

*(Hybrid format) United Nations/Azerbaijan Workshop on  
the International Space Weather Initiative:  
The Sun, Space Weather and Geosphere*

Organised jointly by

**The United Nations Office for Outer Space Affairs and  
The Baku State University on behalf of the Government of Azerbaijan**

Co-organized and co-sponsored by

**The International Committee on Global Navigation Satellite Systems and  
The National Aeronautics and Space Administration, United States of America**

Hosted by

**The Baku State University**

**31 October – 4 November 2022**

**Baku, Azerbaijan**

**PROGRAMME**

*Venue: Fairmont Hotel Baku*

## **Programme Committee**

Elchin Babayev	Co-chair, Baku State University, Azerbaijan
Sharafat Gadimova	Co-chair, United Nations Office for Outer Space Affairs (UNOOSA), Austria
Natchimuthukonar Gopalswamy	Co-chair, National Aeronautics and Space Administration (NASA), United States of America
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Keith Groves	Boston College, United States of America
Kusano Kanya	Nagoya University, Japan
Maria Graciela Molina	National University of Tucumán (UNT), Argentina
Bruno Nava	The Abdus Salam International Centre for Theoretical Physics (ICTP), Italy
Akeem Babatunde Rabi	National Space Research and Development Agency (NASRDA), Nigeria
Nandita Srivastava	Physical Research Laboratory, India
Endawoke Yizengaw	The Aerospace Corporation, United States of America

## **Local Organizing Committee**

Huseyn Mammadov	Baku State University, Azerbaijan
Mahir Pirguliyev	Baku State University, Azerbaijan
Jahan Gani-zade	Baku State University, Azerbaijan



**The International Space Weather Initiative (ISWI) is a programme of international cooperation to advance space weather science by a combination of instrument deployment, analysis of space weather data from these instruments in conjunction with other data and the communication of such results.**

**Monday, 31 October 2022**

*Time: AZT (Baku, Azerbaijan) Local Time (UTC/GMT + 4 hours)*

09:00 - 10:00 *Registration (Fairmont Hotel Baku, Flame Towers 1A, Mehdi Huseyn street, Baku)*

**10:00 – 11:00 Opening and Welcome Remarks**

*Elchin BABAYEV, Baku State University, Azerbaijan*

*Emin AMRULLAYEV, Ministry of Science and Education, Azerbaijan*

*Roald SAGDEEV, Maryland University, United States of America*

*Indira HAJIYEVA, Ministry of Youth and Sport, Azerbaijan*

*Samaddin ASADOV, Space Agency (Azercosmos), Azerbaijan*

*Luc ST-PIERRE, United Nations Office for Outer Space Affairs*

*Sharafat GADIMOVA, International Committee on Global Navigation Satellite Systems Executive Secretariat*

*Natchimuthukonar GOPALSWAMY, National Aeronautics and Space Administration, United States of America*

*Namig JALILOV, Shamakhy Astrophysical Observatory, Azerbaijan*

11:00 – 11:20 *Coffee Break*

**11:20 Keynote addresses: Setting the tone**

11:20 *Protecting the planet from space threats, Roald SAGDEEV, United States of America*

11:45 *The sun as the primary source of space weather, Nat GOPALSWAMY, United States of America*

**12:10 – 13:30 Session 1: Space Weather Instrumentation and Data**

*Chairperson: Andrzej KRANKOWSKI, Poland*

*Rapporteur: Ajesh ASOKAN PILLAI, India*

12:10 *First joint STIX and LOFAR observations of a flare event on 06 June 2020, Malte BRÖSE, Germany*

12:30 *Review of the D Region study using the AWESOME VLF receiver in Algeria, Samir NAIT AMOR, Algeria*

12:50 *Microwave observations of the sun with VIRAC RT-32 radio telescope, Dmitrijs BEZRUKOV, Latvia (virtual)*

13:10 *Questions and discussions*

13:30 – 14:40 *Lunch break*

**14:40 – 16:00 Session 2: Space Weather Modelling**

*Chairperson: Rustam RUSTAMOV, Azerbaijan*

*Rapporteur: Patrick ESSIEN, Ghana*

- 14:40 Space weather with the virtual space weather modelling centre and recent coronal modelling developments, *Michaela BRCHNELOVA, Belgium*
- 15:00 Icarus: a new highly optimized heliospheric model for forecasting purposes, *Tinatin BARATASHVILI, Belgium*
- 15:20 Development of a whole atmosphere model with a non-hydrostatic dynamical core, *Soudeh KAMALI, United States of America*
- 15:40 Using B-splines to model Total Electron Content derived from radio occultation measurements by cosmic satellites over African region, *Patrick MUNGUFENI, Uganda*

16:00 – 16:20 *Coffee Break*

**16:20 – 18:00 Session 2: Space Weather Modelling (continued)**

*Chairperson: Malte BRÖSE, Germany*

*Rapporteur: Jesús Roberto ROMERO RUIZ, Mexico*

- 16:20 Space Weather studies with the NeQuick ionospheric electron density model, *Bruno NAVA, Italy (virtual)*
- 16:40 Operational forecasting of ground effects using the Gorgon MHD Model, *Mike HEYNS, United Kingdom*
- 17:00 Employing advanced coronal mass ejection models in EUHFORIA for space weather forecasting, *Anwasha MAHARANA, Belgium*
- 17:20 Ionospheric models comparison of single-frequency GPS positioning in Algeria, *Lahouaria TABTI, Algeria (virtual)*
- 17:40 Detection, analysis and forecasting of sunspot groups (active regions) using advanced machine learning, *Muhammad Ali ISMAIL, Pakistan*

18:00 *Adjourn*

18:30 – 20:30 *Welcome Reception*

**Tuesday, 1 November 2022**

**09:00 – 11:00 Session 3: Space Weather Research**

*Chairperson: Valeri NAKARIÁKOV, United Kingdom*

*Rapporteur: Saurav GAUTAM, Nepal*

- 09:00 Analysis of geomagnetic disturbances for earthquake precursor detection, *Nur Fatin Irdina ZULHAMIDI, Malaysia*
- 09:20 Evidence of impact of earthquakes on geomagnetic and ionospheric activity during spotless sun, *Tamara GULYAEVA, Russian Federation (virtual)*
- 09:40 Design and assembly of a COTS CubeSat for space weather applications, *M. Chantale DAMAS, United States of America*
- 10:00 Temporal and periodic variations of the solar flare index during the last four solar cycles and their association with selected geomagnetic activity parameters, *Ali KILCIK, Türkiye*
- 10:20 Search and identification of precursors of solar flares based on microwave observations of active regions, *Elena POPOVA, Chile, Dmitrijs Bezrukovs, Latvia, Vladislavs Bezrukovs, Latvia, Sergei Piskunov, Latvia, Anatoli I. Popov, Latvia*

10:40	Heliospheric and atmospheric parameters affecting cosmic rays flux measured at Belgrade muon station, <i>Nikola VESELINOVIĆ, Serbia (virtual)</i>
11:00 - 11:30	<i>Coffee Break</i>
<b>11:30 – 12:50</b>	<b>Session 3: Space Weather Research (continued)</b>
	<i>Chairperson: Renato FILJAR, Croatia</i> <i>Rapporteur: Ahmed Ali HAMEED, Iraq</i>
11:30	Comparison of IRI simulated top-side ionosphere with the in situ satellite observations, <i>Imran GIRACH, India (virtual)</i>
11:50	Plasma irregularities over low-mid latitudes during intense geomagnetic storms of solar cycle 24, <i>Nadia IMTIAZ, Pakistan</i>
12:10	A statistical analysis of geomagnetic storms and their effect on Earth atmosphere currents, <i>Raja Adibah RAJA HALIM SHAH, Malaysia</i>
12:30	<i>Questions and discussions</i>
12:50 - 14:00	<i>Lunch Break</i>
<b>14:00 – 15:40</b>	<b>Session 4: Solar Physics</b>
	<i>Chairperson: Raja Adibah RAJA HALIM SHAH, Malaysia</i> <i>Rapporteur: Heba S. MOHAMED, Egypt</i>
14:00	The limits of the solar events amplitudes: the occurrence of strong flares from the point of view of the underlying dynamo mechanism, <i>Elena POPOVA, Chile, Roald Sagdeev, United States of America, Mikhail Malkov, United States of America, Dmitrijs Bezrukovs, Latvia, Vladislavs Bezrukovs, Latvia, Sergei Piskunov, Latvia, Anatoli I. Popov, Latvia</i>
14:20	Nonlinear self-deformation of unidirectional surface Alfvén waves and aspects of uniturbulence, <i>Rajab ISMAYILLI, Tom Van Doorselaere, Norbert Magyar, Belgium</i>
14:40	On the evolution of dynamical complexities in space environment over four solar cycles, <i>Akeem Babatunde RABIU, Nigeria</i>
15:00	Local Anisotropy in Parker's solar dynamo model, <i>Ramin ALLAHVERDIYEV, Azerbaijan, Egor Yushkov, Russian Federation</i>
15:20	<i>Questions and discussions</i>
15:40 - 16:00	<i>Coffee Break</i>
<b>16:00 – 17:40</b>	<b>Session 4: Solar Physics (continued)</b>
	<i>Chairperson: Babatunde RABIU, Nigeria</i> <i>Rapporteur: Teshome DUGASSA, Ethiopia</i>
16:00	Analysis of small-scale magnetic field generation in MHD-Shell model, <i>Ilyas ABUSHZADA, Azerbaijan, Egor Yushkov and Dmitriy Sokoloff, Russian Federation</i>
16:20	Study of solar elemental abundances evolution during solar flares using satellite-based soft x-ray measurements, <i>Asif M. MANDAYAPURAM, India (virtual)</i>
16:40	Diagnostics of the pre-flare and pre-eruption magnetic field in the solar corona, <i>Valeri NAKARIAKOV, United Kingdom</i>

- 17:00 Spectral transfer of magnetic helicity in short-correlated plasma turbulence, *Egor YUSHKOV, Dmitry Sokoloff, Russian Federation*
- 17:20 Kelvin-Helmholtz MHD instabilities of supersonic shear layers with heat flux in anisotropic space plasmas, *Namig JALILOV, Azerbaijan, Rajab Ismayilli, Belgium*
- 17:40 *Adjourn*

### Wednesday, 2 November 2022

#### 09:00 – 10:20 Session 5: Magnetosphere-Ionosphere-Thermosphere Coupling

*Chairperson: Patrick MUNGUFENI, Uganda*  
*Rapporteur: Abdou Lahat DIENG, Senegal*

- 09:00 Equatorial and low-latitude ionospheric TEC response to CIR-driven geomagnetic storms at different longitude sectors, *Teshome DUGASSA, Ethiopia*
- 09:20 Ionospheric plasma fluctuation response to space weather events in September 2017, August 2018, and March 2015 (St Patrick's Day) over the equatorial and low latitude region, *Patrick ESSIEN, Ghana*
- 09:40 On the response of equatorial thermosphere-Ionosphere system to the annular solar eclipse on 26 December 2019: Preliminary results, *Ajesh ASOKAN PILLAI, India*
- 10:00 Comparison between the position central angle of coronal mass ejections (CME) and its angular width for high and low solar activity and effects on magnetosphere, *Ahmed Ali HAMEED, Iraq*

10:20 – 10:50 *Coffee Break*

#### 10:50 – 12:30 Session 6: Space Weather Effects

*Chairperson: Nadia IMTIAZ, Pakistan*  
*Rapporteur: Fatin Irdina ZULHAMIDI, Malaysia*

- 10:50 Statistical learning TEC predictive model for GNSS ionospheric delay mitigation in self-adaptive environment - aware SDR GNSS position estimation algorithm, *Renato FILJAR, Croatia*
- 11:10 Total electron content estimation and comparison using multi-GNSS constellations at Pashchimanchal Campus, *Saurav GAUTAM, Nepal*
- 11:30 Current performance of IGS ionospheric products and future improvements, *Andrzej KRANKOWSKI, Poland*
- 11:50 Cross wavelet analyses of convection electric field and excess equatorial ionospheric TEC, *Rajat ACHARYA, India (virtual)*
- 12:10 The ionospheric response to geomagnetic storms in Asia using the GNSS network, *Heba S. MOHAMED, Egypt*

12:30 -13:30 *Lunch Break*

#### 14:00 – 18:00 Technical Tour - AZERCOSMOS

### Thursday, 3 November 2022

#### 09:00 – 10:40 Session 7: National/Regional Space Weather Programs

*Chairperson: Amira SHIMEIS, Egypt*

*Rapporteur: Mike HEYNS, United Kingdom*

09:00 Comparison of the daytime variability of equatorial electrojet and vertical drift velocity inferred from ground-based magnetometers and C/NOFS observations in Africa, *Honoré MESSANGA ETOUNDI, Cameroon*

09:20 Monitoring the Impact of Solar Event along Europe –African West Chain by GIM/CODG maps, *Amira SHIMEIS, Egypt*

09:40 Public policies and civil protection in space weather, *Jesús Roberto ROMERO RUIZ, Mexico*

10:00 *Questions and discussions*

10:40 – 11:00 *Coffee Break*

**11:00 – 13:00 Session 8: Space Weather Case Studies, Outreach and Education**

*Chairperson: Luc ST-PIERRE, Office for Outer Space Affairs*

*Rapporteur: Honoré MESSANGA ETOUNDI, Cameroon*

11:20 Geomagnetically induced currents: The case of Kenyan electric power grid, *George Erick OMONDI, Kenya*

11:40 Estimating zonal Ekman transport along coastal Senegal during passage of hurricane Fred, 30–31 August 2015, *Abdou Lahat DIENG, Senegal*

12:00 Investigation of the relationship of electron flux enhancements with interplanetary and geophysical characteristics, *Botakoz SEIFULLINA, Kazakhstan*

12:20 The contribution of CRASTE-LF to capacity building in space science and technology in Africa, *Anas EMRAN, Morocco*

12:40 Low-cost receiver for space weather, *Sharafat GADIMOVA, Office for Outer Space Affairs*

13:00 – 14:30 *Lunch Break*

14:30 Study and Monitoring of the Earth Magnetic Field Using Fasat Charle’s magnetometer, *Herman TELLO, Chile (virtual)*

14:50 The MADRIGAL database, *Anthea COSTER, United States of America (virtual)*

15:10 The effects of ionospheric disturbances on GNSS signals during solar cycle 24, *Eldaw MOHAMMED ABBAKER, Sudan*

**15:30 Discussion Session**

- *Regional cooperation to advance the space weather science.*
- *Capacity-building and technical guidance to be provided to countries that wished to be engaged in space weather science and education.*
- *Issues and concerns of application, requirements of implementing, possibilities of success, mechanisms and resources of implementing.*

16:00 – 16:20 *Coffee Break*

**16:00 Discussion Session (continued)**

- *Discuss plans, framework for a mechanism of regional cooperation; follow-up projects and initiatives.*

17:00 *Adjourn*

**Friday, 4 November 2022**

**10:00 – 11:20 Session 8: Space Weather Case Studies, Outreach and Education (continued)**

*Chairperson: Ali KILCIK, Türkiye*

*Rapporteur: George Erick OMONDI, Kenya*

10:00 Space Science and Technology: Diversity and Sustainability, *Rustam RUSTAMOV, Azerbaijan*

10:20 Geomagnetic disturbances and psychophysiological characteristics in humans, *Aysel Allakhverdiyeva, Ali Allakhverdiyev, Elchin BABAYEV Azerbaijan*

10:40 Space Weather in Satellite Operations, *Safura MIRZAYEVA, Azerbaijan*

11:00 High-resolution remote sensing satellite data and space weather forecasting models, *Sevda IBRAHIMOVA, Azerbaijan*

*11:20 – 11:40 Coffee Break*

**11:40 Wrap-up Session**

- Summary reports of presentation sessions.
- Summary report of discussion session.

*13:00 – 14:00 Lunch Break*

**14:00 Concluding Remarks**

- *Luc ST-PIERRE, United Nations Office for Outer Space Affairs*
- *Elchin BABAYEV, Baku State University*

15:00 *Adjourn*