



The Water and Environmental Research Center (WERC) has two major objectives: to foster **graduate education** and to perform **quality research** that benefits northern people and the international circumpolar research community. Several factors make research challenging at these high latitudes: limited data collection sites, short duration of meteorological and hydrological data, extreme climate, remoteness of research sites, and a variable and changing climate. Following is a brief description of some ongoing research at WERC.

⇒ As part of the **Permafrost Health Program**, our researchers have installed permafrost temperature monitoring systems at several public schools across Alaska. A small borehole (approximately 2 inches in diameter) is drilled in the soil near a school site. The borehole is then lined with plastic pipe and thermistor temperature sensors are installed at various depths. A small battery-operated data logger housed in a small enclosure at the surface collects regular data from the sensors. Students in science classes at each site collect the data and share it with our researchers and other participating schools. Our researchers visit each site on a regular basis, to monitor the equipment and to meet with the science classes, raising awareness about climate issues and scientific research. In the next year, this project will extend to several international sites, as well as new sites in Alaska. This project is jointly funded by the University of Alaska EPSCoR program, NASA IPY and NSF Thermal State of Permafrost program. To learn more about this project, visit <http://www.uaf.edu/permafrost/>.

⇒ Scientists at WERC's [Alaska Stable Isotope Facility](#) are working on **Applying Innovative Stable Isotope ratio Mapping Analysis of Water and Illegal Drugs to gain Intelligence on Trafficking Patterns to and from the most Remote Regions of North America**, a Department of Defense funded project to develop a way to determine in what region of the world a given sample of marijuana was grown, and whether it was grown indoors or out. The key lies at the atomic level, among the stable isotopes of four elements: carbon, oxygen, nitrogen and hydrogen. Isotopes are atoms of elements that have the same number of protons and electrons but different numbers of neutrons. A stable isotope is one that doesn't decay over time. Those additional or missing neutrons in an isotope slightly alter the mass of the atom, allowing scientists to use a stable isotope ratio mass spectrometer to separate the light isotopes from the heavy ones and form a ratio for each sample. That ratio can tell scientists about the sample and its origins. Various agencies, from the UAF Police Department to the Federal Drug Enforcement Administration and the Alaska Bureau of Alcohol and Drug Enforcement have started providing this project with samples. Our researchers hope that, with enough samples, we can create a marijuana isotope map for Alaska and beyond, which could eventually allow scientists to match unknown samples with known growing locations.

⇒ The Alaska Department of Transportation and Public Facilities (AKDOT&PF) is collecting information for a transportation route starting from the Dalton Highway (in the vicinity of the White Hills) and heading west toward the Colville River. To make this infrastructure project successful, they need detailed information concerning how water flows throughout this landscape. **Surface-Water Data Collection for the Alaska Department of Transportation and Public Facilities North Slope Foothills Project** will collect data throughout this important and sensitive watershed.

⇒ The **Intersection between Climate Change, Water Resources, and Humans in the Arctic** project is geared toward understanding the vital role freshwater plays in the lives of humans in the Arctic, how this role has changed in the recent past, and how it is likely to change in the future. Researchers conduct hydrological, cultural, and engineering studies throughout the Seward Peninsula.

Further information about our projects can be found at: <http://www.uaf.edu/water/>