Asia-Ocean Environmental Monitoring Platform

Platform Overview

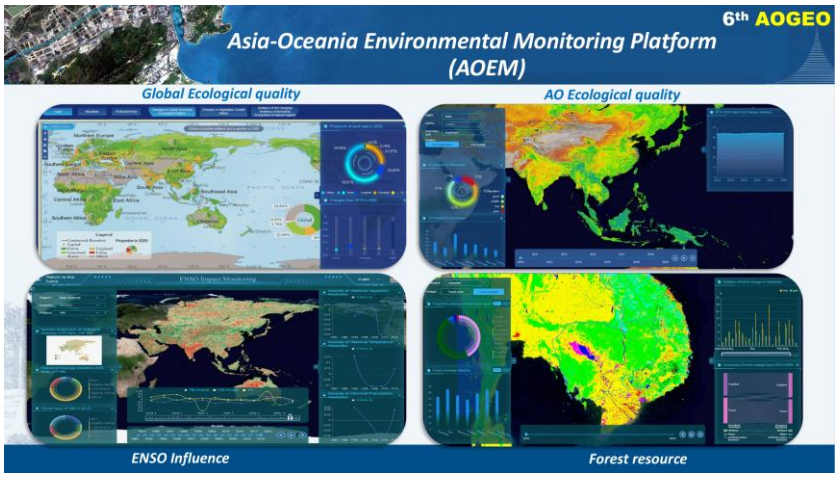
The Asia-Oceania Environmental Monitoring Platform (AOEM) is an integrated remote sensing platform developed under the Asia-Oceania Group on Earth Observations (AOGEO) initiative. Led by the Aerospace Information Research Institute (AIRCAS), Chinese Academy of Sciences, in collaboration with domestic and international partners, AOEM is designed to monitor and evaluate ecological dynamics across key hotspots in the Asia-Oceania region. The platform supports regional cooperation in environmental governance by providing standardized, high-resolution products and analytical reports on forest resources, air quality, urban expansion, and ENSO-related ecosystem responses.



AOEM Portal

Data Description

AOEM integrates multi-source satellite data, including FY-3, MODIS, GF-1/2/5/6, and CBERS-04, to generate 16 thematic products spanning from 5-meter to 3.3-kilometer resolution. Products include land surface parameters, air quality indicators, forest cover maps, and urban impervious surface layers. Temporal coverage extends from 1982 to the present, with daily, seasonal, or annual resolution depending on the product. Data is made available through the AOEM portal, along with monitoring reports and technical specifications. All data follow standardized technical workflows to ensure spatial and temporal continuity and comparability.



Functional Capabilities

AOEM is a comprehensive system integrating ecological monitoring, environmental assessment, and data services. It focuses on global and regional ecological quality analysis (e.g., ENSO climate impacts, forest resource dynamics), urban environmental monitoring (e.g., impervious surfaces, air quality), and industrial environmental effects (e.g., cement industry). With multilingual support, standardized data downloads, and report generation, AOEM serves government policymaking, scientific research, corporate sustainability, and public engagement, advancing ecological conservation and sustainable development.

Reference

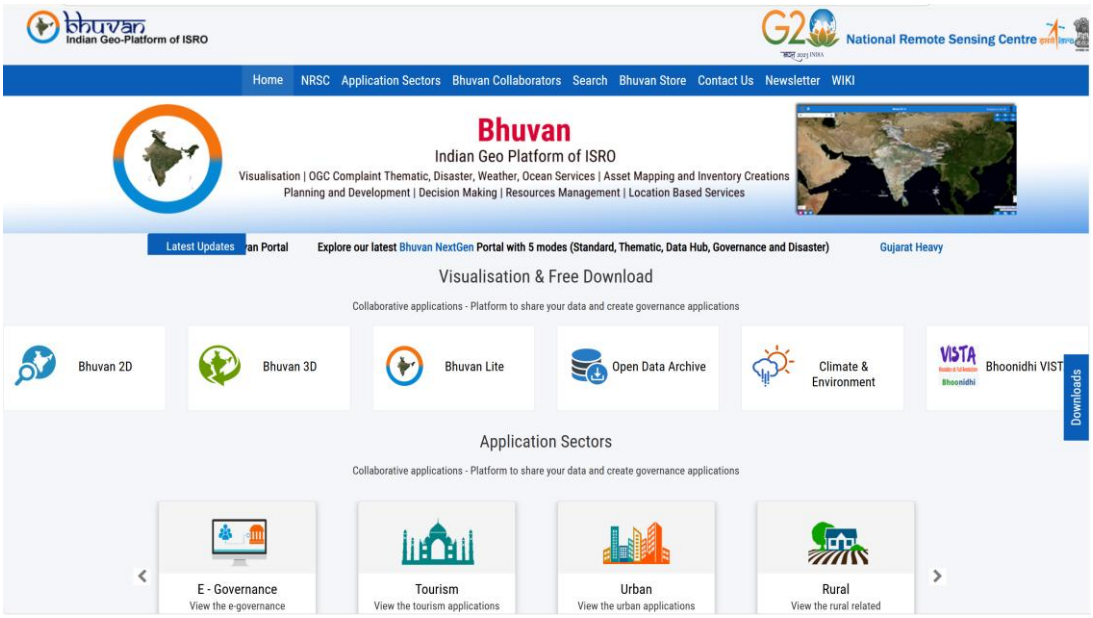
Li, Jing (2023). Integrated remote sensing monitoring of ecosystem over Asia-Oceania hot areas. Presentation at the 6th Asia-Oceania Group on Earth Observations (AOGEO) Workshop. Asia-Oceania Group on Earth Observations (AOGEO). Macau, China, May 29-31, 2023. Available at Integrated remote sensing monitoring of ecosystem over Asia-Oceania hot areas.pdf.

Bhuvan

Platform Overview

Bhuvan is a national geo-platform developed by the Indian Space Research Organization (ISRO) through the National Remote Sensing Centre (NRSC), launched in 2009 as a part of India's geospatial data infrastructure. It offers high-resolution satellite imagery, geospatial visualization, and application services built on data from India's Earth observation satellites such as Resourcesat, Cartosat, and RISAT. Bhuvan provides a centralized environment for accessing spatial information related to agriculture, forestry, urban planning, disaster management, water resources, and rural development. The platform supports more than 35 domain-specific portals, and its architecture is designed to integrate satellite data, GIS functionalities, and user interaction tools to aid governance, policy planning, and research.

Official website link: [Indian Geo Platform of ISRO]



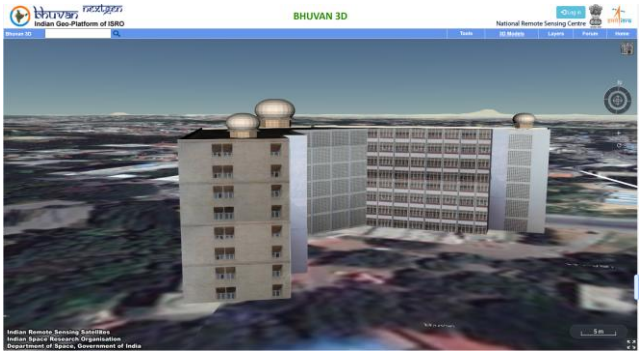
Bhuvan Portal

1. Visualization and Free Download

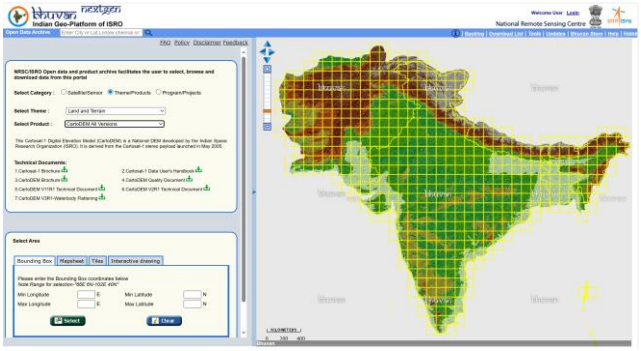
This section covers Bhuvan's core viewing and data access tools, including the 2D Viewer, 3D Viewer, and Open Data Archive, among others. Users can explore multi-resolution imagery and thematic layers in 2D or an immersive 3D environment and freely download satellite data and maps on themes such as land use/land cover, hydrology, and biodiversity.



Bhuvan 2D 2.0



Bhuvan 3D



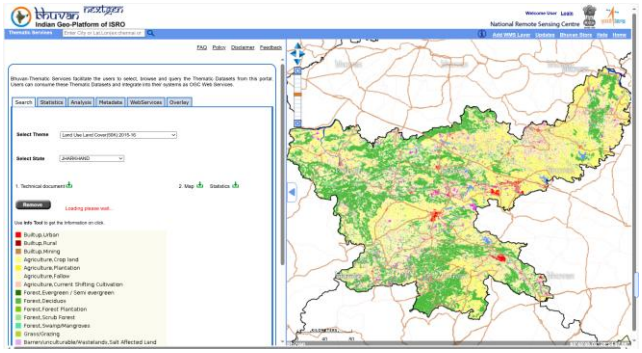
NRSC Open EO Data Archive



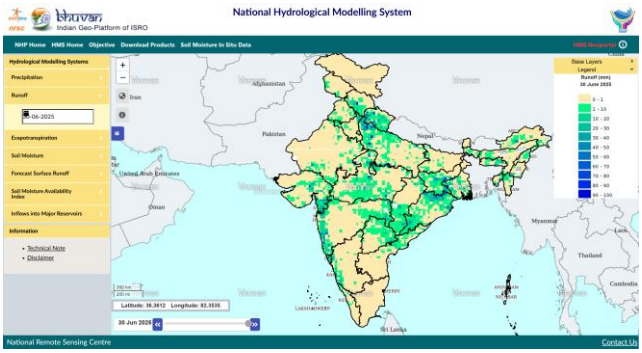
NICES - Earth & Climate Data Portal

2. Application Sectors

This section provides access to diverse application sectors, allowing users to explore resources and tools across agriculture, water, forestry, e-governance, tourism, urban, and rural domains for collaborative and informed decision-making.



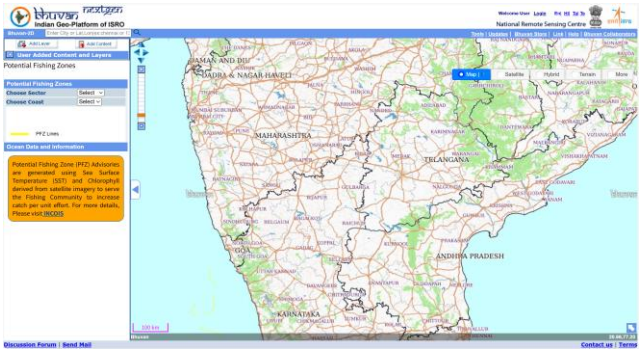
Urban Information System



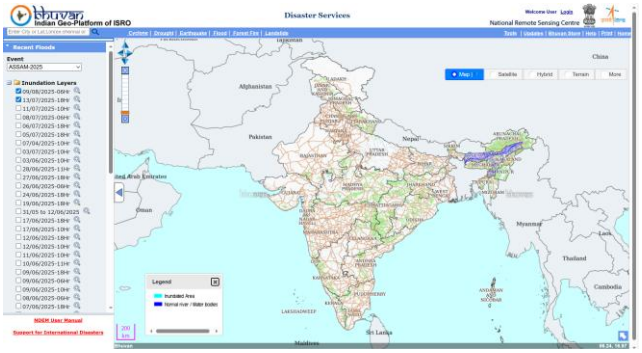
National Hydrological Modelling System

3. Maps and OGC Services

Maps and OGC Services offers thematic mapping solutions and enables users to easily create and manage personalized maps.



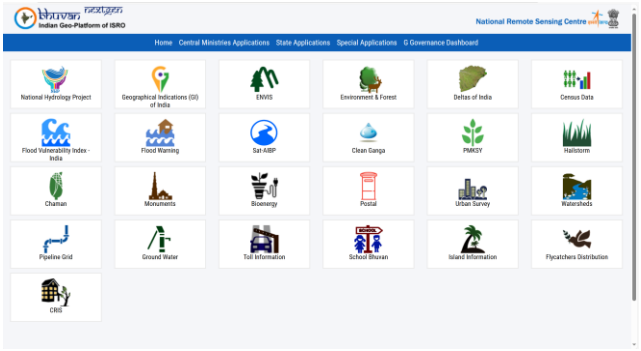
Ocean Services



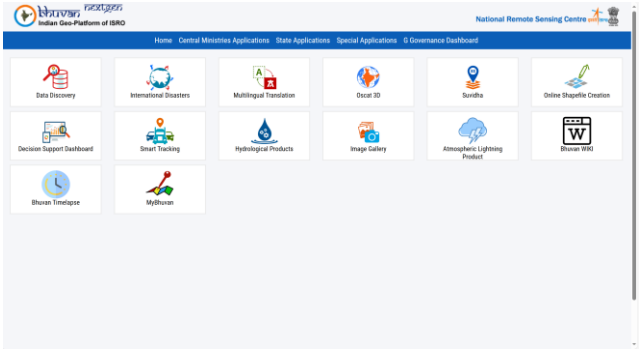
Disaster Services

4. Bhuvan Central Applications

The Bhuvan Central Applications section offers national and state-level platforms, including ministry portals, thematic applications, and governance dashboards to support data-driven decision-making and collaboration.



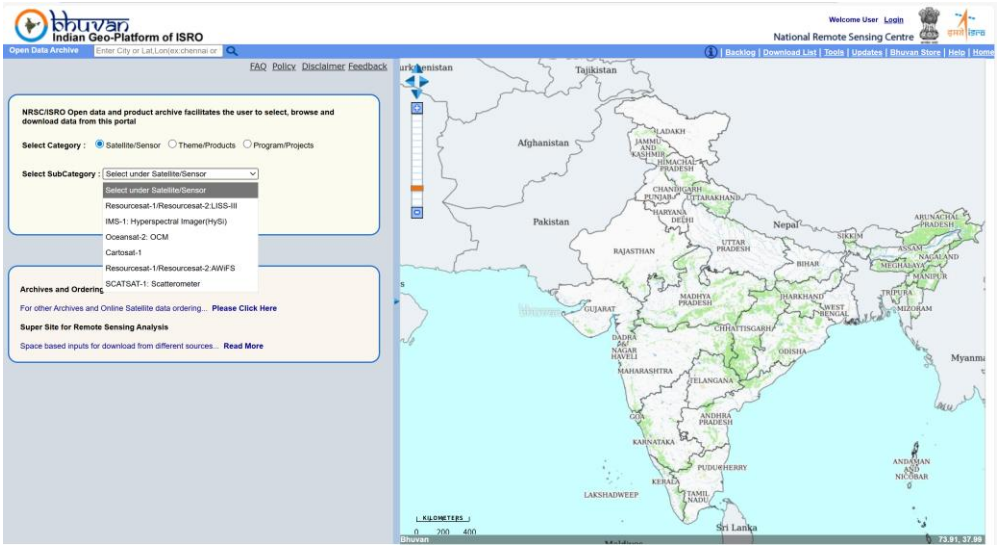
Central Ministries



Special Applications

Data Description

Bhuvan provides access to two primary categories of data: NOEDA (National Open Earth Observation Data Archive) Products and Thematic Services. NOEDA offers scientific datasets spanning land, ocean, atmospheric, and climate domains, including satellite imagery, surface temperature, vegetation indices, and rainfall estimation. Thematic Services deliver application-ready layers such as land use and land cover, groundwater prospects, wetlands, agricultural drought, and flood impact zones. Datasets vary in spatial resolution from sub-meter to 56 meters and in temporal resolution from half-hourly to annual. Many datasets are available through the Bhuvan Store with user registration and can be downloaded in standard GIS formats. The platform follows OGC standards and supports WMS/WFS services for interoperability with national and state-level e-governance platforms.



Open Data

Contact:
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Phone: +91-85-4222-5454

Reference

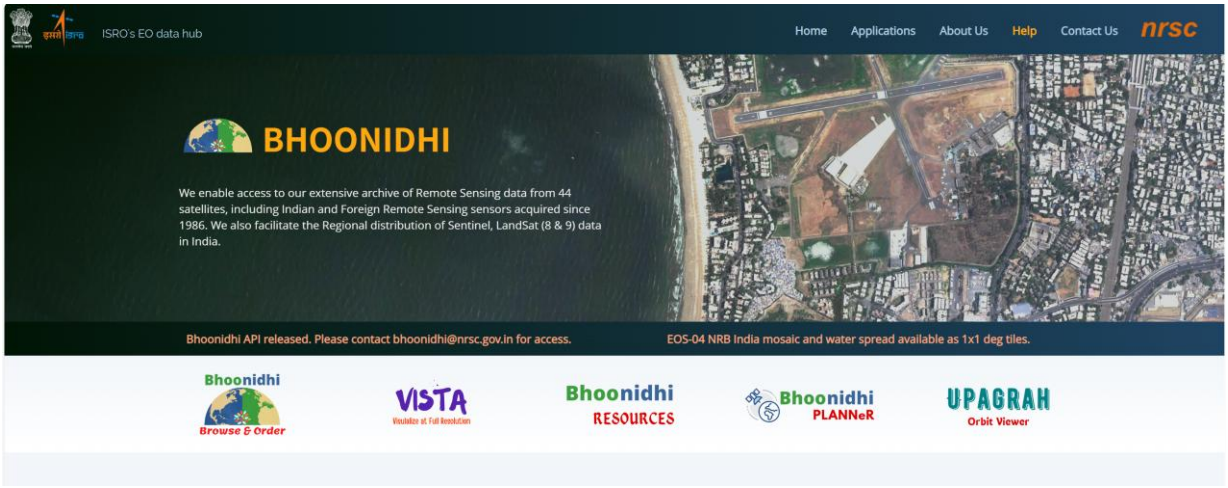
Indian Space Research Organisation (ISRO) (2009). Bhuvan – Indian Geo-Platform of ISRO. Available at: Indian Geo Platform of ISRO. Accessed on 16 August 2025.

Bhoonidhi

Platform Overview

Bhoonidhi (Bhuvan Open Earth Observation Data Hub) is a unified satellite data dissemination platform developed by the National Remote Sensing Centre (NRSC) under the Indian Space Research Organisation (ISRO). Officially launched in 2021, it provides centralized access to over three decades of Earth observation data from more than 46 Indian and foreign satellite missions. The platform is designed to enhance the discoverability, accessibility, and usability of satellite imagery for governance, environmental management, agriculture, infrastructure, and disaster-related applications. Bhoonidhi streamlines multi-source, multi-resolution, and multi-temporal data delivery through a web-based interface and supports end users from academia, government, and private sectors.

Website: Bhoonidhi Home



Bhoonidhi Portal

1. Bhoonidhi Browse & Order

Enables users to search, browse, download, and order open or priced data from multiple satellite missions, such as the IRS series, Landsat-8, Sentinel-1&2, and NovaSAR.



Bhoonidhi Browse

2. Bhoonidhi Vista

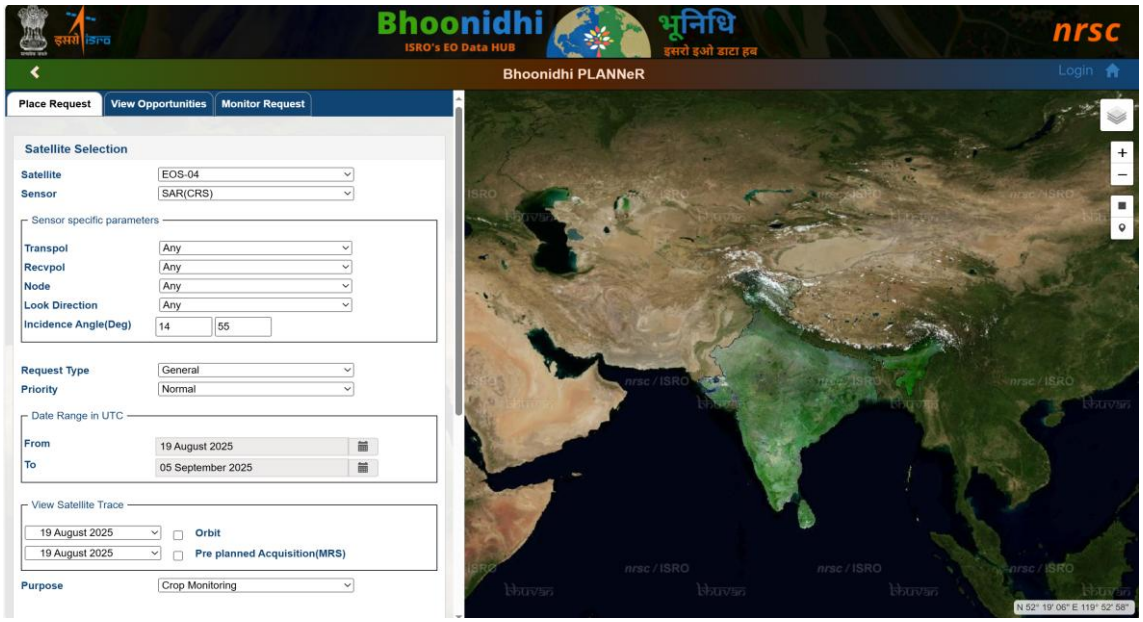
Bhoonidhi Vista offers daily data visualization capabilities, enabling the stitching and display of Earth observation data based on time-series analysis. The platform efficiently integrates multi-source remote sensing data and generates dynamic time-lapse visualizations for environmental monitoring, climate change research, and disaster assessment.



Vista

3. Bhoonidhi PLANNeR

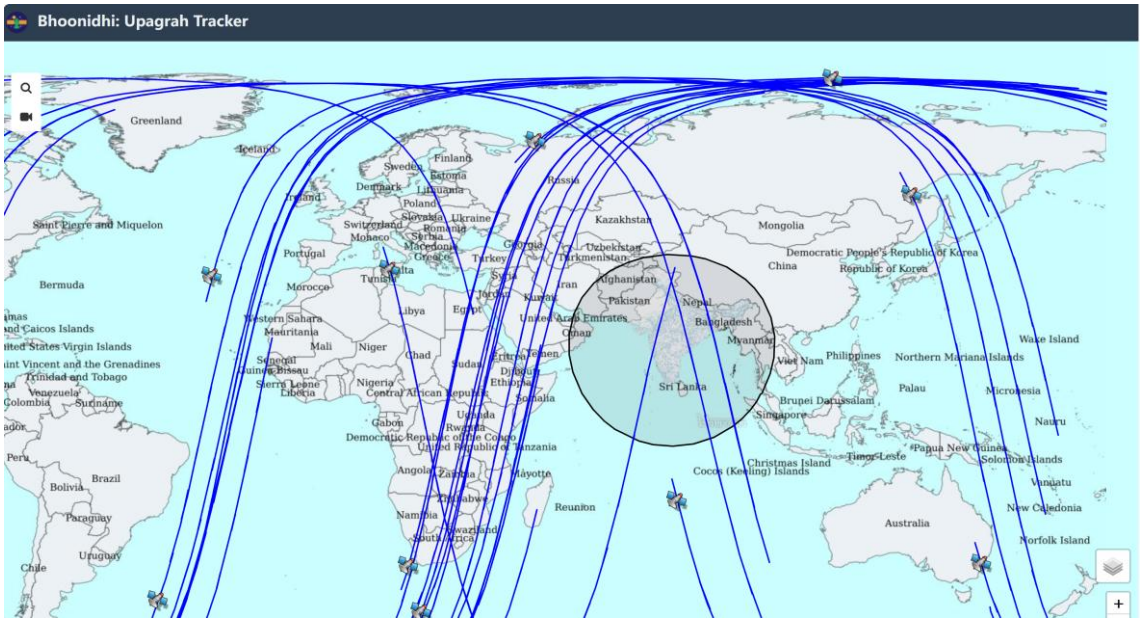
Enables users to query the feasibility and expected timeframes for EOS-04 satellite data acquisition, while also allowing users to submit new data collection requests. The system provides basic data availability query services and accepts user applications for data collection requirements.



PLANNeR

4. Upagrah

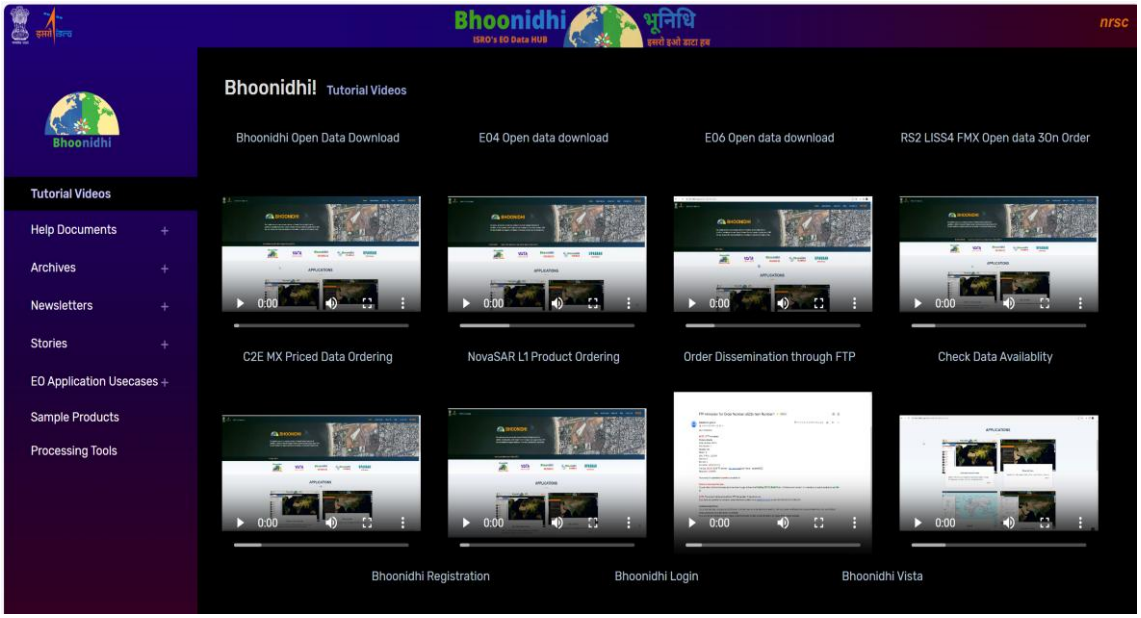
Real-Time Orbit Viewer is used for real-time tracking and viewing of the orbital positions of all satellites (based on UTC time).



Upagrah

5. Bhoonidhi Resources

Provides a resource center, including help documentation, training materials, news briefings, sample products, and data processing tools.



Help Tutorials

Data Description

Bhoonidhi hosts data from Indian missions including Resourcesat, Cartosat, Oceansat, INSAT, EOS series, and high-resolution commercial satellites such as Cartosat-3. It also includes international datasets from Sentinel-1/2 and Landsat-8/9 through collaborative arrangements. The platform supports spatial resolutions from sub-meter (<1 m) to over 1 km, and data products range from raw imagery to processed thematic layers like vegetation indices, land cover, and water bodies. Users can filter data

based on area of interest, time of acquisition, sensor type, and cloud cover, and download data in formats such as GeoTIFF and HDF. Visualization tools and metadata access are integrated to support data selection and interpretation. Many products are available freely after registration, while commercial datasets require request-based access.

Contact

Email: bhoonidhi@nrsc.gov.in

Reference

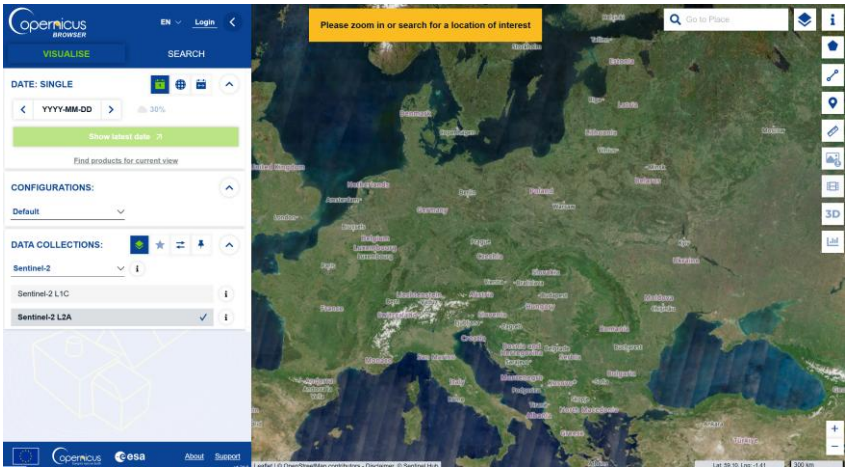
Indian Space Research Organisation (ISRO) (2021). Bhoonidhi – Earth Observation Data Dissemination Portal. Available at: Bhoonidhi Home. Accessed on 16 August 2025.

Copernicus Mirror Site

Platform Overview

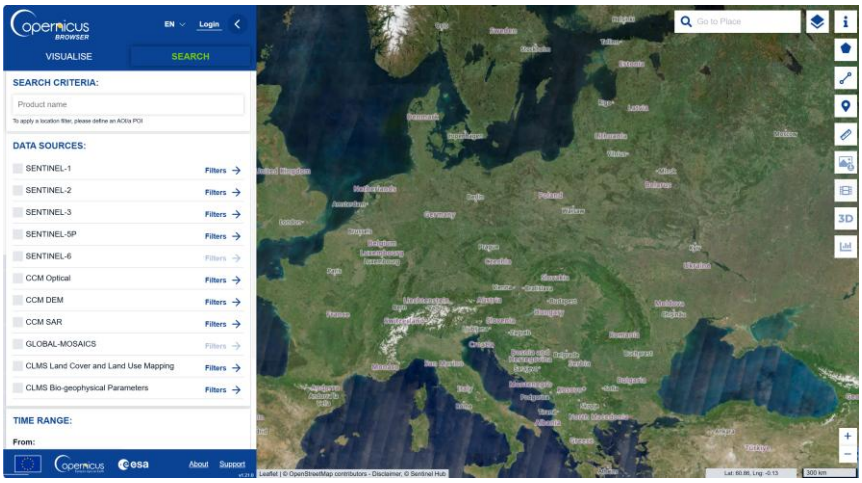
The Copernicus Mirror Site in the Philippines is the first regional Copernicus access node in Asia, jointly established by the European Union and the Government of the Philippines under the EU Global Gateway strategy. Officially launched in 2023, the platform enhances sovereign and localized access to Copernicus Earth observation (EO) data in the Philippines and broader Southeast Asia. Operated in partnership with the Department of Science and Technology (DOST) and the Philippine Space Agency (PhilSA), the mirror site significantly reduces latency and improves reliability in accessing key satellite datasets. It supports national priorities in disaster risk management, climate adaptation, and environmental resilience, while also fostering regional collaboration in EO data utilization.

Website: [Copernicus Browser]



Data Description

The site provides direct access to the full suite of Sentinel missions, including Sentinel-1, Sentinel-2, Sentinel-3, and Sentinel-5P. These datasets are freely available and span resolutions from 10 meters to 1 kilometer, with revisit cycles ranging from 1 to 5 days depending on the satellite and acquisition mode. All data are synchronized with the central Copernicus Open Access Hub and hosted locally to support reduced download times and higher availability across Southeast Asia. The platform also integrates value-added services from Copernicus thematic services, facilitating a broad range of operational and research applications.



Functional Capabilities

The Copernicus Mirror Site provides a sovereign, low-latency access node to Europe's Copernicus Earth observation system, optimized for national and regional use in Southeast Asia. It enables high-throughput retrieval and visualization of multi-sensor data, ensuring continuity of access during peak global demand or limited bandwidth scenarios. The platform's integrated interface allows users to perform area-specific searches, download multispectral and radar imagery, and access downstream thematic layers for environmental, climatic, and hazard applications. Through localized data hosting and open-access protocols, the system strengthens institutional readiness, supports EO-based decision-making, and contributes to regional geospatial capacity building.

Reference

European Space Agency (ESA) (2023). Copernicus Browser. Available at: Copernicus Browser. Accessed on 16 August 2025.

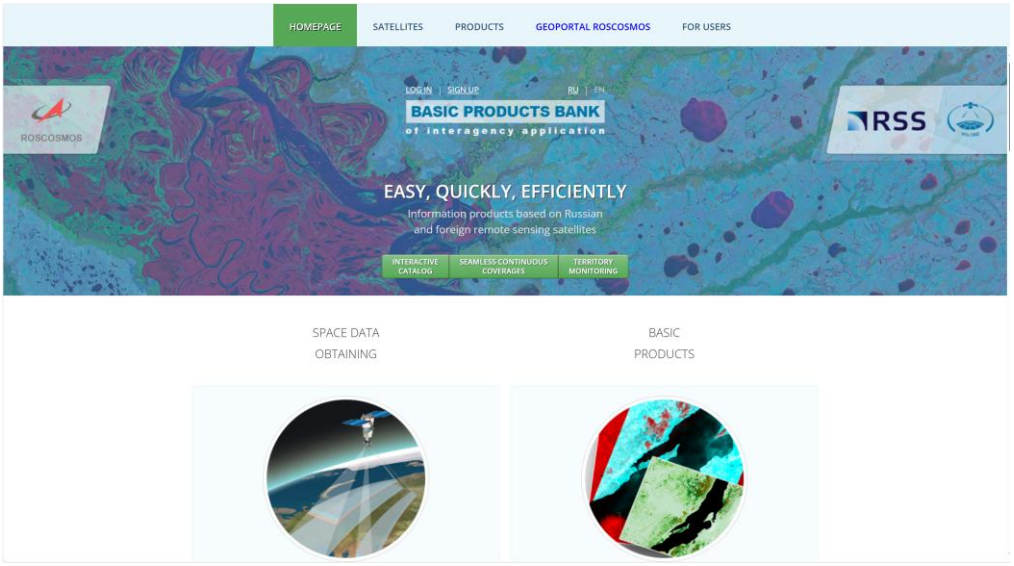
The CopPhil Centre (2024). Available at https://copphil.philsa.gov.ph/. Accessed on 16 August 2025.

Geoportal and Basic Products Bank

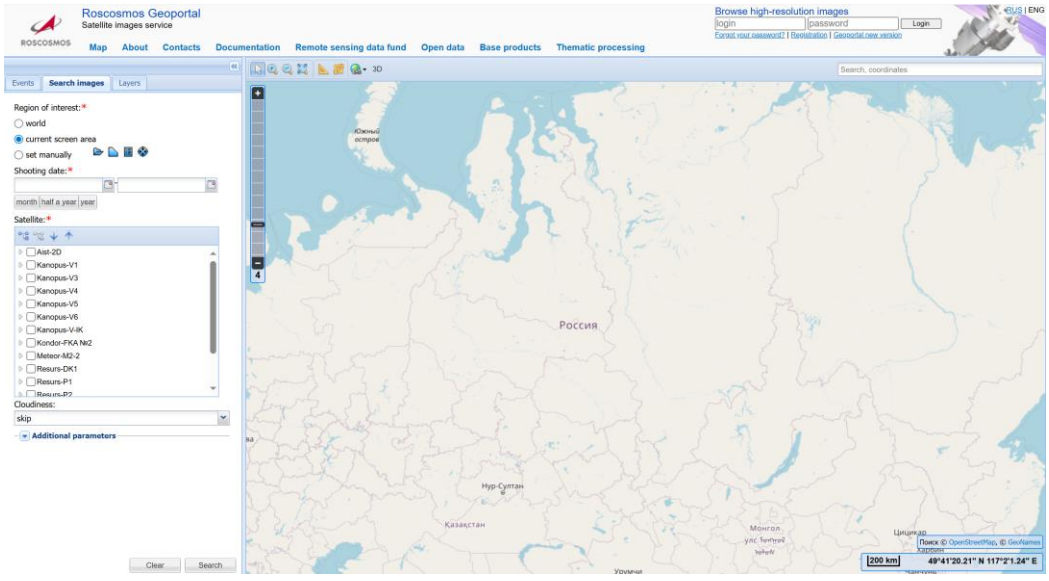
Platform Overview

Basic Products Bank is an official Earth observation data access platform developed by the Scientific Center for Earth Operational Monitoring (NTSOMZ). It serves as a centralized repository for archiving, managing, and distributing foundational remote sensing products acquired from Russian satellite missions. Designed to support national and regional needs, the portal facilitates access for governmental agencies, researchers, and commercial users through a multilingual web interface equipped with interactive visualization and search tools. The site also provides a direct link to the Roscosmos Geoportal, which is the broader national portal for remote sensing resources.

Website: [Basic Products Bank - Homepage]

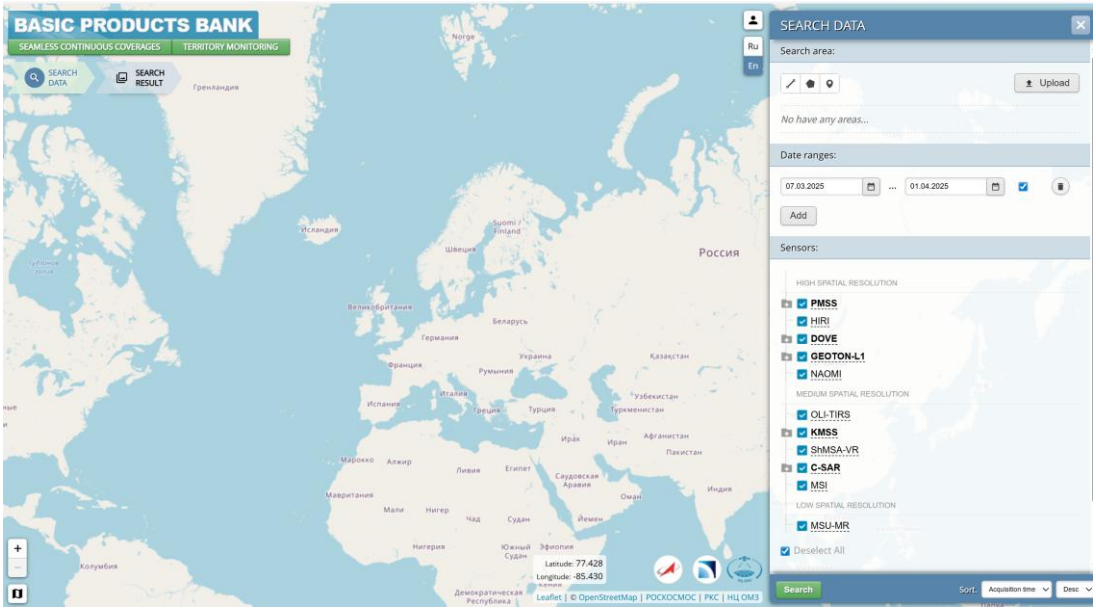


The Roscosmos Geoportal is the official national portal of the Russian space agency for Earth observation data and services. It serves as a central hub that provides access to remote sensing products, thematic applications, and interactive visualization tools. The portal integrates multiple services, including the Basic Products Bank and other specialized resources, supporting both scientific research and practical applications.



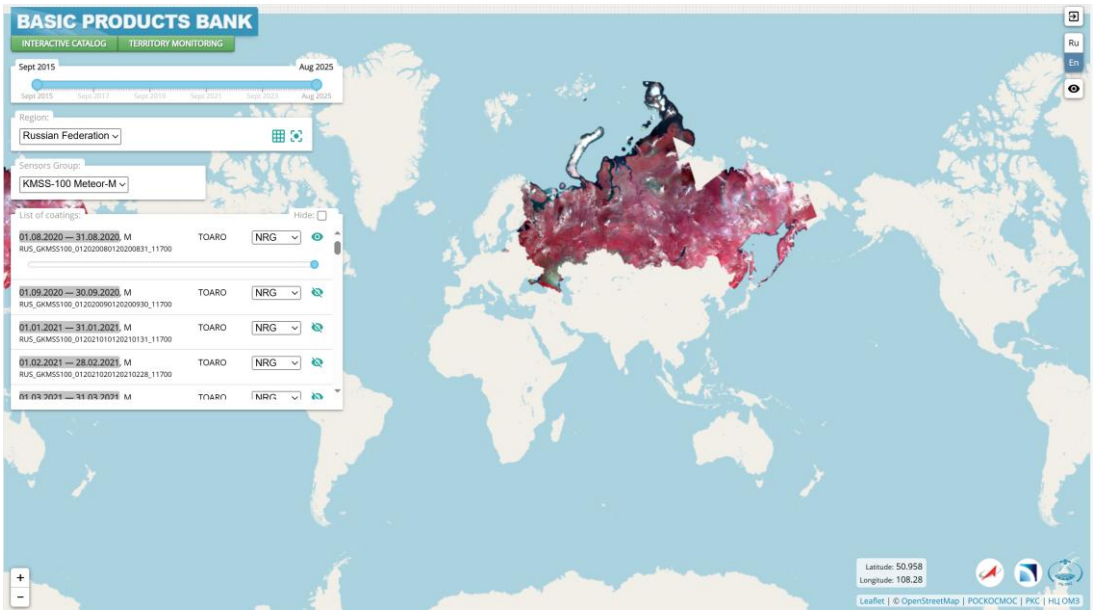
1. Interactive Catalog

Provides an interactive catalog where users can browse, search, and filter remote sensing products from different satellite missions and time periods and preview them on a map.



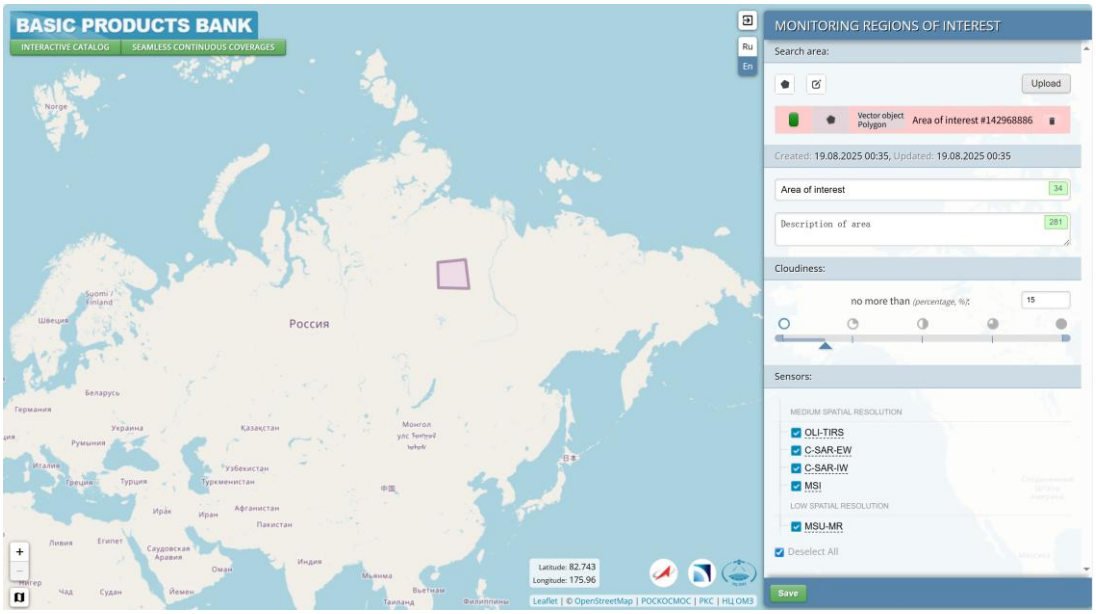
2. Seamless Continuous Coverages

Displays seamless image stitching covering large areas, supporting visualization and application from regional to national scales.



3. Territory Monitoring

Conduct dynamic monitoring based on remote sensing data, covering topics such as forest fires, floods, agricultural conditions, and land use changes.



Data Description

The platform hosts a diverse range of satellite datasets collected from Russian missions such as Resurs-P, Kanopus-V, Meteor-M, Aist-2D, and Obzor-R. These products span multiple thematic domains including optical imagery, vegetation analysis, terrain modeling, ocean and atmospheric monitoring. Users can query and retrieve data based on geographic coordinates, scene ID, or grid index. Archival coverage enables access to historical records for long-term monitoring, and the system supports version tracking to ensure continuity and comparability.

The Base Products section of the Basic Products Bank provides standard outputs derived from satellite data through specialized processing. Two main categories are presented: Index Images, which represent physical or pseudo physical values to characterize surface conditions, and Composite Images, which show relative changes of surface objects across space and time using multi temporal or multi sensor data.



Functional Capabilities

The platform is a comprehensive tool designed to support various applications in forestry, agriculture, marine environments, emergency management, and ecology. It allows users to conduct geospatial searches, visualize satellite scenes, download open-access datasets, and request high-

resolution commercial products. The platform maintains synchronized data archives with multilingual metadata and supports structured delivery through grid-based tiling for bulk retrieval. Version control and long-term data preservation ensure consistent availability for longitudinal studies and operational monitoring. The system is also designed to be interoperable with other Russian national geospatial systems.

Contact

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bbp@ntsomz.ru, ntsomz@ntsomz.ru

Reference

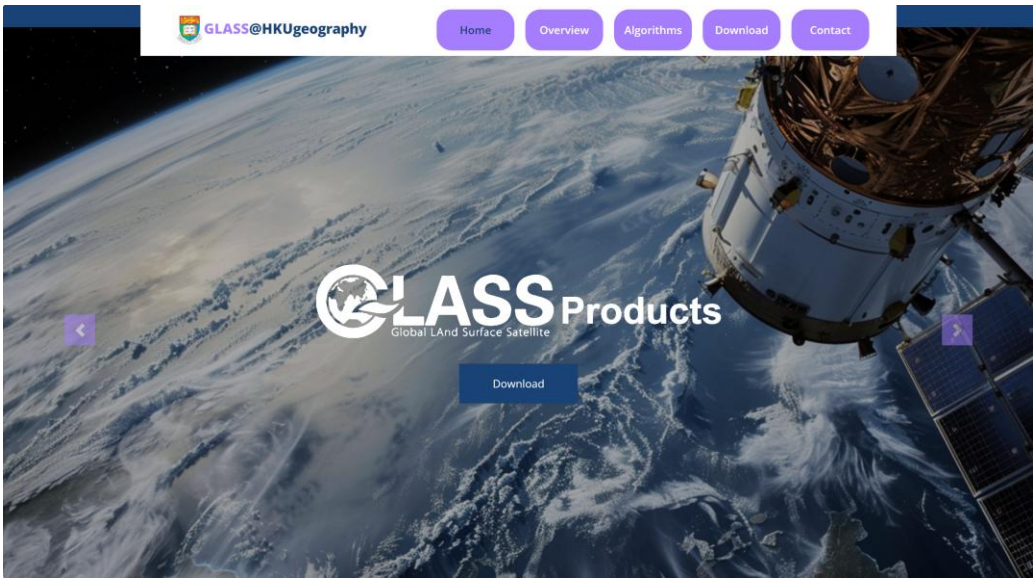
Scientific Center for Earth Operational Monitoring (NTSOMZ) (2016). Basic Products Bank. Available at: Basic Products Bank - Homepage. Accessed on 16 August 2025.

GLASS (Global Land Surface Satellite)

Platform Overview

The Global LAnd Surface Satellite (GLASS) product system is a scientific Earth observation platform developed by the State Key Laboratory of Remote Sensing Science at Beijing Normal University. It provides high-quality, long-term global land surface parameters to support research on climate change, ecological modeling, and Earth system processes. GLASS has become a recognized data provider for global environmental research, offering harmonized datasets derived from multiple satellite sensors including MODIS, AVHRR, and China's Fengyun series.

Website: [GLASS@HKUgeography]



Data Description

GLASS offers a suite of biophysical products such as albedo, leaf area index (LAI), Broadband Albedo, land surface temperature (LST), broadband emissivity, evapotranspiration, and shortwave radiation. Most datasets are available at 0.05° spatial resolution (~5 km), while select products are also provided at 1 km resolution. Temporal resolutions include daily, 8-day, and monthly intervals, with time series beginning from as early as 1981 or 2000, depending on the product. Data are distributed in standard scientific formats like HDF and GeoTIFF and are freely available via the official GLASS portal, which supports preview, filtering, and direct download.



Functional Capabilities

GLASS delivers globally consistent land surface datasets derived from harmonized multi-source satellite observations. It enables large-scale analysis of climate–biosphere interactions, energy balance modeling, and long-term environmental change detection. The system ensures inter-sensor continuity and algorithmic consistency to support time-series reliability and cross-sensor integration. Data services are accessible through an interactive portal supporting download, visualization, and batch access.

Contact

Prof. Shunlin Liang: shunlin@hku.hk
Ms. Leshi Li: leshili@hku.hk

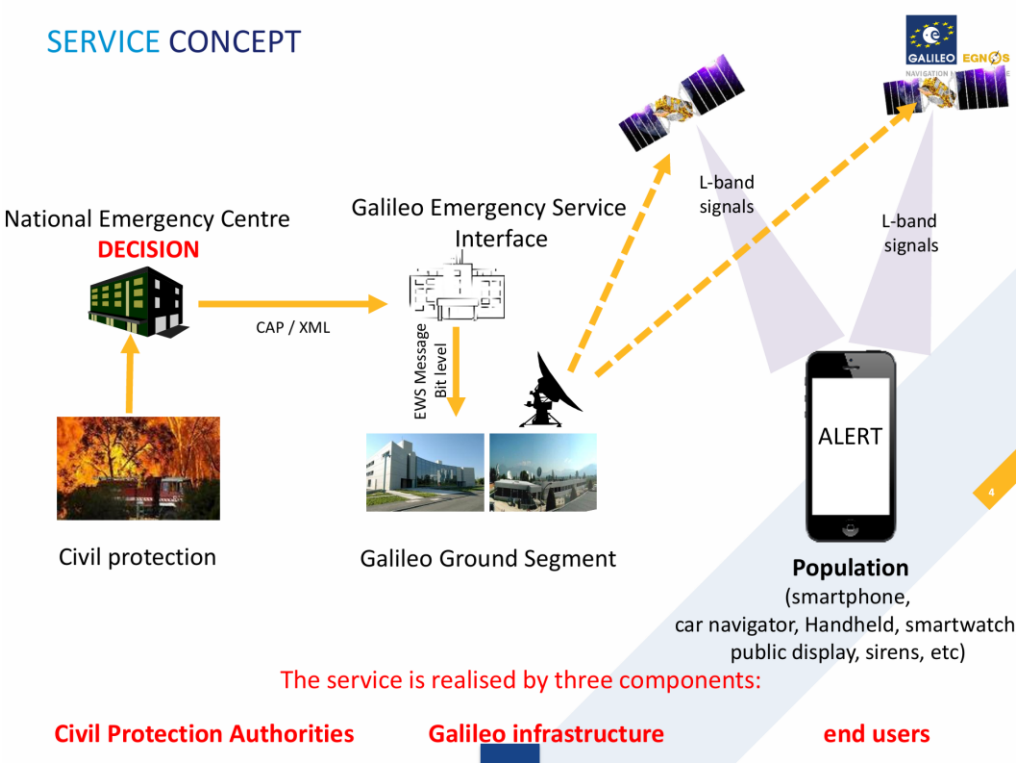
Reference

The University of Hong Kong (HKU) (2013). Global Land Surface Satellite (GLASS). Available at: GLASS@HKUgeography. Accessed on 16 August 2025.

Emergency Warning Satellite Service of Japan's Quasi-Zenith Satellite System

Platform Overview

The Emergency Warning Satellite Service (EWSS) is a satellite-based disaster communication system integrated within Japan's Quasi-Zenith Satellite System (QZSS). Jointly developed by the Cabinet Office of Japan and the Japan Aerospace Exploration Agency (JAXA), it aims to ensure the rapid dissemination of emergency information, particularly in areas where ground-based networks may be unavailable. Operational since 2018, EWSS transmits real-time alerts via the QZSS L1S signal. These digital messages are broadcast approximately every 30 seconds using a one-way short-message protocol, requiring no return channel. Closely linked to the nationwide J-ALERT system, EWSS operates continuously with satellite redundancy, providing stable coverage throughout Japan and surrounding areas in the Asia-Oceania region.



1. Service Functions

1.1 Real-time Alerts

Broadcast alerts to user devices (smartphones, in-vehicle navigation systems, etc.) within 1 minute via L-band satellite signals. Supports disaster types such as earthquakes, tsunamis, fires, floods, and industrial accidents.

1.2 Precise Geofencing

Based on GNSS positioning, alerts are sent only to devices within the affected area (diameter 50 meters to 5,000 kilometers).

1.3 Multi-Language Support

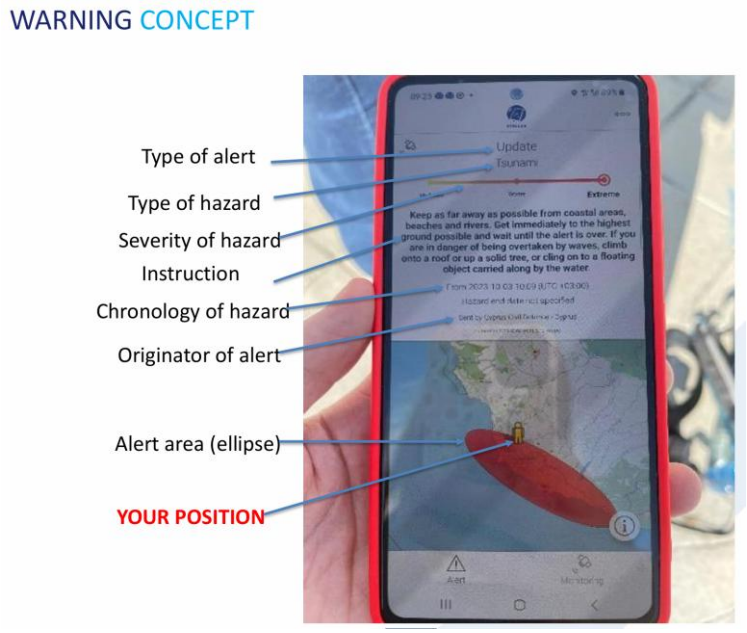
Pre-loaded with 24 language libraries, automatically matching the language of the user's device.

1.4 Device Compatibility

No dedicated hardware required; compatible with all GNSS-enabled devices (including public displays, smartwatches, etc.).

1.5 Security Certification

Utilizes Navigation Message Authentication (NMA) technology to prevent signal forgery (e.g., QZSS L1/L5/L6E signal authentication).



2. Application Scenarios

Natural Disasters: Real-time warnings for earthquakes, tsunamis, and typhoons (e.g., the Japanese QZSS system case).

Industrial Accidents: Emergency response to chemical leaks and nuclear accidents (refer to the German Chempark explosion simulation).

Public Safety: Terrorist attacks and fire broadcasts (EU STELLAR project testing).

International Rescue: Cross-border collaboration (e.g., Galileo and QZSS joint broadcast of Australian forest fire alerts).

Reference

Guyader, Eric (2023). Emergency Warning Satellite Service in Galileo. Presentation at the ICG 17. European Commission. Madrid, Spain, October. Available at: icg17_wgb_20.pdf.

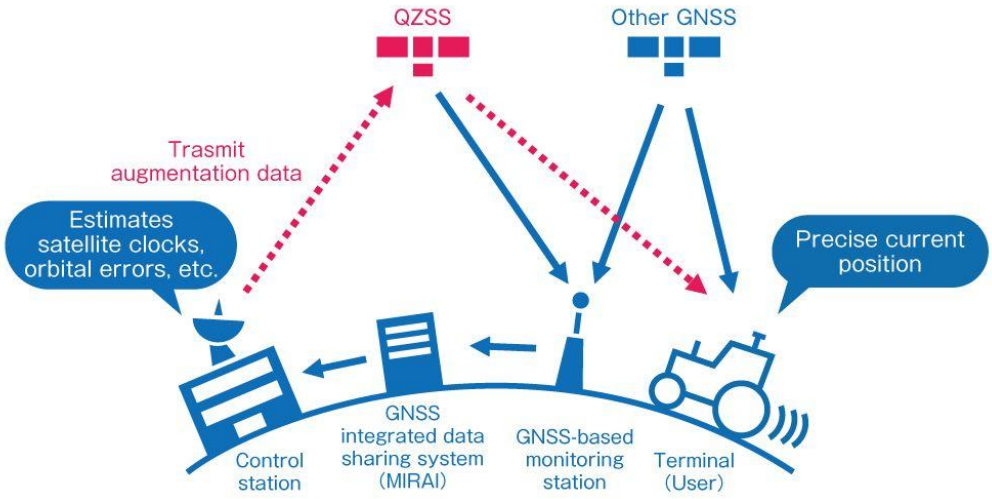
Guyader, Eric (2025). The Emergency Warning Satellite Service in Galileo. Presentation at the ICG Workshop. European Commission. Kathmandu, 27 January– 1 February 2. Available at: 09_Galileo_EWSS.pdf.

European Emergency Number Association (EENA) (2024). Galileo Emergency Warning Satellite Service (Galileo EWSS): Updates from the STELLAR Project. Available at: Galileo Emergency Warning Satellite Service (Galileo EWSS): Updates from the STELLAR Project – EENA. Accessed on 16 August 2025.

Multi-GNSS Advanced Orbit and Clock Augmentation of QZSS (MADOCA)

Platform Overview

The Multi-GNSS Advanced Demonstration tool for Orbit and Clock Analysis (MADOCA) is a high-precision augmentation system developed by the Japan Aerospace Exploration Agency (JAXA). As an integral part of the Quasi-Zenith Satellite System (QZSS), MADOCA enhances satellite-based positioning services across Japan and the broader Asia-Oceania region. It supports multiple Global Navigation Satellite Systems (GNSS), including the Global Positioning System (GPS), GLONASS, Galileo, BeiDou, and QZSS itself, and provides essential orbit and clock corrections for both real-time and post-processed positioning applications. MADOCA's contributions are internationally recognized through its integration into the International GNSS Service (IGS), enabling precise positioning on a global scale.



Data Description

MADOCA provides two main categories of GNSS augmentation data: real-time corrections and post-processed products. Real-time corrections are broadcast at a frequency of 1 Hz via the QZSS L6E signal, offering near-instantaneous high-precision orbit, clock, and bias updates to support centimeter-level Real-Time Precise Point Positioning (PPP). Post-processed products include ultra-rapid (JXU), rapid (JXR), and final (JXF) solutions, available in standard GNSS formats such as SP3c, RINEX, and RTCM-SSR. Additional outputs like Fractional Cycle Bias (FCB) products are also provided to support PPP ambiguity resolution. Post-processed data can be accessed freely from the MADOCA website, while real-time data is available via satellite broadcast or through the GPAS commercial platform.

Functional Capabilities

MADOCA offers a comprehensive suite of GNSS augmentation functionalities. It enables precise orbit and clock estimation for multi-constellation GNSS data, supports real-time PPP through high-rate correction broadcasts, and provides FCB products for ambiguity-fixed positioning. These capabilities are compatible with international standards and can be integrated with existing GNSS software ecosystems. MADOCA's robust accuracy and global distribution make it a powerful tool for scientific, industrial, and infrastructure-related positioning applications.

Reference

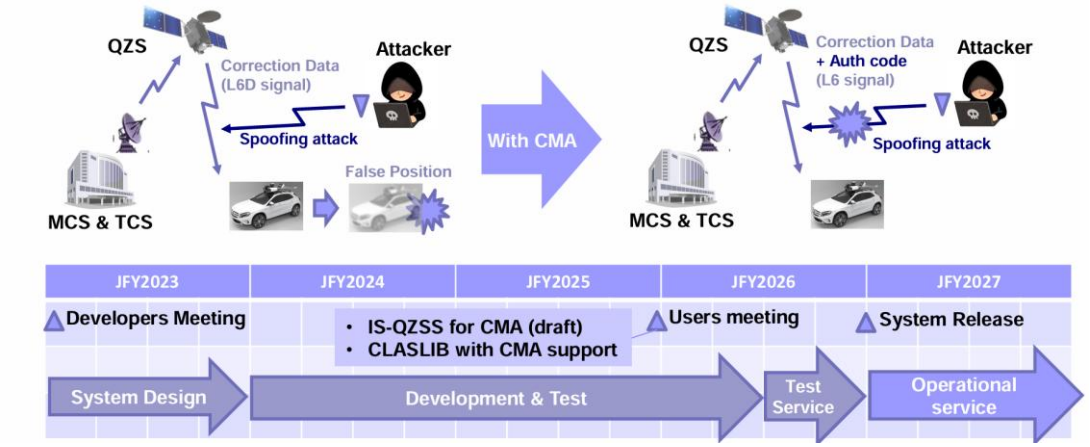
Quasi-Zenith Satellite System (QZSS) (2024). MADOCA Service Overview. Available at: Multi-GNSS Advanced Orbit and Clock Augmentation - Precise Point Positioning (MADOCA-PPP) | Service Overview | QZSS (Quasi-Zenith Satellite System) - Cabinet Office (Japan). Accessed on 16 August 2025.

QZSS Navigation Message Authentication (QZNMA)

Platform Overview

QZNMA is a signal authentication service developed by the Cabinet Office of Japan to enhance the resilience of Global Navigation Satellite System (GNSS) users against spoofing attacks. QZNMA was officially launched in Japanese Fiscal Year 2024 and is designed to verify the authenticity and integrity of QZSS broadcast messages using the Elliptic Curve Digital Signature Algorithm (ECDSA P-256).

QZNMA supports two modes of authentication. For QZSS native signals, including L1C/A (C/B), L1C, and L5, self-authentication is performed directly on the signals. For GNSS signals from external constellations, including GPS (L1C/A, L1C, L5) and Galileo (E1b, E5a), QZNMA provides cross-authentication through the QZSS L6E signal. The authentication process uses digital signatures embedded in the navigation message, verified by users through public key infrastructure. The interface specification for QZNMA, designated IS-QZSS-SAS-001, has been publicly released, and trial transmissions via L6E began in July 2023.



Data Description

QZNMA authentication data are transmitted directly within the QZSS navigation messages on L1 and L5 frequencies, and via L6E for cross-authentication. The digital signature is generated by the QZSS master control station and embedded in the message, allowing receivers to verify authenticity using the public key distributed by JAXA. The data format and authentication procedures are fully documented in the official QZSS signal authentication specification (IS-QZSS-SAS-001). QZNMA's cryptographic protocol is compliant with modern GNSS authentication frameworks and enables secure, low-latency verification without disrupting standard positioning workflows.

Functional Capabilities

QZNMA provides cryptographic authentication of GNSS signals to protect users from spoofing-based position or time manipulation. It secures both QZSS and foreign constellation signals (GPS, Galileo) and integrates seamlessly with the existing QZSS infrastructure. As a forward-looking navigation security enhancement, QZNMA is designed to support future integration with advanced correction services such as the Centimeter-Level Augmentation Service (CLAS) and MADOCA.

Reference

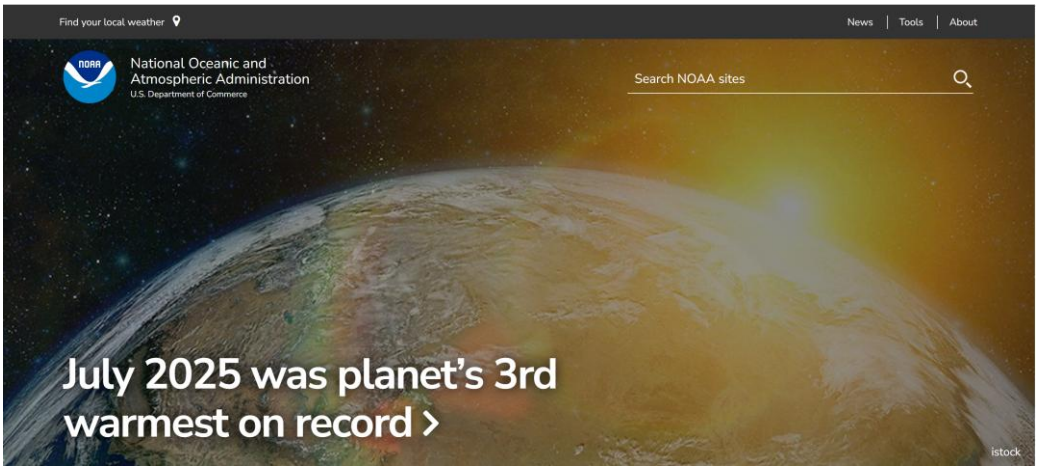
KISHIMOTO, Motohisa (2023). QZSS Navigation Message Authentication Service Status. Presentation at the 17th ICG WG-S. Quasi-Zenith Satellite System (QZSS). Madrid, Spain, October 2023. Available at: QZSS Update.

National Oceanic and Atmospheric Administration Open Data Dissemination

Platform Overview

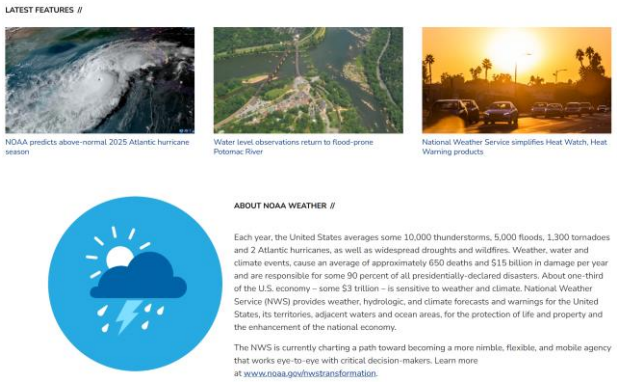
The National Oceanic and Atmospheric Administration (NOAA) is a core scientific and service agency of the United States in the fields of atmosphere, ocean, climate, and environment. It is affiliated with the U.S. Department of Commerce. NOAA's official website provides authoritative meteorological, oceanographic, fisheries, satellite, and climate information for both researchers and the public.

Website: [NOAA Open Data Dissemination (NODD) | National Oceanic and Atmospheric Administration]

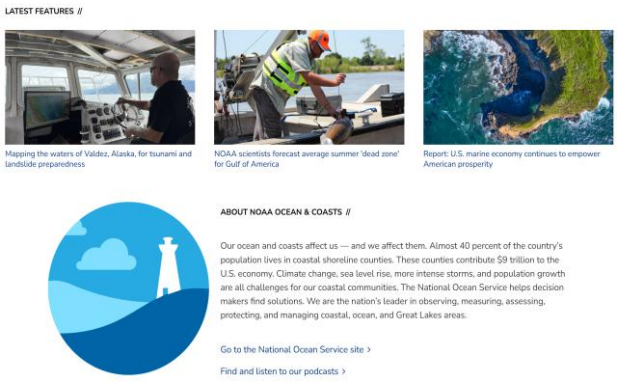


Data Description

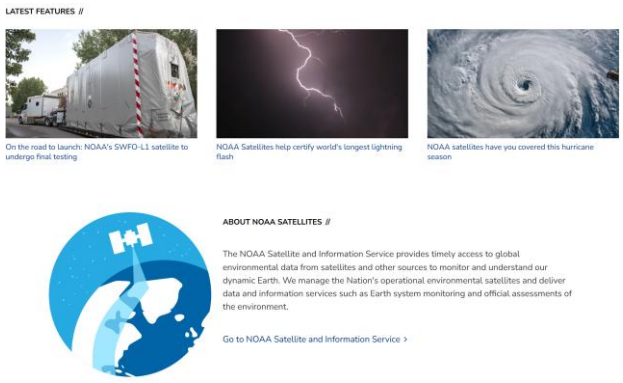
The content provided by NOAA covers multiple areas. In terms of weather and forecasting, the platform can monitor and predict disasters such as hurricanes, storms, floods, droughts, and wildfires in real time. In the field of climate and environment, NOAA provides data support for long-term climate trends, greenhouse gas concentrations, extreme weather events, and sea level changes. In the area of oceans and fisheries, the platform continuously monitors the health of marine ecosystems, manages fishery resources, and tracks marine pollution. Additionally, NOAA has a robust observation and satellite system, providing satellite imagery, weather radar, and ocean buoy data. Furthermore, the platform offers educational and resource services to the public, including climate education materials, environmental protection campaigns, and interactive tools, to help society enhance its understanding and ability to address environmental and climate issues.



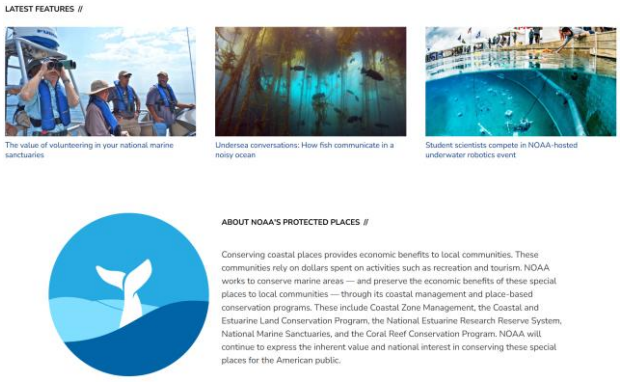
Weather



Ocean & Coasts



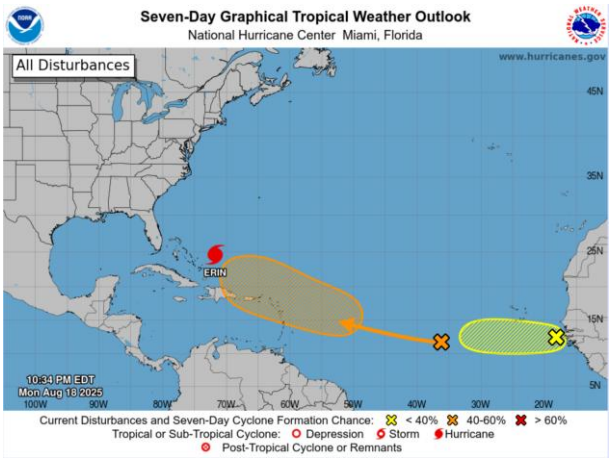
[Satellites]



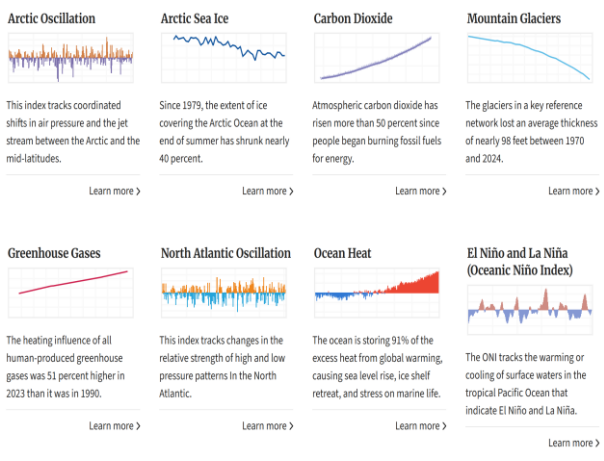
[Sanctuaries]

Functional Capabilities

NOAA platform integrates a variety of practical features. It offers interactive maps and data visualization tools to help users intuitively understand climate and environmental information; it also has a comprehensive disaster warning system that can track events such as hurricanes, tsunamis, floods, and fires in real time. The platform also provides access to NOAA satellite imagery and remote sensing products, including meteorological satellites and polar-orbiting satellites, offering users comprehensive observational data. Furthermore, NOAA provides long-term observational data to support scientific research and policy-making and makes educational resources and service guidelines available to the public to enhance societal awareness and capabilities in environmental protection and disaster prevention and mitigation.



[National Hurricane Center]



[Global Climate Dashboard]

Contact

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Email: webmaster@noaa.gov.

Reference

National Oceanic and Atmospheric Administration (NOAA) (2015). NOAA Open Data Dissemination (NODD). Available at: NOAA Open Data Dissemination (NODD) | National Oceanic and Atmospheric Administration. Accessed on 16 August 2025.