EQUATORIAL HORIZONTAL MAGNETIC VARIABILITY ON HOURLY TO MONTHLY TIME SCALES

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SITI NOOR AISYAH BINTI AHMAD

B.ENG (HONS) ELECTRONIC (COMMUNICATION)
Faculty of Electrical Engineering
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM, SELANGOR

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ABSTRACT

This report discussed the variability of the earth horizontal magnetic field component, H on the hourly, daily and monthly timescales using the MAGnetic Data Acquisition System (MAGDAS) installed in the Langkawi Island, Malaysia. The variation of H shown in this study is selected on the 64 geomagnetically quietest days between January to December 2007. The measured H shows large hourly increase up several nT on the midday and relatively stable on the rest of hours of the day, the measured maximum daily H range between 40430 nT to 40550 nT. The mean H on the daily timescales is 40451 nT with standard deviation of 23.74 nT. The largest standard deviation in the 12 months was 30.752 nT on September with the mean of 40671.36 nT. There was no data observed on October, November and December of 2007. The hourly variability exhibits maximum H amplitude with the occurrence of the earth equatorial electrojet current (EEJ).

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Magnetic pulsations or called ultra-low frequency (ULF) pulsations is electromagnetic waves generated in the magnetosphere. Its frequency range is between 1 mHz and 1Hz. The generation of magnetic field is defendant on solar and processes in the magnetosphere. Earth's magnetic field observations play important role in the understanding of the Earth's electromagnetic environment.

Many experiments done by previous researchers found that the variation in magnetic fields are caused by the dynamo action in the upper atmosphere. Daily variation (24 hours period) of geomagnetic field components was first observed by G. Graham in London [1]. R. G. Rastogi and K. N Iyer (1976) discussed the daily variation of the geomagnetic H-field averaged over the Five International Quiet Days, Sq (H) at Huancayo, Addis Ababa and Trivandrumm in the low latitudes region. They observed variation of Sq magnetic field amplitude near the dip equator stations increases and reaches maximum on the midday and show an almost constant throughout the night time. The observation is referred to the classical dynamo theory. These diurnal variation of H on a quiet days is because of currents flowing in the E-region of the ionosphere [2].

The similar variation were also observed by M.E.James, R.G. Rastogi and H.Chandra (2008). They observed that the decrease of H field is higher during the nighttime than during the daytime because it is due to the eccentric ring current [3]. V.Doumouya (1998) observed that the magnetic data was used to study the characteristics of EEJ in West African longitude. The H component regularly increases