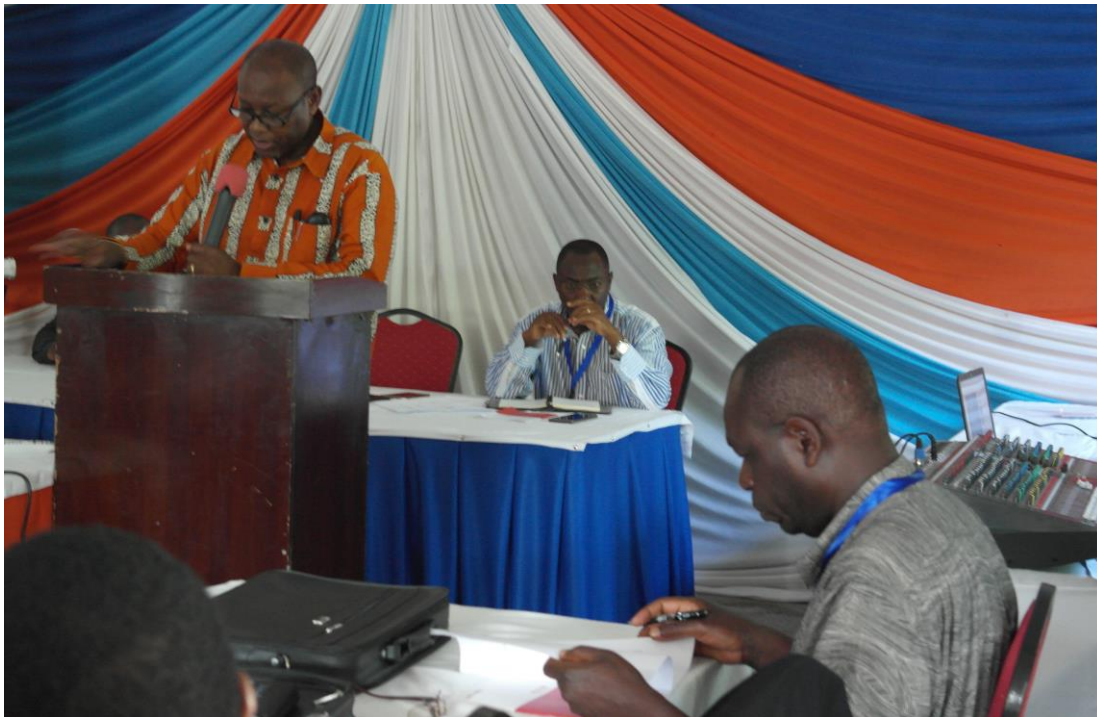


**Report on
The Eastern Africa Global Navigation Satellite System
and Space weather Workshop, held at Pwani
University, 13th -17th, 2019.**



Participants of the Workshop. Seated in Front Row are: from Left, Joy Mwikamba (Workshop secretariat, Dr Olwendo, Dr Kimani (Director Kenya Space Agency, Prof. Christine Amory, Prof. Kahindi (DVC-Pwani), Prof. Rabi Babatunde, Prof. Paul Baki and Dr John Bosco Habarulema.



On Top is Prof. Kahindi (DVC, Academic affairs) and Dr John Kimani (Kenya Space Agency, Director) giving their speech during the opening ceremony of the workshop

Organized by:



**ISTITUTO NAZIONALE
DI GEOFISICA E VULCANOLOGIA**

With the support of Kenyan Space Agency

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CHINA RESEARCH INSTITUTE OF RADIOWAVE PROPAGATIONS

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1. Objectives

The Eastern Africa GNSS and space weather capacity building workshop aimed at developing a regional team to enhance capacity building in space weather monitoring over the region. Space weather is the term used to refer to the set of physical and electromagnetic processes and effects that occur on the Sun, and ultimately interact with the Earth's magnetic sphere, atmosphere and surface. These phenomena which include solar flares, solar wind, geomagnetic storms and coronal mass ejections can have adverse effects on modern technological infrastructure in orbits and on the earth surface. The effects of space weather are more dynamic and highly unpredictable over the low latitude regions. The bulk of the sub-Saharan region mainly lies in the low latitude region where very limited efforts have been made to understand the adverse impact of space weather on its population.

The low latitude regions are not only highly vulnerable to adverse space weather events but the day to day ionospheric turbulence that occurs after local time sunset remains a great challenge. The turbulent post sunset ionosphere over this region has been associated with the high-density equatorial plasma bubbles which span to other latitudes during severe space weather events. The equatorial plasma bubbles are directly linked to disruption of radio wave propagation since they cause radio wave scintillation.

In this workshop we utilized the expertise from a pool of international experts and infrastructure in Pwani University to bring together scientists and students (Masters or Ph. D research students or Post Docs) from the Eastern African region (namely: Ethiopia, Kenya, Uganda, and Tanzania) to a five days space weather workshop at Pwani University. During the five days, the activities done were focused on lectures by international experts. Lectures were also accompanied by Laboratory projects that enabled a hand on capability with data analysis and interpretations. The workshop main goal is to form a regional team focused on increasing capacity building for space weather monitoring, instrumentation, education and research in their home institutions.

2. Expected Output

The expected outcome of the event can broadly be reduced to the following three items: scientific results, capacity building and societal impacts

a) Scientific results

Experts and learners were able to share information and knowledge of the effects of space weather in equatorial region. The knowledge gained will increase our understanding of how space weather impacts on our daily lives and technology.

b) Capacity building

Scientists (mainly at the MSc., Ph.D research students and Post Doc students) from this region had an opportunity to identify key issues associated with space weather monitoring over the African region, in particular identifying training, education, funding and instrumentation required to make significant contribution to the understanding and exploitation of this field. The road-map developed at the workshop did explore the a detailed plan for future training needs.

c) Societal impacts

The knowledge gained will increase our understanding of how space weather impacts our daily lives. This knowledge has the potential to affect millions of people especially when this knowledge is used to mitigate the adverse space weather on our space infrastructure.

3. Organization of the Workshop

The workshop was hosted by Pwani University in collaboration with the Kenya Space Agency. We are very grateful to the Kenya Space Agency which is hardly a year old for taking up this noble task of supporting capacity building initiative. We are also thankful to the African Initiative for planetary and Space Science (AFIPS) for initiating and supporting the idea of regional workshops aimed at enhancing capacity building. Through the AFIPS support we were able to get financial support from the European association of Geochemistry. We are equally thankful to the Union Radio Scientifique Internationale, URSI for the prompt response to our short notice for financial support. The China Research Institute of Radio wave Propagation

(CRIRP) also supported the event by sending an expert to the event and also donating stationery to be used in the workshop. In Addition a number of worldwide experts in GNSS also generously donated their time to participate in workshop as lecturers.

The workshop included formal lectures and hands on practice in GNSS architecture, signal structure, hardware, state of art applications and principally scientific exploration using GNSS. The lecturers were recruited from Europe, China, Africa and all had a reputation of excellence in research, teaching and GNSS technology. This diverse collection of people did generate an environment for social understanding, regional/international friendship and collaborations. Most importantly it represented a regional group committed to facilitating the use of GNSS technology for science applications in their home countries.

4. Methodology

4.1 Committees

DIRECTORS:

Dr Joseph Ouko Olwendo - Pwani University (Kenya)

Dr Claudio Cesaroni - Istituto Nazionale di Geofisica e Vulcanologia (INGV-Italy)

INTERNATIONAL ADVISORY COMMITTEE:

Dr. Zama Katamzi - Joseph - South Africa National Space Agency (SANSA-South Africa)

Dr. Cesaroni Claudio - Istituto Nazionale di Geofisica e Vulcanologia (INGV-Italy)

Dr. David Baratoux - AFIPS Steering committee member

Prof. Zhen Weimin - China research Institute of Radiowave Propagation

Prof. Paul Baki - Technical University of Kenya

LOCAL ORGANIZING COMMITTEE:

Dr. Olwendo Joseph - (LOC Chair), Pwani University

Dr. Thomas Baluku - Pwani University

Dr. Joseph Karanja - Pwani University

Dr. Stephen Owino-Pwani University

Ms. Joy Mwikamba-Pwani University

Prof. Paul Baki - Technical University of Kenya

Maj. Andrew Nyawade - MoD/Kenya Space Agency

4.2 Lecturers

Below are the profiles of the individual lecturers that participated in this workshop.

Dr. Joseph Ouko Olwendo

Dr. Joseph Ouko Olwendo is a lecturer and research scientists in space weather science at Pwani University. He received his BSc, and MSc, in theoretical Physics in 2005 and 2008 respectively from the University of Nairobi. He got his Ph.D. in Space Physics under the supervision of Prof. Paul Baki from Pwani University in 2014. His research interest has been on equatorial Ionospheric dynamics and Ionospheric plasma density irregularities using GNSS signals over the East African sector. He also works on Ionospheric model validation and navigation applications. He has been on several times visiting scientist at the ICTP on short term basis in his capacity as a junior associate scientist since 2014. At ICTP he works with NeQuick 2 model research group under Prof. Sandro M. Radicella. He is the author/co-author of more than 20 papers published in scientific peer-reviewed journals.

Dr. Olwendo has been recognized for his contribution in the understanding of equatorial ionospheric dynamics and plasma process; and was awarded the 2016 Sunanda and Santimay Basu Early Career Award in Sun-Earth science by the American Geophysical Union (AGU) Honors Team, and was also a recipient of the Young scientist award of Union of Radio Science Atlantic in 2015 (URSI-2015). He is currently the Principal investigator on Ionospheric Scintillation at the low latitudes and has a scintillation monitoring laboratory based in Pwani University with a number of international collaborations.

Dr. Claudio Cesaroni

Claudio Cesaroni, holds a PhD degree in Geophysics and is a confirmed researcher at INGV in Italy. His main research interests are related with low and mid latitude ionosphere and space weather. His expertise spans from regional and global TEC modelling and forecasting to ionosonde data automatic scaling and interpretation. Recently, he works also in mid-latitude ionospheric irregularities (TIDs) dynamics by means of GNSS and All Sky Imager data. He is

author of an international patent dealing with a model for TEC and scintillation forecasting. He is author and co-author of more than 30 papers and he acted as task responsible in several international projects funded by European Space Agency and European Commission. He is one of the responsible of the Italian contribution to the PECASUS consortium for the provision of a Space Weather service to ICAO. In 2015 he was awarded with Young scientist award of International Union of Radio Science (URSI).

Dr. Ou Ming

Dr OU Ming is currently a senior engineer of China Research Institute of Radiowave Propagation (CRIRP). He received his master degree from CRIRP and Ph.D degree from the Wuhan University. His research interests is on GNSS data processing and ionospheric remote sensing.

Prof. Paul Baki

Paul Baki is a Professor of Physics (Department of Physics and Space Science, Technical University of Kenya), with interest in Space Physics (Ionospheric & Space Weather), astronomy & astrophysics; Director (School of Physical Sciences and Technology-Technical University of Kenya). He is a Fellow (Kenya National Academy of Sciences-KNAS) and member of the Executive Committee and Governing Council of KNAS; Committee member, International Science Council (ISC) Regional Office for Africa; Member, International Network of Government Science Advice (INGSA). Member of Expert Group C: (Long Term Sustainability of Outer Space Activities) of the United Nations Committee on Peaceful Uses of Outer Space (UNCOPUOS). Member, African Union Working Group on African Space Policy & Space Strategy.

He is also a Member of Scientific Committee on Solar-Terrestrial Physics Visiting Scholar Programme; Formerly member of the Expert Group of the Network of African Science Academies (NASAC); Chairman (Physics Society of Kenya) & Chairman, East African Astronomical Society; he has been listed in Marquis Who is Who in Physical Sciences in the World (2014) and currently Consultant Space Scientist on Space Science & Technology Market Survey and Skills Audit.

Prof. Laneve Giovanni

Giovanni Laneve received the Laurea degree in aeronautical engineering from the Università di Napoli, Naples, Italy, in 1985, and the Laurea degree in aerospace engineering from the Università di Roma “La Sapienza,” Rome, Italy, in 1988. From 1987 to 1991, he was a Consultant with the Centro di Ricerca Progetto San Marco, Rome, Italy, where he was involved in the San Marco 5 satellite mission control and data analysis. He is associate professor at the School of Aerospace Engineering, Università di Roma “La Sapienza”. Since 1998, he has been teaching the course of “Aerospace Systems for Remote Sensing”. His research interests include aeronomy, satellite thermal control, mission design, new algorithms for the exploitation of satellite images, satellite remote sensing applications for fire management, applications of satellite data for the African regions, and studies on environmental and disaster monitoring.

Prof. Babatunde Rabi

Babatunde Rabi, a Professor of Space Physics, is the pioneer Director and Chief Executive of the Centre for Atmospheric Research of the Nigerian National Space Research and Development Agency. His research interest lies mainly in Ionospheric Physics, space weather Solar Terrestrial Interactions and alternative energy development. He was named the Young Scientist of the Year 2000 in Nigeria by the then Third world Academy of Science, Italy in collaboration with the Nigerian Academy of science. He was a postdoc fellow at the National geophysical Research Institute, Hyderabad, India in 2004 and a visiting Associate Professor to the solar terrestrial environment laboratory of the Nagoya University, Japan in 2008. He is a visiting Professor to a number of African universities and has been a regular visiting professor to the International Centre for Space Weather Science and Education ICSWSES of Kyushu University, Japan since 2008. He is at the moment amongst many other responsibilities the national coordinator of the international space weather initiative ISWI and serves on the international steering committee of the UN/NASA-endorsed global cooperation.

Dr. John Bosco Habarulema

John Bosco Habarulema completed his BSc, Physics and Maths (2004) from Mbarara University of Science and Technology in Uganda; and BSc Hons in 2005 (University of Cape Town, South Africa). He then went ahead to complete MSc (2008) and PhD (2011) in Space Physics (from Rhodes University, South Africa) focussing on analytical and empirical modelling of total electron content (on a regional scale) with the use of satellite and ground based data. His research interests include ionospheric modelling including F2-layer parameters as well as total electron content; ionospheric electrodynamics including modelling of low latitude vertical drifts; and studies of Atmospheric Gravity Waves leading to travelling ionospheric disturbances especially during geomagnetically disturbed conditions.

He is currently the scientific Principal Investigator of the South African Ionosonde Network which comprises of four ionosonde stations. Since 2013, he has been a researcher within the Science Research and Applications Unit at the South African National Space Agency, Hermanus, South Africa. He is a research associate in the department of Physics and Electronics, Rhodes University, South Africa. He is a founding member of the African Initiative for Planetary and Space Sciences; which is partly responsible for us being here today.

Dr. Michael Pezzopane

Michael Pezzopane has been a researcher at the Istituto Nazionale di Geofisica e Vulcanologia since 2001. He got his Master Science in Physics at “Sapienza” University of Rome, Italy, and his Ph.D. in Geophysics at the “Alma Mater Studiorum” University of Bologna, Italy. His research interests mainly focus on: mid-latitude and low-latitude ionospheric behaviour for both quiet and disturbed conditions, radio wave propagation in the ionosphere, atmospheric gravity waves, autoscaling of vertical ionospheric soundings, electron density irregularities at low latitudes, E sporadic layer, spread-F, and three dimensional electron density modelling of the ionosphere. He is one of the two developers of the “Autoscala” algorithm, able to automatically scale vertical ionograms, which is installed in several ionosonde stations in Italy, Argentina, Russia and Poland. Together with Dr. Alessio Pignalberi he has recently developed a method, called IRI UP, to real time update the IRI model and a new NeQuick topside formulation based on Swarm data.

He is author/co-author of more than 75 papers published in scientific peer-reviewed journals. He is one of the authors of the patent “Digital Ionosonde”. He has been, and still is, involved in several Italian and European projects, on occasion with leading roles. He has been, and still is, supervisor of Master Science in Physics students and Ph.D. in Geophysics students. He was several times visiting scientist at the Physics and Astronomy Laboratory of the Universidade do Vale do Paraíba (UNIVAP) – São José dos Campos, Brazil. He was Guest Editor for three special issues in Advances in Space Research and he is Editor of Annals of Geophysics. In 2013, he was awarded the first prize for the best communication in Geophysics presented at the XCIX National Congress of the Italian Physical Society, held in Trieste.

Dr. Christine Amory-Mazaudier

Dr Christine Amory-Mazaudier is professionally qualified in the fields of Computer Science (Master), Administration (MBA) and Physics (Master, PhD and ‘Thèse d’Etat’). She worked at CNRS (National Centre for Scientific Research) from 1978 to 2014. She is now senior Scientist at Sorbonne Universities and Staff Associate at ICTP (International Centre for Theoretical Physics). Between 1978 and 1989, Dr Amory-Mazaudier conducted research in various fields of the Earth’s environment, and presently on the Sun Earth relations and Space Weather. Her scientific work had led to 182 publications, comprised 116 scientific papers, 35 proceedings, 28 technical reports, 2 doctoral theses and a book. Dr Amory-Mazaudier has been in charge of young researchers and has trained 10 master students and 40 PhD students in various countries of Europe, Africa, Asia and USA. In 1995, she has founded the IGRGEA (International Group of Research in Geophysics Europe Africa), based upon the practice of sharing. This group develops research on the connections between the Sun and the Earth, throughout Africa and also Asia since 2005. In the framework of the International Heliophysical Year (IHY) and the International Space Weather Initiative (ISWI) projects, she was in charge of the survey of GPS networks in Africa. She has received awards of recognition to her work from USA, Africa, Europe and Asia.

Dr. Zama Katamzi-Joseph

Dr. Zama Katamzi-Joseph is a research scientist at the South African National Space Agency and a research associate of the Department of Physics and Electronics at Rhodes University. Her main research interest centres around ionospheric dynamics. These include studying traveling ionospheric disturbances, plasma bubbles and the influence of thermospheric neutral winds on the ionosphere. For her research projects, she uses measurements from Global Navigation Satellite Systems, Low-Earth Orbit satellites, ionosondes, magnetometers, Fabry-Perot interferometer and airglow cameras.

Dr. Stefan Lotz

Dr. Stefan Lotz is a researcher at the Space Science directorate of the South African National Space Agency (SANSA). His research focus is mainly on geomagnetically induced currents and very low frequency (VLF) wave phenomena. Other research interests include Antarctic science and machine learning.

Dr. Halilu Ahmad Shaba

Dr Halilu Ahmad Shaba was born 1st October 1966 to the family of Halilu Shaba from Lapai in Niger State and Zainab Olayanju Abdulkadir from Ilorin in Kwara State. He began his basic education from Capital School Sokoto where he did his nursery school and Primary one and then finished his primary education from Local Education Authority, Polytechnic Road Kaduna. He attended Rimi College Kaduna and Government Secondary School, Rijau respectively between 1978 and 1984. He graduated from Bayero University with Bsc Geography in 1988 and did his National Youth service Corps 1988-1989. He started work immediately with National Population Commission till 2001. He further obtained his masters in Technology in remote sensing application in 1993 and a PhD in the same field January 2000 all from Federal University Technology Minna. He transferred his service from National Population Commission in 2001 to Federal University Technology Minna and later left to join National Emergency Management Agency in 2006. Dr Halilu Ahmad Shaba joined the National Space Research and Development in 2009 and is currently the Director Strategic Space Applications. He is a member of academics of Science, Nigeria Geographic Association, Association of Nigerian Authors and GEOSON and

also a fellow of Nigeria Cartographic Association. He has written two novels (Darkness of Doom and Bubble Dreams) and has supervised over forty master's and Post Graduate Diploma thesis and about thirty undergraduate researches. He has co supervised over seven PhD both in Nigeria, United Kingdom and Ghana and have written or coauthored about 35 Journals and conferences articles. He is still lecturing, and farming and a scholar.

4.3 Participants

The following is the list and contact details of all the participants at the event.

S.NO.	NAME	EMAIL ADDRESS	INSTITUTION
1.	Dr. John Njoroge Kimani	njorokim2@gmail	Kenya Space Agency
2.	Eng. Phillip NdoloNyakwaka	pnnyakwaka@gmail.com	Kenya Space Agency
3.	Prof. Paul Baki	paulbaki@gmail.com	Technical University of Kenya
4.	Dr. Ou Ming	ohm1122@163.com	China Research Institute of Radiowave Propagation
5.	Dr. John Bosco Habarulema	jhabarulema@sansa.org.za	AFIPS-representative
6.	Prof. Christine Amory Mazaudie	christine.amory@lpp.polytechnique.fr	Sorbonne University LPP Polytechnique
7.	Dr. Stefan Lotz	slotz@sansa.org.za	South African National Space Agency
8.	Dr. Zama Katamzi	zkatamzi@sansa.org.za	South African National Space Agency
9.	Dr. Michael Pezzopane	michael.pezzopane@ingv.it	INGV-Italy
10.	Prof. BabatundeRabiu	tunderabiu@yahoo.com	NASRDA, Nigeria
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15.	Dr. Thomas Baluku	t.baluku@pu.ac.ke	Pwani University
16.	Prof. H. Oyoko	h.oyoko@pu.ac.ke	Pwani University
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26.	Owuor Collins Otieno	cowuor@tum.ac.ke	Technical University of Mombasa

27.	Anditi Caleb Ochieng	sungacaleb@gmail.com	Maseno University
28.	Dr. Bonface Ndinya	bndinya@mmust.ac.ke	MMUST
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47.	Teshome Dugassa	tdugassa2016@gmail.com	Bule Hora University
48.	Changoma Warrakah	warrakahc87@gmail.com	University of Nairobi

Pictures of Participants in the workshop conference room



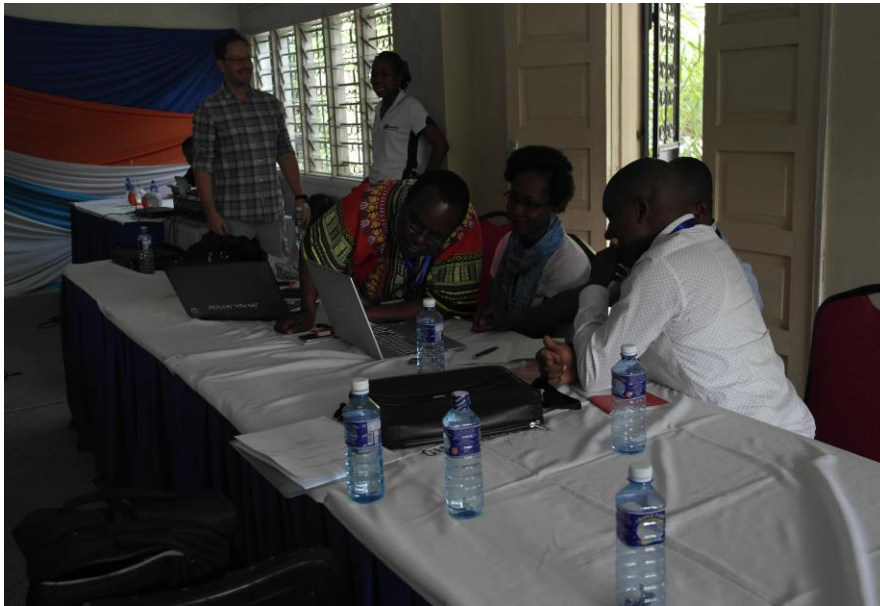
5. Team Work

The objective of the team work was to build capacity on space weather data analysis and interpretation in order to understand the physical process driving the disturbances induced on magnetosphere-ionosphere system by a solar event. Participants were divided into 4 groups and each group was delegated to study one particular event from the point of view of solar wind parameters, geomagnetic indices and total electron content over a particular region chosen by the student themselves.

The lecturers were available during all the period dedicated to the team work to suggest the best way to obtain, analyze and interpret data. At the end of the workshop students from all the groups presented the results of their studies during a dedicated session.



Prof. Christine assisting members of a group on how to accomplish their task



Dr Stefan Lozs assisting members of a group with data interpretation



A lecturer discussing with participants on their projects

6. Programme

The programme as attached below was followed without any fail. There was strict adherence to the times as indicated on the programme. To maximize on the benefits of experts to students, participants were freely allowed to interrupt and ask questions as the lectures continued. Lectures also spared the last fifteen minutes for open discussions. Other lecturers would also raise fundamental questions and subjects that were mainly intended to help the participants gain maximally from the subject of every lecture given.

TIME	ITEM	RESPONSIBILITY
DAY 1	MONDAY - 13TH MAY, 2019	
8:30 – 9:00	Registration	Secretariat
9:00 – 9:30	Welcome Remarks	VC Pwani University. Director, Kenya Space Agency AFIPS representative
10:00-10:15	Space Activities in Broglio Space Centre -Kenya	Prof. Giovanni Laneve
10:15 – 10:30	Status of space science in Africa	Prof. Rabi Babatunde

10:30 – 11:00	TEA/HEALTH BREAK Session Chair: Prof. Paul Baki	
11:00 – 12:30	SUN-EARTH connection and Space weather	Prof. Christine Amory
12:45:13:00	Group work- identification of the groups	moderator
13:00 – 14:00	LUNCH Session Chair: Dr Bonface Ndinya	
14:00 – 15:30	Global Navigation Satellite Systems Technology and Ionospheric Tomography	Dr Zama Katamzi
15:30 – 16:00	TEA/HEALTH BREAK	
16:00 – 17:30	GNSS applications in Remote Sensing and GIS	Dr Halilu Ahmad Shaba
DAY 2	TUESDAY – 14TH MAY, 2019	
	Session Chair: Dr John Bosco	
8:30 – 10:30	HF Propagation and IRI model	Dr Michael Pezzopane
10:30 – 11:00	TEA/HEALTH BREAK	
11:00 – 12:20	Three-dimensional ionospheric electron density reconstruction by GNSS and COSMIC-RO data ingestion into IRI-2016".	Dr Ou Ming
12:20-13:00	Group discussion and project	Moderators/group leaders
13:00 – 14:00	LUNCH Session Chair: Dr Michael Pezzopane	
14:00 – 15:30	TIDs and Techniques used in Monitoring them	Dr. John Bosco Habarulema
15:30 – 16:00	TEA/HEALTH BREAK	
16:00 – 17:30	Ground Induced Current-GIC	Dr. Stefan Lotz
DAY 3	WEDNESDAY – 15TH MAY, 2019	
	Session Chair: Dr. Zama Katamzi	
8:30 – 9:30	Ionospheric Physics	Dr. Claudio Cesaroni
9:30-10:30	Group work discussions	Moderators/group leaders
10:30 – 11:00	TEA/HEALTH BREAK	
11:00 – 13:00	Zonal Electric fields – The Equatorial Electrojet	Prof. Rabi Babatunde

13:00 – 14:00	LUNCH Session Chair: Dr. Claudio Cesaroni	
14:00 – 15:30	Ionospheric Effect on satellite Signals –Scintillation	Dr. Olwendo Joseph
15:30 – 16:00	TEA/HEALTH BREAK	
16:00 – 17:30	GNSS installation	Dr. Claudio Cesaroni
DAY 4	THURSDAY – 16TH MAY, 2019	
	Session Chair: Dr. Stefan Lotz	
8:30-9:00	On the necessity of GPS networking in Africa	Prof. Christine Amory
9:00-10:00	The African Space programme and Agenda 2063	Prof. Paul Baki
10:00-1030	Group work on project	
10:30 – 11:00	TEA/HEALTH BREAK	
11:00-12:30	Group work on project	
12:30 – 14:00	LUNCH	
14:00 – 17:00	Visit to Gede Ruins	
18:00-21:00	Workshop Dinner	
DAY 5	FRIDAY – 17TH MAY, 2019	
	Session Chair: Dr. John Bosco	
8:30 – 10:30	Participants Presentations of group projects	
10:30 – 11:00	TEA/HEALTH BREAK/PHOTO Session Chairs: Directors + Afips + LOC	
11:00 – 13:30	Discussion on Way Forward & Conclusion	
13:00 – 14:00	LUNCH	
14:00 – 15:30	Participants have a free afternoon to plan their travels	
15:30 – 16:00	TEA/HEALTH BREAK	

In the programme was also a laboratory session on installation of GNSS receivers and data analysis. Some of the picture taken during laboratory sessions are shown as being conducted by Dr Claudio Cesaroni.



Laboratory session on installation of GNSS and demonstration with data analysis of GNSS observables

7. Workshop material



Example of badge for participants



Certificate of participation

8. Budget

All the figures are given in terms of Kenya Shillings.

s/N	Item Description	Expenses-Ksh.	Total cost-Ksh.
1	Accommodation of Participants Conference facility Lunch for 50 persons (13 th -17 th May, 2019) Water (all this services were provided at the same facility)	433,840	433,840
2	Accommodation of Experts in a separate facility for the period 12 th to 18 th May 2019	237,770	237,770
3	Workshop Dinner (dinner was made for 50 persons)	125,650	125,650
4	Transportation (Fuel +Per diem for drivers)	103,550	103,550
5	Air Tickets: 7 experts Airtickets for 2-locals (baki +Kimani)	537,750 31,000	619,088

	Airtickets for the KSA board	50,338	
6	Name Tags-60 2 Burners Bags-60 Certificate 60 Stationery	130,000 15,000	145,000
5	Payments were made for the following: 1. Overnight accommodation in Addis Airport for two experts from Abuja at 10,000 each 2. An excursion Gede Ruins -20,000 3. Payment for all those that assisted with preparation on the final week 105,000 4. Honaria to the orgnaizers and co-organizers	20,000 20,000 105, 000 90,000	235,000
6	Administrative and Total running cost in organizing the event	229, 265	229, 265
	Total Expenditure		2,129,163

The contributions that were spend in the event came fom the following sources. All figures are given in kenya shillings:

Kenya Space Agency – 1,500,00

European Association of Geochemistry-469,550

Union Radio Scientifique Internationale, URSI-159, 190

Total contributions received- **2,128,740**