TRACK D - 2
Space Science

Day 1 – Wednesday

Session 1

Session Chair: Pillay

10:30 AM
Title Multivariate Techniques for Constructing Quiet Day Curves. (41)
Presenter Andrew Collier Hermanus Magnetic Observatory
Authors Andrew Collier
Content The identification of anomalies in time series data depends on a knowledge of the expected “normal” variations in the data. Numerous techniques exist for deriving such Quiet Day Curves (QDCs). A flexible multivariate technique has been developed which generates QDCs which account for seasonal and other variations.

10:50 AM
Title Lightning Atmospheric count rate from Marion Island. (359)
Presenter Johannes Breytenbach University of Cape Town
Authors Johannes Breytenbach
Content The lightning sferic count rate from the VLF receiver at Marion Island is presented. Time variation on short to long scales is investigated, and modeled in terms of lightning activity in the southern hemisphere, taking into account propagation conditions over land, ocean and ice.

11:00 AM
Title Multivariate Study of Non-Simultaneous Forbush Decreases. (11)
Presenter Ogbonnaya Okike University of KwaZulu-Natal
Authors Ogbonnaya Okike
Content The distribution of the cosmic ray flux over the Earth is not uniform, but the result of complex phenomena within the Sun-Earth environment. A multivariate analysis of non-simultaneous Forbush decreases from an array of cosmic ray detectors will give an indication of the stations’ asymptotic cones of acceptance.

11:30 AM
Title Effect of different ionospheric and ground conductivities on the propagation of VLF radio waves within the Earth-ionosphere waveguide. (25)
Presenter Stephen Meyer University of Kwazulu-Natal
Authors Stephen Meyer
Content VLF (3-30 kHz) radio waves propagate with little attenuation within the Earth-ionosphere waveguide. There are numerous factors that determine waveguide propagation conditions such as ionospheric free electron density and the conductivity of the Earth’s surface along the propagation path. This paper examines how modifications of these factors alter the propagation of the VLF waves.

11:50 AM
Title Particle simulations of space plasmas. (26)
Presenter Etienne Koen Hermanus Magnetic Observatory, Royal Institute of technology KTH
Authors Etienne Koen; Andrew Collier; Shimul Maharaj
Content PIC simulations are numerical techniques for studying plasma phenomena which do not yield to an analytical solution. These techniques will ultimately be used to study chorus emissions which are whistler mode waves propagating through the Earth’s magnetosphere. The two-stream instability is presented as an initial part of the study.

12:10 PM
Title Study of the time dependent modulation of galactic cosmic rays in the inner heliosphere. (61)
Presenter Edwin Magidimisha Nwu (Potchefstroom)
Authors Edwin Magidimisha
Content In this work a fully time-dependent cosmic ray model, based on the numerical solution of the Parker transport equation, is used to compute intensities of galactic cosmic rays in the heliosphere. Results are compared to recent observations of charged particles by the Ulysses spacecraft. We show how computed intensities along the Ulysses trajectory vary over a solar cycle and in particular show that it is possible to simulate cosmic ray modulation realistically during all the three fast latitude scan periods of the spacecraft.
Session 2

Session Chair: Collier

1:30 PM
Title The changes caused by magnetospheric electric field on high-latitude ionosphere during magneto-sphere-ionosphere coupling. (228)
Presenter Fulufhelo Kenneth Mapaha University of KwaZulu-Natal
Authors Fulufhelo Kenneth; Sadha Pillay.
Content On the 09/08/2002 the Cluster spacecrafts footprint where located within the field of view of the Syowa East SuperDARN radar. The variations in the magnetospheric electric field observed by the spacecrafts were compared to the line-of-sight velocity observed by radar. The 3 min delay was observed during magnetosphere-ionosphere coupling.

1:50 PM
Title Observing mesospheric gravity waves with an imaging riometer in SANAE. (127)
Presenter Bhekumuzi Sfundo Khanyile University of Fort Hare
Authors Bhekumuzi Sfundo Khanyile
Content We present the characteristics of small scale (<100 km) gravity waves in the lower and upper atmosphere derived from imaging riometer at SANAE (71°S, 20°W). FFT technique is used to extract wave parameters of the gravity waves. These waves have horizontal phase speed of 0-250 m/s, horizontal wavelength of 16-30 km and the period of 3-30 min. And the propagation direction is ~ 50 degrees.

2:10 PM
Title Extracting gravity waves parameters during the September 2002 southern hemisphere stratospheric major warming using a SANAE imaging riometer. (160)
Presenter Nkanyiso Mbatha UKZN and HMO
Authors Nkanyiso Mbatha
Content Using absorption data measured by imaging riometer for ionospheric studies (IRIS) located at the South Africa National Antarctic Expedition (SANAE), Antarctica (72°S, 3°W), we extracted the parameters of gravity waves (GW) of periods between 35 and 55 minutes during the period from 16 to 30 September 2002, a period of major sudden stratospheric warming (SSW) in the Southern Hemispheric middle atmosphere.

2:30 PM
Title Existence domains of ion-acoustic and electron-acoustic solitons in two-electron temperature space plasmas. (116)
Presenter Shimul Kumar Maharaj Hermanus Magnetic Observatory
Authors Shimul Kuma; Satyavir Singh; Sadha Pillay; Gurbax Lakhina.
Content Using the Sagdeev pseudo-potential formalism, the permitted velocity ranges of large amplitude ion-acoustic and electron-acoustic solitons are determined for a plasma comprised of hot and cool electrons, and ions. Adiabatic fluids are used for the cool electrons and the ions, whereas, for the hot electrons, both the cases corresponding to including inertial effects and neglecting the inertia by using the Boltzmann assumption for the hot electron number density, will separately be investigated.

2:50 PM
Title Planetary wave features and variability of tide at mesosphere/lower thermosphere region. (326)
Presenter Sibusiso Mthembu Hermanus Magnetic observatory
Authors Sibusiso Mthembu; Pillay Gurbax
Content The activity of planetary waves and variability of tides in the mesosphere/lower thermosphere (MLT) region was studies using the mesospheric wind velocity. Planetary wave activity observed at the MLT region are the result of upward propagating wave which are excited from the lower region of the atmosphere and sometimes are resulting from tidal modulation at planetary wave. Tidal modulation was investigated as the possible candidate for the planetary wave features in the MLT region.

3:10 PM
Blitz poster

PLENARY WILL START AT 4PM
Day 2 – Thursday

Session 3

Session Chair: Malinga

10:30 AM

Title: Geomagnetic survey towards the re-establishment of a magnetic observatory on Marion Island. (76)
Presenter: Pierre Cilliers
Hermanus Magnetic Observatory
Authors: Pierre Cilliers; Pieter Kotze
Content: Marion Island (46d52.740'S, 37d51.442'E), near the edge of the South Atlantic Anomaly, is strategically located for geomagnetic observations. This paper presents the geomagnetic survey done on Marion Island towards the re-establishment of a magnetic observatory to follow up on observations done there during the period 1972 to 1980.

10:50 AM

Title: Potential relationship between high energetic particle precipitation over the South Atlantic Magnetic Anomaly and mid-latitude ionosphere scintillation observations - implications to South Africa’s SKA bid. (318)
Presenter: Ben Opperman
Hermanus Magnetic Observatory
Authors: Ben Opperman; Pierre Cilliers
Content: South Africa’s bid to host the Square Kilometre array (SKA) radio telescope pivots around a number of crucial factors, including the local ionospheric stability. This study investigates the effects of high energetic, electrically-charged particle precipitation over the South Atlantic Magnetic Anomaly on the stability of the South African ionosphere.

11:10 AM

Title: Characterisation of the ionosphere over the South Atlantic Anomaly by using a ship based Dual Frequency GPS receiver. (161)
Presenter: SJ Van der Merwe
University of Pretoria/Hermanus Magnetic Observatory
Authors: SJ Van der Merwe; Pierre Cilliers; Pieter De Villiers
Content: This paper briefly describes a novel approach to characterizing the ionosphere over the South Atlantic Geomagnetic Anomaly using a ship-based dual frequency GPS receiver. Applications include but are not limited to HF propagation path prediction for communication and GPS positioning applications, specifically operating in this zone of abnormal magnetic activity.

11:30 AM

Title: South African Space Weather Prediction Forecast. (97)
Presenter: Mpho Tshisaphungo
Hermanus Magnetic Observatory
Authors: Mpho Tshisaphungo; Kobus Olckers
Content: Space weather describes the conditions in space that affect both Earth- and Space bound technological and biological systems. It is a consequence of the behavior of the Sun, the nature of the Earth’s magnetic field and atmosphere, and our location in the solar system. Space weather is one of the principal threats to modern technology. With the increase in technological systems the need for accurate space weather predictions and forecasts has increased.

11:50 AM

Title: General Relativistic considerations for Space Geodesy. (343)
Presenter: Ludwig Combrinck
HartRAO
Authors: Ludwig Combrinck
Content: The accuracy of Space Geodesy techniques have improved to such an extent that routine data analyses need to incorporate the effects of General Relativity Theory (GRT). A comparison between the accelerations perturbing the orbits of the two LAGEOS satellites resulting from GRT and other non-GRT accelerations are made. The analyses of the resulting data have to be done within the framework of a post-Newtonian formalism.

12:10 PM

Title: Prediction and verification of a high power experimental rocket. (214)
Presenter: Chijioke Nwosa cj
Authors: Chijioke Nwosa cj
Content: Over the past five decades a number of South African institutions have developed capabilities and facilities in various fields of space science and technology. This paper describes an experimental rocket launch project in line with the ongoing South African Space programme.

LUNCH
Session 4

Session Chair: Cilliers

1:30 PM
Title Geomagnetic storms and solar sources relationships: a statistical analysis during solar cycle 23. (55)
Presenter Jean Uwamahoro Hermanus Magnetic Observatory
Authors Jean Uwamahoro; Lee-Anne McKinnell
Content Over a period of 11 years of solar cycle 23: 1996-2006, the solar sources of 219 geomagnetic storms have been investigated. This investigation focused on a class of coronal mass ejections (CMEs) known as halo CMEs and their subsequent geo-effective conditions in the interplanetary medium. In this paper, we present the results of a statistical analysis of geomagnetic storms solar sources in terms of full halo and partial halo CMEs.

1:50 PM
Title Phase scintillation observed over a high-latitude Antarctic station. (40)
Presenter Chigomezio Ngwira Rhodes University/Hermanus Magnetic Observatory
Authors Chigomezio Ngwira; Lee-Anne McKinnell; Pierre Cilliers
Content In this paper, GPS transionospheric signals are used to study phase scintillation observations at the South African Antarctic polar research station. A multi-instrument approach shows that the scintillation events are associated with auroral electron precipitation. It is also demonstrated that substorms play an essential role in the production of scintillation in the high-latitude ionosphere.

2:10 PM
Title Linear and non-linear regression modelling of TEC. (113)
Presenter John Bosco Habarulema Department of Physics and Electronics, Rhodes University
Authors John Bosco Habarulema; McKinnell Lee-Anne; Opperman Ben
Content This paper compares both linear and non-linear regression modeling techniques in approximating total electron content (TEC). Both techniques have been applied on a similar dataset and verified on an independent but identical dataset to assess the performance of the developed models.

2:30 PM
Title The variability of the peak height of the ionospheric F2 layer over South Africa. (159)
Presenter Makhangela Mbambo University of Fort Hare and Hermanus Magnetic Observatory
Authors Makhangela Mbambo
Content This paper presents the investigation into the variability of the maximum height of the ionospheric F2 layer (hmF2) over the South African region. The dependence of hmF2 on solar and magnetic activity is also investigated. An initial result shows larger hmF2 variability around midnight than during the day for all seasons.

2:50 PM
Title Tropospheric and Stratospheric Temperature Measurements by Vibrational Raman-N2 LIDAR at Reunion Island (20.8 deg S, 55.5 deg E). (200)
Presenter Hassan Bencherif Reunion Island University
Authors Hassan Bencherif
Content The improvement of the laser sources allows LiDAR to probe an increasing altitude range of the atmosphere with improved vertical and time resolutions. Several methods using LiDAR technique have been developed to retrieve temperature in the UTLS. However, the Rayleigh technique is limited and can not operate below the 30km height, while the vibrational Raman-N2 technique has been developed in order to measure temperature profiles in the UTLS region. In this study, we present the Raman-N2 LiDAR operating at Reunion Island; the temperature retrieval method; and the main results about the thermal structures in the UTLS as derived from a 10-year.

3:10 PM
Title Satellite Imager Calibration and Validation. (15)
Presenter Lufuno Vhengani CSIR, DPSS
Authors Lufuno Vhengani; Minette Lubbe; Derek Griffith; Meena Lysko
Content The success or failure of any earth observation mission depends on the quality of its data. Data quality is assessed by determining the radiometric, spatial, spectral and geometric fidelity of the satellite sensor. The process is termed calval. This paper will describe calval techniques specific to South Africa.
Day 3 – Friday

Join Astrophysics Sessions

ASTROPHYSICS AND SPACE SCIENCE SG Meeting

PLENARY WILL START AT 4PM

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