DOSM/CTADR/4.2024/SERIES 50

EARTH OBSERVATION

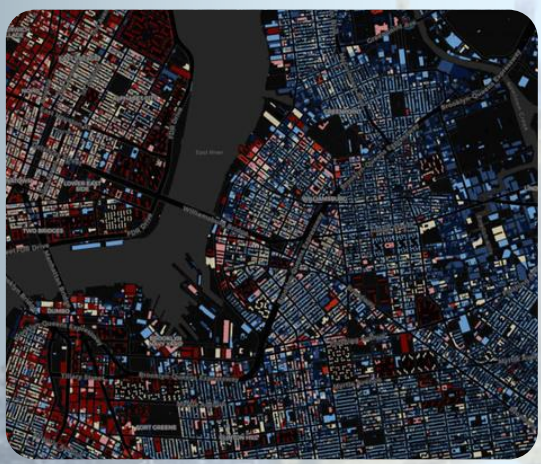
MINISTRY OF ECONOMY
DEPARTMENT OF STATISTICS MALAYSIA
NEWSLETTER

The process of gathering information about the Earth's surface, waters and atmosphere via **satellite remote sensing platforms**, **ground-based** and/or **airborne**. The acquired data are processed and analyzed to extract different types of information that can be used to monitor and assess the status and changes in both natural and human-made environments (Solimini, D.,2016)

Source: Solimini, D. (2016). Understanding Earth Observation. Berlin/Heidelberg, Germany: Springer.

GEOSPATIAL DATA

Data that includes **information related to locations on the Earth's surface**. You can map objects, events, and other real-world phenomena to **a specific geographical area identified by latitude and longitude coordinates**. (Garg P., 2023)



Source: Garg, P. (2023). Understanding Geospatial Data. In Emerging Trends, Techniques, and Applications in Geospatial Data Science (pp. 1-14). IGI Global.

REMOTE SENSING

Technology that aims to observe and study the Earth systems, and their dynamics. Data related to remote sensing, specifically satellite images, have a purpose to observe and study the Earth from space; its land surface, the oceans and the atmosphere (Fu et al., 2020)

SATELLITES

Equipped with sensors that capture images and data across various spectral bands

AIRBORNE SENSORS

Mounted on aircraft and drones, these sensors capture high-resolution data over specific areas

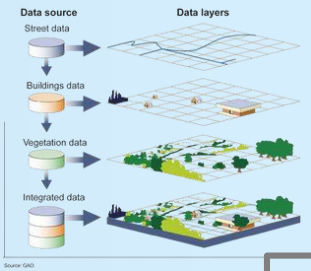
GROUND-BASED INSTRUMENTS

Includes weather stations, seismometers, and other tools that provide localized data

Source: Fu, W., Ma, J., Chen, P., & Chen, F. (2020). Remote sensing satellites for digital earth. Manual of digital earth, 55-123.

GEOSPATIAL INFORMATION SYSTEM

A Geographic Information System (GIS) is a **computer system for capturing**, **storing**, **checking**, and **displaying data** related to **positions on Earth's surface**. GIS can show many different kinds of data on one map, such as streets, buildings, and vegetation. This enables people to **more easily see**, **analyze**, and **understand patterns** and **relationships** (Kumar et al., 2023)



Source: Kumar, M., Singh, R. B., Singh, A., Pravesh, R., Majid, S. I., Tiwari, A. (2023). Geographic Information Systems in Urban Planning and Management. Germany: Springer Nature Singapore.

SOURCES OF SATELLITES DATA

Earth Observation analysis depends on **various sources of satellites data** to **monitor** and understand the **Earth's environment** that changes over time. These satellites data can be retrieved **from various sources such as**;

VIIRS

(Visible Infrared Imaging Radiometer Suite)

Managed by: NOAA and NASA

Data Access: NOAA CLASS and NASA's Earth data

Description: Offers data from the VIIRS instruments on the Suomi NPP and JPSS satellites, used for environmental monitoring, including night-time lights.

SENTINEL

Managed by: European Space Agency (ESA) and the European Commission

Data Access: Copernicus Open Access Hub

Description: Offers data from the Sentinel series of satellites, including radar, optical, and atmospheric data for various Earth observation applications.

MODIS

(Moderate Resolution Imaging Spectroradiometer)

Managed by: NASA

Data Access: NASA's Earthdata and LAADS DAAC

Description: Provides data from the MODIS instruments on the Terra and Aqua satellites, covering a wide range of wavelengths and used for monitoring global dynamics.

LANDSAT

Managed by: NASA and the U.S. Geological Survey (USGS)

Data Access: USGS Earth Explorer and Landsat Look Viewer

Description: Provides multispectral and thermal imagery of Earth's surface from Landsat satellites, offering a long-term data record since 1972.

APPLICATIONS OF EARTH OBSERVATION

National Statistics Offices (NSOs) utilize earth observation technologies to enhance the accuracy and scope of their data collection and analysis. Applications include:

AGRICULTURE MODERNIZATION

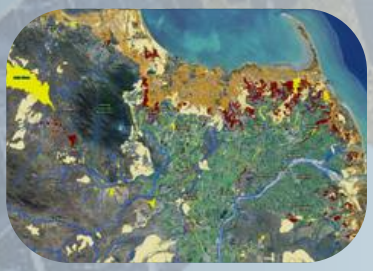
Country: Canada

Data Source: Satellite imagery and historical agroclimatic data

Application: Help classify and map agricultural land use, providing accurate data on crop types and areas under cultivation

Year: 2014

ENVIRONMENTAL MONITORING



Country: Australia

Data Source: Earth observation from space (EOS) and geospatial data

Application: Provides insights into Australia's changing land, coasts and oceans

Year: 2017

POVERTY ERADICATION

Country: Indonesia

Data Source: Multisource satellite imagery, geospatial data and socioeconomic data

Application: Help identify areas of poverty and economic activity

Year: 2022