Vita

Candidate's name: Neline Labuschagne

Universities Attended:

University of Pretoria (2018)
Bachelors of Science
Honors in Physics

University of New Brunswick (2023)
Masters of Science
Physics

Presentations/Conferences/Publications:

Labuschagne N., Jayachandran P.T., An analysis of the effect of calculation interval length on scintillation parameters on high latitude scintillation, 2022 Division of Atmospheric and Space Physics (DASP) Workshop, February 2022

Labuschagne N, Jayachandran P.T., An analysis of the effect of calculation interval length on scintillation parameters on high latitude scintillation., URSI Atlantic Radio Science Meeting, Gran Canaria Spain, June 2022

A statistical analysis on the effect of calculation interval length and data acquisition rate on the determination of scintillation indices

UNIVERSITY OF NEW BRUNSWICK

THESIS DEFENCE AND EXAMINATION

in Partial Fulfillment

of the Requirement for the Degree of
Master of Science

by

Neline Labuschagne

in the Department of Physics

U.N.B., Fredericton, N.B.

Tuesday, April 18th, 2023
2:00 p.m.

Physics Building, Room P204

Examining Committee

Dr. P.T. Jayachandran	Supervisor
Dr. Zong-Chao Yan	Internal Examiner
Dr. Richard Langley	External Examiner
Dr. Abdelhaq Hamza	Chair of Oral Examination

Abstract

Scintillation in Global Navigation Satellite Systems (GNSS) signals is a useful tool in studying the ionosphere. Scintillation indices are a tool used to quantify scintillation and these indices are usually estimated over a time interval of 60 s. In this thesis, the influence of the calculation interval of scintillation indices in Global Position system (GPS) signals recorded at 100Hz by high-latitude stations is investigated. By comparing both individual cases and the statistics of multiple events, identified over a period of 16 months, we conclude that calculation intervals as small as 30s yield results that are very similar to those obtained with a 60s calculation interval. The acquisition rate of the signal recorded by the GNSS receiver is also investigated. Modern GNSS receivers can record scintillation indices at increasingly high rates, which one would expect to resolve higher frequency contributions to scintillation events. However, widely used models of scintillation do not suggest that high-frequency contributions from scintillation events would be particularly significant. These theories are discussed, and an analysis of scintillation indices calculated on artificially decimated signals, to emulate a lower receiver sampling rate, is performed. It is found that receiver sampling rates much lower than 100Hz fully captures the features of scintillation events.