UNIVERSITI TEKNOLOGI MARA

CURRENT MOTION OF PENINSULAR MALAYSIA USING HIGH PRECISION GNSS

NURHANANI BINTI ABD MUTALIB
(2019848788)

Thesis submitted in fulfillment
of the requirements for the degree of
BACHELOR OF SURVEYING SCIENCE AND GEOMATICS (HONOURS)

Faculty of Architecture, Planning and Surveying

August 2022

ACKNOWLEDGEMENT

First and foremost, I want to express my gratitude to God for allowing me to pursue my bachelor's degree and for seeing it through to its successful conclusion. My appreciation and thanks go to Sr. Mohamad Asrul Bin Mustafar my supervisor, for his understanding, encouragement, and assistance. I have gotten a lot out of your extensive knowledge and diligent editing. I am incredibly appreciative that you accepted me as a student and kept believing in me throughout the years.

My appreciation goes to the lecturers and UiTM who provided the facilities and assistance during this study. Special thanks to my colleagues and friends for the supports and helping me with this project.

I am appreciative of my parents' everlasting affection, financial and emotional support, which help to keep me inspired and self-assured. They believed in me, and as a result, I achieved success. My sincere gratitude goes out to my siblings for helping to keep me focused, reminding me of what is essential in life, and encouraging me on all of my journeys. This piece of victory is dedicated to these people. Alhamdulilah.

CHAPTER 1
INTRODUCTION

Research Background

The outermost layer of the Earth is divided into around 15 large slabs known as tectonic plates. These slabs make up the lithosphere, which is made up of the crust (continental and oceanic) and the upper layer of the mantle. Plates tectonic move slowly compared to each other, often a few millimetres per year, but this creates massive deformation near plate borders, which results in earthquakes. The surface of the Earth's motion and tension in the topmost few hundred meters of the Earth's crust are measured using geodetic methods(Murray-Moraleda, 2009). These data capture minor fault-related displacement of the Earth's mantle that fails to produce seismic waves but does cause fast motion during earthquakes. Most earthquakes are associated with tectonic plate boundaries, according to previous research. Tectonic earthquakes are those that occur as a result of plate movements or other causes that are primarily shearing. They are largely caused by defects' stick-slip characteristics (Robert, 2014). Figure 1 shows the tectonic plates in the world.

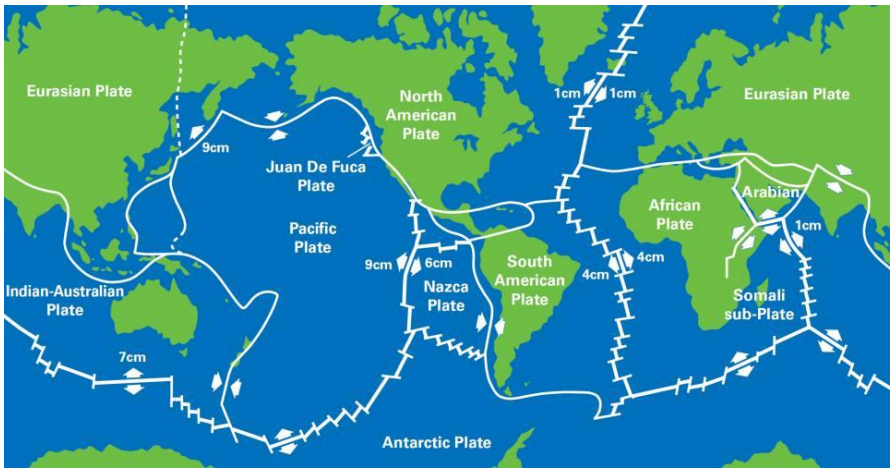

Figure 1.1: Plate tectonic map of the world

The majority of earthquakes are caused by movement in small zones along plate borders. The majority of seismic activity occurs along plate borders that are divergent, convergent, or transform. The majority of earthquakes and volcanic eruptions occur in certain regions, such as along plate borders. The circum-Pacific Ring of Fire, where the

ABSTRACT

Peninsular Malaysia is located relatively distant from Sumatra's seismic source zone, the closest earthquake location to Malaysia is around 350 kilometres away. Sumatran earthquakes have caused vibrations on multiple occasions. Peninsular Malaysia has been hit by major earthquakes from West Sumatra on occasions. The displacement of MyRTKnet stations owing to co-seismic motion from the 2004 Sumatra earthquake ranged from 1.5 to 17.0 cm, with the majority of displacement happening in the south-west direction. Similarly, the data multiple from the 2005 and 2007 earthquakes shows displacements of 1.0 to 6.5 cm and 1.0 to 3.0 cm in the south-west direction, respectively. Meanwhile, the earthquakes of 2012 produced displacements in the north-east direction ranging from 0.3 to 4.8 cm. The study area covers the entire of Peninsular Malaysia. GNSS precise point positioning (PPP) is a useful tool for obtaining more accurate estimates of point displacement up to millimetres. MyRTKNet data were processed via high GPS Processing Software known as GIPSY. The estimation of Peninsular MyRTKNet station's velocities was obtained following the plotted of time series. This study analysed the coordinates time series to predict the strain rate estimation. From the estimated strain rate, Peninsular Malaysia's motion were interpreted. The directions of the station's magnitude were towards South East region. Station magnitudes range from 18.8 to 30.23 mm/yr. Peninsular Malaysia was undergoing a variety of deformations from north to south. The findings in this study helps to detect the motion occur at MyRTKNet station in Peninsular Malaysia due to the impact of the earthquakes that occur in Sumatra Subduction Zone and surrounding. Besides, the deformation analysis helps the authority in forming a solution and plan a mitigation to this matter.

TABLE OF CONTENT