



Project 023 Analytical Approach for Quantifying Noise from Advanced Operational Procedures

Massachusetts Institute of Technology

Project Lead Investigator

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University Participants

MIT

- P.I.(s): R. John Hansman
- FAA Award Number: 13-C-AJFE-MIT, Amendment Nos. 008, 015, and 022
- Period of Performance: Nov. 1, 2014 to Aug. 31, 2017
- Task(s):
 1. Identify candidate arrival or departure procedures or procedure modifications with noise reduction potential and present analytical framework
 2. Select at least 3 procedures and complete analyses of environmental improvement potential for candidate arrival or departure procedures or procedure modifications with noise reduction potential
 3. Review initial research outcomes and determine next steps for FAA assessment of candidate arrival or departure procedures or procedure modifications with noise reduction potential
 4. Identify, evaluate, and document implementation barriers (pilot workload, controller workload, safety, among other considerations) for proposed procedures. Evaluate and document feasibility of an enhanced NAS-wide air traffic evaluation framework
 5. Repeat process for additional procedures
 6. Final Report on potential air traffic procedural changes at BOS to address noise concerns and the feasibility of an enhanced NAS-wide air traffic procedural framework for assessing implications of proposed operational procedures on fuel burn, noise and environmental justice populations without detriment to safety

Project Funding Level

Project Funding Level: \$360,000 FAA funding and \$360,000 matching funds. Sources of match are approximately \$80,000 from MIT and \$280,000 from Massachusetts Port Authority.

Investigation Team

Prof R. John Hansman (PI)
Dr. Brian Yutko (Co-I)
Dr. Greg O'Neill (Postdoc)
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Project Overview

The objective of the first phase of the research has been the development of an analytical approach for evaluating the noise impacts of advanced operating procedures. Older generations of jet engines produced significantly more noise than current-generation products. The assumption that jet noise dominates aerodynamic sources may have been reasonable in previous environmental impact studies. However, for new advanced approach and departure procedures, aerodynamic noise reduction may contribute strongly to environmental benefits. For example, in a delayed deceleration approach (DDA), deployment of landing gear and high-lift devices can be delayed until later stages in an approach, reducing aerodynamic noise. This effect is not captured using current noise-power-distance (NPD) noise calculation tools now in common use throughout the aerospace industry. This illustrates a gap in noise analysis capability for advanced operational procedures.

The second phase of this research is to use and refine the analytical approach by developing both generic and specific RNAV-RNP procedures which offer the potential to reduce community noise impact.

Task Progress and Plans

Task 1: Identify candidate arrival or departure procedures or procedure modifications with noise reduction potential and present analytical framework.

This task is in progress and a generic set of procedure modification have been identified.

Task 2: Select at least 3 procedures and complete analyses of environmental improvement potential for candidate arrival or departure procedures or procedure modifications with noise reduction potential.

This task is in progress. Complaint data has been correlated with current procedures at BOS in detail and at DCA. Final selection of target procedures is pending additional input from community groups and ATO.

Task 3: Review initial research outcomes and determine next steps for FAA assessment of candidate arrival or departure procedures or procedure modifications with noise reduction potential.

This task is pending results of Task 2.

Task 4: Identify, evaluate, and document implementation barriers (pilot workload, controller workload, safety, among other considerations) for proposed procedures. Evaluate and document feasibility of an enhanced NAS-wide air traffic evaluation framework.

This task is pending results of Task 2.

Task 6: Repeat process for additional procedures

This task is pending.

Task 7: Final Report on potential air traffic procedural changes at BOS to address noise concerns and the feasibility of an enhanced NAS-wide air traffic procedural framework for assessing implications of proposed operational procedures on fuel burn, noise and environmental justice populations without detriment to safety.

This task is pending.

Major Accomplishments

Have developed and demonstrated TASOPT and ANOPP connection and modeled several aircraft types with good agreement with certification data. Have demonstrated the tool overall design tool on analysis of procedures at BOS, DCA, JFK and LGB. Currently working with MASSPORT on developing new class of low noise RNAV/RNP procedures for BOS,



Publications

None

Outreach Efforts

Briefed the Administrator and the Management Advisory Committee.

Briefed ATA Technical Pilots Working Groups

NPR Appearance to Discuss Modeling Efforts in Boston

Awards

None

Student Involvement

Graduate students have been involved in all aspects of this research and have been the key implementers.