



Destination Green

ICAO Symposium on Aviation and Climate Change, "Destination Green", 14 – 16 May 2013

Enhancing European Modelling Capabilities in Support of ICAO's Committee on Aviation Environmental Protection

Session 1: Tools, Goals and Data

Andrew Watt
Head of Environment
EUROCONTROL

Enhancing European Modelling Capabilities in Support of ICAO's Committee on Aviation Environmental Protection



- WISDOM
- Advanced Emissions Model
- IMPACT
- Aircraft Assignment Tool (AAT)



What is WISDOM?

World Interconnected Sources Database of Operational Movements



- An historical archive of global aircraft operational movements & trajectories
 - Six selected representative weeks (Feb, Apr, Jun, Sep, Oct, Dec) for Trajectories
 - Full year of aircraft operational movements
- Used for ICAO CAEP - Environmental assessments
 - Linked with AEM - EUROCONTROL Advanced Emissions Model
 - To estimate Fuel burn and Greenhouse Gas emissions



CAEP COD

Common Operations Database



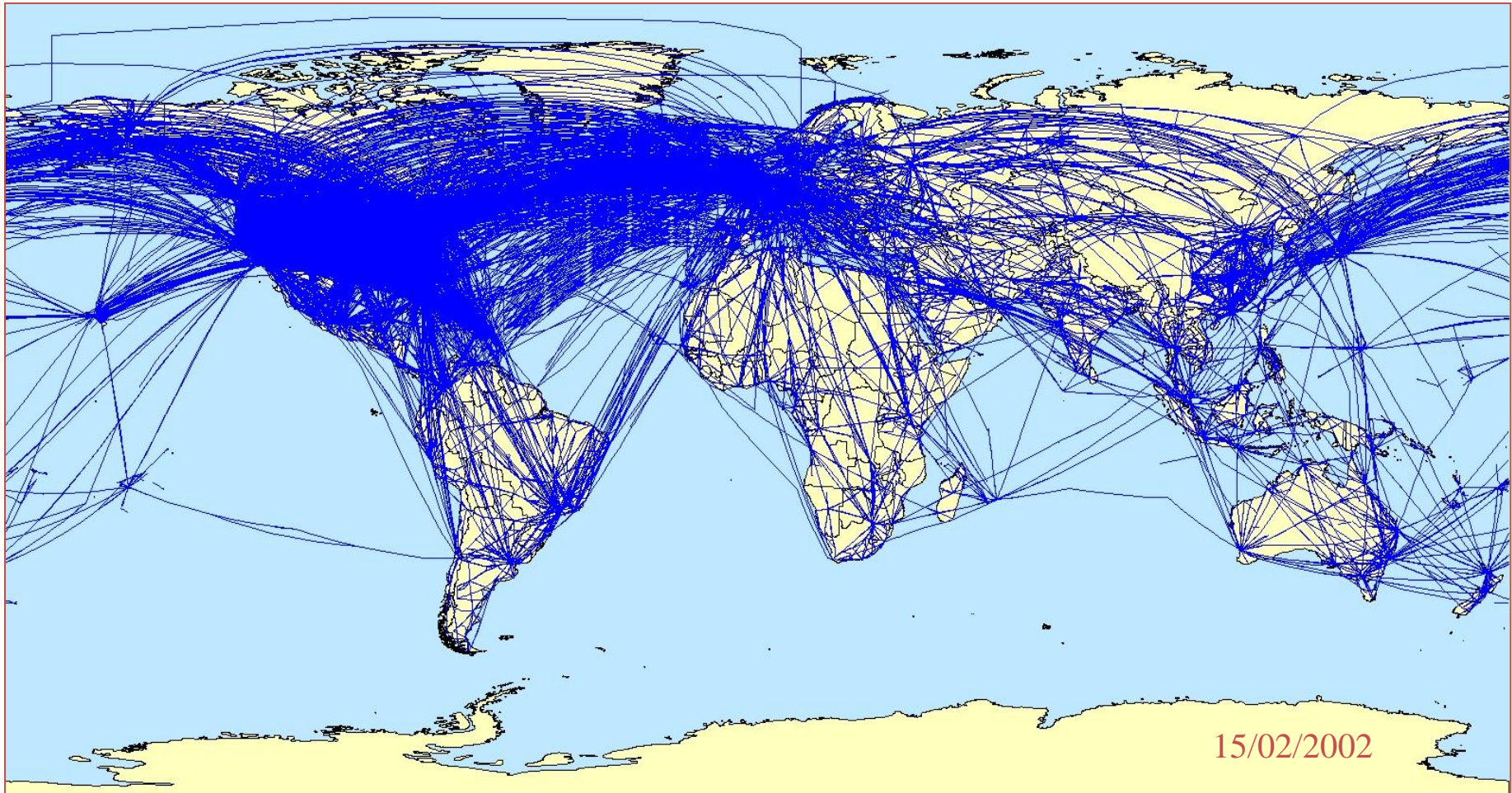
AEDT



WISDOM



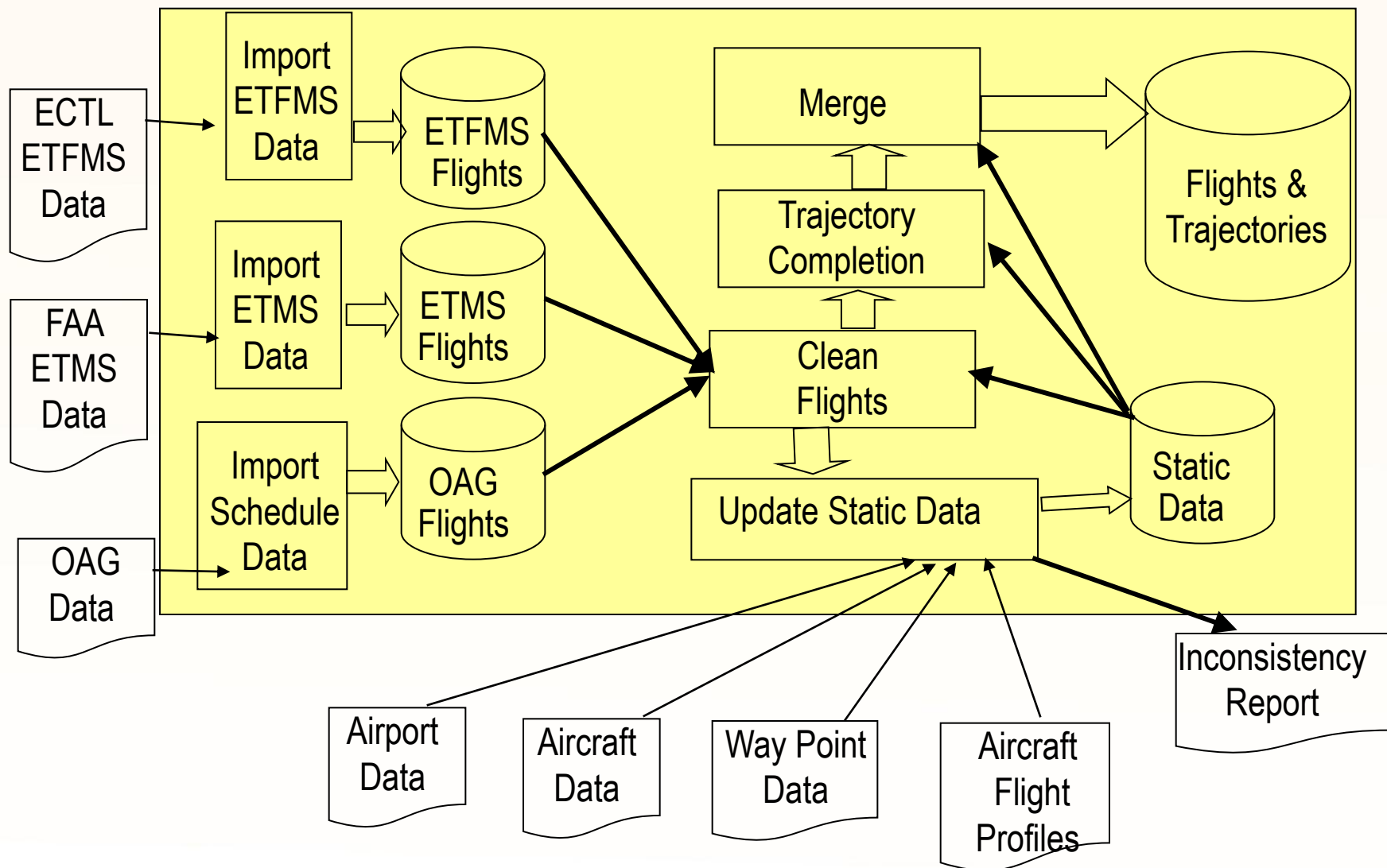
WISDOM Data Coverage





WISDOM

Data Crunching Processes





WISDOM

Trajectory Completion and Merging





ADVANCED EMISSIONS MODEL (AEM)

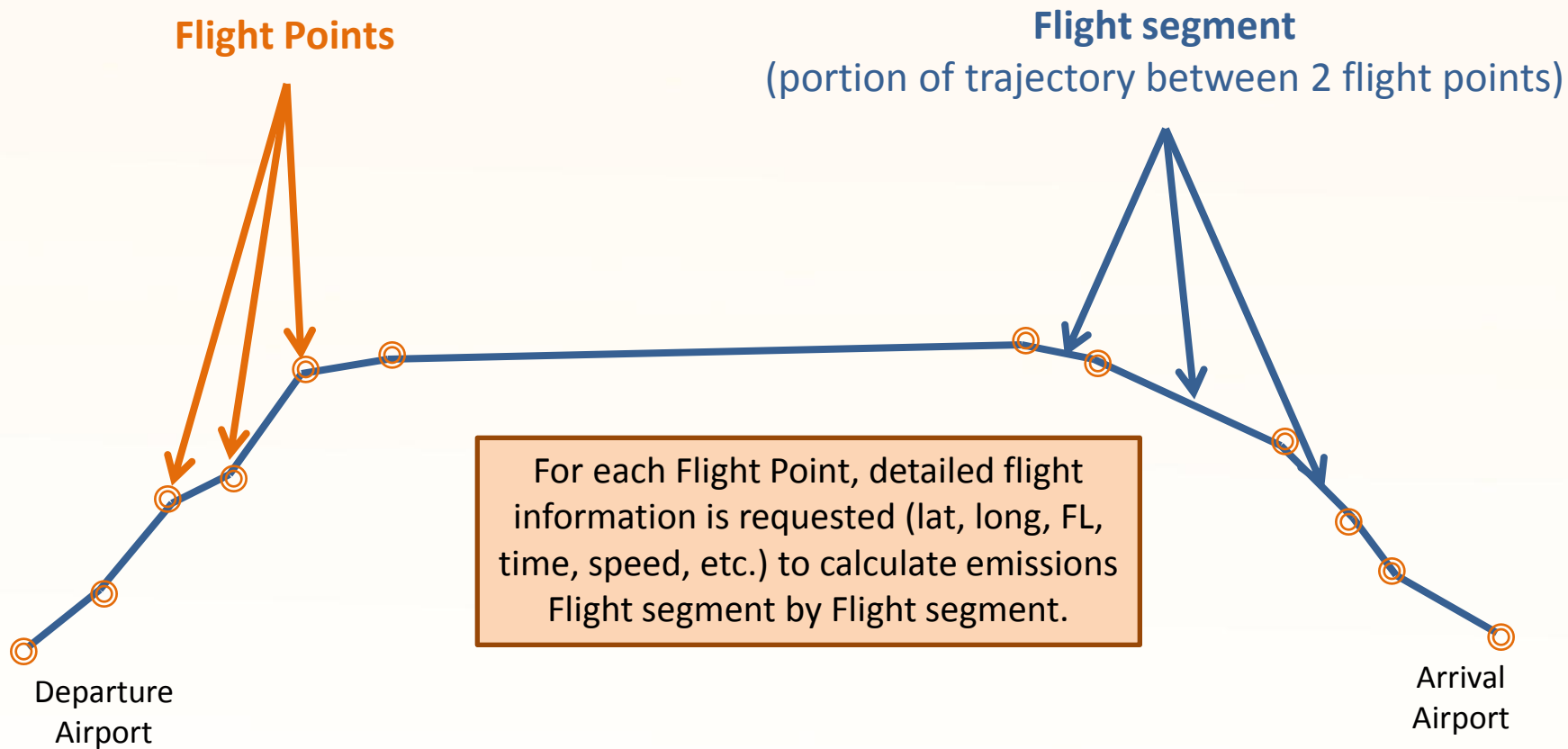


Advanced Emissions Model (AEM) is used to:

- estimate fuel burn/ CO_2 and H_2O , SO_x , NO_x , HC, CO, Benzene, VOC, and TOG; and
- analyse flight profile data on a flight-by-flight basis;

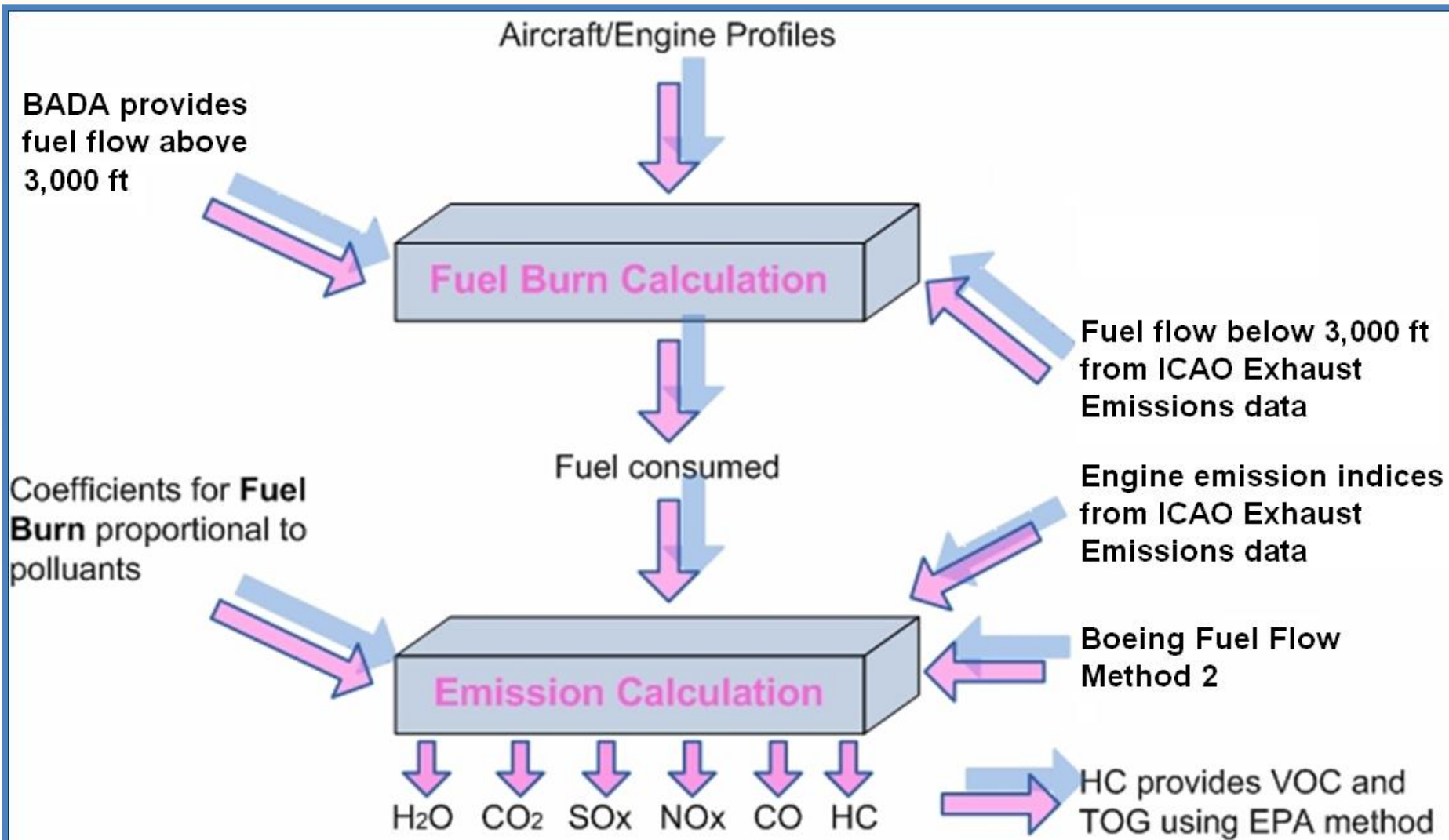
for air traffic scenarios ranging from local studies around airports to global emissions from air traffic.

Trajectory Input Data



AEM

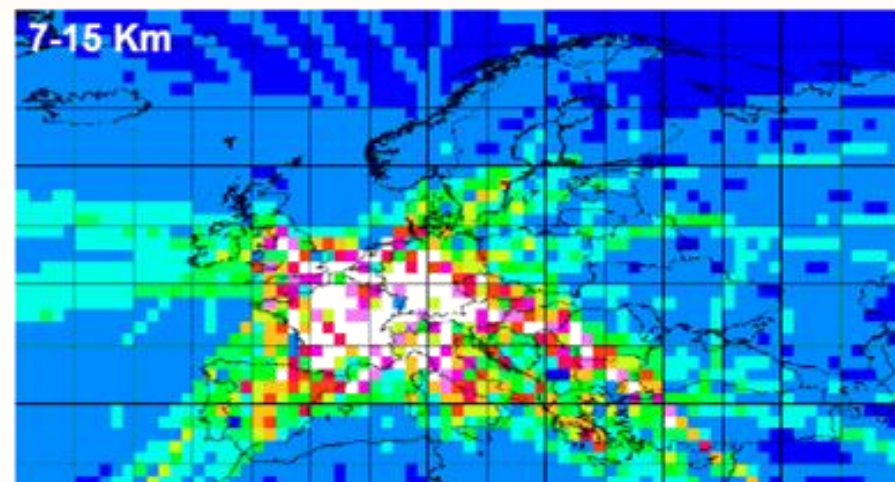
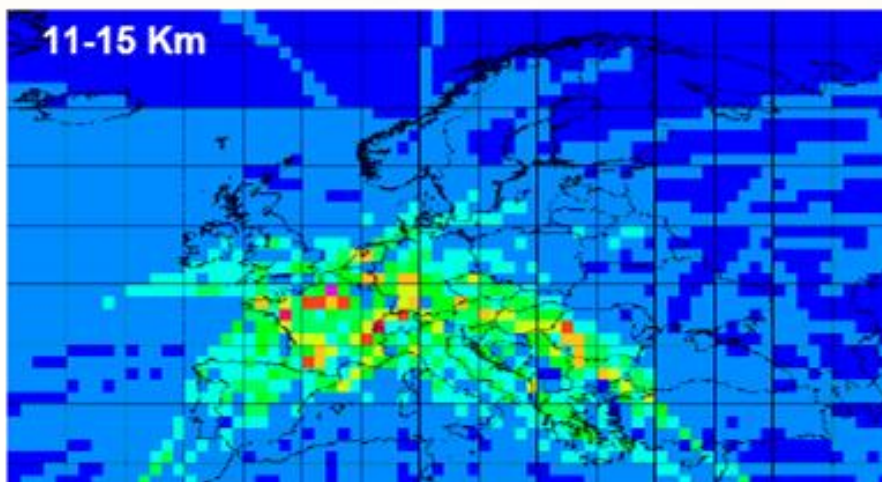
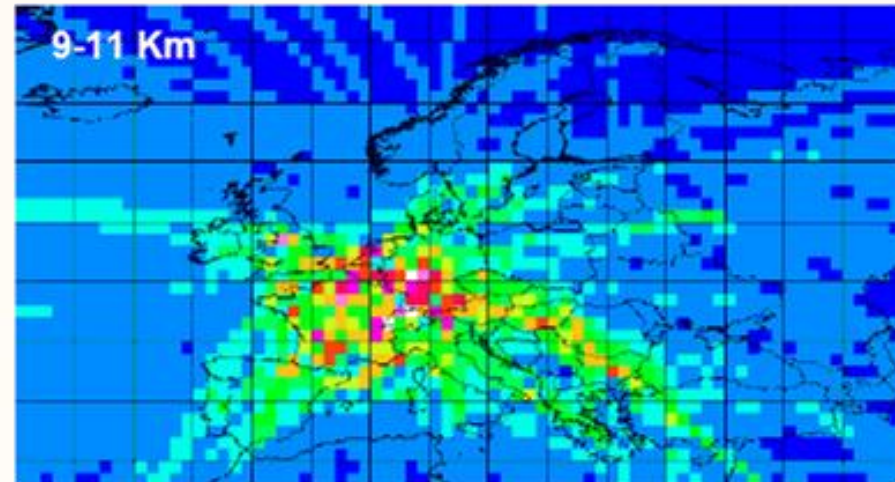
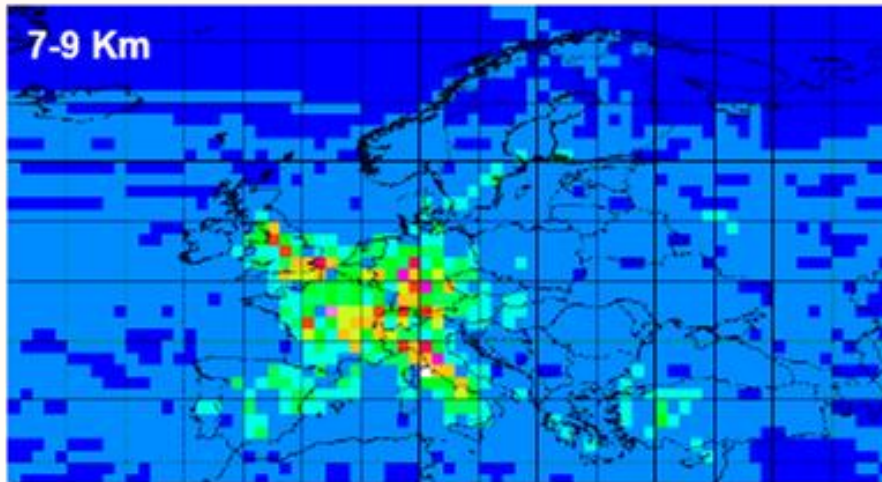
Data Crunching Processes



AEM

Destination Green 

Gridded Emissions Inventories



IMPACT



MEMBER OF
SESAR
JOINT UNDERTAKING



EUROCONTROL



IMPACT

THE NEW ENVIRONMENTAL ASSESSMENT
PLATFORM FROM EUROCONTROL

IMPACT = STAPES + AEM IN THE CLOUD

IMPACT was developed in context of the European SESAR programme.

The main objective was to develop and deliver a modelling system designed to support assessment of the impact of SESAR operational improvements (OIs) on noise and emissions.

IMPACT enables both the EUROCONTROL emission (AEM) and noise (STAPES) models to be run from the same modelling platform via a secure web portal. IMPACT provides a common aircraft operation and trajectory data environment to be used jointly by both models.

IMPACT addresses the following SESAR-specific requirements:

- Provide an appropriate level of granularity (sensitivity) to correctly respond to SESAR operational changes relative to a baseline;
- Cover all phases of flight (gate-to-gate) for fuel burn and emissions;
- Support studies on different scales, from the local level (airport or TMA-specific) up to the global level (European network level and beyond);
- Enable consistent trade-off analyses between fuel burn/emissions and noise;
- Handle input data from different sources including FDR data, fast-time or real-time simulator data;
- Enable the theoretical definition of operational concepts to be used in place of recorded input data, if required (eg. by using procedural steps);
- Make the system available to different users involved in operational projects for performing environmental impact assessments of their operational concepts.

IMPACT is planned to be used in the context of future ICAO environmental policy assessments.

IMPACT's data warehouse contains all reference and default data such as BADA 4.0 and ANP v2.0 required by the STAPES and AEM models

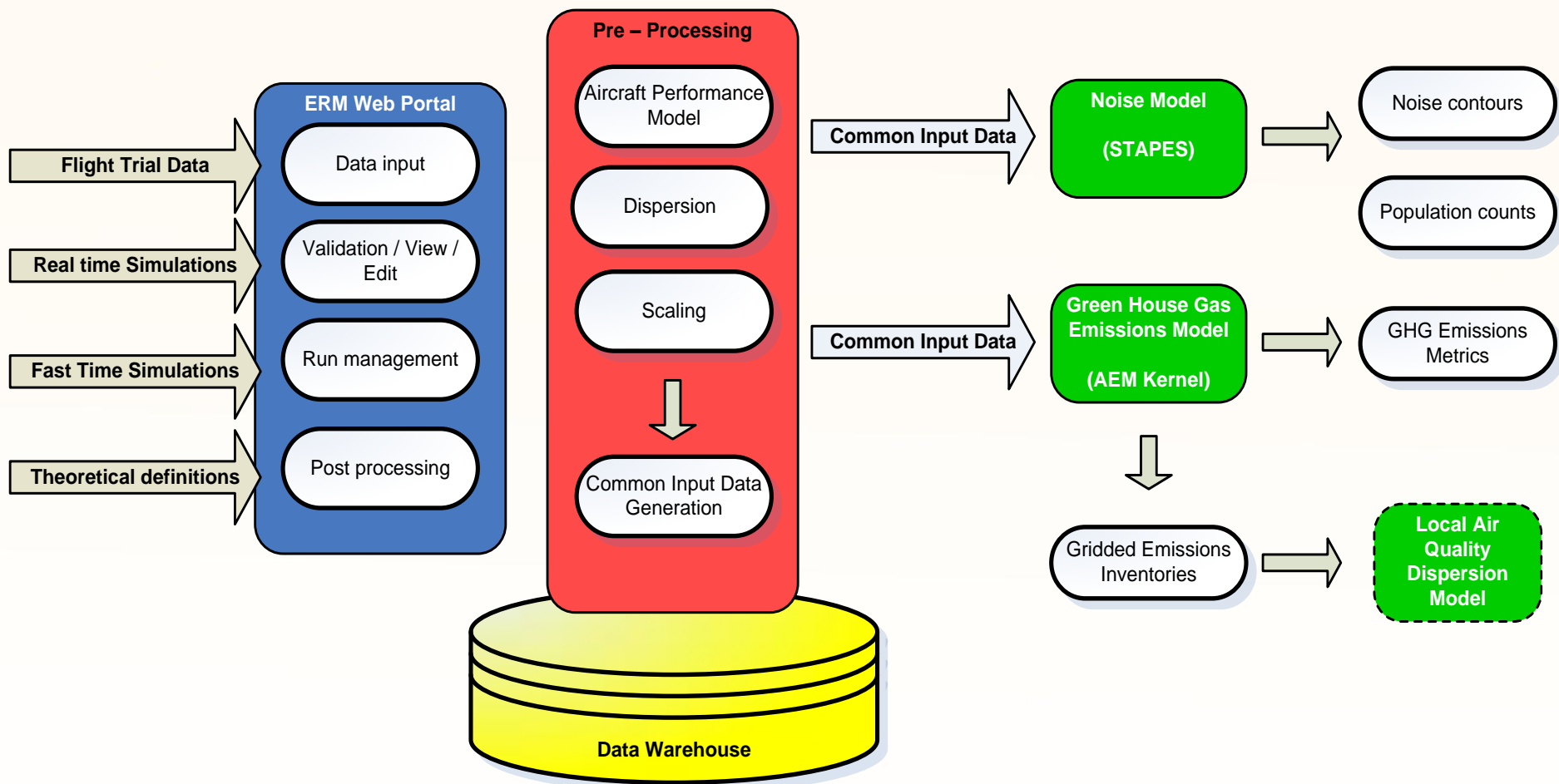
IMPACT availability:

- Now for SESAR users;
- From 2014 for the wider user community



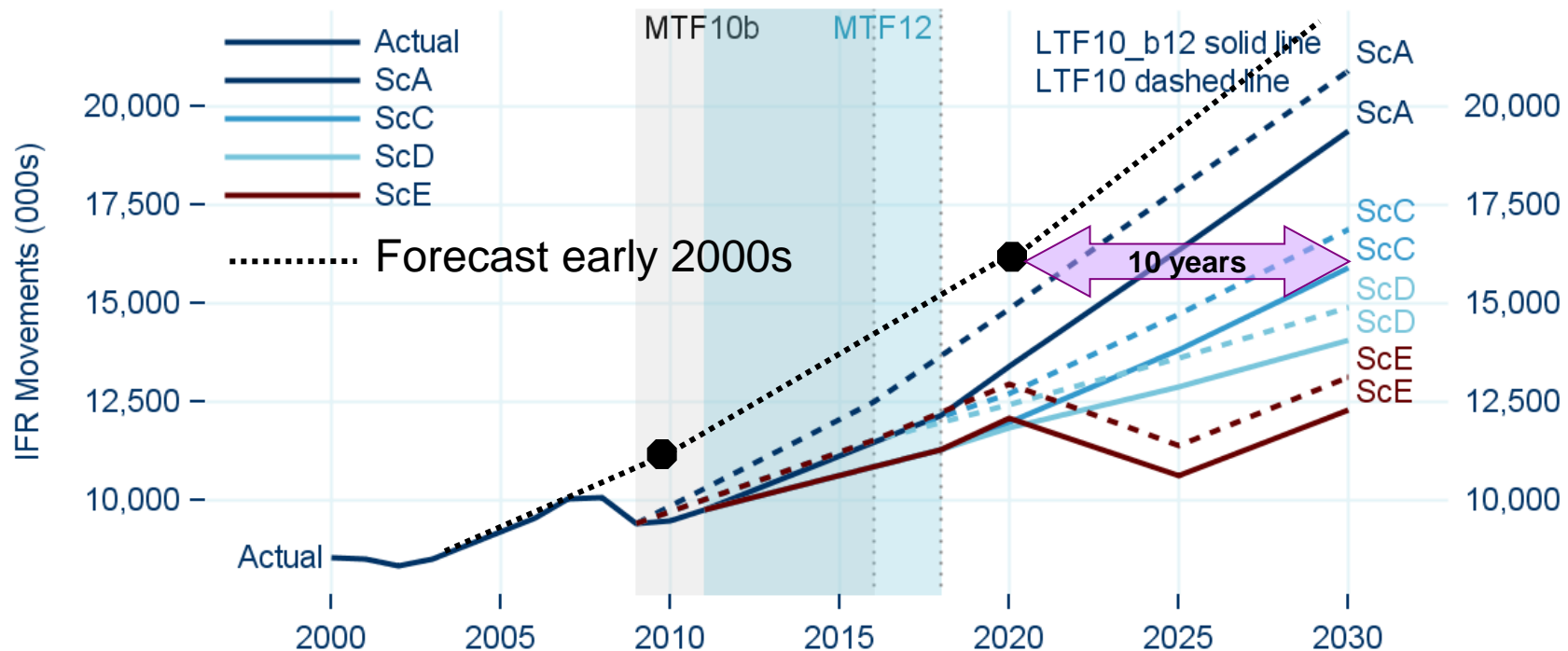
IMPACT

Data Flows



MODELLING FUTURE EMISSIONS

ESRA08 - Grand Total





FUTURE EMISSIONS

The Capability Gap



TRAFFIC FORECAST

CAEP FESG
STATFOR
AERO-MS
Commercial?

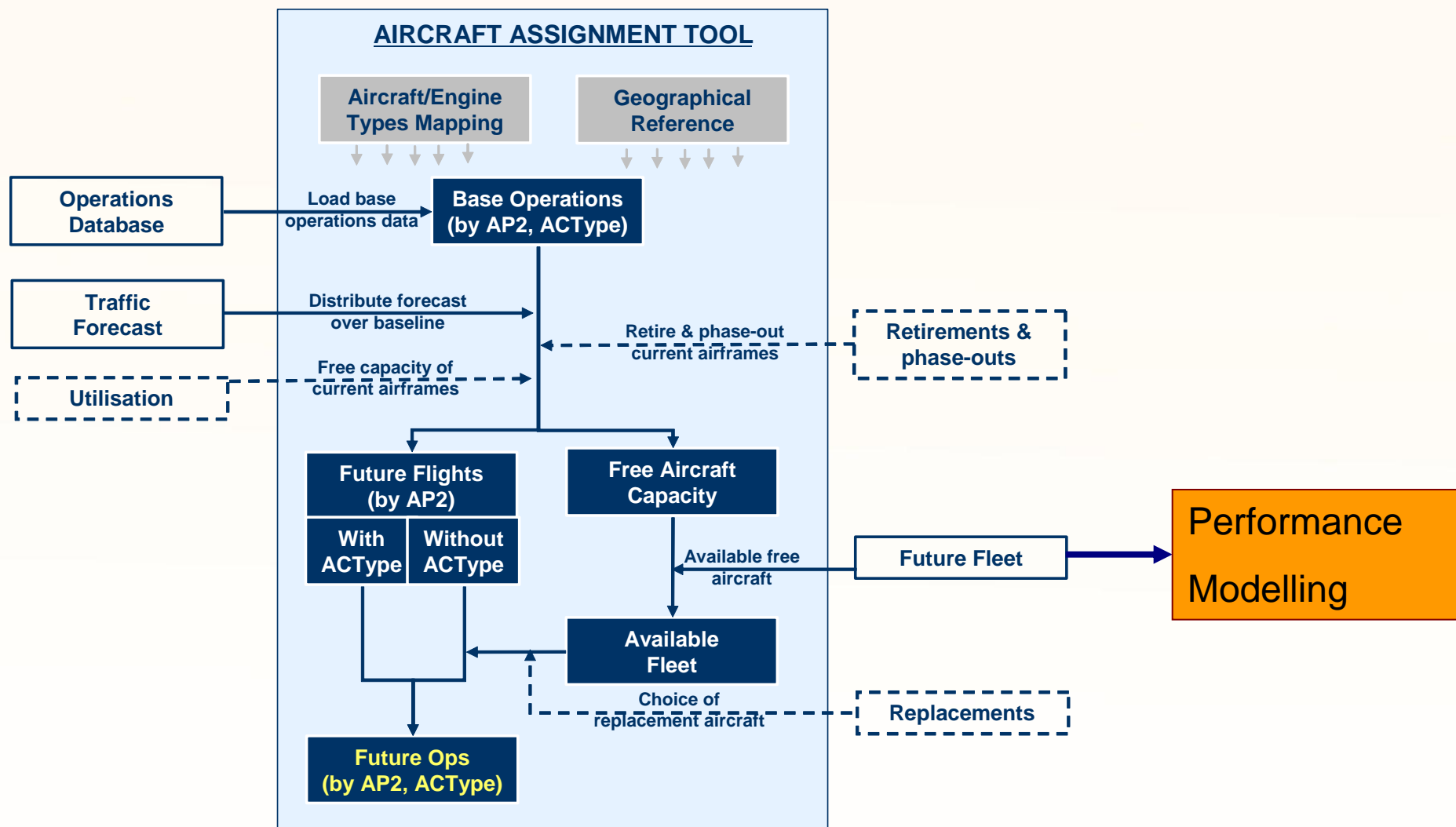


PERFORMANCE DB

BADA
ICAO Engine Emissions db
AC Noise And Performance db
FOI, FOCA, Other?

AIRCRAFT ASSIGNMENT TOOL

Bridging the Capability Gap



CONCLUSIONS

Enhancing European Modelling Capabilities in Support of CAEP



- WISDOM build of 2012 global traffic under way
- IMPACT cloud-based assessment capabilities
 - STAPES (Noise) – Now
 - AEM (Fuel burn & emissions) – Dec 2013
- Forecasting future fleet & emissions
 - Aircraft Assignment Tool (late 2013)
- IMPACT & AAT to be stress-tested in CAEP (2013-14)
- EUROCONTROL, EASA, EC working together