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Annual Report for Malaysia-MAGDAS MoU

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1. INTRODUCTION

The Malaysia-MAGDAS MoU was firstly circulated among members on September 11, 2013 before has been finally issued on 3 February 2014. It was prepared by Mr. George Maeda of International Center for Space Weather Science and Education (ICSWSE), Kyushu University, Dr. Nurul Shazana Abdul Hamid of Universiti Kebangsaan Malaysia (UKM) and Dr. Mohamad Huzaimy Jusoh of Universiti Teknologi Mara (UiTM). This MoU was completely signed by the related members on September 26, 2014. The timeline of the preparation of this MoU is shown in Appendix A.

The first annual meeting between parties in this MoU was held during National School on Space and Earth Electromagnetism 2014 on December 02-05, 2014 at Langkawi National Observatory (LNO), Langkawi. Further information on activities and the annual meeting conducted during the school are presented in the following section.

2. NATIONAL SCHOOL ON SPACE AND EARTH ELECTROMAGNETISM 2014

School Details

Name: National School on Space and Earth Electromagnetism 2014

Date: December 2-5, 2014

Venue: Langkawi National Observatory (LNO), Langkawi, Malaysia

Aim:

- a) Establish effective mechanisms for nurturing and sharing the development and experiences in space weather research and education focusing on electromagnetism among Malaysia-MAGDAS MoU members, researchers and students.
- b) Promote cooperation in the field of education, research and popularization of electromagnetism studies using Magnetic Data Acquisition System (MAGDAS) magnetometer platform with the cooperation from International Center for Space Weather and Education (ICSWSE), Kyushu University, Japan.

This school received 25 participants from ANGKASA, ICSWSE, UKM and UiTM. It gives opportunity to all participants to learn, interact, discuss and share knowledge in space and earth electromagnetism research area. Tentative program of this school and photos during activities are included in Appendix B and Appendix C respectively.

3. MALAYSIA-MAGDAS ANNUAL MEETING

This meeting is a closed meeting for the MoU members. It was held on the day 3 of the National School on Space and Earth Electromagnetism 2014 (4th December). Among members who attended this meeting are as follow:

National Space Agency (ANGKASA): Nyanasegari Bhoo Pathy , Zahira Mohd Radzi

International Center for Space Weather and Education (ICSWSE): Prof. Akimasa Yoshikawa

Universiti Kebangsaan Malaysia (UKM): Prof. Dr. Ir. Mardina binti Abdullah, Dr. Teh Wai Leong, Siti Aminah Bahari

Universiti Teknologi MARA (UiTM): Dr. Muhamad Huzaimy Jusoh

Agenda:

1. Welcoming remarks by ANGKASA
2. Overview of Malaysia-MAGDAS MoU
3. Host Update by ANGKASA and UMS
4. MAGDAS Data Sharing (Real Time)
5. Opportunities on R&D
6. HCD (Training / Workshop)
7. Discussion and Closing

3.1 Overview of Malaysia-MAGDAS MoU

The MoU between universities and ICSWSE is effective on 3rd October 2014. The purpose of the MoU is to specify the responsibilities between all parties involved. This MoU covers the maintenance of MAGDAS in Langkawi and also UMS, Sabah.

ICSWSE is developing automated MAGDAS database by using special FTP. The real time data service and will start operation by 2015. Second party will be able to access to all 73 MAGDAS stations (1 minute data).

3.2 Host update - ANGKASA (LKW station)

The percentage of Malaysian projects/studies using MAGDAS data are 75% in space weather area and 25% in geophysics area. From this number, 53% was using data from LKW station (2007-2012). Details of each projects/studies are include in Appendix D.

Since the first MAGDAS installation in Langawi on September 2006, ANGKASA and ICSWSE have communicated with each other to maintain the continuity of this equipment. The challenges faced and attempted/action taken by both side are include in Appendix E.

3.3 Activities on MAGDAS

Several meetings and activities were conducted since the Malaysia-MAGDAS MoU was planned. These include:

- Meetings among members chaired by ANGKASA on 05 December 2013, 27th February 2014, 11 June 2014, August 2014 and October 2014
- Workshop on MAGDAS organized by UMS on 3-4 March 2014
- Colloquium of Space and Earth's Electromagnetism Malaysia, organized by Space and Earth's Electromagnetism, UiTM on 11th June 2014

3.4 Remarks

- A mailing list has been created right after the first meeting at ANGKASA Headquarters on December 2013. The email address is

see-m@yahoogroups.com

To date, there are 8 members in this list as follow:

ANGKASA: Mhd Fairos Assilam, Nyanasegari Bhoo Pathy

ICSWSE: Dr. Akimasa Yoshikawa, George Maeda

UKM: Dr. Kalaivani Chellappan, Dr. Nurul Shazana Abdul Hamid, Siti Aminah Bahari

UiTM: Dr. Mohamad Huzaimy Jusoh

Other MoU members were invited and encouraged to accept the invitation to join the mailing list.

- UiTM and UKM are responsible to help to analysis raw data copied by ANGKASA-MOSTI and UMS. This task will take place once the direct access (direct url link from ICSWSE) to the data is available.
- Malaysia plan to shift the type of current MAGDAS data transfer system. Figure 1 illustrates the transfer system and Malaysia plan to shift from option B to C. UiTM will be responsible for establishing the Data Transfer System MAGDAS based on the chart in Figure 1. This has been agreed by ICSWSE during the meeting.

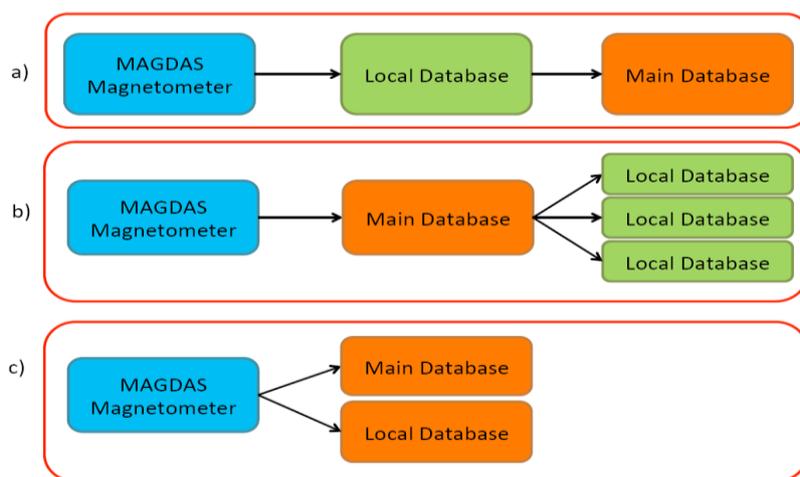
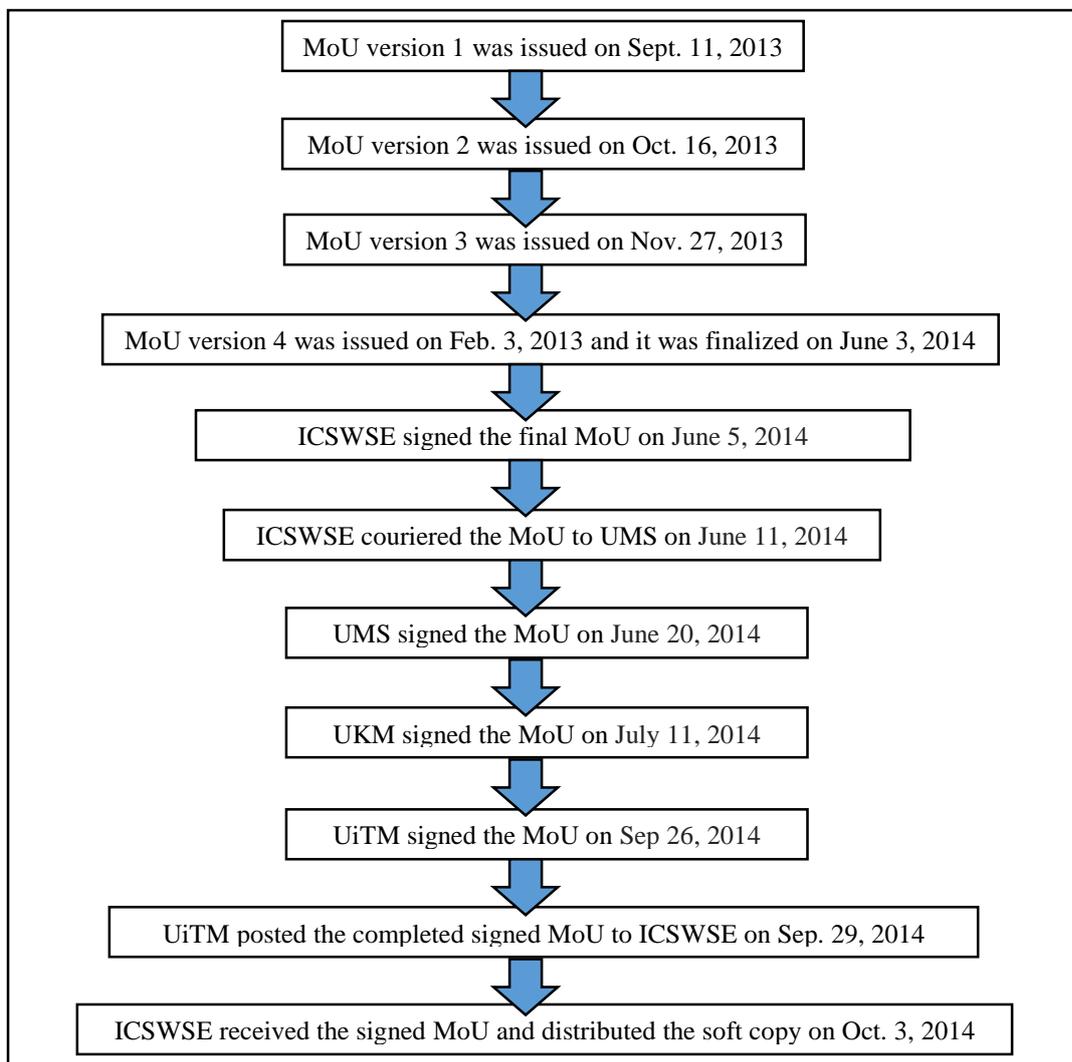


Figure 1 Types of MAGDAS Data Transfer System

- The meeting members suggested to offer UMS to host the next annual meeting of Malaysia-MAGDAS MoU. UKM will be the host for 2016 (UKM informed that budget application for 2015 already closed).
- The meeting members intended to host the 3rd MAGDAS Station which also agreed by ICSWSE, with condition for Malaysia to put on proposal. ICSWSE suggested Malaysia to propose a new location to study the Tsunami warning / Deformation sensor opportunity.
 - i. The scope will be one of ICSWSE's interest to apply for funding under JICA
 - ii. The station will be a reference station or requirement for research measurement, because JICA is looking into studying earthquake in Sumatra therefore the new MAGDAS station should be in southern region Malaysia.
- The meeting members decided that this MoU is based on affiliation and not individual representative; therefore anybody (example: student) from related affiliation are allowable to access data up to 1 minutes resolution. Parties other than the affiliation members need to get consensus from ICSWSE.
- Internal training will be conducted by Dr.Huzaimy/Dr. Shazana for host stations's PIC on data analysis and processing as series of training in year 2015.

Appendix A: Timeline of the MoU's Preparation



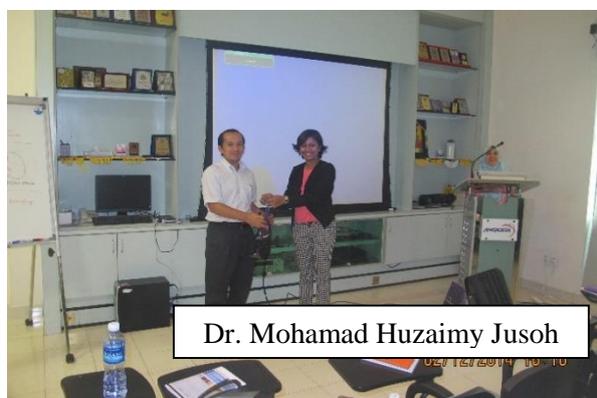
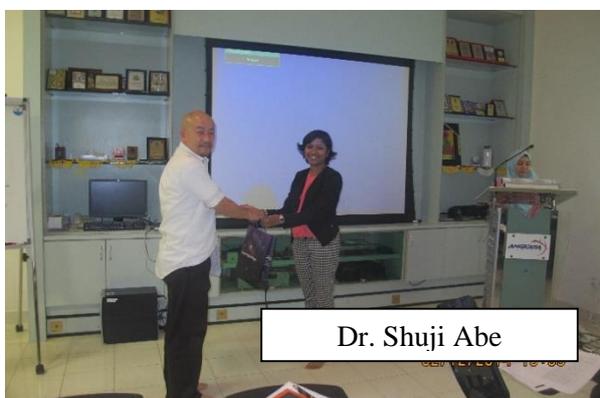
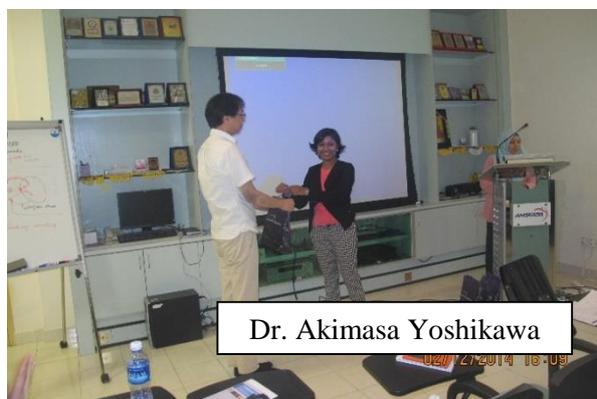
Appendix B: Tentative Program

| Date | Time | Program |
|---------------------------|---|--|
| Day 1 2/12/2014 | 8 ³⁰ am-9 ⁰⁰ am | Registration |
| | 9 ⁰⁰ am-9 ¹⁰ am | Welcome speech by ANGKASA |
| | 9 ¹⁰ am-9 ²⁰ am | Welcome Speech by ICSWSE |
| | 9 ²⁰ am-10 ²⁰ am | Keynote 1 by Prof. Yoshikawa Akimasa from ICSWSE on “ICSWSE-ISWI Project” |
| | 10 ²⁰ am-10 ³⁰ am | Photo Session |
| | 10 ³⁰ am-10 ⁴⁵ am | Coffee Break |
| | 10 ⁴⁵ am-11 ¹⁵ am | Keynote 2 by Ms. Nyanasesegari Bhoo Pathy from ANGKASA on “Overview on ANGKASA and Space Weather Research” |
| | 11 ¹⁵ am-11 ⁴⁵ am | Keynote 3 by Dr. Shuji Abe from ICSWSE on MAGDAS-IUGONET Project |
| | 11 ⁴⁵ am-12 ⁴⁵ pm | Keynote 4 by Dr. Mohamad Huzaimy Jusoh from UITM on “Studies of Geomagnetic Activities and relationship with the Sun” |
| | 12 ⁴⁵ pm-2 ⁰⁰ pm | Lunch |
| | 2 ⁰⁰ pm-3 ⁰⁰ pm | Keynote 5 by Dr. Wai Leong Teh from UKM on “The correlated and uncorrelated relationship of interplanetary magnetic clouds with geoeffectiveness” |
| | 3 ⁰⁰ pm-4 ⁰⁰ pm | Keynote 6 by Dr. Mohamad Huzaimy Jusoh from UITM on “Solar Activity and Seismicity” |
| | 4 ⁰⁰ pm-5 ⁰⁰ pm | Discussion on Research Concept Paper |
| | 5.00 pm | Tea & Adjourn |
| Day 2 3/12/2014 | 9 ⁰⁰ am-1 ⁰⁰ pm | Site Visit to LKW MAGDAS Station : Hands On Experience on Calibration, Maintenance and Troubleshooting of MAGDAS-9 System by Dr. Mohamad Huzaimy Jusoh and Dr. Nurul Shazana Abdul Hamid |
| | 12 ⁴⁵ pm-2 ⁰⁰ pm | Lunch |
| | 2 ⁰⁰ pm-3 ⁰⁰ pm | Research Talk by Dr. Nurul Shazana binti Abdul Hamid: Variability of EEJ and its relation to Sq |
| | 3 ⁰⁰ pm-3 ²⁰ pm | Hands On : Concept of Magnetic Data Acquisition System by Dr. Mohamad Huzaimy Jusoh |
| | 3 ²⁰ pm-4 ²⁰ pm | Hands On : Extraction and conversion of MAGDAS data by Dr. Nurul Shazana Abdul Hamid |
| | 4 ²⁰ pm-5 ⁰⁰ pm | Hands On : Analysis of MAGDAS data using Matlab by Dr. Nurul Shazana Abdul Hamid |
| | 5 ⁰⁰ pm | Tea & Adjourn |
| Day 3 4/12/2014 | 9 ⁰⁰ am-1 ⁰⁰ pm | MAGDAS Annual Meeting (Closed meeting for MOU members) |
| | 1 ⁰⁰ pm-2 ⁰⁰ pm | Lunch |
| | 2 ⁰⁰ pm-3 ⁰⁰ pm | Research Talk by Prof. Yoshikawa Akimasa on Geomagnetic Disturbance from ICSWSE |
| | 3 ⁰⁰ pm-3 ³⁰ pm | Student Presentation 1 by Mr. Ahmad Faizal bin Zainal Abidin from UITM on Development of Low Power Wireless Magnetometer for Geomagnetic Real Time Data Monitoring from UiTM |

| | | |
|---------------------------|---|--|
| | 3 ³⁰ pm-4 ⁰⁰ pm | Student Presentation 2 by Ms. Siti Noor Aisyah binti Ahmad on Variations of Earth's Electromagnetic ULF and VLF due to Space Weather Conditions from UiTM |
| | 4 ⁰⁰ pm-4 ³⁰ pm | Student Presentation 3 by Mr. Khairul Afifi bin Nasudin from UKM on Constructing the Near Equatorial Magnetic Field Model and Studying on the Effect of South Atlantic Anomaly on the Near Equatorial Satellites |
| | 4 ³⁰ pm-5 ⁰⁰ pm | LNO Tour |
| | 5 ⁰⁰ pm | Tea & Adjourn |
| Day 4 5/12/2014 | 9 ⁰⁰ am-9 ³⁰ am | Student Presentation 4 by Mr. Matsushita Hiroki from ICSWSE on Indices for Space Weather Monitoring using MAGDAS Data |
| | 9 ³⁰ am-10 ⁰⁰ am | Student Presentation 5 by Mr. Kaisei Akimoto from Kyushu University on The Relationship among Relativistic Electron Flux in the Radiation Belt, Solar Wind Velocity and PC5 Pulsation at the Dip Equator |
| | 10 ⁰⁰ am-10 ³⁰ am | Student Presentation 6 by Ms. Ayaka Tano from Kyushu University on The Comparison Between Champ Data and GAIA Model about Electron Density in the Ionosphere |
| | 10 ³⁰ am-10 ⁴⁵ am | Coffee Break |
| | 10 ⁴⁵ am-11 ⁴⁵ am | Open Discussion |
| | 11 ⁴⁵ am-12 ¹⁵ pm | Closing Session and Certificate Presentation |
| | 12 ¹⁵ pm | Lunch |

Appendix C: Photos of Activities

Day 1 Welcome speech, Keynote talk and Discussion



Day 2 Site Visit and Hands On Session

Site Visit



Hands On Session



Dr. Nurul Shazana Abdul Hamid

Day 3 & 4 MAGDAS Annual Meeting, Research Presentation and LNO Tour

MAGDAS Annual Meeting





Research talk by Dr. Yoshikawa

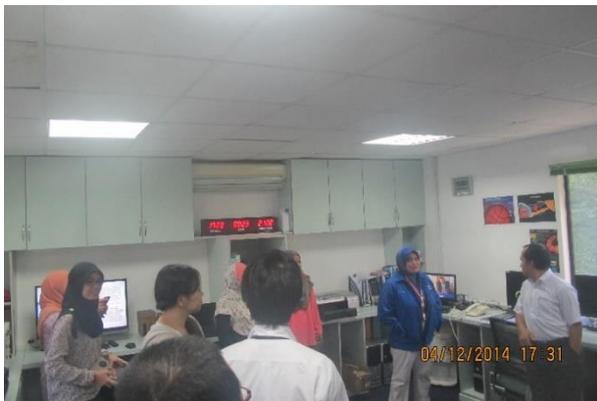


Students Presentation





LNO Tour



Appendix D: Malaysian Projects/Studies Using MAGDAS Data

| NO | RESEARCH TITLE | MAGDAS STATION | INSTITUTION | FIELD |
|-----|---|--|---|--|
| 1. | Ionospheric & magnetic field effects observed during the 2005 geomagnetic storms in the South-East Asia sector | Langkawi, Malaysia | UKM | Space Weather Instrumentation |
| 2. | Determination of fractal properties of geomagnetic field derived from MAGDAS | Langkawi, Malaysia | UKM | Space Weather Instrumentation, Statistical |
| 3. | Scaling and fractal properties of the horizontal geomagnetic field at the tropical stations of Langkawi and Davao in February 2007 | Langkawi, Malaysia, Davao, Philippines | UKM | Space Weather Instrumentation, Statistical |
| 4. | Power spectrum analysis of horizontal geomagnetic field component time series at Station Cebu, Philippines in December 2005 | Cebu, Philippines | UKM | Space Weather Instrumentation, Statistical |
| 5. | The hysteresis exponents of the geomagnetic horizontal component during quiet and active periods | Cebu & Davao Philippines | UKM | Space Weather Instrumentation |
| 6. | Correlation analysis between MAGDAS data and Ionospheric parameter | Manado, Indonesia | UITM | Space Weather |
| 7. | Characterization of regional Earth Magnetic activity based on MAGDAS data | North, equatorial and South region | UITM | Geophysics |
| 8. | Monitoring and analysis MAGDAS data during Ionospheric Events (Geomagnetic storm, SID, TID) | Ashbetsu, Japan | UITM | Space Weather |
| 9. | Correlation between Electromagnetic Phenomena and Earthquake | Manado & Seram, Indonesia | UITM | Geophysics |
| 10. | Gravity data processing for the Andaman Sea (on 2008) | Langkawi, Malaysia | Petroleum Geoservices Exploration (M) Sdn. Bhd. | Geophysics |
| 11. | Studies of geomagnetic field fluctuations using Magnetic Data Acquisition System (MAGDAS) – the Malaysian Beginning. | Langkawi, Malaysia | ANGKASA | Space Weather, general |
| 12. | Langkawi geomagnetic study approaching to solar maximum | Langkawi, Malaysia | ANGKASA | Space Weather, general |
| 13. | The Profile of Daily Geomagnetic Field Variation and its Correlation with Neutral-to-ground Current of A Power Transformer in A Transmission Line | Langkawi, Malaysia | UTM | Space Weather |

Appendix E: Problems faced by MAGDAS at LKW Station and Attempted/Action Taken

| DATE | PROBLEM | ENHANCEMENT/ REPAIR |
|---------------------|--|--|
| Oct. – Dec 2006 | Power outage – due to thunder and lightning | Briefcase replaced and system earthed |
| Jun – Jul 2007 | Data transmission problem | Flash memory card (1GB compact flash) replaced |
| Jul 2007 – Jan 2008 | Data transmission problem | Linux operating system failed and Flash memory card (1GB compact flash) replaced |
| Jan – Feb. 2008 | Strange plot of time series on F data component – sensor unit problem | Adjust height of sensor platform triple legs |
| Jan – Sept. 2008 | Strange plot of time series on Z component, followed by network problem and MAGDAS sensor house filled with water because of leakage and water absorption by MAGDAS sensor hut concrete wall – sensor unit problem | Sensor unit replaced and reconfigured and sensor house modified |
| Jul –Aug 2009 | Data transmission problem | Ethernet converter replaced |
| Nov 2009 – Mar 2010 | Data transmission problem | Network configured and recovered |
| Mar – May 2010 | Strange plot time series and data Z component | Waiting for replacement |
| May 2010 – Nov 2010 | Offline | Waiting for replacement – new MAGDAS-9 installation tentatively in Dec. 2010 |
| 5-11 Dec. 2011 | MAGDAS replacement | Upgrade to MAGDAS-9 system |
| Dec. 2012 | Offline | Server reconfiguration setup |
| Mac 2013 | Online | Fully operating |
| 02 December 2014 | Offline | Changed data logger |