Project Title: Detection of Oil on and Under Ice – Phase III Evaluation of Higher Powered Airborne Radar Systems

Task 2: Summary of search results on airborne radar systems with an operating frequency range of 500MHz to 1GHz

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There are many commercial airborne radar systems, however most are designed either for range finding (altimetry), defense applications such as target identification, or meteorological applications. We have found no commercial airborne radar system designed specifically for subsurface imaging. This is not to say that such studies have not been done, in fact there are many examples of airborne radar deployment for subsurface imaging. However, these studies have been conducted using radar systems designed for ground deployment similar to the systems we have deployed in both ground based, and airborne modes in earlier phases of this study.

Although there are no commercially available solutions, there are two research groups that have been developing airborne radar systems over the last 15-20 years, primarily for glacial ice-sheet imaging. Their programs are summarized below.

- *University of Texas* - Most of the research for airborne radar systems has been focused on ice mapping in Antarctica where a radar system is installed in a Twin Otter plane and flown over the ice. The radar system has a frequency range of 52.6-67.5 MHz. More information can be found at http://www.ig.utexas.edu/research/projects/soar

- *The Center for Remote Sensing of Ice Sheets (CReSIS)* at the University of Kansas – The Radar Systems and Remote Sensing Laboratory is developing airborne radar to map the internal layers in shallow and deep ice to determine the presence/absence of water between ice and bedrock. The ice sheet imaging radar operates at 150 MHz. More information can be found at https://www.cresis.ku.edu/

    - CReSIS has built a prototype airborne radar system for sea ice profiling that operates in the 400 MHz range. This system is undergoing continued testing and development but could be a suitable solution for the oil under ice problem.

Clearly the CReSIS team has the most relevant system for our application. We are currently discussing potential for future collaboration with Dr. Prasad Gogineni who is heading the sea ice radar development group. This collaboration may include participation in the Joint Industry Arctic Oil Spill Research Program and side by side comparison of the CReSIS system with our commercial GPR system deployed in airborne mode.