

WHY STUDY ICE CORES

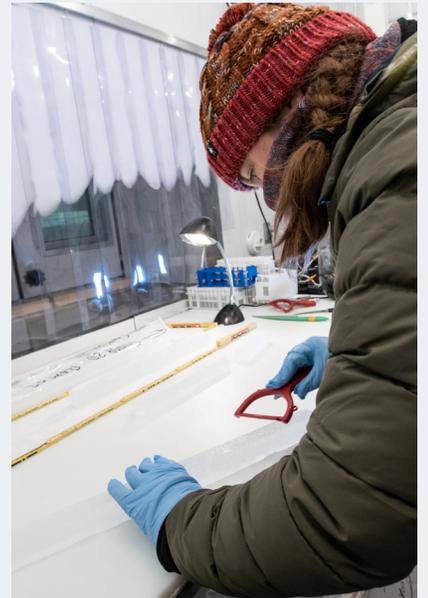
Glaciers and ice sheets contain ice which has remained frozen for millennia. By drilling into the ice and analyzing the chemistry of the frozen water and trapped air bubbles, we can determine the past changes in the environment, ice sheet size, sea level, atmospheric composition, and how humans have impacted the environment and the environment has impacted humans.

HOW DO WE ANALYZE ICE CORES

The DRI Ice Core Laboratory is arguably the premier state-of-the-art facility in the world for ice core analysis; we specialize in the development and application of leading-edge technologies for the analysis of polar and alpine ice cores. Our facilities include a cold-room, class 100 trace chemistry clean room, and wet chemistry laboratories. With the DRI continuous flow analysis (CFA) system, ice cores are analyzed by continuous melting on a custom-built heated plate. Using a series of high precision pumps, the melt water is then transferred to a suite of instruments allowing for high-resolution measurements in real time. The Ice Core Laboratory hosts a suite of sophisticated instruments in its Ultratrace Chemistry Laboratory, including two Thermo-Finnigan Element2 high-resolution mass spectrometers allowing for the measurement of elements to concentrations as low as a few parts per quadrillion. The Ice Core Laboratory and its staff collaboratively analyze ice cores provided by researchers from around the world, support research and training of undergraduate and graduate students, and routinely hosts international students and scientists. Results generated by the DRI Ice Core Laboratory have underpinned findings published in more than 150 peer-reviewed journal articles in the past 20 years and been featured in popular media outlets such as *The New York Times*, *Scientific American*, and *The Economist*.

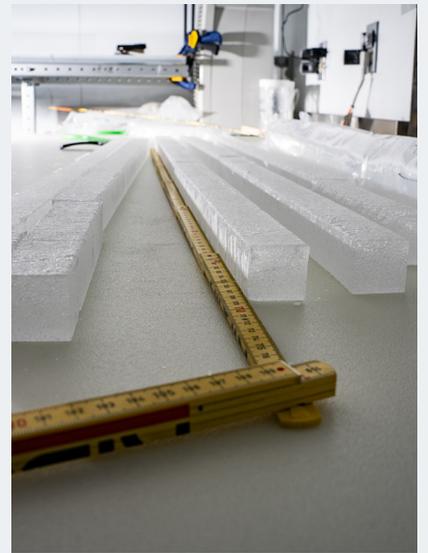


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dri.edu/labs/trace-chemistry-laboratory



CLOCKWISE:

Assistant Research Professor Nathan Chellman measures electrical properties of an ice core at the National Science Foundation's (NSF) Ice Core Facility. Post-doc Sophia Wensman prepares an ice core for analysis at DRI's Ice Core Laboratory. Ice samples from Greenland prepared for analysis. Research Professor Joe McConnell examining archived ice at the NSF Ice Core Facility.



RESEARCH HIGHLIGHTS

We conduct research for a broad range of applied projects worldwide including:

- Human impacts on remote regions such as heavy metal pollution of the Antarctic since the 13th century, and pollution of the Northern Hemisphere from mining, smelting, and industrialization since the Roman civilization. We study pollutants including soot, heavy metals, acid rain, and greenhouse gases.
- Impacts of volcanism and other climate variables on human societies from the Bronze Age to present (last 3,000 years) in collaboration with historians and climate modelers.
- Linkages between large scale atmospheric circulation, hydroclimate, and wildfires such as during the Holocene (last 14,000 years) in collaborations with atmospheric modelers.
- Past drivers and changes of desert dust in the atmosphere and impacts on Earth's energy balance, ocean fertilization, and carbon cycle.
- Effect of soot, desert dust, and other impurities on aging and melting of seasonal snow packs in the western United States and impacts on water resources.



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We are Nevada's non-profit research institute, founded in 1959 to empower experts to focus on science that matters. We work with communities across the state — and the world — to address their most pressing scientific questions. We're proud that our scientists continuously produce solutions that better human and environmental health. At DRI, science isn't merely academic — it's the key to future-proofing our communities and building a better world. For more information, please visit www.dri.edu.