



Oil Detection In and Under Ice

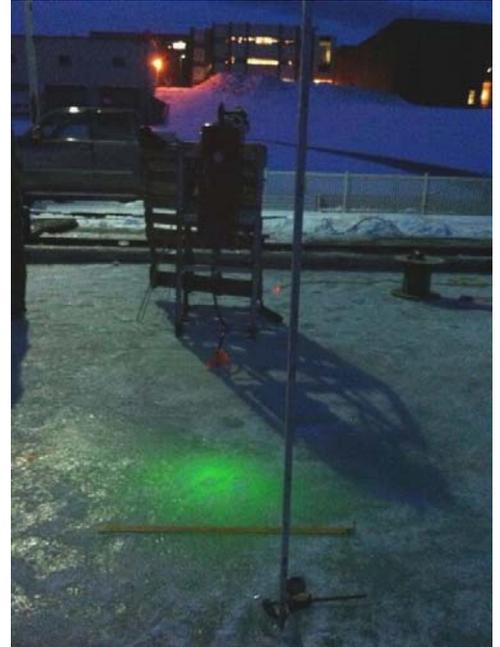
Facilitating leak detection and improving spill response capabilities

There is a critical need to develop a practical remote sensing program to detect and map oil in and under ice to facilitate leak detection and improve spill response capabilities for oil and gas operations in Arctic regions. Over the past 20 years, considerable effort has been spent on the research and development of various methods. To date, none of these technologies have resulted in an operational system.

The only proven method of searching for and detecting the presence of oil from an accidental subsurface spill (e.g., slow leakage from an ice-covered marine pipeline) involves drilling holes at frequent intervals or in a closely spaced grid pattern to expose oil trapped in or under the ice. This process is extremely labor-intensive and is subject to considerable detection error. Ideally, a system would operate from surface and airborne platforms to determine the presence of oil and have the capability to map contamination boundaries over large areas.

Description

Scientists working in the Ice Engineering Facility at ERDC's Cold Regions Research and Engineering Laboratory have been conducting a study to determine whether off-the-shelf technologies and sensors can detect oil under ice in a controlled meso-scale environment. This study is a prelude to further development and field testing of new and innovative equipment and technologies for the remote sensing and surveillance of oil in and under ice. Two independent technologies, radar and ethane sensing, which have potential for further development and large-scale field testing, were found to be effective at detecting oil trapped in and under ice. Hardware evaluation and field testing over a variety of sea ice conditions were conducted in the unique facilities located at ERDC-CRREL, which allow experiments to be conducted under simulated Arctic conditions.



CRREL collaborates with Woods Hole Oceanographic Institution and Scott Polar Research Institute to detect oil under sea ice

Potential Users and Expected Benefits

The U.S. and other nations, government and industry, are environmentally and financially motivated to develop a reliable method for the remote detection of oil in and under ice. Emphasis is on the development of economical and safe platform for application in the Arctic region. Towards the development of such a platform, ERDC-CRREL is conducting and supporting research focused on two key areas: (1) increasing confidence levels in system reliability by testing in a simulated Arctic sea ice environment with variable sea ice thickness and roughness; and (2) developing the necessary software to automatically interpret radar response, given known parameters (e.g., ice properties and temperatures) and oil-in-ice configurations associated with different Arctic spill scenarios. The ultimate goal of this on-going research & development effort is to have complementary systems (or a single system) capable of providing rapid initial determination of oil presence with subsequent detailed site mapping over a broad area.

ERDC Point of Contact

Questions about detecting oil in and under ice?

Visit: http://polar.erdcdren.mil/Polar_Oil_Spill_Research.html

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