Progress of Undergraduate Student-Led Tornado Research Initiative | TILTTING

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What is TILTTING?

Project TILTTING (Thermodynamic Investigation into LCL Thresholds during Tornadogenesis and its Influence in the Northeast and Great Plains) is an undergraduate student-led research project developed in 2021 by Millersville University student meteorologists Ryan Argenti (Class of 2024) and Shane Martrich (Class of 2023) after the remnants of Hurricane Ida which spawned an EF-3 tornado in Mullica Hill, New Jersey.

Creation of TILTTING

- Upon seeing the devastation, the students created a tornado research project to help improve warning lead times, enhance tornado forecasting techniques, and save lives.
- Mentored by Drs. Richard Clark, Sepi Yalda, Greg Blumberg, and Kyle Elliott (M.S.), Ryan Argenti and Shane Martrich drafted the proposal, budget and project layout and assembled a team of sixteen additional student researchers.



2022 – 2023 Team Photo



Photoshop Edit (2024)



2023 – 2024 Team Photo

TILTTING Today

- This project is advised by Greg Blumberg Ph.D. and Kyle Elliott, M.S., and led by three student committee members with two co-lead's who assembled a new team of eighteen additional students.
- The team of students actively engage in annual fundraising efforts to secure necessary equipment, enabling them to conduct Intensive Observation Periods (IOP's) both in the Northeast and the Great Plains.
- The initiative has progressed in data collection, analysis, and computational modeling, focusing on tornadogenesis, structure, and path prediction in localized regions.
- Our current and future preparations include the development of new instrumentation, such as ongoing enhancements to the TILTTING-23 probe, training for Unmanned Aircraft Systems (UAS) operations, Windsond program training sessions, and conducting situational training sessions.



TILTTING in the Plains

On May 5, 2024, eight students a part of the team, along with our project advisor Dr. Greg Blumberg, departed from Millersville University to drive to the Great Plains for a two-week research expedition. This successfully led to four Intensive Observational Periods (IOP's).


May 6, 2024, High Risk Day in Oklahoma




Team Picture near Indianapolis


Students running through data



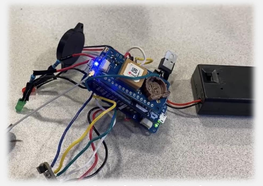

May 15, 2024, Hail Core in Oklahoma


May 19, 2024, Team Picture in Front of Supercell

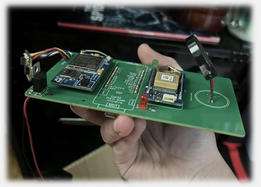

May 19, 2024, Custer City Tornado

Lagrangian Drift Sensor

- The Lagrangian Drift Sensor (L.D.S.), or the TILTTING-23 Probe, is an instrument that was designed and built by undergraduate students.
- The instrument is lightweight and durable suite of sensors designed to be carried into a thunderstorm at tornadogenesis on an expendable drone.
- The L.D.S. went through a series of redesigns to improve its durability and reliability.


TILTTING Probe First Version


TILTTING Probe Second Version


TILTTING Probe Current Version

Our Next Steps

Impacts of the initiative aim to further the scientific understanding of storm environments, interdisciplinary collaboration, strengthen ties between academia and federal connections, and inspire the next generation of aspiring meteorologists. Future phases of the project will continue refining these approaches, with a goal of supporting efforts in risk reduction, disaster preparedness, and resilience to severe weather events, ultimately helping to save lives and property.

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