



NOTICE OF THESIS PROPOSAL PRESENTATION

**Geodesy and Geomatics Engineering
Doctor of Philosophy**

Simon Banville

**October 7, 2008
Head Hall – Room E-11 @ 11:00 am**

Supervisor: Dr. Richard Langley
Supervisory Committee: Dr. Marcelo Santos
Dr. Don Kim
Chair: Dr. Sue Nichols

**ACCURATE REAL-TIME POSITIONING OF A LOW EARTH ORBIT (LEO) SATELLITE
WITH SIMULTANEOUS ATMOSPHERIC SENSING CAPABILITIES**

ABSTRACT

The I-SWEAT (Ionospheric Space Weather Effects in the Auroral Thermosphere) project has recently been proposed to study the relations between the ionosphere and the thermosphere. The University of New Brunswick (UNB) is involved in the development of this mission by providing state-of-the-art concepts for accurate low Earth orbit (LEO) spacecraft positioning and total electron content (TEC) determination.

With the increasing need for real-time space-based applications, this research proposal suggests an approach aiming at improving the currently achievable real-time accuracy of 10-20 cm 3D RMS to better than 10 cm. A potential means to improve this level of accuracy would be to perform real-time kinematic (RTK) positioning between ground stations and the LEO satellites, while modelling all error sources independently at each station using the well-known precise point positioning (PPP) technique. The latter technique also allows obtaining unbiased slant TEC values for ionospheric study purposes. The use of time-differenced positioning (TDP) will also be used to propagate the LEO satellite position in time to increase the reliability of the solution and reduce the computational burden. Hence, the approach proposes to integrate PPP, RTK and TDP into a high-performance processing methodology capable of providing cm-level accuracies for real-time orbit and TEC determination on a LEO satellite.

**Faculty Members and Graduate Students are invited to attend the 20 minute
presentation**