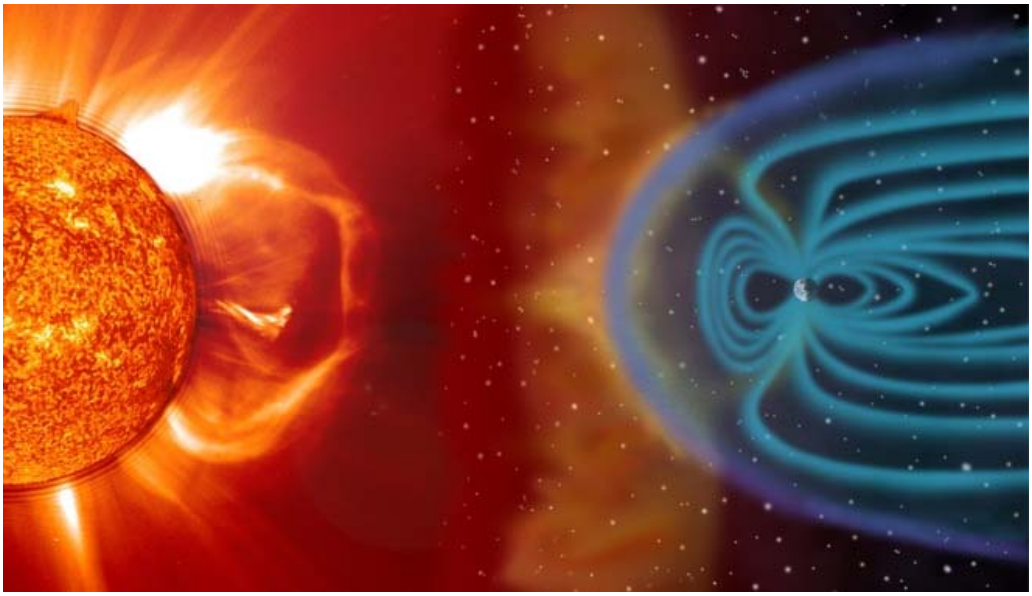
International Space Weather Initiative (ISWI)
UN/NASA/JAXA Workshop
November 6-10, 2010 Helwan, Egypt



Helwan, Egypt

November 6-10, 2010

Helwan University, Egypt

Proceedings of the International Space Weather Initiative (ISWI) UN/NASA/JAXA Workshop

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Contents

Elchin S. Babayev

International Space Weather Initiative (ISWI)

November 6-10, 2010
Helwan, Egypt

Program

Saturday, 6 November

09:00 ▪ Registration of Participants

10:00-10:30 **Session 1: Opening and Welcome Remarks**

- Prof. Ayman MAHROUS, Local Organizing Committee, Egypt
- Prof. Hajime HAYAKAWA, Japan Aerospace Exploration Agency (JAXA), Japan
- Prof. Joseph DAVILA National Aeronautics & Space Administration (NASA), USA
- Prof. Hans HAUBOLD ,United Nations Office for Outer Space Affairs (UNOOSA)
- Prof. Hany HELAL, Minister of Higher Education and Scientific Research, Egypt
- Prof. Mahmoud EL TAYEB, President of Helwan University, Egypt

10:30-11:00 ▪ Space Weather Activities in Egypt, *Ayman MAHROUS, Space Weather Monitoring Center, Helwan University, Egypt*

11:00-11:30 ▪ Introduction, *Hans HAUBOLD and Sharafat GADIMOVA*, *United Nations Office for Outer Space Affairs*

11:30-12:00 ▪ International Space Weather Initiative (ISWI) Overview, *Joseph DAVILA and Nat GOPALSWAMY, National Aeronautics and Space Administration (NASA), USA*

12:00-12:30 *Coffee Break*

12:30-14:15 **Session 2: Space Weather and Science Overviews**

Chairperson: Hans HAUBOLD, United Nations Office for Outer Space Affairs
Rapporteur:

12:30-13:30 ▪ Space Weather Overview, *Nat GOPALSWAMY, National Aeronautics and Space Administration (NASA), USA*

13:30-14:15 ▪ Magnetosphere, *W. GONZALES*

14:15:15:15 Lunch Break

15:15-18:15 **Session 3: Space Weather and Science Overviews (continued)**

Chairperson: Sharafat GADIMOVA, United Nations Office for Outer Space Affairs
Rapporteur:

15:15-16:00 ▪ Ionosphere, *K. SHIOKAWA*

16:00-16:30 ▪ The Australian region space weather network, *Richard MARSHALL*

16:30-17:00 ▪ Modeling of Geospace, *Robert HILLMER*

17:00-17:30 ▪ Solar Physics*, Luc DAME, Centre National d'Etudes Spatiales (CNES), France*

17:30-18:00 ▪ Grid Computing, *M. PETTIDIDIER*

18:00 **Adjourn for Dinner (Cruise)**

Sunday, 7 November

09:30-11:00 **Session 4: Instrument Overviews**

Chairperson: Ayman MAHROUS, Space Weather Monitoring Center, Helwan University
Rapporteur:

09:30-10:00 ▪ Magnetic Data Acquisition System (MAGDAS), *K. YUMOTO, Japan*

10:00-10:30 ▪ South Atlantic Very Low Frequency Network (SAVNET), *J.-P. RAULIN, Brazil*

10:30-11:00 ▪ African Meridian B-field Education and Research (AMBER), *M. MOLDWIN, USA*

11:00-11:30 *Coffee Break*

11:30-13:00 **Session 5: Instrument Overviews**

Chairperson: Joseph DAVILA, National Aeronautics and Space Administration (NASA)
Rapporteur:

11:30-12:00
- ITNE/Coherent Ionospheric Doppler Receiver (CIDR), *T. GARNER, USA*

12:00-12:30
- African GPS Receivers for Equatorial Electrodynamics Studies (AGREES),
E. YISENGAW, USA

12:30-13:00
- African Dual Frequency GPS Network, *C. AMORY-MAZAUDIER, France*

13:00-14:00 Lunch Break

14:00-15:30 **Session 6: Instrument Overviews**

Chairperson: Nat GOPALSWAMY, National Aeronautics and Space Administration (NASA)
Rapporteur:

14:00-14:30
- Scintillation Network Decision Aid (SCINDA), *K. GROVES, USA*

14:30-15:00
- Compound Astronomical Low-cost Low-frequency Instrument for Spectroscopy and Transportable Observatory (CALLISTO), *C. MONSTEIN, Switzerland*

15:00-15:30
- Continuous H-alpha Imaging Network (FMT-CHAIN), S. *UeNo, Japan*

15:30-16:00 Coffee Break

16:00-17:00 **Session 7: Instrument Overviews**

Chairperson: K.YUMOTO,Space Environment Research Center, Japan
Rapporteur:

16:00-16:30
- Optical Mesosphere thermosphere Imager (OMTI), K. SHIOKAWA, Japan

16:30-17:00
- Global Muon Detector Network (GMDN), K. MUNAKATA, Japan

17:00-18:30 **Session 8: POSTERS**

Monday, 8 November

09:30-11:00 **Session 9: Instrument Workshops**

- Instrument Team Meetings

11:00-11:30 *Coffee Break*

11:30-13:00 **Session 10: Instrument Workshops**

- Instrument Team Meetings

13:00-14:00 Lunch Break

14:00-15:30 **Session 11: Instrument Workshops**

- Instrument Team Meetings

15:30-16:00 Coffee Break

16:00-17:15 **Session 12: Instrument Workshops**

- Instrument Team Meetings

17:15-18:00 **Session 13: POSTERS**

18:00 **Adjourn for Dinner (Restaurant)**

Tuesday, 9 November

09:30-11:00 **Session 14: Instrument Workshops**

- Instrument Team Meetings

11:00-11:30 *Coffee Break*

11:30-13:00 **Session 15: Instrument Workshops**

- Instrument Team Meetings

13:00-14:00 Lunch Break

14:00-15:30 **Session 16: Instrument Workshops**

- Contributed Papers

15:30-16:00 Coffee Break

16:00-17:30 Session 17: Instrument Workshops

16:00-16:30
- Contributed Papers

16:30-17:00
- Optical Mesosphere thermosphere Imager (OMTI), K. SHIOKAWA, Japan

17:00-17:30
- Global Muon Detector Network (GMDN), *K. MUNAKATA,Japan*

17:30-18:30 Session 18: POSTERS

Wednesday, 10 November

09:30-11:10 Session 19: Instrument Reports

*Chairperson***:** *Luc DAME, Centre National d'Etudes Spatiales (CNES), France*

09:30-09:50
- Magnetic Data Acquisition System (MAGDAS), *K. YOMOTO, Japan*

09:50-10:10
- South Atlantic Very Low Frequency Network (SAVNET), *J.-P. RAULIN, Brazil*

10:10-10:30
- African Meridian B-field Education and Research (AMBER), *M. MOLDWIN, USA*

10:30-10:50
- ITNE/Coherent Ionospheric Doppler Receiver (CIDR), *T. GARNER, USA*

10:50-11:10
- African GPS Receivers for Equatorial Electrodynamics Studies (AGREES),
E. YISENGAW, USA

11:10-11:30 *Coffee Break*

11:30-13:00 Session 20: Instrument Reports

Chairperson: Christin AMORY, Centre National d'Etudes Spatiales (CNES), France

11:30-11:50 ▪ African Dual Frequency GPS Network, *C. AMORY-MAZAUDIER, France*

11:50-12:10 ▪ Scintillation Network Decision Aid (SCINDA), *K. GROVES, USA*

12:10:12:40 ▪ Compound Astronomical Low-cost Low-frequency Instrument for Spectroscopy and Transportable Observatory (CALLISTO), *C. MONSTEIN, Switzerland*

12:40-13:00 ▪ Continuous H-alpha Imaging Network (FMT-CHAIN), S. *UeNo, Japan*

13:00-14:00 Lunch Break

14:00-17:00 **Session 20: Closing Remarks**

14:00-15:00 ▪ Certificates & Medals

15:00-17:00 ▪ Open Discussion

17:00 **Adjourn for Dinner (Restaurant)**

The schedule in the instrument workshops portion of the above program will be arranged by the instrument array leaders:

• **MAGDAS**	A. Babatunde Rabiu	Nigeria
	Alberto Juiano Macamo	Mozambique
	Habatwa vincent Mweene	Zambia
	Isaac Marobhe	Tanzania
	Paul Baki	Kenya
	Ephrem Tesfaye	Ethiopia
	Gebreab Kidanu	Ethiopia
	Lawrence Babatope Kolowole	Nigeria
	Isaac Abiodun Adimula	Nigeria
	Hamisu Mai-Unguwa	Nigeria
	Doumouya Vafi	Cote d'Ivoire
	Obrou Olivier	Cote d'Ivoire
	Ibrahim Mohamed Elfaki	Sudan
	Richard Marshall	Australia
	Setyanto Cahyo Putranto	Indonesia
	Geri Kibe Gopir	Malaysia
	Rowland Emerito S. Otadoy	Phillipines
	Quirion Sugon	Phillipines
	Edwin Choque (2)	Peru
	Nelson Jorge Schuch	Brazil
	Tardelli Ronan Coelho	Brazil
	K. Unnidrishnan Nair	India
	Stefania Lepiki	Italy
	K. Yumoto	Japan
	S. Abe	Japan
	G. Maeda	Japan
	Y Yamazaki	Japan
	Emad Takla	Egypt
	Essam Elgamry	Egypt
	Adel Fathy	Egypt
	Reham Elhawary	Egypt
	Ibrahim Fathy	Egypt
	S. Lepiti	Italy

- **CIDR** Trevor Garner — USA
  Ayman M. Mahrous — Egypt
  Amira Shemies — Egypt
  Amr Abdellah — Egypt
  Ola Abou Elezz — Egypt
  Safinaze Ahmed — Egypt
  Ebtesam Farid — Egypt

- **SAVNET** Jean-Pierre Raulin — Brazil
  Walter Guevara — Peru
  Liliana Macotela — Peru
  Fernando Bertoni — Brazil

- **Amber/Agrees** Cesar Mbane Bioule — Cameroon
  Fatma Anad — Algeria
  Alem Mebrhatu — Ethiopia
  Endowoke Yigenzaw — USA
  Mark Moldwin — USA

- **ADFGPS** Christine Mazaudier
  Jean ACKAH — Coted'Ivoire
  Bienvenue DINGA — Republic of Congo
  Bruno KAHINDO — RDC
  Zacha KOMENAN — Cote d'Ivoire
  Saidou MADOUGOU — Niger
  Frederic OUATTARA — Burkina Faso
  Naima ZAOURAR — Algeria
  Christian ZOUNDI — Burkina Faso
  Benkhaldoun ZOUHAIR — Morocco

• **SCINDA**	Ackah Jean-Baptiste	Cote d'Ivoire
	Joseph Olwendo	
	Ayman M. Mahrous	Egypt
	Amira Shemies	Egypt
	Amr Abdellah	Egypt
	Ola Abou Elezz	Egypt
	Safinaze Ahmed	Egypt
	Ebtesam Farid	Egypt
• **AWESOME**	Elchin Babayev	Azerbaijan
	Naoshin Haque	US
	Patrick Sibanda	Zambia, but currently at Michigan
	Samir Nait Amor	Algeria
	Thai Lan Hoang	Vietnam
	Rafik Kandalyan	Jordan, but currently in Armenia
	Haris Haralambous	Cyprus

International Space Weather Initiative (ISWI)
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Abstracts

Prediction of the interplanetary Coronal Mass Ejection by using neural network

A. M. Mahrous[1], S.Ahmed[1], A.Radi[2], M. Youssef[3]

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2. Physics Department, Faculty of science, The University of Ain Shams,Cairo,Egypt e-mail:amr1165@yahoo.com , Tel.: 202-26822189 7506
3. National Research Institutes of Astronomy and Geophysics (NRIAG) E-mail: myousef50@yahoo.com ,

Abstract

Here we determined the effective parameter that can be used to predict the estimated arrival time for both interplanetary Coronal Mass Ejection (ICME) (using the List of Richardson/Cane ICMEs in 1996-2007). Neural network model used to predict ICME shock arrival time.
we used the set of CME-IP shock pairs obtain from Richardson/Cane ICMEs list to construct our neural model from (1996-2005). Concurrently, we determined the effective parameter that used CME-IP shock pairs from (2005-2007) by test our neural networks model. We found that the model succeeded to predict 97 %, 93% and 84% of the listed CME events when we used the linear speed, final speed and speed at a distance 20 Rs respectively. It is clear that the most significant parameter is the liner speed.
Also we used the Goplaswamy list to calculated the ICME travel time

Keywords: Interplanetary Coronal Mass Ejection – Neural network

Ionospheric spatial and temporal variations during the 1–5 May 2010 storm using Preliminary results of GPS TEC measurements in Helwan, Egypt

A. M. Mahrous[1],*, A. M. Abdallah[1], A.F.Hassan[1], A. H. El-Kateb[1], K. M. Groves[2]

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2. Air Force Research Laboratory, Space Vehicles Directorate, Hanscom Air Force Base, Massachusetts, . E-mail address: keith.groves@hanscom.af.mil.: Tel.: +1 617 5497067; fax: +1 781 3773137

Abstract

The electron density integral along the paths between a GPS Satellite and the receiver is known as Total Electron Content (TEC), and this parameter can be used to study the ionospheric behaviors. The Total Electron Content can be obtained by means of many methods. Space-based radio navigation systems, such as Global Positioning System (GPS), offer good opportunities for studying the ionosphere. The TEC is calculated from the group path delay and phase advance in GPS satellite signals along slant paths connecting GPS receivers and satellites at 22,000km. Locally, a dual frequency GPS receiver was installed in Helwan, Egypt (latitude 29.86° N, longitude 31.32° E) in November 2009. Here; GPS data were analyzed to establish the daily behaviors of TEC in a region of Northern crest of the equatorial anomaly during the moderate geomagnetic storm 1-5 May 2010.

Keywords: TEC; GPS; equatorial anomaly; geomagnetic storm

Study of the Ionospheric Scintillations and TEC Characteristics at Solar Minimum in an Equatorial Region Using GPS Data

J.-B. Ackah[1], O. K. Obrou[1], K. Z. Zaka[1], M. N. Mene[1], A. T. Kobea[1], P. Assamoi[1], K. Groves[2], C. S. Carrano[3]

[1] Laboratoire de Physique de l'Atmosphère, Université de Cocody ,22 B.P. 582 Abidjan 22, Côte d'Ivoir

[2] Air Force Research Laboratory, Hanscom Air Force Base, Massachusetts, USA

[3] Institute for Scientific Research, Boston College, USA

Abstract

This paper presents a study on the characteristics of ionospheric scintillation and the Total Electron Content (TEC) at solar minimum in an equatorial region.

Ionospheric scintillation is a rapid variations in the amplitude and phase of trans-ionospheric radio signal resulting from density irregularities in the ionosphere. It is referred to us by the index S4. The data used are the scintillation index (S4) and the vertical TEC (vTEC) recorded at the SCINDA GPS station of Abidjan (Latitude = 5.34o N, Longitude = 3.90o W). This work covers the period from January 2008 to December 2009, two years of low solar activity with R12 equal to and respectively. The multipath effects on the scintillation index were removed following the method adopted by Otsuka et al., (2000).

The results show that the scintillation is not intense with S4 values lower than 1 in most of the cases and during the course of the day. However from 2000 to 0200 there is relatively high value of S4 confirming that scintillation is primarily a nighttime observed phenomenon. The scintillation shows a seasonal effect characterized by intense value in the equinoctial months compare to that of the solstice season. The vTEC in general exhibits a diurnal variation as a function of the solar zenith angle. Higher vTEC values are observed around 1100 and 1500 local time.

Dynamics of Arid and Semi-Arid Regions under Climate Changes: Case of Senegal River Delta

A.Ndiaye[1], J.A.NDione[1, 2], A.T.Gaye[1]

[1] Laboratoire de Physique de l'Atmosphère et de l'Océan Siméon-Fongang, Ecole Supérieure Polytechnique (ESP) de Dakar, UCAD BP 5085 Dakar-Fann, Dakar Sénégal.
[2] Centre de Suivi Ecologique rue Léon G. Damas, Fann Résidence, BP 15532 Dakar-Fann, Dakar, Sénégal.

Abstract

Environmental changes following long droughts have significantly contributed to arid and semi-arid areas vulnerability. The spatial and temporal variability of rainfall has increased in some places. This study aims to assess the space-time changes experienced in the Senegal River Delta (characterized by a Sahelian climate with a strong oceanic influence), for different periods 1979-1987, 1987-1999 and 1979-1999. The methodology for assessing land use and land cover changes dynamics in order to understand degradation processes at different scales is based on MSS, TM and ETM + LANDSAT images and SRTM-DEM data from USGS. For different time scales (1979, 1987 and 1999), we have then assessed respectively the percent of areas affected ("changes"), not affected ("no changes") and conversions ("conversions").We mean by conversions very important land cover changes leading to total modification. The results have shown that for the period 1979-1987, changes, no changes and conversions are respectively 35.67, 59.07 and 5.27 percent. For the period 1987-1999, changes, no changes and conversions are respectively 39.70, 55.67 and 4.62 percent. The conversions are very important between those two periods (42 percent of the study area).

Thus, the sparse trees and shrub savanna have decreased by half between 1979 and 1987 (from 791,755 ha to 474,567 ha). Water bodies have been affected also by changes since the Diama dam servicing: temporary water surfaces increased from 9,594 ha (1979) to 51,736 ha (1999) and the permanent water surfaces decreased from 39,064ha to 32,311ha. The DEM show that the Delta (which consists of lowlands drained by a dense hydrographical network), is deeply influenced by human activities.

Keywords: Environmental monitoring and climate, remote sensing, arid areas, Senegal River Delta

Strong Solar Flares and Their Association with Energetic Particles in Space

S.W., Samwel, K.L,.Klein, , G.,Trottet, O,.Malandraki

Abstract

Solar Energetic Particle events constitute one of the most severe radiation hazards to both humans and space systems. Still the relationship of the solar flare and coronal mass ejections with SEP events is not conclusive so far. The present study investigates a specific aspect of this association, using GOES observations. We consider all X class soft X-ray bursts of the 23rd solar cycle (1996-2006) from flares in the western solar hemisphere (69 events) and compare the complete list of GOES soft X-ray bursts with SEP observations in space. We confirm that the GOES list of major SEP events maintained at NOAA is incomplete due to the selection criteria of the SEPs. However, a significant fraction of the western GOES X class flares (22/69) are found to be not accompanied by SEP detected by the GOES spacecraft. We carried out a detailed study of the radio emission of these SEP-less flares. The majority (12/21) has no type III radio bursts from electron beams escaping toward interplanetary space during the impulsive flare phase. Together with other radio properties such as a steep low-frequency cm wave spectrum, we concluded that this is likely because the flare-accelerated electrons remain confined in the low solar corona. We suggest that this is so because flare-accelerated particles do not get access to open magnetic field lines. Furthermore, we found that half of the 12 flares are accompanied by a CME. Thus, flare-accelerated particle populations may be confined even if the flare is accompanied by a CME. On the other hand, 4 electron events are observed by ACE during confined microwave flares. All 4 are found to be accompanied by meter wave type II or type IV bursts or both. The metric radio bursts signal acceleration sites at different locations from the impulsive phase acceleration of the microwave emitting electrons.

Recent Activities for Space Weather Research in KASI

Y.H.Kim[1], Y.D.Park[1], K.S.Cho[1], S.C.Bong[1], Y. S.Kwak[1], J. Hwang[1], J.J.Lee[1], S.H.Choi[1], J. H.Baek[1]

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Abstract

Korea Astronomy and Space Science Institute (KASI) is actively involved in the front line research in the field of solar activity and space weather. Currently we are managing several observation facilities for solar and space weather research: the solar flare telescope, the solar spectroscopy telescope, the sunspot telescope, the solar radio spectrograph, magnetometers, the scintillation monitor, and the all-sky imager. Since 2007, the KASI has been performing a research project for the construction of Korean Space Weather Prediction Center (K-SWPC) to prepare for the next solar maximum (~2013). In this presentation, we briefly introduce the recent progress of KASI activities for K-SWPC; extension of ground observation system, construction of space weather database and network, development of prediction models, and space weather effects. In addition, future international collaborations with NASA and STEL in Nagoya University will be described.

Savnet catalogue of Solar Flare detected at Punta Lobos-Conida, first result

E. Macotela[1], J .Samanes[3], R. Escate[2], W. Guevara Day[1,2], J-P .Raulin[3]

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[2] FCF, Universidad Nacional Mayor San de Marcos Av. Universitária S/N, Lima, 01, Perú
[3] Centro de Radio Astronomía e Astrofísica Mackenzie (CRAAM), Rua da Consolação, 930 – Cep 01302-907 – Consolação São Pablo, UF, Brasil

Abstract

Solar flares emit intense X-ray fluxes that cause perturbations in the ionospheric D-region altering its electrical conductivity characteristics. GOES satellites measure X-ray fluxes on the full-disk of the Sun. These X-ray fluxes are classified as B, C, M, and X class. The electrical characteristics of VLF waves during their propagation through the Earth-ionosphere waveguide are used to study the low ionosphere. The variations in the phase of VLF signals related solar flares we registered during the periods April - December 2007, January-December 2009 and July –August 2010 by the SAVNET station antennas located at Punta Lobos (12°30’ S; 76°17’ O), Lima-Peru. We shown here a preliminary database elaborated for cataloging solar flares detected at Punta Lobos.

Key words: VLF, ionosphere, solar flares, Solar X-ray fluxes

Radio Observations of Weak Energy Releases in The Solar Corona

R. Ramesh[1], C. Kathiravan[1], Indrajit V. Barve[1], G. K. Beeharry[2], and G. N. Rajasekara[2]

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[2] University of Mauritius, Reduit, Mauritius

Abstract

We report observations of weak, circularly polarized, structureless type III bursts from the solar corona in the absence of Hα/X-ray flares and other related activity, during the minimum between the sunspot cycles 23 and 24. The spectral information about the event obtained with the CALLISTO spectrograph at Mauritius revealed that the drift rate of the burst is ≈−30 MHz s^{-1} is in the range 50–120 MHz. Two-dimensional imaging observations of the burst at 77 MHz obtained with the Gauribidanur radioheliograph indicate that the emission region was located at a radial distance of ≈1.5$R_\odot$ in the solar atmosphere. The estimated peak brightness temperature of the burst at 77 MHz is ~108 K. We derived the average magnetic field at the aforementioned location of the burst using the one-dimensional (east–west) Gauribidanur radio polarimeter at 77 MHz, and the value is ≈2.5 ± 0.2 G. We also estimated the total energy of the non-thermal electrons responsible for the observed burst as ≈1.1 × 10^{24} erg. This is low compared to the energy of the weakest hard X ray microflares reported in the literature, which is about ~10^{26} erg. The present result shows that non-thermal energy releases that correspond to the nanoflare category (energy ~10^{24} erg) are taking place in the solar corona, and the nature of such small scale energy releases has not yet been explored.

Key words: magnetic fields – Sun: activity – Sun: corona – Sun: radio radiation

Callisto Spectrum Measurements at MRT Mauritius

Chr. Monstein[1], G. K. Beeharry[2], G. N. Rajasekhara[2]

[1] ETH, Institute of Astronomy, Wolfgang-Pauli-Strasse 27, CH-8093 Z¨urich, Switzerland
[2.] UoM, University of Mauritius, Faculty of science, Department of Physics, Mauritius Radio Telescope, Mauritius ,E-mail: monstein@astro.phys.ethz.ch

Abstract

This report documents part of a planned measurement campaign in which spectrum measurements were done at different locations worldwide. The results of the MRT observatory site in MAURITIUS, which was studied at the end of April 2009, are presented. Measurements were carried out with a self built broadband logarithmic periodic antenna connected to a Callisto spectrometer designed and built at ETH Zurich (Benz, 2004). This study provides the technical basis to decide whether it is possible to do spectroscopic measurements below 1 GHz (¸ > 30cm) at MRT. The results are presented and displayed as digitally zoomed spectrums focusing on interesting frequency bands allocated for radio astronomy and other passive services. In terms of electromagnetic interference, Mauritius is ideal for broadband spectroscopic solar radio astronomy observations. It is perfect for broadband observations to detect CME's or to measure quiet solar radio flux at dedicated frequencies. Narrow band studies would probably be much better than is already possible in Bleien. Finally, by observing a dedicate solar radio flare MRT is compared with six other locations out of the Callisto network.

Key words: Callisto, spectrum, cross modulation, interference.

Solar Radio Burst Observation Using Solar Radiospectrograph Sn4000 in Tanjungsari, Indonesia

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[1] Space Science Application Center Indonesian National Institute of Aeronautics and Space
E-mail : velestra_00@yahoo.com

Abstract

Tanjungsari Space Observation Station (SPD Tanjungsari) that is located at 6054'10" S, 107050'24" N (± 35km from West Java Capital City, Bandung) is one of LAPAN's space observation station which has function to implement observation, recording, computing parameter data of solar, ionosphere, earth magnetic and surface meteorologist. One of the instruments SPD Tanjungsari has is Solar Radio Spectrograph that is the only instrument in Indonesia use to observe solar radio burst event at 56 – 1800 MHz radio spectrum. This radio telescope operated since 1997 have time to experience of damage so that cannot operate from year of 2000 – 2008. Since year of 2009, this telescope operates again and can give the early warning of geomagnetic storm events. This ability obtained because LAPAN have developed early warning system that capable to predict the flare occurrence and shock speed from burst type II and III by using radio burst data events. Flare prediction system called SOLARe that mean solar flare prediction and software to measure shock speed of solar radio burst called S3N4 or Solar radio Spectrograph SN-4000.

The Mauritius Callisto Spectrograph

G. K. Beeharry[1], G. N. Rajasekhara[1]

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Abstract

In view of IHY, this report documents part of a planned measurement campaign in which spectrum measurements were done at different locations worldwide. Mauritius is one of the locations. A CALLISTO spectrometer designed and built at ETH, Zurich (Benz 2004) was set into operation from the end of April 2009 at the MRT station of the UoM (University of Mauritius) to study metric and decimetric radio events of the active Sun. The observations were done with self built broadband log periodic antenna connected to the spectrometer. Till the date MRT has observed more than 250 flares spread in all types. We present some of the observed flares profile, few of them compared with other locations and integrated reveals the frequency range of the flare more clearly. The spectrum measurements at MRT also show that it is ideal place for doing broadband observations of both active and quiet sun in the frequency range of 45 to 870 MHz.

Peruvian Space Weather Program

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Abstract

We will show the aspects about our participation in the first International Heliophysics Year 2007 (IHY2007) on SAVNET (project of solar activity) and LAGO (cosmic rays project)projects, and educational projects with schools and colleges students, we also show the development of Peruvian Space Weather Program, in collaboration with universities and national and international scientific institutions, and future plans to implement.

Simulation of MuSTAnG Telescope response to Cosmic Rays

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Abstract

We have developed a Monte Carlo code based on GEANT4 to simulate the propagation of muons through MuSTAnG telescope. The code allows to compute mean zenith and azimutal angles θ and φ, as well as muon threshold energy for the different upper/lower layer detector combinations. It was found that MuSTAnG telescope detects a muon flux in a wide range of zenith angles ($0° \leq \theta mean \leq 63°$). The threshold energy of muons ranges from 0.118 to 0.252 GeV, depending on zenith angle. Using these parameters as input for CORSIKA simulation the median energies of primary protons, responsible for detected muons, have been calculated for different directions. It was shown, that MuSTAnG telescope selects primary cosmic rays of different energies and makes a study of their variations due to solar activity possible in energy range from 54.3 to 108.7 GeV. The results can be used for the analysis of MuSTAnG telescope response to Space Weather processes.

TEC variability at Ouagadougou and koudougou stations in Burkina Faso

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Abstract

We show here the first TEC variability of Ouagadougou (2006-2008) and Koudougou (2009-2010) stations. Ouagadougou station is involved in AMMA project while Koudougou station is involved in IHY project. TEC profiles show the day to day variability in magnitude and in profile form depends on solar events. Comparison is made with CODG-TEC in order to appreciate our one station model. It emerges the necessity to have a high density of GPS network to obtain better TEC profile.

Key words: TEC, CODG, solar events, day to day variability

Spatial and Temporal Variations of Total Electron Content in Africa

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Abstract

Scintillation Network Decision Aid (SCINDA) is a real-time, data driven, communication outage forecast and alert system. The SCINDA system concept is presently being demonstrated using ten equatorial stations in South America, South Asia and Africa. Ionospheric parameters monitored and recorded at Akure, Nigeria (2007 - 2009) using SCINDA unit were processed for Vertical TEC. We examined the diurnal and seasonal characteristics of the two parameters over our observational point. TEC exhibits a pre-dawn minimum for a short period of time followed by steep early morning increase, attain maximum between 14.00UT and 16.00UT. The seasonal variation in TEC maximizes during the equinox months followed by summer and a minimum during the winter months. This emphasized seasonal redistribution of ionospheric currents. The average values for TEC in 2007, 2008 and 2009 are respectively 48.34, 42.89 and 45.64 TECU. The semiannual variation of TEC is asymmetry with maximum in spring Equinox. Fluctuation in TEC was more in daytime and seems to lack seasonal dependent. Data from our observational point was combined with data from IGS GPS stations and other SCINDA stations to investigate the spatial variation of TEC over Africa. The spatial features so obtained are discussed.

Keywords: Total electron Content, Ionosphere, TEC, GPS.

Ionosphere over Africa: Results from Geomagnetic Field Measurements during International Heliophysical Year IHY

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Abstract

Space Environment Research Centre 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 96o Magnetic Meridian (Geographical 30o – 40o East) were examined for Solar quiet daily Sq variations in the three geomagnetic field components 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 +20º and -30º; maintain a single maximum at noon and sunrise. Sq D has maximum values at about -20º (sunrise), -10º (noon time) and +10º (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 (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.

Keywords: Equatorial Electrojet, TEC, Scintillations, Magnetic data.

Progress Report on MAGDAS in Lagos, Nigeria

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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.

Comparison between local models to estimate the TEC / GPS and the global model of TEC / CODG area in Equatorial Africa

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Abstract

The GPS station SCINDA, acquired by the Congo in 2009 under the cooperation of Air force Research laboratory (AFRL). This station is located in the Research Group in exacts Naturals Sciences (GRSEN, Ministry of Scientific Research (length: +15.25E; lat: S-4.28; alt: 305.4910). The location of this station can provide accurate information for the study on the southern edge of the magnetic equator. The lack of instruments on the ground in central Africa makes it unreliable global models for calculating the TEC area in equatorial Africa, which is why we have led to a comparative study of results from treatment with the global model GPS/CODG. The coherences are very clear when superimposed curves of TEC, but gaps remain at certain times when the values of TEC/GPS are slightly higher than the TEC/CODG. The model that we used to do a smoothing every quater of an hour while the CODG smooth for two hours data.

Ionospheric Responses to the Solar Tsunami on August 1st 2010 Observed in Vietnam

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Abstract

The Earth's ionosphere responses strongly to the intense X-ray and ultraviolet radiation from the Sun during solar events. After oversleeping for more than one year, on August 1st 2010 at 8:55 UT a C3.2 magnitude soft X-ray flare erupted on the Sun and triggered CMEs directing to the Earth with 1000 km/s speed.
We will present the results of Ionospheric responses observed in Vietnam (10.5 N, 106.3 E, Dip lat. 2.9 N) to this solar event.
Using HF signals, the Ionosphere can be observed only E and F regions, but with VLF signals can be observed D region. In this presentation we will mention also our preparation to install an AWESOME receiver that is relevant to the objectives of the ISWI.

Effects of quiescent solar activity and of geomagnetic disturbances in the lower ionosphere using SAVNET data

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Abstract

In this work, we summarize some recent results using measurements from the South America VLF Network (SAVNET) data base. This network is an international project coordinated by CRAAM, Brazil in cooperation with Peru and Argentina. SAVNET has been involved in IHY activities (2004-2009) and it is part of the international program International Space Weather Initiative (ISWI). It started operating in April 2006, and now counts on eight stations (Atibaia, Palmas, Santa Maria and Estação Antártica Comandante Ferraz in Brazil; Piura, Punta-Lobos and Ica, in Peru; CASLEO, in Argentina). We have obtained daily maximum diurnal amplitude time series that exhibited behavior patterns in different time scales: 1) long term variations indicating the solar activity level control of the low ionosphere; 2) characteristic periods of alternated slow and fast variations, the former being related to solar illumination conditions, and the latter that have been associated with the winter anomaly at high latitudes; 3) planetary wave type oscillation periods. Finally, we present some results of current studies on geomagnetic disturbances using SAVNET data.

Solar Radius Determination using Baily beads Observations of Annular Solar Eclipse 15 January 2010, Sri Lanka

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Abstract

An attempt was made to determine the solar radius by using the data of Baily's beads observation carried out on the southern limit of the annular solar eclipse on 15th January, 2010 in Sri Lanka. A positive correction of 0.26''±0.06'' to the solar radius was found and the standard solar radius was corrected as 959.89±0.06 arcsec at the time of observation. No correlation was found between the sunspot number and the variation of the Suns radius with the available past data.

Study of Pi2 pulsation observed from MAGDAS chain in Egypt

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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.

Key words: Irregular pulsation (Pi2), MAGDAS, ISWI, Wavelet.

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

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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.

Key words: MAGDAS, ISWI, Solar quiet daily variation (Sq).

Automatic Detection of Geomagnetic Sudden Commencement via Discrete Wavelet Transforms

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Abstract

One of the global processes in ionosphere-thermosphere-magnetosphere system is the geomagnetic storm. It is of great importance to develop an algorithm that auto-detects sudden commencement (SC) because it is an indicator of the onset of the geomagnetic storm. Automatic detection of sudden commencement is based on multi resolution analysis of discrete wavelet transform using haar wavelet filter. Proposed algorithm is tested on data set collected from stations belong to the international real-time magnetic observatory network (INTERMAGNET) network. Maximum standard deviation of algorithm detection times is observed to be one minute of the corresponding arrival times published by National Geophysical Data Center (NGDC).

Key words: Sudden commencement (SC), Haar wavelet, INTERMAGNET.

Malaysia Approach on ISWI Programme

Abstract

Malaysia had performed the ISWI Working Committee of Malaysia on 20th July 2010. The theme of ISWI initiative in Malaysia is 'Space weather for knowledge generation and services towards societal well-being ' . The educational and awareness programme on space weather has been proposed to be included in the current National Planetarium's programme. The general proposed idea was to promote and share the current data, instruments and researches regarding space weather using the platform ISWI and also for Malaysia to join in the ISWI instrument programme.

With the Langkawi National Observatory (LNO) at Pulau Langkawi, Kedah (Long: 99d 46m 52s E , Lat: 06d 18m 25s N) which is housing a several telescope which are robotic apochromatic refractor (diameter 15 cm) for solar observation purpose, the continuous of solar activity can be observe (sunspot and flare).

The telescope set be used for solar observation mainly in three different wavelengths simultaneously ; the continuum, H-alpha and Calcium K-line. With this existing facilities at LNO, we hope can contribute our own data to the international parties and the same time expert from international can co-working with us to strengthen our human capital.

This paper also shown the interest and the national interest expert to participate. With this kind of arrangement, we hope can host some instrument and develop a good local programme and at the same time participate in the international research programme.

Improving the results of SID signal at Kinshasa (Congo, the Democratic Republic of,)

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Abstract

The Democratic Republic of Congo is one of the beneficiaries developing countries all over the world and particularly in Africa to receive simple instruments enabling to research from the UNBSS campaign deployed in the frame work of the principles of instruments program. This program tells us in one hand that the lead scientific funded by his country provides instrumentation and data distribution on the other hand the host provides the workforce ,facilities and become part of the team.

We mention that some equipments was distributed during the workshop at Addis Ababa among them the SID monitors donated by the Stanford VLF Remote Sensing. Actually this material helps us to experience in our laboratory the Strong solar flares that penetrate to lower ionospheric region.

In the beginning the signal of SID monitor shows some difficulties like various noises and needed to be smoothed. At first the antenna was placed horizontally in the laboratory in which was a voltage transformer these conditions did not allow to obtain good result. But we move outside the antenna and set up antenna in using an RLC circuit to absorb the noise by filtering. The signal was also fitted with the wavelet method in order to have a smooth signal. After correction the results compared with others sites like S.I.D Lionel in France and Stanford team in USA don't give any difference.

MAGDAS/CPMN Magnetometers in Peru

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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: -11.79º, longitude: -77.16º and geomagnetic(2000) latitude is: 3.10º and longitude: 354.66º. 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.

Space Weather in Peru

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Abstract

Geomagnetic observations begun in Peru since 1922 by Carnegie Institution of Washington, solar observations begun in 1936 using a Hale Type coelostat, in 1960 a monochromatic spectrograph was installed to take images of the Sun to monitor solar activity and in 1967 a radio polarimeter to observe solar phenomena at 9.5 Ghz. Gomagnetic data was reported and used worldwide uninterrupted since that, unfortunately solar data could not be available since 90's. Then since 2002 thanks to cooperation within Geophysical Institute and a local national university, Sunspots observations were performed, and in March of this year flare monitoring observations begun at the new Solar Observatory of San Luis Gonzaga de Ica University. Flare monitoring observations in Peru borne thanks to IHY initiative. Flare monitoring observations is tripod cooperation within a Peruvian research institution, a local university and a foreign research institution. Hida Observatory of Kyoto University provided the Flare Monitoring Telescope.

Probing of D-region ionosphere using AWESOME VLF receivers in India: Setup under IHY/UNBSSI program

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Abstract

Lightning discharge radiated extremely low frequency (ELF, 30-3000 Hz) and very low frequency (VLF, 3-30 kHz) waves is a powerful and effective tool for the diagnosis of Earth's ionosphere and magnetosphere. During the year 2007-2008 three AWESOME VLF receivers developed by Stanford University were setup at three low latitude locations in India during 2007 by Indian Institute of Geomagnetism, India. Lightning generated radio atmospheric that propagates long distances via multiple reflections through reflecting boundaries of the Earth-ionosphere waveguide (EIWG) shows sharp dispersion near the cut off frequency ~1.8kHz of The EIWG. These dispersed atmospherics at lower frequency end are called as 'tweek' radio atmospheric. In this work we have utilized the dispersive property of tweeks observed at low latitude Indian stations Nainital and Allahabad for the estimation of D-region electron densities at the ionospheric reflection heights. Direction finding technique has also been applied to determine the source locations of causative lightning discharge of tweeks. Geographic locations is determined by the intersection of two circles drawn taking distance travelled/propagation distance by tweek atmospheric from source location to Allahabad and Nainital stations. The results are in good agreement with World Wide Lightning Location Network (WWLLN) data.
After the extended the long solar minimum, the solar cycle 24 has initiated with good number of strong solar flares. These solar flares effects have been seen on narrowband VLF signals propagating in earth ionosphere wave guide. During the solar flares X-ray flux enhancement causes perturbation on upper boundary of Earth-Ionosphere waveguide i.e., lower ionosphere through which the VLF signal propagates. This causes the perturbation on Phase and Amplitude of VLF signal. The magnitude of VLF perturbation caused by a solar flare is thus a potentially good measure of the effects of the flare on the loweionosphere. We will discuss the results obtained from the analysis of VLF waves to investigate D region ionosphere.

Installation of Magnetometer- Magdas II and SIDs Monitor, at the University Eduardo Mondlane – Department Physic, Maputo-Mozambique

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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 fase 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.

CME DYNAMICS AND KINEMATICS

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Abstract

We investigate the initiation and development of the limb coronal mass ejection (CME), utilizing observations from Mauna Loa Solar Observatory (MLSO), Solar and Heliospheric Observatory (SOHO), Solar Terrestrial Relations Observatory (STEREO) and Solar Dynamic Observatory (SDO). The goal of this study is to investigate the new, relatively fast method for determining true geometric and kinematical CME parameters from simultaneous observation of CMEs by various satellites and ground based MLSO observatory. These parameters are direction of CME motion, velocity and acceleration of the different parts of CME (the frontal rim, the cavity, and the prominence) and CME angular size. Furthermore, we investigate the driving mechanisms of CME and infer the magnetic field properties at the onset of the instability. To determine the driving mechanism, we quantitatively and qualitatively compared the observationally obtained kinematic evolution with that predicted by various CME models, mainly based on toroidal geometry (cf., Chen, 1989; Vršnak, 1990; Forbes and Isenberg, 1991; Amari et al., 2000; Wu et al., 2000; Török and Kliem, 2005).

Signature of midnight temperature maximum (MTM) using TEC (GPS) and OI630 nm Night Airglow

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Abstract

Night airglow data of Kolhapur station and GPS data of Hyderabad and Bangalore station have been used to obtain OI 630.0 nm intensity emission and d (TEC)/dT values respectively in order to monitor the ionospheric behavior in the Indian region. For this task, we are using the Tilting Photometers and Don Thompson's slant TEC software (rd_rinex) which gives OI 630.0 nm intensity emission and vertical TEC above each station respectively. The nocturnal variations observed in the atomic oxygen airglow emission at low latitude are well correlated with the dynamical variations seen in the F-region ionospheric parameters such as d(TEC)/dT, for both quiet and disturbed days.
The signature of midnight temperature maximum (MTM) has been observed in some of the nights in both OI630.0 nm and d (TEC)/dT data. The signature of MTM has been found in both night airglow (OI630.0 nm) and TEC data. It is suggested that F-region temperature should be simultaneously measured both at equator as well as at Kolhapur to confirm the signature of MTM.

Kyushu University's SERC Subcenter at Manila Observatory, Philippines

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Abstract

Last February 8, 2010, Fr. Daniel J. McNamara, S.J. of Manila Observatory (14°38′12.01″ N, 121°4′36.01″ E)and Prof. Kiyohumi Yumoto of the Space Environment Research Center (SERC) signed a Memorandum of Agreement, in the presence of administrators from Kyushu University and
Ateneo de Manila University. The MOA was made in order to promote the research collaboration on the study of the interaction of the lithosphere, ionosphere, and magnetosphere, especially in the case of earthquakes. Following the signing of the MOA, Manila Observatory's Ionoshere Research Building was renamed as the Kyushu University's SERC Subcenter. The SERC subcenter is a rectangular solid-shaped building with a floor area of $6.67m \times 10.0 m = 66.7m2$, not including the toilet, kitchen, and entrance porch. Kyushu University gave $ 5,000 for the renovation of the subcenter and Manila Observatory gave $ 2,000. The money was spent for the electrical rewiring of the building. There are now 70 universal outlets capable of handling more than 1000 W load at the same time. Each electrical outlet has three holes, with the third hole for the grounding. The grounding system was centralized to protect the equipments from lightning strikes: all ground wires are connected to a single node at the base of the radar tower. This
node is connected to several copper plates buried in layers of charcoal and salt. Water is poured on this system everyday to increase its conductivity. The rest of the money were spent on the installation of acoustic board ceiling with 12 louver type $2 \times 20W$ flourescent bulbs with aluminum reflectors, cleaning of the brick walls, and repainting of the cement walls and doors. The replacement of the
porcelain tiles in the toilet and the vinyl tiles in the working room is still currently being contemplated. New tables, chairs, and other furnishings will soon be bought. The renovation of the building started May 2010. It will be finished at the end of September 2010.

An Investigation into the Effect of Column Ozone on the Variability of UV Radiation in the Tropical African Region

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Abstract

This study aimed at investigating the relationship of ozone and UV Radiation on six selected stations in the Tropical African region using Total Ozone Monitoring System (TOMS) satellite data for a period of 24 years from 1979 to 2003.

The study was subdivided into several parts. The first part concentrated on data quality control and homogeneity tests using residual mass curve. Time series analysis was used so as to determine their trend, seasonal characteristics and cyclic behavior. Linear correlation, autocorrelation and periodogram analyses were finally used to determine whether the observed UV fluctuations are as a result of` ozone. Time series analysis under different sky conditions showed an oscillating characteristic without any significant trend. Occurrences of large and low values were however evident. Total ozone has a seasonal cycle; it reaches a maximum in October (285 DU) and minimum in January (230 DU). Surface UV radiation also exhibits seasonal cycles that have maxima in March (165 w/m2) and minima in December (144 w/m2). Calculations from the departures indicated an increasing UV trend of 18.2% per decade against an insignificant 9.9% per decade of ozone decrease but leveling off in the late 90s.

The variability of surface UV due to cloud cover are reduced by selecting UV values taken at about 0-10º solar zenith angle (SZA) and under low cloud cover showing an increase of surface UV radiation at 310 nm from 1970s to 1990s.

Results from the spectral analysis identified quasi-periodic fluctuations from temporal fluctuations of ozone and UV over the six stations. These fluctuations were centered on the 4-6, 11-12, 23-25 and 34-35 months. The dominant 23-25 months cycles could be explained in terms of the Quasi-Biennial Oscillation (QBO) and other general atmospheric systems, while the 11-12 months depicted the annual cycle. The physical reality of the fluctuations which are centered around 4-6 and 34-35 months could however not be identified from the current study.

Keyword: Planetary Ionosphere, Thermospheres and Mesospheres, and Upper Atmospheres

Nocturnal low-level jet wind potential at Niamey

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Abstract

This work presents a large study of the wind characteristics and the diurnal and seasonal wind variations obtained from the data of wind profiler radar installed at Niamey in 2006. The nocturnal low level jet peaked at 14 m s-1 at 500 m. It was still obvious at 150 m. An important wind shears were also shown, together with the impacts on aircraft activity.
The wind pattern was marked by a strong diurnal cycle as well as a strong seasonal cycle. A wind assessment was made by two methods. The first involved the wind distributions directly observed. The second was based on the Weibull distributions. Day and night were compared. Results showed that the nocturnal low level jet was an interesting source of energy provided that wind turbines were 150 m high. Harmattan period is most propitious with an output power exceeding 300 W.m-2 due to the nocturnal jet.

Keywords: Boundary layer ; Wind profiler radars ; Nocturnal low level jet; Wind potential; Wind turbines.

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

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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.

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Geomagnetism Science and MAGDAS Station in Southern Brazil

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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, (29,43º S, 53,82º 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.

GPS studies of the Ionosphere

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Abstract

This paper is devoted to the use of GPS receivers to study ionosphere. We focus our presentation on physical phenomena at middle and low latitudes:

- equatorial fountain study with GPS
- signature of magnetic storms on GPS signal
- travelling ionospheric disturbances
- F diffus
- scintillations
- etc…

Investigating the Influence of Solar Activity on Rainfall in Indonesia by using Outgoing Longwave Radiation Data

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Abstract

As maritime continent in equator region, Indonesia is very important to be source of global atmospheric convection affecting climate. The weather and climate system are influenced by local (inter-island interaction), regional (monsoon system) and global condition such as El Nino Southern Oscillation (ENSO), Indian Ocean Dipole (IOD) and also solar activity. In this study we present possible influence of solar activity on Indonesia rainfall by using Outgoing Longwave Radiation (OLR) satellite data from NOAA (National Oceanic and Atmospheric Administration). The Remote Sensing Affairs, National Institute of Aeronautics and Space (LAPAN) has used this data to provide the information system of natural hazard mitigation since the measurement provides information on cloud-top temperature which can be used to estimate tropical rainfall amounts which is important in forecasting weather and climate. For investigate the solar activity effects on rainfall pattern in Indonesia region we use spectral analysis method to calculate the periodicity related to solar signal. We have analyzed region based on Indonesia climate patterns that is monsoon, equatorial and local patterns and also the position of the sun related to the season. From preliminary result we find that in general the solar signal appears on some regions with different climate pattern or seasonal time ranges. The stronger solar signal appears over region with monsoon pattern and during dry seasons, when local or regional effects is least.

Keywords: solar activity, Outgoing Longwave Radiation (OLR)

Estimation of vTEC using the Nequick2 model:A case study over Lusaka, Zambia for the year 2003.

Abstract

Vertical Total Electron Content (vTEC) affects the propagation of the radio waves in the ionosphere which in turn affects GPS signals. The NeQuick2 electron density model is one of the models that can be used to estimate the vTEV values in absence of experimental data given the global F10.7 data and other input parameters. The results show that TEC values are highest between 10 and 12 UT and lowest around 2 UT. The results also indicate that TEC is highest and lowest during the southern hemisphere and northern hemisphere respectively. This is in agreement with the preliminary results of the analysis of observed vTEC values. The NeQuick2 model can therefore be used to estimate vTEC values over a region.

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

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Abstract

The Northern part of Taiwan Island, on 19th of December 2009, was struck by an earthquake measuring 6.4 on the Richter scale at depth ≈ 45 km. The epicenter was located about 20 Km away from the Hualien station (MAGDAS I station). The earthquake caused some damages in the vicinity of the epicenter.

In order to identify the possible occurrence of any anomalous geomagnetic variations associated with the seismic activity in Taiwan on the 19th of December 2009, geomagnetic data recorded at Hualien station (HLN) were analyzed. Amami-oh-shima (AMA) station in Japan was used as a remote reference station. The geomagnetic components (H, D and Z) recorded at HLN station showed baseline fluctuations during December 2009. These anomalous variations started about 1 week before the occurrence of the earthquake and lasted for about 2 weeks with ≈ 15-20 nT amplitude. Furthermore, there was an enhanced ULF signal in the range of Pc3 (10-45 sec) linked with the seismic event and observed a few days before the onset of the earthquake. In addition, there was a good correlation between the occurrence time of the earthquake and the polarization ratio (Z/H) of the Pc3, where there was a decrease in the polarization ratio at HLN a few days before the onset of the EQ. In addition, we observed less than 1 nT increase in the total intensity of geomagnetic field that occurred about two minutes before the onset of the seismic event.

The mechanism for generating such observed anomalous geomagnetic fluctuations is not fully understood. Previously, different mechanisms were purposed to explain the observations of anomalous geomagnetic variations related to a number of earthquakes. Generally, changes in the magnetic susceptibly, conductivity, remanent and induced magnetization of the rocks as a piezomagnetic effect or the earthquake-related currents along the fault planes can cause such geomagnetic changes during the seismic activities. However in the present study, we expect that the crustal stress perturbations played an important role for generating our observed geomagnetic variation as a tectonomagnetic effect. In addition, the crustal stress also can drive the underground currents along the fault plane which maybe also contributed to the observed geomagnetic variations. So, we think that the observed anomalous geomagnetic fluctuations may be connected to the seismic activity near the HLN station.

Deployment of MAGDAS in Africa

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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,
(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.

Latitudinal profile of the ionospheric disturbance dynamo magnetic signature: comparison with the DP2 magnetic disturbance

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Abstract

During magnetic storms, the auroral electrojets intensification affects the thermospheric circulation on a global scale. This process which leads to electric field and current disturbance at middle and low latitudes, on the quiet day after the end of a storm, has been attributed to the ionospheric disturbance dynamo (Ddyn). The latitudinal profile of the Ddyn disturbance magnetic signature exhibits an eastward current at mid latitudes and a westward one at low latitudes with a substantial amplification at the magnetic equator. Such current flow reveals an "anti-Sq" system established between the mid latitudes and the equatorial region and opposes the normal Sq current vortex. However, the localization of the eastward current and consequently the position and the extent of the "anti-Sq" current vortex changes from one storm to another. The latitudinal profile of the Ddyn disturbance as well as the magnetic disturbance DP2 generated by the mechanism of prompt penetration of the magnetospheric convection electric field in general, show a weak disturbance at the low latitudes with a substantial amplification at the magnetic equator. Due to the intensity of the storm, the magnitude of the DP2 appears higher than the Ddyn over the American and Asian sector contrary to the African sector.

Modeling of geomagnetically induced currents during geomagnetic storms using geoelectric fields and auroral electrojet indices

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Abstract
The effects of space weather on ground based technology mostly occur due to the varying geomagnetic field during geomagnetic storms produces geomagnetically induced current (GIC). Space weather storms involve intense and rapidly varying electric currents in the ionosphere, which create geoelectric and geomagnetic fields at the Earth's surface. In this study we investigate some intense geomagnetic storms: September 18th, 2000; March 31th, 2001; October 21st, 2001; November 6th and 24th, 2001; October 29th and 31st, 2003 and November 9th, 2004. The electric field for each day is computed using ground conductivity and geomagnetic recordings. The conductivity models are determined by least square fit between the observed and predicted GIC values. Our results show that GIC are strongly correlated with the geoelectric field, and also with eastward (AU) and westward (AL) auroral electrojet indices and time derivatives of the horizontal geomagnetic field. RMSE (Root Mean Square Error) statistical test was employed to evaluate the accuracy of the models used

TEC equinoctial asymmetry obtained at Niamey from 1998 to 2009 by using CODG model

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Abstract

In this paper we analyse the CODG-TEC measurement during more than one decade. The CODG-TEC exhibit the well known equinoctial asymmetry (maxima at equinox) related to the sun earth position. Most of the time the amplitude of the vernal maxima is larger than the amplitude of the autumnal one (years 2000, 2001, 2002, 2003 2004, 2005, 2006, 2007, 2009). During two years 1999 and 2001, we observe a reversed pattern: the autumnal maximum is larger than the vernal one. These observations are interpreted as a function of the two components of the solar magnetic field (toroidal and poloidal) and solar events.

Key words: TEC, equinoctial asymmetry, solar magnetic field

Overview of Solar Terretrial, ionospheric and atmospheric researches performed using the South America VLF Network SAVNET

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Abstract

The South America VLF NETwork (SAVNET) has completed three years of operation in April 2010. In this work, we will review the results obtained so far in the context of the Sun-Earth relationships and the ionosphere. In particular the low ionospheric C-region has been monitored on a daily basis, using the well known post sunrise phase effect. The results show that the slow variations of this effect are well understood in terms of the solar illumination conditions, while transient and more intense variations are well correlated with "winter anomaly" times. We took advantage of the very low solar activity levels between 2006 and 2009 to study about 500 solar flares during this period, and their response in the ionospheric D region. We find a new lower detection limit for such events of about 2.7 10^-7 W/m2, that is a soft X-ray power corresponding to very small solar events of GOES Class B 2.7. A comparison with earlier results nicely confirms the role of Lyman-alpha radiation in the formation and to maintain the diurnal D region. Finally, we used different VLF propagation paths to monitor the VLF wave amplitude at local noon. As we have found in the case of the C-region, the slow and long-term amplitude variations can be explained by the solar illumination. Interestingly, amplitude long-term variations do show the presence of both solar cycle and solar rotation signatures. SAVNET is also used to monitor exotic objects like magnetars where physical conditions are extreme. Then such remote objects are of great astrophysical importance. We will show few examples of such detections, and how the simple technique used by SAVNET instrumental facility can complement space gamma-ray sensors, which often suffer from off pointing conditions, saturation or Earth occultation. Finally we report on the search for seismic-electromagnetic effects prior to earthquakes events using the SAVNET network. These activities are of fundamental importance for the South America regions were SAVNET receivers have been installed because of the regular seismic activity there.

Ionospheric scintillation during amagnetic storm over kenyan airspace

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Abstract

Scintillation is a rapid amplitude and phase fluctuations of satellite signal observed near the earth's surface. Scintillation can be a major problem in navigation application using GPS receivers particularly in a highly disturbed ionosphere. In this work we present the effect of ionospheric scintillation on the satellite signals over the Kenyan space using observation derived from a GPS-SCINDA receiver collected for the periods of July 22-23, 2009. The results reveal that the Kenyan space does experience ionospheric scintillation mainly in the early hours between 4-7 HRS UT time. During a magnetic storm on 22, July, ionospheric scintillation was more intense and lasted longer compared to scintillation during magnetically quite days.

Key words: scintillation, disturbed ionosphere, magnetic storm, Scinda-Gps

MAGDAS Project at SERC for Space Weather during ISWI

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Abstract

The Space Environment Research Center (SERC), Kyushu University has deployed the MAGnetic Data Acqusition System (MAGDAS) at 50 stations along the 210- and 96-degree magnetic meridians (MM) and the magnetic Dip equator, and three FM-CW radars along the 210-degree MM during the International Heliophysical Year (IHY) period of 2005-2009 (see http://magdas.serc.kyushu-u.ac.jp/ and http://magdas2.serc.kyushu-u.ac.jp/). The goal of MAGDAS project is to become the most comprehensive ground-based monitoring system of the earth's magnetic field. It does not compete with space-based observation. Rather, this ground-based network complements observation from space. To properly study solar-terrestrial events, data from both are required. This project intends to get the MAGDAS network fully operational and provide data for studies on space weather. By analyzing these new MAGDAS data, we can perform a real-time monitoring and modeling of the global (e.g. Sq, EEJ) current system and the ambient plasma mass density for understanding the electromagnetic and plasma environment changes in geospace during helio-magnetospheric storms. In order to examine the propagation mechanisms of transient disturbances, i.e., sc/si, Pi 2, and DP2, relations of ionospheric electric and magnetic fields are investigated by analyzing the MAGDAS magnetic data and the Doppler data of our FM-CW ionospheric radar. A new EE-index (EDst, EU, and EL) was also proposed by SERC for real-time and long-term geo-space monitoring. The basic algorithm to obtain EE-index was constructed by Uozumi et al. (2008). EU and EL mainly represent the range of the EEJ (equatorial electrojet) and CEJ (equatorial counter electrojet) components, respectively. The baseline levels of EU and EL are obtained by averaging the H-component magnetic variations observed at the nightside (LT = 18-06) MAGDAS/CPMN (Circum-pan Pacific Magnetometer Network) stations along the magnetic equator. The baseline value is defined as EDst and its variations are found to be similar to those of Dst. We examined relationships among the EEJ amplitude, the F10.7 solar radiation flux, the solar wind parameter, Ap-index and the ionospheric conductivity. We found that the intensity of the EEJ depends on the 11-years solar activity. The semi-annual EEJ oscillation is caused by changes in the ionosphere dynamo and not by changes in the ionospheric conductivity. The 14.5-day EEJ oscillation may be caused by waves inside the atmosphere. The EEJ amplitudes are also controlled by the interplanetary electric field (Ey = - Vsw x BIMF). In the present paper, we will present the several scientific results obtained by MAGDAS project, and introduce a coordinated near-earth satellite and MAGDAS observations for space weather during the International Space Weather Initiative (ISWI) period of 2010-2012.

Latitude dependency of solar flare index - temperature relation occurring over middle and high latitudes of Atlantic-Eurasian region

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Abstract

By applying multitaper methods and Pearson test on the surface air temperature and flare index used as a proxy data for possible solar sources of climate-forcing, we investigated the signature of these variables on middle and high latitudes of the Atlantic-Eurasian region (Turkey, Finland, Romania, Ukraine, Cyprus, Israel, Lithuania, and European part of Russia). We considered the temperature and flare index data for the period ranging from January 1975 to the end of December 2005, which covers almost three solar cycles, 21st, 22nd, and 23rd. We found significant correlations between solar activity and surface air temperature over the 50-60 and 60-70 degree zones for cycle 22, and for cycle 23, over the 30-40, 40-50, and 50-60 degree zones. The most pronounced power peaks for surface air temperature found by multitaper method are around 1.2, 1.7 and 2.5 years which were reported earlier for some solar activity indicators. These results support the suggestion that signature of solar activity effect on surface air temperature of mid-latitudes.

Keywords: Solar activity; Flare index; Surface air temperature; Time series analysis; Sun-climate effects

Seasonal Impact on F Layer at Night

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Abstract

We study equatorial night-time F layer behaviour from quater-hourly ionograms at Korhogo/Ivory Coast (9.2°N, 5°W, dip lat. -2.4°) during local time from january to december 1995, declining solar flux period, according to the magnetic activity. The height and thickness of the F-layer are found to vary intensely with time and from one day to the next. At time of the equinox transition, by the end of March, a net change of the nightly height-time variation is observed. The regime of a single height peak phase before 22 March changes to up to three main F-layer height phases after 30 March, each associated to a dominant mechanism. The first phase is identified to the post-sunset ExB pulse, the second phase associated to a change in the wind circulation phenomenon and the third one attributed to pre-sunrise phenomena. The influence of the magnetic activity is identified by the increase in the second peak amplitude. After the 21 April magnetic-equinox period, the height-time morphology becomes more irregular suggesting meridional wind abatement

Exact Solution of Pioneer Anomaly & Fly by Anomaly

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Abstract

There are (6) astrophysical phenomena's (until now) are not solved by any gravitational theory. The advanced tiding approach between microscopic world and the macroscopic world, will gain its turn this time. The analysis of Pioneer anomaly through such approach is appeared from:- 1- QED lagrangian analogy, 2-Inverse large mirrorWith the same NASA addressed value. Also Fly by anomaly is shown as an astrophysical Cyclotron, where thy gravity field by sun-planet- moon as a C of the electric field (It will give the needed potential for acceleration) and the electromagnetic field of sun-planet-moon as a mirror of the magnetic field in elementary particle Cyclotron (for body circulation). The solar wind (the solar particle) affect on the changed velocity up and down according the up and down of the solar cycle. The empirical formula by J.D. Anderson (NASA) was deduced from that approach $\Delta V\infty / V\infty = 1 / 2 * \Delta E / E = K\_(\cos\partial i - \cos\partial o)$.

Keywored: Astrophysical Cyclotron **,** astrophysical Cyclotron ,solar cycle

On the role of the bow shock in power of magnetospheric disturbances

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Abstract

The importance of Space Weather, i.e., state of electromagnetic fields, plasma and particle fluxes in near-Earth space, for space vehicles is defined by a capability of potentially hazardous factors to increase for a short time. On the one hand the geomagnetosphere is the environment through which impacts responsible for solar-terrestrial relations are to pass, and on the other hand it is getting an arena of economic activities to a far greater degree itself.

Bow shock is a powerful transformer of the solar wind kinetic energy into the gas dynamic and electromagnetic energy. Indeed, the magnetic field tangential component and magnetic energy density increase by factors of almost 4 and approximately 15, respectively, at the bow point when the front is crossed. The physical essence of this process consists in that the Earth in the solar wind stream disturbs this stream, which is supersonic for the Earth. This means that the bow shock front is formed, upstream of which the solar wind plasma is not disturbed and new scales of a change in the values appear downstream (a front thickness is the minimal of these scales). In describing the bow shock, we followed [Whang, Y.C., J. G. R. 1987]. A jump of the magnetic field tangential component at front crossing means that the front carries an electric current. The solar wind kinetic energy partly transforms to gas kinetic and electromagnetic energy when passage through the bow shock front. The transition layer (magnetosheath) can use the part of this energy for accelerating plasma, but can conversely spend the part its kinetic energy on the electric power generation, which afterwards may be used by the magnetosphere. Thereby, transition layer can be both consumer and generator of electric power depending upon special conditions. The direction of current behind the bow shock front depends on the sign of the IMF Bz-component. It is this current which sets convection in motion. Energetically, this external current is necessary for maintaining convection of plasma in the inhomogeneous system (magnetosphere). The generator at the bow shock front can be a sufficient source of power for supplying energy to substorm processes [Ponomarev, Sedykh. J. of Atm. Solar-Terr. Phys. Vol. 68. 2006; Ponomarev, Sedykh et al., Geomagn. and Aeron., 2009].

The two-stage development of substorm active phase

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Abstract

In this paper the description of phases of a substorm is given on the basis of the obtained analytical solution of the problem of solar wind energy transformation into the energy of magnetospheric processes and the problem of magnetosphere-ionosphere coupling [Ponomarev, Sedykh. J. of Atm. Solar-Terr. Phys. Vol. 68. 2006; Ponomarev, Sedykh, Geomagn. and Aeron., 2006]. The certain attributes, the real physical mechanism correspond to each stage of a substorm. Results of research of processes in the bow shock region and process of external current penetration into the magnetospheric plasma lead to the scenario of a substorm with two-stage active phase as an alternative of the traditional scenario of a substorm with growth phase, expansion phase and recovery phase. Researchers, who are engaged in description of a substorm phases, note that the active phase of a substorm may be two-stage process. Instead of traditional description of three phases of a substorm (growth, expansion, recovery), e.g., some researchers separate active phase of a substorm on active-convectional and expansion phase. For example, the chain of 4 substorms has been described, and in development of an active phase two-stage process has been marked. In the practical relation, such model of a substorm [Ponomarev, Sedykh, Geomagn. and Aeron., 2006], including the description and the basic attributes of substorm phases, are of value for development empirical and semiempirical models of magnetospheric disturbances, allowing to optimize such models, and that is the important element of the Space Weather Program.

Quantification of damage category on mega and micro-scale of constructional Nubian sandstone, Temple of Madinet Habu, Luxor, Egypt

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Abstract

Sandstone has been widely used as constructional natural rock since early dynasties in the Egyptian history particularly at Upper Egypt. El-Silsila Quarries at 105km South-East of Luxor are the main source for construction at Upper Egypt. Weathering processes act on this construction sandstone composing one of the most precious and highly decorated temples at the West-Bank of Luxor "Temple of Madinet Habu" that had been built for God Amun by King Ramsis III. The present study focalizes the damage category (in a quantitative form) at different parts of this temple using field and laboratory investigations. DCAW Scheme of Fitzner et al (2002) has been used to quantify rock damage category of this site based on detailed field recording and measuring the weathering forms' dimensions at different parts of this temple. This field investigation is non-destructive technique that is almost preferred in case of historical buildings. Laboratory investigations included petrographic, geotechnical and hydrochemical analysis using tiny samples loosen from the weathered parts at this site, this is to numerically quantify this damage category and detect the role of salt weathering at this area.

Keywords: archaeological site, constructional sandstone, quantification of damage category

Quiet day Diurnal anisotropy of variation of GCR flux in Rome Neutron Monitor

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Abstract

Data from the cosmic ray neutron monitor at Rome (41.9oN, 12.5oE) have been Fourier analyzed to obtain the first four harmonics of its variation. The quiet day seasonal and yearly averages of diurnal variations were plotted for the station on solar cycle basis. The amplitude of the diurnal variation during solar minimum leads that of the maximum with as much as two hours. We report for the first time (from available literature) a pre-noon peak in the quiet day diurnal variation at about 8:00 solar local time (SLT). This observation has never been discussed in previous and recent studies. We also established that the pre-noon peak is more visible during the solar minimum period. We found a weak correlation (< 0.2) at (r= 0.95) between the galactic cosmic ray harmonics and geomagnetic/ Solar heliospheric variations. The seasonal correlation analysis shows that the GCR intensity clearly correlates well with solar activity and Heliopsheric modulation. There appear to be a seasonal trend in the GCR flux correlation with sunspot number (R) where the correlation is greatest in the J-season and least in the D-season. We infer that the phase reversal is controlled by the solar polar magnetic field reversal associated with the 22-year solar activity cycle rather than the 11-year sunspot cycle. Also the variations in the harmonics of the GCR flux may be associated with galactic sources or medium through which the GCR had traveled towards the heliospheric boundary. These results have significant implications for understanding the anomalies of GCR flux associations with atmospheric and geophysical forcing.

Space Weather and Geomagnetic Storms Association of Scintillation Activity

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Abstract

Ionospheric plasma is often far from homogeneous because irregularities of different types arise and disappear in all ionospheric layers both by day and at night. They may hinder short-wave radio transmissions on Earth, satellite communications and, in the age of satellite positioning systems, navigation. Together with the solar and geomagnetic effects, known as "space weather", tides, earthquakes, etc. can also change the ionosphere and may play a role in the generation of the ionospheric irregularities. To investigate the small scale irregularities one can look for irregular scintillations in a signal passed through the ionospheric plasma. In this work the solar wind and the equatorial ionosphere parameters, Kp, Dst, AU, and AL indices characterized contribution of different magnetospheric and ionospheric currents to the H-component of geomagnetic field are examined to test the space weather effects on generation of ionospheric irregularities producing VLF scintillations to predict its. The relationship between the equatorial ionospheric scintillations and the IMF Bz, Dst , Kp AU, AL indices has been demonstrated. It is shown that all of these indices are suitable for investigations of scintillaton activity at the equatorial ionosphere. Undoubtely, the Dst index is convenient and available one to study geomagnetic conditions during the ionospheric disturbances. However, the examples considered show that difficulties emerge when we consider the relation of the magnetospheric ring current to the equatorial ionosphere height variations and scintillation activity. The reason is that the Dst index does not include the auroral sources. For example, Kp as the planetary (p) index carries information about auroral electrojets and we can see from our examples that scintillation activity decreases when Kp reduces with positive Bz IMF. This means that the auroral electrojets depicted by AU, AL-indices are connected with DP systems and the FAC moving polarward. The solar wind electric field through the FAC of Region 1 and Region 2 is likely to be the factor which generates or inhibits the equatorward penetration of the high-latitude electric field. If the equatorial ionospheric height is below or equal to 350 km, then scintillations are not generated. The negative Bz IMF enhances the auroral electric fields and the FAC electric fields can penetrate to equatorial ionosphere, and the ionospheric F-layer is raised above of threshold height (350 km). The equatorial irregularities associated with spread F can be generated at this height and above, and scintillations can be observed there. Plasma falling from the high ionospheric altitudes is favored for generation of the equatorial scintillations as well. The possible source of this phenomenon is the solar wind electric fields – the auroral and equatorial ionosphere coupling. The success of prediction of the ionospheric scintillations seems to use models which explain the relationship between equatorial ionospheric hoF, foF2 parameters and the equatorial geomagnetic variations with the polar ionosphere currents and the solar wind parameters such as Bz IMF, Ey − the solar wind electric field.

Ionosphere Variations during 10 March 1998 Geomagnetic Storm and Problems of the Storm Identification with the Solar Sources

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Abstract

In this paper we have made an attempt to examine the solar sources and the solar wind conditions to illustrate what kind of the solar activity and solar wind parameters leads to short-term variations of the critical frequency foF2 and virtual height variations at the equator during a geomagnetic storm. The ionospheric data well as SOHO and the solar wind conditions OMNI data have been examined for the 10 March 1998 geomagnetic and inospheric storms. This was driven mainly by the solar wind variations due to solar activity. It was problem to identify with the solar activity the solar wind parameters variations near the Earth. So, the solar predecessor event had the ambiguous identification. Most likely it was a high speed stream of ionized material released by the coronal hole of the sun. The solar wind electric field disturbed the auroral ionosphere and the auroral electrojets were formed. The high-latitude electric field and termospheric disturbances penetrated to the equatorial ionosphere. It was the reason of the equatorial ionospheric variations during this geomagnetic storm. It is shown that the auroral and the equatorial ionospheric phenomena are developed practically simultaneously. This fact confirms interaction of the auroral and the equatorial ionospheric electric fields. An accurate prediction of the behavior of various ionospheric parameters requires data at higher resolution that the shortest time constant of the event. The ionospheric 5-min variations at the equatorial stations allowed us to calculate in detail time delays of the auroral and equatorial ionospheric phenomena. Taking into account the time delay between the solar wind electric field which was near 40 min the relationships between the solar wind and the ionospheric parameters can be used for prediction of different ionospheric phenomena. For example, the changes of the ionosphere height may serve as a good measure for predictions of the spread F or intense ionospheric scintillations.

Study of Ionospheric Total Electron Content during Solar Eclipse of July 2009 and January 2010 in the Indian Zone

P. Galav, S. Sharma and R. Pandey

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Abstract

We have studied the ionospheric response to the total solar eclipse of July 22, 2009 and of the annular solar eclipse that occurred on January 15, 2010 in the Indian zone; in terms of the total electron content (TEC) and electron density profile using the ground based and space based global positioning system (GPS) receivers. The eclipse of July 2009 was in early morning hours for the Indian region whereas the Annular eclipse of January 2010 was on post morning hours. For this purpose TEC data from three ground based GPS stations at Udaipur, Hyderabad and Bangalore has been analyzed. The TEC values show decrement in accordance with the obscuration rate at different stations. The electron density profiles, obtained from GPS radio occultation technique, have been utilized, for the first time in the region, to show the prominent effect of eclipse on ionospheric electron density in the Indian zone. The detailed result of the study and discussion will be presented during the workshop.

Latitudinal and Longitudinal Variations of Ionospheric Total Electron Content during the Geomagnetic Storm of August 2005

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Abstract

Response of low latitude ionosphere to the geomagnetic storm of August 2005 has been studied using total electron content (TEC) data obtained from the global positioning system (GPS) receivers. These studies were carried out using the receivers that were located (a) near the northern crest (~15° N Mag. Lat.) of the equatorial ionization anomaly around 56°, 74°, 102° and 121° E longitude and (b) from the northern crest of ionization anomaly down to the magnetic equator in the longitude belt 75°± 3° E. These studies have been substantiated with the ground based magnetometer data. The TEC on the August 24 reveals two well defined humps. These enhancements have been attributed to the prompt penetration electric fields and abnormal equatorial plasma fountain as inferred from the solar wind parameters, southward component of the inter planetary magnetic field, cross polar cap potential drop, zonal component of the inter planetary electric field and the strength of the equatorial electrojet. Suppressed TEC on August 25 has been attributed to the disturbance dynamo electric fields. Detailed discussion and new results on longitudinal effects of prompt penetration electric field would be presented during the workshop.

Statistical study of the DP2 enhancement at dayside dip equator compared to low latitudes

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Abstract

During the magnetic storms, the magnetospheric electric field is transmitted to the auroral ionosphere buy the FACs. This electric field can penetrate to the low latitude and cause the DP2 currents. The electric field associated with the DP2 currents contributes to enhance or decrease the equatorial electrojet when the R1 FACs or R2 FACs dominates respectively. The equatorial electric field disturbances causing by DP2 events makes the forecasting of the electric field at low latitude hard and none of the empirical and theoretical electric field models have been developed in the past contains a good description of the stormtime magnetospheric electric fields, in particular the electric fields that penetrate to equatorial zone. One of the DP2 characteristics is its enhancement at dayside dip equator. This amplification is a result of cowling effect. To quantify the enhancement ratio of the DP2 amplitude at dayside dip equator compared to low latitudes, we make a statistical study on this phenomenon using the ground magnetometer data. The results show that the enhancement ratio presents a diurnal variation with a maximum value at 1200LT and is correlated with the regular variation of the geomagnetic H component. The longitudinal variation of the enhancement ratio of DP2 shows high values at American sector compared to African and Asian sector. This longitudinal dependence is similar with this of equatorial electrojet.

Magnetic Clouds and Space Weather

Badruddin

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Abstract

In this talk, we present a review, and some new results, on the space weather consequences of magnetic clouds. In particular, we present results related to geospheric and heliospheric consequences (Geomagnetic Storms, Forbush Decreases and Ground Level Enhancements in cosmic ray intensity) and their precursors relevant for space weather predictions. Some new results obtained by us are also discussed.phenomenon using the ground magnetometer data. The results show that the enhancement ratio presents a diurnal variation with a maximum value at 1200LT and is correlated with the regular variation of the geomagnetic H component. The longitudinal variation of the enhancement ratio of DP2 shows high values at American sector compared to African and Asian sector. This longitudinal dependence is similar with this of equatorial electrojet.

Cameroon's contribution to the Observation of Equatorial Electrodynamics in Africa using AMBER Magnetometer Network

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Abstract

For centuries, navigators of the world have been familiar with an effect of Earth's magnetic field: It impacts a directional preference to the needle of a compass. Although in some settings magnetic orientation remains important, the modern science of geomagnetism has emerged from its romantic nautical origins and developed into a subject of great depth and diversity. One of these sciences is to understand the electrodynamics of the Earth's atmosphere using the magnetometer observation data. Although this type of observation has been performed in other longitudinal sector for decades. African longitudinal sectors remained unexplored due to lack of ground-base instruments, leaving the scientific community with incomplete understanding of the electrodynamics process. In order to have a complete global understanding of the governing motion of the electrodynamics, deployment of ground-base magnetometers in Africa had been essential. AMBER magnetometer network has been deployed just to close this gap of understanding. One of AMBER magnetometer has been housing at the premises of Yaoundé University I in Yaoundé, Cameroon. In this paper we will present the equatorial electrojet observation in the West African sector, which will be compared with electrojet in the East African sector.

Estimate the polarization electric field from the vertical drift of electron at the magnetic equator

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Abstract

Our work consisted in determining the electrodynamics parameters such as the zonal and polarization electric fields at magnetic equator. From the analysis of ionosonde IPS-42 data at Korhogo, we showed that average value zonal field (0.2 mV/m) contributes slighthly to the formation of the equatorial electrojet (EEJ), whereas the polarization field (2 to 4 mV/m) contributely to EEJ current. these results made it possible to determine the average value of the intensity in the center of the current of the EEJ (Io=231.11 A/km) which is consistent with ealier studies.

Keyword: equatorial electrojet EEJ; polarization electric field; zonal electric field, ionosonde IPS-42; intensity of center of EEJ

Magnetic Field Variations from MAGDAS measurements at some Equatorial Electrojet Stations

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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.

Keyword: Equatorial Electrojet, Geomagnetic Variations EEJ current

Near Real Time MAGDAS Data Processing System in Indonesia

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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.

Keywords: space weather, magdas, near-real time data transfer

Rules for Using MAGDAS Data

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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.

KOERI Geomagnetic Field Variability in Relation to Space Weather Markers Ap and FI

Y.Tulunay, T. Ataç, A. Özgüç, S. Yeşilyutr, E.Tolak, E. Tulunay, M. K. Tuncer
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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.

Study and Assesment of HF Channel Availability Under Ionospherically Disturbed Conditions

Ersin Tulunay, Özgür Sarı, Yurdanur Tulunay

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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.

The Earth's ionosphere and its importance in space weather

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Abstract

The ionosphere is partially-ionized upper atmosphere surrounding the Earth at altitudes of ~70-1000 km. The ionosphere varies significantly due to atmospheric waves propagated from the lower atmosphere and electromagnetic fields imposed from space. This talk reviews the structure and dynamic variations of the Earth's ionosphere using recent new imaging observations. The ionosphere covers the altitudes where most of the artificial satellites and space stations fly. Thus, understanding the ionospheric environment is essentially important for safe and stable operation of space missions.

Optical Mesosphere Thermosphere Imagers (OMTIs) for investigation of the Earth's upper atmosphere

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Abstract

The Solar-Terrestrial Environment Laboratory, Nagoya University, has operated the Optical Mesosphere Thermosphere Imagers (OMTIs). The OMTIs consist of 13 all-sky cooled-CCD imagers, four Fabry-Perot interferometers (FPIs), three meridian scanning photometers, and four airglow temperature photometers. They measure two-dimensional structures of the upper atmosphere, Doppler wind, and temperature, through nighttime airglow emissions from oxygen (wavelength: 557.7 nm) and OH (near infrared band) in the mesopause region (altitudes: 80-100 km) and from oxygen (630.0 nm) in the thermosphere and the ionosphere (altitudes: 200-300 km). The OMTIs are in automatic operation at Norway, Australia, Indonesia, Thailand, far-eastern Russia, four stations in Japan, and two stations in Canada. We contribute the ISWI and CAWSES-II international projects through the OMTIs ground-network measurements.

The MAGDAS Instrument and Space Science at the University of Zambia

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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

Discussion on the maintenance of MAGDAS

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Abstract

The Department of Physics at the University of Zambia has decided to branch out into . 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.

Space weather observations using the Global Muon Detector Network (GMDN)

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Abstract

A solar disturbance propagating away from the Sun affects the pre-existing population of galactic cosmic rays (GCRs) in a number of ways. Most well-known is the "Forbush Decrease" (FD), a region of suppressed cosmic ray density located downstream of an Interplanetary Coronal Mass Ejection (ICME) shock. Some particles from this region of suppressed density leak into the upstream region and, traveling nearly at the speed of light, they race ahead of the approaching shock and are observable as a precursory loss cone (LC) anisotropy far into the upstream region. LCs are characterized by intensity deficits confined to a narrow pitch-angle region around the sunward direction along the Interplanetary Magnetic Field (IMF) and are typically visible 4-8 hours ahead of shock arrival for shocks associated with major geomagnetic storms. The directional intensity of high energy cosmic rays can be monitored by the global network of muon detectors. This paper reports on recent results from the space weather observations using the Global Muon Detector Network (GMDN) which has been in operation since March, 2006.

The white light corona during total solar eclipses at different phases of the solar cycle

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Abstract

Comparative analysis of the results of white light corona observations during 4 total solar eclipses, at different phase of the solar activity cycle is presented (1999, 2006, 2008 и 2009). Photos are made with objectives with different focus and exposure. Structures of the coronas are determined from composite images. Solar corona flattening is determined and its dependence from the solar cycle phase is investigated. The connection of coronal structures with the long streamers is also studied. Electron concentration up to three solar radii in polar and equatorial regions is determined.

Atmospheric boundary layer response to total solar eclipses

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Abstract

Meteorological parameters of the atmospheric boundary layer during 5 total solar eclipses (1990, 1999, 2006, 2008 and 2009) at different solar activity are compared taking into account geographic environment, the general meteorological conditions, seasons and phase of the Solar cycle. Atmospheric response during the eclipse was determined using measurements of the temperature of both the air at three different levels - 10 cm, 50cm and 200cm and the soil, barometric pressure, speed of the wind and humidity. The absolute luminosity of the sky during the eclipse was measured by three photometers - horizontal, in zenith and in the plane of the Sun.

Investigation of the Influence of the IMF on Equatorial Electrojet through Nonlinear and Time Series Analyses of the MAGDAS Data

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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.

The Total Electron Content Variations during Space Weather Disturbed Week of November 2004 - A Case Study

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Abstract

The Global positioning system derived TEC provides the information about the true variations of the ionosphere during quiet as well as geomagnetically disturbed conditions. In the present study we have analyzed the GPS-TEC data for three Indian GPS stations (covering the region from magnetic equator to 20º N magnetic latitude) for the Space weather disturb week of November 2004. The suppression in the low latitude Total Electron Content on November 8 and November 10 can be attributed to the disturbance dynamo electric field whereas the anomalous enhancement in low latitude TEC on November 9 is the result of prompt penetration electric field. Observation of TEC enhancement on November 11, after ~48 hours of southward turning of the Interplanetary magnetic field (IMF Bz) on November 9, 2004 indicate a positive phase of geomagnetic storm. Some new results on the effect of prompt penetration and disturbance dynamo electric field on the ionospheric TEC would be presented and discussed during the workshop.

Study of Anomaly Crest Variation in the both Hemispheres using GPS TEC data for a Solar Minimum Year

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Abstract

Total electron content variations near the crest of EIA in the northern and southern hemispheres have been studied at ~73º E longitude during the year 2005 nearly solar minima. For this purpose the data recorded at Udaipur (Geog. Lat. 24.6º N, Geog. Long. 73.7º E and Mag. Lat. 16.22º E), and Diego Garcia, an IGS station (Geog. Lat. 7.3º S, Geog. Long. 72.4º E and Mag. Lat. 15.29º E) have been utilized. The spatial and temporal variations of crest during different seasons have been analyzed. The study indicates that both the crests move poleward during equinoxes and equatorward during winter. Further discussion regarding existence/absence of winter and annual anomaly in both the hemispheres along with other results would be presented during the workshop.

Installation of Magnetometer- Magdas II and SIDs Monitor, at the University Eduardo Mondlane – Department Physic, Maputo-Mozambique

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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 fase 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.

ISWI in Slovakia

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Abstract

This contribution presents application of ISWI International Programme in the conditions of Slovak institutions, scientific focus of which includes among other fields of observational and research work also analysis of space weather processes. Particular attention is paid to providing scientific knowledge to students and the general public.

Peculiarities of the level of cosmic radiation after sudden decreases

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Abstract

In the analysis of sudden decreases (Forbush Decrease - FD) in the 23rd cycle of solar activity we have found that a return to the original level after the FD has not generally the same evolution. In this paper we analyze cases where the FD is followed by a recovery to the original level within 10 hours and then follows the same decrease as the original one, but with no apparent external cause, as measured on satellites of the Earth.

Magnetic Field Observation in Dar Es Salaam, Tanzania

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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 S of the equator and is°cause of observation. The station is located just 6 therefore characterized high amplitudes during the day time.

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

Y. Yamazaki, A. Ikeda, S. Abe, T. Uozumi, G. Maeda and K. Yumoto

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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.

Study of the Ionospheric Current System Using MAGDAS Data

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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.

Space weather's potential influence on human beings: results of studies conducted in middle latitudes

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Abstract

The effect of space weather (SW) and space radiation on humans is a potential showstopper to human space exploration and reason of possible economic losses. There is a need to conduct local, regional and world-wide complete investigations to establish the possible physical links between human health and space weather sources, to identify what types of studies are missing, and to compare ongoing (and theoretical) clinical studies on Earth. The main/leading health risk agents from space weather, as well as similarities and differences between space weather sources in terms of their impacts on human health on the Earth and beyond, and the significance of the suspected links between solar (SA) and geomagnetic (GMA) activity and human health must be defined clearly. Limited comparison of results of investigations on possible effects to humans from SW changes exists between studies conducted in high, middle and low latitudes and for different phases of SA cycle. Experimental and statistical heliobiological studies conducted by current author and his colleagues in middle latitudes and their analyses and comparison of results of relevant world-wide studies enabled to make following general conclusions: (i) human physiological and cardio-health states are potentially affected by changes in SA, GMA and cosmic ray activity (CRA) depending on their intensities and/or strengths (storms); (ii) not only extremely high, but also very low and even calm levels of GMA (accompanied by high CRA (neutron monitor) levels) influence the human body, particularly, affecting significantly the number of some acute cardiac events (sudden cardiac death (SCD), acute myocardial infarction (AMI) morbidity and mortality); (iii) major and severe geomagnetic storms can affect the number of traffic and other accidents (increasing, as a trigger factor) through retarded or inadequate reactions in the human brain (important factor for space mission crew); (iv) for healthy persons, under geomagnetic field variations, heart rate is more stable cardiophysiological parameter than other physiological parameters (i.e., blood pressure). Heart rate and the cosmic ray intensity variations show well-displayed correlation (important factor for space missions); (v) not only geomagnetic disturbances of various intensities, but accompanied changes in CRA also could be considered as one of the regulating factors in human homeostasis. Obtained results could be used as guidelines for future Earth-based and space mission scenarios, with an emphasis on what needs to be done in mitigating (prevention and therapy) possible adverse effects of space weather on humans which can also potentially lead to significant economic losses.

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

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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.

CHAIN Project: International Collaboration on Full Sun Multi-wavelength H-alpha Observation as a Basis of Space Weather Research

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Abstract

The Flare Monitoring Telescope (FMT) was constructed in 1992 at Hida observatory in Japan to investigate the long-term variation of solar activity and explosive events. It has been a part of the international coordinated observations program (STEP) since 1991. It has five solar imaging telescopes that SIMULTANEOUSLY observe the full-disk Sun at different wavelengths around H-alpha absorption line or in different modes. Therefore, it can measure the 3 dimensional velocity field of gas motion of active phenomena on the full solar disk with suppressing the seeing effect. Moreover, it can detect Moreton-waves (shock waves) that accompany solar flares. Observations of physical properties of such solar explosive phenomena play a very important role for the space-weather research. We want to monitor all geoeffective solar flares, erupting filaments and shock waves as much as possible by using such characteristic telescopes. We started "Continuous H-alpha Imaging Network (CHAIN)-project" as part of IHY - ISWI project and the CAWSES - CAWSES-II project. In the CHAIN-project, we intend to install the FMT-type telescopes in appropriate foreign sites, so that we achieve 24 hr continuous observations. As for the station for the 1st oversea FMT, we selected Ica University in Peru and we already installed it there in March 2010 with cooperation of Peru/IGP(*) and Ica Univ. Moreover, we are planning to install the 2nd oversea FMT to Algeria in around 2012 with cooperation of Algeria/CRAAG(**). Furthermore, we also want to collaborate with Asian countries on this project to achieve more continuous observations of the Sun. Through such distributions of instruments under the CHAIN-project, we aim to advance international cooperative studies, education and popularization of space weather research and solar physics. These are also important purposes of the CHAIN-project. In this talk, we would like to introduce characteristics of the CHAIN-project, current status and plans in the next several years including ISWI-period.

(*)IGP: Instituto Geofisico del Peru

(**) CRAAG: Centre de Recherche en Astronomie Astrophysique et Geophysique

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

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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.

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

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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 realtime. 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 scinitilation 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 availibility of Data from MAGDAS System; and 2) On the assimilation of GPS TEC in NeQuick Model over Ethiopia: algorithm and application. We will demosnstrate how with better data and model, the plasma content and structure in the region are accurately mapped.

Behaviour of Solar and Interplanetary Parameters for the Geomagntic event observed during Unusual Declinining Phase of Cycle 23

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Abstract

In this study, we present the behaviour of the solar and interplanetary parameters of a very complex anomalous geomagnetic storm that is recorded during the declining phase of the solar cycle 23. This was the last major geomagnetic event occurred during the declining phase of solar cycle 23. This declining phase was persist for few more years up to 2009, although this period was expected to be the starting minimum phase of solar cycle 24. The observed event shows a very prominent and abrupt increase in He/proton density, and plasma dynamic pressure with a depressed alpha/proton ratio and low plasma beta, and more negative Bz at the stream interface. Two days before of the event coronal hole associated high speed stream and 1 day before a halo earth-ward directed CME, with linear speed ~ 1774 km/s at 2:54:04 on 13/12/2006 were observed. This CME was formed as ICME, which pushed the forward shock as sheath region and producing ring current in equatorial region of the earth's magnetic field. For the reported study which is under investigation, we use the hourly values of interplanetary plasma and magnetic field parameters as well as geomagnetic disturbance indices, for the period December 13-18, 2006. It is found that the major geomagnetic storm with a Dst ~ -146 nT, occurred on 15 December, 2006, was associated with Storm Sudden Commencement, (SSC), had a more complex interplanetary structure with a X-class Solar flare and an ICME + Sheath. This geomagnetic event recorded on the basis of the large Dst has a peculiar characteristic with complexity in nature; particularly it is associated with CME and ICME, although it was expected to be associated with the CIR, because of its long recovery phase. The study of these anomalous characteristics of this particular event is the main aim of this paper.

The Australian region space weather network

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Abstract

IPS Radio and Space Services, the space weather unit of the Australian Bureau of Meteorology, is the delivery point for space weather information and services to the Australian region and beyond. IPS operates a ground-based network of observatories from Antarctica to equatorial regions that provides solar, geomagnetic, and ionospheric data in near real-time. Typical equipment includes solar optical and magnetogram instruments, solar radio spectrographs, ionosondes, magnetometers, riometers, and scintillation monitors. This paper provides an overview of the IPS network (IPSNET) and derived space weather services. Aspects such as data acquisition and LAN hardware at IPSNET field stations will also be presented.

MAGDAS in Australia

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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.

Solar Radius Determination using Baily beads Observations of Annular Solar Eclipse 15 January 2010, Sri Lanka

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Abstract

An attempt was made to determine the solar radius by using the data of Baily's beads observation carried out on the southern limit of the annular solar eclipse on 15th January, 2010 in Sri Lanka. A positive correction 0.06'' to the solar radius was found and the standard solar radius was±of 0.26'' 0.06 arcsec at the time of observation. No correlation was±corrected as 959.89 found between the sunspot number and the variation of the Suns radius with the available past data.

Geo-effective Interplanetary Transient Flows, Associated Forbush Events and GLEs during Solar Cycle 23

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Abstract

This talk presents the behavior of transient cosmic rays Forbush decrease events during the phase of highly geoeffective interplanetary transient solar wind plasma flows. The Ground Level Enhancements (GLE's) are the sudden and sharp increase in the cosmic ray intensity, which is expected to occur due to solar transient eruptions. These interplanetary transients are large scale structures containing plasma and magnetic field expelled from the active regions of solar atmosphere. We have studied the Bi-directional Electron Heat Flux (BEHF) Events. These are the fast magnetized plasmoids moving away from the Sun in to interplanetary space. As they come to interplanetary medium the interplanetary magnetic field drape around them. This field line draping was thought as possible cause of the characteristic eastward deflection and giving rise to geomagnetic activities as well as produce the modulation effects on the cosmic rays. In this paper a systematic study has been performed to analyze these BEHF events occurred during solar cycle 23, by dividing them in two categories 1. Associated with coronal holes (CH) and 2. Non - Associated with coronal holes. In this work we used hourly values of IMF data obtained from the NSSD Center. The analysis mainly based on looking into the effects of these transients on earth's magnetic field and analyzing the Forbush decrease events occurred during their time span and characterizing the ground level enhancements. The high-resolution data IMF BZ and solar wind data obtained from GOES satellite was available during the selected period. Dst and Ap are taken as indicator of geomagnetic activities. We have used the Kiel neutron monitor data for this study. It is found that Dst index, solar wind velocity, proton temperature and the Bz component of magnetic field have higher values and increase just before the occurrence of these events. Larger and varying magnetic field mainly responsible for producing the short-term changes in cosmic ray intensity are observed during the BEHF events associated with coronal holes.

Exploring X-ray Characteristics of Solar Flares as a Proxy for Geo-effectiveness

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Abstract

We present the study of X-ray spectral characteristics of 30 solar flares observed by Reuven Ramaty High-energy Spectroscopic Imager (RHESSI) during solar cycle 23. Spectral analysis is done using OSPEX tool in SolarSoft. The photon spectra in the energy range from 13 keV to about 100 keV can be best-fitted with vth+thick2 function. RHESSI spectra in higher energy shows dominance of non-thermal emission. In the present investigation, we consider the flare-CME events and their geo-effectiveness based on Dst index. We explore the relationship between the X-ray spectral parameters and the Dst index. The relationship between X-ray spectral parameters of a solar flare and the dynamics of the associated CME is also studied. Our analysis revealed that extraordinary particle acceleration takes place in geo-effective solar flares, which, however, also show strong X-ray spectral hardening. The flare-CME associated particle acceleration in the corona producing strong hard X-ray emission at higher energies causes geomagnetic storms.

First Results from the Space Environmental Viewing and Analysis Network (Sevan)

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Abstract

A network of particle detectors located at middle to low latitudes, SEVAN (Space Environmental Viewing and Analysis Network), aims to improve fundamental research of the particle acceleration in the vicinity of the sun and the space environment. The new type of particle detectors will simultaneously measure changing fluxes of most species of secondary cosmic rays, thus turning into a powerful integrated device used for explo-ration of solar modulation effects. The first SEVAN modules are under test operation at Aragats Space Environmental Center in Armenia, in Bulgaria and Croatia. We present the first results of SEVAN operation, as well as some characteristics of the detector setup.

Facilities of the Aragats Space Environmental Center at the Start of 24 Solar Activity Cycle

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Abstract

Particle fluxes in the vicinity of Earth are the global geophysical parameters and basics of Space Weather. Time series of intensities of high energy particles can provide cost-effective information on the key characteristics of the interplanetary disturbances. Surface monitors located at Aragats Space Environmental Center (ASEC) on Mt. Aragats in Armenia at 1000, 2000 and 3200 m altitudes detect charged and neutral components of secondary cosmic rays with different energy thresholds and various angles of incidence. Information on the changed fluxes of various species of secondary cosmic rays is used to predict the expected hazard of upcoming geomagnetic storms hours before shock arrival and detection by the magnetometers on ACE and SOHO. In 2010 we add new particle detectors, magnetometers and radio emission detectors. Total number of time series measured exceeds hundreds, covering primary proton energies from 4 till 20 GeV. The one-minute time series of gamma rays, neutrons, electrons and muons are measured with accuracy (relative MSD) 0.12% - 2%. Aragats station 3,200 m. above sea level:

1. Aragats Neutron monitor - Neutrons (no energy available, register secondary hadrons, namely neutrons and protons, with energy starting from 5 MeV). Minimal energy of the primary proton initiated cascade in the atmosphere which can end up with a neutron reg-istered in the neutron monitor equals 7 GeV. Relative error (RE) of the one minute count rate 0.7%, surface 18 m2;
2. Aragats Solar Neutron Telescope (ASNT) – combination of the thin (5 cm, registering mostly electrons and muons, energy >15 MeV) and thick (60 cm, registering neutrons and gamma rays if upper thin scintillator is used as a veto), primary proton energy 9 GeV, RE=0.45%, surface 4 m2; if signal is registered in both layers (combination 11), i.e., coinci-dence of 5 and 60 cm scintillators, the minimal energy of the electrons/muons is 25 MeV , primary proton energy 11 GeV, RE=1.1%; Near vertical (0 - +/- 30 degrees), and inclined trajectories are detected separately and time series are available; additional information as histograms of the energy releases in thick scintillators, correlation matrices, etc is stored each minute.
3. Three layered SEVAN module, measure fluxes of electrons/muons with energy > 15 MeV, primary proton energy 9 GeV, RE = 0.8%, surface 1 m2; gamma-rays and neutrons, primary proton energy 7 GeV, RE = 3%, surface 0.25 m2; electrons/muons with eenergy > 200 MeV, primary proton energy 13

GeV, RE = 1.5%; and electrons/muons with eenergy > 100 MeV, primary proton energy 11 GeV, RE = 1.5%.
4. Aragats Multidirectional Muon Monitor (AMMM) muons with Energy > 5GeV; primary proton Energy > 20 GeV; RE=0.15%, surface 90 m2; electrons/muons with Energy > 10 MeV; primary proton Energy 9 GeV; RE=0.13%, surface 27 m2;
5. MAKET electrons/muons with energy > 10 MeV; primary proton Energy 9 GeV; RE=0.18%, surface 16 m2; Extensive air shower (EAS) triggers with energy 1013 and 1014 eV. Nor Amberd 2000 m a.s.l.
6. Nor Amberd Neutron monitor - Neutrons (no energy available, starting from 5 MeV) pri-mary proton energy 7 GeV, Relative error (RE) of one minute data 0.9%, surface 18 m2;
7. Nor Amberd Multidirectional Muon Monitor (NAMMM) upper layer, mostly muons/electrons with energy > 15 MeV, RE=0.3% , surface 10 m2 (2 units); bottom layer, mostly muons/electrons with energy > 100 MeV, RE=0.4% , surface 10 m2 (2 units); 5 Dif-ferent angles of incidence from NAMMM;
8. Nor Amberd SEVAN the same as for Aragats Yerevan, 1000 m a.s.l.
9. SEVAN modules

Forecasting of space radiation storms by surface particle detectors

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Abstract

Modern society depends heavily on a variety of technologies that are susceptible to the extremes of space weather – severe disturbances of the upper atmosphere and of the near-Earth space environment that are driven by the magnetic activity of the Sun. The charged-particle radiation and geomagnetic storm can degrade GPS navigation, disrupt radio communications, and trigger continent-wide blackouts lasting hours and days. That's why forecasting space weather storms are of upmost importance. The surface particle detectors can be compatible to excellent measuring facilities located on a fleet of spacecraft around the Earth and in the interplanetary space. Using GOES X-Ray data as trigger networks of ground based particle detectors (SEVAN, worldwide network of neutron monitors, etc.) measuring time series of secondary particles born in cascades originating in the atmosphere can predict upcoming geomagnetic storms hours before the arrival of Interplanetary Coronal Mass Ejections (ICMEs) at the ACE and SOHO spacecrafts. In this paper we present an alert system based on data of Aragats Space Environmental Center(ASEC) monitors and worldwide networks, which is expected to forewarn for upcoming radiation storm hours sooner than other similar systems.

Effects of quiescent solar activity and of geomagnetic disturbances in the lower ionosphere using SAVNET data

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Abstract

In this work, we summarize some recent results using measurements from the South America VLF Network (SAVNET) data base. This network is an international project coordinated by CRAAM, Brazil in cooperation with Peru and Argentina. SAVNET has been involved in IHY activities (2004-2009) and it is part of the international program International Space Weather Initiative (ISWI). It started operating in April 2006, and now counts on eight stations (Atibaia, Palmas, Santa Maria and Estação Antártica Comandante Ferraz in Brazil; Piura, Punta-Lobos and Ica, in Peru; CASLEO, in Argentina). We have obtained daily maximum diurnal amplitude time series that exhibited behavior patterns in different time scales: 1) long term variations indicating the solar activity level control of the low ionosphere; 2) characteristic periods of alternated slow and fast variations, the former being related to solar illumination conditions, and the latter that have been associated with the winter anomaly at high latitudes; 3) planetary wave type oscillation periods. Finally, we present some results of current studies on geomagnetic disturbances using SAVNET data.

Ionospheric response to the space weather events during December 2006 in the South Pacific Region

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Abstract

We study the VLF perturbations on subionospheric signals from NWC (19.8 kHz), NPM (21.4 kHz), VTX3 (18.2 kHz), NLK (24.8 kHz) VLF transmitters monitored at Suva, Fiji, due to solar flares that occurred during 5-14 December 2006. A series of solar flares with classes from C1.7 to X9.0 occurred during 5-14 December that produced VLF perturbations on above VLF signals. An intense storm associated with coronal mass ejections and solar flares of X class occurred at 14:14 UT on 14 December with a minimum Dst value of -145 nT at 0800 hrs on 15 December. A solar flare of class X1.5 occurred on 14 December 2006 at 21:07 UT and ended at 22:26 UT with its peak flux at 22:15 UT, during the A) of above VLFΔmain phase onset of this storm. Enhancements in the amplitude (A were found to be in the range ofΔtransmissions were determined. The values of 3.6 - 8.8 dB for solar flares of C1.7 to X9.0 classes. The enhancement in the amplitudes of VLF signals is due to the increase in the D-region electron density due to ionization enhancements produced by the solar flares. An intense storm associated with coronal mass ejections and solar flares of X class occurred at 14:14 UT on 14 December with a minimum Dst value of -145 nT at 0800 hrs UT on 15 December. The storm-time effects in the F2-region during at Niue (19.06.2oS, 169.93oW) and Townville (19.63oS, 146.85oE), low latitude stations near at the ionization anomaly crest, will be presented

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

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Abstract

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.

Keywords: Geomagnetic field, fractal, self-affine, Hurst exponent and wavelet variance analysis

New Development of Chinese Meridian Observation Project

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Abstract

Chinese Meridian Chain Meridian Project is a ground-based network program to monitor Solar-Terrestrial space environment, which consists of a chain of 15 ground-based observatories located roughly along 120ºE longitude and 30ºN latitude. Each observatory is equipped with multiple instruments to measure key parameters such as the baseline and time-varying geomagnetic field, as well as the middle and upper atmosphere and ionosphere from about 20 to 1000 km. The Meridian Project. Meridian Project has officially been approved by the Chinese government. The project started construction in 2008, and will be finished by the end of 2010. Starting in 2011, the project will collect data for at least 11 years, providing the wide-range, continuous, and multi-parameter data sets needed to guide model developments, which in turn will better describe and predict the characteristics and dynamics of the geospace environment. This talk will give an overview, the recent progress and preliminary observational results of the Meridian Project.

The ISWI Global AWESOME and SuperSID Network

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Abstract

The study of ELF/VLF radio waves (300 Hz-30 kHz) has enormous applications to studies of the Earth's ionosphere and magnetosphere. Because ELF/VLF waves reflect in the D region of the ionosphere (60-90 km), and also off the Earth's surface, they propagate efficiently in the Earth-ionosphere waveguide. Lightning is the dominant source of ELF/VLF waves on Earth, with impulsive signatures known as radio atmospherics that can be detected at global distances due to efficient propagation in the Earth-ionosphere waveguide. Sferics are effectively a "fingerprint" of the lightning stroke, convolved with the effects of the subionospheric propagation. There are, in addition, a number of VLF transmitter beacons for the purpose of submarine communications. Since they, too, rely on subionospheric propagation, they are inherently a continuous diagnostic of the D region, which is difficult to study by other means since these altitudes are too low for satellites, yet too high for balloons. The D region of the ionosphere is known to respond to a broad array of natural phenomenon, including lightning, electron precipitation from the radiation belts, solar flares, earthquakes, auroral precipitation, and cosmic gamma-rays. Furthermore, the small amount of VLF energy (either from lightning or manmade transmitters) that is absorbed by the ionosphere, propagates in the plasma whistler mode in the Earth's magnetosphere, where it can strongly affect Van Allen radiation belt dynamics. To investigate these phenomena, the AWESOME receiver has been developed and deployed in multiple countries. With this global AWESOME receiver network, several collaborations have taken place, along with many publications in renowned journals. There have also been two workshops, with a third one in the near future, to promote further research collaborations and findings. In addition, hundreds of SuperSID receivers, a smaller version of the AWESOME receiver, have been deployed all over the world, including at several high schools.

Nano satellite constellation for studying the space weather

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Abstract

The paper presents the EduSat initiative made by the Author to develop two Nano satellites through the participation of university students. the project is carried out under the sponsor ship of bibliotheca alexandrina, and The National Authority for Remote Sensing and Space Sciences. The satellites are aimed at generating telemetry information from their scientific payload, demonstarting space weather measurments. The collected data will be used for enhancing the accuracy of the current models for space weather. Relevant telemtry information from the EgyptSat1 mission will be used as a reference database together with space weather models to validate the satellites operation.

Analysis of the temperature data of the total solar eclipse on the 22nd of July 2009

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Abstract

The lecture is about the mathematical analysis of measured temperature values of the total solar eclipse in China, on the 22nd July, 2009. The group of Slovak Central Observatory (SCO) in co-operation with Bulgarian experts observed this eclipse right next to its central line, close to Shanghai. As the result of these observations, we got data from three different sources, six measuring points, including temperature data from different heights and also under the level of the ground. We received details about the humidity of the air during the phenomenon.

Like the analysis of the total solar eclipse in Turkey 2006, we examined the relation between the measured temperature values and the area of the visible arc of the Sun during the solar eclipse. We determined the appropriate functions like the temperature as function of time, and area of the visible arc of the Sun - under the partial sections of the solar eclipse - as the function of time. We compared the coherent functions, and examined the process of the temperature change. We also took attention to the change of the humidity during the phenomenon as the function of time, compared with the coverage of the Sun.

We will present the way of the analysis, the functions, pre- and final results. We draw conclusions from the results of the examination and confront them with results of former solar eclipses.

The results are the productum of the Hungarian (NYME-SEK) and Slovak (SCO) cooperation.

The astronomical researches in Uzbekistan corresponding with ISWI Program

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Abstract
Scientific researches relating with ISWI thematically that carry out on Maidanak observatory is discussed. The observatory is located in the mountainous area on the height 2700m above the sea level and it is one of best among the observatories in the East Hemisphere due to high quality atmospheric conditions, favorable location (in the middle of Asia) and good instrumental facilities. The observations we carry out on Maidanak covered practically all directions of optical astronomy and astrophysics. The important directions of our investigations are the researches of the Sun, solar activity and solar-terrestrial links, i.e. the factors that define the space weather. They are the following:

• Researches of global fluctuations and local pulsations of the Sun Solar Cycle.
• Variation of p-Mode Frequencies Generated by Perturbation in the Solar Interior.
• Flow circulation along meridians deep in the Solar interior and dependence of them from latitude.
•Studying the bright coronal formations.
• Research of an astroclimate and properties of an atmosphere above mountain Majdanak.
• Ionosphere investigation using the VLF-receiver under the AWESOME project.
• Investigation of the Earth albedo variation on the base of measurements of lunar reflection of the earth's shine.

The project aimed to estimate variations of the Earth's albedo that is closely related to the total energy input from the Sun and thus affects the Earth's global warming problem. Observations will be carried out in Maidanak observatory using recently installed robotic telescope of Taiwanese EAST project.

Investigation of the seasonal dependence of range error for L band and S band signal on the Satellite - Earth signal path

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Abstract

The L-band and S-band frequencies are widely employed in for communication in low earth orbiting satellite mostly for remote sensing, disaster management and positioning. These frequencies are however prone to degradation from ionospheric and tropospheric effect which affect the accuracy of measurements by the satellite. In this work, the TEC data from SCINDA GPS receiver installed at Nsukka and meteorological data collected for radio refractivity study by the Centre for Basic Space Science Nsukka was employed to determine the seasonal dependence of the diurnal variation cumulative range error for signal in these bands over Nsukka South-Eastern Nigeria. The result showed that while the ionospheric delay decreases with increase in frequency, the tropospheric delay showed decrease with increase in elevation angle. This result is in agreement with other results from the literatures. The result from the study also show that the cumulative range error is always highest during the sunlit period of the day with highest range error of about 15m observed in the month of March. It was further observed from the study that the range error does not drop below 2m for all the period considered irrespective of the month.

Analysis of a Forbush Decrease, A Cosmic-Ray Storm, a Gle and Geomagnetic Storms of January 2005

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Abstract

We present a detailed analysis of a simple Forbush-type decrease, a complex cosmic-ray storm, a ground level enhancement (GLE) and geomagnetic storms, all of them occurring within a period of one month (January 2005) in the declining phase of solar cycle 23. We identify the solar and interplanetary causes of these events in cosmic ray intensity and geomagnetic activity. We use neutron monitor data of several neutron monitoring stations, located at different latitudes and longitudes responding to particles of different rigidities. The geomagnetic indices Dst and Kp are used as measures of geomagnetic activity. We utilize interplanetary plasma (solar wind velocity, its density and pressure) and field parameters (magnetic field strength, its variance and north-south component, electric field) to identify cause(s) and mechanism(s) responsible for the Forbush-type decrease, the complex cosmic ray storm, the GLE and the geomagnetic storms of different magnitude and time profiles. Application of such a study to space weather prediction is also discussed.

The South American Meridional B-field Array (SAMBA) and opportunities for inter-hemispheric studies

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Abstract

The Antarctic continent, the only landmass in the southern polar region, offers the unique opportunity for observations that geomagnetically range from polar latitudes to well into the inner magnetosphere, thus enabling conjugate observations in a wide range of geomagnetic latitudes. The SAMBA (South American Meridional B-field Array) chain is a meridional chain of 12 magnetometers, 11 of them at L=1.1 to L=2.5 along the coast of Chile and in the Antarctica peninsula, and one auroral station along the same meridian. SAMBA is ideal for low and mid-latitude studies of geophysical events and ULF waves. It is conjugate to the northern hemisphere MEASURE and McMAC chains, offering unique opportunities for inter-hemispheric studies. We use 5 of the SAMBA stations and a number of conjugate stations from the Northern hemisphere to determine the field line resonance (FLR) frequency of closely spaced flux tubes in the inner magnetosphere. Standard inversion techniques are used to derive the equatorial mass density of these flux tubes from the FLRs. From our conjugate pairs we find, surprisingly, that the derived mass density of closely spaced flux tubes, from L=1.6 to L=2.5, drops at a rate that cannot be predicted by any of the existing models or agree with past observations. We also study asymmetries in the power of Pc3 waves. We find that during northern summer solstice the waves are significantly stronger at the northern conjugate point, while during northern winter solstice the wave power is comparable over both conjugate points. Finally, using the SAMBA auroral station, WSD, along with all available southern auroral stations we calculate a southern AE index and its direct conjugate northern AE index and compare both with the standard AE index. We explore under what conditions the north-south asymmetries in the AE calculation are due to the significant gap of auroral stations in the Southern hemisphere and under what conditions the asymmetries have a geophysical source.

Gyeryong 40.8 MHz coherent scatter ionospheric radar observations of E- and F-region field-aligned irregularities over Korea

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Abstract

As a part of the construction of Korean Space Weather Prediction Center (K-SWPC), solar and space weather research group in Korea Astronomy and Space Science Institute (KASI) installed a VHF coherent scatter radar to observe upper atmospheric/ionospheric phenomena over the middle latitude. The new coherent scatter ionospheric radar has been operating at Gyerong city (36.18°N, 127.14°E, dip lat 26.7°N), South Korea. This VHF radar is consisted of 24 Yagi antennas having 5 elements and observes the E- and F-region field-aligned irregularities (FAIs) in a single frequency of 40.8 MHz with a peak power of 24 kW. In this presentation, we initially report the first results of the E- and F-region FAIs over Korea by using the new VHF coherent scatter ionospheric radar. The morphological and echo characteristics are studied in terms of their echo strength, Doppler velocity and also by spectral width values. From the continuous observations from December 2009, we found ionospheric E- and F-region FAIs appeared frequently. The most interesting and striking observations for E region are occurrence of daytime E-region irregularities and strong Quasi-Periodic (QP) echoes at nighttime. And for F region, strong post-sunset and pre-sunrise FAIs appeared frequently. The VHF radar observations over Korea are discussed in the light of current understanding of mid-latitude E- and F-region FAIs.

Interplanetary Transient Plasma and their Associated Space weather Impacts

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Abstract

Previous studies have indicated the association of space weather activities like, geomagnetic storms with various solar and interplanetary features. In the present study two types of solar wind plasma structures namely, Magnetic cloud events and Bidirectional electron heat flux events have been taken to study the short-term changes and analyzed taking in to consideration their association with coronal holes, selecting these events occurred during solar maximum and soalr minimum period of cycle 23. Analysis reveals distinctly different effects of these two signatures on ionospheric / magnetospheric geo- effective events. Magnetic cloud events are found more effective comparing to bidirectional events on short-term basis.

International Space Weather Initiative (ISWI)

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Abstract

The International Space Weather Initiative (ISWI) is an international scientific program to understand the external drivers of space weather. The science and applications of space weather has been brought to prominence because of the rapid development of space based technology that is useful for all human beings. The ISWI program has its roots in the successful International Heliophysical Year (IHY) program that ran during 2007 – 2009. The primary objective of the ISWI program is to advance the space weather science by a combination of instrument deployment, analysis and interpretation of space weather data from the deployed instruments in conjunction with space data, and communicate the results to the public and students. Like the IHY, the ISWI will be a grass roots organization with key participation from national coordinators in cooperation with an international steering committee. This talk outlines the ISWI program including its organization and proposed activities.

The First Detection of Cosmic Ray in Egypt

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Abstract

In this paper we will introduce the first detection of cosmic- ray particles in Egypt by using the scintillation detector. Cosmic-ray particles are responsible for a good chunk of the background radiation that we experience on earth and play a big part in the everyday weather. Here we will show the construction of the detection system used and the data results obtained.

Key words: Cosmic- ray particles and scintillation detector

DEVELOPMENT OF A CATALOGUE OF SOLAR FLARE DETECTED BY THE SAVNET STATION AT PUNTALOBOS

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Abstract

Solar flares emit intense X-ray fluxes that cause perturbations in the ionospheric D-region altering its electrical conductivity characteristics. GOES satellites measure X-ray fluxes from the full-disk of the Sun. These X-ray fluxes are classified as B, C, M, and X class. The electrical characteristics of VLF waves during their propagation within the Earth-ionosphere waveguide are used to study the low ionosphere. The variations of the phase of VLF signals during solar flares were registered during the periods April - December 2007, January-December 2009 and July –August 2010 by the SAVNET station antennae located at Punta Lobos (12°30' S; 76°47' W), Lima-Peru. We show in this work a preliminary database elaborated in order to catalog solar flares detected at Punta Lobos.

Key words: VLF, ionosphere, solar flares, Solar X-ray fluxes

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