

Molecular Air Data Clear Air Turbulence Sensor: MADCAT

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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 (1-9) at beginning and end of Phase 1: **Begin 2; End 3**

Projected TRL should a Phase II be funded: 5-6

- MADCAT looks ahead of aircraft to measure air data and detect turbulence
- 3 look angles provide 3 line-of-sight measurements for direction information

www.boeing.com/commercial/787family/

Technical Objectives and Work Plan

Technical Objectives:

1. Determine performance specs and instrument constraints for CAT hazard-detection system.
2. Determine the performance and capabilities of proposed MADCAT system.
3. Develop a detailed design augmentation of existing optical air data system to add CAT-detection capability.

Work Plan tasks:

1. Requirements analysis
2. Sensor Performance Trade Studies
3. System Augmentation Design
4. Demonstration plan for Phase 2 effort

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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