ORION at the University of Alaska Fairbanks

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http://www.ims.uaf.edu/ORION

Introduction

Arctic areas of Alaska are especially vulnerable to nuclear accidents. Atmospheric fallout and the resultant bioconcentration in the lichen-caribou-human food chain are of great concern for those living a subsistence lifestyle. Observing Radiation In Our North (ORION) was initiated to provide an opportunity for Alaska Native undergraduate college students to participate in environmental monitoring, research, and communication of the results through the American Indian Science and Engineering Society (AISES) at the University of Alaska Fairbanks.

International Nuclear Safety Program

The focus of the International Nuclear Safety Program (INSP) at PNNL is on improving safety at international nuclear power facilities and reducing or eliminating nuclear materials produced at those facilities. Students will work with PNNL to provide information on Russian nuclear power plants and work being done under the INSP in Russia.

Why Monitor Radiation in Alaska?

Long-term meteorological and radiation observations will provide a baseline against which any major changes in atmospheric conditions and radioactivity can be detected. The former Soviet Union has many old and outdated nuclear facilities still in operation that poses potential threats to atmospheric radiation, especially, the Bilibino nuclear plant is the closest plant to Alaska. ORION stations gather real time data and would detect any increase in background radiation levels should an accident occur.

Wily Splain helps install an ORION station in Barrow.

ORION

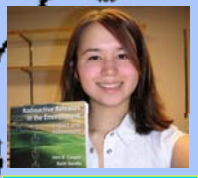
ORION is a network of meteorological and radiological monitoring stations, central data storage, and processing systems. Data products are wind direction and speed, ambient air temperature, atmospheric pressure, humidity, and ionizing gamma radiation.

Access to the data can be gained via the Internet or through an onsite readout located on the Data Collection Platform. ORION stations in Alaska are located in Fairbanks, Seward, Nome, Point Hope, Barrow, and Kotzebue. The URL for ORION is http://orion.lanl.gov.

Project Chariot

ORION interns studied Project Chariot in order to understand part of Alaska's history of nuclear testing. In 1958, the Atomic Energy Commission (AEC) unveiled the Project Chariot idea to create a harbor in Ogotoruk Creek, near Point Hope, Alaska. This harbor would be created with nuclear blasts as a "peaceful use of the atom". Resistance from the science community and North Slope residents prevented this project from ever getting started.

Photo of Ogotoruk Creek from The Firecracker Boys.



Margaret Cysewski with Radioactivity Releases in the Environment.

Tutorials

With faculty input, ORION interns are producing a series of tutorials on environmental radioactivity. These tutorials are based on Radioactivity Releases in the Environment: Impact and Assessment, include a history of radioactivity, basic concepts and definitions of radiation, nuclear power and weaponry, health and waste issues and methods of measurements. The power point tutorials are designed for public presentation.

Wadeable Streams

ORION helps with the EMAP Wadeable Streams project for the summers of 2004 and 2005. With 200 randomly chosen streams through out the interior of Alaska, a team from University of Alaska Anchorage hiked, drove, and rode helicopter into each site. To assess the condition and health of each stream, the team collected samples of water, bugs in the water, and periphyton (rock scum), along with observing the physical characteristics of the stream and its surroundings. In addition to visiting a few sites, interns helped with the paperwork, shipping, and putting together topographical maps and aerial photos of each site. ORION specifically took soft sediment samples from the streams for future study of its radiation content.

A side study was done in the burned area of Cripple Creek, about 30 miles up the Steese Highway. A dozen samples were taken in this area to observe how fire affects the condition of streams. Samples will be taken each year to observe the developing effects.

Photo of the burned area of Cripple Creek

AISES

The American Indian Science & Engineering Society is a private, non-profit organization which nurtures building of community by bridging science and technology with traditional Native values. Through its educational programs, AISES provides opportunities for Alaska Natives and American Indians to pursue studies in science, engineering, technology and other academic areas. These graduates will be able to assume roles in which Native leaders manage and develop their lands and resources. The URL for the AISES website is http://www.aises.org. The URL for the UAF chapter of AISES is http://www.uaf.edu/aises. The ORION program is an official AISES project.

AISES students gather outside the UAF Museum next to ORION tower after installation.

Technical Presentations

Students throughout the school year give technical presentations. These presentations not only help students to network, but also give them an opportunity to research and present projects to the scientific community. Technical presentations include posters, slideshows, and pamphlets.

Student Internships

The ORION program supported through the Battelle-Pacific Northwest National Laboratory (PNNL) helped many AISES students to develop in science and engineering skills. Students have held intern positions at UAF, through the Institute of Marine Science (IMS) and at the Los Alamos National Laboratory (LANL) in Los Alamos, New Mexico. Plans are underway to develop new internship opportunities at PNNL.

Photo taken April 2004, from left to right: Doug Dasher, Sathy Naidu, David Norton, Jenny Nakai, John Kelley, and Richard David.

Website

The website is run by the ORION interns and located at: http://www.ims.uaf.edu/NEWNET/.

Loda Griffeth collects lichen and soil samples along the Seward Highway.

Lichen Radionuclide Baseline Research

This past project in gamma radiation monitoring determined current concentrations of various radionuclides in lichens, a food source for caribou. The data was compared to previous published data to follow any changes in radionuclide levels in lichens and to determine caribou bioaccumulation.

References:

Cooper, John R., Keith Randle, and Ranjeet S. Sokhi. Radioactive Releases in the Environment: Impact and Assessment. England: John Wiley & Sons, LTD, 2003.

Griffeth, L., et al, Radiation in the Environment, 2001.

Griffeth, L., Ionizing Radiation Source Analysis, 2000.

Levno-Chythlook, F., et al, Status of Transboundary Radiation Monitoring in Alaska, 1999.

O'Neill, Dan. The Firecracker Boys. New York City: St. Martin's Press, 1994.

http://www.aises.org

http://www.ims.uaf.edu/NEWNET

Participants:

- School of Fisheries and Ocean Sciences, UAF
  Institute of Marine Science
- Rural Student Services, UAF
- Department of Electrical Engineering, UAF
- Alaska Department of Environmental Conservation
- Los Alamos National Laboratory

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