

What is it?

ICECHIP, or the In-Situ Collaborative Experiment for the Collection of Hail in the Plains, was funded by the National Science Foundation as the first comprehensive hail-focused field campaign in the U.S. in over 40 years.

When is it happening?

The field campaign will take place over six weeks in the summer of 2025. The team will deploy cutting-edge technologies such as mobile radars, unpiloted aerial systems, laser scanning devices, and high-resolution cameras to gather critical data on hailstorms across the U.S. Front Range and Central Plains. These field observations will be used to improve hail forecasting models and radar-based detection, helping to mitigate the substantial economic and societal impacts of hailstorms.



Why is it important?

Hailstorms represent a growing challenge for industries like aviation, agriculture, renewable energy, and in particular, the insurance industry, where hail causes 60-80% of insured losses annually. The comprehensive dataset collected during ICECHIP will offer a long-awaited advancement in hail science, creating the foundation for improved risk mitigation strategies across sectors.

Training the next generation of scientists

In addition to advancing the scientific understanding of hail, ICECHIP will also focus on education and collaboration. The campaign will involve 32 undergraduate and 20 graduate students from 10 U.S. universities, providing them with hands-on training in field research. Researchers from Canada, Australia, Switzerland, and Germany will be joining the effort along with the U.S.-based Insurance Institute for Business and Home Safety.

How can we get involved?

- Submit hail reports to your local National Weather Service office! If sending a picture of the hailstone, hold it next to a reference object (e.g., ruler), NOT your hand! Hands are all different sizes.
- Become a CoCoRaHS (Community Collaborative Rain, Hail, and Snow) citizen science observer! <https://www.cocorahs.org/application.aspx>.

ICECHIP
U.S. NATIONAL SCIENCE FOUNDATION

Atmospheric and Environmental Research

- Collect hailstones and estimate their in-storm trajectories by analyzing their layers.
- Understand how hail melt can be observed via radar.
- Use custom-designed hail trajectory models to understand how hail is produced.

Australian Bureau of Meteorology

- Deploy custom-designed HailSondes that estimate a hailstone's path in the storm and observe conditions along the way
- Use drones to estimate the size distribution of hail at the ground

Central Michigan University

- Collect, analyze, and synthesize hailstone observations throughout the hail swath.
- Understand how hailstone properties like size, density, and concentration change in a storm.
- Observe how air near the surface during and after the storm passage can affect strength of impact.

Colorado State University

- Encourage new and existing observers with the CoCoRaHS project to submit hail reports, both via picture and through use of hail pads.

Insurance Institute for Business and Home Safety

- Obtain measurements of hail impact energy (how hard hail hits a surface) through the hail swath
- Use new ICECHIP observations of hail properties to improve knowledge of how hail damages roofs and other structures.

Jackson State University

- Undergraduate students will work with mentors across other institutions to collect and analyze hailstone and radar measurements.

NSF National Center for Atmospheric Research

- Use laboratory studies to determine how fast hailstones fall, and if that changes depending on their shape, how rough they are, and other properties. Hailstones collected from ICECHIP will be used in the laboratory studies.

National Severe Storms Laboratory

- Develop an improved microphysical parameterization that better accounts for melting hail that sheds water
- Using ICECHIP radar observations, calculate wind and moisture fields to drive hail trajectory models

Northern Hail Project, Western Univ., Canada

- Design and deploy the SuMHOs, Super Mobile Hail Observatories, to measure hailstone fall speed and collect hailstones in a cooler after falling.

Northern Illinois University

- Explore how important different types of observations are to forecasting if hail will happen.
- Add new understanding of hail uncertainties to a forecast model to see if it helps hail prediction.

Pennsylvania State University

- How do changes in the environment around a storm affect hail production?
- Which observation types are most important to successfully forecasting a hailstorm?
- What radar characteristics can be observed prior to/ during increased hailfall production?

Purdue University

- Develop an improved microphysical parameterization that better accounts for melting hail that sheds water.
- Understand how hail melt and shedding can change in different storm types and environments.

University of Alabama Huntsville

- Operate 4 mobile radars during ICECHIP to observe both wind fields and precipitation in the storms.

University of Bern, Switzerland

- Graduate students will learn about detection of hail in the U.S., and share expertise on hail detection in Europe.

University of Colorado Boulder

- Operate a UAS during ICECHIP to observe the extent of the hail swath over storm duration.
- Explore how we can know if a hailstorm will produce a lot of small hail, instead of fewer but larger hailstones.

University of North Dakota

- Design and deploy a custom hail video system that records hail as it falls to see shape and orientation.

University of Oklahoma

- Develop a new radar-based hail sizing algorithm.
- Retrieve 3D wind motions from radar data observations, to drive hail trajectory models.

University of Texas San Antonio

- Undergraduate students will collect hailstones in the field and analyze them by layer.

