Capacity Building Workshop for Small
Island Developing States: Leveraging Big
Earth Data to Evaluate the SDGs Progress

WORKSHOP PROGRAMME

Geospatial Big Data

Supporting Evidence-Based Decision Making in SIDS

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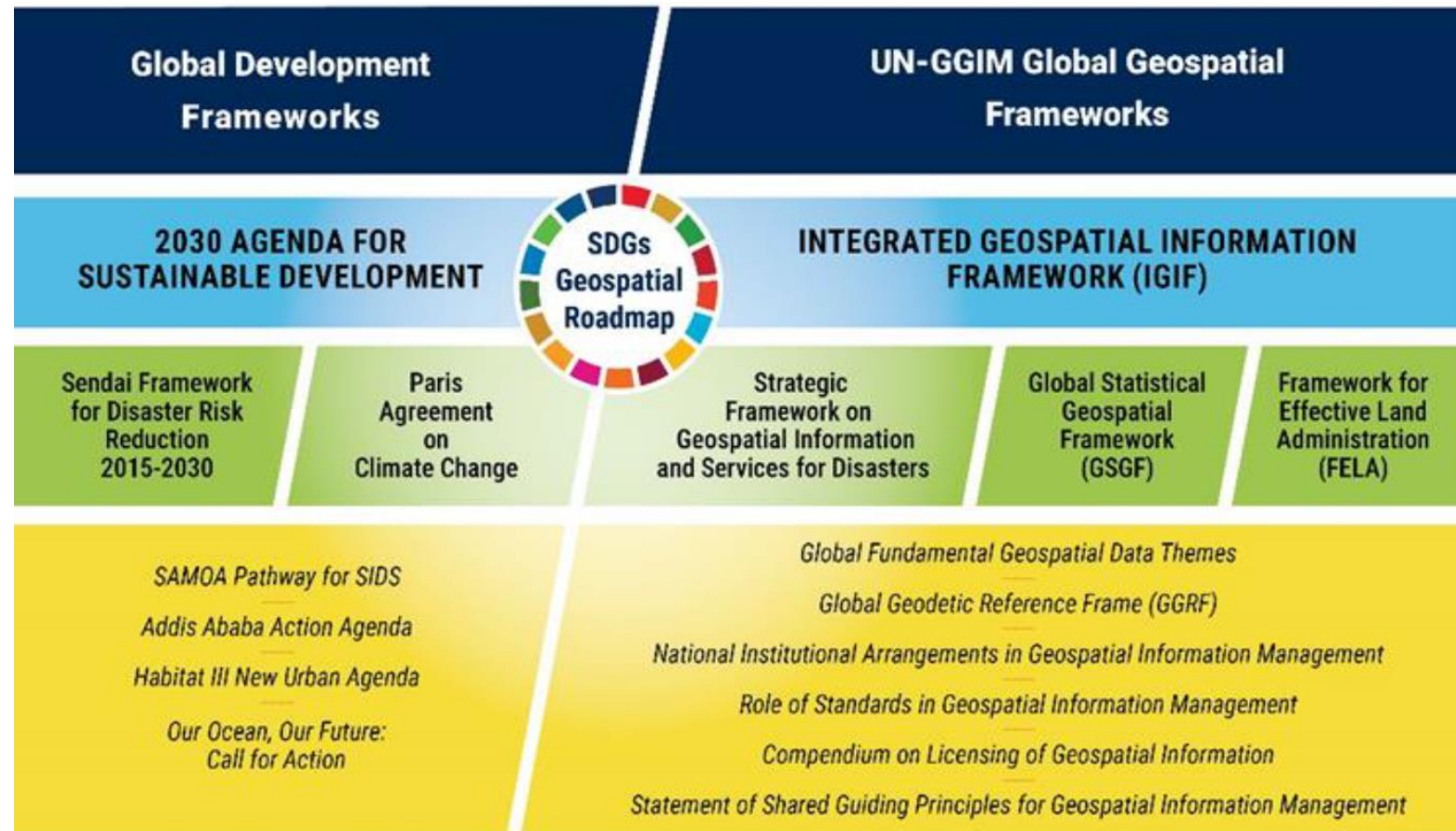
Presentation Outline

- UN-Integrated Geospatial Information Framework (UN-IGIF)

- Leadership as the Key to Overcoming the Challenge of Geospatial Information Coordination

- Geospatial Big Data -*Supporting Evidence-Based Decision Making*

What is UN-IGIF?
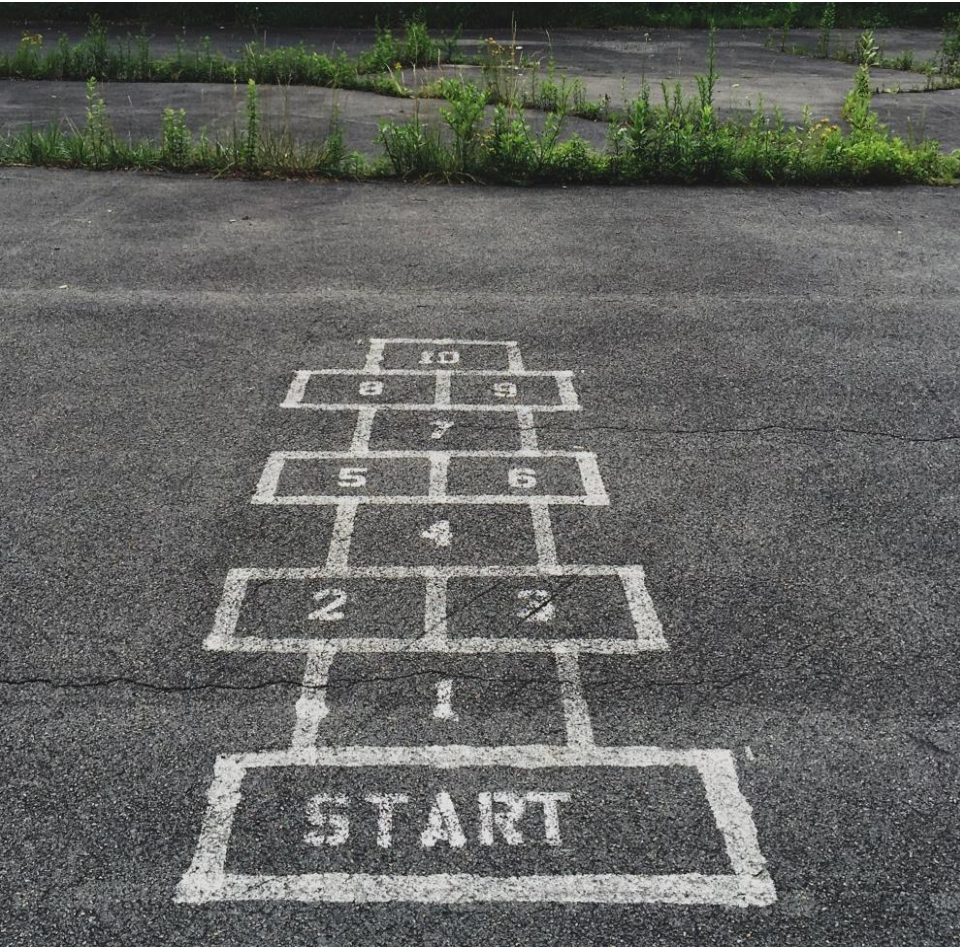
Multi-dimensional Framework, adopted by the United Nations in 2018, that guides countries in the development, management, and refinement of their national geospatial information resources.

UN·IGIF — INTEGRATED GEOSPATIAL INFORMATION FRAMEWORK

Global Development Frameworks

UN-GGIM Global Geospatial Frameworks

SDGs Geospatial Roadmap

2030 AGENDA FOR SUSTAINABLE DEVELOPMENT

INTEGRATED GEOSPATIAL INFORMATION FRAMEWORK (IGIF)

Sendai Framework for Disaster Risk Reduction 2015-2030

Paris Agreement on Climate Change

Strategic Framework on Geospatial Information and Services for Disasters

Global Statistical Geospatial Framework (GSGF)

Framework for Effective Land Administration (FELA)

SAMOA Pathway for SIDS

Addis Ababa Action Agenda

Habitat III New Urban Agenda

Our Ocean, Our Future: Call for Action

Global Fundamental Geospatial Data Themes

Global Geodetic Reference Frame (GGRF)

National Institutional Arrangements in Geospatial Information Management

Role of Standards in Geospatial Information Management

Compendium on Licensing of Geospatial Information

Statement of Shared Guiding Principles for Geospatial Information Management
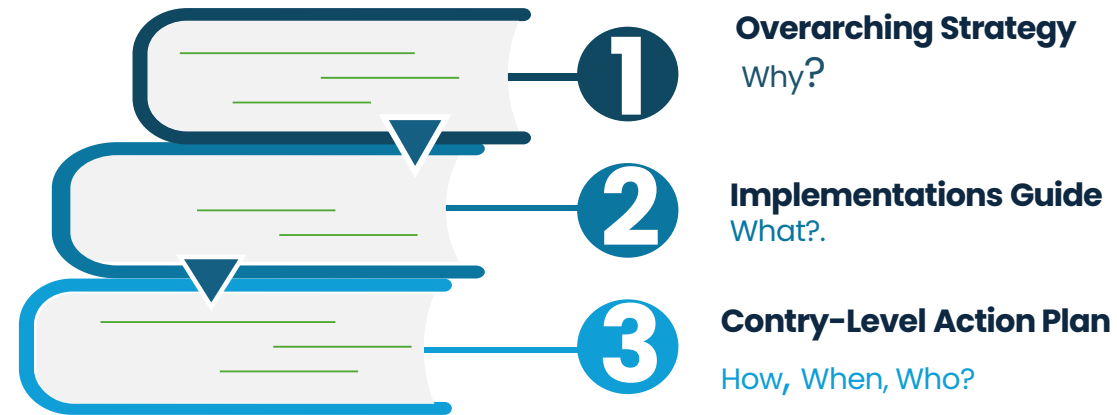
MISSION

The efficient use of geospatial information by all countries to effectively measure, monitor and achieve sustainable social, economic and environmental development – leaving no one behind

VISION

To promote and support innovation and provide the leadership, coordination and standards necessary to deliver integrated geospatial information that can be leveraged to find sustainable solutions for social, economic and environmental development.
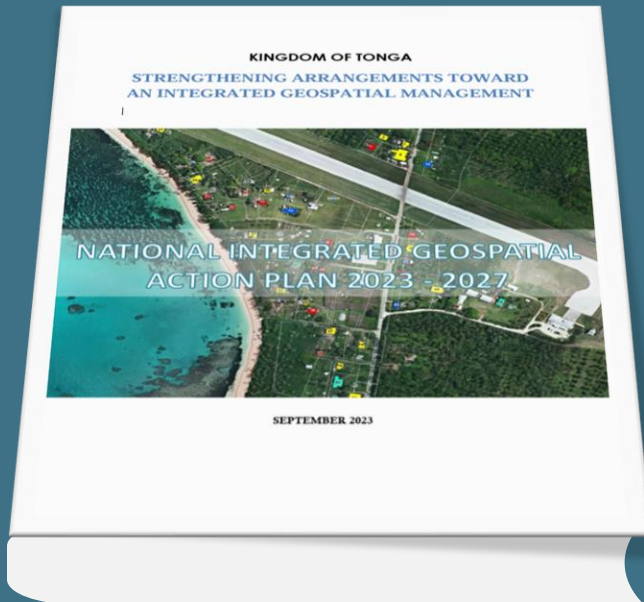
Three interconnected parts

1 **Overarching Strategy** Why?

2 **Implementations Guide** What?.

3 **Contry-Level Action Plan** How, When, Who?

CAP - Kingdon of Tonga

Part 1: Overarching Strategic Framework – WHY geospatial information is a critical element of national social and economic development and needs to be strengthened.

Part 2: Implementation Guide – WHAT types of actions can be undertaken to strengthen geospatial information management.

Part 3: Country-level Action Plan – HOW the actions will be carried out, **WHEN** and by **WHO.**

https://ggim.un.org/UN-IGIF/

9 Strategic Pathways

GOVERNANANCE

TECHNOLOGY

PEOPLE

Knowledge · Decisions · Development

Value · Applications · Technology

Users · Citizens · Access

| Governance and Institutions | Policy and Legal | Financial |
| Data | Innovation | Standards |
| Partnerships | Capacity and Education | Communication and Engagement |

Society · Economy · Environment
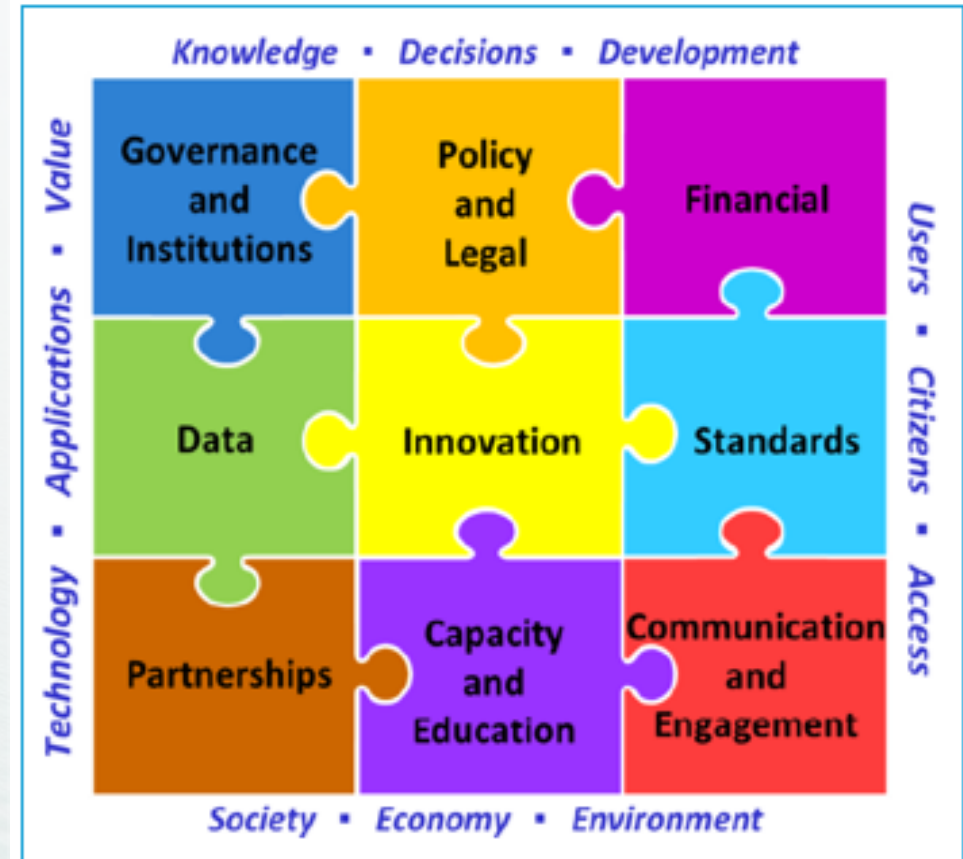
Anchored by nine Strategic Pathways, the Framework is a mechanism for articulating and demonstrating national leadership in geospatial information, and the capacity to take positive steps.

Integrated Geospatial Information Framework – Benefits
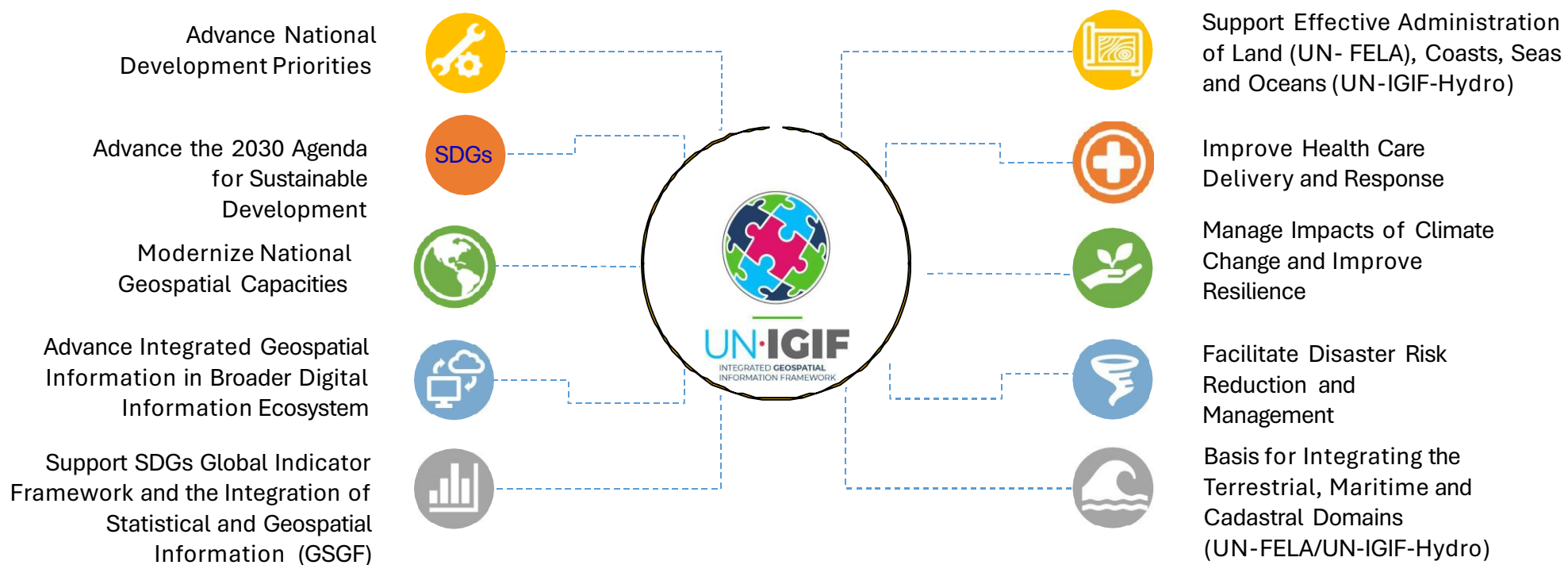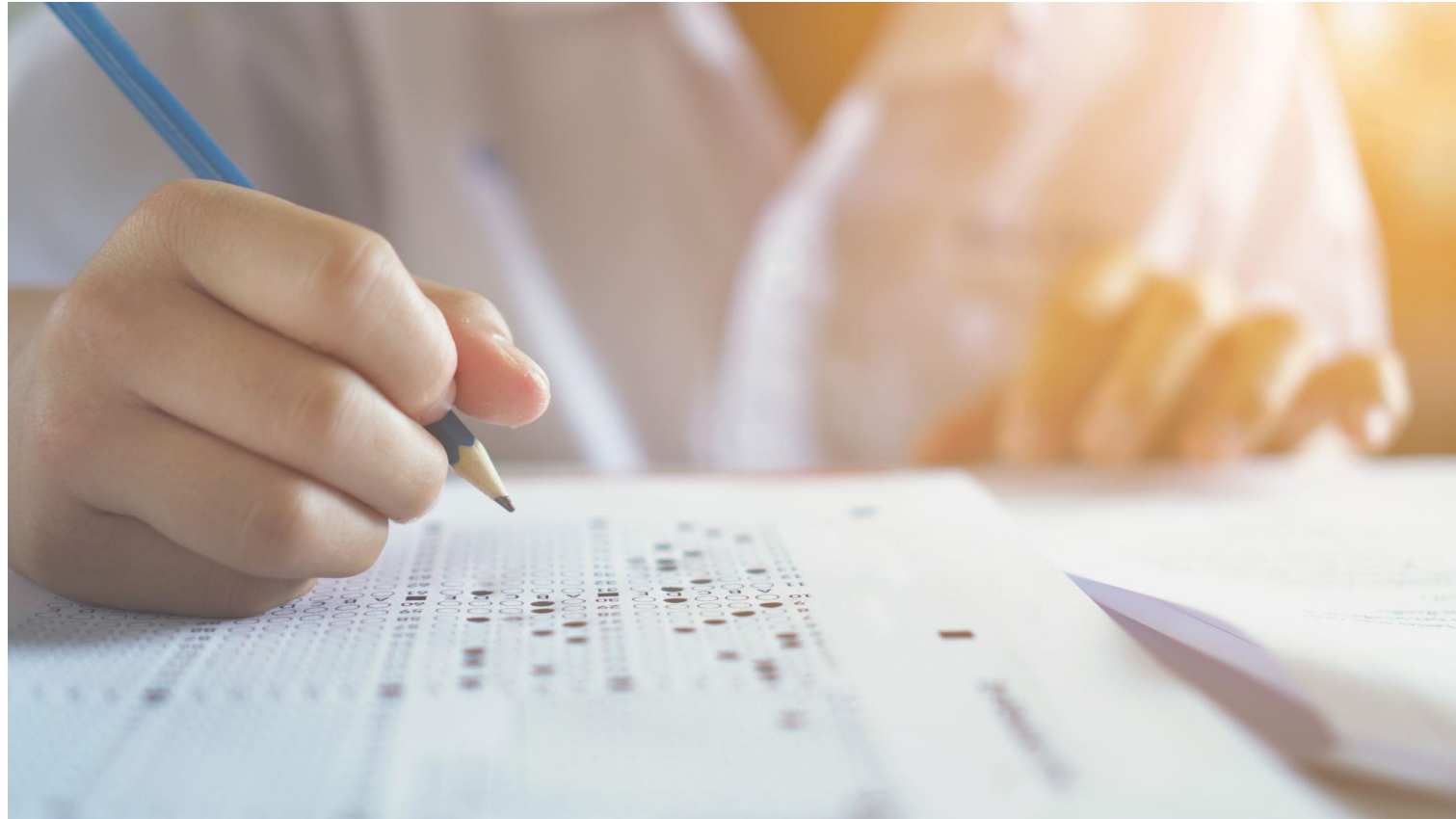
UNIGIF Annual Survey - Need and Importance

1. **UN-IGIF** directly supports the achievement of the **SDGs,** critical enabler for monitoring progress and guiding national priorities.

2. Success of UN-IGIF implementation depends on ability **to understand progress, identify challenges, and share solutions.**

3. Annual survey provides the foundation for this understanding, **enabling more effective coordination, targeted support, and accelerated progress toward shared objectives of strengthening geospatial information capabilities worldwide.**

Global/GGIM
- Regular assessment of progress toward UN-IGIF objectives
- Regular reporting opportunities to member states and partners
- Advocacy efforts by demonstrating implementation progress and impact

UN-GGKIC
- Helps UNGGKIC plans/assess progress against established goals/Actions
- Identifies challenges for interventions, successful practices to be scaled
- Supports internal planning and resource allocation decisions

Member States
- Offers countries benchmarking opportunities against regional and global peers
- Identifies areas where national strategies may need adjustment or additional focus
- Provides evidence for support request/capacity buildings/needs

Knowledge Sharing and Learning

Best Practice Identification
Peer Learning Networks

Accountability and Transparency

Progress Monitoring
Stakeholder Engagement

Strategic Planning Resource Mobilization

Gap Analysis
Resource Optimization

Impact Measurement Communication

Outcome Documentation
Success Story Development

UNIGIF Annual Survey - Activities& timeline

1. Design and Development

- Finalize survey and questionnaire design
- Establish data collection and analysis protocols
- Develop online survey
- Create multi-language versions

2. Stakeholder Engagement

- Conduct outreach to national focal points
- Establish partnerships with regional committees
- Organize regional briefing sessions
- Develop COMM materials and guidance documents

3. Pilot Implementation

- Launch pilot survey (selected countries)
- Test data collection processes and analytical frameworks
- Gather feedback on survey design and implementation approach
- Refine methodology based on pilot

4. Full Launch and Initial Analysis

- Launch first annual survey globally
- Implement a comprehensive outreach and follow-up strategy
- Conduct initial data analysis and report
- Present findings at the 16th GGIM session and relevant international forums/UNGGKIC Workplan

Jul – Aug 2025 → **Sep – Oct 2025** → **Nov – Dec 2025** → **Jan– Apr 2026**

UNIGIF Annual Survey - Content Structure

Part 1: Profiling/awareness

- Country/Region
- One focal person per country
- Data aggregation to region level
- Areas of IGIF Usage
- IGIF adoption/awareness

Part 2: IGIF Implementation

Level of implementation

Initial

- 9 strategic pathways implementation
- Progress/Challenges
- Support & Resources

Advanced

- CAP development
- Challenges /Needs
- Collaboration

Part 3: Outcomes/benefits

- Benefits Realized
- SDG alignment
- Future priorities
- Cooperation

Cooperation & Stakeholder Engagement

UNIGIF Annual Survey - Comparative Analysis and Knowledge Products

- Incorporate lessons learned
- Refine questions and analytical approaches
- Develop enhanced visualization and reporting
- Create automated analysis tools

Conduct a comprehensive analysis of year-over-year trends

Develop specialized reports for different stakeholder groups
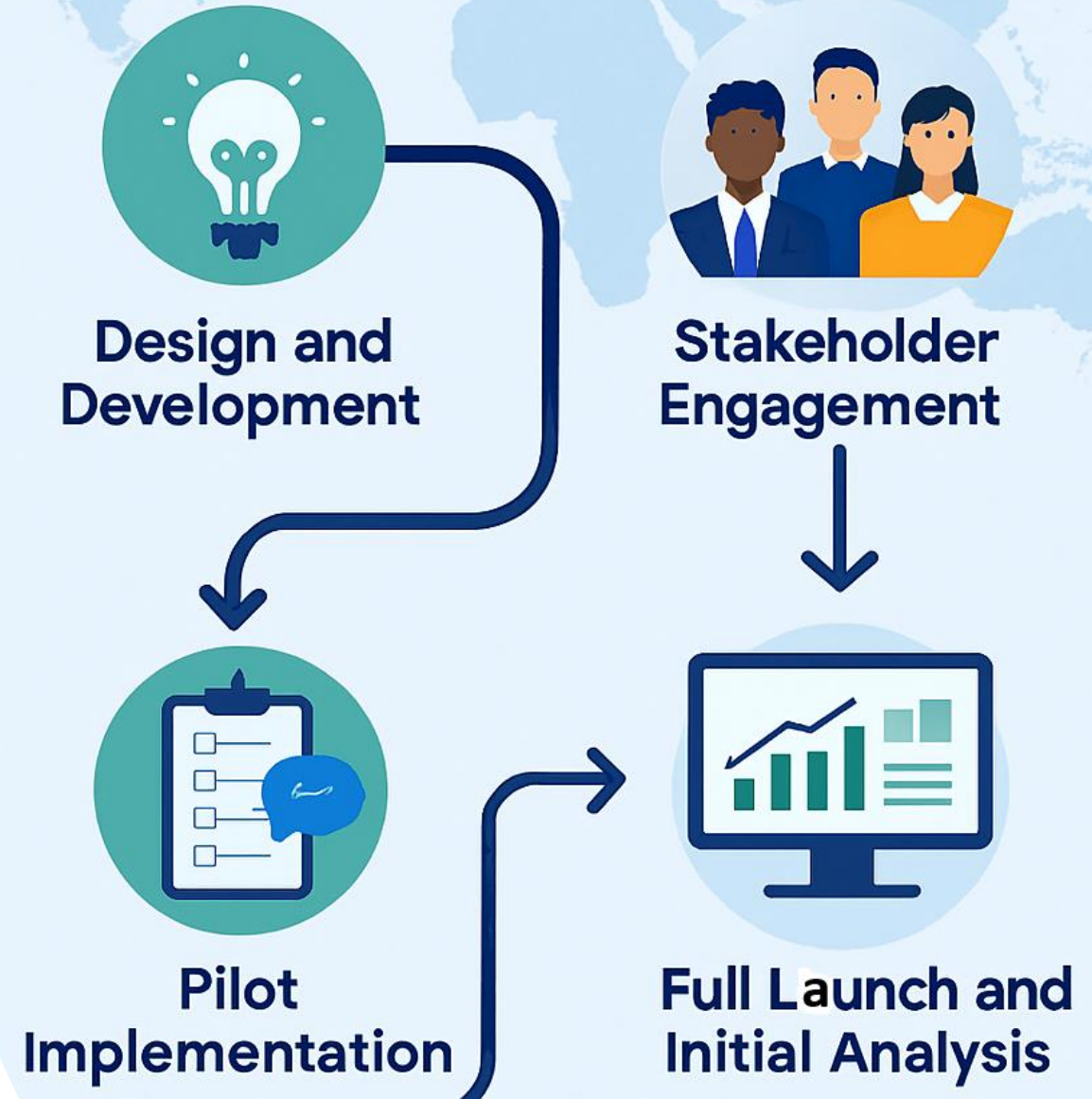
Create interactive dashboards for progress monitoring
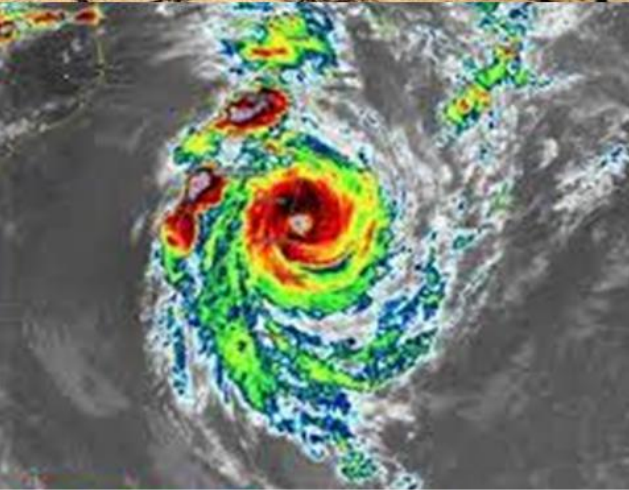
Produce case studies on significant progress or innovative approaches

Cooperation & Stakeholder Engagement

Global Survey on the Use and Implementation of UN-IGIF

PDF Only →

Design and Development

Stakeholder Engagement

Pilot Implementation

Full Launch and Initial Analysis

Small Island Developing States stand at the frontline of climate change, increasingly exposed to disasters and pressing environmental challenges.

Their unique vulnerabilities demand innovative solutions powered by **geospatial big data.**

Challenges

- Lack of (or insufficient) **governance** - legal/policy frameworks for interagency collaboration

- Lack of qualified GIS professionals, enhancing **geospatial skillset** Lack of data **standard and infrastructure**

- Sustaining **financial** investment either from national or private sectors in geospatial programs

- Unconvinced **buy-in** from highest-level decision makers (cabinet)

- Limited global and regional **coordination** and participation for policy alignment

- Sustaining **institutional memory** – free from political changes in the country (related to #1)

Leadership as a Key to Overcoming this Challenge

- **Collaboration**: Strengthen collaboration across institutions and stakeholders to foster inclusive and synergistic use of geospatial data.

- **Emerging leaders**: Strengthen emerging leaders in geospatial technology applications to build capacity, innovation, and long-term sustainability.

- **Political buy-in**: Ensure political commitment to integrate geospatial approaches into national policies and decision-making.

- **Continuous learning**: Promote continuous learning and knowledge exchange to enhance innovation and adaptability in geospatial practices.

- **Data frameworks**: Establish robust data frameworks to guarantee interoperability, standardization, and sustainability of geospatial information.

- **Geospatial strategies**: Develop and implement national and regional geospatial strategies to guide risk-informed planning and sustainable development.

- **Predictive**: Advance predictive analytics and modeling to enable proactive risk management and anticipatory action.

- **Accurate, timely, and accessible geospatial data**: Ensure reliable, timely, and accessible geospatial data to support evidence-based decision-making for disaster risk reduction and sustainable development.
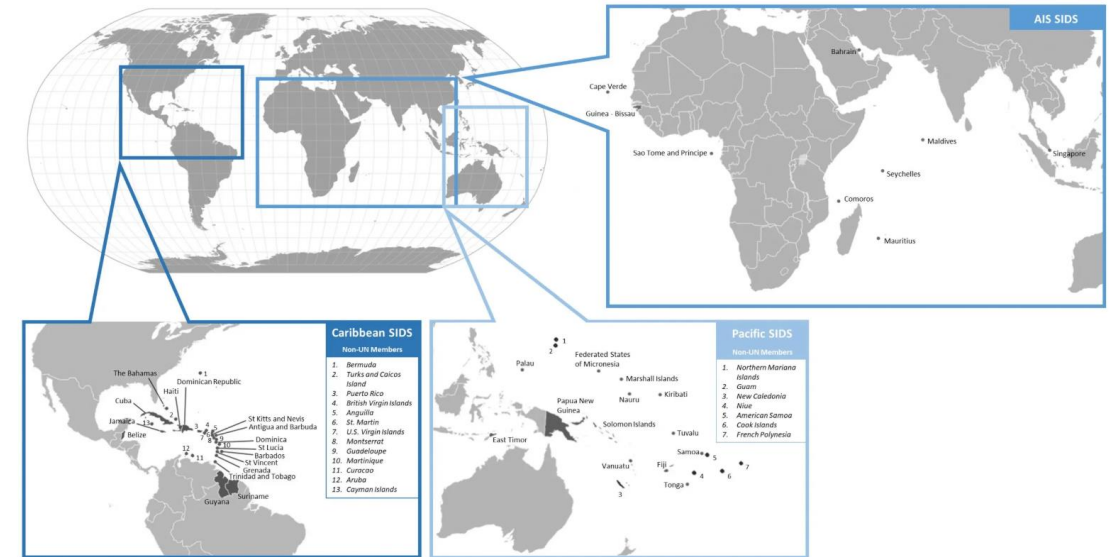
Need to develop a pilot project that responds to common needs and priorities of SIDS

Using Geospatial Big Data to Support Decision-Making

WHAT IS GEOSPATIAL BIG DATA?

Geospatial Big Data: subset of Big Data, having spatial component.

Big data incorporating a spatial component: "GEOSPATIAL BIG DATA" becomes topic for research and development community: academia, industry, government and international organizations including UN.

A significant portion of big data is geospatial data, and the size of such data is growing rapidly.

Managing and processing geospatial big data to help decision-making becomes an important scientific and societal issue.

COE for Sustainable Development of SIDS in Aruba

In 2015, the Government of Aruba, UNDP and the Kingdom of Netherlands agreed to create a Centre of Excellence COE for Sustainable Development of SIDS in Aruba.The Centre of Excellence (COE) for the Sustainable

provide a platform for strengthening innovation and resilience among SIDS through South-South cooperation and exchange of knowledge on sustainable practices in areas such as energy, public-private partnerships (PPP), water management, environment, tourism and health.

SIDS COE and SIDS Global Data Hub

MOU Signing between the Alliance of Small Islands States (AOSIS), the government of Antigua and Barbuda and PVBLIC Foundation representatives.

At the UN General Assembly in September 2023, PVBLIC signed a collaboration agreement with the Alliance of Small Island States (AOSIS) and Antigua & Barbuda to support the establishment of a SIDS Centre of Excellence and a SIDS Global Data Hub, powered by the SDG Data Alliance.

The SIDS Centre of Excellence served as a hub for research, capacity building, and collaboration to enhance the socio-economic and environmental resilience of SIDS.

Launched at SIDS4, the SIDS Global Data Hub will establish a sustainable and enduring repository for comprehensive data on SIDS, help national governments share data, monitor public investments, track progress toward the SDGs, and engage stakeholders.

Characteristic of Geospatial Big Data

Geospatial Data
has always been
BIG DATA.

Geospatial Big Data typically refers to spatial datasets exceeding the capacity of standard computing systems
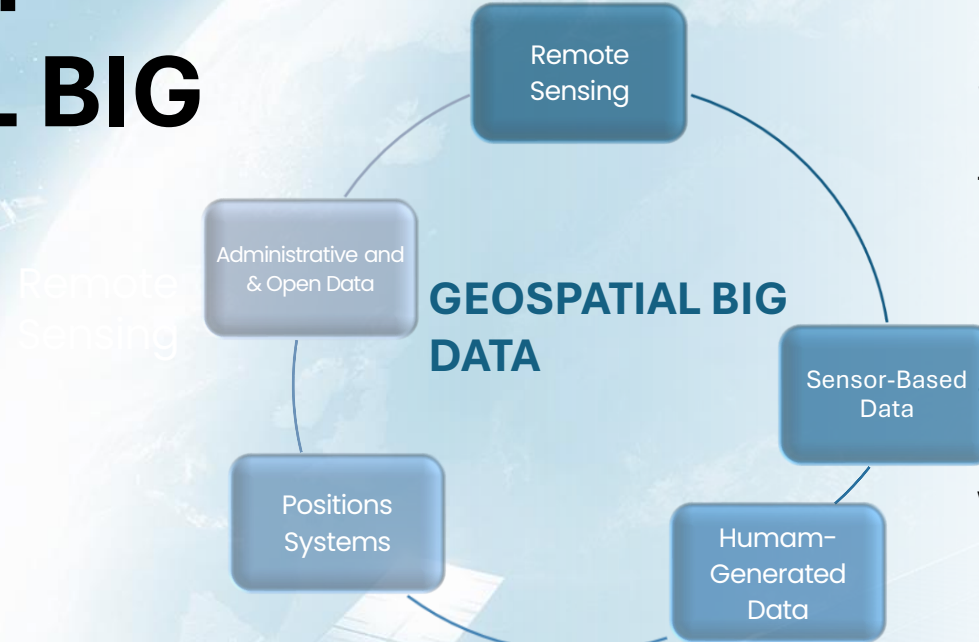
Geospatial Big Data is characterized by the 5 V

Volume

Velocity

Variety

Varacity

Value

SOURCES OF GEOSPATIAL BIG DATA

Remote Sensing

Administrative and & Open Data

GEOSPATIAL BIG DATA

Sensor-Based Data

Positions Systems

Humam-Generated Data

Earth Observation Satellites

Satellites are the most extensively used Earth observation technology for gathering geospatial information.

Satellite imagery are sources of geospatial big data

Weather satellites collect large amount of weather and climate data
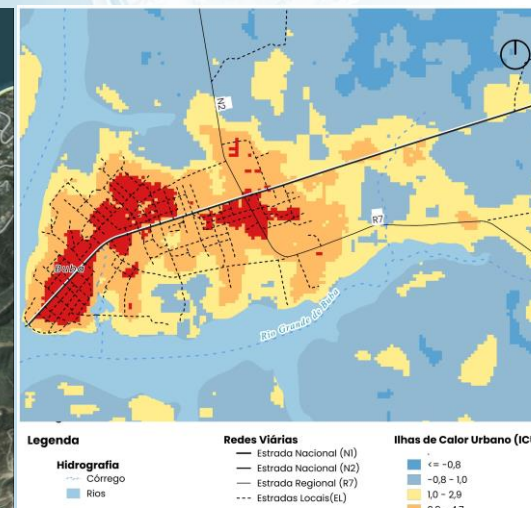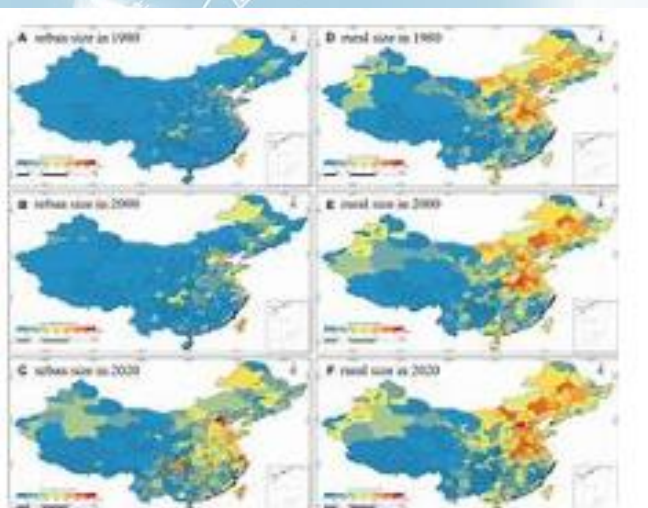
SOURCES OF GEOSPATIAL BIG DATA

GPS (Global Positioning System): provide positioning and navigation information

One of the Global Navigation Satellite Systems (GNSS): Galileo, GLONASS, BeiDou,

GPS technology is widely utilized for applications such as mapping, surveying, tracking, precision agriculture, etc.
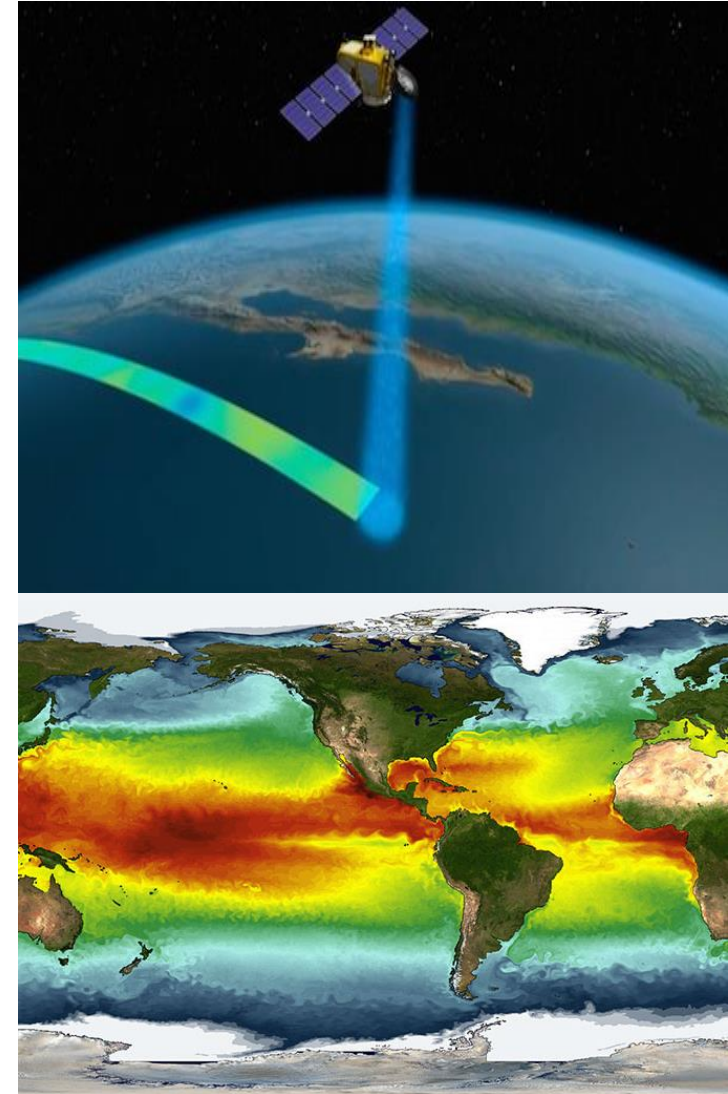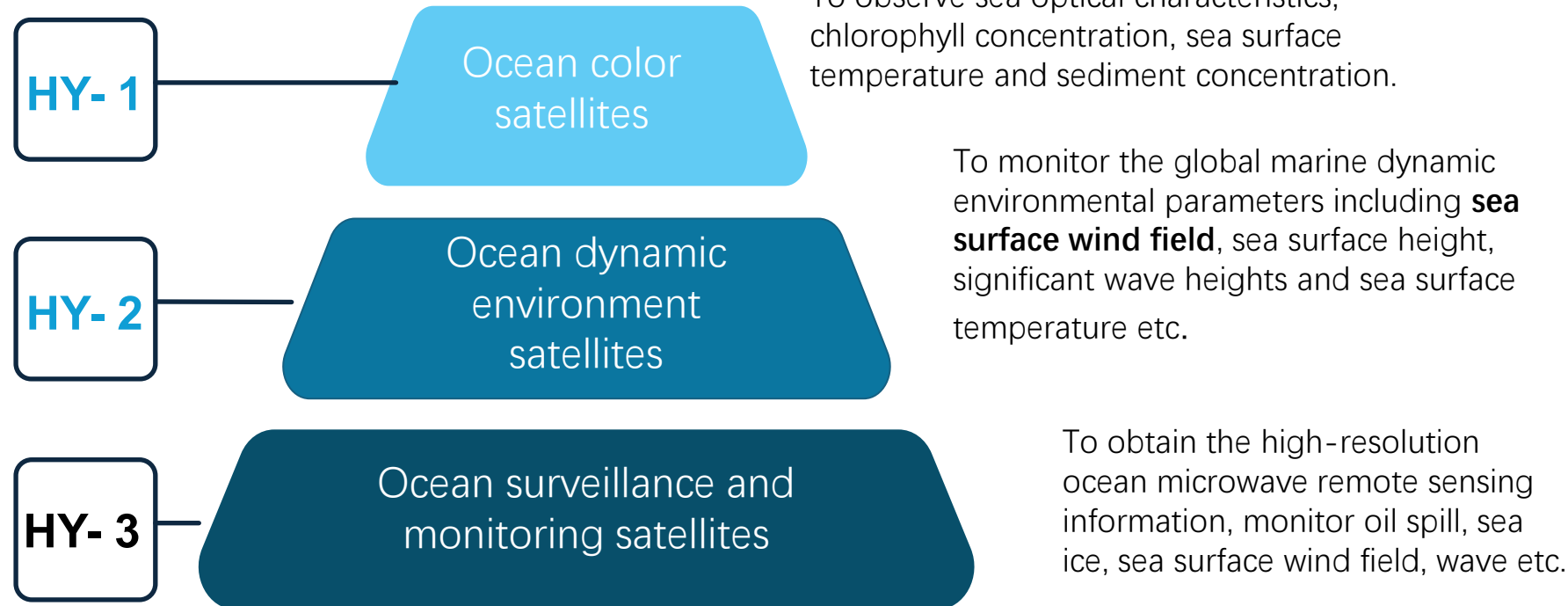
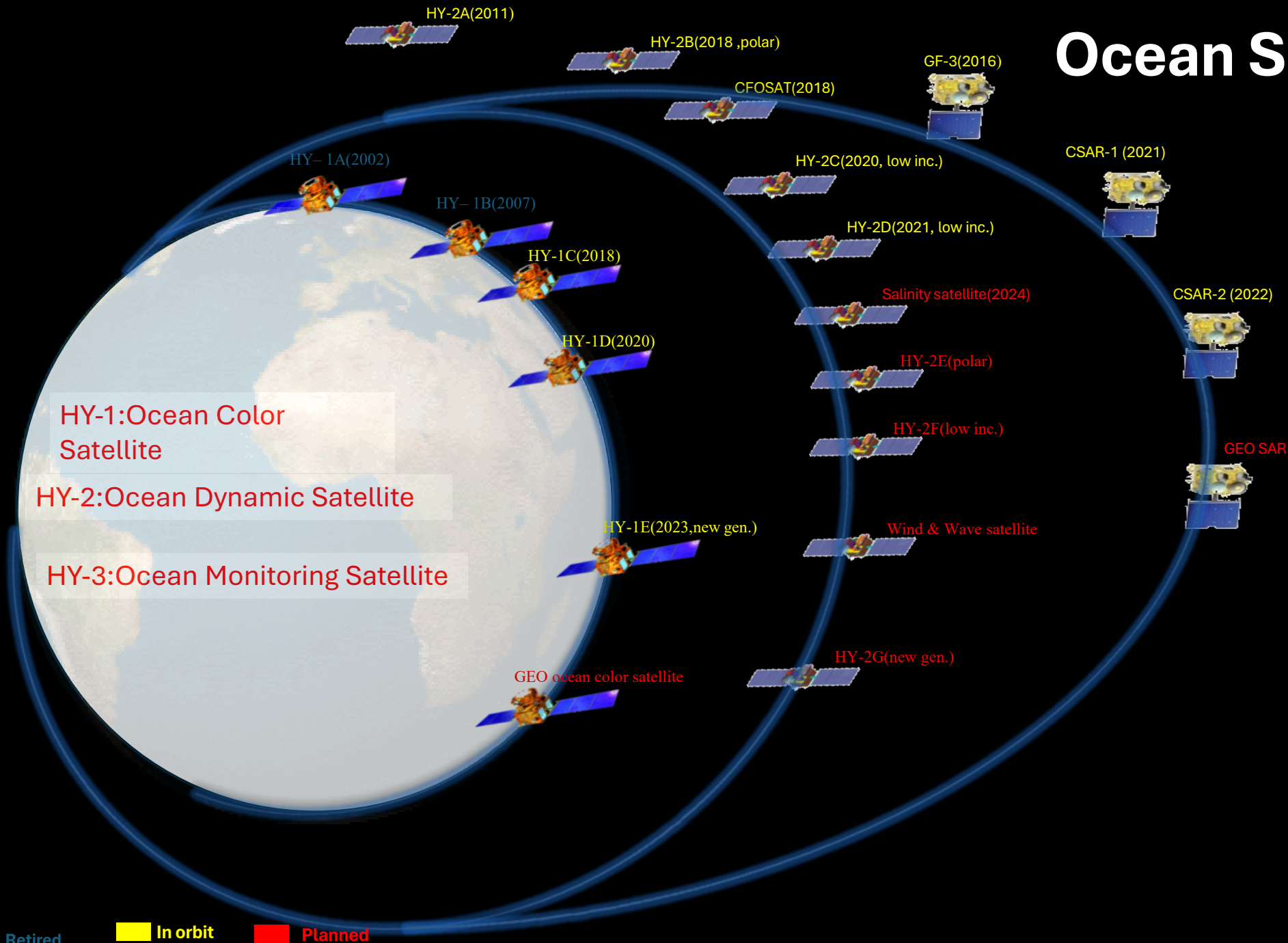Embedded in mobile devices, vehicles (navigation)

China's Ocean
Satellite and programme

Haiyang (海洋)

| HY- 1 | Ocean color satellites |

To observe sea optical characteristics, chlorophyll concentration, sea surface temperature and sediment concentration.

| HY- 2 | Ocean dynamic environment satellites |

To monitor the global marine dynamic environmental parameters including **sea surface wind field**, sea surface height, significant wave heights and sea surface temperature etc.

| HY- 3 | Ocean surveillance and monitoring satellites |

To obtain the high-resolution ocean microwave remote sensing information, monitor oil spill, sea ice, sea surface wind field, wave etc.

Ocean Series Satellite

HY-2A(2011)
HY-2B(2018 ,polar)
GF-3(2016)
CFOSAT(2018)
CSAR-1 (2021)
HY–1A(2002)
HY–1B(2007)
HY-2C(2020, low inc.)
HY-1C(2018)
HY-2D(2021, low inc.)
CSAR-2 (2022)
Salinity satellite(2024)
HY-1D(2020)
HY-2E(polar)
HY-2F(low inc.)
GEO SAR
HY-1:Ocean Color Satellite
HY-2:Ocean Dynamic Satellite
HY-1E(2023,new gen.)
Wind & Wave satellite
HY-3:Ocean Monitoring Satellite
GEO ocean color satellite
HY-2G(new gen.)

Retired   In orbit   Planned

SOURCES OF GEOSPATIAL BIG DATA

- **LiDAR (Light Detection and Ranging):** A remote sensing technology that uses laser pulses to measure variable distances to the Earth, creating high-resolution 3D information about the surface.

Key Characteristics

- Produces **point cloud data** (millions of 3D points).

- Provides **high spatial accuracy** and **fine detail**.

- Works day/night and can penetrate vegetation gaps.
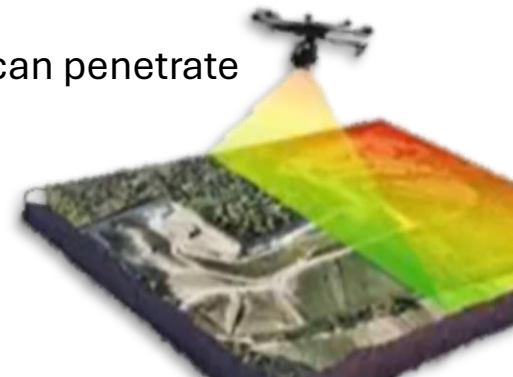
SOURCES OF GEOSPATIAL BIG DATA

UAVs (Unmanned Aerial Vehicles): UAVs, better known drones, are utilized for capturing high-resolution aerial images of small areas, such as buildings or farm fields.

- Full motion videos or high-resolution photogrammetric images
- Object detection, change detection and real-time tracking at finer scales
- Used for applications such as agriculture, forestry, and mining, environmental, urban, and hazards assessment applications …
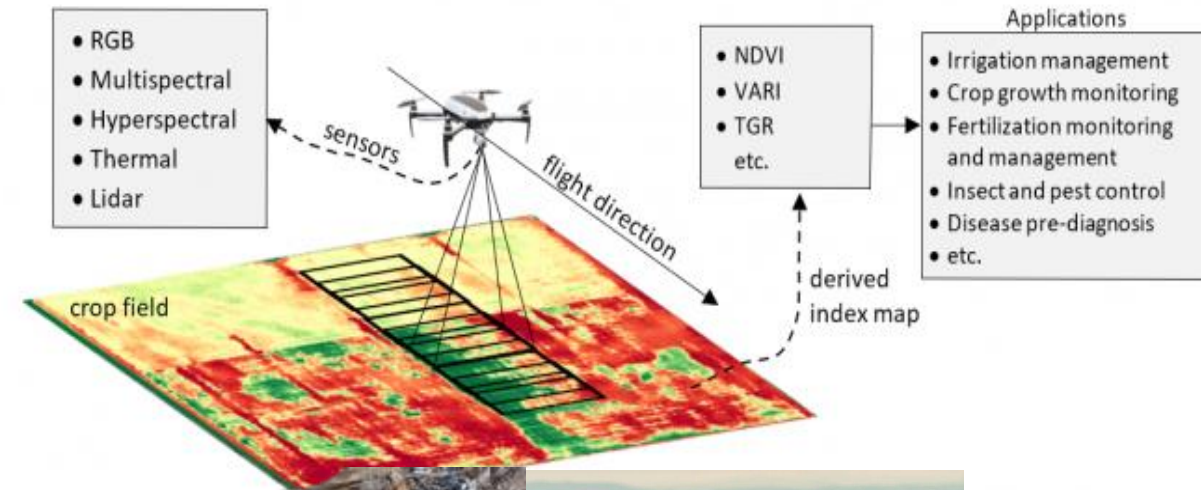
Application Examples for Smart Agriculture

Crop Growth Monitoring and Early Warning

- Real-Time Monitoring
- UAV /Remote Sensing
- AI Image Recognition
- Big Data Analysis and

Precision Agricultural Management

- Smart Irrigation
- Precision Fertilization
- Environmental Control
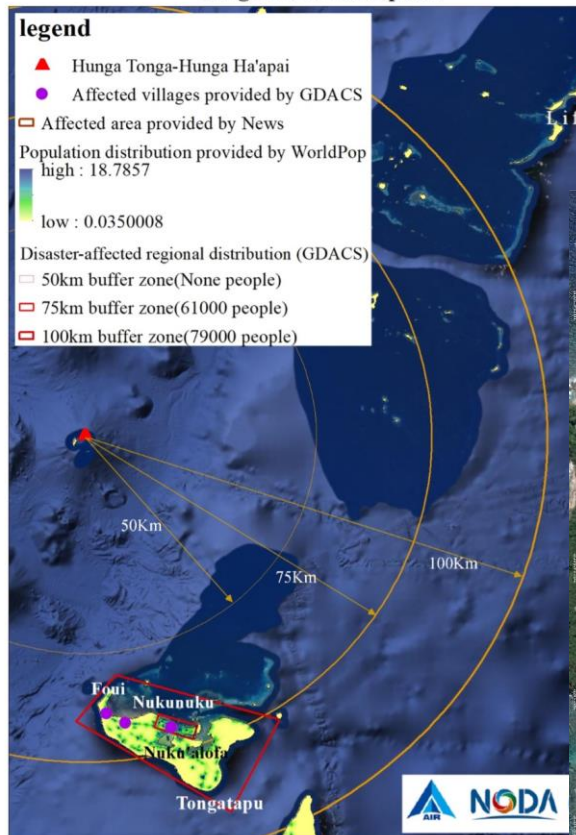- IoT Monitoring

Agricultural Decision Support

- Data Analysis
- Smart Decision System
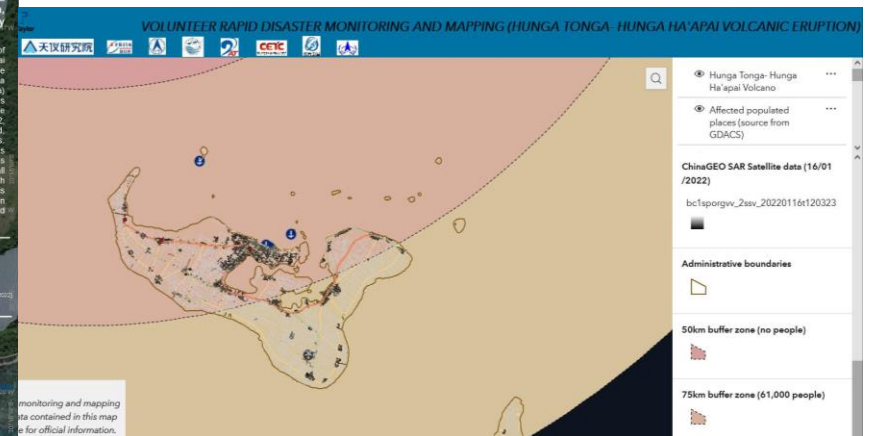
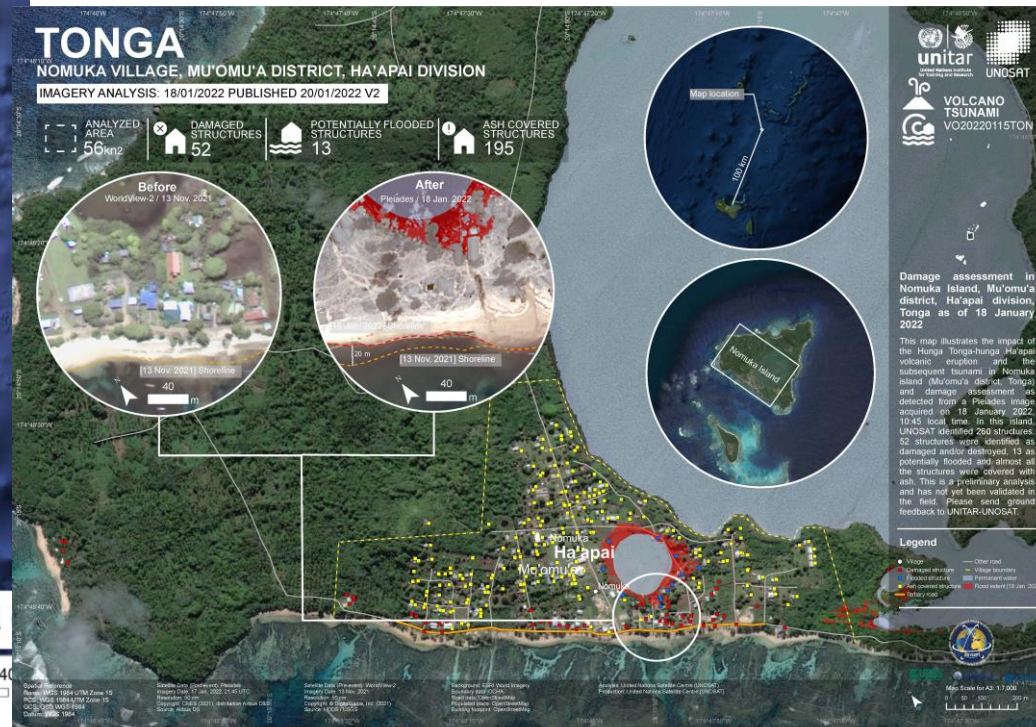# Satellite Data from China Helps Tonga with Disaster Response

HISEA-1 SAR images, Jilin-1 and BJ3A optical images, and Zhuhai-1 hyperspectral images provided by ChinaGEOSS, combining with information such as population and settlement distribution affected by Tonga Volcanic Eruption provided by National Earth Observation Data Center (NODA)

Thank you for your attention