NOTICE OF UNIVERSITY ORAL

GEODESY AND GEOMATICS ENGINEERING

Master of Science in Engineering

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Head Hall – ADI Room (C-level)

Board of Examiners: **Co-Supervisors:** **Dr. David Wells, GGE**
Dr. Sue Nichols, GGE
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Tuning CUBE for Patagonian Waters

ABSTRACT

This thesis is focused on making the CUBE (Combined Uncertainty and Bathymetry Estimator) algorithm more suitable for Chilean bathymetric data acquired in the Patagonian area. The Chilean Hydrographic Office (SHOA) processes its multibeam data using the interactive editing with the software CARIS HIPS. To reduce the time consumed in this process and to avoid subjective decisions made by the operators, HIPS has semi-automated filters included. CUBE is one of them. Unfortunately, the default configuration of CUBE is not suitable to be used with data affected by steep slope and rough seafloor, which is characteristic of the Patagonian waters.

TPE (Total Propagated Error) values are necessary to run CUBE. For this research, they were obtained by replacing the parameters of an existing "Device Model" within HIPS with the proper sonar's information from the manuals and the manufacturer of ATLAS FANSWEEP 20 (200 kHz).

Using HIPS, two data set acquired in the Patagonian channels were computed with CUBE Default parameters and CUBE different configurations. Also the two BASE (Bathymetry with Associated Statistical Error) surfaces achieved at SHOA were loaded in two projects to be used for comparison purposes. The parameters related to the Assimilation of the contributing soundings to a node and the Intervention of this process, were modified in CUBE.

The methods used for BASE surface comparison were 2D and 3D visualization. Also sub-areas were queried in order to get numerical values from different surfaces. Their discrepancies were analyzed using histograms. The percentages of data rejected using CUBE filter were compared between the different solutions. Additionally, the CUBE multiple and single grid resolution were tested for cleaning purposes.

Single grid resolution was more effective for filtering purposes since multiple resolution cannot avoid noise-data "floating" in the upper layers. Noise-data corrupted the surface generation making the filtering process unviable. CUBE single resolution with parameters tuned shown a better estimation of the surface and increased the hypotheses strength of the nodes, especially in these areas affected by steep slopes and rough seafloor. Also the new configuration showed a much better bathymetric data cleaning. Thus the new configuration enhanced CUBE for use with Chilean bathymetric data.

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