

NOTICE OF UNIVERSITY ORAL

GEODESY AND GEOMATICS ENGINEERING Master of Science in Engineering

Karen Cove

May 26, 2005 @ 1:30 pm ADI Room - Head Hall

Board of Examiners: Supervisor: Dr. Marcelo Santos, GGE

Examining Board: Dr. David Wells, GGE

Dr. Anna Jensen, Technical University

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Chair: Dr. Richard Langley, GGE

Improvements in GPS Tropospheric Delay Estimation with Numerical Weather Prediction

ABSTRACT

Long baseline, carrier-phase differential GPS positioning in a coastal environment poses unique challenges. It is well known that differential GPS positioning results degrade as baseline length increases due to several sources of error, including the error introduced by differential troposphere. The effect of the troposphere on GPS has been extensively discussed by numerous researchers, either by comparing the resolution of global prediction models or by assessing the tropospheric delay directly on GPS measurements and results.

The goal of this thesis is to examine methods for improving tropospheric delay estimation by using meteorological data. This includes the use of surface meteorological parameters in a global prediction model and Numerical Weather Prediction (NWP) model data in the estimation of the delay. For the tests presented in this thesis, the Saastamoinen global prediction model is used and NWP data are accessed from the Canadian Meteorological Centre's (CMC) regional model.

Results are presented in the measurement and position domains. In the measurement domain, tropospheric delays modelled from the NWP model and global prediction model are compared with those from the IGS final zenith tropospheric delay product. In the position domain, the estimated delays are applied to kinematic GPS data sets and are evaluated based on short/long baseline comparisons.

The test results show a significant improvement in the measurement domain, with the use of NWP model data in the estimation of zenith tropospheric delay. This improvement does not appear to have positive effect on the position results.

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