Taiwan Data Cube Development Ming-Chih Cheng, Cynthia Liu & NSPO IPS

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The world's leading and comprehensive community of experts making location information:





Open Data Cube

Open Data Cube

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- an integration of multi-temporal and multi-sensor remote sensing data set,
- has been promoted by the CEOS (Committee on Earth Observation Satellites) for the sharing of remote sensing data

Analysis Ready Data (ARD)

- data with precise pre-processing and standardization,
- providing for the end users with completed info of satellite imageries







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Ref: https://www.opendatacube.org/

Taiwan Data Cube – Development

Photo Source: Geoscience Australia Global Forest Observation Initiative (GFOI)







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TWDC Enhancement: Data & Performance 12 : 45 : 87 OGC



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TWDC Multiple Cubes Service Framework

- By integrating TWDC to TWCC, multiple cubes data sharing framework can be accomplished
- Data are stored in different cubes according to sensor types or source provider
- User can access data of various cubes when authorization is granted
- Types of cubes are classified as follows:
 - Public or Private
 - Commercial free or non-free



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TWDC Integrated Cloud Analysis

Drive NCDR Cube to Execute Analysis Tools NCDR Cube **User End** TAIWAN COMPUTING **Analysis Conditions** CLOUD Formosat-2 / 5 Space TWDC Time 0 Sentinal-1 Product Preprocessing **Analysis Results** Sentinal-2 Mount Data (Cube) to **Display Result** Lansat-7/8 **NCDR** Cube

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TWDC Response to SDGs

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Societal Benefit Area	Topics	Benefit/Impact	SDG	
Agriculture	Multi-source image data for smart agriculture	Damage identification rate reached 90%.	2, Zero Hunger	2 ZERO HUNGER
	Paddy rice detection	Science and Technology Diplomacy	2, Zero Hunger (Thailand)	
	Panama isease detection	Science and Technology Diplomacy	2, Zero Hunger	
Water Resources Management	Water quality detection	This technology can monitor the water quality in a wide area and efficiently.	6, Clean Water	6 CLEAN WATER AND SANITATION
	Mapping Extent Annual Change in the Wetland Cover	This technique reduces traditional monitoring errors.	6, Clean Water	
Sustainable Urban Development	Assessment of Land-Use and Land- Cover Change	This analysis method can improve the research results that require long time and wide spatial scale.	11, Sustainable Cities and Communities	11 SUSTAINABLE CITIES
Biodiversity and Ecosystem Sustainability	Water Depth Detection	Satellite monitoring can be improved action that is not easy to monitor in shallow water near the coast.	14, Life Below Water	14 LIFE BELOW WATER
Biodiversity and Ecosystem Sustainability Disaster Resilience	Shoreline Detection	This technology enhances the effectiveness of early warning.	14, Life Below Water	
Biodiversity and Ecosystem Sustainability	Vegetation Recovery Monitoring	Remote sensing is not be restricted by terrain, so it can be monitored quickly and accurately.	15, Life on Land	15 LIFE ON LAND
Biodiversity and Ecosystem Sustainability Disaster Resilience	Wildfire Detection of Dry Forest in Dry Chaco Region	This study speeds up the assessment of the frequency and location of wildfires.	15, Life on Land] 🧳

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TWDC Response to SDGs

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TWDC Response to DRR

Data Cube accelerates image processing for emergency request

Flood Module

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The Data Cube can be accessed by web-interface and Jupyter Notebook with python API. Users can connect these interface tools for common analyses.

Flooding in Tainan Taiwan, 08/2018

Indonesia 05/2020

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Application-Paddy Rice Detection

Joint Research Project in Precision Agriculture is being conducted with National Science and Technology Development Agency (NSTDA) of Thailand



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Summary

- Taiwan Data Cube (TWDC) is a highly efficient cloud computing platform supporting for multi-temporal analysis of Earth environmental changes in satellite images.
- TWDC will lower the technical barriers for users to exploit the power of data (extending to UAV data) with versatile application algorithms.
- TWDC can further provide substantial benefits to improve social wellbeing and achieve the SDGs across the communities, including governments, research institutes, industries, and academia.



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Thank You!

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