Ph.D. Candidate

Michael Baier Sheng

Graduate Academic Unit

Geodesy & Geomatics Engineering

~~~~~~~~~~~~~~~~~~~~~~~~~~~~

July 25, 2019

9:30 a.m.

Forestry/Geology Bldg.
Room 202

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Examining Board:
Dr. Karl Butler (Earth Sciences)
Dr. Robert Kingdon (Geodesy & Geomatics Eng.)
Dr. Ian Church (Geodesy & Geomatics Eng.)
Dr. Marcelo Santos (Geodesy & Geomatics Eng.) Supervisor
Dr. Petr Vaníček (Geodesy & Geomatics Eng.) Supervisor

External Examiners:
Dr. Petr Holota
Senior Scientist, Research Institute of Geodesy, Topography & Cartography Prague East, Czech Republic

The Oral Examination will be chaired by:
Dr. Mary McKenna, Assistant Dean of Interdisciplinary Studies

BIography

Universities attended (with dates & degrees obtained):
2014 – present PhD candidate, University of New Brunswick
2013 – 2014 MScE candidate, University of New Brunswick (transferred into PhD program effective Sept. 1, 2014)
2009 – 2013 BScE (Dean’s List) Geodesy & Geomatics Eng., University of New Brunswick

Publications:

Several Conference Presentations
Improvements to Satellite Global Gravity Field Modelling

Abstract

Modelling the gravity field of the Earth is of the utmost importance for a wide variety of scientific disciplines. A global model allows for the unbiased investigation of long-wavelength properties of the gravity field. Satellite derived global models provide an additional benefit as they are uncorrelated with any potential errors contaminating regional terrestrial gravity information; this makes them ideal for use with terrestrial gravity data in order to formulate high-precision regional geoid models. This dissertation investigates several possible areas of improvement to both the formulation and evaluation of satellite-only global gravity models. The first major barrier is due to what is known to the geodetic community as the “polar-gap problem”; the lack of data collected over the poles due to the inclination angle of the orbiting satellites. The second is the rigorous evaluation of these models inside of the topographical masses (and most pertinent, on the surface of the geoid).

These problems are addressed in three articles. The first presents a mathematical tool that can be used in order to address the polar-gap problem by performing the global integration per partes. The second article presents a computational scheme that allows for the evaluation of various quantities relatable to global gravity models inside the topographical masses. Finally, the third article describes the formulation and validation of a 2D global topographical density model that is required for the rigorous evaluation as prescribed in the second article.