Committee: World Meteorological Organization (WMO)

Issue: Space weather: impact on the climate and the relevant technologies.

Student Officer: Sofia-Maria Kapetanaki

Position: President

PERSONAL INTRODUCTION

Dear delegates,

My name is Sofia Kapetanaki and it is my utmost honor to serve as the president of the World Meteorological Organization (WMO) in the 8th ATSMUN. I am 16 years old, I want to study Shipping and I will be attending the 11th Grade of Platon School by the time of the Conference. My official MUN experience started in 9th grade and since then it has truly grown. I have attended 9 conferences and I have got various knowledge for many things. I guarantee you that you will not regret your decision to participate in MUNs as it is an activity full of joy.

The following study guide is to guide you on the issue of space weather which is a critical issue that is very interesting to learn about. It will provide you with the appropriate understanding of the topic, nevertheless, you are expected to do research so as to have a clear image of your country's position and policy. Should you have any questions on the topic or need any clarifications do not hesitate to contact me at kapetanakisophia7@gmail.com.

I look forward to seeing you all at the conference, to having a fruitful debate and making unforgettable memories!

Best Regards,

Sofia Kapetanaki

INTRODUCTION

Space weather is an important modern example of a risk that needs good communication to wider audiences, especially when it can have severe adverse impacts on human activities. As the name suggests, "space weather" has its origins in space and can often be traced back to the physical processes of the sun. Violent eruptions on the Sun's surface produce huge clouds of magnetized plasma and/or high-energy particle radiation, which can then travel through interplanetary space and surround Earth. Space weather effects can range from damage to satellites caused by charged particles to disruption of Earth's power grids during geomagnetic storms, radio dimming on the paths of transpolar aircraft, or disruption of satellite positioning systems. Monitoring space weather is becoming increasingly important, as its study and applications with the increasing use of space in daily life for communications, observation and navigation.

Other natural hazards such as strong winds, extreme temperatures, flooding, and objects falling from the sky can be seen and perceived by human senses and recognized as a serious threat to life and property. But the only direct manifestation of space weather is the aurora in the night sky and the natural response of man is to see beauty rather than danger. Only science allows us to see the aurora borealis as a result of solar eruptions hitting Earth and driving, a cycle of plasma physics processes within the magnetosphere.

The risks associated with space weather have become more serious as we have become more dependent on advanced technologies, and the severity of the risk has been reinforced by reports of adverse effects of major space weather events, especially in 1967, 1972, 1982, 1989, 2000 and 2003. Those events have helped improve our understanding of space weather and build a space weather community of experts in science, technology, economics and policy making. However, complacency remains a major challenge for this community to address, especially after more than a decade without a major incident.[1]

DEFINITION OF KEY TERMS

Space Weather

Space weather describes changing environmental conditions in near-Earth space. Magnetic fields, radiation, particles and matter, which have been ejected from the sun, can interact with the Earth’s upper atmosphere and surrounding magnetic field to produce a variety of effects. [2]

Coronal Mass Ejections (CMEs)

Coronal Mass Ejections (CMEs) are large expulsions of plasma and magnetic field from the Sun's corona. They can eject billions of tons of coronal material and carry an

[1] Hapgood, Mike. *IOPscience*, 1 Jan. 2017, https://iopscience.iop.org/book/978-0-7503-1372-8/chapter/bk978-0-7503-1372-8ch1

[2] “Space Weather.” *Met Office*, https://www.metoffice.gov.uk/weather/specialist-forecasts/space-weather.

embedded magnetic field (frozen in flux) that is stronger than the background solar wind interplanetary magnetic field (IMF) strength. [3]

Plasma

CMEs (coronal mass ejections) that are made up of magnetized solar articles.

European Space Agency (ESA)

The European Space Agency, provides Europe's gateway to space. ESA is an intergovernmental organization, created in 1975, with the charge to shape the development of Europe's space capability and ensure that investment in space delivers benefits to the citizens of Europe and the world.[4]

The International Space Environment Service (ISES)

A collaborative network of space weather service-providing organizations around the globe. Our mission is to improve, to coordinate, and to deliver operational space weather services. ISES is organized and operated for the benefit of the international space weather user community. [5]

Aurora

The Aurora Borealis (Northern Lights) and Aurora Australis (Southern Lights) are the result of electrons colliding with the upper reaches of Earth’s atmosphere. (Protons cause faint and diffuse aurora, usually not easily visible to the human eye.)[6]

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[3] “Coronal Mass Ejections.” *Coronal Mass Ejections | NOAA / NWS Space Weather Prediction Center*, https://www.swpc.noaa.gov/phenomena/coronal-mass-ejections.
[4] *Federation, International Astronautical. “European Space Agency (ESA).” IAF, https://www.iafastro.org/membership/all-members/european-space-agency-esa.html.*
[5] “Ise’s.” *ISES*, http://www.spaceweather.org/.

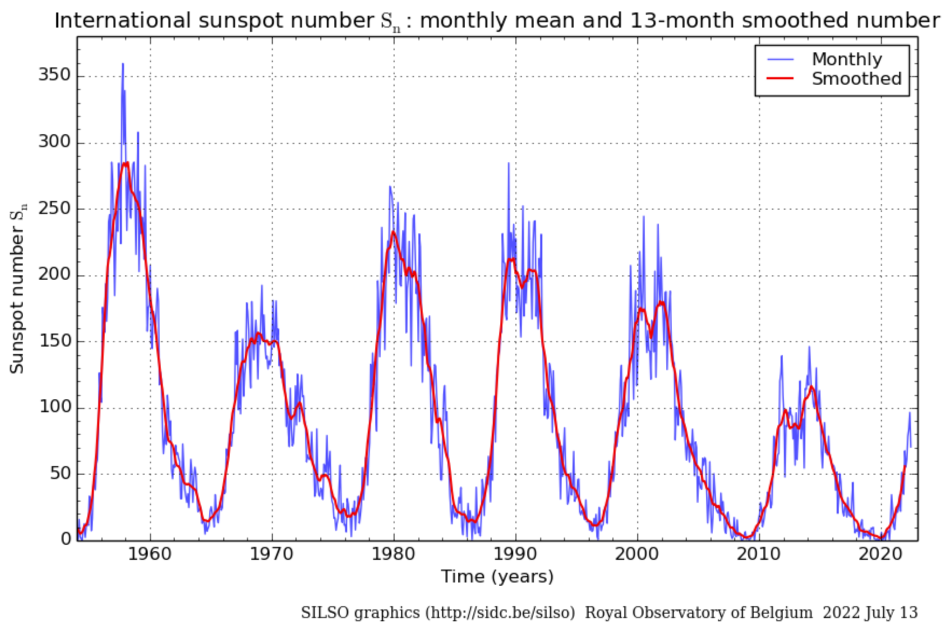
[6] “Aurora.” *Aurora | NOAA / NWS Space Weather Prediction Center*, https://www.swpc.noaa.gov/phenomena/aurora.

BACKGROUND INFORMATION

Space weather is caused by changes in the speed or density of the solar wind. The flow of solar wind affects the Earth's magnetic field in ways that can change its strength and direction. This activity is caused by fluctuations in the flow of solar wind, and it happens in various places around the Earth. Geomagnetic disturbances are sudden changes in the Earth's magnetic field. Solar Radiation storms can make several changes on the earth's atmosphere and that will cause difficulties on satellite signals reaching the ground. For example, GPS will be affected and other magnetic changes will occur.

Historical Background

Space weather is noticed substantially by its goods on Earth. After a great solar flare in 1859, telegraph drivers discovered that currents from the violent sunup borealis was flowing through their systems, causing their telegraph keys to melt and stick in position. During



World War II, the new invention of radar failed whenever the space weather exertion was high. Comet tails that twisted and pointed way from the sun showed that a solar wind, a part of space weather, was always blowing out through the solar system. When police buses in San Francisco tried to talk to their dispatchers, dispatchers in Minneapolis answered.[7]

Figure 1: "Space Weather." *Space Weather Data Archive - Space Weather*, https://swe.ssa.esa.int/gen_arv.

[7] *The Northern Light, A. Brekke, A. Egeland, Springer-Verlag, New York. 1983*

Space Weather Impacts on Climate

The most important impact the Sun has on Earth is from the brightness or irradiance of the Sun itself. The Sun produces energy in the form of photons of light. The variability of the Sun's output is wavelength dependent; different wavelengths have higher variability than others. Most of the energy from the Sun is emitted in the visible wavelengths (approximately 400 – 800 nanometers (nm)). The output from the sun in these wavelengths is nearly constant and changes by only one part in a thousand (0.1%) over the course of the 11-year solar cycle. At Ultraviolet or UV wavelengths (120 – 400 nm), the solar irradiance variability is larger over the course of the solar cycle, with changes up to 15%. This has a significant impact on the absorption of energy by ozone and in the stratosphere. At shorter wavelengths, like the Extreme Ultraviolet (EUV), the Sun changes by 30% - 300% over very short timescales (i.e., minutes). These wavelengths are absorbed in the upper atmosphere so they have minimal impact on the climate of Earth. At the other end of the light spectrum, at Infrared (IR) wavelengths (800 – 10,000 nm), the Sun is very stable and only changes by a percent or less over the solar cycle. [8]

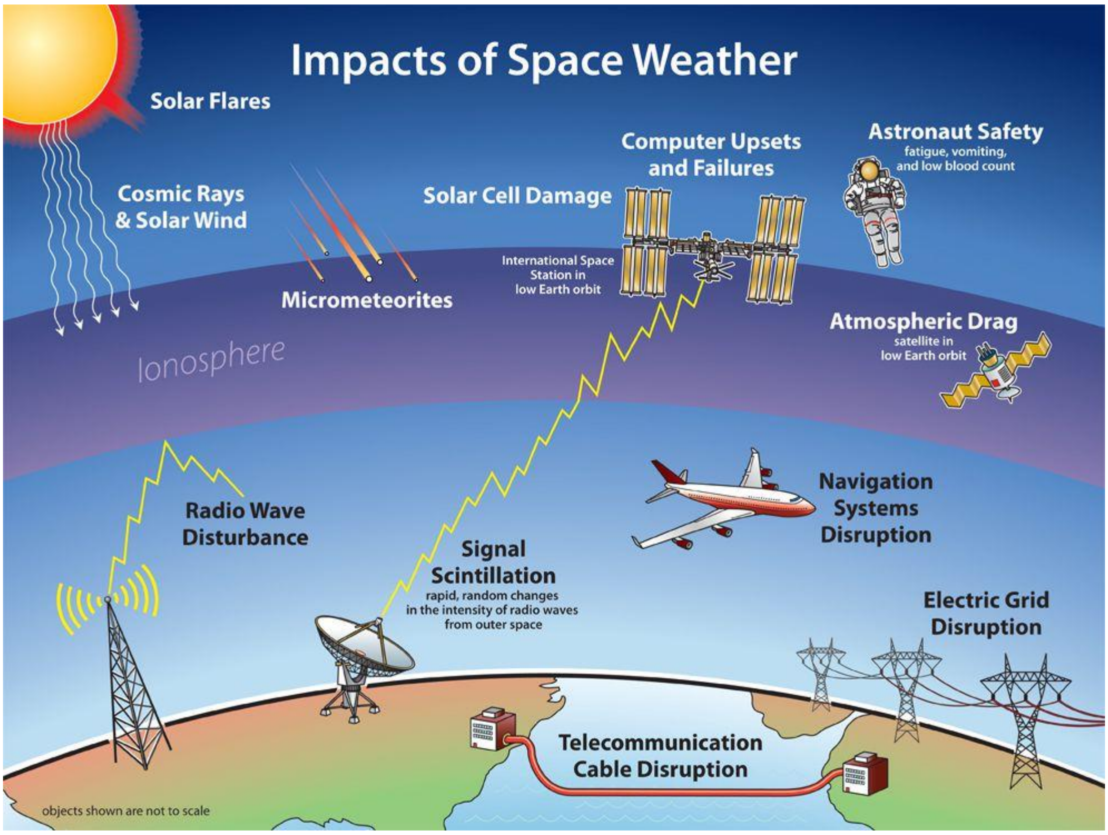


Figure 2: National Geographic Society. "Explore the Photo Ark." *National Geographic Society*, https://www.nationalgeographic.org/projects/photo-ark/explore/.

[8] "Space Weather Impacts on Climate." *Space Weather Impacts On Climate | NOAA / NWS Space Weather Prediction Center*, https://www.swpc.noaa.gov/impacts/space-weather-impacts-climate . Figure

Space Weather and GPS Systems

The use of single and binary frequency satellite radio navigation systems, like the Global Positioning System (GPS), has grown dramatically in the last decade. GPS receivers are now in nearly every cell phone and in numerous motorcars, exchanges, and any outfit that moves and needs perfection position measures. High perfection binary frequency GPS systems are used for husbandry, construction, disquisition, surveying, snow junking and numerous other operations critical to a functional society. Other satellite navigation systems in route include the European Galileo system and the Russian GLONASS system. There are several ways in which space weather impacts GPS function. GPS radio signals travel from the satellite to the receiver on the ground, passing through the Earth's ionosphere[9]. The charged tube of the ionosphere bends the path of the GPS radio signal analogous to the way a lens bends the path of light. In the absence of space weather, GPS systems compensate for the "average" or "quiet ionosphere, using a model to calculate its effect on the delicacy of the positioning information. But when the ionosphere is disturbed by a space weather event, the models are no longer accurate and the receivers are unfit to calculate an accurate position grounded on the satellites above.

In calm conditions, single frequency GPS systems can give position information with a delicacy of a cadence or lower. During a severe space weather storm, these crimes can increase to knockouts of measures or further. Binary frequency GPS systems can give position information accurate to a many centimeter. In this case the two different GPS signals are used to more characterize the ionosphere and remove its impact on the position computation. But when the ionosphere becomes largely perturbed, the GPS receiver cannot lock on the satellite signal and position information becomes inaccurate.

Geomagnetic storms produce large disturbances in the ionosphere. The currents and energy introduced by a geomagnetic storm enhance the ionosphere and increase the total height- integrated number of ionospheric electrons, or the Total Electron Count (TEC). GPS systems cannot rightly model this dynamic improvement and crimes are introduced into

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[9] "Space Weather and GPS Systems." *Space Weather and GPS Systems | NOAA / NWS Space Weather Prediction Center*, https://www.swpc.noaa.gov/impacts/space-weather-and-gps-systems.

the position computations. This generally occurs at high authorizations, though major storms can produce large TEC advancements atmid-latitudes as well.

Near the Earth’s glamorous ambit there are current systems and electric fields that produce precariousness in the ionosphere. The precariousness is most severe just after evening. This lower scale (knockouts of kilometers) precariousness, or bubbles, beget GPS signals to “scintillate”, much like swells on the face of a body of water will disrupt and scatter the path of light as it passes through them. Near the ambit, binary frequency GPS systems frequently lose their cinch due to “ionospheric scintillation”. Ionospheric scintillations aren't associated with any kind of space weather storm, but are simply part of the natural day- night cycle of the tropical ionosphere.

Aurora

Aurora comes in several different shapes. The auroral forms are frequently made of numerous altitudinous shafts that look much like a curtain made of crowds of cloth. During the evening, these shafts can form bends that stretch from horizon to horizon. Late in the evening, near night, the bends frequently begin to twist and sway, just as if a wind was blowing on the curtains of light. At some point, the bends may expand to fill the whole sky, moving fleetly and getting veritably bright. This is the peak of what's called an auroral substorm. Also, in the early morning the auroral forms can take on a further pall- suchlike appearance. These verbose patches frequently blink on and off constantly for hours, also they vanish as the sun rises in the east. The stylish place to observe the aurora is under a round shaped region between the north and south authorizations of about 60 and 75 degrees. At these polar authorizations, the sunup can be observed further than half of the nights of a given time.

When space rainfall exertion increases and further frequent and larger storms and substorms do, the sunup extends equatorward. During large events, the aurora can be observed as far south as the US, Europe, and Asia. During veritably large events, the aurora can be observed indeed further from the poles. Of course, to observe the aurora, the skies must be clear and free of shadows. It must also be dark so during the summer months at auroral authorizations, the night sun prevents auroral compliances.

Figure 3: "Aurora Borealis Alaska Pictures, Images and Stock Photos." *IStock*, https://www.istockphoto.com/photos/aurora-borealis-alaska.

MAJOR COUNTRIES AND ORGANISATIONS INVOLVED

United States of America (NASA/USSF)

With a budget nearly twice that of the coming-loftiest agency, the United States' National Aeronautics and Space Administration (NASA) is fluently the most fat and active space agency in the world. Thanks to NASA, America was the alternate country to shoot humans to space, the first country to land humans on the moon, and one of the major contributors to the International Space Station, or ISS. Fresh NASA achievements include the space shuttle program, the Voyager and Mariner examinations, and the Mars rovers Curiosity and Perseverance.

Russia (ROSCOSMOS/SSSR)

Russia has employed two different space agencies. First came the Kosmicheskaya programma SSSR, which was active from 1955 until the dissolution of the Soviet Union in 1991. The SSSR enabled Russia to become the first country on Earth to launch a space charge, as well as the first country to shoot humans to space — cosmonaut Yuri Gagarin completed a route of Earth on 12 April 1961, just weeks before astronaut Alan Shephard became the first American in space on 5 May of the same time.

China (CNSA/CMSA)

China's programme is created from two sister agencies: The China National Space Administration (CNSA) and also the smaller China Manned Space Agency (CMSA). China is the third country to send humans into space independently, following the U. S. and Russia. In 1970, China succeeded in launching its first communication satellite, Dong Fang Hong I. China is currently the third-largest space power within the world. In 2019, China's Chang'e 4 probe became the primary to land on the dark side of the moon. In May 2021, CNSA's Tianwen-1 mission succeeded in landing an enquiry on the surface of Mars, making China the second country to the touch down on the Red Planet. China, too, includes a military space force, during this case referred to as the People's Liberation Army Strategic Support Force (PLASSF).

Italy (ASI)

The Italian Space Agency, or Agenzia Spaziale Italiana (ASI), is charged with managing Italy's space exploration activities. It coordinates with many other space agencies, like the Italian Aerospace Research Centre (CIRA) and therefore the ESA. Its operations include the Cassini-Huygens mission to review Saturn (a venture with NASA, ESA, and ASI), contributions to the ESA's Mars Express and Venus Express missions, and Rosetta, an ESA-led mission that landed a groundwork on a comet in 2014.

India (ISRO)

The Indian Space Research Organisation could be a research institute for space and allied sciences supported by the Department of Space, Government of India. One in every of only a couple of agencies with the potential to launch satellites and extraterrestrial missions, the institute has made India a number one contributor to space-related research and development. India's first satellite, Aryabhata, was launched by the Union of Soviet Socialist Republics in 1975, and also the country launched a satellite into space on its own for the primary time in 1980. Since that point, India has launched probes to the moon and Mars similarly as establishing one amongst the world's largest fleets of navigational satellites.

Japan (JAXA)

Japan is one of the world's leading space powers. Its national aerospace research and development activities are controlled by the Japan Aerospace Exploration Agency (JAXA), which was formed in 2003 by the merger of three smaller agencies: Japan's Institute of Space and Astronautical Science (ISAS), the National Aerospace Laboratory of Japan (NAL), and National Space Development Agency of Japan (NASDA). Japan launched its first satellite, Osumi, into space in February 1970, becoming the fourth country to possess indigenous satellite launch capability. It currently operates a fleet of meteorological, communication, astronomical, and earth observation satellites.

France (CNES)

In addition to hosting the EU Space Agency's global headquarters in Paris, France also employs its own national space agency, the National Centre for Space Studies, officially referred to as the Centre National d'études Spatiales (CNES). One amongst Europe's largest national space agencies, CNES is additionally the third-oldest space agency within the world, trailing only NASA and Russia's SSSR/ROSCOSMOS. CNES is currently working with Germany's DLR space agency to develop an atomic number 8 and methane-powered reusable launch vehicle. CNES have five main pillars: access to space, civil applications of space, sustainable development, science and technology research, and security and defense.

Brazil (AEB)

The Agência Espacial Brasileira (AEB), called the Brazilian Space Agency to English speakers, launched its first rocket into space in 2004. Together with over 20 additional countries, Brazil could be a partner in NASA's Artemis program, which plans to send a manned spaceflight back to the moon by 2025.

Iran (ISA)

The Iranian Space Agency was established in 2004, with the stated goals of constructing policies that promote peaceful use of space, the deployment and use of research satellites, and general regional and international cooperation in matters regarding space. The program wasn't popular internationally and was suspended from 2015 to 2021, but is currently operational again. Its two most up-to-date successful launches have each deployed a Noor military satellite into orbit.

Israel (ISA)

The Israel Space Agency (Sokhnut heKhalal haYisraelit) was founded in 1983, with the intent that it would replace Israel's previous space agency, the National Committee for Space Research. As of mid-2022, Israel is the smallest country to possess an area agency, in addition to office with indigenous launch capability. Israel launched its first satellite in 1988. The ISA is an enthusiastic collaborator and has signed cooperation agreements with fellow space agencies including NASA, CNES, the Canadian CSA, ISRO, ASI, Roscosmos, and more.

Kenya (KSA)

The Kenya Space Agency was founded in 2017, replacing the National Space Secretariat as the country's leading space agency. Operating under the core values of excellence, professionalism, integrity, and commitment, the KSA is tasked with leveraging space research and technology (especially satellites) to enhance six main areas: Agriculture, Disaster Management, Security, Communication, Urban Planning, and Resource Management.

South Korea (KARI/KASI)

South Korea's Korean Aerospace Research Institute (KARI) was founded in 1989 and is targeted upon improving the lives of the nation's people via exploration, technological advancement, and therefore the sharing of discoveries and data within the fields of space science and technology, additionally to the deployment of several weather and communications satellites, KARI is currently planning the Korea Pathfinder Lunar Rover (KPLO), likewise as a specialized GPS-style system.

DPRK (NADA)

This secretive country's space agency, the National Aerospace Development Administration (NADA), has attempted a minimum of six satellite launches and succeeded a minimum of twice. Several additional programs are announced, including missions to launch lunar probes, explore Mars, participate in manned spaceflights, and develop an area shuttle-like reusable launch vehicle.

World Meteorological Organization (WMO)

In 2008, a report on the implicit compass, cost and benefit of a WMO exertion in support of transnational collaboration of Space Weather services, was prepared by the WMO Space Programme.

A Four- time Plan for WMO's Collaboration of Space Weather Conditioning 2020-2023(FYP2020- 23) was drafted by IPT- SWeISS and approved by the Eighteenth World Meteorological Congress (Cg- 18) in 2019. The perpetration of space rainfall services and operations aligned with the FYP2020- 23 is anticipated to give significant benefits to WMO Members, in terms of more precise and bettered compliances.

The International Space Environment Service (ISES)

ISES has been the primary association engaged in the transnational collaboration of space rainfall services since 1962. ISES members partake data and vaticinations and give space rainfall services to druggies in their regions. ISES provides a broad range of services, including vaticinations, warnings, and cautions of solar, magnetospheric, and ionospheric conditions; space terrain data; client- concentrated event analyses; and long- range prognostications of the solar cycle.

European Space Agency (ESA)

Europe formerly has a wealth of moxie and means furnishing high- quality scientific compliances, results and models in the sphere of space rainfall, together with a growing number of space- rainfall' products'- reused, usable data which are being used by guests across Europe in assiduity, government and exploration institutes.

ESA's Space Weather (SWE) Service Network builds forcefully upon this foundation to apply an allied European Space Weather service provision conception, avoiding duplication and icing. These being means and coffers play a crucial part in Europe's new coordinated Space Weather Service provision system.

TIMELINE OF EVENTS

Date	Description of Event
1733	Measuring the height of Aurora
1770	Establishing the connection between Aurora and Magnetic Storms
July 7 1860	CMEs first spotted during a total solar eclipse.
July 29 1958	The U.S. Congress passes legislation establishing the National Aeronautics and Space Administration (NASA), a civilian agency responsible for coordinating America's activities in space[10].
January 1959	Solar Wind discovered

[10] "NASA Created." *History.com*, A&E Television Networks, 24 Nov. 2009, https://www.history.com/this-day-in-history/nasa-created.

March 13 1989	The Quebec Blackout
December 4 2005	Supercomputer Model of Earth's Magnetic Reversals
June 18-27 2008	The WMO Executive Council (EC- LX) noted the considerable impact of Space Weather on meteorological structure and important mortal conditioning. It conceded the implicit community between meteorological and Space Weather services to functional druggies. The Council agreed that WMO should support transnational collaboration of Space Weather conditioning and prompting WMO Members to give corresponding coffers through secondments and Trust Fund donations.
May 3 2010	WMO established the Interprogramme Coordination Team on Space Weather (ICTSW) with an accreditation to support Space Weather observation, data exchange, product and services delivery, and functional operations. As of May 2016, ICTSW involves experts from 26 different countries and 7 transnational associations.
May 16 - June 3 2011	The World Meteorological Congress (Cg- 16) conceded the need for a coordinated trouble by WMO Members to address the observing and service conditions to cover the society against the global hazards of Space Weather.
May 25 - June 12 2015	The World Meteorological Congress (Cg- 17) took note of the Four- time Plan for WMO Coordination of Space Weather Conditioning developed by ICTSW in discussion with CAeM and the Commission for Basic Systems (CBS). Congress agreed that WMO should take over transnational collaboration of functional space rainfall monitoring and soothsaying with a view to support the protection of life, property and critical architectures and the impacted profitable conditioning in an optimized overall trouble.
October 25 2021	General Assembly Adopts Resolution Outlining Global Blueprint for Using Space Science, Technology Applications to Achieve Sustainable Development Goals

UN INVOLVEMENT: RELEVANT RESOLUTIONS, TREATIES AND EVENTS

Resolution 5(Cg-XIV)-WMO Space Program (2003)[11]

Inauguration of a new major WMO Space Programme as across-cutting programme to increase the effectiveness and benefactions from satellite systems to WMO Programs. Promote vacuity and application of satellite data and products for rainfall, climate, water and related operations and to coordinate environmental satellite matters and conditioning throughout all WMO Programs.

Report A/AC.105/L.331/Add.5[12]

In this report published in June 2022, the United Nations Committee on the Peaceful Uses of Outer Space talks about recommendations and decisions about space and climate change and the use of space technology in the United Nations system.

Space Technology and the Implementation of the 2030 Agenda[13]

" The Global Goals are designed to collectively address global challenges. Space technology can and will be used to support such endeavors. But while recent developments in outer space strengthen our efforts to attain a sustainable world, space remains a limited resource that must be protected through one joint vision. With an increasing number of actors, including more and more States and private entities entering the space arena, the world today finds itself at the same decisive crossroads as in 1957, shortly after the launch of Sputnik.

From supporting global efforts, to the use of space technology for sustainable development, to maintaining the normative framework governing activities in the space environment, the United Nations has a long legacy of facilitating international cooperation in outer space. UNOOSA

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[11] Group, PMB. "Fourteenth World Meteorological Congress: ." *Library*, www.library.wmo.int/index.php?lvl=notice_display&id=4754.

[12] Robert.wickramatunga. "United NationsOffice for Outer Space Affairs." *A/AC.105/L.331/Add.5 - COPUOS 2022: Draft Report (Chapter II: Recommendations and Decisions: G. Space and Climate Change, H. Use of Space Technology in the United Nations System & I. Future Role and Method of Work of the Committee)*, www.unoosa.org/oosa/en/oosadoc/data/documents/2022/aac.105l/aac.105l.331add.5_0.html.

[13] "Space Technology and the Implementation of the 2030 Agenda." *United Nations*, United Nations, https://www.un.org/en/chronicle/article/space-technology-and-implementation-2030-agenda.

is proud to represent such a legacy as we continue to work to bring the benefits of space exploration to everyone everywhere."[14]

PREVIOUS ATTEMPTS TO SOLVE THE ISSUE

The US National Space Program

The National Space Weather Program began in 1994 in response to community sweats to punctuate the strategic nature of space wisdom exploration. In response to these sweats, several government agencies established an interagency working group to coordinate space rainfall conditioning. Program rudiments include introductory exploration, modeling, compliances, technology transition, functional soothsaying, and education. The pretensions and objects of the program have been delineated in a strategic plan and a perpetration plan that has been lately streamlined.

Accomplishments during the once five times include the support of targeted introductory exploration, colorful shops and meetings riveting on the requirements of space rainfall guests, the development of a modeling center for transitioning space rainfall models, and education and outreach sweats that have redounded in unknown mindfulness of space rainfall. The program emphasizes the treatment of the space terrain as an intertwined system encompassing the sun, solar wind, magnetosphere, ionosphere, and thermosphere. The history of the National Space Weather Program underscores the graces of interagency partnering and user-oriented pretensions in enhancing the quality and applicability of scientific exploration.

NATO (North Atlantic Treaty Organization)

In 2019, Abettors espoused NATO's Space Policy and honored space as a new functional sphere, alongside air, land, ocean and cyberspace. This policy attendants NATO's approach to space and insure the right support to the Alliance's operations and operations in similar areas as dispatches, navigation and intelligence. Through the use of satellites, Abettors and NATO can respond to heads with lesser speed, effectiveness and perfection.

The elaboration in the uses of space and rapid-fire advances in space technology have created new openings, but also new pitfalls, vulnerabilities and implicit pitfalls. While space

[14] "Space Technology and the Implementation of the 2030 Agenda." *United Nations*, United Nations, https://www.un.org/en/chronicle/article/space-technology-and-implementation-2030-agenda.

can be used for peaceful purposes, it can also be used for aggression. Satellites can be addressed, jammed or weaponized, andante-satellite munitions could cripple dispatches and affect the Alliance's capability to operate.

NATO is an important forum for Abettors to partake information, increase interoperability and coordinate conduct. The Alliance isn't aiming to develop space capabilities of its own and will continue to calculate on public space means. NATO's approach to space will remain completely in line with transnational law.

POSSIBLE SOLUTIONS

NGOs in action

NGOs that are involved in the space sector contribute to outreach conditioning, education, space mindfulness, and capacity structure. Rather of space operations being solely governed by the governments and transnational associations, NGOs allow the interested people in the general public to become involved in council and trial. NGOs are important to farther space flight because they're suitable to operate without having to worry about covenants and other types of transnational relations. Rather of people committing the same miscalculations, nations can work together to ameliorate spaceflight for everyone.

Weaponizing

Technology frequently determines what transnational laws govern a particular object, the distinction between an extremely high- flying aircraft or a satellite in an extremely low route determines what laws govern its employment. Weaponization of space refers to the act of placing munitions in space to be employed against other space objects, land targets, or objects coursing the earth’s atmosphere, whereas the demilitarization of space is the use of space for military operations similar as imagery, intelligence, dispatches, rainfall, and surveillance. Weaponization includes kinetic and non-kinetic systems that destroy or disrupt objects or functionality.

Legal and ethical frameworks

There are many existing legal and ethical frameworks for space weather from the UN Committee on the Peaceful Uses of Outer Space (COPUOS), the EU or U.S. National Science and Technology Council but more organizations and committees need to take action so to have more better and useful results. Several programs and policies need to be established about space weather risks, long-term sustainability of space operations etc.

Open strategic autonomy in developing, planting and using global space- grounded architectures, services, operations and data

Nowadays, EU citizens enjoy watching satellite television, decreasingly accurate global navigation services for all transport modes and druggies (e.g., mobile phones and auto navigation systems), extended Earth covering for land, marine, atmosphere and climate change, global meteorological observation and accurate cartographies of a wide number of variables. Space also makes important benefactions to security extremity operation and exigency services.

Environmental Hazards

Last but not least, it is very important to state solutions that are eco-friendly to the environment so human and not only societies should not be affected. Thus, a part of the resolution could be focused on solutions on decreasing the endanger of human health because of space weather effects.

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