



NASA Icing Update – Oct 2026

Presentation for the
SAE AC-9C Technical Committee Meeting
Oct 19, 2026 | Tysons Corner, VA USA

Contributors

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Outline / New & On-going Topics

- Icing Branch Status Update
- Facility Updates
- Rotating Propellor Scaling
- FanICE Update
- SLD Flight Campaign Feasibility Study
- SLD Instrumentation test in IRT
- Baylor Collection Efficiency test in IRT
- Summary



Current Status of NASA Icing Branch

The NASA Glenn Research Center (GRC) Icing Branch merged with the GRC Acoustics Branch to become the Icing and Acoustics Branch

- Cliff Brown (clifford.a.brown@nasa.gov) is Branch Chief

FY27 Planning

- Operating under Continuing Resolution until December 11, 2026
- NASA Aeronautics will be Division under Research and Technology Mission Directorate
- Programs and Projects are replanning under new structure
 - Continue to support icing prediction for novel airframes
 - Interested in developing propeller/fan/engine icing capability
 - New focus on GlennIce Verification, Validation, and Interoperability

Research and Technology Mission Directorate



Office of the Associate Administrator

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Dr. Wanda Peters, Deputy Associate Administrator

Aeronautics Division

Laurie Grindle, Director

Research Innovation and
Technology Program

Flight Research and
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Aerospace Capabilities
Portfolio Office

Advanced Research and Technology Division

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Space Transportation Advanced
Technology Office

Space Infrastructure Advanced
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Space Communications and Navigation (SCaN) Division

John McCullough, Acting Director
Philip Baldwin, Deputy Director

Network Operations

Capabilities Development

Mission and Stakeholder Engagement

Agency Spectrum Management

Systems Engineering and Integration

Network Integrity

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Cynthia Simmons, Director

Space Reactor -1 Freedom

Lunar Reactor -1

Radioisotope Power Systems
Program Office

Advanced Nuclear
Technology Office

Business Management Office

Bill Harrison, Office Chief

Resource Management

Business Operations



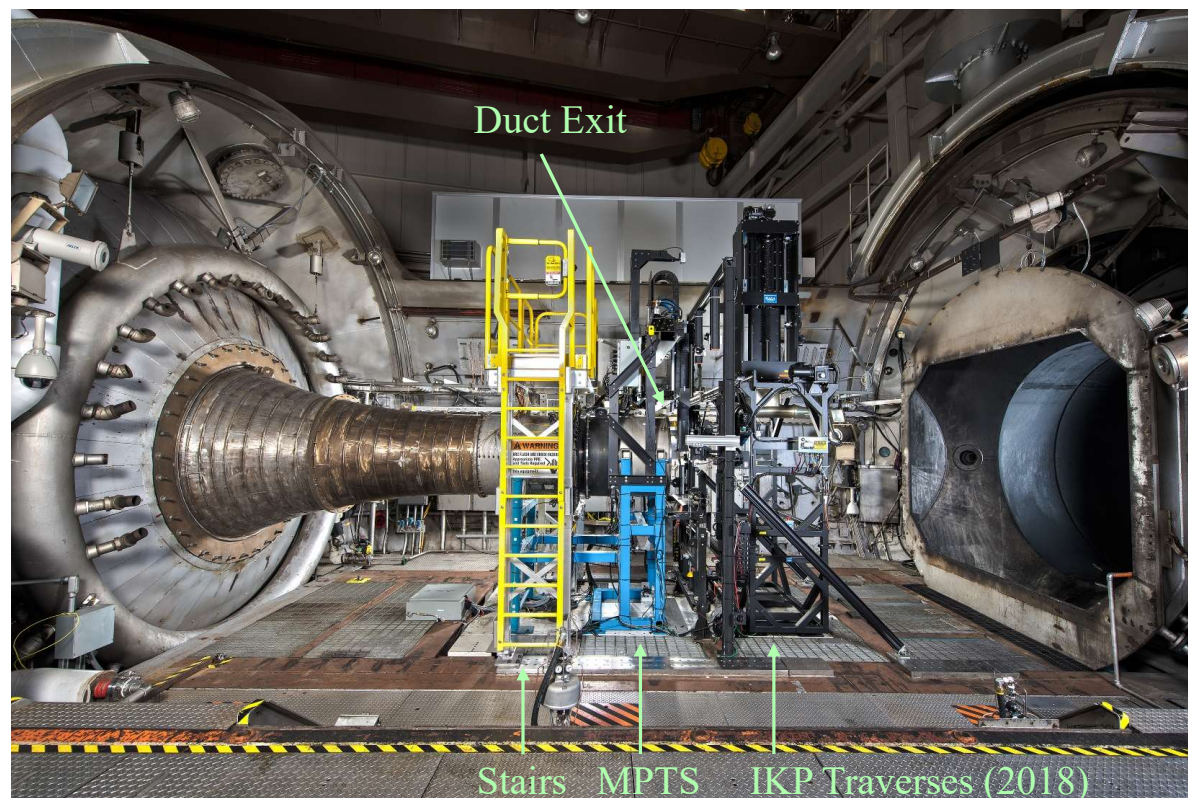
IRT Facility Update

- Maintaining calibration cadence recommended by ARP-5905
 - Last check cal performed in this month, October 2026
 - Next scheduled in January
 - Continuing to develop statistical process control charts for both water content and zonal uniformities
- Completed Mod2-Nozzle Calibration Report
- Working with limited resources to bolster the opportunity for more regular rig-style testing



PSL Icing Capability Update

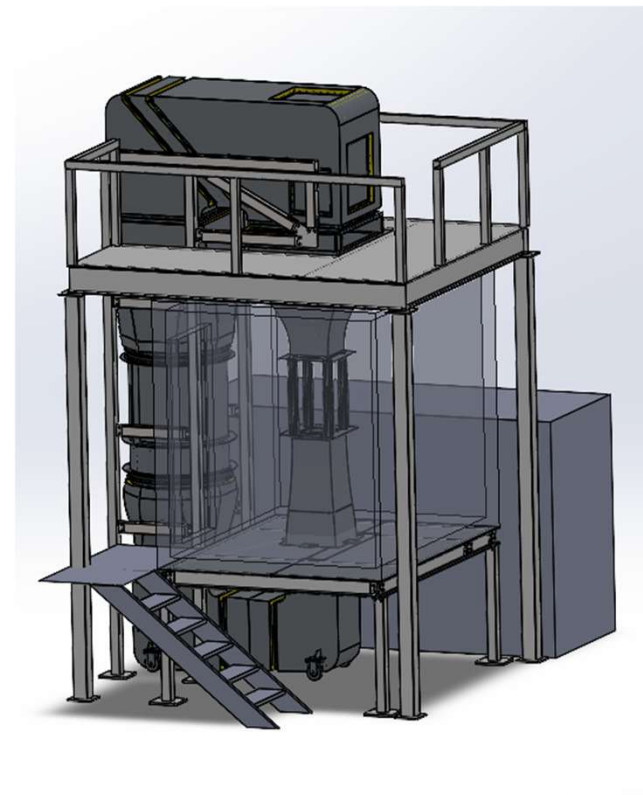
- Continuing to work on reinstallation of icing spraybars
 - Replaced all water hoses
 - Solenoid valves checked as needed
 - Cabling and systems check is next
- Redesigning a multi-probe traversing system adaptable for different duct diameters and additional instrumentation capabilities
- Preparing for a facility checkout in Spring 2027
- Working with NASA Glenn's data quality team and characterization group on Design of Experiments appropriate to building test matrices
 - Expensive facility and limited time
 - need to be efficient while collecting quality, statistically-significant data
 - Using TADICE to assist with preliminary assumptions for optimization





Adaptive Icing Tunnel (AIT) Description

- New NASA icing facility
 - 12" x 12" x 28" test section
 - 250 mph (115 m/s), -20 °C
 - Modular spray bar and test section
- Status update:
 - Most of tunnel loop in place: motor, refrigeration system, test section with walk-in freezer
 - Need to finalize hookups/installation
- Future Dates:
 - Jan 2027: Tunnel Completion
 - Jun 2027: Chiller Turn-On



Adaptive Icing Tunnel (AIT) Description



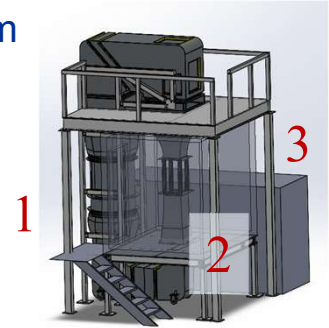
1. Motor



2. Converging / Diverging sections inside walk-in freezer



3. Refrigeration System





NASA / RTA Propeller Icing Scaling Collaboration

NASA–RTA Space Act Agreement established to evaluate rotational icing scaling methods for propellers using NASA IRT and RTA CWT facilities.

Austrian Government funding through FFG Project **PRECISE** for testing at RTA.

- PRECISE Partners:
 - AeroTex (ATX)
 - Rail Tec Arsenal (RTA)
 - Austrian Institute of Icing Sciences (AIIS)
 - FH Joanneum (FHJ)



NASA / RTA Propeller Icing Scaling Collaboration

OBJECTIVE: Improve understanding, establish best practices, and provide greater confidence in applying icing scaling methods to rotating geometries.

APPROACH *(next slide):*

- Evaluate icing scaling techniques using two geometrically similar propellers with diameters of 0.5- and 1-meter in the NASA Icing Research Tunnel (IRT).
- Extend scaling analysis from 1- to a larger, 2-meter diameter propeller tested at the Rail Tec Arsenal (RTA) Climatic Wind Tunnel (CWT) in Vienna, Austria.
- Prior to the propeller test at RTA, perform interfacility comparison tests using a shared NACA 0012 wing model to understand and account for facility differences.



NASA / RTA Propeller Icing Scaling Collaboration

NACA 0012 Interfacility Comparison
(FY25 - **COMPLETED**)

Propeller Icing Scaling Tests
(FY26-27)

NASA IRT

RTA CWT



(a)

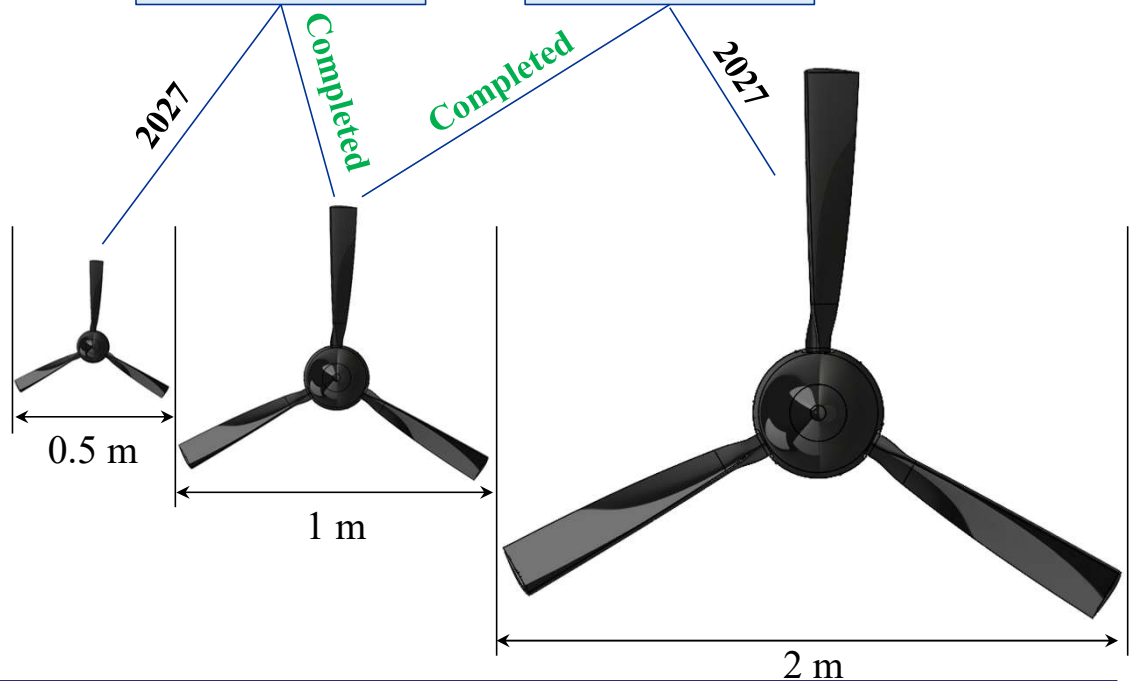


(b)

21-in NACA-0012 model tested at
both facilities

NASA IRT

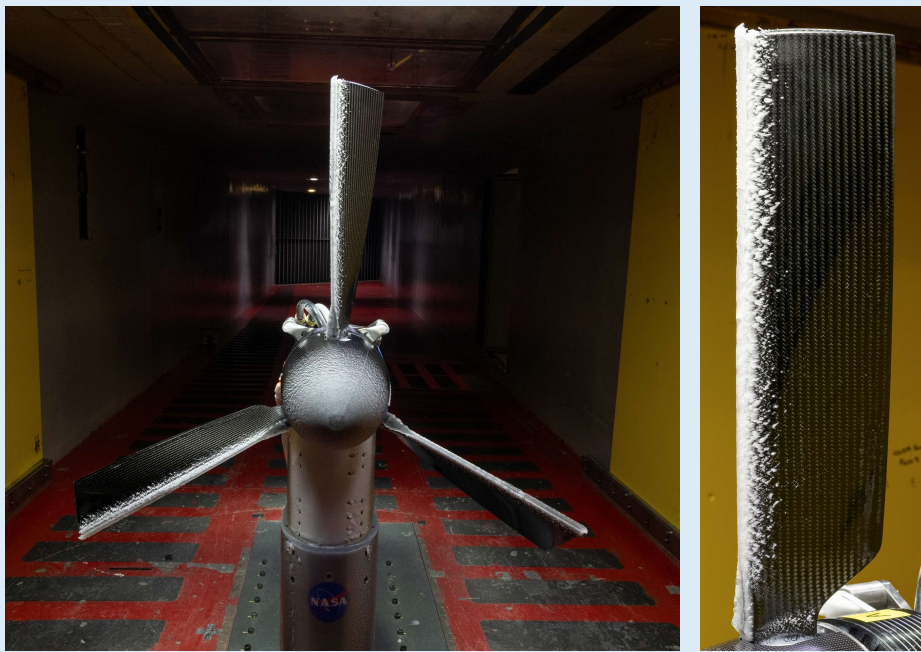
RTA CWT



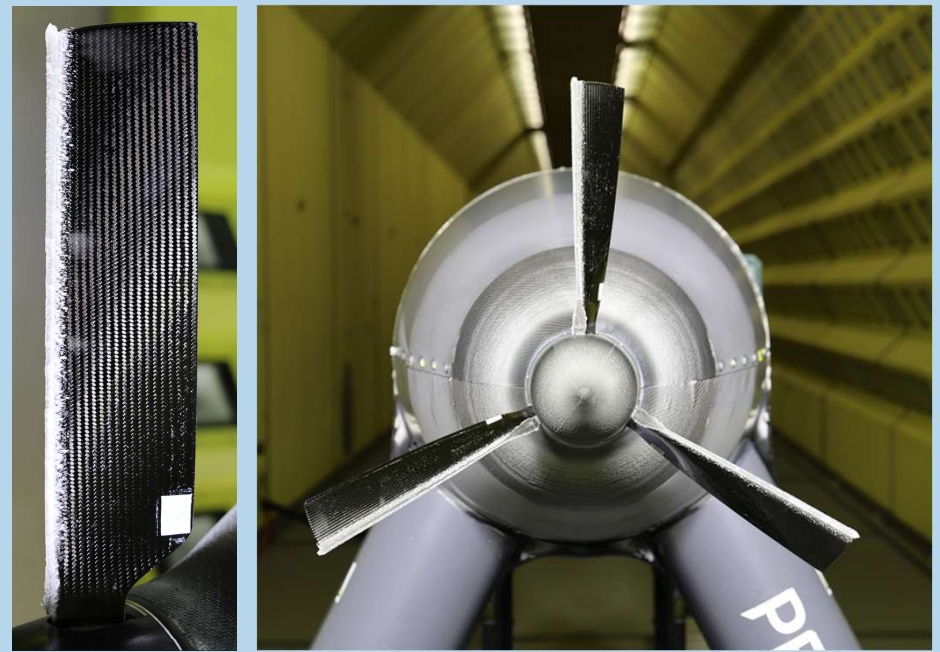


NASA / RTA Propeller Icing Scaling Collaboration

NASA IRT



RTA CWT



Photos from the 1-meter Diameter Propeller Test at NASA IRT (Feb. 2026) and RTA CWT (Sept. 2026)



NASA / RTA Propeller Icing Scaling Collaboration

Upcoming Publications:

2027 SAE International Icing Conference - Montreal, Canada

- Preliminary results from the 21" NACA 0012 Interfacility Comparison (AeroTex / RTA / NASA)
- Preliminary results from the 1-meter propeller scaling evaluations at IRT (NASA)

POC: Paul von Hardenberg (paul.h.vonhardenberg@nasa.gov)

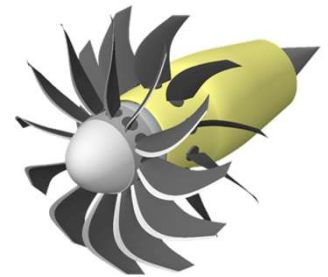


FanICE - Background

Motivation: More efficient turbine engines

Barrier: Certification of new or novel engine designs is risky due to lack of confidence in engineering tools (facilities, codes). **SCL** & IC

FanICE Objective: Design and build a rotating rig capability simulating a subscale engine fan; gather experimental data for validation.



Open Rotor

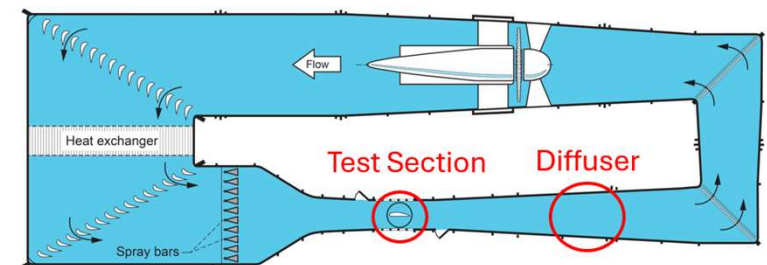
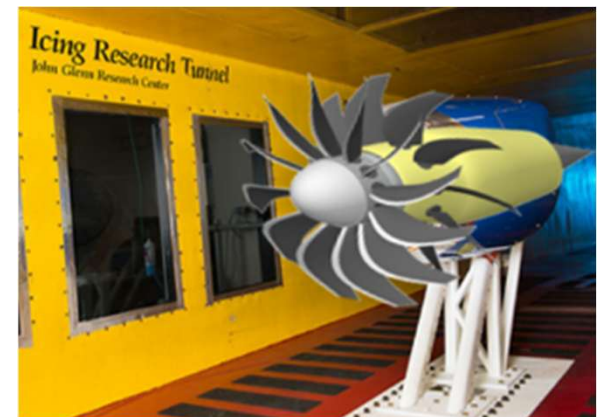


High-Bypass
Geared Turbo Fan



FanICE – Test Concept

- Open rotor fan
 - 10,000 RPM
 - ~24" fan diameter
- Driven by 1-MW electric motor
 - ~2000 lbf thrust
- Build capability in the NASA Icing Research Tunnel (IRT)
 - TBD: build in IRT test section or downstream in diffuser
- Stepwise approach building 0.5 MW to 1.0 MW
- **Current Effort:** Developing technical, facility, and safety requirements, advancing the test concept.





SLD Flight Campaign – Feasibility Study

FAA approached NASA regarding a potential flight campaign in SLD

- Seeking flight-based data to benchmark physical models
 - Experimental Facilities
 - Computational Tools

Step 1: Feasibility study (1-year duration) to determine

- Requirements
- ROM cost – capability range
- Schedule

Step 2: Deliver findings to FAA



SLD Instrumentation Testing – PSD

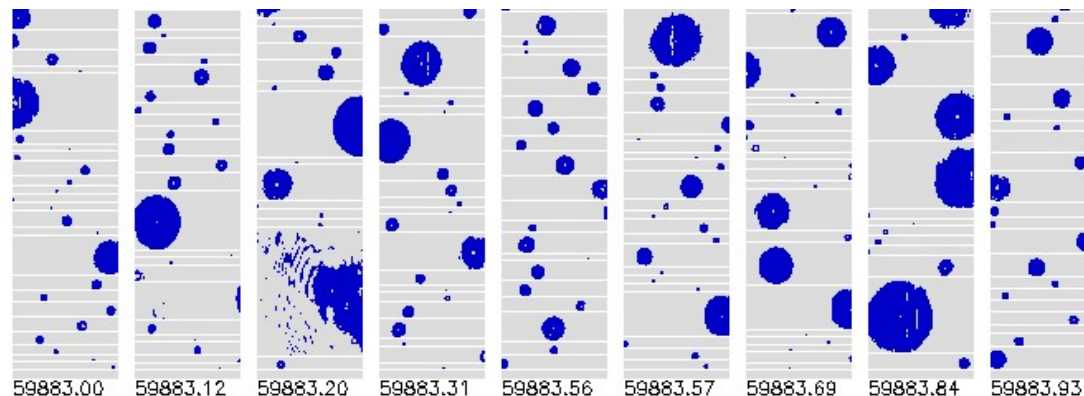
Goal

- Explore newer drop sizing probes from SEA: 1D2Ds
- Simulate IRT calibration test

Instrumentation

- Acquire 1D2D data in most restrictive “Mode 3”
- Compare as-is “raw” DAS output to SODA 2D image processed

Probe	Size Range
CDP	2 – 50 um
1D2D-X	15 – 960 um
1D2D-Y	50 – 3200 um



2D image data as viewed by SODA



SLD Instrumentation Testing – LWC

What: IRT Test with Iso-Kinetic Probe (IKP) and Multi-Element (ME) Probe

Why: Goal to reduce the uncertainty in calculated efficiency (collision, retention and evaporation) of the hot-wire probes across a range of LWCs and MVDs.



Related Publications

- Chen, R.-C., "A Comprehensive Review of Hot-Wire Probes for Water Content Measurements: Theory and Methods," Journal of Atmospheric and Oceanic Technology, in press, 2026.
- Chen, R.-C., "Experimental isolation and Sommerfeld scaling framework for droplet mass retention on heated cylinders in supercooled large droplet flows," Flow Measurement and Instrumentation, 103419, 2026, <https://doi.org/10.1016/j.flowmeasinst.2026.103419>
- Chen, R.-C., "Droplet Splashing on Thin Hot Wires for Liquid Water Cloud Measurements," PhD thesis, Case Western Reserve University, 2026, http://rave.ohiolink.edu/etdc/view?acc_num=case1778079839349027
- *Planned:* Chen, R.-C., et al, "Repeatability, Nozzle Dependence, and Wire Temperature Sensitivity of Hot-Wire Water Content Measurements in Supercooled Large Droplet Icing Clouds", submitted to the 2027 SAE International Icing Conference.

Water Drop Impingement Measurement

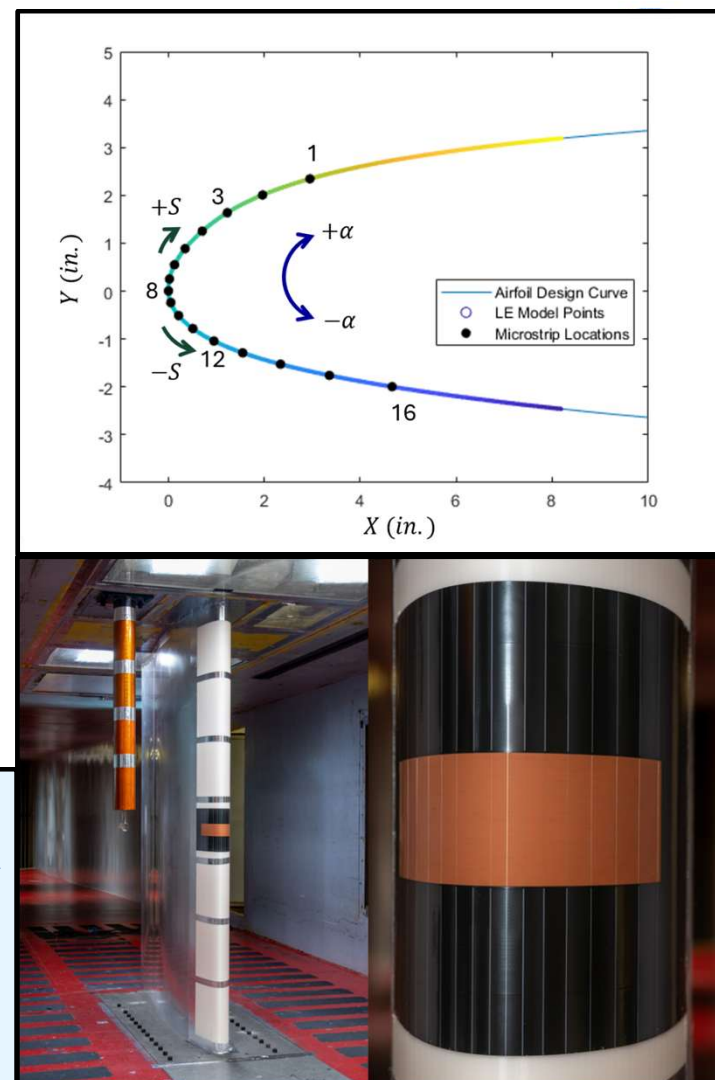
NASA has funded Baylor University via an NRA to develop and refine a capability to measure local water collection.

Baylor has developed a microwave-based measurement capability and recently tested this technology in the Icing Research Tunnel (Aug. 2026).

The results of this effort will be presented and published at the 2027 SAE International Conference on Icing of Aircraft, Engines, and Structures under the title *“Implementation of a Microwave Collection Efficiency Measurement System in the NASA Icing Research Tunnel”*

This work also received a funded extension to double the amount of measurement locations, as well as evaluate the ability for this technique to be applied to more complex configurations, such as swept wings.

Schematic of waveguide measurement locations (top) and images of the instrumentation integrated into the HAARP-II model (bottom).





Future Publications / Presentations

- Excited to present these efforts and much more at the
2027 SAE International Icing Conference
June 21-25, 2027
Montreal, QB, CANADA



Presentation Summary

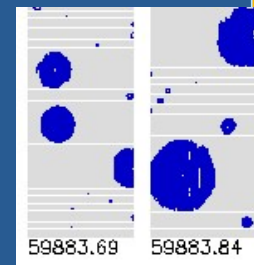
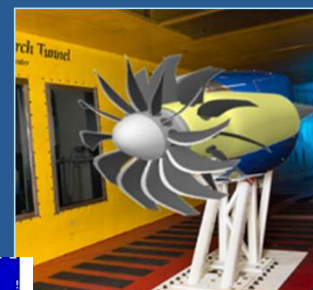
NASA:

- Maintains world-class icing facilities
- Develops tools and methods for icing simulation
- Provided update on some ongoing research
- Continually seeking collaboration opportunities



Icing research in this briefing:

- Facility Updates
- NASA/RTA Prop Icing Scaling
- FanICE Update
- SLD Flight Feasibility
- SLD Instrumentation Tests
- Impingement Studies





Thank You!

