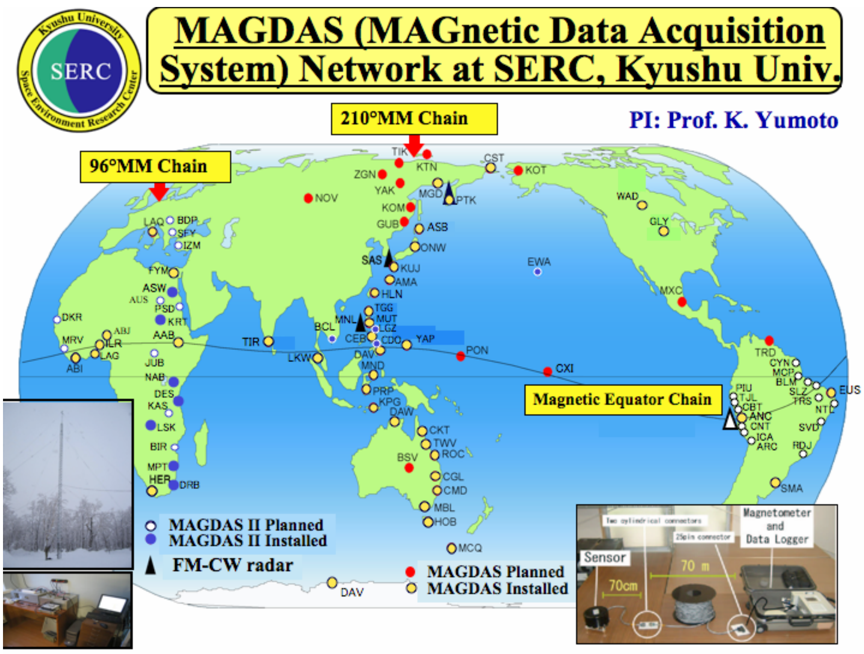
MAGDAS Session Proceedings

(1st Annual Equal Partnership MAGDAS School)

During ISWI UN/NASA/JAXA Workshop
Helwan, Egypt.
6 – 10 November 2010.



Current global deployment of MAGDAS

The MAGDAS Session is organized by

the Space Environment Research Center (SERC)

of Kyushu University, Fukuoka, Japan.

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Contents of the Proceedings

Preface

On behalf of the staff and students of SERC (Space Environment Research Center of Kyushu University) and MAGDAS hosts all over the world, I welcome you to the *MAGDAS Session of the 2010 ISWI Workshop in Egypt*. There was also a MAGDAS Session during the 2007 IHY Workshop in Tokyo, but it was much smaller in scale. Hereafter, in conjunction with ISWI workshops or ISWI schools, I hope to make MAGDAS Sessions annual events so as to improve communication between MAGDAS Project members.

With respect to this research and education project, the key position of SERC and Kyushu University is to follow the guiding principles of IHY and ISWI. IHY/ISWI seeks to bring together "instrument providers" and "instrument hosts" in such a way that there is *mutual benefit* -- this is the only way to make these collaborations long-term and self-sustaining. And if there is mutual benefit, then we can realize "Equal Partnership".

But this Equal Partnership cannot be achieved overnight – there is a process involved. I believe there are three phases in this process: (1) Development of instrument capacity, (2) Development of data analysis capacity, and (3) Development of science capacity (i.e., the ability to do science with the data from the instrument at the host's site). Taken together, these three phases constitute "Capacity Building" – one of the major goals of IHY and ISWI.

In these Proceedings, you will find the Program for this MAGDAS Session, which will occur during Day 3 and Day 4 of the ISWI workshop; abstracts of all scheduled speakers are included in these Proceedings. The talks are numbered from Talk #1 to Talk #31. "Talk #1" will be presented by myself (K. Yumoto). In my talk, I will go into detail regarding the aforementioned Capacity Building.

With this MAGDAS Session, I hope attending MAGDAS hosts can start a discussion on how we can accelerate Capacity Building. In addition, I hope each host will raise the issues that he or she sees as important. Everyone should listen to these points raised by others. I am hoping for a very frank exchange of information and opinions during this MAGDAS Session.

To conclude this Preface of the MAGDAS Session Proceedings, I wish to state the *Main Goal* of SERC, of the MAGDAS Project, and of ISWI: It is to stir the imagination of young people so that they seek to pursue a career in space-related science. Our central goal, I believe, is to create a *Big Dream* for them. Science is meaningful only if there exists another generation of scientists to continue this Big Dream and to continue the research agenda that we have established. I ask that you, too, excite the imagination of your young scientists so that they go in this direction.

Prof. Dr. Kiyohumi Yumoto
- Director of SERC, Kyushu University
- Professor, Faculty of Sciences, Kyushu University
- Chair, the STPP subcommittee of the Science Council in Japan
- PI, MAGDAS/CPMN Project.
- Member, ISWI Steering Committee

Program of MAGDAS Session

Day 3 of ISWI Workshop in Egypt 2010

Talk No.	Abstract Reference Number SA=submitted abstract AA=attached abstract X=extra abstract	Name (first author)	Sub-Session Type 1=instrument related 2=data related 3=science related	Day Number of Workshop (Day 3 or Day 4)	Time of Presentation (each consists of 15-min. talk followed by 5-min. discussion.)
1	X-5	Yumoto	Overview	3	9:00-9:20
2	SA-49	Yamazaki	1	3	9:20-9:40
3	SA-26	Maeda	1	3	9:40-10:00
4	SA-24	Adimula	1	3	10:00-10:20
5	SA-33	Mweene	1	3	10:20-10:40
WORKSHOP COFFEE BREAK					10:45-11:15
6	SA-43	Macamo	1	3	11:20-11:40
7	SA-46	Marobhe	1	3	11:40-12:00 (noon)
8	SA-55	Tesfaye	1	3	12:00-12:20
9	X-1	Baki	1	3	12:20-12:40
10	AA-15	Kolawole	1	3	12:40-13:00
WORKSHOP LUNCH BREAK					12:45-14:15
11	X-4	Elfaki	1	3	14:20-14:40
12	X-2	Mai-Unguwa	1	3	14:40-15:00
13	SA-34	Nair	1	3	15:00-15:20
14	SA-47	Choque	1	3	15:20-15:40
15	SA-54	Lepidi	3	3	15:40-16:00
16	SA-58	Marshall	1	3	16:00-16:20
WORKSHOP COFFEE BREAK					16:15-16:45
17	AA-33	Sugon	1	3	16:40-17:00
18	AA-37	Schuch	1	3	17:00-17:20
19	SA-52	Abe	2	3	17:20-17:40
20	SA-25	Tanto	2	3	17:40-18:00
21	SA-70	Gopir	2	3	18:00-18:20

Day 4 of ISWI Workshop in Egypt 2010

Talk No.	Abstract Reference Number SA=submitted abstract AA=attached abstract X=extra abstract	**Name** (first author)	Sub-Session Type 1=instrument related 2=data related 3=science related	Day Number of Workshop (Day 3 or Day 4)	Time of Presentation (each consists of 15-min. talk followed by 5-min. discussion.)
22	SA-27	Maeda	3	4	9:00-9:20
23	AA-14	Rabiu	3	4	9:20-9:40
24	SA-50	Yamazaki	3	4	9:40-10:00
25	X-3	Vafi	3	4	10:00-10:20
26	AA-22	Mahrous	3	4	10:20-10:40
WORKSHOP COFFEE BREAK					10:45-11:15
27	AA-21	Ghamry	3	4	11:20-11:40
28	Recent entry.	Takla	3	4	11:40-12:00 (noon)
29	AA-36	Stekel	3	4	12:00-12:20
30	SA-40	Otadoy	3	4	12:20-12:40
31	SA-30	Takla	3	4	12:40-13:00
WORKSHOP LUNCH BREAK					12:45-14:15
MAGDAS Session Summary Discussion Prof. Yumoto and SERC seek to have a MAGDAS Session every year. To conclude the 2010 MAGDAS Session, we wish to have a "wrap up" seesion, where we can freely talk about future plans for MAGDAS, collaborative efforts, important goals, items that you wish to clarify, etc.					14:20-16:00

Talk Number: 1

Title:
Capacity Building of MAGDAS

Author(s): K. Yumoto

Affiliation: SERC, Kyushu University, Japan.

Abstract:
Under the framework of the MAGDAS Project of SERC (at Kyushu University), this talk will cover the three phases of "Capacity Building": (1) Development of instrument capacity, (2) Development of data analysis capacity, and (3) Development of science capacity. Capacity Building is one of the major goals of IHY and ISWI, as specified by the organizers of IHY and ISWI.

Talk Number: 2

Title:
MAGDAS-I, -II and -9 Systems of SERC

Author(s):
Y. Yamazaki, A. Ikeda, S. Abe, T. Uozumi, G. Maeda and K. Yumoto

Affiliation: Kyushu University, Japan.

Abstract:
The MAGDAS is one of the largest ground magnetometer array in the world. There are 53 MAGDAS stations all over the world, which send real-time data to the Space Environment Research Center (SERC) at Kyushu University in Japan. In this talk, I give details on the three magnetometer types of MAGDAS. I also mention some operation details.

Talk Number: 3

Title:
Deployment of MAGDAS in Africa

Author(s):
G. Maeda, K. Yumoto, Y. Kakinami, T. Tokunaga, A. Fujimoto, A. Ikeda, Y. Yamazaki, S. Abe, M. Sakai, N. Eto, H. Terada, M. Shinohara.

Affiliation: SERC, Kyushu University.

Abstract:
The deployment of MAGDAS began in Africa in the Year 2006, with installations along the dip equator in three countries. In 2008, the 96 Deg. MM Chain was established, running from Hermanus to Fayum. In 2010, a major upgrade was performed on the equatorial stations of MAGDAS. We will discuss details. As well, we will evaluate stations on the basis of performance: (1) quality of data, (2) quality of Internet connection, and (3) stability of instrumentation.

The MAGDAS Hosts of Africa are from West to East:
(ABJ) Prof. Vafi, (LAG) Prof. Kolawole, (ILR) Dr Adimula,
(ABU) Dr Rabiu, and (AAB) Prof. Gizaw.

The MAGDAS Hosts of Africa are from South to North:
(HER) Dr McKinnell, (DRB) Prof. Afullo, (MPT) Dr Macamo,
(LSK) Dr Mweene, (DES) Dr Makundi, (NAB) Dr Baki,
(KRT) Prof. Badi, (ASW) Dr Mahrous, and (FYM) Dr Mahrous.

Talk Number: 4

Title:
Magnetic Field Variations from MAGDAS measurements at some Equatorial Electrojet Stations.

Author(s):
I. A. Adimula, A. B. Rabiu and The MAGDAS group

Affiliation of the first author: University of Ilorin, Nigeria

Abstract:
Measurements of H,D and Z components of the Geomagnetic fields from the MAGDAS stations at 5 equatorial electrojet (EEJ) stations were analyzed for the day to day variability and their interdependence. The results show that the EEJ current peaks at about local noon for all stations and show strong correlation ($r > 0.9$ in some instances) between different pairs of EEJ stations, which indicates that the source of the EEJ current is global rather than local of which effect is far more than other sources that may cause geomagnetic variation.

Talk Number: 5

Title:
The MAGDAS Instrument and Space Science at the University of Zambia

Author(s): Habatwa Vincent Mweene

Affiliation: Department of Physics, University of Zambia

Abstract:
The Department of Physics at the University of Zambia has decided to branch out into space science. To this end, it has recruited two lecturers trained in that area and has a member of staff doing a PhD in this field of physics. Courses in space science are being drawn up for approval by the Senate, and it remains to identify an area for research activity. The MAGDAS instrument at the university is a natural focal point for research activity. In this talk we discuss our plans and hopes about using the instrument to help us realise the dream of introducing space science at the University of Zambia

Talk Number: 6

Title:
Installation of Magnetometer- Magdas II and SIDs Monitor, at the University Eduardo

Author(s): Alberto Juliao Macamo

Affiliation: Dept. of Physics, University Eduardo Mondlane, Maputo, Mozambique.

Abstract:
The studies sustainability in weather space supported by IHY and according to the invitation formulated by SCINDA2007, the environmental physic research group and Solar energy research group of Eduardo Mondlane University, the Physic's Department has integrated in MAGDAS phase II Project in September 2008, a site installed in Maputo in the setting coordinate (S 250 56' 58.6" e E 320 35'56.4"). In addition to other was also installed the SID monitor for experimental testing in measurement of solar disturbance, as well as the impressive as scintillations from lightning. With these instruments installed, we will get condition to share and correlate the ionosphere's scintillations, magnetosphere's events and environmental climatology. As solar disturbance some results have already been obtained and while in the review process for later its scientific validation.

Talk Number: 7

Title:

Magnetic Field Observation in Dar Es Salaam, Tanzania.

Author(s):
I. M. Marobhe and Uiso C.B.S.

Affiliation:
Geology Department University of Dar Es Salaam, Tanzania

Abstract:
The magnetometer to monitor the magnetic field was installed in Dar Es Salaam in September 2008 by SERC of Kyushu University. The instrument MAGDAS II measures the vertical component (Z), the horizontal Component (H) and the magnetic declination (D). The data is collected and sent to SERC through the internet connection. The paper presents the results of the two years observation period, problems that have been encountered in the cause of observation. The station is located just 6□S of the equator and is therefore characterized high amplitudes during the day time.

Talk Number: 8

Title:

Deployment of MAGDAS at Magnetic Equatorial Station of Addis Ababa: Status and Upgrade to New System as well as its use in conjunction with

Author(s):

Epherem Tesfaye, Gebreab Kidanu , Gizaw Mengistu, MAGDAS Group

Affiliation:

Department of Physics, Addis Ababa University, Ethiopia

Abstract:

Magntic Data Acauisitionn System (MAGDAS) magnetometer system, one of several existing and planned chains of magnetometer in Africa consists of the fluxgate-type magnetometer with orthogonal 3-axial ring-core (amorphous metallic alloys) sensors. Magnetic field digital data are obtained with the sampling rate of 16 Hz, and then 1 second and 1 minute averaged data are recorded and transferred to the SERC, Japan in real time. The resolutions of MAGDAS data are 0.031 nT/LSB and 0.061 nT/LSB for 1,000 nT and 2,000 nT range, respectively. The long-term inclinations (I) of the sensor axes are measured by two tiltmeters with 0.2 arc-sec resolution. This magnetometer and several ground-based GPS receivers, e.g. two SCINDA stations primarily designed for scintillation studies and over 15 UNAVCO stations primarily aimed at geodetic studies are necessary to provide complementary data, are currently deployed in Ethiopia. This set of instrumentations are very much needed to monitor the electrodynamics activity over Ethiopia and Africa in general paving the way for scientific inquiry and the development of global data assimilation models. In this context, we give two presentations: 1) Status, upgrade, use and availability of Data from MAGDAS System; and 2) On the assimilation of GPS TEC in NeQuick Model over Ethiopia: algorithm and application. We will demonstrate how with better data and model, the plasma content and structure in the region are accurately mapped.

Talk Number: 9

Title:
A study of the F Region Current using MAGDAS and CHAMP satellite data.

Author(s): P. Baki

Affiliation: Dept. of Physics, University of Nairobi, Kenya.

Abstract:
We present preliminary results of the Study of the F region current using ground-based magnetic data and in situ space based magnetic field measurents as taken by the cHAMP satellite. We also provide information on the MAGDAS station in Nairobi.

Talk Number: 10

Title:
Progress Report on MAGDAS in Lagos, Nigeria

Author(s):
L.B. Kolawole, M.O. Osinowo

Affiliation:
Department of Physical Sciences, Redeemer`s University, Nigeria.

Abstract:
The MAG9 installed in Lagos, Nigeria is one of the fourteen 14 MAGDAS stations in Africa and one of the five 5 located in the Equatorial Chain, west to east}. It is installed in Lagos geomagnetic lat 6.48, long 3.27 and has been functional since September 2008.The paper highlights the continued technical and administrative support received from Professor Yumoto and other members of his team at the Kyushu University, Japan. Some operational challenges encountered as well as the invaluable data already acquired with the equipment are also articulated. For example, the early set of data has been used of undergraduate degree projects. We have also acknowledged the unwavering support of the management of the Redeemers University which hosts the equipment.

Talk Number: 11

Title:
MAGDAS STATION IN SUDAN

Author(s): Dr I.M.Elfaki

Affiliation:
Department of Physics- Sudan University of Science and Technology

Abstract:
Sudan is a country in northeastern Africa. It is the largest country in Africa; the river Nile divides the country between east and west sides; the capital is Khartoum. Sudan University of Science and Technology (SUST) is a Sudanese university situated in Khartoum State, in Sudan. The different colleges of SUST, institutes and centers of the university are located in Khartoum and Khartoum North localities. The campuses of the university are the Main Campus, The Music and Drama Campus, The Southern Campus, The Forestry Campus, The Radiologic Science Campus, Kuku Campus, The Northern Campus, Shambat Campus and Wad al Maqbul Campus. The Southern Campus is the host of MAGDAS, which was installed two years ago on 23/9/2008. The program was well established and data processed to main data source and packed data stored in the university. There is a periodic maintenance program for the instrument and two months ago on 27/7/2010 an expert visited the instrument for a check and a Japanese team will visit the station on 7-10/9/2010.

Talk Number: 12

Title:
THE EFFECT OF NEGETIVELY CHARGED DUST ON GRADIENT DRIFT INSTABILITY IN SPACE DUSTY PLASMA

Author(s):
Dr. H. Mai-Unguwa, Dr. S. O. Mohammed.

Affiliation:
National Space Research and Development Agency (NASRDA), Abuja, Nigeria.

Abstract:
Possible effects of negatively charged dust on the gradient–drift instability in the lower ionosphere are investigated. The presence of localized regions of charged dust with short- scale variation in the dust charged density may lead to the generation of small-scale electron density gradients which can enhance the growth of instability. In addition, negatively charged dust can influence the instability through its effect on equilibrium charged neutrality, which affects the phase speed of the waves. Using linear kinetic theory, critical electron drifts are estimated. The analytical derivation results are solved numerically using **FORTRAN** programming language. The results are found to be in good agreements with literature.

Talk Number: 13

Title:
Discussion on the maintenance of MAGDAS

Author(s): K.U.Nair

Affiliation:
Indian Institute of Geomagnetism

Abstract:
Poster presentation of the Installation and discussion on the maintenance of the real-time Magnetic Data Acquisition System of Circum-pan Pacific Magnetometer Network, i.e. MAGDAS/CPMN, installed at the Equatorial geophysical research lab (8º 44´ N and 77º 44´ E) Tirunelveli India, during October 2007.

Talk Number: 14

Title:
MAGDAS/CPMN Magnetometers in Peru

Author(s):
Edwin Choque, Jose Ishitsuka

Affiliation:
Geophysical Institute of Peru

Abstract:
Due to a peculiar geomagnetic position, magnetometer of DTM of Carnegie Institution of Washington was installed in 1922 at Huancayo Observatory. In 1985 the first magnetometer of Kyushu University was installed in Huancayo Observatory, then it was moved after to Ancón Observatory that have the same latitude of Huancayo. This magnetometer was part of The Equatorial Magnetic Observation Network (PI; Prof. T. Kitamura), after it become as the Circum-pan Pacific Magnetometer Network (PI of CPMN; Prof. K. Yumoto). In October 13th of 2006 Space Environment Research Center - SERC of Kyushu University installed a new Magnetic Data Acquisition System MAGDAS (PI; Prof. K. Yumoto) that is working stable since the installation. Ancón Observatory's geographic latitude is: -11.79°, longitude: -77.16° and geomagnetic(2000) latitude is: 3.10° and longitude: 354.66°. At Ancón Observatory we also have an old magnetometer that belonged to ERI that was transferred to us and it is working well, recently electronics were renewed thanks to WDC-Kyoto support, since that also barometric pressure data is available.

Talk Number: 15

Title:
The contribution of L'Aquila (Italy) Geomagnetic Observatory to MAGDAS project

Author(s):
S. Lepidi (1), A. Meloni (1), P. Palangio (1), K, Yumoto (2)

Affiliations:
(1) Istituto Nazionale di Geofisica e Vulcanonogia, Roma, Italy.
(2) Space Environment Research Center, Kyushu University

Abstract:
The geomagnetic Observatory of L'Aquila (Italy) was founded by INGV in 1958, on the occasion of the International Geophysical Year. It is the main Italian geomagnetic observatory. Since 1999 L'Aquila Observatory belongs to the Intermagnet system, an International network grouping worldwide geomagnetic observatories able to provide Earth's magnetic field measurements according to precise quality standards. Geomagnetic field measurements in L'Aquila are used to study the variations of the Earth's geomagnetic field, both of internal and external origin. In November 2008 a new magnetometer was installed in L'Aquila within the MAGDAS project, coordinated by SERC. The location of this installation can be useful to complete the MAGDAS monitoring system to study solar-terrestrial events.

Talk Number: 16

Title:
MAGDAS in Australia

Author(s):
Richard Marshall

Affiliation:
IPS Radio and Space Services, Australian Bureau of Meteorology

Abstract:
IPS Radio and Space Services, the space weather unit of the Australian Bureau of Meteorology, manages the majority of MAGDAS installations in Australia. This paper presents details of IPS managed installations within Australia, including the near real-time transfer of data to both the Space Environment Research Center in Japan and IPS in Sydney, Australia. This paper will also discuss the use of MAGDAS data in IPS space weather services.

Talk Number: 17

Title:
Proposal for geomagnetic field mapping using MAGDAS stations and spherical harmonics: correlations of magnetic anomalies with earthquake epicenters

Author(s):
Quirino M. Sugon Jr., Akihiro Ikeda, Daniel J. McNamara, Manabu Shinohara and Kiyohumi Yumoto

Affiliation of the first author:
Manila Observatory, Philippines.

Abstract:
In this talk we present our proposal for making a geomagnetic field map of the Philippines at one second time interval using data from 6 MAGDAS stations: the four existing stations at TUG, MUN, CEB, DAV, and two other stations to be installed in LGZ and CAG. To determine the magnetic field at any point in the Philippine area of responsibility, we shall use spherical harmonic expansion of the internal geomagnetic field via Schmidt quasi-normalized associated Legendre polynomials. (We cannot separate the external magnetic field due to the solar wind because we do not have MAGDAS stations above the surface of the earth.) Because we only have 6 stations measuring magnetic field at x-, y-, and z-axis, the number of simultaneous linear equations that we can use to solve the Gaussian coefficients of the spherical harmonics is 18, which corresponds to a spherical harmonic expansion up to the 3rd order. We believe that the effect of the solar wind on the geomagnetic field would be evenly spread throughout the Philippine archipelago, while the magnetic anomalies before, during, and after the occurrence each earthquake would be localized at the quake's epicenter. If this hypothesis is correct, then we can make short-term predictions of earthquakes.

We can extend our method of geomagnetic field mapping to any point on the surface of the earth using about 50 magnetometer stations in MAGDAS/CPMN (Magnetic Data Acquisition System/Circum-pan Pacific Magnetometer Network). This would require solving about

150 simultaneous linear equations for about 150 Gaussian coefficients of an 11th order spherical harmonic expansion. For comparison, the International Geomagnetic Reference Field (IGRF-11) uses 13th order spherical harmonic expansion using data from non-MAGDAS/CPMN stations and satellites. But unlike the !GRF-11 which is an average prediction for a 5 year interval from 2010-2011, the 11th order spherical harmonic expansion determined from the MAGDAS/CPMN data would be a time-varying expansion capable of resolving 1-second fluctuations of the geomagnetic field. So whenever an earthquake happens anywhere in the world, we hope to be able to determine where and when the earthquake happened based from the position and occurrence time of the magnetic field anomalies in the geomagnetic map.

Aside from monitoring earthquakes, we can also use our worldwide geomagnetic maps to picture the effect of geomagnetic storms on the surface of the earth. These pictures would allow us to make better definitions of the K, Kp, DST, and G-scale indices.

Talk Number: 18

Title:

Geomagnetism Science and MAGDAS Station in Southern Brazil

Author(s):

NELSON JORGE SCHUCH[1], Kiyohumi Yumoto[2], Kazuo Makita[3], Nalin Babulal Trivedi[4], Severino Luiz Guimaraes Dutra[4], Sergio Luis Fontes[5], Andirlei Claudir da Silva[1], Tardelli Ronan Coelho Stekel[1], Cassio Espindula Antunes[4], José Paulo Marchezi[1], Cristofer Rovian Claro Pedrozo[1].

Affiliations:

1 – Southern Regional Space Research Center - CRS/CCR/INPE-MCT, in collaboration with the Santa Maria Space Science Laboratory - LACESM/CT-UFSM, Santa Maria, RS, Brazil.

2 – Space Environment Research Center, Kyushu University, Fukuoka, Japan.

3 – University of Takushoku, Tokyo, Japan.

4 – National Institute for Space Research, São José dos Campos, SP, Brazil.

5 – National Observatory – ON/MCT, Rio de Janeiro, RJ, Brazil.

Abstract:

The secular variation in the total geomagnetic field F and the westward drift of SOUTH ATLANTIC MAGNETIC ANOMALY (SAMA) has been observed in the Brazilian INPE's Southern Space Observatory – SSO/CRS/CCR/INPE–MCT, (29,43° S, 53,82° W, 488m a.s.l.), in South of Brazil, since 1985, in cooperation with the Space Environment Research Center – Kyushu University, Japan. The main objective of the Magnetic Observatory with the MAGDAS Station at SSO is to monitor the westward drift of the SAMA and to provide valuable observations for the Space Weather. According to IGRF2010 the present value of F at the Southern Space Observatory is 22654 nT a value close to the measured one. The secular variation in F at this station is -28 nT per year. It is difficult to forecast the drift movement of the SAMA Anomaly in the coming years, however, it is a matter of concern should the field continue to decrease at the present rate or even faster. An overview of Geomagnetism Science and the MAGDAS station at south of Brazil and the continuous observation of the Geomagnetic Monitoring Program at SSO in the SAMA region is presented.

Talk Number: 19

Title:
How to use MAGDAS Data for Science -- STP Phenomena in MAGDAS Data -

Author(s):
S. Abe, T. Uozumi, A. Ikeda, Y. Yamazaki, G. Maeda and K. Yumoto.

Affiliation: SERC, Kyushu University.

Abstract:
MAGDAS (MAGnetic Data Acquisition System) is a world-wide geomagnetic magnetometer network constructed by Space Environment Research Center (SERC), Kyushu University, Japan in cooperation with all MAGDAS host institutes. One of MAGDAS features is near real-time data transmission from overseas stations by using Information Technologies. There are many differences and difficulties to construct the network connection between MAGDAS magnetometers installed at each host station and data collection server at SERC. We will introduce some case examples of MAGDAS real-time data transmission.
Geomagnetic data collected by MAGDAS are released from SERC after some processes for scientific usage (for example, noise reduction, temperature drift correction, and so on). In recent date, we announced via our MAGDAS Newsletter that we have released Africa MAGDAS data collection as DVD media. FTP data are also available. We will introduce the detailed contents of this DVD media, and demonstrate the usage of MAGDAS data (read, plot, and simple analysis) by using DVD media.

We can see many Solar Terrestrial Physics (STP) phenomena by analyzing MAGDAS data. All of them are very important to understand the complexity of Sun-Earth system. We will present some examples of STP phenomena (ssc, sfe, DP2, Pc 3-4, Pc 5, Pi 2, substorm and magnetic storm) which can know from MAGDAS data.

Talk Number: 20

Title:
Near Real Time Magdas Data Processing System in Indonesia

Author(s):
Setyanto Cahyo Pranoto

Affiliation: National Institute of Aeronautics and Space (LAPAN), Indonesia.

Abstract:
Space Environment Research Center - SERC of Kyushu University installed a new Magnetic Data Acquisition System (MAGDAS, PI; Prof. K. Yumoto) that is dedicated to observe the magnetic field for supporting the space weather study. In Indonesia, MAGDAS places the instruments at three observation sites i.e at Parepare, Manado and Kupang. The first step to monitor the geomagnetic activity supporting space weather program of LAPAN (National Institute of Aeronautics and Space), we developed a near-real time data transfer where the magnetic data is transferred from the MAGDAS sites to LAPAN at Bandung. Currently, we developed a near-real time system for data processing to display the real time magnetic variations and to extract the magnetic pulsations in the band frequency of Pc3, Pc4, Pc5 and Pi2. The system also calculates near-real time of k-index as well.

Talk Number: 21

Title:
Wavelet Based Estimation of the Hurst Exponent for the Horizontal Geomagnetic Field at MAGDAS Equatorial Stations

Author(s):
G. Gopir, N. S. A. Hamid, N. Misran, A. M. Hasbi and K. Yumoto

Affiliation:
Universiti Kebangsaan Malaysia & Kyushu University (Japan)

Abstract (continued on a second page) :
The geomagnetic field is known to be scaling, fractal and self-affine due to modulations by the magnetosphere and lithosphere. It is also non-stationary and contains transients during active or disturbed periods; and thus its time series could be analyzed using wavelet to extract the fractal parameter of Hurst exponent. In this study we have applied the wavelet variance analysis to calculate the Hurst exponent for the horizontal component of the geomagnetic field observed by the global network of the Magnetic Data Acquisition System (MAGDAS) developed and installed by the Space Environment Research Center (SERC) of Kyushu University, Japan. We used the MAGDAS time series of the horizontal geomagnetic field for the quiet day of 11 August 2005 and the active or disturbed day of 24 August 2005; and the quiet month of February 2007 at the equatorial stations of Davao (geographical 7.00°N, 125.40°E; geomagnetic 1.02°S, 196.54°E) and Cebu (geographical 10.36°N, 123.91°E; geomagnetic 2.53°N, 195.06°E) in the Philippines and Langkawi (geographical 6.30°N, 99.78°E; geomagnetic 2.32°S, 171.29°E) in Malaysia. The daily data were sampled every second and every minute; and the monthly data were sampled every minute. Wavelet transform using the Mexican hat mother wavelet was performed on the geomagnetic field time series and from the variance of the transform at different scales we calculated the Hurst exponent. We found significantly different Hurst exponent values of 0.4-0.5 for the quiet periods and 0.6-0.7 for the active periods of the horizontal geomagnetic field at these MAGDAS equatorial locations. This indicates that the quiet period is slightly anti-persistent and the

active period is moderately persistent for the geomagnetic field. Thus, the wavelet variance analysis is a convenient computational tool to characterize the fractal, scaling and self-affine nature of the geomagnetic field.

(end of abstract.)

Talk Number: 22

Title:
Rules for Using MAGDAS Data

Author(s):
G. Maeda, K. Yumoto, S. Abe, A. Ikeda, T. Uozumi

Affiliation: SERC, Kyushu University.

Abstract:

MAGDAS generates two types of data: 1-min. data and 1-sec. data. And there are three types of users: First Party (SERC), Second Party (MAGDAS hosts), and Third Party (all others). So we will discuss the Rules that govern who can use what and how.

Talk Number: 23

Title:
Ionosphere Over Africa: Results from Geomagnetic Field Measurements During International Heliophysical Year IHY

Author(s):
Rabiu, A. B., Yumoto, K., MAGDAS/CPMN Group

Affiliation: of the first author:
Centre for Space Research and Applications, Federal University of Technology, Akure, Nigeria

Abstract:
The Space Environment Research Center (SERC) of Kyushu University, Japan, installed 13 units of Magnetic Data Acquisition Systems (MAGDAS) over Africa during the International Heliophysical Year, IHY. Magnetic records from 10 stations along the African 96 Deg. Magnetic Meridian (Geographical 30 Deg. to 40 Deg. East) were examined for Solar quiet daily Sq variations in the three geomagnetic field components of H, D and Z. Latitudinal variations of Sq in the geomagnetic components were examined. Signatures of equatorial electrojet and worldwide Sq were identified and studied in detail. H field experienced more variation within the equatorial electrojet zone. Diurnal and seasonal variations of the geomagnetic variations in the three components were discussed. Sq H is expectedly consistently maximum within the electrojet zone as a result of EEJ. Sq Z demonstrates 2 sunrise maxima at about geographical latitudes +20 Deg. and -30 Deg.; maintain a single maximum at noon and sunrise. Sq D has maximum values at about -20 Deg. (sunrise), -10 Deg. (noon time) and +10 Deg. (sunset). Levels of inter-relationships between the Sq and its variability in the three components were statistically derived and interpreted in line with the mechanisms responsible for the variations of the geomagnetic field. Data from 2 magnetic observatories within equatorial electrojet EEJ strip and 2 stations outside the EEJ strip were employed to evaluate and study the signatures of the Equatorial electrojet over the African sector. The transient variations of the EEJ at two almost parallel axes using Lagos-Ilorin (West Africa) and Nairobi-Addis

Ababa (East Africa) pairs were examined. The eastern electrojet appeared stronger than the western. The latitudinal and longitudinal profiles of the Sq were examined and inferences drawn from observed results were discussed.

Talk Number: 24

Title:
Study of the Ionospheric Current System Using MAGDAS Data

Author(s):
Y. Yamazaki, A. Ikeda, S. Abe, T. Uozumi, G. Maeda and K. Yumoto

Affiliation: Kyushu University, Japan.

Abstract:
The MAGnetic Data Acquisition System (MAGDAS) is a global magnetometer network operated by the Space Environment Research Center (SERC) at Kyushu University in Japan. The MAGDAS data enables us to study electric currents flowing in the ionosphere. We explain how to use the MAGDAS data for study of the ionospheric currents and show some results we obtained.

Talk Number: 25

Title:
The Magnetic Data Acquisition System (MAGDAS) in Abidjan

Author(s):
Doumbia, V., K. O. Obrou, O. F., Grodji.

Affiliation:
Universite de Cocody-Abidjan, UFR-SSMT,
Laboratoire de Physique de l'Atmosphere, 22 BP 582 Abidjan 22
Côte d'Ivoire.

Abstract:
In the framework of the Magnetic Data Acquisition System (MAGDAS) worldwide network deployment, the Space Environment Research Center (SERC) of Kyushu University (Japan) has setup a MAGDAS station at the University of Cocody, Abidjan (Côte d'Ivoire) in September 2006. As part of an equatorial network, this station was aiming to simultaneously record the geomagnetic field variations with the other MAGDAS stations. However due to technical troubles, especially with Internet connection, data acquisition at the Abidjan MAGDAS station has not been very successful during the last four years. Fortunately, in August 2010, the station was upgraded to a MAGDAS_9 magnetometer, which is currently providing reliable magnetic data.

In this presentation, we will focus our talk on what has not worked in the Abidjan MAGDAS station, and will make proposition for better cooperation.

Talk Number: 26

Title:

Day-to-day variability of the magnetic field measurements, preliminary result from MAGDAS chain in Egypt

Author(s):

A. Mahrous[1], E. Ghamry[2], R. Elhawary[1] and K. Yumoto[3]

Affiliations:

(1)- Space Weather Monitoring Center (SWMC), Helwan University, Ain Helwan 11795, Egypt.

(2) - National Research Institute of Astronomy and Geophysics, NRIAG, Helwan.

(3) - SERC, Kyushu University, Japan.

Abstract:

MAGDAS, the Magnetic Data Acquisition System, was successfully installed at two stations in Egypt, the first station is located in Fayoum University while the second one is located in South Valley University at Aswan. MAGDAS is an important component of the International Space Weather Initiative (ISWI). We studied preliminary results obtained from the variability of the amplitude of the solar quiet (Sq) daily variations in the three geomagnetic elements, H, D, Z. The day-to-day fluctuations of the horizontal, declination, and vertical component of the geomagnetic field along MAGDAS chain in Egypt are examined. The magnetic data obtained from Fayoum and Aswan gives a good representation of the geomagnetic field at low stations.

Talk Number: 27

Title:
Study of Pi2 pulsation observed from MAGDAS chain in Egypt.

Author(s):
E. Ghamry[1, 2], A. Mahrous [2], N. Yasin[3], A. Fathy[3] and K. Yumoto[4]

Affiliations:
(1)-National Research Institute of Astronomy and Geophysics, NRIAG, Helwan.
(2)- Space Weather Monitoring Center (SWMC), Helwan University, Ain Helwan 11795, Egypt.
(3)- Physics Department, Faculty of Science, Fayoum University
(4)- SERC, Kyushu University, Japan.

Abstract:

We present first results of Pi2 pulsations observed from MAGDAS stations in Egypt (FYM and ASW). MAGDAS, the Magnetic Data Acquisition System, is an important component of the International Space Weather Initiative (ISWI).

We carried out our analysis through a visual inspection comparing our events with burst in AE index during the period from November 2008 to October 2009. To investigate the generation mechanism of Pi2 pulsations, we used two different methods. (i) Fourier transformations and (ii) wavelet power spectrum.

The frequency of Pi2s is identical at two stations reflect the possibility of plasmaspheric cavity resonance as a generation source of Pi2 pulsations.

Talk Number: 28

Title:
Latitudinal Dependence of Pc 3-4 Amplitudes at 96 MM Stations in Africa

Author(s):
E. M. Takla[1], K. Yumoto[1,2], M. G. Cardinal[1], S. Abe[2], A. Fujimoto[1], A.Ikeda[1], T. Tokunaga[1], Y. Yamazaki[1], T. Uozumi [2], A. Mahrous[3], E.Ghamry[3,4], G. Mengistu[5], T. Afullo[6], A. Macamo[7], L. Joao[7], H. Mweene[8], N.Mwiinga[8], C. Uiso[9], P. Baki[10], G. Kianji[10], K. Badi[11], P. Sutcliffe[12], and P. Palangio[13].

Affiliations:
[1] Dept. of Earth and Planetary Sci., Kyushu Univ., Japan; [2] Space Environ. Res. Center, Kyushu Univ., Japan; [3] SWMC, Helwan Univ., Egypt; [4] NRIAG, Egypt; [5] Dept. of Phys. Addis Ababa Univ., Ethiopia; [6] Dept. of Elec. Engineering Univ. of Kwazulu-Natal, South Africa; [7] Dept. of Phys., Eduardo Mondlane Univ., Mozambique; [8] Dept. of Physics, Univ. of Zambia; [9] Dept. of Phys., Univ. of Dar es Salaam, Tanzania; [10] Dept. of Phys., Nairobi Univ., Kenya; [11] Dept. of Eng., Sudan Univ. of Sci. and Tec., Sudan; [12] Hermanus Mag. Observatory, South Africa and [13] INGV, Italy.

Abstract.

The study of the latitudinal dependence of Pc 3-4 amplitudes at very low latitudes particularly near the dip equator is very important to identify the propagation mechanisms of the equatorial Pc 3-4 pulsations. Therefore, geomagnetic data simultaneously recorded at the MAGDAS African stations along the 96° Magnetic Meridian chain were analyzed to examine the latitudinal dependence of Pc 3-4 amplitudes at the equatorial and very low latitudes up to middle latitudes. During three and a half months between 4 October 2008 and 22 January 2009, 21 Pc 3 events and 25 Pc 4 events were selected for studying the latitudinal dependence of Pc 3-4 amplitudes. From the data analysis, the Pc 3 amplitudes showed a peak at low-latitude stations with a depression at the dip equator. The

attenuation of the Pc 3 amplitude at the dip equator may be explained as a result of the ionospheric shielding effect. On the other hand, the Pc 4 amplitudes showed a peak at the dip equator and decreased with increasing latitudes up to middle latitudes. According to the obtained results, the main source of the equatorial Pc 3 must be related to the compressional upstream waves, while the equatorial Pc 4 may be linked with the compressional upstream waves and/or the Pc 4 excited at higher latitudes.

Talk Number: 29

Title:
Geomagnetic field variation due to solar flare in the South Atlantic Magnetic Anomaly region

Author(s):
TARDELLI RONAN COELHO STEKEL[1],
Nelson Jorge Schuch[1],
Kiyohumi Yumoto[2],
Kazuo Makita[3],
Nalin Babulal Trivedi[4],
Severino Luiz Guimaraes Dutra[4],
Sergio Luis Fontes[5],
Andirlei Claudir da Silva[1],
Cassio Espindula Antunes[4],
José Paulo Maechezi[1],
Cristofer Rovian Claro Pedrozo[1].

Affiliations:
1 – Southern Regional Space Research Center - CRS/CCR/INPE - MCT, in collaboration with the Santa Maria Space Science Laboratory - LACESM/CT- UFSM, Santa Maria, RS, Brazil.
2 – Space Environment Research Center, Kyushu University, Fukuoka, Japan.
3 – University of Takushoku, Tokyo, Japan.
4 – National Institute for Space Research, São José dos Campos, SP, Brazil.
5 – National Observatory – ON/MCT, Rio de Janeiro, RJ, Brazil.

Abstract:
The solar flare incidence follows a behavior similar to the solar cycle activity, which results in periodic disturbances on the Earth's atmosphere and magnetosphere. Sudden perturbations of the geomagnetic fields at solar flares are called geomagnetic Solar Flare Effect (SFE) or Magnetic Crochet. The SFE is associated with the sudden change of ionospheric currents caused by the extra ionization produced by the soft X-ray (0.1 to 9.0 nm) and EUV (9.0 to 100.0 nm) radiation from the solar flare. Intense SFE events were analyzed for

the horizontal (H), declination (D) and vertical (Z) geomagnetic components. For this purpose, analysis were performed for X-ray data (0.1 to 0.8 nm) from the GOES X-ray Sensor (XRS), and the EUV count rate data (26.0 to 34.0 nm and 0.1 to 50.0 nm) from SOHO Solar Extreme Ultraviolet Monitor (SEM), as well as, the MAGDAS magnetometers data dedicated to study of the Solar-Earth interactions at the Southern Space Observatory (SSO/CRS/CCR/INPE – MCT), (29.4°S, 53.8°W), São Martinho da Serra, RS, Brazil, near the South Atlantic Magnetic Anomaly Center. With the analyze of these events it was made the correlation between the solar flare and the magnet crochet event studying the direction of ionospheric current and the importance of the solar terrestrial relationship.

Talk Number: 30

Title:
Investigation of the Influence of the IMF on Equatorial Electrojet Through Nonlinear and Time Series Analyses of the MAGDAS Data

Author(s):
R. E. S Otadoy, R. Violanda, K. Yumoto, and the MAGDAS Group

Affiliation of the first author:
Department of Physics, University of San Carlos, Cebu City, Philippines.

Abstract:
We will investigate the effect of the change of the interplanetary magnetic field (IMF) on the equatorial electrojet both in quiet and disturbed conditions. Whereas most researches in this area were conducted in a limited part of the EEJ, our study will cover the full latitudinal EEJ sector along the 210o magnetic meridian through the MAGnetic Data Acquisition System (MAGDAS). Constructed by the Space Environment Research Center, Kyushu University in Fukuoka, Japan, MAGDAS is the most extensive magnetometer network in the world to date. We will use nonlinear techniques such as fractal/multifractal structures, Hurst coefficients, algorithmic complexity and nonlinear predictability to characterize detect sudden changes in the magnetic field data, EE-indices, and IMF. We will also use cross-correlation coefficients, mutual information, and transfer entropy to characterize correlations and information transfer between IMF and geomagnetic field data associated with the equatorial electrojet and EE-indices.

Talk Number: 31

Title:

Geomagnetic Variations associated with a moderate Earthquake at Taiwan on December 19, 2009

Author(s):

Takla E., K. Yumoto, Jann-Yenq Liu, Y. Kakinami, T. Uozumi, and S. Abe.

Affiliation of the first author:

Dept. of Earth and Planetary Sci., Kyushu Univ., Japan.

Abstract:

The Northern part of Taiwan, on 19 December 2009, was struck by an earthquake measuring 6.4 on the Richter scale at approximate depth of 45 km. The epicenter was located around 20 km away from the Hualien (HLN) station. By using Amami-oh-shima (AMA) station in Japan as a remote reference station, the geomagnetic components (H, D and Z) recorded at HLN station are found to show baseline fluctuations during December 2009. These anomalous variations started about one week before the occurrence of the earthquake and lasted for about two weeks with about 10-15 nT amplitude. Also, we observed about 5 nT decrease in the total geomagnetic field intensity as a co-seismic geomagnetic variation. In addition, an enhanced ULF signal in the range of Pc 3 (10-40 s) was observed a few days before the onset of the earthquake. Furthermore, the polarization ratio (Z/H) of the Pc 3 at HLN station, showed a decrease few days preceding the earthquake. The mechanism for generating such observed anomalous variations is not fully understood. However, we expect that the crustal stress perturbations and the underground conductivity changes associated with the seismic event played an important role for generating such observed geomagnetic variations.

This is the last abstract of the 2010 MAGDAS Session.

Appendices

Appendix A – Appendix G

APPENDIX A

List of MAGDAS Stations (as of 06 Oct 2010)

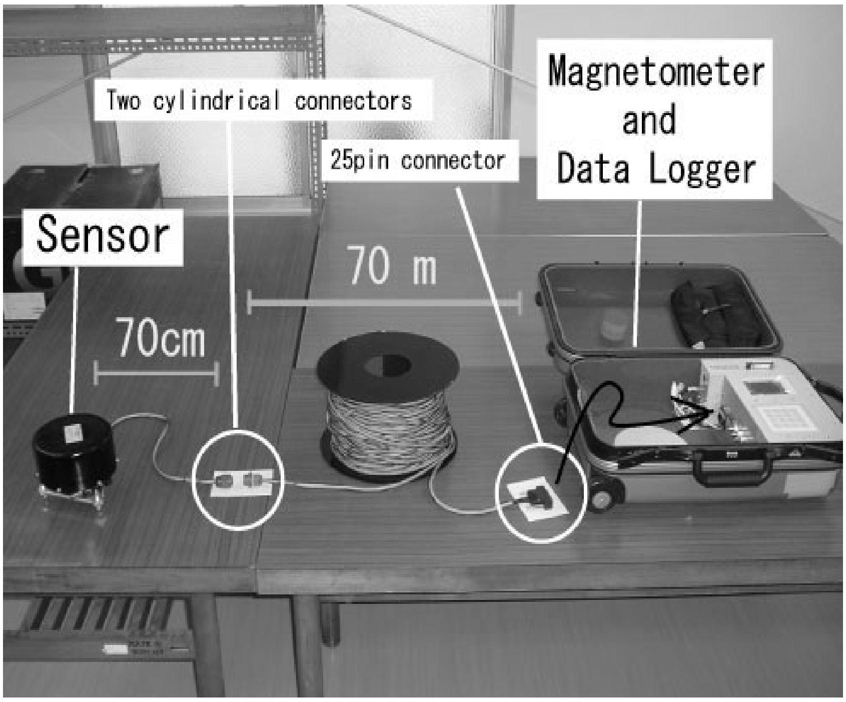
	Station Code (in alphabetical order)	Location (City, Country)	Real time (RT), Non real time (NRT), or Will be real time (WBRT)	Start of real time data transmission	Type of Internet connection	Notes
1	**AAB**	Addis Ababa, Ethiopia	RT		LAN connection readily available	Located on university campus
2	**ABJ**	Abidjan, Ivory Coast	WBRT		LAN connection readily available	Located on university campus
3	**ABU**	Abuja, Nigeria	RT		LAN connection readily available	Government land
4	**AMA**	Amami Oushima, Japan	RT		ISDN	Private land
5	**ANC**	Ancon, Peru	RT		LAN connection readily available	Located on the premsises of an observatory
6	**ASB**	Ashibetsu, Japan	RT			
7	**ASW**	Aswan, Egypt	RT		LAN connection readily available	Located on university campus
8	**BCL**	Bac Lieu, Vietnam	RT		ADSL	Located on the premsises of an observatory
9	**CDO**	Cagayan De Oro, Philippines	RT		Cellphone technology (therefore, wireless)	Located on university campus
10	**CEB**	Cebu, Philippines	RT		LAN connection readily available	Located on university campus
11	**CGR**	Culgoora, Australia	RT		LAN connection readily available	Located on the premsises of an observatory
12	**CKT**	Cooktown, Australia	RT		LAN connection readily available	Located on the premsises of a school
13	**CMD**	Camden, Australia	RT		LAN connection readily available	Located on the premsises of an observatory
14	**CST**	Cape Schmidt, Russia	NRT		DIRECT INTERNET CONNECTION NOT AVAILABLE.	
15	**DAV**	Davao, Philippines	RT		ADSL	Located on the premsises of an observatory

16	**DAW**	Darwin, Australia	RT			Located on the premsises of an observatory
17	**DES**	Dar Es Salaam, Tanzania	RT		LAN connection readily available	Located on university campus
18	**DRB**	Durban, South Africa	RT		LAN connection readily available	Located on university campus
19	**DVS**	Davis, Australia	RT		LAN connection readily available	Located on the premsises of an observatory
20	**EUS**	Eusebio, Brazil	RT		LAN connection readily available	Located on the premsises of an observatory
21	**EWA**	Ewa Beach, Hawaii, USA	RT		LAN connection readily available	Located on the premsises of an observatory
22	**FYM**	Fayum, Egypt	RT		ADSL	Located on university campus
23	**GLY**	Glyndon, USA	RT			
24	**HER**	Hermanus, South Africa	RT		LAN connection readily available	Located on the premsises of an observatory
25	**HLN**	Hualien, Taiwan	RT	May, 2005	LAN connection readily available	Located on university campus
26	**HOB**	Hobart, Australia	RT		LAN connection readily available	Located on the premsises of an observatory
27	**ILR**	Ilorin, Nigeria	RT		LAN connection readily available	Located on university campus
28	**KPG**	Kupang, Indonesia	WBRT		Cellphone technology (therefore, wireless)	Located on the premsises of an observatory
29	**KRT**	Khartoum, Sudan	RT		LAN connection readily available	Located on university campus
30	**KUJ**	Kuju, Japan	RT		ISDN	Private land
31	**LAG**	Lagos, Nigeria	RT		LAN connection readily available	Located on university campus
32	**LAQ**	L'Aquila, Italy	RT		LAN connection readily available	Located on the premsises of an observatory
33	**LGZ**	Legazpi, Philippines	RT		Cellphone technology (therefore, wireless)	Located on university campus
34	**LKW**	Langkawi, Malaysia	RT		LAN connection readily available	Located on the premsises of an observatory
35	**LSK**	Lusaka, Zambia	RT		LAN connection readily available	Located on university campus
36	**MCQ**	MacQuarie Island, Australi	RT		LAN connection readily available	Located on the premsises of an observatory

37	**MGD**	Magadan, Russia	NRT		DIRECT INTERNET CONNECTION NOT AVAILABLE.	Located on the premsises of an observatory
38	**MLB**	Melbourne, Australia	RT		ADSL	Located on the premsises of a weather station
39	**MND**	Manado, Indonesia	RT		Cellphone technology (therefore, wireless)	Located on the premsises of an observatory
40	**MPT**	Maputo, Mozambique	RT		LAN connection readily available	Located on university campus
41	**MUT**	Muntinlupa, Philippines	RT		LAN connection readily available	Located on the premsises of an observatory
42	**NAB**	Nairobi, Kenya	RT		LAN connection readily available	Located on university campus
43	**OIS**	Oiso, Japan.	RT		LAN connection readily available	Located on university campus
44	**ONW**	Onagawa, Japan	RT		LAN connection readily available	Located on the premsises of an observatory
45	**PRP**	Pare Pare, Indonesia	RT		Cellphone technology (therefore, wireless)	Located on the premsises of an observatory
46	**PTK**	Paratunka, Russia	NRT		DIRECT INTERNET CONNECTION NOT AVAILABLE.	Located on the premsises of an observatory
47	**ROC**	Rockhampton, Australia	RT		LAN connection readily available	Located on university campus
48	**SMA**	Santa Maria, Brazil	RT		LAN connection readily available	Located on the premsises of an observatory
49	**TGG**	Tuguegarao, Philippines	WBRT		Cellphone technology (therefore, wireless)	Located on university campus
50	**TIR**	Tirunelveli, India	RT		LAN connection readily available	Located on the premsises of an observatory
51	**TRV**	Tirunelveli, India	RT		LAN connection readily available	Located on the premsises of an observatory
52	**TWV**	Townsville, Australia	RT		LAN connection readily available	Located on the premsises of an observatory
53	**WAD**	Wadena, Canada	RT		Commercial (via satellites) broadband Internet service ("Xplornet")	Private land
54	**YAP**	Yap Island, Micronesia	RT		LAN connection readily available	Located on the premsises of an observatory

APPENDIX B

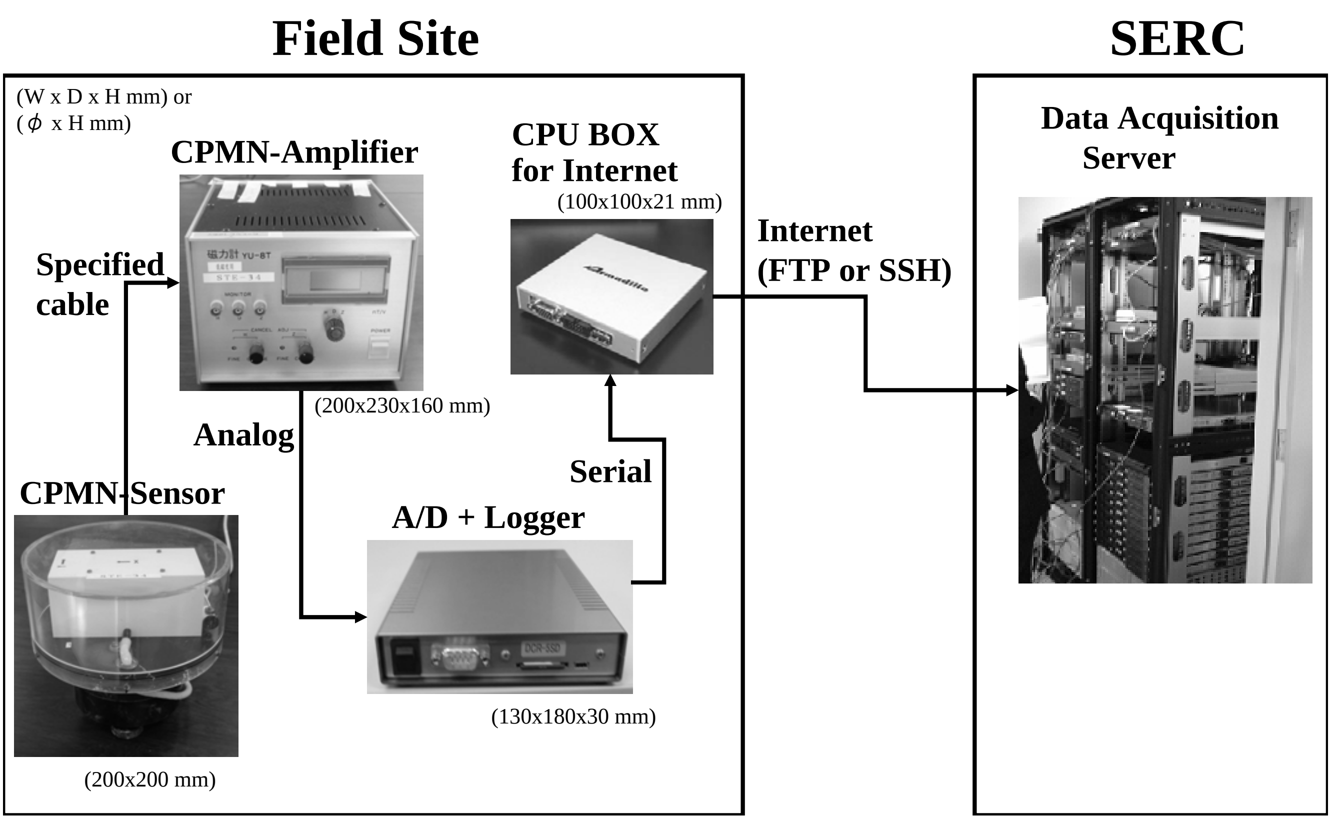
MAGDAS-I



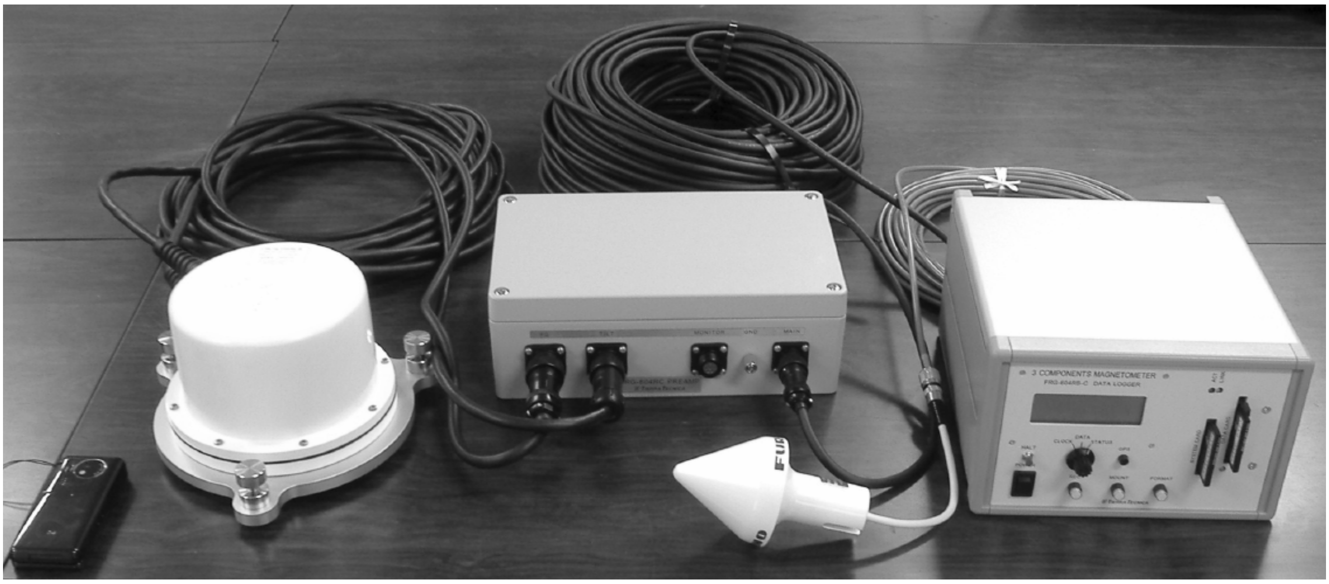
- **Tiltmeter of sensor**
  Range: ±1°,
  Resolusion: 0.2 arc-sec
- **Thermometer of sensor**
  Range: ±60℃,
  Resolusion: 0.002℃
- **Observation ranges**
  ±1000nT, ±2000nT,
  (±65000nT)
- **16bit A/D converter**
  0.031nT/dig, 0.061nT/dig
- **Sampling rate**
  1-sec, 1-min
- **Estimated noise level**
  0.02nTp-p
- **Total weight**
  14.5 kg

MAGDAS-A: Fluxgate magnetometer system
with data logging and transfer units.

MAGDAS-II



MAGDAS-9



- Sensor + 7 m cable; 2.9 kg + 1.7 kg
- Amplifier; 2.9 kg
- 70 m cable; 4.5 kg
- GPS antenna + cable; 0.85kg
- Data Logger; 2.6 kg

Total 15.5 kg

- (H,D,Z,F)-comp magnetic fields, ±70,000nT,0.01nT, 2 tilt meter, 0.1”; 32bits 250Hz sampling, 10Hz, 1Hz averaged data
- Temperatures at sensor and amplifier;0.01℃ 24 bits 10Hz sampling
- Power consumption; 12Vx400mA
- Data card; 2 Gbyte, 10Hz data logging

Notes:

- Fifty units of MAGDAS-I were built by Meisei Electric of Japan, for the MAGDAS Project.

- Many units of MAGDAS-II were assembled by the staff and students of SERC.
  The core of it is the "Armadillo" Linux computer, which stores data and sends data to SERC via the Internet. The software was developed at SERC.

- Fifty units of MAGDAS-9 were built by Tierra Technica of Japan, for the MAGDAS Project.

APPENDIX C

To view up-to-date version of Appendix C, please visit SERC web site: www.serc.kyushu-u.ac.jp

Data Base

- **MAGDAS/CPMN**

**MAGnetic Data Acquisition System/
Circum-pan Pacific Magnetmeter Network Data**

Our data archives consist of the following four databases.

- MAGDAS-II (MAGnetic Data Acquisition System II)
- MAGDAS (MAGnetic Data Acquisition System)
  (About the MAGDAS and MAGDAS-II)
  - 1 sec. and 1 min. sampling data from August, 2005.
  - This network is the integrated latter three networks.
  - The principal investigator (PI) is Prof. K. Yumoto.

  (Supporting Information)
  - This MAGDAS observation was made by the financial supports of Japan Society for the Promotion of Science (JSPS) as Grant-in-Aid for Overseas Scientific Survey (15253005, 18253005). This database was made by the financial supports of Japan Society for the Promotion of Science (JSPS) as Grant-in-Aid for Publication of Scientific Research Results(188068, 198055, 208043), and National Institute of Information and Communications Technology(NiCT) as the funded research.

- CPMN (The Circum-pan Pacific Magnetometer Network)
  (About the Circum-pan Pacific Magnetometer Network)
  - 1 sec., 3 sec. and 1 min. sampling data from January, 1996.
  - This network is the integrated latter two networks.
  - The principal investigator (PI) is Prof. K. Yumoto.

  (Supporting Information)
  - This database was made by the financial supports of Japan Society for the Promotion of Science (JSPS) as Grant-in-Aid for Publication of Scientific Research Results (128068,138059,148071,158068,168066, 188068, 198055, 208043).

- The 210 MM Magnetic Observation Network
  (About the 210 MM Magnetic Observation Network)
  - 1 sec. and 1 min. sampling data from May, 1990 to December, 1995.
  - The PI is Prof. K. Yumoto.

- The Equatorial Magnetometer Network
  (About the Equatorial Magnetometer Network)
  - 3 sec. sampling data from December, 1985 to December, 1996.
  - The PI is Prof. T-.I. Kitamura who retired in 1995.

*) These databases were funded in part by the Japan Society for the Promotion of Science (JSPS)
as Grant-in-Aid for Publication of Scientific Research Results (128068,138059,148071,158068,168066,188068,198055, 208043).

important Rules for data usage

Scientists who want to engage in collaboration with SERC should contact the project leader of MAGDAS/CPMN observations, Prof. Dr. K. Yumoto, Kyushu Univ., who will organize such collaborations.

There is a possibility that the PI of MAGDAS will arrange offers so that there is less overlapping of themes between MAGDAS research groups

Before you use MAGDAS/CPMN data for your papers, you must agree to the following points;

1. Before you submit your paper, you must contact the PI (Prof. K. Yumoto: yumoto@serc.kyushu-u.ac.jp) and discuss authorship.
2. When you submit your paper after doing the above item 1, you must mention the source of the data in the acknowledgment section of your paper.
3. In general, you must use the following references:
    1. Yumoto, K., and the 210MM Magnetic Observation Group, The STEP 210 magnetic meridian network project, J. Geomag. Geoelectr., 48, 1297-1310., 1996. [PDF]
    2. Yumoto, K. and the CPMN Group, Characteristics of Pi 2 magnetic pulsations observed at the CPMN stations: A review of the STEP results, Earth Planets Space, 53, 981-992, 2001. [PDF]
    3. Yumoto K. and the MAGDAS Group, MAGDAS project and its application for space weather, Solar Influence on the Heliosphere and Earth's Environment: Recent Progress and Prospects, Edited by N. Gopalswamy and A. Bhattacharyya, ISBN-81-87099-40-2, pp. 309-405, 2006. [PDF]
    4. Yumoto K. and the MAGDAS Group, Space weather activities at SERC for IHY: MAGDAS,
    Bull. Astr. Soc. India, 35, pp. 511-522, 2007. [PDF]
4. In all circumstances, if anything is published you must send a hardcopy to the following address:

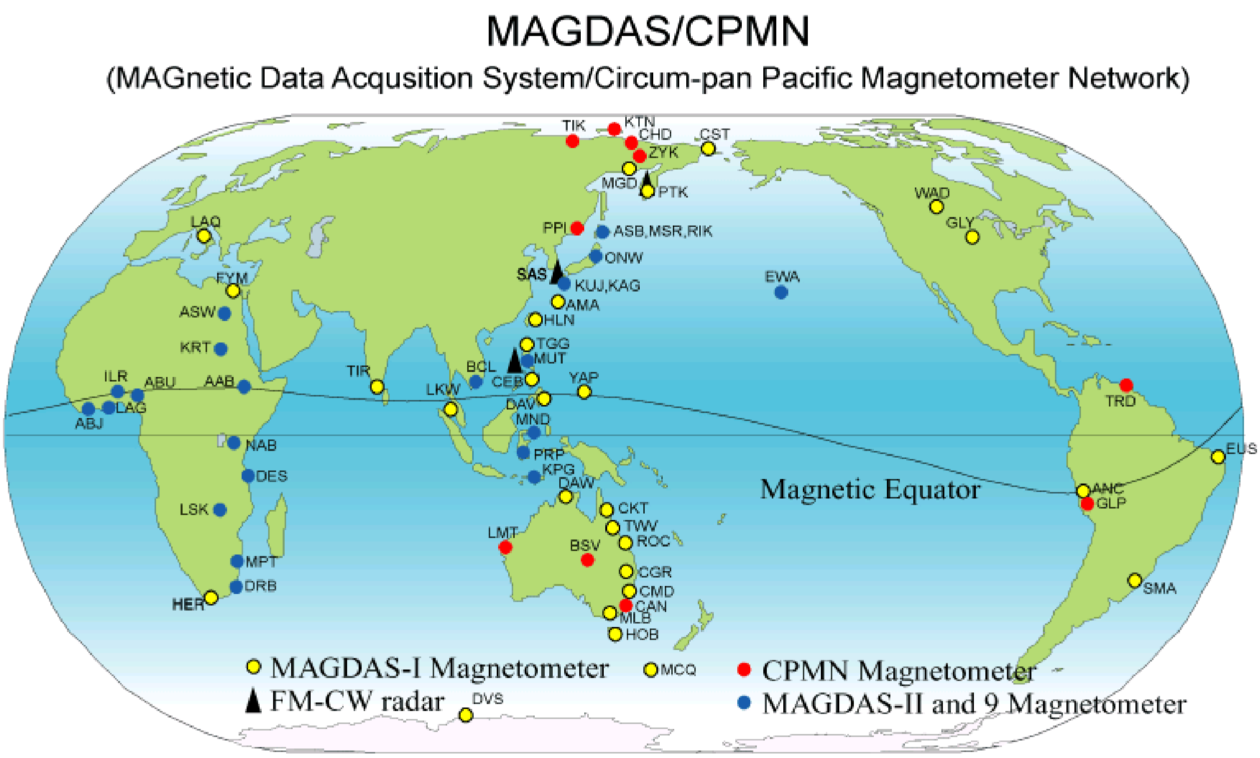
Prof. Dr. Kiyohumi Yumoto
PI of MAGDAS/CPMN Project
Director of Space Environment Research Center,
Kyushu University 53
6-10-1 Hakozaki, Higashi-ku Fukuoka 812-8581, JAPAN
TEL/FAX:+81-92-642-4403, e-mail: yumoto@serc.kyushu-u.ac.jp

To view up-to-date version of Appendix D, please visit SERC web site:
www.serc.kyushu-u.ac.jp

APPENDIX D

MAGDAS Map and Stations

WORLD MAP



Details of Each Station

Russia

Abbrev.	Station Name	Nation	GG Lat.	GG Lon.	GM Lat.	GM Lon.	L	Dip Lat.	Install
CST	Cape Schmidt	Russia	68.50	179.20	64.01	235.86	5.21		07/09/24
MGD	Magadan	Russia	53.60	141.06	53.88	219.70	2.84		07/10/04
PTK	Paratunka	Russia	52.94	158.25	46.18	226.21	2.09		05/11/07

Japan

Abbrev.	Station Name	Nation	GG Lat.	GG Lon.	GM Lat.	GM Lon.	L	Dip Lat.	Install
ASB	Ashibetsu	Japan	43.46	142.17	36.43	213.39	1.54		05/02/15
ONW	Onagawa	Japan	38.44	141.48	31.27	212.72	1.37		05/02/28
KUJ	Kuju	Japan	33.06	131.23	26.13	202.96	1.24		05/02/22
AMA	Amami-Oh-shima	Japan	28.17	129.33	21.11	200.88	1.15		05/10/25

Pacific and Asia

Abbrev.	Station Name	Nation	GG Lat.	GG Lon.	GM Lat.	GM Lon.	L	Dip Lat.	Install
HLN	Hualien	Taiwan	23.90	121.55	16.86	193.05	1.09		05/05/01
MUT	Muntinlupa	Philippine	14.37	121.02	6.79	192.25	1.01	6.79	05/05/15

TGG	Tuguegarao	Philippine	17.66	121.76	10.26	193.05	1.03		05/05/16
CEB	Cebu	Philippine	10.36	123.91	2.53	195.06	1.00	2.74	05/06/26
DAV	Davao	Philippine	7.00	125.40	−1.02	196.54	1.00	−0.65	05/06/28
YAP	Yap Island	FSM	9.50	138.08	1.49	209.06	1.00	1.70	06/07/29
LKW	Langkawi	Malaysia	6.30	99.78	−2.32	171.29	1.00	−1.88	06/09/08
MND	Manado	Indonesia	1.44	124.84	−6.91	196.06	1.01		05/07/26
PRP	Pare Pare	Indonesia	−3.60	119.40	−12.38	190.75	1.05		05/07/24
KPG	Kupang	Indonesia	−10.20	123.40	−19.58	194.95	1.13		06/07/21
TIR	Tirunelveli	India	8.70	77.80	0.21	149.30	1.00	0.60	07/09/28

Australia and Antactica

Abbrev.	Station Name	Nation	GG Lat.	GG Lon.	GM Lat.	GM Lon.	L	Dip Lat.	Install
DAW	Darwin	Australia	−12.41	130.92	−21.91	202.81	1.18		05/09/19
CKT	Cooktown	Australia	−15.48	145.25	−24.62	218.38	1.21		05/11/14
TWV	Townsville	Australia	−19.63	146.86	−28.73	220.30	1.30		05/11/14
ROC	Rockhampton	Australia	−23.19	150.31	−32.40	225.14	1.40		05/11/18
CGR	Culgoora	Australia	−30.32	149.57	−40.17	225.75	1.71		05/09/23
CMD	Camden	Australia	−34.06	150.67	−44.06	227.92	1.94		05/09/24
MLB	Crib Point	Australia	−38.36	145.18	−49.46	222.51	2.37		06/10/03
HOB	Hobart	Australia	−42.94	147.32	−54.19	226.53	2.92		05/09/20
MCQ	Macquarie Island	Australia	−54.50	158.96	−64.54	248.12	5.41		06/04/14
DVS	Davis	Antarctica	−74.49	99.62	−74.60	100.25	13.98		07/04/19

North America

Abbrev.	Station Name	Nation	GG Lat.	GG Lon.	GM Lat.	GM Lon.	L	Dip Lat.	Install
WAD	Wadena	Canada	51.90	−103.90	61.33	318.34	4.34		06/10/26
GLY	Glyndon	U.S.A.	46.50	−96.30	57.07	330.02	3.38		06/10/20

South America

Abbrev.	Station Name	Nation	GG Lat.	GG Lon.	GM Lat.	GM Lon.	L	Dip Lat.	Install
ANC	Ancon	Peru	−11.77	−77.15	0.77	354.33	1.00	0.74	06/10/13
EUS	Eusebio	Brazil	−3.88	−38.43	−3.64	34.21	1.00	−7.03	06/09/30
SMA	Santa Maria	Brazil	−29.72	−53.72	−19.30	13.24	1.12		06/10/07

Europe and Africa

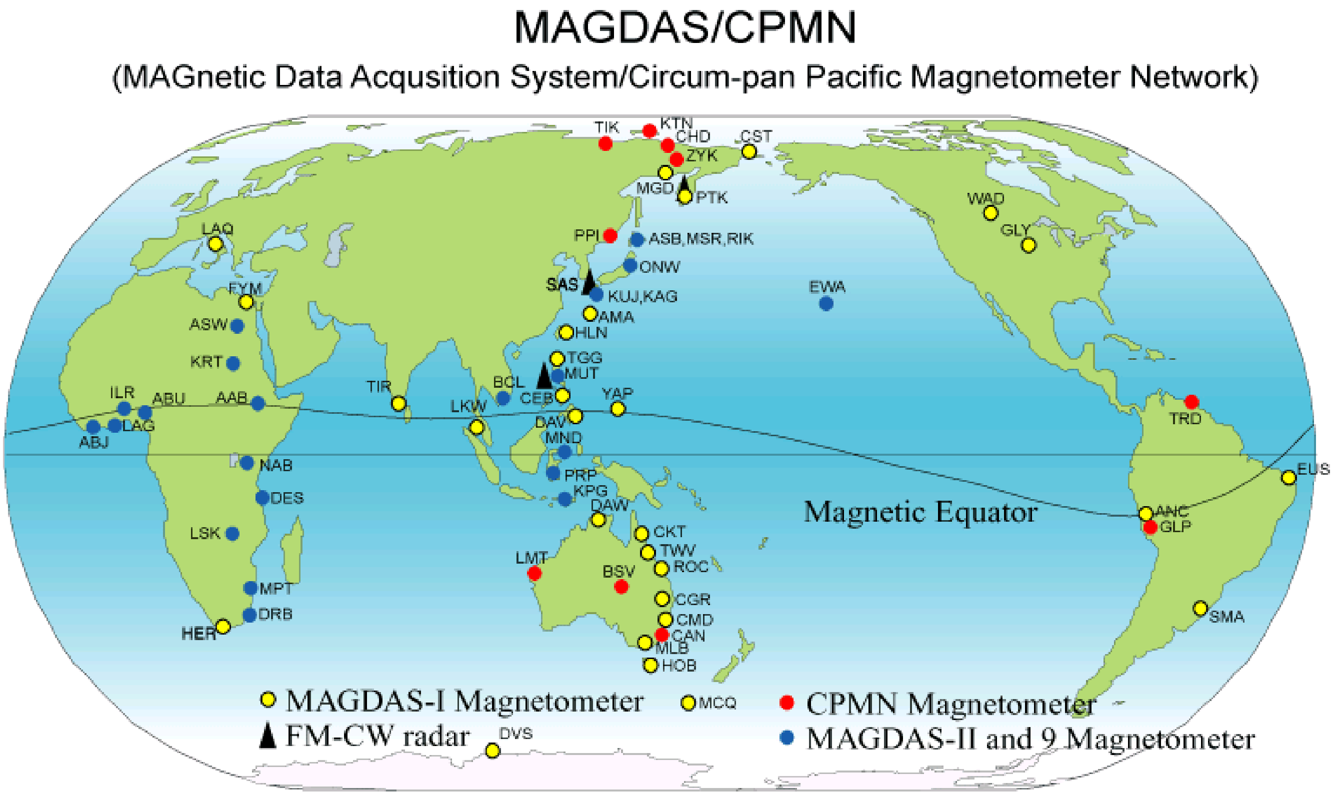
Abbrev.	Station Name	Nation	GG Lat.	GG Lon.	GM Lat.	GM Lon.	L	Dip Lat.	Install
LAQ	L'aquila	Italy	42.38	13.32	36.25	87.56	1.56		08/12/02
AAB	Adis Ababa	Ethiopia	9.04	38.77	0.18	110.47	1.00	0.57	06/08/19
ILR	Ilorin	Naigeria	8.50	4.68	−1.82	76.80	1.00	−2.96	06/08/24
ABJ	Abidjan	Ivory Coast	5.35	−3.08	6.32	69.23	1.00	−6.32	06/09/01
HER	Hermanus	South Africa	−34.34	19.24	−42.29	82.20	1.83		07/09/14
FYM	Fayum	Egypt	29.30	30.88	21.13	102.38	1.15		08/01/14

Reference

Geomagnetic latitude and longitude are calculated by AACGM
http://superdarn.jhuapl.edu/aacgm/index.html

MAGDAS-II Map and Stations

WORLD MAP



Details of Each Station

Pacific and Asia

Abbrev.	Station Name	Nation	GG Lat.	GG Lon.	GM Lat.	GM Lon.	L	Dip Lat.	Install
EWA	Ewa beach	U.S.A.	21.19	−157.60	21.59	269.95	1.16	---	08/08/28
BCL	Bac Lieu	Vietnam	9.32	105.71	−0.66	177.96	1.02	1.35	09/03/23
ASB	Ashibetsu	Japan	43.46	142.17	36.43	213.39	1.54		10/09/22
TNO	Tohno	Japan	39.37	141.60	32.48	213.15	1.41	---	09/02/10
ONW	Onagawa	Japan	38.43	141.47	31.24	212.93	1.39	---	09/02/10
OIS	Oiso	Japan	35.18	139.17	26.52	208.41	1.31	---	10/03/25
KUJ	Kuju	Japan	33.06	131.23	26.13	202.96	1.24		05/02/22
MUT	Muntinlupa	Philippine	14.37	121.02	6.79	192.25	1.01	6.79	05/05/15
CDO	CagayanDeOro	Philippines	8.46	124.63	−1.10	196.66	1.00	0.77	10/06/02
LGZ	Legazpi	Philippines	13.15	123.74	3.54	195.56	1.00	5.49	09/07/21
MND	Manado	Indonesia	1.44	124.84	−6.91	196.06	1.01		10/01/26
PRP	Pare Pare	Indonesia	−3.60	119.40	−12.38	190.75	1.05		10/01/31
KPG	Kupang	Indonesia	−10.20	123.40	−19.58	194.95	1.13		10/01/27

Africa

Abbrev.	Station Name	Nation	GG Lat.	GG Lon.	GM Lat.	GM Lon.	L	Dip Lat.	Install
ASW	Aswan	Egypt	23.59	32.51	15.20	104.24	1.07	---	08/12/23
KRT	Khartoum	Sudan	15.33	32.32	5.69	103.8	1.01	6.41	08/09/23
ABJ	Abidjan	Ivory Coast	5.35	-3.08	6.32	69.23	1.00	-6.32	10/08/07
AAB	Adis Ababa	Ethiopia	9.04	38.77	0.18	110.47	1.00	0.57	06/08/18
LAG	Lagos	Nigeria	6.48	3.27	-3.04	75.33	1.00	-4.95	08/09/04
ILR	Ilorin	Nigeria	8.50	4.68	-1.82	76.80	1.00	-2.96	10/03/25
ABU	Abuja	Nigeria	8.99	7.39	-0.54	81.31	1.00	-0.95	10/08/15
NAB	Nairobi	Kenya	-1.16	36.48	-10.65	108.18	1.09	---	08/09/16
DES	Dal Es Salaam	Tanzania	-6.47	39.12	-16.26	110.59	1.09	---	08/09/10
LSK	Lusaka	Zambia	-15.23	28.20	-26.06	98.32	1.24	---	08/09/25
MPT	Maputo	Mozambique	-25.57	32.36	-35.98	99.57	1.53	---	08/09/15
DRB	Durban	South Africa	-29.49	30.56	-39.21	96.1	1.67	---	08/09/08

Reference

Geomagnetic latitude and longitude are calculated by AACGM
http://superdarn.jhuapl.edu/aacgm/index.html
http://superdarn.jhuapl.edu/tutorial/Baker_AACGM.pdf

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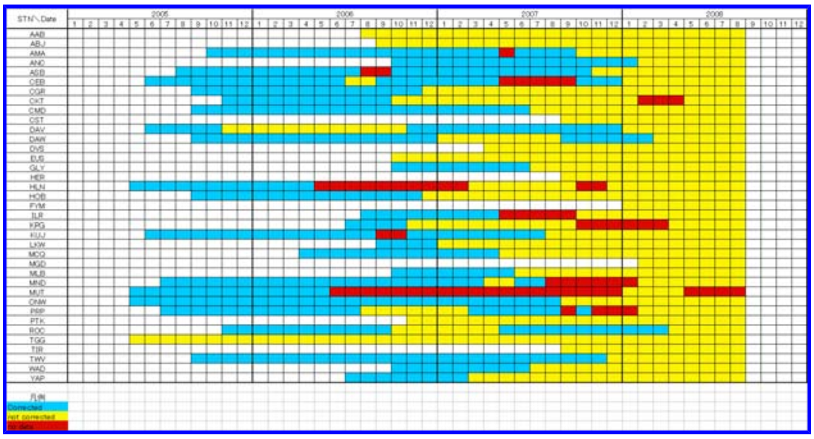
To view up-to-date version of Appendix E, please visit SERC web site:
www.serc.kyushu-u.ac.jp

APPENDIX E

Corrected Data List and QL

Monthly Data Catalog



detail data catalog along the 210 MM is here

Notice

MAGDAS realtime data requires significant further processing to make them useful for scientific studies (These data are named as corrected data). These processes are required the experiences and expertises with MAGDAS instrument teams. Thus, it takes more time (a half or one year and more) to create corrected data from realtime data. If you want to use the data as soon as possible, please contact the PI of MAGDAS project and MAGDAS team in the agreement with our data usage rules.
We reassert it is strongly recommended that users of MAGDAS data treat these data more carefully.

Data List for Each Station

Russia						
CST	MGD	PTK				
Japan						
ASB	ONW	KUJ	AMA			
Pacific and Asia						
HLN	MUT	TGG	CEB	DAV	YAP	LKW
MND	PRP	KPG	TIR			
Australia and Antarctica						
DAW	CKT	ROC	CGR	CMD	TWV	MLB
HOB	MCQ	DVS				
North America						

WAD	GLY			
South America				
ANC	EUS	SMA		
Africa				
AAB	ILR	ABJ	HER	FYM

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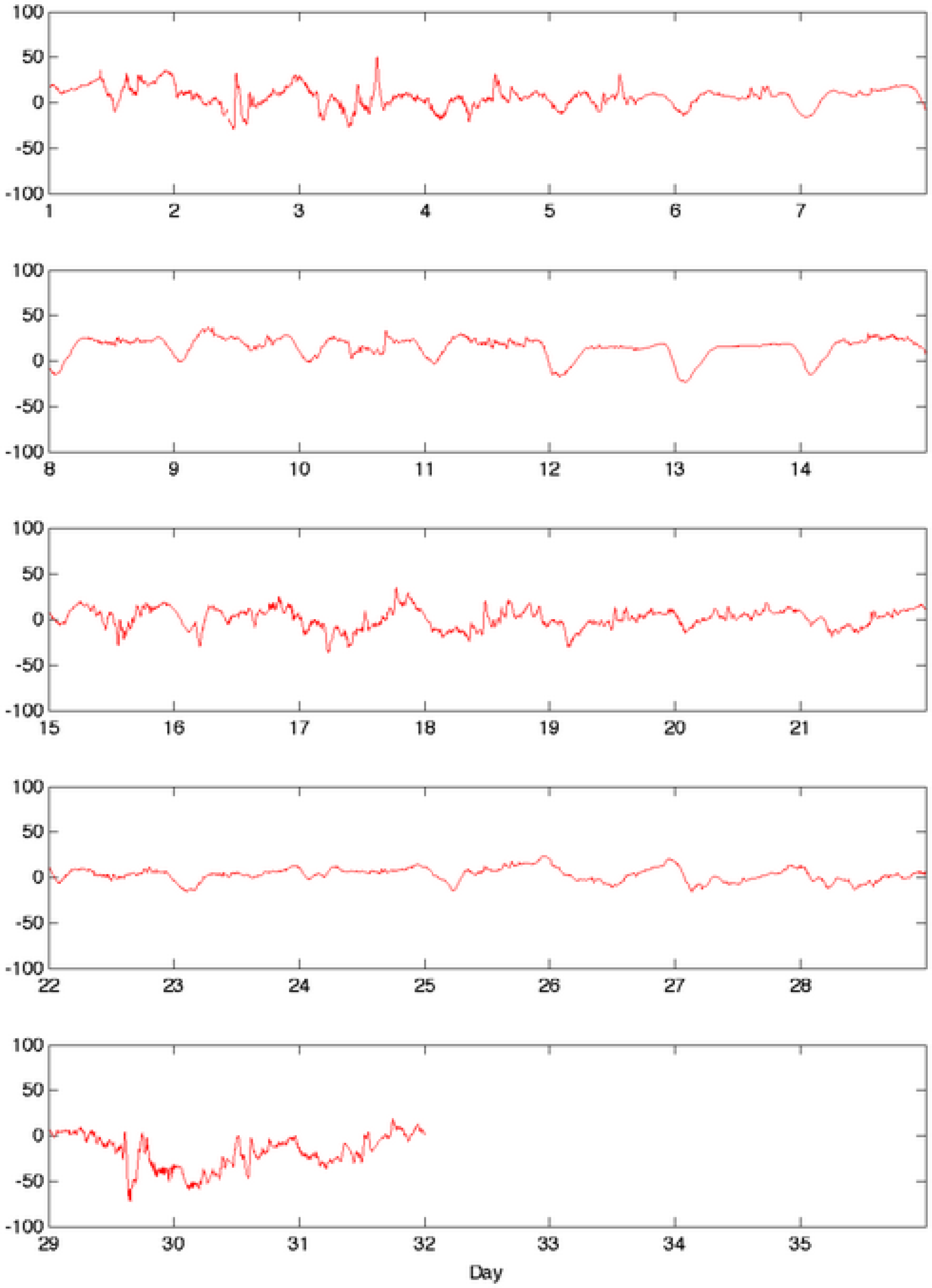
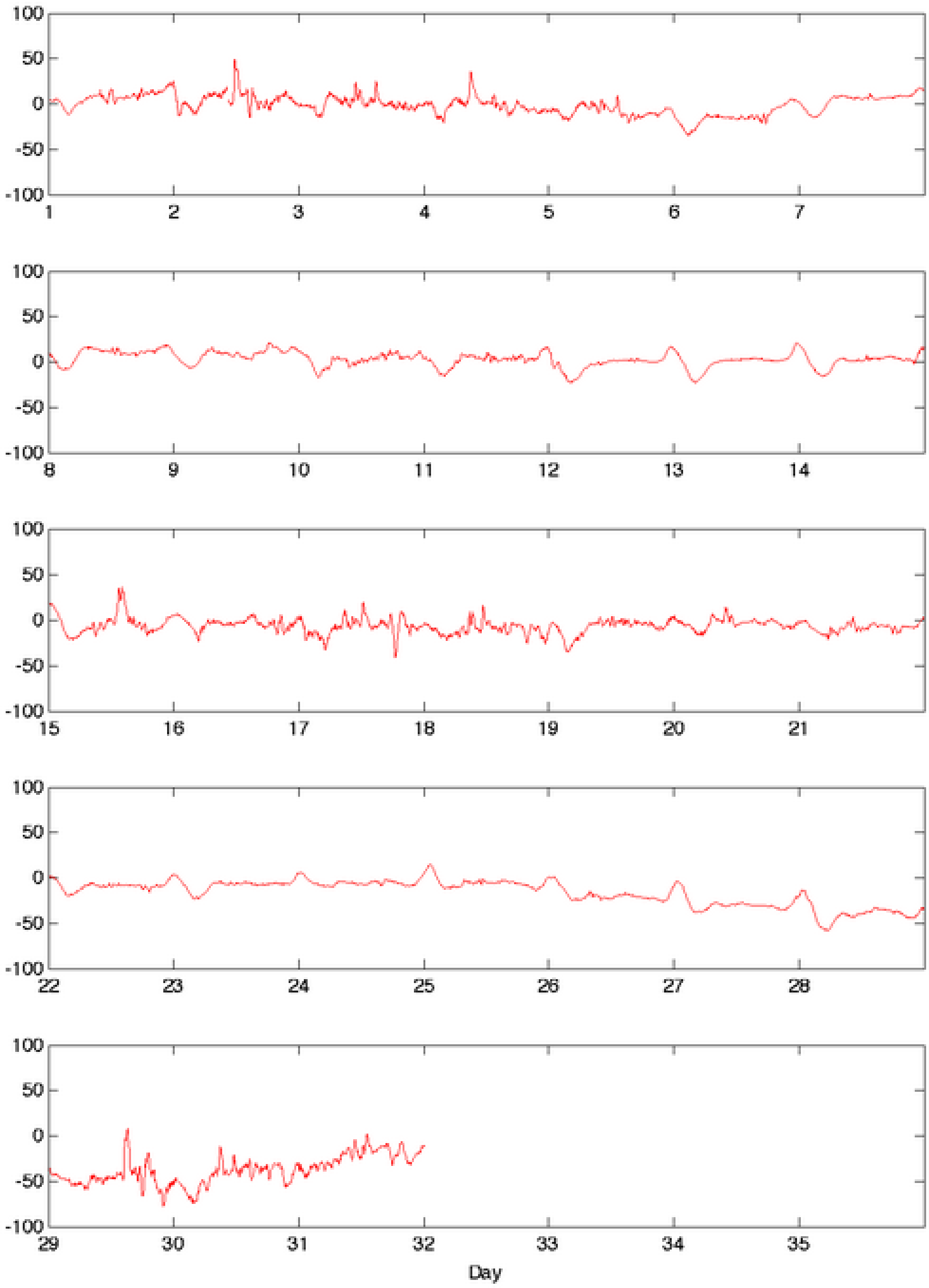
MONTH data plot (H)



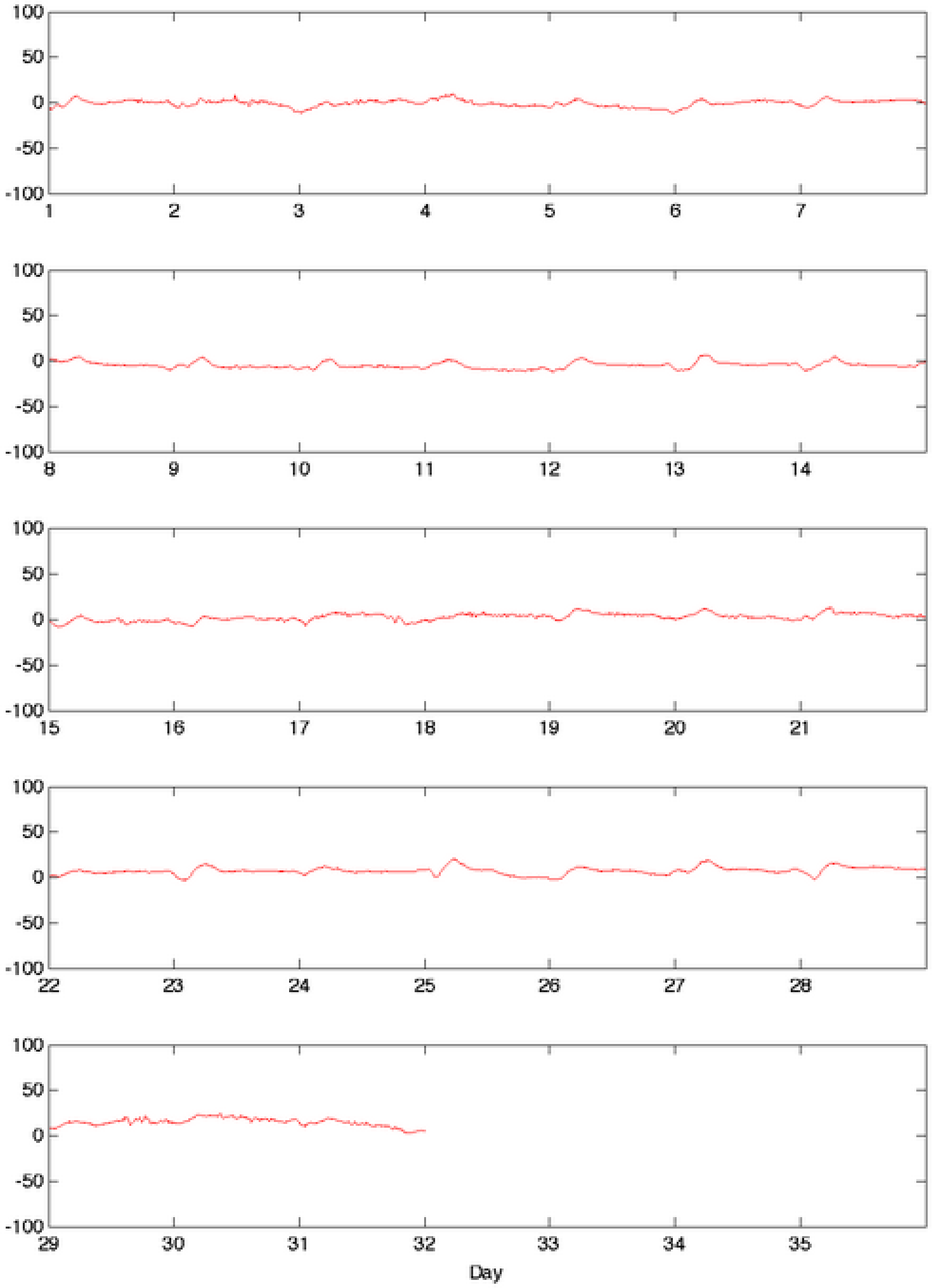
ASB_0701_H

MONTH data plot (D)



ASB_0701_D

MONTH data plot (Z)



ASB_0701_Z

Use this form to the specify what data you wish to work with; the data will be prepared for you. To actually receive the data, you must sign the SERC Data Release Form, which follows this form.

APPENDIX F

******************** Data Request Form ********************

This form available at SERC web site: www.serc.kyushu-u.ac.jp

TO THE ATTENTION OF PROF. K. YUMOTO

1. Professor of Kyushu University, Japan.
2. PI of the MAGDAS Project
3. Director of SERC

Please print very clearly:

Your Name: ____

Your Position: ____

Your Institute: ____

Your telephone or fax number:

(please include country code) ______________________________

Your email address: ____

Purpose of Request Data:

____

____

____

Please specify your request in this way:

station code (3 characters), and time period (yyyymmdd).

For example: KUJ, 20051201-20051231 ASB, 20060101-20060110

____

____

____

Note:____

I agree to conform to all data usage rules of SERC.

Your signature ____

Fax this completed form to +81-92-642-4403, or send pdf to

Prof. Kiyohumi Yumoto [yumoto(atmark)serc.kyushu-u.ac.jp]

and Dr. Shuji Abe [abeshu(atmark)serc.kyushu-u.ac.jp].

(Please replace (atmark) with " @ ".)

Use this form to receive the data that you requested in the previous form of Appendix F.
PLEASE READ THIS FORM VERY CAREFULLY. If you cannot agree to the terms, do not sign the form. If you fully agree with the terms, please sign it and send it to Prof. Yumoto.
All signed forms are filed at SERC. GM 22 October 2010.

SERC Data Release Form

(version 28 August 2009)

This form available at SERC web site:
www.serc.kyushu-u.ac.jp

Any support from investigators is very important in order to continue MAGDAS/CPMN operations around the world. So please let us inform you about the policy of the data usage.

As you may know, it is very important that PI and Institute, conducting the global network observation, receive proper credit for the data use, because it is needed for the survival of ground-based magnetic observations. Recently, the Danish government is going to shutdown its geomagnetic observation network. This network lost its government support, for one reason or another. PI/Institute cannot get continued funding for magnetic network observation if the proper credit is not accorded by other researchers. Our research center is not official Japanese institute for geomagnetic observations, but in the same situation. Government support is critical for its survival. We hope you can understand this is an extremely serious situation. In conclusion, without visual evidence, e.g. a number of publications and citation, we cannot continue the global network observations. Acknowledgement is of no use for funding.

We require you to offer us co-authorship and make the necessary references when our data is an important part of the paper. Even if our data is used only as a minor reference, you must refer to our papers (our minimum requirement). Before you make any presentation or publication, please show the result of your study to Prof. Yumoto (PI of MAGDAS/CPMN), and make a consultation about the co-authorship. You can see more information from our web-page as following address.

http://magdas.serc.kyushu-u.ac.jp/datausage/index.html

If you can agree to all of the above, we will release the data to you. Please sign below and provide some basic information for us:

Your signature ___________________________________

Your name (print) ________________________________

Name of your institute ____________________________

Your email address _______________________________

Telephone number

of your institute_________________________________

Date ____

Please fax this page to +81-92-642-4403 or email pdf of this page to

`yumoto@serc.kyushu-u.ac.jp`

and

`CPMN@denji102.geo.kyushu-u.ac.jp`

If you have any question, do not hesitate to ask us.

End of *SERC Data Release Form.*

APPENDIX G

Websites relevant to MAGDAS

www.serc.kyushu-u.ac.jp
Maintained by SERC (Japan) to support the MAGDAS Project.

www.iswi-secretariat.org
Maintained by Bulgaria as the main ISWI web site. Please note that the *ISWI Newsletter* (Publisher is Prof. K. Yumoto and Editor is Mr. G. Maeda) is archived at this web site. You may access the current issue and all back issues of this newsletter by going to this web site.

www.oosa.unvienna.org
Maintained by the UN Office for Outer Space Affairs
(Vienna, Austria)

www.spaceweather-eg.org/iswi
Maintained by Helwan University (Egypt) in support of the
2010 ISWI Workshop in Egypt (6-10 Nov. 2010).

www2.nict.go.jp/y/y223/sept/ISWI/ISWI.html (in Japanese)
Maintained by NICT (Japan) to support ISWI activities in Japan.

This is the last page of the MAGDAS Session Proceedings.