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Title of Thesis : A Study of Geomagnetic Activities Observed from MAGDAS Stations in Egypt

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ABSTRACT

The ultimate goal of this study is to study the geomagnetic activities includes geomagnetic storm and substorm and its related signatures observed from ground based magnetometers in Egypt [Fayoum (FYM) and Aswan (ASW)] deployed in Year 2008. Stations are part of MAGDAS (MAGnetic Data Acquisition System/Circum- pan Pacific Magnetometer Network). The MAGDAS network has been constructed by Kyushu University (SERC, Japan) widely covers the world. These ground magnetometers are used for monitoring Earth's magnetic field variations using fluxgate magnetometers which are cheaper and sensitive to low variations in the Earth's magnetic field. It measures the horizontal [H], declination [D] and vertical [Z] components respectively with high time resolution (one Second) and sensitivity.

Thesis is concentrated on the irregular Pi 2 pulsations. Results are being analyzed and discussed in qualitative (individual case studies) and quantitative (statistical) form in addition to individual case studies of geomagnetic storms and substorms observed through the period of observation. The Study includes the following points

1. Review on solar terrestrial physics, geomagnetic activities and its related signatures especially Pi 2 pulsations.
2. Present a first study of Pi 2 pulsations observed at FYM and ASW stations in Egypt.
3. Suggest a possible generation mechanism of Pi 2 pulsations
4. Study the propagation mechanism of the Pi 2 pulsations.

The present work consists of an introduction, three chapters and appendix which are being arranged as follow.

Chapter One, discusses different geomagnetic activities, magnetic storms and geomagnetic substorms and their signatures in the Earth's magnetic field, using different geomagnetic indices. This chapter is concentrated on reviewing geomagnetic pulsations especially irregular pulsation in the period (40:150s) which is called the Pi 2 pulsations. This review deals with the generation and the propagation mechanism of this type of pulsations which still in debates especially at low latitude region.

Chapter Two discusses data sets and the aim of MAGDAS project, in addition to the analytical methods used in this study including the Fourier transformation and the Wavelet transformation.

Chapter Three discusses the results of the analyzed data in the period November 2008 - October 2009. This chapter arranged as follow: Description of individual cases of geomagnetic storm, substorm and Pi 2 pulsations at FYM and ASW stations and their comparison with other available stations. The explanation of the analysis technique we used on a case study. Statistical studies of Pi 2 pulsations in addition to individual cases. This discussion is concentrated on the Pi 2 pulsations discussing its characteristics, generation and propagation mechanisms.

Appendix Divided into four appendices; Appendix A give short explanations about the magnetospheric structure and current system. Appendix B Give some details about the wavelet theory. Appendix C illustrates the MATLAB programs we used in this study. Appendix D is a table of almost Pi 2 events gives the beginning of Pi 2 event, its dominant frequency, amplitude and the level activity during observation.

The summary not more than 500 words