Analysis Ready Data Cube

The iMMAP MENA Analysis Ready Data Cube (ARDC) is designed to assist the humanitarian and development sectors in addressing crucial economic, environmental and social challenges by harnessing earth observation data from satellites as well as climate models.

Employing the technology infrastructure behind the Open Data Cube initiative, the iMMAP MENA ARDC is the first Open Data Cube with a focus around the needs of the humanitarian sector. The iMMAP MENA ARDC will increase the impact of Earth Observation data aimed at supporting different clusters with On-Demand Analysis Ready Data and Information.

With the advances in machine learning, data mining and computing infrastructures, the iMMAP MENA ARDC will be capable of managing big data queries and rapidly yield time-series analysis of large satellite data archives such as Sentinel 2 and Landsat spanning as far back as 30 years.

What can the iMMAP MENA ARDC be used for?
- Detect and monitor urban changes
- Identify crop types and assess their condition
- Detect surface water extent and change over time
- Assess and monitor ecological status of water bodies
- Classifying land productivity and degradation
- Disaster Monitoring including floods, wildfires, and landslides
- Climate change analysis

What thematic areas can the iMMAP MENA ARDC support?
- Disaster Risk Management
- Food Security and Market and Systems Value Chain
- Urban Profiling
- Population Displacement
- Public outreach and awareness of environmental events
- Landscape compliance, management and monitoring

Through the Open Data Cube initiative, the iMMAP MENA Geoinformatics Unit has been working with Dr Brian Killough of the NASA Langley Research Center and Dr Alex Held of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia to increase the use of Earth Observation data that can assist humanitarian and development sectors to make better decisions.

Open Data Cube

A non-profit and open-source initiative, the Open Data Cube (ODC) aims to organize, increase the use and maximize the impact of satellite data. The data cube is also a way to prepare for the influx of earth observation data that is being generated by satellites.

Between 2017 and 2018, a total of 835 satellites were launched, which is more than the previous four years combined. A satellite can generate more than one terabyte of data per day.

The ODC is a community of people and organizations building capability for working with and managing earth observation and satellite data.

The Committee on Earth Observation Satellites (CEOS) defines a data cube as “time series multi-dimensional stack of spatially aligned pixels ready for analysis.”
Contribution to Four Sustainable Development Goals

Ecosystem

Open Data Cube Ecosystem

iMMP CUBE → Analysis → Products

Raster Data:
- Sentinel 2
- Landsat 5, 7, 8
- MODIS
- Sentinel 1 SAR
- Climate (ERA5)

Pixel by Pixel processing:
- Time Series analysis
- Statistical analysis
- Classification
- Machine learning

Examples include:
- Urban Change
- Crop ID
- Crop condition
- Water quality
- Drought
- Wildfire
- Landcover
- Climate Change

Field sampling ↔ Existing geospatial databases ↔ Thematic teams

Initial data sets iMMP MENA ARDC Geospatial Data layers:
- MODIS/VIIRS sensors (19 years)
- Landsat 5, 7, 8 satellites (30 years)
- Sentinel 2A & 2B satellites (5 years)
- SRTM Digital Elevation model
- ERA5 Climate model (40 years)

Satellite Image Resolutions: 10m - 30m

Current focus area: Syria, Jordan, Lebanon and Iraq

The infrastructure behind the iMMP MENA ARDC allows both technical and non-technical users access to earth observation information by eliminating technical barriers such as access to data, complex data preparation, lack of analyses tools and limited software and hardware resources.

The iMMP MENA ARDC can be deployed over any region around the world but will initially focus on countries such as Syria, Jordan, Lebanon and Iraq. Initial products related to urban change, land degradation and water extent will be available by mid-March 2020 with the inclusion of agricultural products and climate data by the end of 2020.

ARDC

Contribution to Four Sustainable Development Goals
Water Quality – Lake Homs, Syria
Chlorophyll a concentrations (mg/m³)

Ecological Status
- High
- Moderate
- Low
- Extreme Low
Northeast Syria Fire Impact Study for the Food Security Sector
Sentinel 2 and Landsat Data

Normalized Difference Vegetation Index

Data Source:
- Data created by: iMAP
- Data: Sentinel 2 and Landsat

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