STUDY GUIDE UNOOSA

TOPIC: ENHANCING THE USE OF SPACE TECHNOLOGIES FOR SUSTAINABLE DEVELOPMENT AND DISASTER RESILIENCE

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Introduction to the Committee

The United Nations Office for Outer Space Affairs (UNOOSA) facilitates international collaboration to achieve the peaceful exploration and use of outer space. It contributes to the formulation of international law on outer space and encourages the use of space technologies for sustainable development, particularly in developing countries. Based at the United Nations Office in Vienna, the Office works with Member States, other United Nations entities and international organizations to make the benefits of space activity more widely available.

With an increase in the number of satellites, the expansion of commercial space activity and the growing involvement of private space companies, the range of issues before the Office has widened considerably. It now addresses questions about space governance, long-term sustainability and equitable access alongside its established work. These issues are pursued through its programs, among them UN-SPIDER, which applies space-based information to disaster management. Through this work, the Office seeks to ensure that the benefits of space technology are shared worldwide rather than confined to a small number of States.

Committee Mandate

The mandate of UNOOSA is derived from resolutions of the General Assembly rather than from a founding treaty of its own. The Office began in 1958 as a small unit of the Secretariat, became the Outer Space Affairs Division in 1962, was raised to the status of an Office in 1992 and was relocated to Vienna in 1993. Its central purpose is to promote international cooperation in the peaceful use of outer space and to ensure that space science and technology contribute to development, with particular attention to the needs of developing countries.

The Office serves as the secretariat of the Committee on the Peaceful Uses of Outer Space (COPUOS), which the General Assembly established as a permanent body in 1959 and which remains the principal intergovernmental forum for space matters. In that capacity, it prepares the documentation on which COPUOS and its Scientific and Technical and Legal Subcommittees deliberate, and it carries out the decisions they take. It also maintains the Register of Objects Launched into Outer Space on behalf of the Secretary-General and administers the United Nations Program on Space Applications, established in 1971 to bring the benefits of space technology to developing countries.

The substantive work of the Office is directed towards a set of objectives established in successive resolutions. These include promoting cooperation and the exchange of practical experience in space science and technology between industrialized and developing countries and among developing countries themselves; supporting fellowships and in-depth training for scientists, technologists and applications specialists; organizing seminars on advanced space applications for managers and users; encouraging the growth of an autonomous technological base in developing countries; disseminating information on new and advanced applications with emphasis on their relevance to developing countries; and providing technical advisory services on space applications projects at the request of Member States.

Introduction to the Topic

Space technologies have become central to the functioning of modern society, providing services and data that support decision-making across socio-economic and environmental development. With the increase in climatic and environmental problems, the role of these technologies has become crucial. Satellite systems make it possible to monitor agriculture, food security, water resources and land use, to support infrastructure planning, and to observe environmental change at a scale that ground-based methods cannot match.

The contribution of space technology to disaster management is equally significant. Satellites can identify areas at risk before a hazard occurs, support early warning systems, and provide communication when terrestrial networks fail. Once a disaster has taken place, satellite imagery allows governments and humanitarian agencies to establish the extent of the damage and direct assistance where it is most needed. Because these applications operate at every stage of the disaster management cycle, space-based information contributes directly to the achievement of the Sustainable Development Goals.

Key Terms

Sustainable Development

Development that meets present needs while protecting the resources and opportunities of future generations, pursued internationally through the seventeen Sustainable Development Goals adopted in 2015.

Disaster Risk Reduction (DRR)

The policy objective of preventing new disaster risk, reducing existing risk and strengthening resilience. Disaster risk reduction is anticipatory and continuous, and is distinguished from disaster response, which is reactive.

Earth Observation

The collection of information about the Earth through satellites to monitor weather, environmental change, natural resources and disasters.

Remote Sensing

The science of gathering data about objects or areas from a distance. It is used to obtain information about the Earth's surface from space by detecting and measuring electromagnetic waves emitted, reflected, or diffracted by the sensed object.

Satellite Imagery

Images of the Earth collected by satellites. Such images are used to monitor weather, environmental changes, damaged areas and affected communities, and their usefulness depends on their level of detail, how often the satellite passes over the same area, and the parts of the spectrum recorded.

Global Navigation Satellite Systems (GNSS)

Constellations of Earth-orbiting satellites that broadcast their location in space and time, together with networks of ground control stations and receivers that calculate positions on the ground. The operational systems are GPS, Galileo, GLONASS, and BeiDou, and they are used in every form of transport as well as in surveying, agriculture and emergency response.

Disaster-Management Cycle

The four stages through which disasters are managed, namely prevention or mitigation, preparedness, response, and recovery. Space technologies may be used throughout the entire cycle rather than only after a disaster occurs.

Early Warning System

An integrated system that links hazard monitoring, forecasting and predicting, risk assessment and communication with preparedness activities. It enables individuals, communities, governments, and businesses to take timely action to reduce disaster risk in advance of a hazardous event.

UN-SPIDER

The United Nations Platform for Space-based Information for Disaster Management and Emergency Response, a program of UNOOSA established by the General Assembly in 2006. Its purpose is to ensure that all countries have access to, and the capacity to use, space-based information throughout the disaster management cycle. It pursues this through technical advisory support, capacity-building, and emergency support.

Historical Development

The use of space technology for civilian benefit began almost immediately after the beginning of spaceflight. The first meteorological satellite was launched in 1960 and demonstrated within weeks that storms could be tracked from orbit before reaching land. The launch of the first Earth resources satellite in 1972 extended observation from the atmosphere to the land surface, making it possible to monitor crops, forests, water bodies, and mineral resources anywhere on the planet.

This capability created an immediate political problem. A State operating an observation satellite could survey the natural resources of another State without its consent and without sharing the results. Developing countries argued in COPUOS that this affected their sovereignty over their own resources and pressed for a requirement of prior consent, while the States operating the satellites argued that observation from orbit was lawful and that a consent requirement would destroy the value of global datasets. The dispute was settled only after more than a decade of negotiation, when the General Assembly adopted the Principles Relating to Remote Sensing of the Earth from Outer Space in resolution 41/65 of 3 December 1986. The principles did not make observation subject to consent, but they established that a sensed State has a right of access to data concerning its own territory on a non-discriminatory basis and on reasonable cost terms, and that information identifying a natural disaster must be transmitted to the States concerned.

A more serious problem became apparent in December 2004, when an earthquake in the Indian Ocean produced a tsunami that killed approximately 227,000 people across fourteen countries. The earthquake had been detected within minutes, and the waves took roughly two hours to reach the coasts of Sri Lanka and India and longer to reach the Horn of Africa. The deaths in the more distant countries were therefore not the result of a failure of detection. They resulted from the absence of a warning system in the Indian Ocean basin, of arrangements to transmit an alert across national borders, and of any means of converting a technical observation into an instruction to move inland. The disaster established that detection without dissemination protects nobody.

The response to that failure created much of the structure that exists today. The Hyogo Framework for Action was adopted in January 2005 as the first global agreement on disaster risk reduction, and a tsunami warning system for the Indian Ocean became operational in 2006. In December of that year the General Assembly adopted resolution 61/110, establishing UN-SPIDER as a program of UNOOSA. The premise of the resolution was explicit: satellite data already existed in quantity, and the deficit lay in the ability of States to obtain and use it.
That premise remains the starting point for the present discussion.

Development of the International Agenda

Three instruments adopted in 2015 established the policy framework within which this topic now sits. The Sendai Framework for Disaster Risk Reduction 2015–2030, adopted on 18 March, replaced the Hyogo Framework and provided long-term guidance on disaster prevention, preparedness, response, and recovery. It set seven measurable global targets, one of which, Target G, commits States to substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information by 2030.

The 2030 Agenda for Sustainable Development was adopted in September 2015 and set out the seventeen Sustainable Development Goals, covering economic, social and environmental objectives. The agenda specifically recognizes the potential of Earth observation and geospatial information in supporting development goals, and a substantial part of its indicator framework depends on measurements that can realistically be obtained only from orbit. The Paris Agreement, adopted in December of the same year, created reporting obligations on emissions and adaptation that rest on the same measurement of capability.

The space community subsequently sought a single strategy linking its activities to these agendas. The fiftieth anniversary of the first United Nations conference on the exploration and peaceful uses of outer space was marked in 2018 by the UNISPACE+50 process, during which COPUOS began drafting a forward-looking strategy and Member States supported the establishment of a “Space2030” framework. The General Assembly adopted the resulting text, the “Space2030” Agenda: space as a driver of sustainable development, by consensus in resolution 76/3 of 25 October 2021, together with an implementation plan. The agenda is organized around four objectives — space economy, space society, space accessibility and space diplomacy — and it directs the promotion of space-based technologies across all phases of the disaster management cycle, the advancement of space technology in addressing climate change, and the sharing of disaster risk information.

Current Situation

The present situation is defined by a gap between the availability of data and the capacity to use it. Satellite data has never been more accessible. The Landsat archive was opened to free use in 2008, and the Copernicus Sentinel missions have been licensed on free and open terms since 2014, placing a continuous global observation record within reach of any institution with an internet connection. More than ten thousand active satellites are now in orbit, and the cost of launch, of data storage and of processing has fallen sharply over the past decade.

Assistance to Member States is delivered mainly through UN-SPIDER, which operates from offices in Vienna, Bonn and Beijing and works through a network of Regional Support Offices hosted by space agencies, universities, research centers and civil protection bodies. Its technical advisory missions assess, at the invitation of a government, what capacity a State possesses, and what prevents better use of space-based information and are usually followed by training. Its knowledge Portal publishes step-by-step procedures, developed using free software and freely available imagery, for producing specific outputs such as flood extent maps. During emergencies the program connects national disaster authorities to the mechanisms that can supply data at short notice, among them the International Charter “Space and Major Disasters”, under which member space agencies provide satellite imagery free of charge to authorities responding to a major disaster.

The gap nonetheless persists. According to recent monitoring by the United Nations Office for Disaster Risk Reduction and the World Meteorological Organization, 119 countries, or about 60 per cent of the total, now report having a multi-hazard early warning system, compared with 52 in 2015. Coverage remains thinnest among least developed countries, small island developing States and territories affected by conflict, and risk knowledge is the weakest of the four components of an early warning system worldwide. The human consequence is measurable: disaster-related mortality in countries with limited coverage runs at close to six times the rate recorded in countries with substantial to comprehensive coverage, and the number of people affected is several times higher.

The distinction between States that own satellites and those that do not is less significant than it first appears. Several States without independent launch or manufacturing capabilities make effective use of freely available data, while others with access to the same data lack the analysts, institutions and connectivity required to act on it. The divide is therefore one of capacity rather than of ownership, and it is towards that divide that international assistance has increasingly been directed.

International Legal Frameworks and Agreements

Five instruments are of primary relevance to this topic. Full texts are available through the sources listed at the end of this guide.

Outer Space Treaty (1967)

The foundational instrument of international space law. It establishes that the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and that States are internationally responsible for national activities in space, including those conducted by private entities.

Principles Relating to Remote Sensing of the Earth from Outer Space (1986)

A set of United Nations principles governing the use of remote sensing to observe and collect information about the Earth's surface. They provide that a sensed State shall have access to data concerning its own territory on a non-discriminatory basis and on reasonable cost terms, that States with remote sensing capability should offer technical assistance to others, and that information identifying a natural disaster shall be transmitted to the States concerned. The principles are not binding and were drafted before commercial remote sensing existed.

Sendai Framework for Disaster Risk Reduction (2015–2030)

An international framework that aims to reduce disaster risk and strengthen the resilience of communities and countries through prevention, preparedness, response and recovery. Its seven global targets include Target G on multi-hazard early warning systems, progress against which is monitored annually.

2030 Agenda for Sustainable Development (2015)

The agreement establishing the seventeen Sustainable Development Goals. It recognizes Earth observation and geospatial information as means of implementation and of measuring progress, and it provides the political mandate through which many space applications in developing countries are funded.

"Space2030" Agenda (2021)

A forward-looking strategy adopted by the General Assembly in resolution 76/3, together with an implementation plan. It connects space activity to the 2030 Agenda, the Sendai

Framework and the Paris Agreement, and is organized around the four objectives of space economy, space society, space accessibility, and space diplomacy.

Problems with Access to and Use of Space Technologies

The obstacles set out below are connected rather than independent. Data that is free to download is of no value to an authority that cannot process it, and an accurate analysis is of no value if no institution has the authority to act on it. Addressing any one obstacle in isolation therefore tends to produce limited improvement, which is why proposals that rely on a single measure usually disappoint.

High costs and limited financial resources

Although much satellite data is free, the systems required to use it are not. Ground receiving stations, data storage, processing hardware, software licenses, reliable electricity and sufficient bandwidth all carry recurring costs, and recurring costs are precisely what donor-funded projects are least likely to cover. The common failure is not the absence of a facility, but the abandonment of one that was equipped through a grant and left without an operating budget when the project closed. Developing and maintaining satellites of one's own is more expensive still.

Weak infrastructure

Many developing countries lack the ground stations, digital systems, connectivity and electricity supply needed to receive and process satellite information quickly. Where these are unreliable, data that arrives in time to be useful cannot be handled within the period in which it would make a difference.

Shortage of technical expertise

Converting imagery into a decision requires trained people. Remote sensing, geospatial analysis and hydrological modelling are specialized skills that are internationally mobile and well paid, and public disaster management agencies compete for them against commercial employers and against emigration. Training that produces individual expertise without institutional retention is therefore of limited durability, and capacity embedded in permanent posts and documented procedures lasts considerably longer than capacity held by a small number of trained individuals.

Restricted data sharing and unequal access

Open archives coexist with significant restrictions. The most detailed imagery is largely commercial, and although operators frequently release data during emergencies, they do so at their discretion rather than under any obligation. Free missions carry no guarantee of continuity, so a State that builds its procedures around a particular satellite assumes the risk that it will not be replaced. Several States also restrict the release of detailed mapping of their own territory on security grounds, which can leave a national authority without lawful access to the best available information about its own country.

Difficulty converting data into decisions-

Satellite data may be available without being usable. Products are often supplied in formats and technical language that the intended recipient cannot readily interpret, and a warning changes outcomes only if it reaches the person at risk in a language they understand, from a source they trust, with enough time and a realistic option to act. Each of these conditions fails routinely, which is why preparedness to respond remains a weaker component of early warning systems worldwide than detection and forecasting.

Limited coordination between institutions

Responsibility for space-derived information is frequently divided among a space or remote sensing agency, a meteorological service, a disaster management authority, a mapping department, and one or more ministries. Where the body that produces an analysis lacks the authority to order an evacuation, or where it is unclear which institution issues a warning, the technical product does not reach a decision. Space agencies, governments, and disaster-response organizations also do not consistently share information with one another.

Orbital congestion and space debris

The services described in this guide depend on continued safe operation in orbit. The rapid growth of space activity has increased the number of objects in orbit and the quantity of debris, raising collision risk, insurance and operating costs, and shortening mission lifetimes. The burden falls most heavily on new and smaller operators, and the loss of a widely used open mission would remove a resource on which many States depend.

Rising exposure from climate change and urbanization

Climate change and rapid, often unplanned, urban growth are increasing the number of people exposed to hazards and the value of the assets at risk. This raises the importance of space-based monitoring and early warning at the same time as it increases the cost of failing to provide them.

Impacts

The consequences of the problems set out above fall under four headings. They interact, so that a shortfall under one heading produces losses under the others.

Humanitarian and public-safety impacts

- **Preventable loss of life.** Disaster-related mortality in countries with limited multi-hazard early warning coverage runs at close to six times the rate recorded in countries with substantial to comprehensive coverage, and nearly four times as many people are affected.
- **Reduced time to evacuate.** Where forecasting or dissemination is weak, warning lead times shorten from days to hours, which is frequently too short for communities without transport or nearby shelter.
- **Delayed search and rescue.** Without rapid mapping, responders cannot establish which settlements have been cut off or which routes remain passable, and the most critical hours are spent locating the damage rather than addressing it.
- **Unequal protection within populations.** Women, older persons, persons with disabilities and displaced or minority communities are consistently the least likely to receive a warning and to be able to act on it.

Economic and infrastructure impacts

- **Slower and more expensive recovery.** Where damage cannot be assessed remotely, needs assessment depends on physical survey, which delays reconstruction and increases its cost.

- **Greater property and livelihood losses.** Delays in identifying damaged roads, settlements and farmland slow rescue, relief and rebuilding, extending the period over which income is lost.

- **Exclusion from insurance and risk transfer.** Parametric insurance and catastrophe risk pools require objective, verifiable indicators, which in practice means satellite data; States without it are effectively excluded from these markets.

- **Wasted development expenditure.** Infrastructure sited without reference to hazard mapping is more likely to be destroyed, so public investment is lost repeatedly to the same recurring hazard.

Environmental and climate impacts

- **Poorer understanding of environmental change.** Insufficient use of Earth observation weakens understanding of climate change, ecosystems, biodiversity, land use and natural resources.

- **Unmonitored degradation.** Deforestation, illegal mining, coastal erosion, glacier retreat and unlicensed fishing are detectable from orbit and largely undetectable otherwise at national scale, so enforcement fails where monitoring is absent.

- **Weaker climate reporting.** Obligations to report emissions, land use change and adaptation progress presuppose a measurement capability that many States do not possess independently.

- **Poorer environmental decision-making.** Governments unable to measure conditions on their own territory cannot readily develop climate response strategies or defend the positions they take in international negotiations.

Developmental and inequality impacts

- **Widening of the existing divide.** Capability is cumulative: States that already possess data analysts and institutions attract further investment and partnerships, while those that possess no find each subsequent step harder.

- **Slower progress towards the Sustainable Development Goals.** Because a significant part of the indicator framework depends on Earth observation, a measurement gap becomes an implementation gap, particularly in developing regions.

- **Dependence on external suppliers.** States without indigenous capability purchase imagery and analysis commercially, at prices set by a small number of providers, and rely on others for information about their own territory.

- **Loss of skilled personnel.** Without domestic demand for geospatial expertise, trained graduates emigrate and the possibility of a national industry in this field does not materialize.

Stakeholders

The actors below hold the capability, the mandates or the exposure that will determine whether any measure agreed in this committee has effect. Delegates should establish their own allocation of national space policy, its disaster history and its record in COPUOS before drafting a position paper.

State Actors

- **United States of America** — Operates the largest civil space program, funds the Landsat series and much of the global weather satellite network, and hosts the commercial Earth observation industry. Its decision to release the Landsat archive without charge in 2008 remains the single most consequential act of space-enabled development assistance. It favors open data, voluntary arrangements, and commercial provision over new binding obligations.

- **European Union and the European Space Agency** — The Copernicus program is the largest provider of free and open Earth observation data in the world, and its Emergency Management Service supplies rapidly mapping well beyond Europe. European agencies initiated the International Charter and remained among its most active contributors, and European development financing is a major funder of capacity-building.

- **China** — Operates an extensive Earth observation program and the BeiDou navigation system, hosts one of the three UN-SPIDER offices, and has developed substantial South–South cooperation including joint satellite programs, ground stations and training for partners in Africa, Asia and Latin America.

- **India** — Its space program was founded explicitly on the principle that space technology should serve development, and it combines communications, meteorology, remote sensing and navigation with domestic application in agriculture, water management and disaster response. It activated the International Charter for the 2004 tsunami and hosts a regional center for space science and technology education.

- **Japan** — Combines advanced Earth observation and radar capability with a national policy emphasis on disaster resilience. Its space agency co-coordinates Sentinel Asia,

  the regional mechanism supplying satellite data for disaster response across the Asia-Pacific, and it funds programs through which institutions in developing countries deploy their first small satellites.

- **Russian Federation** — Operates the GLONASS navigation system together with meteorological and remote sensing satellites and participates in the International Charter. It generally favors binding instruments over voluntary norms and State rather than commercial provision.

- **Developing and highly exposed States** — This is the largest group in the committee and includes States such as Pakistan, Bangladesh and the Philippines, small island developing States, and the many African States that have established space programs in recent years. They possess the greatest exposure to hazards and the least capacity to monitor them independently, and they negotiate most effectively as blocs for predictable financing, regional shared facilities and grant-based assistance rather than loan-based assistance.

United Nations and Intergovernmental Bodies

- **UNOOSA and UN-SPIDER** — Provide technical advisory missions, training, knowledge resources and emergency support, and coordinate implementation of the "Space2030" Agenda.
- **Committee on the Peaceful Uses of Outer Space (COPUOS)** The intergovernmental forum in which space policy is negotiated, working by consensus through its Scientific and Technical and Legal Subcommittees.
- **United Nations Office for Disaster Risk Reduction (UNDRR)** Custodian of the Sendai Framework and its monitoring, and co-leading of the Early Warnings for All initiative launched by the Secretary-General in 2022.
- **World Meteorological Organization (WMO)** Coordinates the global observing and data exchange systems on which all weather and climate forecasting depends and co-leads Early Warnings for All.
- **International Telecommunication Union (ITU)** Allocates radio spectrum and coordinates orbital slots, without which no satellite service can lawfully operate, and supports emergency telecommunications.
- **International Charter "Space and Major Disasters"** — A voluntary arrangement among seventeen space agencies and operators through which satellite data is supplied free of charge to authorities responding to a major disaster. UNOOSA is authorized to request its activation on behalf of United Nations bodies.

Non-State Actors

- **Commercial satellite operators** — Companies operating imaging constellations and communications networks now hold much of the world's capabilities. Several contribute data during emergencies and restore connectivity to disaster areas within days, but they do so at their own discretion and their licensing terms determine what recipients may lawfully do with what they receive.

- **Humanitarian organizations and NGOs** — Bodies such as the International Federation of Red Cross and Red Crescent Societies, together with humanitarian mapping networks, convert imagery into usable maps and deliver the assistance that satellite analysis identifies as necessary.

- **Universities and research institutions** — The regional centers for space science and technology education affiliated to the United Nations, together with the UN-SPIDER Regional Support Offices, are the principal channel through which technical capability is transferred and retained, and universities are increasingly the route by which a State acquires its first satellite.

- **Local communities and civil society** — The final recipients of any warning. Community volunteers, local government and civil society organizations determine whether an alert results in action, and their involvement is the factor most consistently associated with reduced loss of life.

QARMA (Questions a Resolution Must Answer)

1. In what ways can space technology help countries prepare for disasters rather than only respond to them?
2. How can developing countries obtain better access to satellite data, and what would make that access reliable rather than discretionary?
3. What financial tools could assist developing countries in using space technology, and how would the recurring costs of operation be met?
4. What steps could be taken to build technical capability and expertise in developing countries, and how could trained personnel be retained?
5. What more can UNOOSA and UN-SPIDER do to provide training and technical support within their existing mandate?
6. How could Member States improve the sharing of satellite information while respecting national security and sovereignty?
7. How can space technology be embedded in national plans for disaster risk reduction and sustainable development?
8. How can space technology assist countries in monitoring climate change and protecting natural resources?
9. How should progress be measured, so that commitments made in this committee can be assessed rather than merely restated?

Useful Sources

UNOOSA and its programs

- **UNOOSA official website** — https://www.unoosa.org
- **Committee on the Peaceful Uses of Outer Space (COPUOS)** — https://www.unoosa.org/oosa/en/ourwork/copuos/index.html
- **Space Applications Program** — https://www.unoosa.org/oosa/en/ourwork/space-applications/index.html
- **Space for Sustainable Development** — https://www.unoosa.org/oosa/en/ourwork/space4sdgs/index.html
- **Access to Space for All** — https://www.unoosa.org/oosa/en/ourwork/access2space4all/index.html
- **UN-SPIDER Knowledge Portal** — https://www.un-spider.org
- **UN-SPIDER technical advisory support** — https://www.un-spider.org/advisory-support

Legal instruments and frameworks

- **Space law treaties and principles** — https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties.html
- **Outer Space Treaty (1967)** — https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html
- **Remote Sensing Principles, GA resolution 41/65 (1986)** — https://docs.un.org/en/A/RES/41/65
- **GA resolution 61/110 (2006), establishing UN-SPIDER** — https://docs.un.org/en/A/RES/61/110
- **"Space2030" Agenda, GA resolution 76/3 (2021)** — https://www.unoosa.org/oosa/en/ourwork/space4sdgs/space2030agenda.html
- **2030 Agenda and the Sustainable Development Goals** — https://sdgs.un.org/goals

Disaster risk reduction and early warning

- **UNDRR official website** — https://www.undrr.org
- **Sendai Framework 2015–2030** — https://www.undrr.org/implementing-sendai-framework/what-sendai-framework
- **UNDRR disaster risk reduction terminology** — https://www.undrr.org/drr-glossary/terminology
- **Global Status of Multi-Hazard Early Warning Systems reports** — https://www.undrr.org/reports
- **Early Warnings for All** — https://www.un.org/en/climatechange/early-warnings-for-all
- **International Charter "Space and Major Disasters"** — https://disasterscharter.org

Earth observation, navigation and the space environment

- **Copernicus Emergency Management Service** — https://emergency.copernicus.eu
- **International Committee on GNSS** — https://www.unoosa.org/oosa/en/ourwork/icg/icg.html
- **UNOOSA on space debris** — https://www.unoosa.org/oosa/en/ourwork/topics/space-debris/index.html
- **ESA space debris office** — https://www.esa.int/Space_Safety/Space_Debris