NOTICE OF THESIS PROPOSAL PRESENTATION

Geodesy and Geomatics Engineering

Doctor of Philosophy

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Thursday, February 9, 2017 @ 2:30 pm
Head Hall – room E-11

Supervisor:	Yun Zhang, Geodesy and Geomatics Engineering
Supervisory Committee:	Dave Coleman, Geodesy and Geomatics Engineering
	Katy Haralampides, Civil Engineering
Chair:	Emmanuel Stefanakis, Geodesy and Geomatics Engineering

Surface Water Quality Assessment Using a Remote Sensing, GIS, and Mathematical Modelling Framework

ABSTRACT

The presence of various pollutants in water bodies leads to the deterioration of surface water quality. Conventional surface water quality assessment is performed using laboratory analysis; however, it is labour intensive, costly, and time consuming. In contrast, remote sensing has shown significant benefits over conventional techniques because of its spatial and temporal consistency. Thus, exploring the potential of using remotely sensed data for surface water quality assessment is important for improving the efficiency of surface water quality evaluation and water body treatment.

In order to properly assess surface water quality from satellite imagery, the relationship between satellite spectral data and the concentrations of surface water quality parameters (SWQPs) should be modelled. Because of the complexity of the relationship between optical and non-optical SWQPs, it is essential to extract the accurate water quality levels of water bodies. To improve the cost effectiveness of water body treatment, classification maps are needed to show the spatial distribution of the dominant SWQPs that impact water quality variation.

Therefore, my PhD research will focus on the development of new methods to: (1) estimate the concentrations of both optical and non-optical SWQPs from satellite data, (2) map the complex relationship between satellite spectral signatures and SWQPs, (3) delineate the overall water quality levels of water bodies, and (4) classify the major SWQPs that contribute to water quality variation.

To achieve the 1st objective, a remote sensing-based-stepwise regression approach is proposed to estimate concentrations of both optical and non-optical SWQPs.

To achieve the 2nd objective, a remote sensing framework based on the back-propagation neural network is proposed to model the complex relationship and map concentrations of different SWQPs with highly accurate results.

To achieve the 3rd objective, a combination of remote sensing spectral data and the Canadian water quality index is proposed to extract the overall patterns of water quality at water bodies.

To achieve the 4th objective, the integration of remote sensing reflectance data and principal component analysis is proposed to classify the major SWQPs, which negatively affect water quality.

Overall, it is anticipated to find out appropriate models to retrieve concentrations of SWQPs from satellite data with highly accurate results, and to demonstrate the feasibility of performing routine water quality assessment using satellite image data.

Faculty Members and Graduate Students are invited to attend the presentation