



NASA SBIR/STTR Technologies



09-2 A1.04-9447 – Molecular Air Data Clear Air Turbulence Sensor: MADCAT
Phase 1 Contract #NNX10CE68P

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Identification and Significance of Innovation:

- Clear Air Turbulence (CAT) is a significant air safety and passenger comfort issue.
- MADCAT will extend an existing optical air data system design to sense CAT for warning purposes.
- Michigan Aerospace uses direct-detection ultraviolet Doppler LIDAR that works in clear air using molecular backscatter and is eye safe.

Expected TRL Range at the end of Phase 2 Contract (1-9): 5

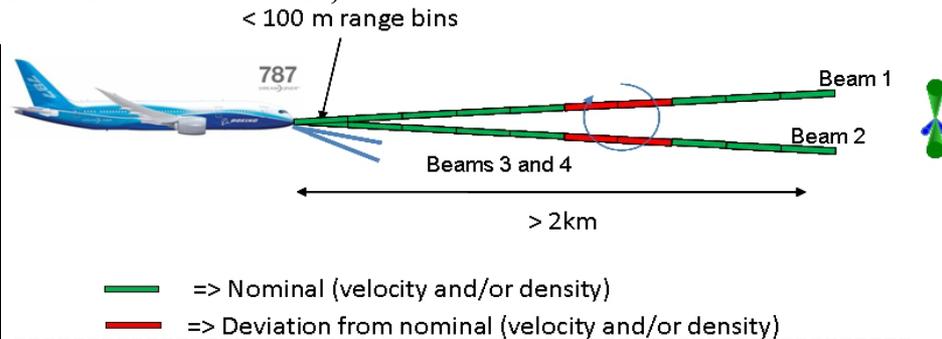
Technical Objectives and Work Plan

Technical Objectives:

1. Establish final MADCAT technical specifications.
2. Fabricate and test an engineering model of MADCAT.
3. Recommend a final design for testing on an airborne platform.

Work Plan tasks:

1. Finalize MADCAT design specifications.
2. Design and fabricate a MADCAT engineering model.
3. Further develop algorithms necessary to process MADCAT data.
4. Design engineering model test program.
5. Run engineering model tests.
6. Draw up recommendations for MADCAT prototype design suitable for airborne testing.



CAT detection is achieved with Beams 1 and 2 by sensing other-than-nominal velocity/density in some range bins compared to the rest. Beams 3 and 4 provide air data.

NASA and Non-NASA Applications

NASA: Turbulence detection for both warning and research purposes, with optical air data system capability.

Non-NASA: Commercial and military aircraft turbulence warning with optical air data system capability. Technology can be applied to turbulence warning and wind mapping for ground applications, such as for wind farms and military artillery and other fire-control activities.

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NON-PROPRIETARY DATA