

UNIVERSITI TEKNOLOGI MARA

**ACCURACY ASSESSMENT OF POSITIONING USING
SIGNAL BETWEEN GPS SATELLITE AND BEIDOU
SATELLITE THAT EFFECT ATLAS L-BAND
CORRECTION**

MUHAMMAD SYAFIQ BIN IZHAM

Thesis submitted in fulfilment
Of requirements for the Degree of
Bachelor in Surveying Science and Geomatics
(Hons)

Faculty of Architecture, Planning and Survey

AUGUST 2020

AUTHOR'S DECLARATION

I declare that the work in this thesis/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student	:	Muhammad Syafiq Bin Izham
Student I.D. No.	:	2015316379
Programme	:	Bachelor of Surveying Science and Geomatics (Honours) – AP220
Faculty	:	Architecture, Planning & Surveying
Thesis	:	ACCURACY ASSESSMENT OF POSITIONING USING SIGNAL BETWEEN GPS SATELLITE AND BEIDOU SATELLITE THAT EFFECT ATLAS L- BAND CORRECTION
	:	
Signature of Student	:
Date	:	10 th August 2020

ABSTRACT

Differential Global Positioning System of DGPS is widely used in hydrographic surveying. It uses the correction from the various ground base station around the globe as it references to improve accuracy. There are many correction service provider nowadays. For this study, the correction comes from the ATLAS Basic by using L band satellite for correction data transmitter. This study is to do the accuracy assessment between GPS and BeiDou satellite constellation by using ATLAS L-band correction. 6 hours DGPS observation commenced for both GPS, BeiDou satellite. Static observation executed lastly to get the real position of the established control point. The static data post-process by using Topcon tool software tied with a JUPEM 3 based station and get the final coordinate for later comparison. The data collection phase ended and moved to the processing phase. Observation data from GPS and BeiDou firstly need to be filtered to eliminate unwanted data and left the important data only. Data after filtered will compared to the final coordinate from static observation to calculate error from both satellite constellation, then the processing phase ended, continue with the analysis phase. The analysis for this study using two Software IBM SPSS and Microsoft Excel. IBM SPSS used to do the statistical analysis while the Microsoft Excel used to plot the error pattern. For this study, GPS perform well with the error occur in the range of 0.022m to 0.8m compared to BeiDou 0.074m to 1.698m. Even though BeiDou accuracy lesser than GPS, both of satellite constellation archived special order accuracy classification guided by IHO guidelines, $< \pm 2.00\text{m}$ in error or uncertainty.

TABLE OF CONTENT

CONFIRMATION BY PANEL OF EXAMINERS.....	i
AUTHOR’S DECLARATION	ii
SUPERVISOR’S DECLARATION	iii
ABSTRACT.....	iv
ACKNOWLEDGEMENTS	v
TABLE OF CONTENT.....	vi
LIST OF TABLE	ix
LIST OF FIGURES	x
LIST OF ABBREVIATION.....	xii
CHAPTER ONE INTRODUCTION	1
1.1 Introduction.....	1
1.2 Research Background	1
1.3 Problem Statement	2
1.4 Aim	3
1.5 Objectives	3
1.6 Research Question	3
1.7 Study Area	4
1.8 Methodology.....	5
1.9 Significance of Study.....	6
1.10 Limitation of Works.....	6
CHAPTER TWO LITERATURE REVIEW	7
2.1 Introduction.....	7
2.2 Global Navigation Satellite System (GNSS).....	7
2.3 GPS	8
2.4 BeiDou	9

2.5	Differential Global Positioning System (DGPS)	9
2.6	GPS Probable Error.....	10
2.6.1	Space Errors.....	10
2.6.2	Receiver error.....	12
2.6.3	Atmospheric Error	13
2.7	ATLAS L-Band	14
2.7.1	L Band Satellite.....	15
2.8	Dilution of Precision (DOP)	15
2.8.1	HDOP.....	16
2.8.2	VDOP.....	17
2.8.3	PDOP	18
2.8.4	TDOP	18
CHAPTER THREE METHODOLOGY.....		19
3.1	Introduction.....	19
3.2	Research Methodology	19
3.3	Preliminary Studies.....	21
3.3.1	Software Used.....	22
3.3.2	Equipment Used.....	24
3.4	Data Collection	25
3.4.1	Establish Control Point	26
3.4.2	Equipment Installation.....	26
3.4.3	Data Collection	26
3.5	Data Processing.....	26
CHAPTER FOUR RESULT AND ANALYSIS.....		27
4.1	Introduction.....	27
4.3	Horizontal Error	28
4.3.1	GPS Horizontal Error.....	28