

Geographic Information Systems (GIS), Earth Observation, and Resources Utilization

Addressing Global Challenges: Data Integration and Geospatial Technologies

“Leave No One and No Place Behind”

Social Dimension and Spatial Dimension

Combines two crucial principles from global development and geospatial management: integration of people and places in development efforts.

- All people have access to essential services and opportunities for a better quality of life.
- Every location is represented in data and included in development strategies.

This is critical in tackling challenges such as:

Climate Change: Incorporating vulnerable populations and degraded regions into climate adaptation and mitigation strategies.

Disaster Risk Reduction: Including all communities and geographic areas in disaster preparedness and recovery efforts.

Sustainable Development: Promoting equitable growth that balances progress between urban centers and rural areas globally.

Traditional vs. New Data Sources for DRR and SDGs

Traditional Data Sources:

- Population and household censuses, surveys, and economic studies.
- Administrative records (civil/vital registration, customs, water, electricity, cadaster systems).
- Provide a broad understanding of national development trends

New Data Sources:

- **Geospatial Information Systems (GIS)** and **Earth Observations (EO)** technologies (satellite imagery, drones, aerial surveys).
- Provide **real-time, high-resolution, and disaggregated** data (by location, socio-economic, demographic).

Integrating EO and GIS data with traditional sources is essential for achieving the SF targets & 2030 SDGs, improving data quality, timeliness, and granularity.



What are Earth Observations?

“As a subset of geospatial information, Earth Observations (EO) are an all-encompassing term for data and information collected about our planet, whether atmospheric, oceanic or terrestrial. These EO includes space-based or remotely sensed data, as well as ground-based or in situ data. EO data is borderless, impartial and inclusive for all.”



Empowering Decision-Making with Geospatial Tools and Global Collaboration

UN-GGIM > Implementing the 2030 Agenda with geospatial information

- The 2030 Agenda for Sustainable Development emphasizes leaving no one behind and calls for high-quality, disaggregated data.
 - Geospatial information and new data approaches are crucial for measuring progress toward the SDGs at local levels.
-
- [United Nations Integrated Geospatial Information Framework \(UN-IGIF\)](#)
 - [Working Group on Geospatial Information of the Inter-Agency and Expert Group on the Sustainable Development Goals Indicators \(IAEG-SDGS\)](#)
 - [The SDGs Geospatial Roadmap](#) [English](#) [French](#) [Spanish](#)

United Nations Integrated Geospatial Information Framework (UN-IGIF)

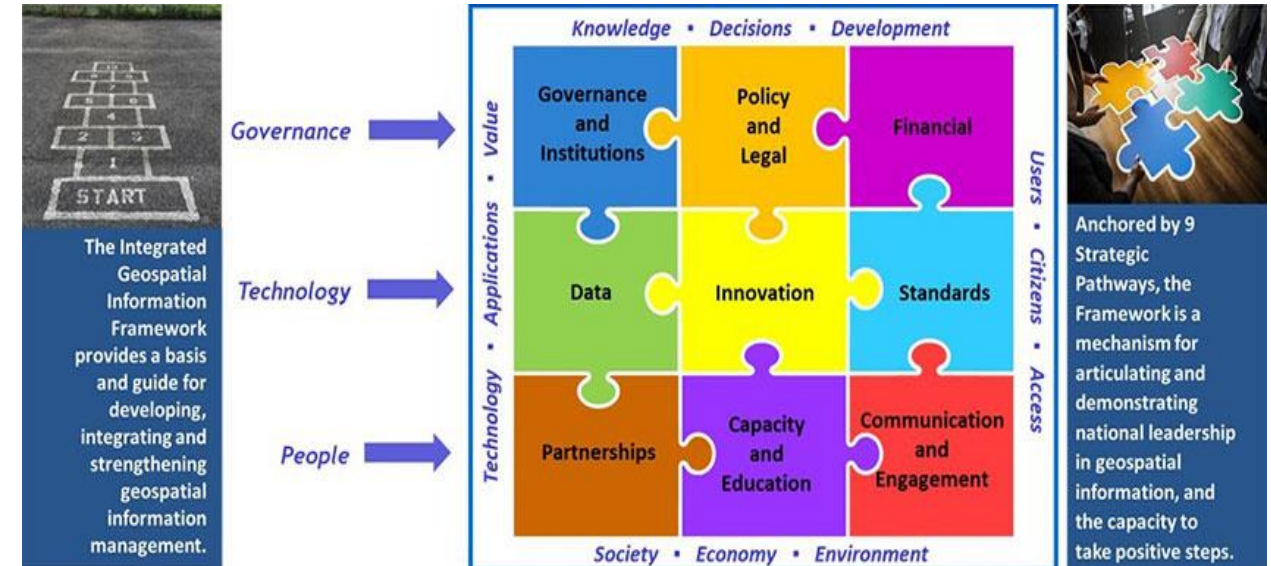
The UN-IGIF is based on 9 Strategic Routes in 3 main areas of influence

Global Statistical Geospatial Framework (GSGF)

- The GSGF integrates geospatial and statistical data.
- Its five principles enable standardized data for decision-making.
- The data supports development goals, including the 2030 Agenda.

GSGF 5 Principles

1. Use of fundamental geospatial infrastructure and geocoding
2. Geocoding of unit record data in a data management environment
3. Common geographies for the dissemination of statistics
4. Statistical and geospatial interoperability
5. Accessible and usable geospatially enabled statistics



Home

Publications

Events

Resources

GeoTalks

Situation Room

UN Data

Home » One UN Geospatial Situation Room

One UN Geospatial Situation Room

- The One UN Geospatial Situation Room centralizes UN geospatial data for decision-making.
- It offers webmaps, apps, and geospatial knowledge across UN themes.
- Created following a UN-GGIM decision, it aligns with the UN Data Strategy.

UN-GGIM

Committee of Experts on
Global Geospatial Information
Management



UN-IGIF

Integrated Geospatial
Information Framework



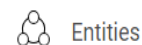
UN

Data Commons for
the SDGs



One Map. One Humanity.

42



Entities

360+



Network Members

5



Nexus Apps

7



Priority Data Themes

Working Group on Geospatial Information for Disaster Risk Management

- The group was formed in August 2015 to develop a strategic framework for Disaster Risk Reduction.
- It aims to ensure timely access to geospatial information for decision-making in disaster management.

The Working Group invites stakeholders to help maintain the global disaster risk reduction inventory through ongoing surveys:

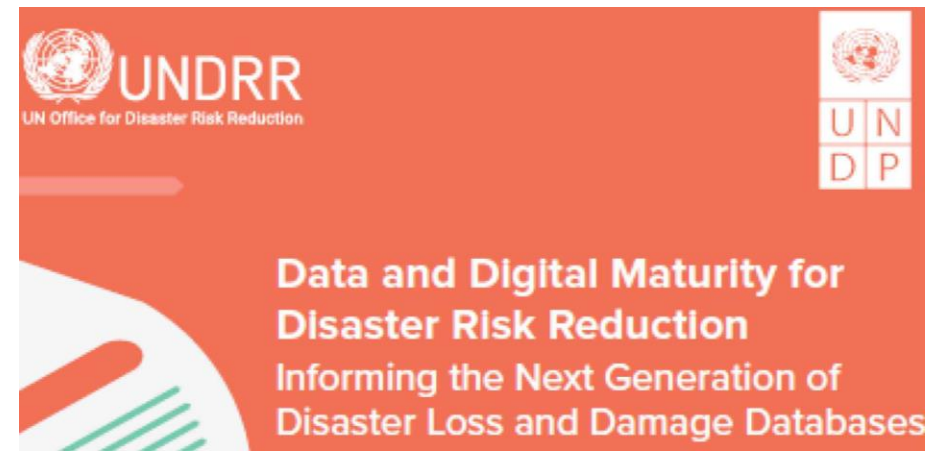
- DRR Geospatial Information & Services Platforms Inventory Survey
- DRR Organizations Inventory Survey

The Global Statistical and Geospatial Framework (GSGF) e-Learning Tools
UN-GGIM - Country reports

Disaster related statistics framework (English selfpaced): Online Course
DesInventar as a Disaster Information Management System

EMDAT - Emergency Management Disasters Database
Group on Earth Observations (GEO): EARTH OBSERVATIONS FOR IMPACT

UNDP: DDRRMM White Paper
DDRRMM Maturity Calculator



Geospatial Solutions in Action: Tools, Applications, and Collaboration

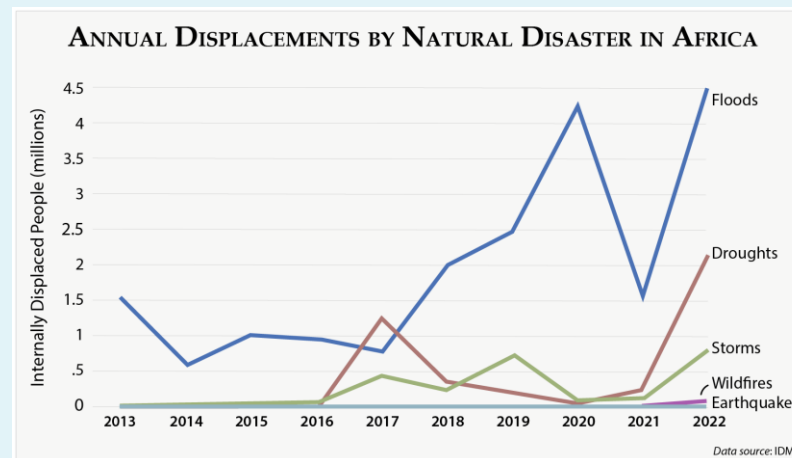
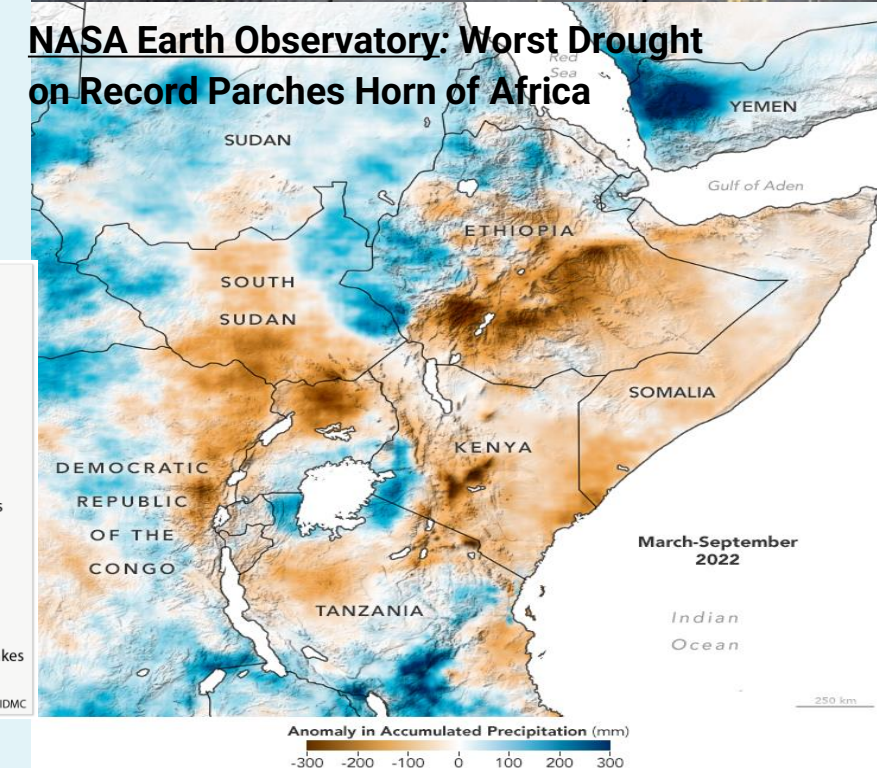
Disaster Impacts in Sub-Saharan Africa: Key Facts

GAR Special Report 2024

- **Cyclone Freddy (2023):** Killed over 400 people in Madagascar, Mozambique, and Malawi, leaving extensive damage.
- **Horn of Africa Drought (2020-2023):** Over 30 million people in Ethiopia, Kenya, and Somalia faced severe food insecurity due to drought.
- **Floods and Displacement:** 45,000 asylum seekers fled to Kenya from Somalia in 2023, driven by drought and food shortages.
- **Food Insecurity:** By 2024, 29.9 million people across the Horn of Africa are in crisis or worse (IPC3+ levels).
- **Livestock Loss:** The drought led to 9.5 million livestock deaths, severely affecting livelihoods.

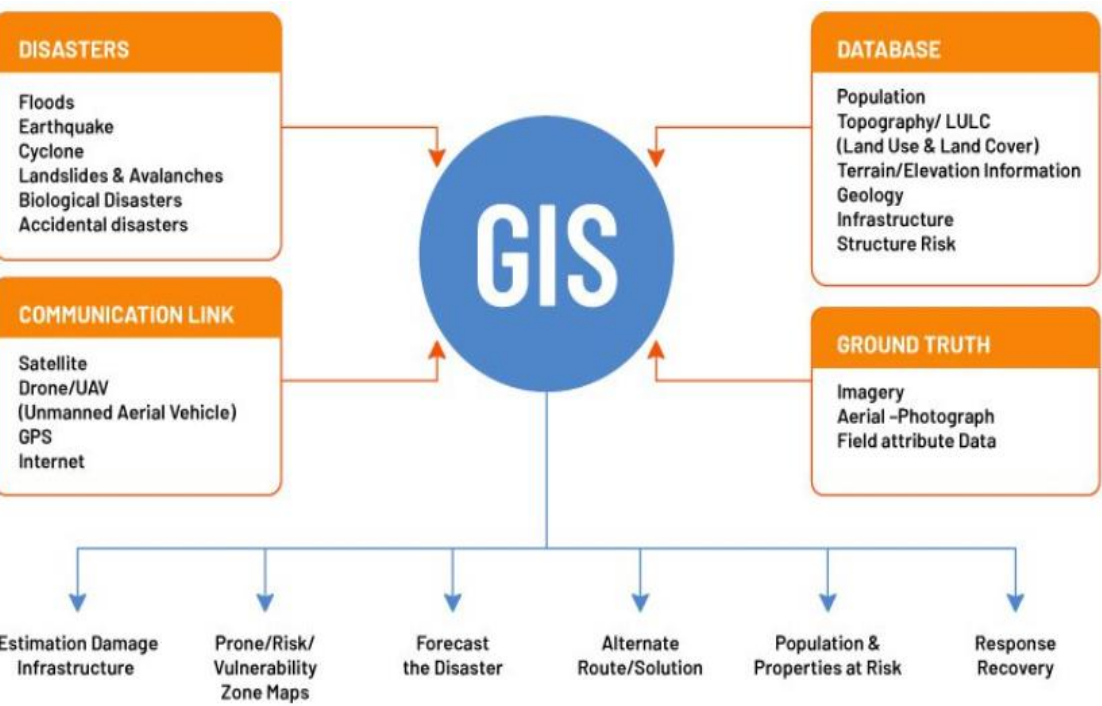


NASA Earth Observatory: Worst Drought on Record Parches Horn of Africa



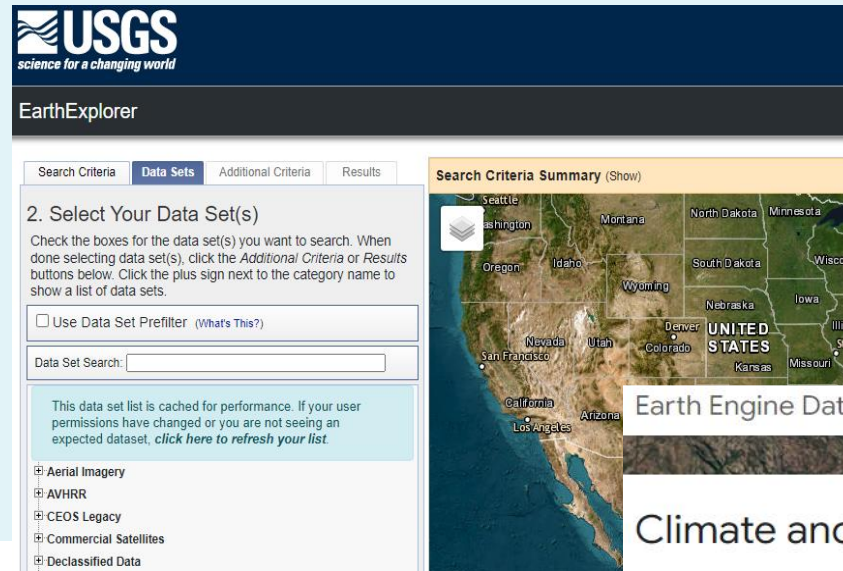
Source: [Africa Center for Strategic Studies](#)

Disaster Management Cycle: Leveraging GIS and EO



ROLE/FUNCTION	GIS APPLICATION	EO APPLICATION	EXAMPLES
Real-time Monitoring and Early Warning Systems	Visualizing real-time hazard data	Monitoring hazards with satellite-based data	Global Disaster Alert and Coordination System (GDACS)
Hazard Mapping and Zonation	Creating hazard maps, identifying high-risk areas	Providing satellite imagery for hazard monitoring	Flood Inundation Mapping, Flood Hazard Mapping and Flood Risk Mapping in Malaysia
Vulnerability and Exposure Assessment	Integrating socio-economic data with hazard info	Assessing exposure using land use/population data	Drought vulnerability in Kenya
Risk Communication and Community Engagement	Visualizing risk information for community engagement	Creating visual representations of risk	Community mapping exercises in the Philippines
Situational awareness/ Real-time Monitoring	Real-time Data Integration for aiding response efforts	Providing real-time data on disaster extent/thermal imaging	Cyclone Idai 2019 in Mozambique/ Australian Bushfires 2019-2020
Resource Allocation and Coordination	Mapping affected areas and estimating losses	Using pre- and post-disaster imagery for damage assessment	Damage mapping in Haiti post-2010 earthquake

Producers of free, high-quality EO and RS data



[US Geological Survey \(USGS\)-EarthExplorer](#)

[Google Earth Engine](#)

OTHERS:

- [European Space Agency \(ESA\) - Copernicus Open Access Hub](#)
- [JAXA Global ALOS](#)
- [Planet NICFI](#)
- [Copernicus Climate Data Store \(CDS\)](#)
- [Sentinel Hub](#)
- [UNAVCO](#)
- [NOAA CLASS \(Comprehensive Large Array-data Stewardship System\)](#)

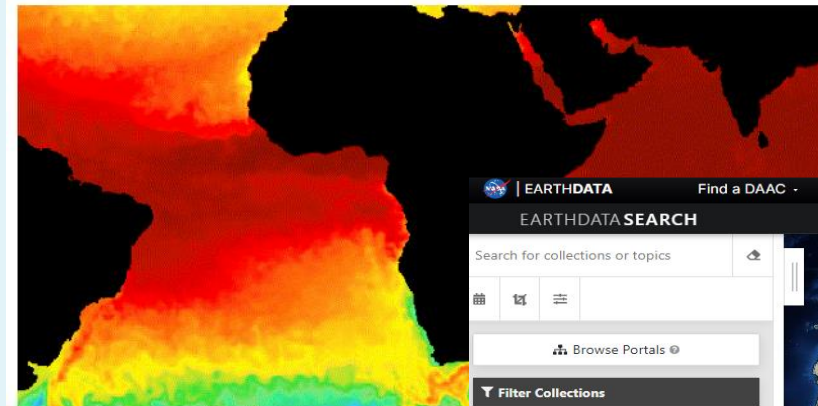
SDGSAT-1 Satellite Data - CBAS China

[FROM IMAGERY TO IMPACT: UNOSAT – UNITAR: Mapping Service](#)

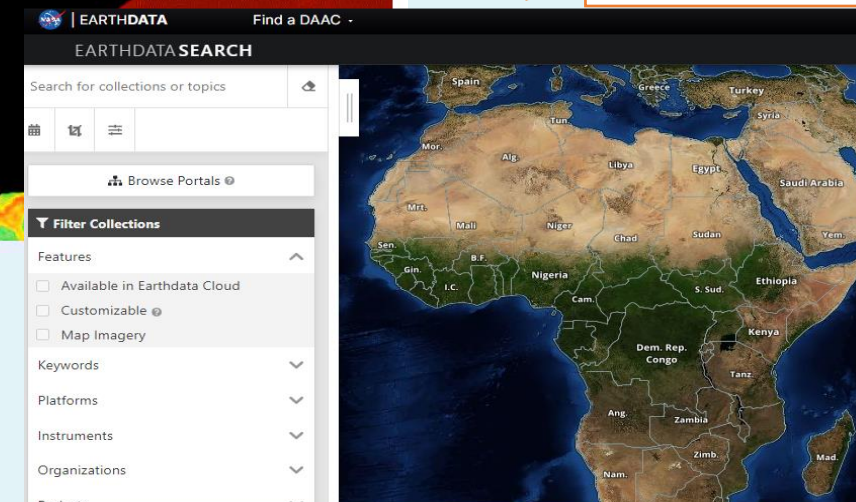
[Geospatial Information Technology \(GIT\) in Fragile Contexts E-learning Course](#)

Earth Engine Data Catalog

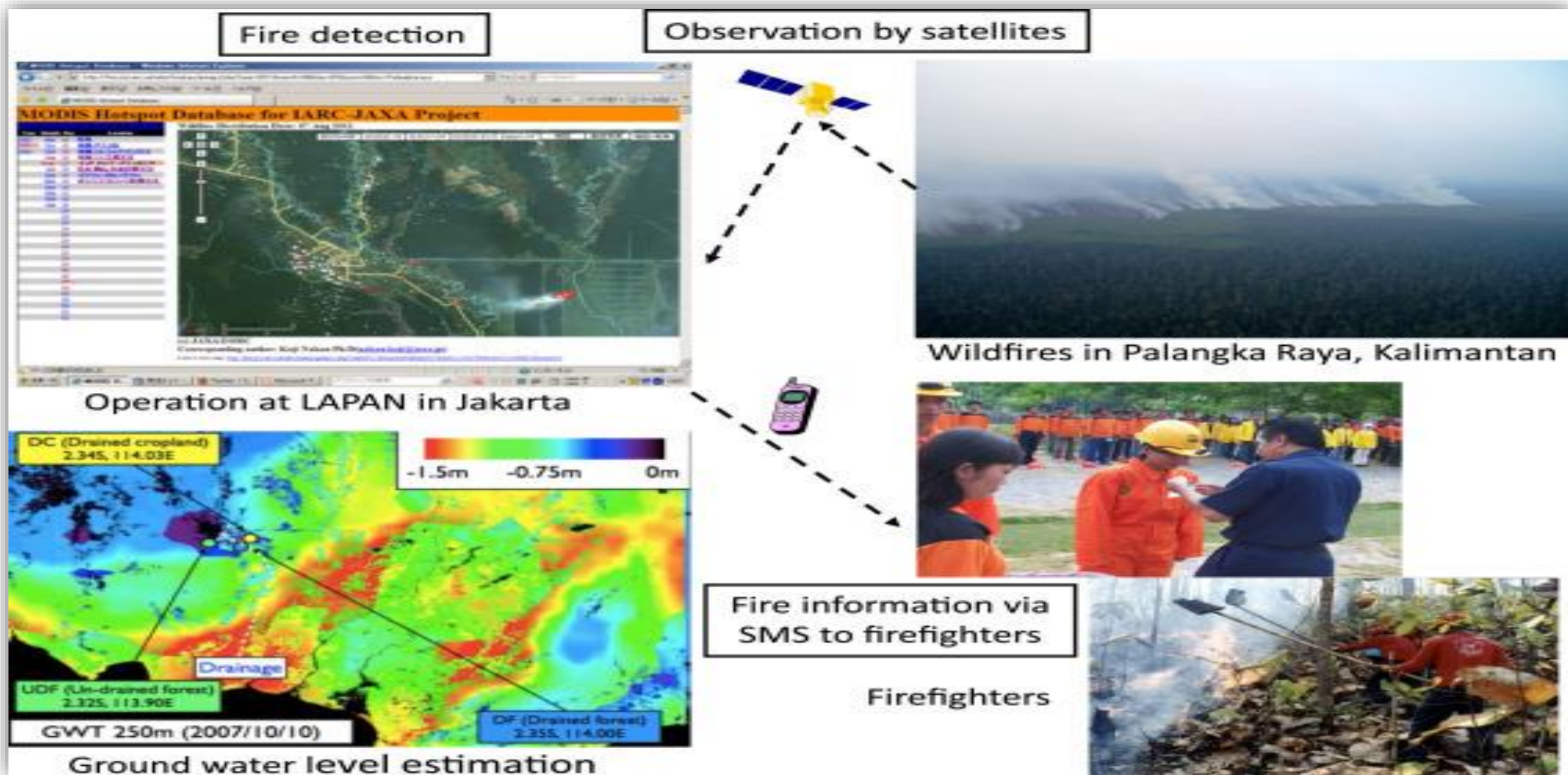
Climate and Weather



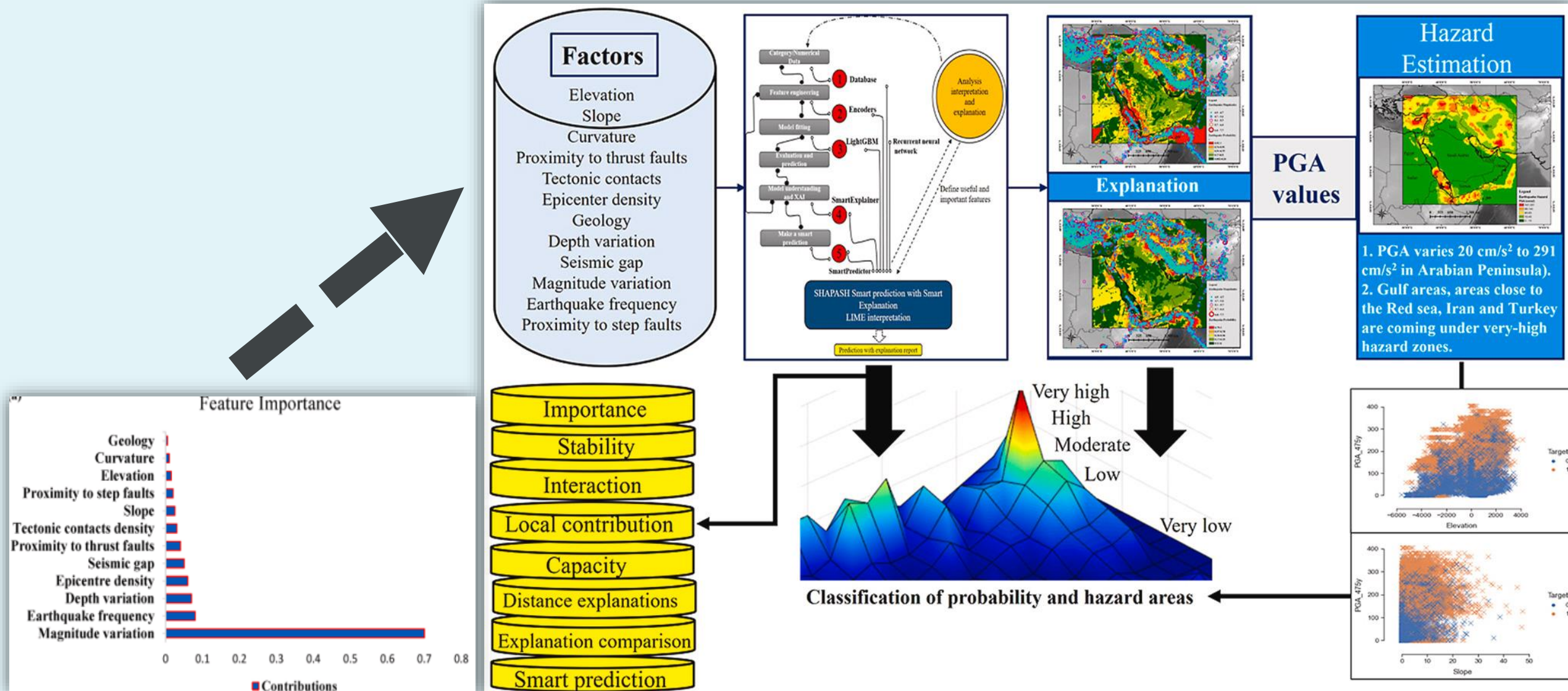
[NASA Earthdata](#)



Fire detection and control system of the JST/JICA project on wildfire and carbon management in a peat forest in Indonesia



Earthquake spatial probability and hazard estimation using various explainable AI (XAI) models at the Arabian peninsula



Other Resources

- [EO Supporting the Sustainable Development Goals:](#)
A wide list of success stories categorized according to the [United Nations Sustainable Development Goals](#) (UN SDGs)
- [Special Issue “EO Solutions to Support Countries Implementing the SDGs”](#)
- **Mobile Data Collection Apps**
 - KoboToolbox
 - ODK Collect (Open Data Kit)
 - Survey123 for ArcGIS
 - Fulcrum
 - Epicollect5

Cooperation, Collaboration and Partnerships

- **Global Frameworks and Initiatives:** Partnerships through frameworks, UN-IGIF promote standardized geospatial data use for SDGs and DRR
- **Public-Private Partnerships:** Collaboration with organizations like NASA, ESA, and private platforms (e.g., Google Earth Engine) provides access to advanced geospatial tools and data sharing.
- **Inclusive Approaches:** The "Leave No One and No Place Behind" principle integrates marginalized communities and remote areas into disaster and climate strategies.
- **Regional Cooperation:** Organizations like IGAD and ECCAS harmonize disaster data and policies across Africa, fostering collaboration.
- **Cross-Government Collaboration:** Coordination between NSOs, NDMAs, and geospatial agencies is essential for efficient disaster data sharing and harmonization.

Opportunities and Challenges

- **Real-Time Monitoring:** EO and GIS technologies enable real-time disaster risk monitoring, improving early warning systems and resource allocation.
 - **Capacity Development:** Increased focus on building technical skills in developing countries for effective EO data utilization.
 - **Open Data Access:** Platforms like Copernicus provide free, high-resolution satellite data for global use.
 - **Alignment with Global Frameworks:** Consistency with the Sendai Framework, SDGs and Paris Agreement creates opportunities for international support and cooperation.
- **Data Gaps:** Limited infrastructure and technical expertise in developing countries hinder full adoption of EO and GIS technologies.
 - **Integration Issues:** Difficulty in harmonizing traditional and geospatial data for effective decision-making.
 - **Cost Barriers:** High financial costs associated with processing EO data, especially for low-resource countries.
 - **Geopolitical Concerns:** Restricted access to sensitive geospatial data due to national security and sovereignty concerns.

4th Global Expert Forum for Producers and Users of Disaster-related Statistics -
28 October 2024 to 1 November 2024

Thank you



United Nations Avenue, Gigiri
PO Box 30552 – 00100 GPO Nairobi, Kenya

www.unep.org