Environmental Impacts in ATM System Design and Operations ENV

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Papers

There were four environmental papers.

Paper 43: Evaluating the Environmental Performance of the U.S. Next Generation Air Transportation System (Quantitative Estimation of Noise, Air Quality, and Fuel-Efficiency Performance), presented by Terence Thompson, Metron Aviation. This paper provided an aggregate approach to achieving environmental goals for noise, emissions, and fuel savings for future NextGen policy scenarios of higher traffic volumes, advanced satellite tracking technologies, enhanced traffic procedures, and new aircraft technologies.

Paper 84: Assessment of the Aviation Environmental Design Tool, presented by Rebecca Cointin, FAA. This paper provided the steps of a rigorous assessment program of FAA's aviation environmental tool, AEDT, to determine the uncertainties in the model based on assumptions and input parameters. This program suggests a new (higher) standard in understanding confidence in aviation environmental models.

Paper 122: Development of Flight Inefficiency Metrics for Environmental Performance Assessment of ATM, presented by Tom G. Reynolds, University of Cambridge. This paper identified the potential causes of flight inefficiencies, followed by the development of flight inefficiencies metrics based on lateral track extension and fuel burn to quantify the environmental performance of the system. These metrics are used with flight data to illustrate their utility.

Paper 48: Fuel consumption modeling in support of ATM environmental decision-making, presented by by David Senzig, US DOT. This paper provided a completely new set of aircraft performance algorithms, based upon manufacturer data, that allows for a high level of accuracy of aircraft positioning and fuel burn quantification during low speed enhanced traffic procedures. Uncertainties below 5% when compared to gold standard flight data recorder data were consistently observed.

Analysis

Two of the four papers were on modelling analyses that quantified ATM environmental performance metrics, one focused on common flight inefficiency metrics of ATM systems and the other focused on evaluating the environmental performance of NextGen implementation within the US. Key messages from these analyses brought forth the point that aviation environmental consequences for noise, air quality pollutants, and greenhouse gases (GHGs) are interdependent (i.e., you cannot address one without affecting the others). In addition, mitigation of environmental consequences pose a challenge as air traffic management improvements are implemented under both NextGen and SESAR programs. For instance, one on the paper's preliminary conclusions were that with the full operational and technological benefits of NextGen in place, the 2025 environmental goals for noise and emissions did not seem achievable. Additional environmental analyses of ATM improvements are needed, but with research and development of more robust/accurate models.

The remaining two papers in the session focused on portions of the research and development of FAA's Aviation Environmental Design Tool (AEDT) regarding (1) advanced aircraft performance methodologies within the terminal airspace at non-cruise phases of flight (i.e., low speeds) in order to increase the accuracy of fuel burn and emissions estimates for ATM procedures and (2) the results of the first round of assessment and validation of certain modules of FAA's AEDT model. FAA's innovative approach to modelling 4-D aircraft performance and simultaneously deriving noise, emissions and fuel burn implications will be critical to quantify the environmental performance of future ATM scenarios.

General Aspects

3 US papers, 1 European paper. Approximately 45-50 people in attendance. All four papers were high quality papers written in a professional manner backed by scientific references.

High-level Recommendations

Quantifying and mitigating environmental impacts in ATM system design and operations is a real challenge for both NextGen and SESAR. Both programs are committed to reducing significant environmental impacts from aviation. In addition, EUROCONTROL has additional burdens to quantify aviation fuel burn/emissions as part of the Emission Trading Scheme, which will be affected by the implementation of new operational procedures and ATM designs. The ATM2009 environmental session papers touched on the important role ATM plays in reducing the environmental impacts of aviation, yet at the same time raised awareness of the analytical uncertainties that exist in today's attempts at quantifying aviation environmental impacts.

Therefore, essential recommendations for ATM2011 are as follows:

- Call for environmental papers should be targeted on the research and development of aviation environmental models to quantify and assess the role ATM measures play in environmental impacts of noise, air quality pollutants, and climate change. Further emphasis should be placed on characterizing the trade offs between mitigating environmental impacts within the context of policy changes, regulatory requirements, and NextGen/SESAR implementation.
- Research gaps, divergences and needs:
  - Flexibility in modelling system to accommodate a variety of ATM radar, fleet, and/or simulation data to accurately assess environmental impacts?
  - How good is the aircraft performance modelled for enhanced air traffic procedures? This affects fuel burn, emissions, and aircraft positioning for noise impacts. How good is "good enough" for environmental impacts?

Other general recommendations:

- Provide papers earlier for seminar participants. No need to wait until the final list of papers is complete. Release the initial lot of certain papers earlier.
- Set up an automated email tickler to notify registered attendees that new papers have been posted to the seminar website.
- Encourage more FAA/EUROCONTROL co-written papers pertaining to environmental performance comparisons of NextGen and SESAR.