



The International Charter Space and Major Disasters NEWSLETTER

October 2025 | Issue 31



Activations on map



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ISRO – Charter Leadership

Indian Space Research Organisation (ISRO) became leader for the Charter in April 2025, succeeding the joint lead period of National Institute for Space Research (INPE)



NASA ISRO SAR Mission

NISAR, a NASA-ISRO radar mission, empowers global disaster relief with timely Earth observation and International Charter support.



New Value Added Products for Floods

ICube-SERTIT introduces a new flood mapping model with enhanced statistics and flood depth estimation using its INFLOS tool, delivering rapid, reliable information for Charter activations in flooding events.



SATELLITE DATA TO SUPPORT DISASTER RESPONSE WORLDWIDE

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ISRO's six-month leadership

In April 2025, the Indian Space Research Organisation (ISRO) assumed leadership of the International Charter:Space andMajorDisasters, takingover from Brazil'sNational Institute for Space Research (INPE). The transition was marked by the 53rd Charter Meeting held in Hyderabad, India, which brought together over 50 representatives (including ISRO - ECOs & PMs) from Charter member agencies to review progress and chart future directions. Alongside technical collaboration, the Hyderabad meeting allowed participants to visit ISRO's Earth Station facilities and experience India's cultural heritage, including the visit to Charminar and Kanha Shanti Vanam in Hyderabad.

During ISRO's six-month tenure, the Charter experienced 31 activations worldwide, including support for wildfires in Russia, floods and landslides in India, floods in Southeast Asia, oil spill in Kazakhstan, earthquake in Colombia among others.

During ISRO's lead period, several key activities were undertaken. Monthly *WebStories* were published from April to September. A detailed Content Plan for 2026 was prepared to enhance engagement through regular updates. The 25th Anniversary video by CNES was finalized and published, and work began on developing the New Standard Charter Presentation.

The Charter also advanced its global outreach during this period, 4 new Authorized Users (AU) namely Zambia, Namibia, Jamaica and Libya were added to the Charter, thus increasing the recognition of Charter's role in disaster management. Trainings for Authorized Users and Project Managers (PMs) were conducted, enhancing operational capacity across member nations. In parallel, the Charter initiated the processing of GHGSat's application as a potential Data Contributor, which would further expand the satellite resources available to the Charter community. Médecins Sans Frontières (MSF) was imparted observer role in the Charter. A Training Subgroup was also initiated in July 2025 to streamline and unify Charter training efforts, ensuring consistency and long-term planning for capacity building.

The Charter Leadership role was transferred to the Centre National D'Etudes Spatiales (CNES) during the board meeting held in France in October 2025



Members during the visit to the Kanha Shantivanam. Rainforest.



Charter Members during meeting



Charter Group being showcased the National Database for Emergency Management (NDEM) during the NRSC ISRO facility visit.



ISRO hands over the Charter Leadership role to CNES.



Charter members attending the 53rd meeting in Hyderabad, India

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25 years of International Charter

The International Charter: Space and Major Disasters stands as a remarkable example of global cooperation in harnessing space technology for humanity. Established in 1999 and operational since 2000, the Charter has become a lifeline for disaster relief organizations worldwide, providing critical Earth-observation satellite data to help save lives, protect infrastructure, safeguard the environment

Over the past 25 years, the Charter has been triggered nearly 1,000 times, supporting response efforts in 143 countries affected by natural and man-made disasters. From floods and earthquakes to volcanic eruptions, oil spills, wildfires, it has provided timely geospatial information to emergency responders on the ground. This unique international mechanism has ensured that space assets are mobilized in a coordinated, rapid and humanitarian spirit.

One of the Charter's most remarkable achievements lies in the evolution of its technological capabilities. When it began, optical satellite imagery had a resolution of several meters. Today, thanks to advances in satellite engineering, data with resolutions as fine as 30 cm can be delivered. The number of satellites accessible to the Charter has also grown exponentially—from just three in 2000 to over 270 today—ensuring better coverage, revisit times, redundancy.

Innovation has been central to this journey. The introduction of agile imaging modes, advanced Synthetic Aperture Radar (SAR) techniques, on-orbit weather forecasting has enhanced acquisition accuracy and reliability. Processing and delivery times, once stretching into days, are now reduced to minutes or hours, often making the difference in early relief actions. Artificial intelligence and improved algorithms for geometric and radiometric corrections have further boosted the precision of derived products, enabling rapid change detection and damage assessment.

Equally important has been the Charter's commitment to collaboration and openness. Its workflows are now largely automated, with APIs supporting rapid activation. Moreover, while the Charter images and derived products were reserved to Charter members at the beginning, in 2012 the Universal Access open the space domain to disasters managers of all countries. Finally, partnerships with regional and international initiatives such as Sentinel-Asia, Copernicus Emergency Management Service (CEMS), Committee on Earth Observation Satellites (CEOS) have strengthened its global achievements and impact.

The "International Charter 'Space and Major Disasters'" received the William T. Pecora Award in 2017, a prestigious honor given for outstanding contributions to understanding the Earth through satellite. The Charter was recognized for its critical role in providing free satellite imagery for disaster response worldwide

As it marks 25 years, the International Charter symbolizes the power of space assets when shared selflessly across borders. By combining cutting-edge technology, international solidarity, a humanitarian mission, it continues to stand as a vital tool in global disaster management—helping societies become more resilient in the face of an uncertain future.



WILLIAM T. PECORA AWARD

International Charter on Space and Major Disasters
For outstanding support to the global community during times of crisis

"The International Charter on Space and Major Disasters (Charter) supplies 'during periods of crisis, to States or communities whose population, activities or property are exposed to an imminent risk, or are already victims of natural or technological disasters, satellite data which provide critical information for the management of crises.' From the first Charter activation in 2000 to ongoing activations in 2017, the Charter has provided satellite imagery free of charge for disaster response purposes throughout the world."

Satellite imagery and information disseminated from the Charter supported response efforts to the massive 7.9 magnitude earthquake in Nepal in 2015; Typhoon Haiyan in the Philippines in 2013; the earthquake in Haiti in 2010; the oil spill in the Gulf of Mexico in 2010; the tsunami in Indonesia and Thailand in 2004, and more than 500 other disasters spanning the globe. In each situation, the Charter responded with satellite remote sensing data, information, and expertise, in a reliable and responsive way to help mitigate the impact on human lives and livelihoods from floods, earthquakes, fires, oil spills, hurricanes & typhoons, and more. The Charter has a system that springs into action in the earliest hours following a disaster, through cooperation and collaboration across space agencies and participating organizations, to provide the right data and information to the right set of users and responders at the right time.

The founding of the Charter in November 2000 and its subsequent growth and operations have changed the way civil protection agencies respond to disasters, greatly increasing their use of satellite earth observations to save lives and protect property. With the satellite imagery provided by the Charter, decision-makers, rescue teams, and responders can assess the extent and areas of damage before putting response teams at risk. That imagery allows them to quickly determine best available ingress routes to rescue victims, move them to safety, and select the best marshalling locations for rescue efforts.

Through its network of authorized users, the Charter provides a unified system of remote sensing satellite data acquisition and delivery to those affected by sudden onset natural or anthropogenic disasters. Each of the 18 Charter member agencies commits satellite, data processing, and data distribution assets to provide emergency managers with information they need to support response and near-term recovery efforts. The wide range of capabilities operated by Charter members can ensure rapid coverage and on-call responses on the Earth, providing an invaluable source of near-real-time information to responders.

The humanitarian mission, design, and implementation of the International Charter Space and Major Disasters make it highly deserving of the William T. Pecora Award.

Secretary
Department of the Interior

Acting Administrator
National Aeronautics and
Space Administration

The "International Charter 'Space and Major Disasters'" received the William T. Pecora Award in 2017

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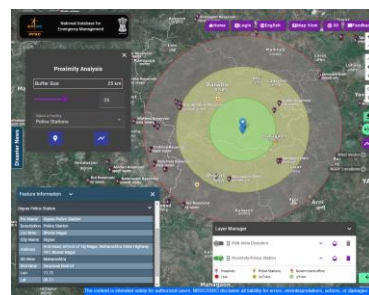


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NDEM: Mapping Resilience – How India's Geo-Intelligence Portal is Shaping Disaster Management

As natural disasters grow increasingly unpredictable, India is building resilience through innovation. At the heart of this effort lies the National Database for Emergency Management (NDEM)—a geo-intelligence platform developed by ISRO's National Remote Sensing Centre (NRSC) under the vision of the Ministry of Home Affairs (MHA). More than a database, NDEM acts as a command centre for emergency response, space-data fusion, and disaster intelligence across the country.

Designed to support disaster managers in all States and Union Territories, NDEM assists through every phase—early warning, preparedness, response, and recovery. Its Disaster Dashboard consolidates critical alerts, forecasts, and news to provide a Pan-India situational overview. Historical disaster archives enable detailed geospatial analysis, while Decision Support Tools—including proximity analysis, route planning, evacuation strategies, and multi-layer analysis—enhance operational efficiency during crises.



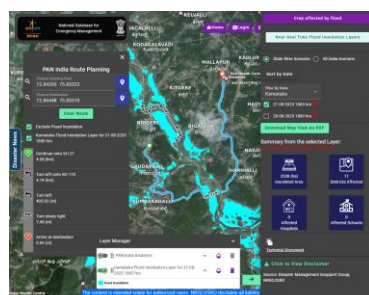
Proximity analysis



NDEM Version 5.0: Real-Time Disaster Intelligence

The latest release, NDEM Version 5.0, represents a unified platform integrating multi-agency services for near real-time disaster alerts. Developed under ISRO's Disaster Management Support Programme, it provides dynamic national coverage with live forest fire locations, flood mapping, and spatial flood early warnings for the Godavari and Tapi basins. Lightning alerts generated by NRSC further strengthen localized preparedness.

NDEM 5.0 also integrates forecasts and warnings from key organizations. This integration ensures disaster managers receive timely, accurate, and actionable data through a single geospatial portal powered by ISRO's space capabilities.



Obstruction Avoidance Route Planning

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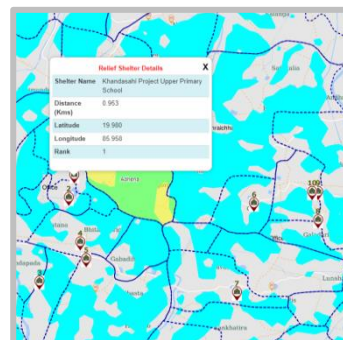
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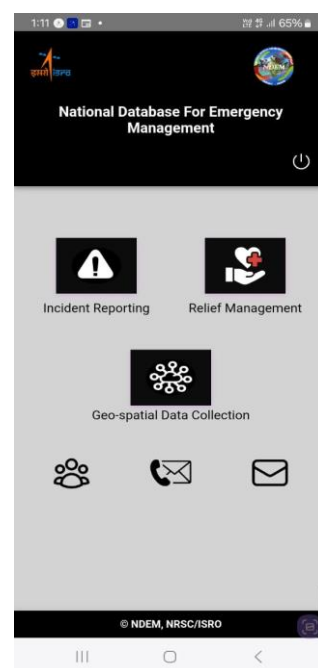
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Key Highlights of NDEM

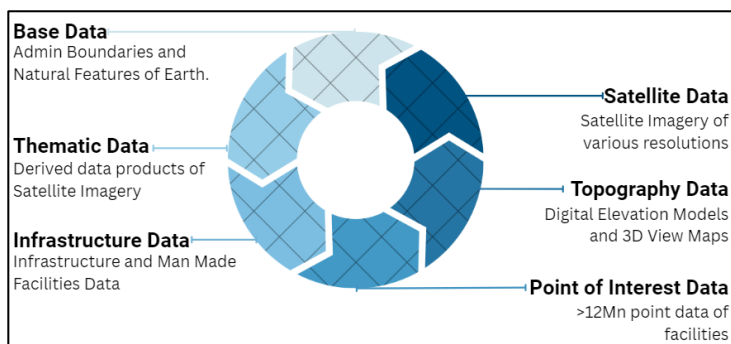
- **Nationwide Geo-Portal:** With over 59 million hits and 42,000 unique IPs in 2024, NDEM has become a trusted hub for disaster-related information. Multilingual maps, proximity and route analyses, and statistical modules aid decision-making.
- **Disaster Information Products:** Over 11,900 disaster-specific products have been delivered through NDEM for floods, cyclones, landslides, and earthquakes, with real-time dissemination and also via email and messages.
- **Multi-Scale Geospatial Database:** Hosting data at varying resolutions from 50 meters to sub-meter imagery for critical areas, the database covers base maps, infrastructure, thematic layers, topography, and Points of Interest.
- **Decision Support Tools:** Proximity, route, and evacuation planning tools are supplemented with Indian Disaster Resource Network (IDRN) integration for search & rescue equipment, resource management modules, and Post-Disaster Needs Assessment (PDNA) for mitigation.
- **Customized NDRF Geo-Portal:** Built in collaboration with NDRF, this secure platform aids incident reporting and approvals, supporting relief operations. NDRF personnel from 16 battalions have been trained
- **Capacity Building:** More than 3,000 officials from central, state, and district agencies, as well as NDRF/SDRF, have been imparted training through workshops and mock drills.
- **To strengthen disaster management at the ground level,** the NDEM Lite 2.0 mobile application has been developed



Evacuation Planning during flood –
identification of relief shelters



NDEM Relief Management Mobile App



Categorized Multi-scale Geospatial Database of NDEM

NDEM employs AI and machine learning to enhance disaster intelligence. A large language model moderates disaster news, filtering misinformation, while CNN and LSTM-based systems enable dynamic multilingual translation, ensuring accessibility across India's linguistic diversity.

NDEM embodies India's commitment to resilience—a platform that unites technology, institutions, and communities for disaster preparedness, response, and recovery. By fusing space-based insights with ground-level action, NDEM has become a cornerstone of India's disaster management ecosystem and a model of how geo-intelligence can safeguard lives and livelihoods in an increasingly uncertain world.

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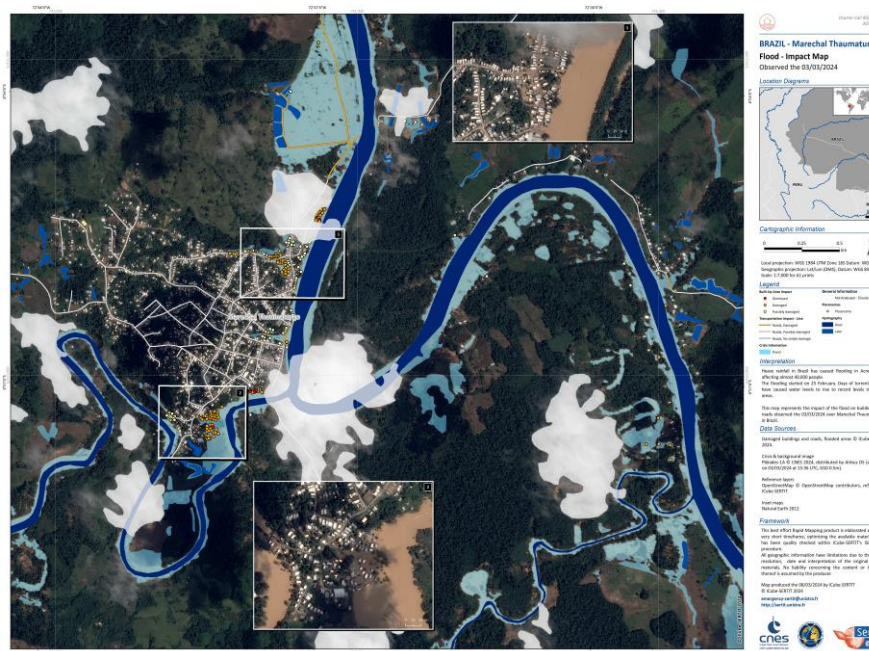
New Value-Added Product for flooding events



Since March 2025, a new Value-added Product is proposed by ICube-SERTIT in the case of Charter activation for flood events.

ICube-SERTIT is the French CNES sub-contractor and its Rapid Mapping Service has recently deployed of a new map model built on ArcGIS Pro. The new maps are based on the latest standards, following the recommendations set out within the Charter, and including statistics (e.g. flooded area surface, number of affected buildings affected, etc.).

This model is the new reference for SERTIT and will be used in all Charter activations involving SERTIT as value adding specialist. SERTIT will of course continue to produce and make available the vector layers displayed in the raster maps on its website: <https://sertit.unistra.fr/en/rapid-mapping/>



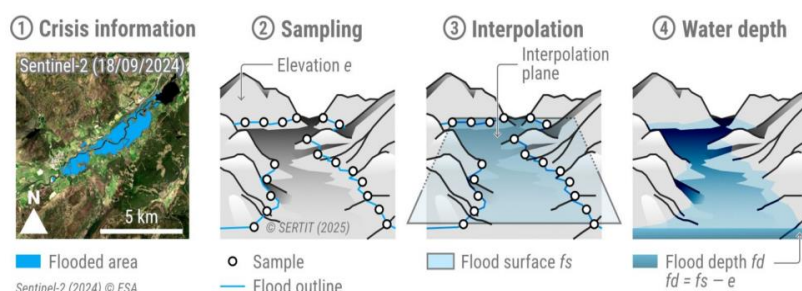
Flood depth estimation displayed in SERTIT's new map model, based on the results of the Charter Call 992 (ID 865) activation in August 2024 over Marechal Thaumaturgo in Brazil.

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In addition, ICube-SERTIT is proud to announce the integration of a new product in its Charter value adding portfolio: flood depth estimation, which will be provided when the event is relevant. This information can be provided thanks to the innovative INFLOS tool developed by ICube-SERTIT (<https://www.mdpi.com/2072-4292/17/2/329>).

Interpolated FLOod Surface (INFLOS) Simplified workflow



Simplified workflow to derive depth information for Value-Added Product

INFLOS (Interpolated FLOod Surface), which delivers flood depth estimates in under 30 minutes, is a rapid and adaptable solution for estimating floodwater depth across diverse flood scenarios, using remotely sensed data and high-resolution Digital Terrain Models (DTMs). It calculates flood depth by interpolating water surface elevation from sample point altitudes along the flooded area's boundaries.

Empowering Global Disaster Relief: NISAR and the International Charter

Monitoring the Earth's constantly changing surface and vegetation cover from space is essential for generating insights that benefit society and enhance resilience. Responding to this need, the NASA-ISRO Synthetic Aperture Radar (NISAR) mission brings a new dimension to radar-based Earth observation. As an all-weather, day-and-night radar imaging system, NISAR provides consistent and reliable data to support a wide range of scientific applications—including solid earth processes, ecosystem health, and cryosphere studies—while also playing a crucial role in disaster monitoring and global emergency response. Designed to track earthquakes, volcanic activity, land deformation, and environmental change, NISAR enhances rapid response capabilities by prioritizing data acquisition and accelerating delivery in disaster situations, ensuring that decision-makers receive timely and actionable information.

Launched on 30 July 2025 from ISRO's Satish Dhawan Space Centre, NISAR is the world's first dual-frequency SweepSAR mission, operating in L-band (1.25 GHz) and S-band (3.2 GHz) radar frequencies.

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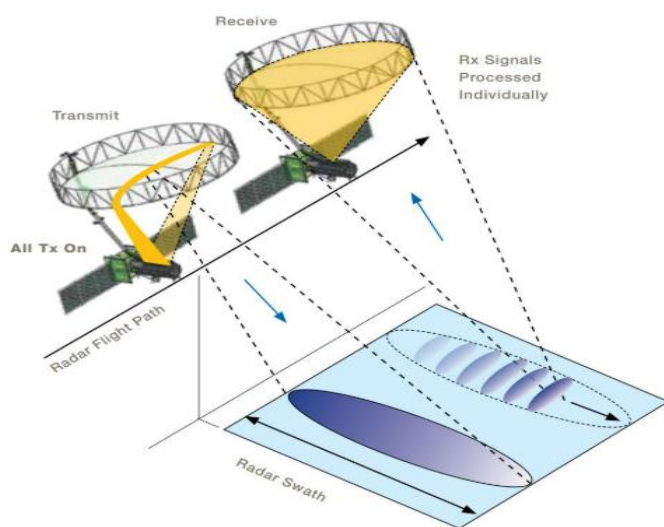


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Developed jointly by NASA's Jet Propulsion Laboratory (JPL) and ISRO, the mission represents a landmark achievement in Earth observation. Equipped with a 12-meter deployable reflector, a dual-frequency antenna feed, and advanced polarimetric and interferometric modes, NISAR delivers high-resolution imaging (3–10 meters) over a wide 240 km swath with a 12-day revisit cycle. The payload incorporates precision GPS for orbit determination and a high-rate downlink system to handle massive data volumes, ensuring global accessibility. Operating in L-only, S-only, or combined L+S acquisition modes, NISAR is designed to meet diverse science and operational needs across ecosystems, cryosphere, coastal zones, solid earth, and disaster response.



SweepSAR Imaging technique

A major innovation of the mission is its provision for Urgent Response (UR) tasking, which allows data acquisition, downlink, and processing to be prioritized after major disasters. Although imaging opportunities are tied to orbital cycles, NISAR strengthens the global fleet of Earth observation satellites by reducing delays in the delivery of actionable data. Under the UR protocol, tasking requests are submitted through the Smart Tasking Tool and reviewed alongside other mission priorities. NISAR operates on a 24-hour tasking cycle, with a 5–6 hour data delivery window from the time of ground station downlink. This capability ensures rapid turnaround to support critical decision-making in response to disasters such as floods, wildfires, earthquakes, volcanic eruptions, landslides, oil spills, and dam failures.

Processing NISAR's SweepSAR data is complex, involving digital beamforming and pulse repetition frequency (PRF) dithering across polarizations. At ISRO's National Remote Sensing Centre and NASA's Science Data System, advanced ground segments handle high data volumes and transform raw radar echoes into multiple levels of products.

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These include Level-0 raw radar packets, Level-1 geocoded products such as single-look complex images and interferograms, Level-2 terrain-referenced outputs like unwrapped interferograms and polarimetric covariance matrices, and higher-level thematic products (Level-3/4) for ecosystems, surface deformation, cryosphere, geology, oceanography, and disaster response. Calibration and validation plans, using corner reflector sites across India and globally distributed targets, ensure product accuracy and reliability.

	S-band	L-band
Orbit	747 km with 98° inclination (Polar Sun-synchronous)	
Repeat Cycle	12 days	
Time of Nodal Crossing	6 AM / 6 PM (dawn-to-dusk-orbit)	
Frequency	3.2 GHz ± 37.5 MHz	1.257 GHz ± 40 MHz
Wavelength	9 cm	24 cm
Available Polarimetric Modes	Single Pol (SP): HH or VV Dual Pol (DP): HH/HV or VV/VH Compact Pol (CP): RH/RV Quasi-Quad Pol (QQP): HH/HV and VV/VH	SP: HH or VV DP: HH/HV or VV/VH CP: RH/RV Quad Pol (QP): HH/HV/VH/VV
Range Bandwidths Options	10 MHz, 25 MHz, 37.5 MHz, 75 MHz	5 MHz, 20 MHz, 40 MHz, 80 MHz
Swath Width	>240 Km (except for QQP Mode)	>240 Km (except for 80MHz BW)
Spatial Resolution	6.5m (Az); 2m-15m (Slant-Range)	7m (Az); 2m-30m (Slant-Range)
Incidence Angle Range	33 - 47 deg	33 - 47 deg
Noise Equivalent σ ₀	Better than -25 dB (for required full-swath modes)	
Pointing	Left (South), capacity exists for left / right pointing	
Pointing Control	< 273 arc seconds	
Orbit Control	< 500 meters	
Data and Product Access	Free & open access	
Mission Duration	5 years (Baseline mission duration: 3 years)	
Imaging Payload	• Dual Frequency (L & S-Band) Synthetic Aperture Radar (SAR) • L-band SAR (NASA); S-band SAR (ISRO) • Large size 12 diameter common unfurlable reflector antenna • ~240 Km observable swath with (2-30 meters range resolution)	

NISAR data is distributed openly, reinforcing global accessibility. ISRO provides products through its Bhoonidhi platform (<https://bhoonidhi.nrsc.gov.in>), which supports direct download and an on-demand processing framework, while NASA disseminates L-band products via the Alaska Satellite Facility (ASF) DAAC. Together, these platforms ensure that scientists, disaster managers, and International Charter members can access and exploit NISAR data efficiently.

For the International Charter on Space and Major Disasters, NISAR significantly enhances global disaster relief efforts. Its dual-frequency capability, wide coverage, and urgent tasking provision enable rapid acquisition and delivery of critical radar products, strengthening the Charter's mission of providing timely space-based support to countries in crisis.

By delivering free, reliable, and high-resolution data to the international community, NISAR stands as a symbol of technological innovation and global collaboration—empowering resilience, precision, and effective disaster response worldwide.

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ESA's Engagement at the CDM13 Conference to Strengthen Disaster Preparedness in the Caribbean

The European Space Agency participated in the 13th Caribbean Conference on Comprehensive Disaster Management (CDM13), held from December 2-6, 2024, in St. Kitts and Nevis. Aligned with the conference's theme, "Road to Resilience - Checkpoint 2024: Levelling Up for a Dynamic Future," ESA engaged with regional and international experts to explore innovative disaster management strategies. Philippe Bally, Charter Board member from ESA, attended the conference along with Zachary Foltz from ACRI-ST, who supports ESA's Charter activities related to the processing environment and the user base.

A key focus of ESA's participation was expanding access to the International Charter in the Caribbean, a region highly vulnerable to hurricanes, floods, and other hazards. Currently, the Caribbean is one of the few regions of the world lacking sufficient Authorized Users, limiting their ability to directly request satellite-based emergency response support. To address this gap, the ESA team held bilateral meetings with several National Disaster Management Agencies, including those from Cuba, St. Vincent and the Grenadines, St. Kitts, Jamaica, and Belize. These discussions informed the agencies about the Charter and encouraged them to apply for Universal Access, which would enhance their disaster response capabilities. The ESA Charter Mapper was demonstrated both at these bilateral meetings and in the "Resilience Village" area of the conference where attendees could view different booths and explore presentations from various organizations. The use of the Charter Mapper during the response to Hurricane Beryl was highlighted, as very-high resolution before and after images were used to assess the damage due to the storm.

In addition to these engagements, ESA attended multiple presentations to gain insights into the latest advancements in disaster risk management across the Caribbean. The connections made at CDM13 will play a crucial role in strengthening regional disaster preparedness, fostering collaboration, and ensuring that more nations can leverage space-based resources to build resilience in the face of evolving climate and disaster challenges.



European attendees of CDM13 meet the prime Minister of St. Kitts and Nevis.

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As part of the CDM13 program, ESA, in collaboration with DG INPTA LAC, organized a dedicated session on the role of satellite EO in disaster risk management. This session explored the contributions of the Copernicus Sentinel missions and supporting application programs, such as the CopernicusLAC initiative, which has active use cases and partnerships in the Caribbean. The session provided an overview of the current state of hydrometeorological services in the region, plans for their evolution, and how satellite data can enhance risk mitigation, disaster preparedness, and response. The session also showcased the potential benefits of an online ecosystem for big data and hydromet applications, such as those planned within CopernicusLAC for Sentinel missions. An open discussion allowed participants to engage with experts on how these capabilities could be further tailored to regional needs.

As of May 2025, 6 months following the conference, 4 countries engaged at the conference applied and were accepted as Authorized Users. These countries are Cuba, Saint Vincent and the Grenadines, Belize, and Jamaica. Considering this improvement in Authorized user coverage in the Caribbean region, the conference was a great success for the Charter. It is therefore planned to continue involvement with CDEMA to continue capacity building efforts in the LAC region. The next CDM conference will be CDM14 in Georgetown, Guyana, in December 2026.



ESA and partners present on the contribution of EO to DRM

Showcasing Disaster Response Efforts at ESA Living Planet Symposium 2025

The International Charter “Space and Major Disasters” reaffirmed its commitment to global resilience by taking part in the European Space Agency’s Living Planet Symposium, held in Vienna from June 23rd to 27th 2025. This landmark event, hosted in a different European city every three years, gathers the global Earth observation community to bridge the gap between data and tangible climate action.

LPS25 drew over 6,500 in-person participants, representing nearly 120 countries, and featured more than 4,200 scientific presentations and posters, making it one of the most diverse and dynamic Earth observation gatherings to date.

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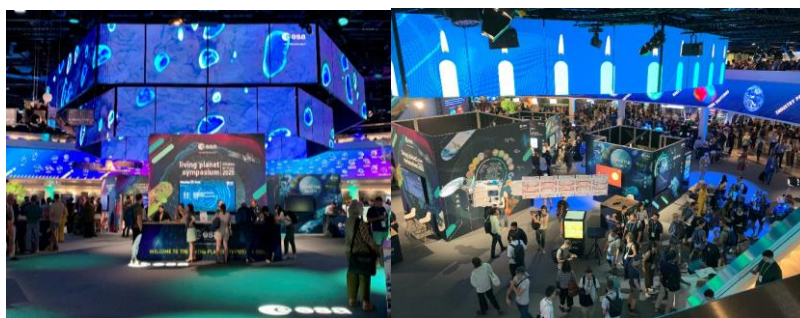


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Within this vibrant context, the Charter played a role in two dedicated conference sessions. The first, *“Using satellite EO in global capabilities for disaster response”*, chaired by Charter members Philippe Bally (ESA) and Sandro Martinis (DLR), showcased how the Charter and other large-scale Earth observation initiatives are providing rapid damage and situation mapping during emergencies. Discussions emphasized the need for timely, high-quality geoinformation, especially as climate change drives more frequent and severe disasters. The sessions also highlighted innovations such as multi-sensor analysis, artificial intelligence, and cloud-optimized platforms to improve coverage and speed. The second session, *“International Collaborations concerning Satellite EO and Disaster Response”*, chaired by Charter board member Rune Floberghagen (ESA) and featuring presentations from Charter board member Linda Tomasini (CNES) and Harshbir Sangha (UKSA), explored how partnerships between initiatives such as the Charter, UNITAR/UNOSAT, Sentinel Asia, and Copernicus Emergency Management Service are advancing global disaster risk reduction. Together, these sessions underscored the Charter’s central role in fostering collaboration, driving innovation, and ensuring that satellite data translates into actionable insights when they are most urgently needed.



Photos of the exposition and agora area of the conference

The symposium’s broader theme **“From Observation to Climate Action and Sustainability for Earth”** emphasized how Earth observation technologies, such as the Charter’s platforms and emerging tools like AI-driven damage assessment, are critical to enhancing disaster risk reduction globally. By combining satellite data, digital tools like AI, and a global network of agencies, the Charter is helping communities around the world anticipate and respond to natural disasters with greater speed and accuracy.

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