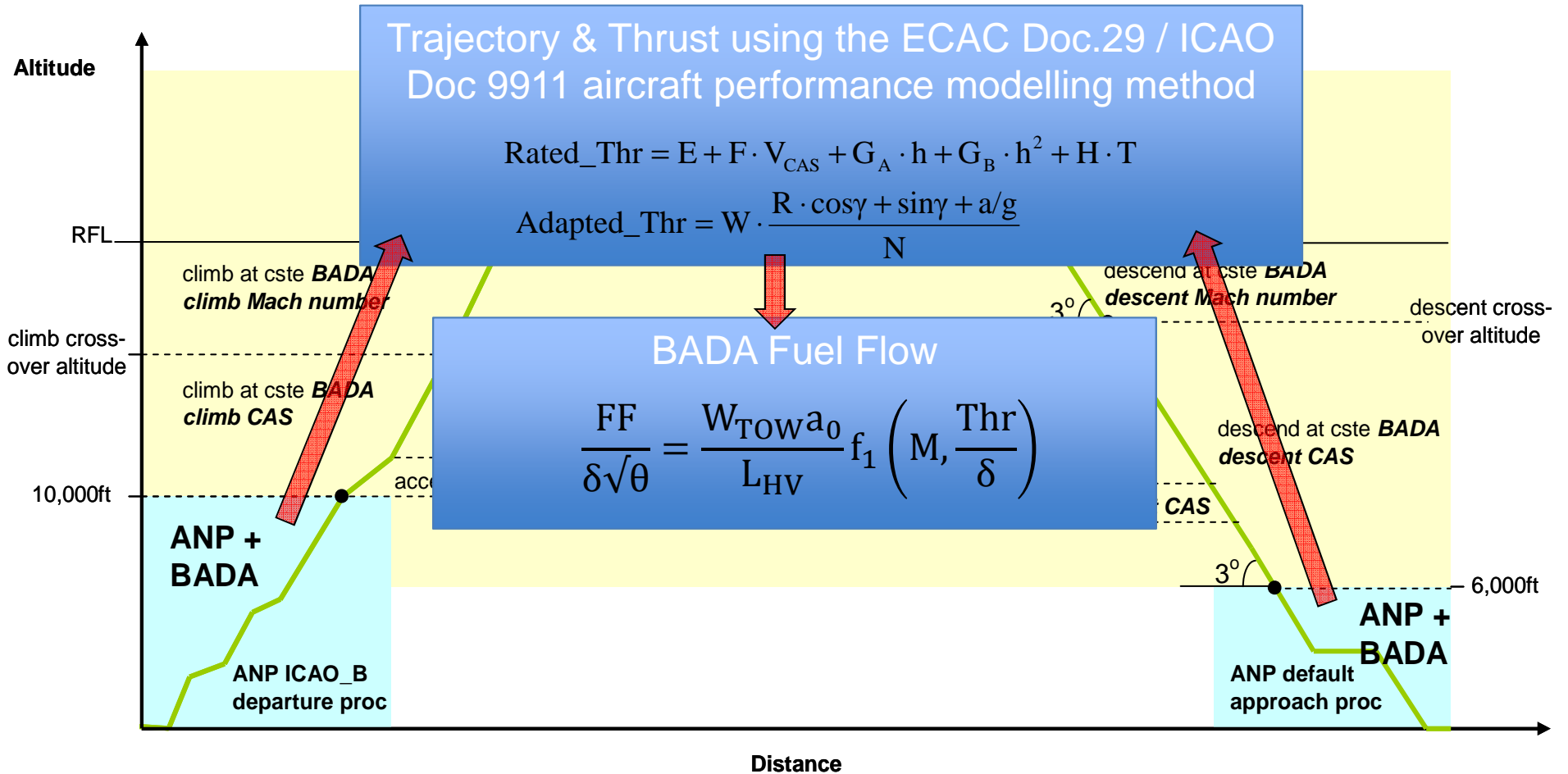




# A key component: the common trajectory calculator...



# A key component: the common trajectory calculator...



# IMPACT outputs

## Noise

- Noise level grids and noise contours
- Different noise metrics
  - Exposure-based metrics (SEL, Lden, DNL, Laeq, etc.)
  - Maximum noise levels (LAm<sub>ax</sub>)
  - Number Above (NA<sub>x</sub>)  
Number of operations exceeding a given noise level threshold
- Contour areas and number of people inside the contours
  - Use of the EEA population database

## Fuel consumption and global emissions

- Fuel burn/CO<sub>2</sub> masses
- Pollutant masses (NO<sub>x</sub>, SO<sub>x</sub>, HC, CO, PM, etc.)
- Aggregation of results per phase of flight, time period, FL range, etc.



# IMPACT outputs

## Local Air Quality

- **Gridded emissions inventories**
  - A “pre-assessment” feature helping to determine whether a full LAQ study should be undertaken (e.g. accounting for other non-aircraft emissions sources and using a dispersion model)
- Spatial and temporal distribution of aircraft-emitted pollutant masses
  - 3D calculation grids over different time periods
- Comparisons between a studied operational concept and a baseline
  - User-specified % difference threshold
  - Highlight areas with increased masses of emitted pollutants



# Benefits of the Web approach...

No installation issues

No need for powerful computers...

- Any machine with a web browser

Easy models & databases updates

- Single instance of the modelling toolset

Easy user licence management

- user accounts

Protection of sensitive reference information

- BADA data



# IMPACT in the future...

## Develop further capabilities

- Support user-defined flight procedures in the BADA portion
  - climb, cruise & descent phases
  - User-defined speed schedule
- Support additional types of descent segments
- Address other future modelling needs

## Grant access to a wider community of users

- Outside SESAR
- Airports, ANSPs, DGCAs, Airlines, others...
- Licence agreement under development
- Need to ensure appropriate level of support and maintenance
  - Web-based application context



**Thank you!**  
**Questions?**

Visit us at the **SESAR JU stand** for **IMPACT live demo**

Contact: [impact@eurocontrol.int](mailto:impact@eurocontrol.int)

