RESEARCH TALK on MAGDAS/CPMN Project

MAGnetic Data Acquisition System/Circum-pan Pacific Magnetometer Network

Programme Book & Abstract

Published by SERC of Kyushu University
I S W I Newsletter
under the auspices of the United Nations

This pdf circulated in Volume 5, Number 38, on 27 March 2013.

20 Mac 2013
Bilik Mesyuarat Utama (BMU)
School of Science and Technology
Universiti Malaysia Sabah

UMS UNIVERSITI MALAYSIA SABAH
ICSWSE
九州大学 KYUSHU UNIVERSITY
ANGKASA MALAYSIA
UNIVERSITI TEKNOLOGI MARA

MESSAGE FROM THE DEAN OF SCHOOL OF SCIENCE AND TECHNOLOGY

UMS
UNIVERSITI MALAYSIA SABAH

Assalamualaikum w.bt. and Good Day,

First and foremost, on behalf of Universiti Malaysia Sabah and School of Science and Technology, I would like to extend my warm welcome to all of our experts and participants today on the Research Talk on MAGDAS/CPMN Project. It is a great honour for our school to host today's event that brought together experts from various institution such as Kyushu University, Malaysia ANGKASA Agency, UiTM and UMS as well. I would like to give a special word of thank to the organizing committee for their commitment to make this event a success.

Today's event is another milestone after signing of Memorandum of Understanding (MOU) between UMS and Space Environment Research Center (SERC) from Kyushu University. This MOU formalised the collaboration between the two parties in the field of geophysics in particular the research on the earth magnetic field. The main project within the collaborative framework is the deployment of MAGDAS instrument –i.e. Magnetic Data Acquisition System here in UMS.

We are lucky today to have experts on MAGDAS to talk about their findings in Japan and Malaysia, with which the purpose of the research talk being held today. Hopefully by having the instrument here it will further contribute to the space research community in general and might be impetus for new and innovative ideas in the future. Finally, I wish a meaningful research discussion today; have a great stay in Kota Kinabalu and on behalf of my university, I am pleased to officiate the opening of this research talk.

Thank you very much.

Assoc. Prof. Dr. Baba Musta
Dean
School of Science and Technology

MESSAGE FROM THE DIRECTOR ICSWSE OF KYUSHU UNIVERSITY

KYUSHU
UNIVERSITY

Dear Participants of
"Research Talk on MAGDAS/CPMN Project" at UMS:

As Director of the "International Center for Space Weather Science and Education" at Kyushu University and as the PI of the MAGDAS/CPMN Project, I am very pleased and honored that UMS has organized this research talk on the MAGDAS/CPMN Project.It is an excellent way to start our 10-yearcollaboration to collect geomagnetic data atSabah in Malaysia.

As you may know, the speciality of the MAGDAS/CPMN Projectis its 210 deg. magnetic meridian chain. It is a meridian that passes through Japan. Our chain goes up toSiberia and down to the Antarctica. Along this chain, our magnetometers are placed at less than 500 km interval. The data collected along this chain is quite famous throughout the geophysics community. Although Sabah is not right on this meridian, it is very close. So it can contribute to the science done by the 210 chain. In addition, data from magnetometers at low latitude are in demand.

Unfortunately, due to my current health situation, I cannot be with you for this event. However, I wish you all the best for a successful and fruitful research talk. I hope our collaboration will encourage many young people in Sabah to consider a career in science and technology.

Thank you for participating in this international event.

Sincerely,
Prof. Dr. Kiyohumi Yumoto
- Director, ICSWSE of Kyushu University.
- Professor, Faculty of Sciences, Kyushu University.
- PI, MAGDAS/CPMN Project.
- Member, ISWI Steering Committee (Int'l Space Weather Initiative)
- Chair, ULTIMA (Ultra Large Terrestrial Int'l Magnetometer Array)
- Chair, JSWA Steering Committee (Japan Space Weather Association)
- Chair, the STPP Subcommittee of the Science Council in Japan.
- Chair, Kyushu University Ito-shima Kai.

TENTATIVE

DATE	TIME	ACTIVITY
18 Mac 2013	7.00 pm	Welcoming Dinner: • Courtyard Hotel
20 Mac 2013	8.30 am	Arrival of lecturers, students and staffs
	8.45 am	Arrival Dean of SST and the Deputy Deans
	8.50 am	Ceremony begins with the recital of Du'a.
	8.55 am	Welcome speech from Dean of SST
	9.10 am	Delivery of appreciation to representative researchers by the by Dean of SST • ICSWSE • UiTM Shah Alam • Agensi ANGKASA Malaysia
	9.20 am	Refreshments
	9.30 am	Research presentation starts: • Dr Shuji Abe "An Overview of MAGDAS/CPMN Project" • Shun Imajou (ICSWSE, Kyushu University) "Low-latitude Geomagnetic Variation and Substorm" • Daijirou Tanaka (ICSWSE, Kyushu University) • "Searching Seismo-electromagnetic Anomalies in ELF Ranged Observed by an Induction Magnetometer in Kuju" • Mohamad Huzaimy Jusoh (ICSWSE, Kyushu University & UiTM) "Application of MAGDAS Data in Long Term Analysis of Possible Solar-Seismicity Coupling" • Mohd Helmy Hashim (ANGKASA) "Geomagnetic study - MAGDAS Langkawi Station" • Mohamad Zul Hilmey Makmud (UMS) "Progress report on the Deployment of MAGDAS in Sabah, Malaysia"
	11.30 am	Discussion sessions
	12.00 pm	Lunch

An Overview of MAGDAS/CPMN Project

Dr Shuji Abe

International Center for Space Weather Science and Education (ICSWSE),
Kyushu University

ABSTRACT

The International Center for Space Weather Science and Education (ICSWSE), formerly known as Space Environment Research Center (SERC, since 2002), Kyushu University, was established on 01 April 2012. The purposes of this re-organization are to continue to conduct research in space weather and related fields on more global basis, and establish a permanent international institution for space weather science and education. One of our important work is to develop a real-time geomagnetic field observation system, known as the "MAGDAS (MAGnetic Data Acquisition System)/CPMN (Circum-pan Pacific Magnetometer Network) Project", whose principal investigator is the director of ICSWSE (Prof. K. Yumoto). It is a global network of geomagnetic observations operated by collaborations between ICSWSE and institutions in many countries. To date, the MAGDAS Project has installed over 70 real-time magnetometers around the world. In this talk, I will introduce the background of ICSWSE and the progress on MAGDAS/CPMN project.

Low-latitude geomagnetic variation and substorm

Shun Imajou

International Center for Space Weather Science and Education (ICSWSE),
Kyushu University

ABSTRACT

The magnetosphericsubstorm is a process in which energy is stored in the magnetotail through the interaction between the solar wind and the magnetosphere and is released explosively. We can observe geomagnetic variation associated with the substorm all over the world, even in the equatorial region. In the low-latitude region, two types of the variation are observed: magnetic positive bay and Pi 2 pulsation. Magnetic positive bay is an increase of the geomagnetic field which associated with the enhanced current system of substorm. Pi 2 geomagnetic pulsations are defined as impulsive magnetic field oscillations with a period of 40-150 second [Jacob et al., 1964]. There are many ideas to explain generation and propagation mechanism of Pi 2, however, we have not come to any conclusions yet. In the lecture, we will present an introduction of magnetic variation associated with substorm and recent research results achieved by MAGDAS network.

Searching Seismo-electromagnetic Anomalies in ELF Ranged Observed by an Induction Magnetometer in Kuju

Daijirou Tanaka

International Center for Space Weather Science and Education (ICSWSE),
Kyushu University

ABSTRACT

Seismo-electromagnetic anomalies have been observed in a lot of frequency ranges, from the ultra-low frequency (ULF) range to the very-high frequency (VHF) range. These ranges include the extremely-low frequency (ELF) range, which covers 3 to 300Hz. In the ELF range, there exist a phenomenon called Schumann Resonance, where electromagnetic waves excited by lightning resonate in the cavity between the earth's surface and the ionosphere in the ELF range, especially at 8Hz, 14Hz and 20Hz. On the other hand, the ELF range may also include seismo-electromagnetic waves: For example, Ohta et al. [2005] reported that some ELF waves were excited before earthquakes and the excited waves differed from the ones caused by lightning. However, there exist few papers about seismo-electromagnetic anomalies in the ELF range, compared to other frequency ranges. The International Center for Space Weather Science and Education has an induction magnetometer in Kuju, which can detect magnetic variations in the ELF range. The purpose of this study is to use this magnetometer and determine whether or not there are seismo-electromagnetic anomalies in the ELF range before, during and/or after earthquakes by power spectral analyses of the magnetic-field data obtained from the induction magnetometer in Kuju. We have referred to a publically available earthquake list, and searched for earthquakes in 2003-2011 falling into the following two different categories: (ⅰ) M≧5.0, and Epicenter-Kuju distance≦150km (ⅱ) M≧5.0, Epicenter-Kuju distance≦1500km, and Depth≦3km As a result, we identified 4 (2) events in the category ⅰ (ⅱ). Among them, we found 4 (1) events associated with bursty electromagnetic anomalies. These anomalies may be the effect of earthquakes or lightning, and it is a topic of future research to distinguish the generation mechanisms.

Application of MAGDAS Data in Long Term Analysis of Possible Solar-Seismicity Coupling

Mohamad Huzaimy Jusoh

International Center for Space Weather Science and Education (ICSWSE),
Kyushu University & Universiti Teknologi Mara (UiTM)

ABSTRACT

Solar activities play significant roles in electromagnetic coupling of the Sun – Earth system. Theoretically, this coupling mechanism starts from the sun as the main source of energy influences parameters in the interplanetary space and terrestrial environment. The connection between solar wind and the ground magnetic pulsations has been proven empirically by several researchers previously (H. J. Singer et al., 1977, E. W. Greenstadt, 1979, I. A. Ansari 2006 to name a few). In our preliminary analysis on relationship between solar and seismic activities (Jusoh and Yumoto, 2011, Jusoh et al., 2012), we observed a higher tendency of earthquake's energy to be released during descending phase of solar cycles which significantly related with solar wind parameters (i.e solar wind dynamic pressure (Pdyn), speed (Vsw) and input energy (epsilon)). To connect the solar impact on seismicity, we investigate the possibility of ground magnetic pulsations; Pc3 (22-100 mHz), Pc4 (6.7-22 mHz) and Pc5 (1.7-6.7 mHz) as one of the connecting agent. The localized Pc3-Pc5 magnetic pulsations data were extracted from Magnetic Data Acquisition System (MAGDAS)/Circum Pan Magnetic Network (CPMN) located at Ashibetsu (Japan); for earthquakes monitored at north Japan and Langkawi (Malaysia); for earthquakes observed at north Sumatra, Indonesia. This magnetometer arrays has been established by International Center for Space Weather Science and Education, Kyushu University, Japan. From the results, we observed significant correlations between the observed parameters, where the increasing of Vsw and epsilon correspond to the number of observed magnetic pulsations and localized earthquakes.

Geomagnetic study - MAGDAS Langkawi Station

Mohd Helmy Hashim

National Space Agency of Malaysia (ANGKASA)

ABSTRACT

An establishment of geomagnetic field observation network under The Circum-pan Pacific Magnetometer Network (CPMN), Magnetic Data Acquisition System (MAGDAS) was constructed and initiated by the International Center for Space Weather Science and Education (ICSWSE) which formerly known as Space Environment Research Center (SERC). Through this project, MAGDAS was installed at Langkawi National Observatori (LNO), National Space Agency of Malaysia (ANGKASA). This presentation is mainly discussing on the research done using MAGDAS by local researchers and its challenges.

Progress report on the deployment of MAGDAS in Sabah, Malaysia

Mohamad ZulHilmey Makmud

Universiti Malaysia Sabah (UMS)

ABSTRACT

In conjunction of scientific collaboration between Universiti Malaysia Sabah (UMS) and International Space Weather Science and Education (ICSWSE), a MAGDAS station which was known as MAGDAS-UMS was installed in UMS campus. This presentation mainly discuss on site decision and installation process prior to the deployment of MAGDAS in Sabah. Initially, three strategic locations were proposed to ICSWSE as potential site for the MAGDAS-UMS station, after an intensive discussion between UMS and ICSWE, a location coordinated as 06° 02.532'N 116° 06.871'E was chosen. Moreover, the process of deployment also involve designing and providing a sensor and pre amplifier hut and as well as the data logger hut and their facilities.

COMMITTEE MEMBERS OF RESEARCH TALK ON MAGDAS / CPMN

(MAGnetic Data Acquisition System/Circum-pan Pacific Magnetometer Network)

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