# NOTICE OF THESIS PROPOSAL PRESENTATION

## Geodesy and Geomatics Engineering

Doctor of Philosophy

# Anand Devappa Hiroji

**Friday, June 5, 2015 @ 10:00 am**
**Head Hall – Room E-11**

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| Supervisor: | John Hughes Clarke, Geodesy and Geomatics Eng. |
| Supervisory Committee: | Yun Zhang, Geodesy and Geomatics Eng. |
| | Karl Butler, Department of Earth Sciences |
| | Jonathan Beaudoin, QPS |
| Chair: | To Be Announced |

## Improving the Reliability of Seabed Backscatter Data: A Potential Tool for Monitoring Sediment Change


**ABSTRACT**

The use of multibeam acoustic backscatter data for bottom characterization is currently being attempted by many researchers to aid geological, biological, and engineering projects. Ideally the absolute bottom backscatter strength would be measured, but in reality the reported data are only approximate. In real-time, manufacturer-applied gain only approximately reduces geometric and radiometric effects. Subsequently existing post-processing algorithms undertake improved but still imperfect corrections to better account for residual artifacts due to geometric and radiometric effects. The geometric effects include changing insonified area across the swath, whereas the radiometric effects include the variation in the transmitted energy and the receiver sensitivity. Recent developments in motion stabilization, which are used to achieve higher and more equal sounding density, have added additional radiometric complications to the backscatter data. Before the backscatter data can be used for classification, either in the form of mosaic or in the form of backscatter strength angular response curves, these remaining residual artifacts in the data have to be properly minimized.

The remaining residual artifacts reflect the fact that existing empirical beam pattern corrections imperfectly account for geometry and radiometry and do not adequately distinguish between grazing, incident, and sonar relative angle. This research attempts to develop a new method of reducing the backscatter data by explicitly differentiating between seafloor angular response and radiometric artifacts. The new method will further differentiate between along- track and across-track radiometric beam patterns. As part of this research, a careful review and the implementation of subtle changes in the Ocean Mapping Group's existing backscatter data reduction algorithms will be undertaken. While limitations will always remain due to other unaccounted factors, once the beam pattern effect is minimized, angular response curves may be derived with increased accuracy. These angular response curves can be then used to estimate changes in the type of sediments over time. As a direct test of the efficiency of this new method, it can be applied to repeated surveys of a seafloor in Squamish that is believed to be slowly changing. This test will help to quantify the limit of backscatter strength angular response discrimination.


**Faculty Members and Graduate Students are invited to attend the presentation**