ABSTRACT BOOK

IAGA international Symposium-IV
"Influence of short and long term solar variability on climate"
Hurghada, Egypt, 20 -24 March 2016

A Solar and Space Weather mission addressing the solar variability influence on Earth climate

Luc Damé [1], Alain Hauchecorne [1], Slimane Bekki [1], Philippe Keckhut[1], Mustapha Meftah[1], Abdenour Irbah [1], David Bolsée [2], Nuno Pereira[2] and the SUITS Team

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Abstract:

Solar Spectral Variability, Space Weather and Solar-Climate Relations are major scientific issues of this new millennium that deserve better access to observations than spare places on few missions. Accordingly, we present the SUITS/SWUSV microsatellite mission investigation: "Solar Ultraviolet Influence on Troposphere/Stratosphere, a Space Weather & Ultraviolet Solar Variability" mission. SUITS/SWUSV was developed first to determine the origins of the Sun's activity, understand the flaring process (high energy flare characterization) and onset of CMEs (forecasting). Another major objective added is to determine the dynamics and coupling of Earth's atmosphere and its response to solar variability (in particular UV) and terrestrial inputs. It therefore includes, in addition to the prediction and detection of major eruptions and coronal mass ejections (Lyman-Alpha and Herzberg continuum imaging), the solar forcing on the climate through radiation and their interactions with the local stratosphere (UV spectral irradiance measures from 170 to 400 nm). The mission is proposed on a sun-synchronous polar orbit 18h-6h (for almost constant observing) and proposes a 7 instruments model payload of 65 kg - 65 W with: SUAVE (*Solar Ultraviolet Advanced Variability Experiment*), an optimized telescope for FUV (Lyman-Alpha) and MUV (200–220 nm Herzberg continuum) imaging (sources of variability); SOLSIM (*Solar Spectral Irradiance Monitor*), a spectrometer with 0.65 nm spectral resolution from 170 to 340 nm; SUPR (*Solar Ultraviolet Passband Radiometers*), with UV filter radiometers at Lyman-Alpha, Herzberg, MgII index, CN bandhead and UV bands coverage up to 400 nm; HEBS (*High Energy Burst Spectrometers*), a large energy coverage (a few tens of keV to a few hundreds of MeV) instrument to characterize large flares; EPT-HET (*Electron-Proton Telescope – High Energy Telescope*), measuring electrons, protons, and heavy ions over a large energy range; ERBO (*Earth Radiative Budget and Ozone*) NADIR oriented; and

a vector magnetometer. Illustration of a complete accommodation of the payload is presented on a PROBA type platform. Heritage is important both for instruments (SODISM and PREMOS on PICARD, LYRA on PROBA-2, SOLSPEC on ISS, …) and platform (PROBA-2, PROBA-V, ...), leading to high TRL levels (>7). SUITS/SWUSV was initially designed in view of the ESA/CAS AO for a Small Mission; it is now envisaged for a joint CNES/NASA opportunity with Europeans and Americans partners for a possible flight in 2021-2022. Scientific objectives, model payload and mission profile will be addressed in the talk.

Invited Review Session 1

Preface

This Symposium is the forth in a series International Symposiums supported by IAGA, the International Association of Geomagnetism and Aeronomy. It will be held at Hurghada, Egypt, a seaside resort along the Red Sea. The first Symposium of the series, held in Cairo, Egypt, on 5–9 October 2008, was entitled “Space Weather and its effects on Spacecrafts”. The second one was also held in Cairo, Egypt, on 4–8 December 2009, and it was entitled “Solar Wind-Space Environment Interaction”. The third one, held in Luxor, Egypt, on 13–17 November 2011, was entitled “Heliospheric Physics during and after a deep solar minimum”.

There are proceedings for each Symposium, see for example IAGA-3 proceedings:

http://www.sciencedirect.com/science/journal/20901232/4/3

The aim of the forth Symposium is to maintain the momentum thus generated by bringing together communities interested in Solar-Terrestrial relations and Space Weather, both from solar and atmospheric thematic, and including observing and modelling. Our newly proposed forth Symposium is entitled "Influence of short and long term solar variability on climate", and opens to major new research in cross fertilization between the Sun and its influence on climate.

Since the last deep minimum of Solar Cycle 24 which provided the quietest Sun seen in almost a century and questioned our understanding of the Sun variability, particularly in the ultraviolet part of the spectrum, a dedicated study of the impacts of the diverse aspects of the solar influence on climate, from minimum to the unusual double peak maximum of Solar Cycle 25 will provide the main thrust of this Symposium.

The Symposium will be divided into 6 Sessions as follows:

Session 1: Solar and Space missions for Space Weather and solar variability observations
Session 2: Solar activity/variability effects on the lower, middle and upper atmosphere
Session 3: Modeling climate consequences of solar activity influence and suggested mechanisms
Session 4: Modeling and predicting large flares, super flares, CMEs and other extreme event
Session 5: Solar energetic particles and Solar wind influence on the Earth's inner magnetosphere and atmosphere
Session 6: Societal impact of solar variability, Education and Public Outreach

Supporting Organizations:

International Union of Geodesy and Geophysics (IUGG),
International Association of Geomagnetism and Aeronomy (IAGA),
Cairo University (CU),
The Scientific Committee on Solar Terrestrial Physics (SCOSTEP),
Variability of the Sun and Its Terrestrial Impact (VarSITI),
National Research Institute of Astronomy and Geophysics (NRIAG).

The symposium URL: http://iaga.cu.edu.eg

We wish you a pleasant stay in Hurghada, Egypt

Session 1- Solar and Space missions for Space Weather and solar variability observations

Solar and Space Weather missions addressing the solar variability influence on Earth climate

Luc Damé et al

IPSL/CNRS/UVSQ LATMOS

Abstract

Will the current secular minimum of solar activity be a great minimum?

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Abstract:

We analyzed the ratio of amplitudes of odd (Go) and even (Ge) cycles of activity in the period from 1600 to 2015, and found a modulation with period of about 220 years and amplitude varying between -0.5 and 1.5 (average Go/Ge is about 1). Minima of solar activity on centennial-scale appear near the extremes of the envelope line of this modulation: Go/Ge ~ 1.2 during the Maunder minimum (around year 1700), Go/Ge ~-0.7 in the era of Dalton minimum (~1820) and Go/Ge ~ +1.5 during the Gnevyshev minimum (~1900). Using this fitted periodicity as a predictor suggests that the next minimum in Go/Ge ratio will occur around cycle 25 with a predicted Go(cycle 25)/Ge (cycle 24) ratio at about 0.75, which is close to the Go/Ge ratio during the Dalton minimum.

Session1

Invited

Installation and Development a New Digital Solar Spectrograph Station in Helwan, Egypt for Solar Variability Observations

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Abstract

A solar spectrum laboratory was built in National Research Institute of Astronomy and Geophysics (NRIAG) as Solar Spectral Monitoring Station at Helwan, involving rigid bears to install the various components of the horizontal telescope, the grating spectrograph and CCD cameras. The optical components of the flash spectrum system are utilized as fixed spectroscopic equipment, to carry out regular observations of the spectrum of the solar disk. It is intended to observe the integrated spectrum of the profiles of observed spectral lines. The main purpose is to development of the new solar spectroscopy & imaging station of Helwan Observatory by developing an automatic system for positioning and tracking active regions, centring on flaring regions and recording the observations, i.e. line profiles, spectra, in H-Alpha and in the Sodium D3 line. Helwan H-Alpha Solar Monitoring Station will be automatic control/command for pointing and acquisition and data server for real time access of the recorded events. This will allow on one side to integrate the station to a Solar Monitoring network in the framework of the International Space Weather Initiative (ISWI) and, on the other, to

help acquiring skills with imaging data processing on ground in preparation of the Far Ultraviolet micro-satellite Space Program SWUSV (Space Weather and Ultraviolet Solar Variability), proposed to ESA and CNES and with an Egyptian participation.

Session 1

Oral

Variations of solar activity, according to the analysis of long-term archive of photographic plates

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Abstract:

We present the results of applying our numerical algorithms for identification and parametrisation of sunspots from a long series of photographic observations made in white light during the period of time from 1918 to 1972 by the Royal Greenwich Observatory (RGO) and Kislovodsk astronomical station from 1954 to 2014. The main purpose of this work was creating a catalogue of individual sunspot parameters, which is a step forward with respect to the previous catalogues of this kind.

Poster
Session: 1

THE SKY BRIGHTNESS DURING ECLIPSED SUNRISE ON MARCH 29, 2006

Ahmed E. Ghitas and M.A. Semeida

National Research Institute of Astronomy and Geophysics, Helwan, Cairo, Egypt

Abstract:

During the total solar eclipse of 29 March 2006, the sky had already begun to fully brighten; then a total eclipse took place and the sky got dark; after several minutes, the sky grew bright again. This succession of events would reproduce the record of "Double Dawn". An experimental set up is fixed above the Sallum hill top of about 200 m above sea level at latitude 31o 34′ N and longitude 25 o 7′ E. The light meter was used to determine the sky light variation during normal sunrise and Visual rising. The investigation of the variation in the sky brightness during the eclipsed sunrise by using Liu et al. 1999 model is supposed to identify the phenomenon of the "Double Dawn" during that eclipse in Egypt.

Session1

Poster

The implications of solar-triggered variations in the lower magnetosphere to crustal magnetotelluric investigations in Egypt

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Abstract

Long and short term variations in solar activity are well known to result in variations in the magnetosphere. These variations extend from the outer magnetosphere down to the surface of the Earth. As the solid Earth behaves like a conductor immersed in a magnetic field, the magnetospheric perturbations induce electric fields and eddy currents in the earth's crust. Such naturally induced electrical fields in the crust are referred to as magnetotellurics and can provide useful information about the structure of the Earth at different depths. The depth of investigation is a function of the period of variation in the magnetic field. Low frequency variations are significant for deep crustal studies, whereas high frequency perturbations give clues to shallow lithologies. In this work we demonstrate results of deep and shallow investigations carried out in Egypt during events of solar activities.

Session 1
poster

Session 2- Solar activity/variability effects on the lower, middle and upper atmosphere

On the Role of the Sun and the Middle Atmosphere in Climate

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Abstract

ROSMIC (Role Of the Sun and the Middle atmosphere/thermosphere/ ionosphere In Climate) is one of the four scientific projects launched under SCOSTEP's new science program VarSITI (Variability of the Sun and Its Terrestrial Impact). The science program will run from 2014 until 2018 and aims at providing a platform for international collaboration and discussion.ROSMIC is formed of four working groups, namely 1) Solar Influence on Climate, 2) Coupling by Dynamics, 3) Trends in the MLT, and 4) Trends and Solar Influence in the Thermosphere. ROSMIC supports scientific investigations which contribute to our understanding of the impact of the Sun on the terrestrial middle atmosphere/lower thermosphere/ionosphere (MALTI) and Earth's climate and its importance relative to anthropogenic forcing over timescales from minutes to centuries. Close collaborations between the observation and modeling communities is encouraged. Observational activities range from the analysis of existing data records, measurements from ground based, insitu and satellite instruments, the organization of coordinated observing campaigns, and the development and implementation of new instrumentation and observation techniques. Dedicated models directed toward particular phenomena as well as sophisticated whole atmosphere/ionosphere models are expected to play a vital role in this project. Collaborations between the working groups and with the other three VarSITI projects will be facilitated during this program. This presentation will give an overview of the

ROSMIC project, its scientific aims, programmatic organization, and some recent highlights.

Session 2

Invited Speaker

Solar modulation and quasi-periodicities of galactic cosmic rays during deep minimum of cycle 23 and 24

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Abstract

Galactic cosmic rays (GCRs) are extra solar energetic particles that are found in space and filter through our atmosphere. Intensity of GCR particles entering inside the heliosphere is modulated by outward propagating diffusive barriers as they travel through the interplanetary magnetic field (IMF). The ~ 11-year cyclic variation in cosmic ray intensity observed at the Earth is anti-correlated with solar activities with some time lag. The minimum phase of the solar cycle 23 lasted much longer than expected. During this period, the sunspot activity and IMF strength at the Earth orbit reached the lowest value since its in situ measurements. Solar cycle 24 started much later and showed slow rise towards the maximum. These physical anomalies call for new insight to understanding the solar and heliospheric modulation of GCRs. In this work, we study the modulation of GCRs at both low and high cut-off rigidity (Rc ˜ 1 GV- 8 GV) in terms of solar and geomagnetic activity indices for the prolonged minimum phase of the cycle 23/24 (2006-2009). We find that recoveries of GCRs are faster than solar indices with some negative time-lag during minimum epoch of cycle 23/24. The hysteresis effect between GCRs and the solar, heliospheric and geomagnetic activity indices are also investigated. We have also investigated the periodic behavior of GCRs during minimum phase of cycle 23/24. The power spectrum analysis shows a clear signature of the best known Rieger period (130 – 180 days) along with ˜ 14 days and ˜ 27 days of variations in both low and high cutoff rigidities. We discuss our results

in light of global solar activity affecting the conditions of GCRs propagation inside the heliosphere including drift effects and previous results.

Session 2

Oral

Oukaimeden Observatory: First statistics.

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Abstract

The Remote Equatorial Nighttime Observatory of Ionospheric Regions (RENOIR) project at Oukaimeden Observatory is a joint scientific program between the University of Illinois at Urbana-Champaign in the United States of America and the Cadi Ayyad University in Morocco. The main goal of RENOIR is to study the coupled thermosphere/ionosphere system by making long-term measurements of important parameters to better understand the climatology of the thermospheric neutral winds and temperatures, as well as to study the occurrence of ionospheric structures, such as equatorial plasma bubbles (EPBs). The RENOIR experiment at the Ouklameden Observatory was begun in November 2013 as part of the United Nation sponsored International Space Weather Initiative (ISWI). In this work we present the first climatological results of the thermospheric neutral wind and temperature obtained during the first two years of the experiment. These are estimated using Fabry-Perot interferometer observations of the Doppler shift and broadening of the naturally occurring 630.0-nm dissociative recombination emission, which is related to the thermospheric wind and temperature, respectively. We also present the first occurrence statistics of equatorial plasma bubbles (EPBs) obtained from a wide-angle imaging system

Session 2

Oral

On the variations of the ionospheric F region over Indian low latitude during different solar activity conditions and model comparison

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Abstract

In this paper, we present a comprehensive study on the behavior of the low latitude ionospheric F region over India in different solar activity conditions including the recently concluded prolonged deep solar minimum. Variations in the F layer parameters have been evaluated using concurrent measurement of ExB drift and solar flux and have been compared with those predicted by IRI-2012 model. Variations in foF2 and foF3 with solar flux show a distinct pattern in summer as compared to other seasons and both foF2 and foF3 clearly show saturation effect when F10.7 exceeds ~120 sfu unlike midlatitude. Annual mean and seasonal mean of both foF2 and foF3 during the deep solar minimum of 2009 are ~20% and 30%, respectively, lower than those observed during normal low solar activity condition. Strong asymmetry observed in solstice is attributed to the solstice asymmetry in meridional neutral winds and relatively weak asymmetry observed in equinox is attributed to the equinoxial asymmetry in ExB drifts. Local time variations in foF2 and foF3 show noon bite out in all seasons and in all solar activity conditions, which are attributed to vertically upward plasma transport by zonal electric field. Variations in foF2 show dominant periods of ~27 days, ~16 days and ~6 days. Intriguingly, amplitudes of ~27-day variations in foF2 are found to be maximum in low solar activity (LSA), moderate in medium solar activity (MSA) and minimum in high solar activity (HSA) while the amplitudes of ~27-day variations in F10.7 are minimum in LSA, moderate in MSA and maximum in HSA. Comparison of observed foF2 with those of the IRI model clearly shows that the model values are always higher than those of observations and this difference is large during noontime owing to the

noon bite out phenomenon. Comparison with the IRI model reveals that while the observed peak electron density in 1995 is about 15% smaller than that predicted by the model, in 2009 it is smaller by as much as 40%, underlining that the IRI model heavily overestimates the ionospheric density during the long deep solar minimum.

Session 2 - Solar activity/variability effects on the lower, middle and upper atmosphere.

Oral

Statistical association between North Atlantic Oscillation and solar activity during intense geomagnetic storms

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Abstract

The association between short-term variability in the North Atlantic Oscillation (NAO) and intense geomagnetic storms is analyzed taking into account the solar activity level. The NAO is the dominant pattern of variation in atmospheric circulation in the North Atlantic basin. This oscillation results in a large-scale modulation of the normal patterns of heat and moisture transport, especially in winter, which determines changes in temperature and precipitation in a great area from eastern North America to Central Europe. A positive correlation between long-term variations in several studies the NAO and geomagnetic activity has already been shown in several studies. However, at daily timescales, from the study of more than 200 geomagnetic storms we observe a decrease in the NAO index coincident with the maximum intensity of the geomagnetic storm. An explanation of our results is given through the upper atmosphere processes induced by geomagnetic storms followed by coupling mechanisms among the different atmosphere regions, reaching finally the troposphere, in the context of an overall increasing trend which may be due to anthropogenic activity. A possible explanation would be that the NAO decrease due to geomagnetic storms is highly localized in time at daily scales and the high positive correlation between geomagnetic activity indices and NAO, specially after 1970, is due merely to a coincidence of increasing trends in both parameters

Session 2 - Solar activity/variability effects on the lower, middle and upper atmosphere.

Oral

White-Light Coronal Structures and Flattening During Six Total Solar Eclipses

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Abstract

Solar corona is very important part of the solar atmosphere, which is not available every time and it is very difficult to observe it. From solar corona we can get more information about outer sun layers. Large-scale structure of the solar corona can be studied during total solar eclipses. The structure, shape and brightness of the solar corona significantly change from eclipse to eclipse. They depend on activity of the sun. At maximum solar activity, the corona is very bright and uniform around the solar limb. There are a lot of bright coronal streamers and other active regions on it. During minimum of solar activity the solar corona stretches at the equator and become elliptical. Flattening index is the first quantitative parameter introduced for analyses of the global structure of the solar corona. It varies with respect to the phase of the solar activity and sunspot number. In this paper we study the solar corona during the 1990, 1999, 2006, 2008, 2009 and 2012 total solar eclipses. We obtain flattening coefficients for all the six eclipses by using a new computer program. Our results are in a good agreement with published results.

Session 2

Poster

Possible Influence of solar output on atmospheric parameters

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Abstract:

Various atmospheric parameters are in some periods positively and in others negatively correlated with solar activity. In this work a hypothetical scenario to examine this concentration was employed using regional climate model "RCM". The solar output was proposed to increase by 1 and 10% respectively and the influence on meteorological variable for wide domain and long period were examined.

Primary result show that significant influence exists in the 10% scenario through surface pressure decrease in the north of Africa with more than -2 hPa and about -1.5 hPa in the south of Africa and north of Saudi Arabia, while through the surface temperature there are increase reaches +2 degree Kelvin in all regions in Africa and the Arabian Semi-Island except the region between latitudes +13 to +22 and longitude 0 to +36 which faces decrease with about 3 degrees Kelvin, and the relative humidity at the surface level shows a decrease in the region above the equator until below the Cancer Tropic along the west coast of Africa reaches about -20% while the region between latitudes +13 to +22 and longitudes +7 to +37 faces increase to about +35% which is controlling local climate circulation.

For the 1% scenario no significant change in the surface pressure, while through the surface temperature there are increase reaches +5 degree Kelvin in all regions in Africa and the Arabian Semi-Island except the region between latitudes +4 to -7 and longitude +10 to +25 which faces decrease with about 3 degrees Kelvin with more decrease at the shore area reaches 6 degree Kelvin, and the relative humidity at the surface level shows an increase all over the increase reaches a maximum at the west shore of Africa around the equator with a value of about +16% while the region in the central area of Africa shows a decrease reaches about -10%.

Session 2 ORAL

Analysis of Day-to-Day variability of Sq(H) from magnetic station of Yaoundé, (AMBER Network)

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Abstract:

The geomagnetic data used for this study are obtained from magnetic station of Yaoundé, (AMBER Network) located at University of Yaoundé 1 in Cameroon (3.87°N, 11.52°E), provide continuous recordings of geomagnetic field since 2009. The variability of H component of geomagnetic field has been examined by using the north component (X) and east component (Y) of the earth's magnetic field, recorded from 2011 to 2014. The H component was used to calculate and analyze the diurnal and seasonal Solar quiet variations Sq(H) observed at Yaoundé-Cameroon during quiet magnetic days. The results obtained show that, Sq(H) shows a seasonal variation. The Sq(H) amplitude of 2014's campaign is the greatest one (~ 80 nT) while the Sq(H) amplitude of 2011's campaign is the smallest one during all the seasons. The Sq(H) amplitudes in Spring and Autumn are comparable (~ 80 nT). The Sq(H) exhibits the reversal of H component of geomagnetic field around morning and evening during all the seasons. This negative depression of regular H-component is explained to be the effect of a westward flow of electret current and named counter électrojet. The aim of this work is analyze the diurnal and seasonal variations of Sq(H) at Yaoundé-Cameroon using the data recorded from 2011 to 2014 during the quiet days. The quiet days are those universally recognized by the World Data Center (WDR).

POSTER

session 2

Solar Forcing of Weak Solar Cycles on Equatorial African Plateau Lakes

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Abstract

Weak solar cycles occupy the maximum and the bottom of the Wolf-Gleissberg cycles and induce climate changes that cause sudden rises of East African lakes. The 1962-64 sudden rise happened at cycles 19-20 interphase. Cycle 20 is weak. The 1878 -1922 period of weak solar cycle started with the 1878 sudden rise of lakes due to cycle 12. Cyclic rise and fall of lakes occurred due to forcing of solar cycles 13-15. The 1997 sudden rise is due to weak cycle 23. Altimetry satellites observations allowed us to extend our study to several East African Lakes and also to study the forcing of cycle 24. Solar forcing is location and time dependent. The 1878 and 1997 sudden rises of lakes are attributed to very strong El Nino events followed by very strong La Ninas. The 1962 rise is attributed to negative North Atlantic Oscillations (NAO) index.

Session 2

Poster

Irregular magnetic pulsation observed near the Van Allen Probe perigee

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Abstract:

The irregular magnetic micropulsations that occur in connection with magnetospheric substorms are called Pi2 pulsations and have periods ranging from 40 sec to 150 sec. In space, the electric field data are sensitive to Pi2 pulsations down to L ~ 2 but the magnetic field data are too noisy to detect Pi2 pulsations at L < 4. That's why, no studies concern with Pi2 observed from magnetic data near satellite perigee. In this study we examined clear Pi2 pulsations, with non-substorm signature occurred in very quiet geomagnetic conditions (Kp = 0), detected by the fluxgate magnetometer of the Van Allen Probes A and B (VAP-A and VAP-B, respectively) near perigee. Low-latitude station on the ground (Kakioka, L = 1.23) used as a reference to determine the relative amplitude and phase of the Pi2 detected at VAP-A. We found that the oscillations observed by the satellite and on the ground were in phase. The cross phase of VAP-Bz relative to Kakioka H-component were near ~180^{o}. These properties are consistent with the radial structure of the fundamental cavity mode oscillations confined in the plasmasphere.

Session 2

poster

Investigation of Solar Flare Effects on GPS TEC and their positional dependence at Low, Mid and High Latitudes

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Abstract

The state and dynamics of the earth's ionosphere is completely controlled by the solar radiations. The amount of solar radiation incident on the ionosphere varies considerably with the solar activity, so does the ionospheric variability. In this chapter we investigate the influences of solar flares on the ionospheric variability, since during solar flares huge amounts of radiation fluxes are released from the sun. To investigate the effect of solar flares on the ionosphere we consider the solar flares that were observed during 1998-2011. We have taken the three latitude station one each in mid, low and high latitude region. The solar X-ray flux in the 0.1 – 0.8 nm band were taken from the measurements of Geostationary Operational Environmental Satellite while as the solar EUV flux in the 24 – 34 nm band were taken from the Solar EUV monitor (SEM) onboard SOHO spacecraft. The correlative study of these fluxes was carried out with GPS derived Total Electron Content (TEC) at three latitude station viz Davis (68.570S, 77.960E), Usuda (36.130N, 138.360E) and IISC Bangalore (13.020N, 77,570E). From our study we found that peak values and peak enhancements of the radiation fluxes correlate well with the peak values and peak enhancements of TEC. However the correlation between peak enhancements of fluxes and TEC are much stronger than the correlation between peak values themselves. We then adjusted the solar radiation fluxes to the CMD, where CMD is Central Meridian Distance and takes care of flare location on the solar disc, and then investigated the correlation of CMD adjusted fluxes with the TEC. We found that the correlation between fluxes and TEC is extraordinarily improved as the fluxes are adjusted to CMD. Therefore location of flare has a considerable role in deciding how much impact it will produce on the ionosphere. Key Words: GPS, TEC, CMD

Session 2

Poster

GPS-TEC and Solar flux observations in ascending and descending phase of Solar Cycle

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Abstract:

The Total Electron Content (TEC) is computed from Global Positing System (GPS) from Bangalore (13.020N, 77.570E) and IGS station for the period 2002 to 2013. We compared the GPS TEC with Solar Flux in quiet and disturbed period during the descending phase of solar cycle 23 and ascending phase of solar cycle 24. GPS data of other available low latitude IGS stations in India were analyzed and compared with Solar Flux. We found that the both average GPS-TEC were positively correlation with solar flux in quiet and disturbed condition for the entire 12 year period. This study investigates the seasonal response of TEC during the solar minimum and maximum period. Key Words: GPS, TEC, Solar Flux, Low Latitude.

Session 2

Poster

Probing the variation of the hydrogen Lyman profiles through solar cycle 24

Ahmed Ghitas, Safinaz A. Khaled, Luc Damé, M. A. Semeida, Magdy Y. Amin, Shahinaz Yousef
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Abstract

The hydrogen Lyman Lya, 121.67nm spectral line, is very important for studying the solar atmospheric ultra violet (UV) flux. We present high resolution spectral observations performed on the Lya line with the LYRA scientific instrument on the PROBA 2 satellite. PROBA 2 also observed the Sun using APS and image processing (SWAP instrument). Variation of the shape of the hydrogen Lya line has been obtained and is discussed through solar cycle 24.

Poster

Session 2

THE SKY BRIGHTNESS DURING ECLIPSED SUNRISE ON MARCH 29, 2006THE SKY BRIGHTNESS DURING ECLIPSED SUNRISE ON MARCH 29, 2006

Ahmed E. Ghitas and M.A. Semeida
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Abstract

During the total solar eclipse of 29 March 2006, the sky had already begun to fully brighten; then a total eclipse took place and the sky got dark; after several minutes, the sky grew bright again. This succession of events would reproduce the record of "Double Dawn". An experimental set up is fixed above the Sallum hill top of about 200 m above sea level at latitude 31o 34′ N and longitude 25 o 7′ E. The light meter was used to determine the sky light variation during normal sunrise and Visual rising. The investigation of the variation in the sky brightness during the eclipsed sunrise by using Liu et al. 1999 model is supposed to identify the phenomenon of the "Double Dawn" during that eclipse in Egypt.

Session 2

Poster

Session 3- Modelling climate consequences of solar activity influence and suggested mechanisms

Modeling of the Zonal Flow Generation in Non-uniform Ionospheric shear Flows

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Abstract

Near Earth space (ionosphere, magnetosphere) is characterized by complicated dynamics and for modeling of such processes, especially at conditions of external nonstationary impact (bow shock) it is very important an estimation of determined and stochastic parts of the dynamics, as well as the possibility of the generation of large scale wave and fractal structures.

In this work a physical model of the plasma perturbations for experimental data treatment and their physical and theoretical interpretation is obtained. In this model a nonlinear mechanism of interaction of the perturbations with spatially inhomogeneous space flows is considered. From this flows a zonal flow is energetically most important. Numerical simulation of formation of such large scale flows are carried out.

Time series of velocity flow and magnetic field components of the magnetospheric flows observed by THEMIS satellite mission are studied by virtue of nonlinear methods. For numerical treatment of these data a recurrent diagram method is used, which is effective for short data series. Recurrence is a fundamental feature of the dissipative dynamical systems, which is used for analysis of relaxation processes in the magnetotail. The results of nonlinear analysis of plasma perturbations for interpretation is compared with the signals obtained by Lorentz and Weierstrass function. By virtue of recurrent diagram method a fractal nature of experimental signals and dynamical chaos parameters. The results of satellite and numerical simulation data are compared.

Invited

Session 3

Expected Climate Changes Due to Qattara Depression Project

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Abstract

Qattara Depression has the shape of a teardrop with its point facing east and the broad deep area facing the south west. It is considered the lowest pit in Africa, existing in Egypt near Alalameen having the dimensions 80 Km long, 120 Km wide and 133 m below the sea water. Several benefits could be achieved if the project connecting the Qattara Depression with the medeterian sea. The most important are:: 1)Generation of hydroelectric power by the falling running stream of sea water from the upper level of the cliff down to the Qattara depression through 140 m. 2)Climate modification due to the formation of a huge surface area lake confronted with the hot climate down the cliff.

The climate of the Qattara Depression is highly arid with annual precipitation between 25 to 50 mm on the northern rim to less than 25 mm in the south of the depression. The average daily temperature averages between 36.2 to 6.2 °C (97.2 to 43.2 °F) during summer and winter months. The prevailing wind comes from the north varying between north easterly and westerly directions. Wind speeds peak in March with of 11.5 m/s (25.7 mph) and minimal in December with 3.2 m/s (7.2 mph). The average wind speed is about 5–6 m/s (11.2-13mph). The goal of this study is to present a numerical simulation approach describing the expected relevant climate changes due to filling the Qattara Depression with the sea water. We call for the cooperation between Physics, metreolegists, geologists, Climatologists as well as geography experts to reach a conclusive decision about the importance of the Qattara Depression project.

Invited Session 3

QUATTARA DEPRESSION

QUATTARA DEPRESSION
80 Km long, 120 Km wide and 133 m below the sea level

Solar Activity and Climate Change correlations

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Abstract:

This paper discusses if the global worming caused by the green-house gases effect will be equal or less than the global cooling resulting from the solar activities. In this respect, we refer to the Modern Dalton Minimum (MDM) which stated that starting from year 2005 for the next 40 years; the earth's surface temperature will become cooler than nowadays. However the degree of cooling, previously mentioned in old Dalton Minimum (c. 210 y ago), will be minimized by building-up of green-house gases effect during MDM period. Regarding to the periodicities of solar activities, it is clear that now we have a new solar cycle of around 210 years.

Session 3

Invited

A Simplified One-Dimensional Global Space Weather Model for Assessment of LEO Satellite Loading

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ABSTRACT

In this work, a simplified computational method is developed to investigate loading conditions on low Earth orbit satellites, operating at 400-800 km altitudes. Variability of the solar wind strength directly affect LEO Satellites. This requires early assessment of such loading so that requirements of spacecraft shielding be established. A simple one-dimensional magnetosphere – ionosphere simulation code is developed. Ideal magnetohydrodynamic equations were discretized using Finite Difference Method. The main issue here, is to resolve the magnetosphere shock due to the interaction of the solar wind with the Earth dipole magnetic field. Magnetosphere-ionosphere coupling is used to provide the electric field necessary to calculate near Earth boundary condition. A numerical solution for the F-layer ionization in the ionosphere is therefore performed to calculate particle load changes under normal and severe situations. Both CWENO and Roe schemes were used to compute the required solutions. Results will be compared to NASA Community Coordinated Modeling Center 3D models such as BATS – R – US magnetosphere model and Schunk ionosphere models. A secondary objective of the

work is to investigate the extent to which Mathematica software may be used in solving such model.

Oral

Session 3

Probing relationship between solar activities and seismicity during weak solar cycle 23

Mohamed Ahmed Semeida[1], Rabab Helal Abdel Hamed[1] ,Sara Said Khodairy[1], Mahmoud Salah El Hadidy[1], , ShahinazMostafa Ali Youssef[2]
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Abstract:

The relations between sunspot numbers, sunspot areas, solar 10.7 cm radio flux, solar proton events and earthquakes of ($M \geq 5$) and ($M \geq 8$) during the interval from 1996 to 2008 of solar cycle 23 have been analyzed in this work. We have found that there is a direct relation between solar activity and seismic activity for $M \geq 5$ and $M \geq 8$ near the maximum of this cycle, but there is an inverse relation between both at the descending phase of the cycle.

Session 3 Poster

Session 4- Modelling and predicting large flares, super flares, CMEs and other extreme events

Effects of Nearby Supernovae on Atmosphere and Climate

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Abstract:

It is now evident that data using short-lived radionuclides such as ^{26}Al , ^{41}Ca, ^{53}Mn, and ^{60}Fe from earth, the moon and other parts of the solar system gives conclusive evidence of the role supernovae, probably core collapse (type II), in the early formation stages of the solar system as well as subsequent times. In this work we concentrate mainly on recent (less than 100 k years) nearby supernovae where we discuss the cosmic ray and other factors influencing the atmosphere and climate. We will also extrapolate and predict future influence of an explosion of nearby supernovae and follow the motion of the solar system and the local interstellar medium in the galaxy in the long & short terms.

Invited Session 4

Solar particle events and radiation exposure risks in Mars missions

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Abstract

Radiation hazard in near-Earth space, and in the inner solar system, is caused by a number of factors among which, besides the time of exposure to the radiation environment, the most significant are the orbital parameters of satellites, as well as the levels of solar and geomagnetic activities leading to radiation flux enhancement.

The main components of the radiation environment, surrounding the Earth are: galactic cosmic rays, solar energetic particles and the radiation belts. Solar energetic radiation is subject to studies from the point of view of biological radiation impact. As case studies, effects of solar particle events recently measured on Mars and the Moon are assessed.

Solar particle events have been observed by RAD (Radiation Assessment Detector) on the surface of Mars: recent peaks in the solar-activity cycle have caused relevant peaks in the radiation dose measurements, both on Mars and on the Selenic surfaces.

After the RAD measurements during Curiosity's flight to Mars and on the surface of Mars, solar particle events are the big unknown in predicting the radiation exposure for a human mission to Mars. They are contributing an unknown but certainly significantly higher amount to the overall dose.

Session4

Invited

Interplanetary cause of Large, Super and Super Great Geomagnetic Storms during Solar Cycle 23 and 24

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Abstract:

In the present paper, I have compiled a catalogue of all those standard types geomagnetic storms, which are associated with Dst decrease of more than -100nT to -200nT (large storm), -200nT to -300nT (super storm) and less than -300 nT (super-great storms) observed during the period 1996-2012 which cover the solar cycle 23 and 24. The minimum value during a storm will be between -100nT and maximum approximately -500nT. Large geomagnetic storms are often associated with CMEs or IP shocks in the solar wind resulting from the interaction between high-speed and low-speed plasma streams. A CME produces a disturbance in the solar wind preceded by a shock wave. Interplanetary space probes encountering such disturbances have recorded increased solar wind speeds, densities and rapidly varying magnetic field. When these interplanetary disturbances reach the Earth, they give rise to geomagnetic storms. The most common interplanetary structures leading to the development of large storms be magnetic clouds, sheath fields, sheath fields followed by a magnetic cloud and corotating interaction regions at the leading fronts of high speed streams. However, the relative importance of each of those driving structures has been shown to vary with the solar cycle.

Session 4

Oral

Descriptive study of X-class flares released in the year 2014, during the double peak of SC-24

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Abstract:

During the Solar cycle 24 decline phase, giving a new peak was given on January 7, 2014 and the release of x-class flare, with high energetic particles, bigger than that occurred during the mean peak of this cycle. After that a few X-class flares was released during year 2014. We note that during the last 5 solar cycles, a new peak has appeared releasing high energetic particles and X-class solar flares, which are called the secondary peak or the double peak of solar cycle. The aim of this descriptive study is to follow the morphological and magnetic changes of the active region before, during, and after the production of X-class flares according to data analysis. Furthermore, the causes of the release of these eruptive storms have been discussed for the period, year 2014, during the double peak of the solar cycle 24.

Session 4

oral

Long-term global temperature variations under the effects of different cosmophysical factors

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Abstract

We have analyzed different cosmophysical factors which have effect on long-term global temperature variations during solar cycles 20-24. A detailed analysis of total solar irradiance (TSI), the spectral solar ultraviolet emission (UV), space weather and cosmic rays (CRs) show that there are phase shifts between the responses of the atmosphere processes and cosmophysical factors. Phase shifts between processes have permitted clarifying of scheme of action of solar activity in the various manifestations on the state of atmosphere and climate. We have shown that increasing of global temperature is likely affected by TSI and UV during solar maxima. During the descending phases of these solar cycles the interplanetary magnetic field and long-lasting solar wind high speed streams occurred frequently and were the primary contributors to minimize of CRs effect on the Earth's atmosphere. In this case global temperature is increased extra as result of increase in the atmosphere's transparency. We show that there are a few effective physical mechanisms of the action of solar activity and space weather on the global temperature. TSI and CRs play essential role in climate change and main part of climate variations can be explained by the mechanism of action TSI and CRs modulated by the solar activity on the state of lower atmosphere and meteorological parameters.

Session 4

Oral

Event of Solar flares and coronal mass ejection with geomagnetic activity during solar cycle 23 and 24

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Abstract

Sudden increases in the solar wind dynamic pressure, such as solar flares and coronal mass ejection, cause compression of the magnetosphere and earthward motion of the magnetopause. The interplanetary shock events from 1996 to 2015 are used to determine the shock-associated disturbance and propagation characteristics inside the Earth's magnetosphere. Interaction of an interplanetary shock with the magnetopause responsible for a shock-related disturbance inside the magnetosphere which propagate at a speed significantly higher than that in the solar wind or magnetosheath. These disturbances are caused by the interaction of the solar wind, and therein, with the Earth's magnetic field. Wind Velocity, interplanetary magnetic field and minimum variance analysis and has shown to vary in different regions of the magnetosphere. The impulse disturbance wave mode changes as the plasma and field conditions change inside the magnetosphere.

Session 4

Poster

Solar Induced Climate Changes on Millennium, Century and Solar Cycle scales

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Abstract

Millennium solar cycles derived from radiocarbon records in tree rings are used to explain the discharge and level of the Nile and lake Qarun prior to 500 years BC. It is found that high water level of both the Nile and Lake Qarun (which also reflects Nile level variations) corresponds to high activity periods of the sun while inactive solar periods cause dryness.

The great resemblance of the patterns of solar activity and the level of Lake Qarun makes it possible to extend Millennium solar cycles back to 9000 yr. BC.

The above records shows solar induced climate changes at 2470 BC and 1300 BC which caused the Yusof"s and Moses's famines respectively.

Time series of the Caspian Sea level (9000 BC – 2000 AD) is also compared to Millennium solar cycles. The drop of Nile levels and Lake Qarun between 6000-5000 BC contemporary with a prolonged period of Millennium solar inactivity was accompanied by high level of the Caspian Sea. Paleo -records of Lakes and closed Seas with special emphasis on the Dead Sea are potential sources of paleo- solar records. Such Millennium records should be taken into consideration to investigate the evolution of the sun as a star.

Millennium solar cycles are used to investigate 2000 years of Dead Sea level variations in relation to those major solar cycles. It is found that a 70 meters level rise of the Dead Sea between 70 BC and 40 AD was contemporary with the peak of a major solar cycle.

A list of El Nino and La Nina events (622-1467) is compiled from Nile records. Comparison of Usoskinet al.(2003) solar activity (1000-2000 AD), auroras events and El-Nino-La Nina events are made with reference to Wolf- Minimum (1282-1342 AD), Spörer Minimum (1416-1534 AD)and Maunder Minimum (1645-1715 AD)periods of solar inactivity as well as the Medieval Maximum (1135-1280 AD). It is found that during the first part of the Medieval maximum, aurora records are present and only El Nino events were found. On the other hand, during the Spörer Minimum only La Nina records are present with no aurora records.

The important conclusion is that solar wind protons and CMEs produce auroras and initiate El Nino events. La Ninas are produced due to the lack of solar activity. The mechanism of El Nios formation will be presented in the context of ENSO and NAO.

On the century Scales, the 80 yr. Wolf-Gleissberg cycles plays an important role with solar induced climate changes occurring at their turning points. The sudden rises and falls of the East African lakes; Lake Chad, Aral Sea, American lakes and the Dead Sea will be discussed in this context. A nearby Solar Induced climate change is highly probable with sudden rise of the Dead Sea.

On the 11 and 22 yr. cycles, some relations will be presented.

Transient events due to coronal hole's fast streams and CMEs role in initiating flash floods and hurricanes will be presented in a separate paper.

Invited

Session 4

Study on Climatic Variabilities Induced By Urbanization and Industrialization in Egypt

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Abstract
The present work investigates the effect of urbanization and industrialization processes on climatic variabilities over three distinguished districts in Greater Cairo Region (GCR), Egypt. The three districts have been chosen to represent different degrees of urbanization namely, Bahtim, (represents rural area), Abbasiya (represents urban area) and Helwan (represents industrial area). The annual mean anomalies of seven climatic elements (minimum, maximum and mean temperatures, wind speed, relative humidity, cloud and rainfall amounts) for three successive periods at the rural, urban and industrial areas have been calculated and used in this study. The three periods have been selected to represent stages of growth and development of each district. The results revealed that, the values of minimum, maximum and mean temperatures were gradually increased from old period to attained maximum values during the last recent period, while the values of wind speed, relative humidity, cloud amounts and rainfall amounts showed fairly opposite behavior. The effects of industrialization processes on the climatic elements were found stronger than the effects of urbanization processes.

Poster

session 4

Observation of flares in Lyman-Alpha using PROPA2/LYRA data through solar cycle 24

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Abstract:

The hydrogen Lyman-Alpha 121.6 nm line is the strongest line in the solar spectrum and is of particular importance both for flare physics and for its impact on the Earth's atmosphere. PROBA2 is a small ESA satellite aiming at exploring the active Sun and its effects on the near-earth environment. The LYRA radiometer on board PROBA2 has observed several flares resulting in a significant increase in the Lyman-Alpha flux. In this paper we present a study of the appearance and behavior of flares that occurred during cycle 24, using LYRA data on board PROBA2 from 2010 until now.

poster

session 4

The Interaction between CoronalMass Ejections (CMEs) and Coronal Holes (CHs) during the Solar Cycle 23 and its Geomagnetic Consequences

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Abstract

The interactions between the two large scale phenomena, coronal holes (CHs) and coronal mass ejections (CMEs) maybe considered as one of the most important relations that having a direct impact not only on space weather but also on the relevant plasma physics. Many observations have shown that throughout their propagation from the Sun to interplanetary space, CMEs interact with the heliospheric structures (e.g., other CMEs, Corotating interaction regions (CIRs), helmet streamers, and CHs). Such interactions could enhance the southward magnetic field component, which has important implications for geomagnetic storm generation. These interactions imply also a significant energy and momentum transfer between the interacting systems where magnetic reconnection is taking place. When CHs deflect CMEs away from or towards the Sun-Earth line, the geomagnetic response of the CME is highly affected. Gopalswamy et al. [2009] have addressed the deflection of CMEs due to the existence of CHs that are in close proximity to the eruption regions. They have shown that CHs can act as magnetic barriers that constrain CMEs propagation and can significantly affect their trajectories. Here, we study the interaction between coronal holes (CHs) and coronal mass ejections (CMEs) using a resultant force exerted by all coronal holes present on the disk and is defined as the coronal hole influence parameter (CHIP). The CHIP magnitude for each CH depends on the CH area, the distance between the CH centroid and the eruption region, and the average magnetic field within the CH at the photospheric level. The CHIP direction for each CH points from the CH centroid to the eruption region. We focus on Solar Cycle 23 CMEs originating from the disk center of the Sun (central meridian distance =15°). We present an extensive statistical study via compiling data sets of observations of CMEs and their interplanetary counterparts; known as interplanetary CMEs (ICMEs). There are 2 subsets of ICMEs: magnetic cloud (MC) and non-magnetic cloud (non-MC) ICMEs. MCs are identified by a smooth change of the magnetic field as measured with spacecraft at 1 AU, using ACE and Wind

spacecraft. It is found that the maximum phase has the largest CHIP value (2.9 G) for non-MCs. The CHIP is the largest (5.8 G) for driverless (DL) shocks, which are shocks at 1 AU with no discernible MC or non-MC. These results suggest that the behavior of non-MCs is similar to that of the DL shocks and different from that of MCs. In other words, the CHs may deflect the CMEs away from the Sun-Earth line and force them to behave like limb CMEs with DL shocks. This finding supports the idea that all CMEs may be flux ropes if viewed from an appropriate vantage point**.** **Poster Session 4**

Session 5- Solar energetic particles and Solar wind influence on the Earth's inner magnetosphere and atmosphere

Magnetosphere-Magnetosheath-Ionosphere coupling. Multi-species Plasma outflow from ionosphere to dayside magnetosphere:3D PIC EM Relativistic Simulation.

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Abstract

Magnetosphere-Magnetosheath-Ionosphere coupling is validated in the current study. Multi-species Plasma outflow from ionosphere to dayside magnetosphere were simulated by 3D PIC EM Relativistic kinetic model.
The outflow of thermal ions from the high latitude ionosphere to the magnetosphere is tracked in 3D specially in the dayside magnetosphere. This study is trying to approach some of the unanswered questions in space physics, such as: I) How the ionospheric ions plasma impact the global structure of the magnetosphere. II) What are the energisation processes of that plasma and where they operate (plasma sheet, ring currents). Our code is plugged to a spherical symmetric ionospheric model (International reference ionosphere IRI-2007). Our aim is to investigate the time-dependent enhancement and dynamics of the 3D magnetosphere in response to thermal ions plasma supply from the ionosphere.

Invited

Session 5

Catalog of ACE Electron Events (1997-2014)

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Abstract:

In the present study, a list of solar energetic electron events in solar cycle 23 and the rising half of solar cycle 24 in the energy range 38-315 keV is given. We collected and analyzed the observed in situ electron data from ACE/DE spacecraft located near Earth. It is considered as the first comprehensive catalog for electron events during the interval 1997-2014. We identified the onset times, peak intensities of the electron events, and the characteristic quantities of the associated solar activity, namely solar flares and coronal mass ejection. We performed linear and partial correlation analysis of the properties of electron events and the associated eruptive solar phenomena in order to distinguish between the effects from the different particle accelerators. This catalog can be used by the space weather community in studying the effect of the solar energetic particles on the man-made systems and on the climate changes. In addition, studying such correlations is considered as essential ingredient of models by which solar observations are used to predict particle events. Thus, such hazard effects of solar energetic particles can be mitigated.

Poster Session 5

Catalog of Wind/EPACT proton events (1997-2014)

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Abstract:

We present a catalogue of solar energetic proton events at about 25 and 50 MeV using the EPACT instrument aboard Wind spacecraft. We report here all proton enhancements observed during the period 1997 to 2014 in both energy channels. Onset time, peak time and peak proton intensity have been analyzed. We identified the SEP origin (flares and coronal mass ejections) using timing arguments. A statistical study (in terms of linear, partial and multiple correlations) of the peak proton intensity and the flare/CME properties is also presented that covers 18 years of solar data during solar cycles 23 and 24. The catalogue is posted on-line and will be updated with the recently released data. The purpose of this catalogue is to provide a publicly available service to the community for the study of space weather and space climate effects due to solar energetic particles.

Poster

Session 5

On the Classifications of the Solar Active Regions (ARs)

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Abstract:

The declining phase of solar cycle 23 is an important case of study. Many high energetic solar flares occurred in 2003. The occurrence of high energetic solar X-ray flares (X-type) is related to solar cycle's phases and the state of the active regions producing them. In some cases, the declining phases may be more active than the maximum phase. A statistical study is performed for solar flares (X-class) occurrence at declining and maximum phases of solar activity. The relationships between the X-class flares, SSN and active regions (ARs) will be investigated. The active region productivity of X-flares is in coherence with the number of days of (β - γ – δ) magnetic field. The active regions energies are consumed in the acceleration of protons and production of X-flares among other things (e.g. CME lifting up). The higher the energy of X-flares the lower the proton flux (pfu @ >10MeV) and vice versa.

Session 5

poster

Session 6- Societal impact of solar variability, Education and Public Outreach

Attempts to quantify solar and terrestrial impacts on the climate

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Abstract

The terrestrial climate depends on many dynamical processes on the Earth, inside and outside it. It is not predictable because of several reasons: 1) Models of the ocean, atmosphere, solid Earth and biosphere as well as long-term interactions between them and with the space environment are too complicated. They do not reproduce the geospheres with a needed and sufficient accuracy. The problem in principle not reduced to the low dimension physical description. The input parameters variable and not fixed in space and in time. Many of them not known. 2) Numerical realizations of models are too simplistic. 3) Relative roles of different terrestrial and extraterrestrial impacts remain not always clear. Dimensionless scaling between them demonstrates ample variability from unexpected catastrophic dominance (asteroids, volcano, earthquakes, possible supernovae explosions etc.) to negligible and slow evolution from time to time, which ultimately bring to global change. Attempts to forecast the climate only with one or a few factors in hands have nothing to do with the real science and resemble the guesswork. It is because of many comparable contributions to climate changes. The solar activity impact is of special interest in this conference. The solar activity is not predictable as well. The recent attempt of this kind, which is not acceptable, was unfortunately published and widespread in the mass media (Zharkova et al., Sci. Rep. 2015) with subsequent speculations about forthcoming global cooling due to predicted solar activity grand minimum. The method of the forecast is not tenable. Energy, momentum and mass transports in solar activity not considered at all. The naïve and simplistic mathematical model expressed in two trigonometric formulae with several fixed parameters to fit the short period data is physically not justified for extrapolations in past and future. It fails to reproduce the well-established features of the solar activity evolution during the last millennium as was shown by Usoskin and Kovaltsov (2015)

(http://arxiv.org/pdf/1512.05516v1.pdf). Obtained formulae appear not applicable de facto for the forecast. This recent lesson shows the danger of one-sided and oversimplified formal views on the climate change problem. The climate change problem is hopeless in the sense of accurate quantitative predictions. One can consider the climate change problem as the interdisciplinary scientific driver of our knowledge increase about the environment and its long term changes (the 'climate' concept defined on the scales of tens of years and more in comparison with the 'weather' on shorter scales). For example, it helps to holistic and ecological views on celestial mechanics, solar physics, geology, geophysics, space physics, biophysics etc. coupled in the same or differing space-time scales. This coupling demonstrates the cause-to consequence chains. Sometimes they are clear, well known and expected, sometimes not. New discoveries are possible in the nearest future, which would change dominant climatological paradigms drastically. The conclusion is that 'cosmos' on the heaven is equally important as the 'cosmos' inside the Earth for the better understanding of gradual and abrupt climate changes, which can be expected, but not definitely predicted in the deterministic way. Short historical review shows several other examples of erroneous and partially correct expectations in the last century.

Session 6

INVITED

Solar control of Earth's Temperature

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Weak Solar cycles induce cooling on the earth. Weak solar cycles 4, 5 & 6 and 12, 13&14 forced the earth's air and Oceans to cool down.

Since cycles 23, 24 are weak and eventually cycle 25 is expected to be weak, we propose natural cooling of the Earth.

Cyclic heating and cooling of the earth occur in coherence with the Wolf-Gleissberg cycle.

Inactive sun during Sporer and Maunder minimum caused cooling of the earth. On the contrary the medieval maximum caused earth's temperature to rise.

Oral session 6

Disappearance of Egyptsat-1

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Abstract:

The aim of our present work is to identify if the solar activity parameters have any effect of the interruption of the coming signal from Egyptian satellite "Egypt sat-1" which lost totally since 19 July, 2010. So we are hedging our bets to study the effect of the main factors that can affect the degradation; or the damage of the electronic components of the satellites. The most characterized solar activity variations are solar wind, Mega storm, solar flare, coronal mass Ejection (CME_S)…etc. which causing solar storm eruption. Focusing on these factors incoming, we found that none of them are responsible for the complete loss of the satellite signal. This may be attributed to the inactivity of the sun during the ascending phase of the activity cycle number 24.

Oral

Session 6

Analysis of the spectral variations on the performance of Silicon solar cells operating under real climate conditions

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Abstract:

Photovoltaic performance is correlated to many environmental factors like temperature, radiation intensity as well as radiation spectrum. In order to select a suitable type of solar cells to operate at certain given site, a studying of spectral variation intensity of the incident solar radiation has to be performed prior to choose the solar cells types to operate at that site. In the present study, the spectral variation intensity of the incident solar radiation has been measured using a Sun spectroradiometer (a device measures solar spectrum at selective wavelengths from broad band 350-1000 nm). In order to cover the spectral response of most solar cells, selected wavelengths 350, 368, 615, 780, and 870 nm have been chosen. The monthly variation of the spectrally solar radiation at definite wavelengths has been recorded and plotted. Optimum matching of solar cell spectral response with the selective solar spectrum is studied. Finally, the optimum time for using the different solar cells has been evaluated.

Poster

Session6