NOTICE OF
UNIVERSITY ORAL

GEODESY AND GEOMATICS ENGINEERING

Master of Science in Engineering

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Tuesday, July 17, 2012 @ 2:00 pm

Head Hall – Room E-11

Board of Examiners:
Supervisor: Dr. John Hughes Clarke, Geodesy and Geomatics Eng.
Examining Board: Dr. Yun Zhang, Geodesy and Geomatics Eng.
Dr. Jonathan Beaudoin, Hydrographic Center, UNH

Chair: Dr. Sue Nichols, Geodesy and Geomatics Eng.

Proper Environmental Reduction for Attenuation in Multi-sector Sonars

ABSTRACT

While an imperfect attenuation coefficient has no effect on bathymetry accuracy, it significantly reduces the value of the backscatter strength. As we move towards more precise calibration of backscatter strength to get additional information about the nature of the seafloor, such as bottom type or bottom micro roughness and their respective lateral and temporal homogeneity, the requirement for a precise attenuation coefficient is increasingly important. The need for better calibrated acoustic backscatter strength estimate is driven by operational needs in environmental monitoring, oil field development and defense applications, such as submarine and mine detection. A particular application used as an example is monitoring seasonal changes in backscatter on the floor of a fjord with active turbidity currents.

Most recently, multi-sector multibeam sonars have made the requirement for proper attenuation coefficients more pressing. These systems are capable of operating simultaneously on different frequencies, often use CW and FM chirp pulses and divide their transmit fan in multiple sectors and even in multiple swaths, with the purpose of allowing a sufficient sounding density alongtrack at reasonable vessel speeds, achieving longer range capability and thus reducing ship time surveying. However, as attenuation is a frequency, temperature, salinity and pressure dependent environmental control, the fidelity of the backscatter strength output from these new multi-sector systems potentially suffer by different wave absorption in their multiple sectors/swaths, if an incorrect attenuation is used.

This research reviews the role of attenuation and its proper application, and the sensitivity of attenuation variation. It then develops an extension to the UNB/OMG code to specifically correct any input multibeam data, accounting for the attenuation applied, and properly reapplies a new attenuation using a specific CTD and specific centre frequency.

Faculty Members and Graduate Students are invited to attend this presentation.