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Contribution by UNOOSA

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UNITED NATIONS
Office for Outer Space Affairs

UNOOSA Inputs for CSTD 2023-2024 Priority Themes

Priority Theme 1: Data for Development

1. What are the major contributions and risks of data in relation to the achievement of the 2030 Agenda for Sustainable Development?

Space data and applications of outer space-based technologies have significant and varied utility for the achievement of the 2030 Agenda for Sustainable Development, as outlined in the 'Space2030 Agenda: space as a driver of sustainable development' (A/RES/76/3) adopted by the UN General Assembly in 2021. The Space2030 Agenda affirmed that the fulfilment of the Sustainable Development Agenda "requires improved access to space-based data and applications and space infrastructure" and promoted "space open data policies and the sharing of data" within this.

Space-based tools can directly contribute to this as enablers and drivers of sustainable development as well as indirectly, by providing essential data for the monitoring of the implementation of the Sustainable Development Goals (SDGs). 65 of the 169 SDG targets, almost 40%, are reliant on geolocation and Earth observation (EO) data, and a recent study found that broader applications of space technologies can contribute to nearly 60% of SDG targets. A selection of these various applications is outlined below.

Infrastructure and Urban Development

Infrastructure is an important development priority to include as societies are reliant on critical infrastructure operating effectively and reliably, and as such it pertains to and interconnects with multiple SDGs. Sustainable urban development has been of increasing importance as urbanization has progressed and 6 out of 10 people in the world are expected to reside in urban areas by 2030, with 90% of this growth estimated to occur in developing regions. These issues interconnect across various SDGs, but most directly concern SDGs 9: Industry, Innovation and Infrastructure, 11: Sustainable Cities and Communities, and 15: Life On Land.

Applications of space technologies are used to produce data that support the achievement of these SDGs in relation to infrastructure. EO data can be used in vulnerability assessments for the planned location of infrastructure especially in areas prone to natural hazards, such as floods and fires. This can also include an assessment of the evolution of risk from climate projections due to the role of EO in climate modelling. In the post-construction phase of infrastructure, EO, as well as global navigation satellite systems (GNSS), data can be used to monitor land deformation to detect changes in the Earth's surface which can cause damage to infrastructure due to instability. UNOOSA's UN-SPIDER platform works to support countries during the full disaster management cycle using space technologies, this helps countries to become more resilient if a disaster strikes. UNOOSA is also the secretariat of ICG, the International Committee on GNSS, where issues about compatibility and interoperability of GNSS systems as well as applications are discussed.

Relevant to both infrastructure and urban development, EO and GNSS data can be utilized to monitor road traffic flows as part of smart and sustainable mobility. Similarly, GNSS data is used to support a variety of modes of public transport through, for instance, fleet analysis to optimize their numbers and usage as well as energy management and automatic speed limitation on electric powered vehicles. Regarding urbanization specifically, EO and GNSS data can be employed to create digital twins of cities via 3D modelling which allow for

the visualization, monitoring and forecasting of natural and human activity in the urban area in support of sustainable development.

Therefore, there are many creative and varied applications of space data to support infrastructure and urban development in accordance with the Sustainable Development Agenda.

The Triple Planetary Crisis

Space technologies produce data that is valuable both for monitoring the scale and development of the triple planetary crisis and its impacts as well as for informing strategies to mitigate, adapt, and build resilience to the crisis. Indeed, 26 of the 50 Essential Climate Variables can only be measured from space. UNOOSA supports Member States through capacity-building efforts to become acquainted with space technologies, data and infrastructure and to maximize their potential, by providing training, advisory missions and organizing conferences and workshops. There are many areas where space can support to understand and provide actionable insights into the Triple Planetary Crisis and UNOOSA stands ready to continue supporting Member States and the UN to unlock the full potential of space.

For example, with respect to climate services, various types of EO data can be used to monitor and forecast different climate parameters such as air quality, land temperature, and cloud cover. GNSS can also be used to support climate modelling to measure other properties of the Earth that affect climate, including magnetic fields and the atmosphere.

Regarding biodiversity loss, EO is especially useful for monitoring terrestrial ecosystems as it has sufficient electromagnetic spectral resolution to be able to distinguish between plant species based on how they reflect light. Importantly, space technologies can also be applied to support agricultural processes as they are increasingly disrupted by the environmental crisis. EO and GNSS data can be used in conjunction to, for instance, forecast crop yield and deliver precision irrigation.

Space-based tools therefore directly contribute to the Sustainable Development Agenda, helping to achieve SDGs 13: Climate Action, 14: Life Below Water, and 15: Life On Land as well as several other SDGs interconnected with the triple planetary crisis, such as SDG 2: Zero Hunger and 11: Sustainable Cities and Communities. This is also especially relevant for developing countries, who can often be among the most vulnerable to the impacts of the crisis and yet the most neglected by mitigation, adaptation and resilience strategies.

There is an important gap here in developing countries' capacities to monitor and respond to the triple planetary crisis that space technologies are well-positioned to contribute to. The UN Environment Programme assessed in 2019, prior to the start of the COVID-19 pandemic and related setbacks to the Sustainable Development Agenda, that there was not sufficient data to comprehensively measure the progress of 68% of environment-related SDG indicators and called for data sources that can improve spatial and temporal coverage. This is a particular advantage of geospatial data generated by satellites and space technologies can therefore fill this gap, in accordance with the recommendations of the Space2030 Agenda, by monitoring and providing data on the progress of these indicators. This would also help to address the climate emergency as outlined as an interlocking threat by the UN Secretary-General in 'Our Common Agenda Policy Brief 9: A

New Agenda for Peace'. UNOOSA has provided training courses and advisory missions and will continue doing so to increase the uptake of space technology, data and applications.

The 'Infodemic'

As outlined in 'Our Common Agenda Policy Brief 8: Information Integrity on Digital Platforms', misinformation and disinformation have become significant obstacles to sustainable development. In a "post-truth" world, trust in the accuracy and reproducibility of data is undermined which in turn hampers the utility and effectiveness of development strategies based on data. All forms of data, including space data, are not immune to misrepresentation or biased analysis and can, for example, produce misleading visual representations if the scale of a map is altered or if particular features or locations are selectively emphasised or omitted. For this reason, it is essential that space data is presented in a clear and appropriate way that can be readily validated and reproduced to avoid misinformation. Additionally, it is also important that the data is processed and interpreted by individuals with the right skills, otherwise they may lead to flawed conclusions (for example, see Flawed estimates of the effects of lockdown measures on air quality derived from satellite observations | Copernicus).

However, the benefits far outweigh the risks and UNOOSA, through its capacity-building activities and initiatives, can support information integrity by providing a source of publicly available, objective data that is verifiable, reproducible and transparent, enabling situational assessments of events on Earth that are more robust in the face of mis- or disinformation. Space data, typically EO data, can therefore provide a fresh perspective on contested topics to inform journalism and other forms of reporting that its transparency and reproducibility make it more difficult to dispute.

Geospatial data produced by satellites is one example of space data that is effective in countering mis- and disinformation. Geospatial intelligence, produced from analyses of geospatial data, can offer a unique perspective by providing detailed bird's-eye-views of phenomena that can be employed to validate or invalidate statements and claims about events on Earth. This can therefore be useful in exposing manipulated information or mistruths and in identifying propaganda or disinformation networks.

The interpretation and communication of such space data through a 'storytelling' process is a particularly useful method of communicating space data as a public resource in a digestible, relatable and compelling manner. This can be achieved by interpreting and employing satellite data to produce stories about global issues that raise awareness and inspire action. For example, machine learning can be used to analyse satellite images in order to map the development of destructive activities in the Amazon Rainforest, producing an accessible dataset that journalists, activists and others can use to validate the damage to the Amazon ecosystem on the ground.

Global Connectivity

A reliable and workable internet connection is required to access publicly available space data and for data handling. Data transfer and internet connectivity are therefore crucial aspects of data for development that if neglected, undermine access to data and the translation of data into constructive outputs for sustainable development. Space-borne satellite communication networks provide internet connectivity to many communities around the world and are an essential tool for building internet infrastructure in developing countries.

The Space2030 Agenda, the only global agenda where space is at the centre and has been adopted by UN Member States, specifically emphasises the promotion and support of "the use of space technologies to enhance worldwide access to data and broadband technologies, giving special attention to developing countries and areas with less-developed infrastructure". Although there is an abundance of data being produced and open data resources are now available, reliable internet infrastructure remains a key development issue in developing countries which inhibits their capacity to access and handle data.

Space communication networks are particularly effective for building internet connectivity in developing countries as terrestrial infrastructure can be unsuitable for certain geographical areas, such as those especially vulnerable to natural disasters or where there are isolated communities. Space-based tools therefore have a crucial role in building developing countries' capacities to access data and in data transfer so that they can utilize data for their sustainable development.

The UN Secretary-General has highlighted the need for universal internet connectivity to implement the Sustainable Development Agenda in 'Our Common Agenda Policy Brief 5: A Global Digital Compact – an Open, Free and Secure Digital Future for All'. Furthermore, the Sustainable Development Solutions Network has outlined universal digital access as one of its 6 long-term transformations necessary for sustainable development. Outer space is therefore essential in fulfilling these ambitions, and has an important role in supporting the Global Digital Compact, as well as the Code of Conduct for Information Integrity, under Our Common Agenda.

Implementing global connectivity via space-based communication tools helps to implement a variety of SDGs, including SDGs 4: Quality Education, 9: Industry, Innovation and Infrastructure, 10: Reduced Inequalities, and 11: Sustainable Cities and Communities.

2. How can developing countries benefit from the data revolution while considering risks?

As has just been discussed with regards to global connectivity, a lack of the necessary infrastructure undermines access to data and its use for development. As such, data processing, including the analysis and interpretation of space data, is a considerable obstacle to developing countries who often lack the investments, expertise and training to produce meaningful development outputs from space data.

It is for these reasons that it is crucial to engage in awareness-raising and capacity-building around the interpretation of space data and its utility for sustainable development, so that developing countries are aware of the key role it can play in their development plans, which is why UNOOSA is working to provide the right tools and understanding of capabilities to Member States.

There are several risks that those involved in using space data for development should be cognizant of due to the new challenges that abundant data creates. Such risks can hamper the fulfilment of the Sustainable Development Agenda and regress on the issues highlighted in 'Our Common Agenda Policy Brief 9: A New Agenda for Peace'.

As the value of data has increased, there has been competition in the collection of data which has led to unsustainable and inequitable handling of data, and this can deepen power asymmetries for developing countries. Another related risk associated with data is the

potential for developing countries to remain only consumers of space data without their own capacity to effectively capture the value of data. The massive amount of data being produced has made data handling more complex, now requiring more multifaceted analysis methods and more powerful computing instruments which demand increasingly significant investments from developing countries that lack the necessary infrastructure and expertise.

This is where capacity-building with respect to data processing and interpretation becomes crucial for developing countries. It is important that developing countries are aware of the expertise, infrastructure and investments required for effective data interpretation and how these can be acquired, and of the support available in building this capacity from UNOOSA (please see UNOOSA's submission for Priority Theme 2 for examples of the Office's capacity-building work). Opportunities for training in the expertise necessary to generate constructive development outputs from space data would be highly valuable. It is equally as important that developing countries are aware of the risks associated with data and how to balance these as they pursue greater data processing capabilities.

It may also be useful for developing countries to invest in a domestic capacity to generate space data, which UNOOSA can support via the Access to Space for All programme, for technology demonstration purposes to raise awareness domestically about the applications of space for sustainable development and inspire future generations to enter the space industry. Additionally, considering that the Space2030 Agenda promotes "space open data policies", developing countries could increase their participation in global space governance – through, for example, the UN Committee on the Peaceful Uses of Outer Space (COPUOS) and the Summit of the Future process – to further promote the democratization of access to space data.

3. What national and international policies and support measures can help address the challenges of the developing countries in the area of data relevant for sustainable development, including scientific and research purposes, data quality, data capabilities and data governance, while taking into account the multiple dimensions of data?

Considering the promotion of "space open data policies and the sharing of data" in the Space2030 Agenda, global initiatives for the collection and sharing of data for the implementation of the SDGs could enhance the capacities of developing countries. Notable examples of such initiatives beyond UNOOSA include the Global Partnership for Sustainable Development Data, the SDG Transformation Centre, and the Sustainable Development Solutions Network (SDSN). These initiatives provide a platform for learning and knowledge exchange around data and the SDGs to promote timely, inclusive and accountable data and the use of science and technology-based tools and analytics for the implementation of the SDGs. Through this, they offer open educational resources on data and sustainable development that compliments the capacity-building work of UNOOSA on space data and development.

UNOOSA's capacity-building efforts in data interpretation and processing capabilities are crucial given that the 2023 Sustainable Development Report underscored that there has been limited progress in developing countries' statistical capacity since 2016 and that international funding for data and statistics fell between 2019 and 2021. UNOOSA's work in raising awareness, promoting data democracy and increasing the uptake of space data is crucial for the monitoring of the implementation of the SDGs.

EO and geospatial data are especially valuable for monitoring progress on the SDGs due to their ability to provide geographical reference points and monitor trends over time.

Geospatial data produced by satellites in particular can capture spatial and temporal resolutions which allows for the monitoring of annual trends in progress towards the SDGs. The UN Committee of Experts on Global Geospatial Information Management has reported that geospatial data is beneficial for measuring 13 of the 17 SDGs: specifically, it provides valuable monitoring on 40% of underlying SDG targets and on 23% of SDG indicators.

Another advantage of using geospatial data to monitor SDG progress is its ability to capture spatially disaggregated information, allowing us to measure the progress of communities at the sub-national level. This provides a broader and more representative perspective on a country's SDG progress and encourages greater local participation in and ownership of data. This also enables us to involve indigenous and historically marginalized communities in SDG efforts to ensure that no one is left behind in the Sustainable Development Agenda.

In this sense, geospatial data is also crucial for the development of Voluntary Local Reviews of SDG progress, which have been published by cities and other sub-national entities, that allow for localized assessments and strategies for the implementation of the SDGs. Space-based tools can therefore produce timely, inclusive and locally accountable data for the monitoring of the SDGs, which developing countries can utilize through open space data policies for the monitoring of their development plans.

4. What could be the role of the CSTD as part of the overall work on the UN in the field of digital data?

In accordance with the CSTD's mandate to advance understanding of science and technology policies, the CSTD could have a role in supporting UNOOSA, as the gateway to space in the UN system, in its work in relation to the Space2030 Agenda to promote the use and applications of space for development and for the achievement of the SDGs.

As part of its role in "the examination of science and technology questions and their implications for development", the CSTD could seek representation at COPUOS in order to keep abreast of high-level discussions on the use of space for development. The Commission could also explore the possibility to join UN-Space to participate in inter-agency collaboration around space and development (for more information on UN-Space, please see UNOOSA's submission for Priority Theme 2).

Regarding the CSTD's mandate in "the formulation of recommendations and guidelines on science and technology matters within the United Nations system", the Commission could explore a possibility to support UNOOSA in capacity-building and providing support to developing countries in the sound interpretation of space data and its translation into meaningful outputs for sustainable development.

Please contact oosa@un.org if you have any questions.

Sources:

ST/SPACE/85 - Contribution to the "Space2030" Agenda: EU Space - Supporting A World Of 8 Billion People. UNOOSA, EUSPA. 2023.

The "Space2030" Agenda: space as a driver of sustainable development. UN General Assembly. 2021.

Our Common Agenda Policy Brief 7: For All Humanity – the Future of Outer Space Governance. UN Secretary-General. 2023.

Our Common Agenda Policy Brief 8: Information Integrity on Digital Platforms. UN Secretary-General. 2023.

Our Common Agenda Policy Brief 5: A Global Digital Compact – an Open, Free and Secure Digital Future for All. UN Secretary-General. 2023.

Our Common Agenda Policy Brief 9: A New Agenda for Peace. UN Secretary-General. 2023.

Space4SDGs: How space can be used in support of the 2030 Agenda for Sustainable Development. UNOOSA. 2023.

Space Solutions Compendium. UNOOSA. 2023.

Space for the Sustainable Development Goals: mapping the contributions of space-based projects and technologies to the achievement of the 2030 Agenda for Sustainable Development. André Baumgart, Eirini Ioanna Vlachopoulou, Jorge Del Rio Vera, and Simonetta Di Pippo. 2021.

Wardens in the dark: the triad resilience, GEOINT and data in the face of disinformation. Euro-Atlantic Resilience Centre. 2023

Earth Genome - Technologies for planetary scale intelligence. Earth Genome. 2023.

Advancing the next generation of SDG geospatial indicators. SDG Transformation Center. 2023.

Using geospatial data. SDG Transformation Center. 2023.

SDG Transformation Center. SDG Transformation Center. 2023.

Sustainable Development Report 2023. Sustainable Development Solutions Network. 2023.

SDGs Today. Sustainable Development Solutions Network. 2023.

Sustainable Development Solutions Network. Sustainable Development Solutions Network. 2023.

Global Partnership for Sustainable Development Data. Global Partnership for Sustainable Development Data. 2023.

UNSD — UN-GGIM. UN Statistics Division. 2023.

Measuring Progress: Towards Achieving the Environmental Dimension of the SDGs. UN Environment Programme. 2019.

UN-Habitat - A Better Urban Future. UN-Habitat. 2023.