

NARLabs 國家實驗研究院

This project is funded by

國家高速網路與計算中心
National Center for High-performance Computing

A FEDERATED NATIONAL DATACUBE REPOSITORY

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2021/10/14



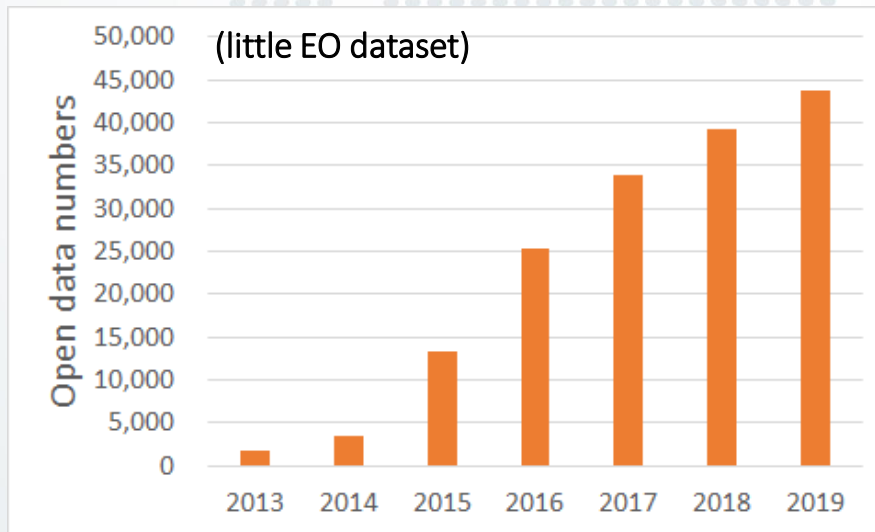
GIS.FCU
GIS RESEARCH CENTER, FCU

Backgrounds

Current status
data.gov.tw



API
Direct access/Web



flow rate



Purpose
Object

What about EO data? Problem?

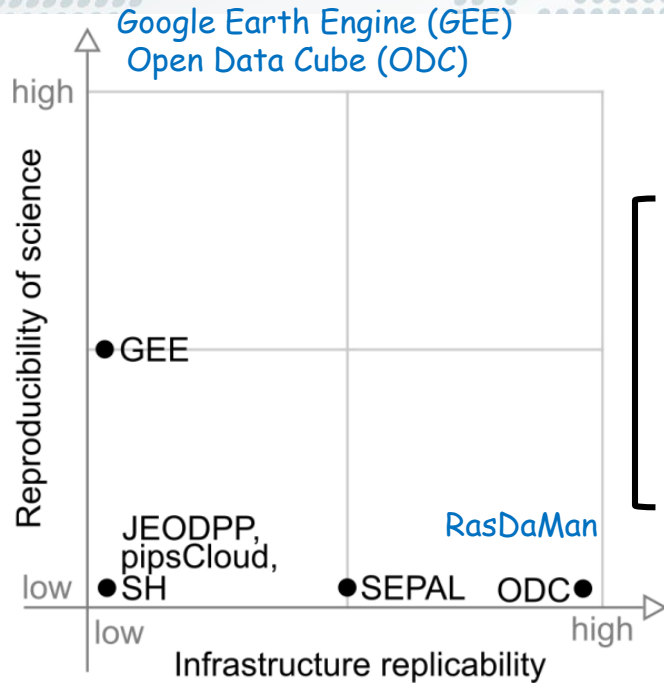


Figure 10. Infrastructure replicability vs. Reproducibility of science.

share/ reproduce the results

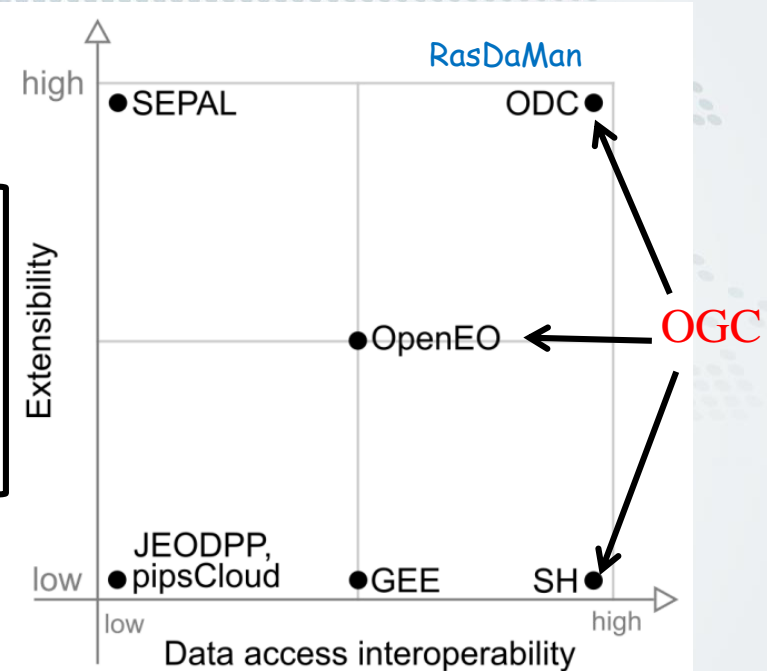


Figure 12. Data access interoperability vs. Extensibility.

Development

Jun
2017

Nov
2020

Oct
2021

2023



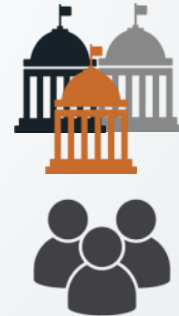
rasdaman
raster data manager



rasdaman
raster data manager



**National Raster Data
Federation**



**Data source
FormoSat-2**

**Data source
All Raster based data**

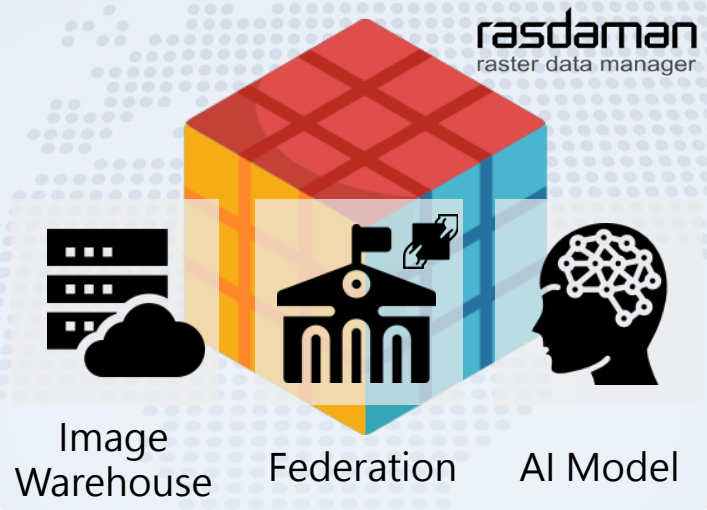
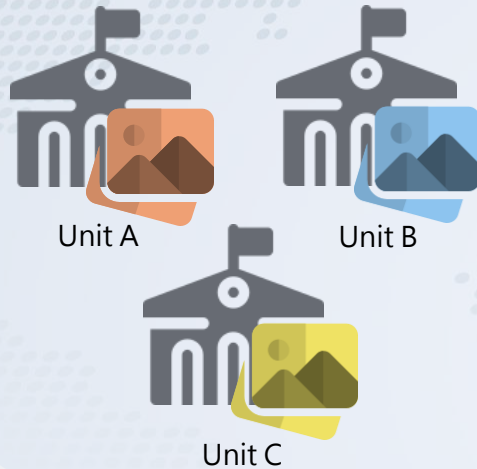


Architecture of National Geo-Datacube

Data Management

Data Integration & Federation

Applications



Infrastructure



ISO 27001 驗證
資安全管理系統



BS 10012/PIMS 認證
個人資料管理



ISO 27017 認證
安全雲端環境



ISO 27018 認證
個人隱私資料保護



ISO 9001 驗證
品質管理



TAIWANIA 1



TAIWANIA 2

CPU/GPU 主機



TAIWANIA 3
(建置完成・今年運轉)



高性能異地儲存



政府公部門整合網路
(籌備中)



雲端聯網中心
(籌備中)

GIS RESEARCH CENTER, FCU

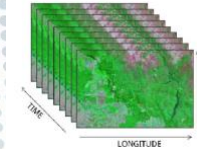
Short-term integration plan

rasdaman
raster data manager



OGC®
Making location count.

Standards



Information control
Resource management
Data sharing
Authorization
Cloud computing

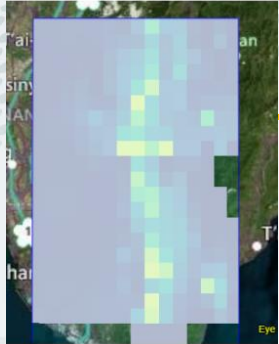
Data
(Netcdf, GeoTiff,...)
Web Map Services
(WMS, WCPS, WCS....)

3D GIS platform
Web publish
Apps
API

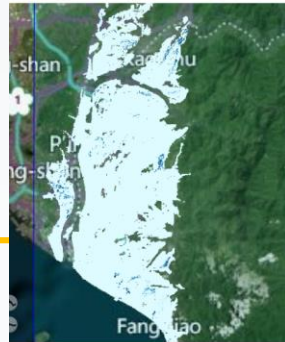


Integration experiment

Precip. CWB

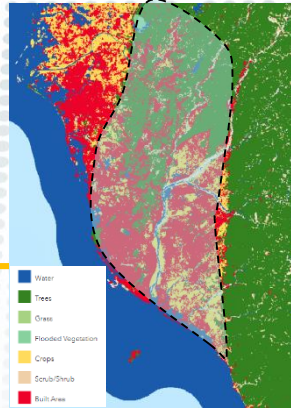


+ flooding model



Inundation add-on

+ Land-use



Damage add-on

+ Social impact



Subsidy/recovery
add-on

→ and so on

Data
is
flowing

Agricultural Scenario

- Only about $8,300\text{km}^2$ (23%) of land are suitable for agriculture
- The average farm covers 1.1 ha
- The agricultural sector is largely composed of small family farms
- ** Farmer's age 62

Multifaceted terrain with mountains and rugged hills covering two-thirds of the island

- Complex and diverse ecology

Located in the subtropics and tropics

→ With abundant rainfall, high temperature and moisture, typhoon...

→ Harsh climate

23.436°N, Tropic of Cancer

Effective Productivity + High Adding Value!





2016



2015



2017 6.2



2017

蘋果日報

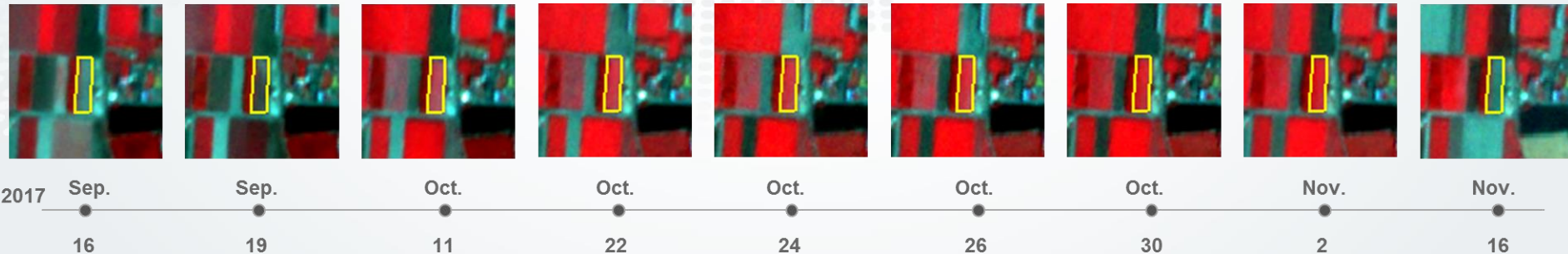
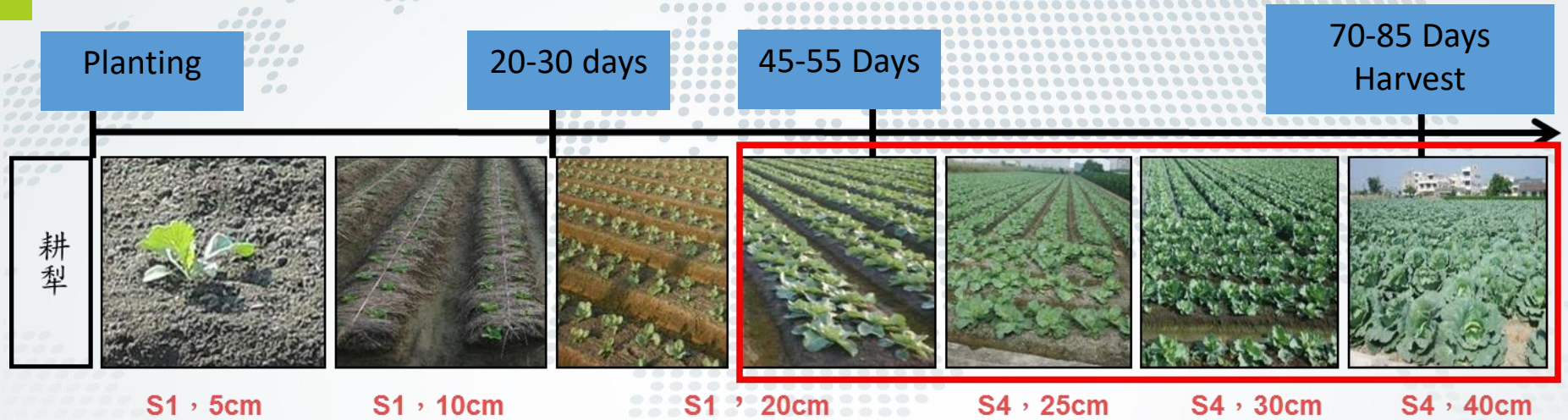


MAINLAND CHINESE BAN ON TAIWANESE PINEAPPLES HURTS FARMERS

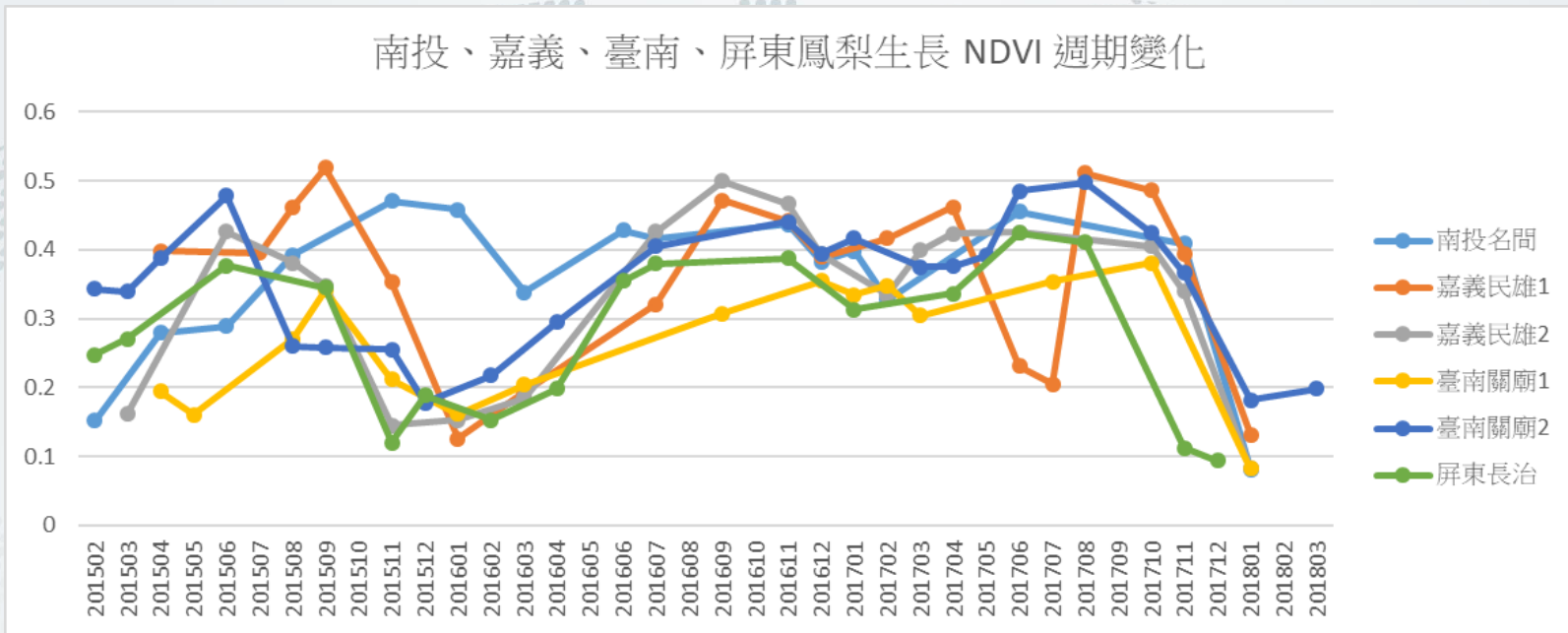


TVBS NEWS

Cabbages cultivation monitoring in winter season



Pineapple time series NDVI curve



鳳梨的物候期 BBCH系統



蓋70%黑網延遲開花、防果實日曬

The Concept of Datacube image repository

- Images from various sources and stored in separated location caused the difficulty to manage it.
- **Time wasting** for correct/available images searching and processing.
- **Different Image analysis scale and methods** for estimating agricultural loss and compensation.

Demands on developing a platform to manage, query, analysis raster data cross authorities

System Architecture Design

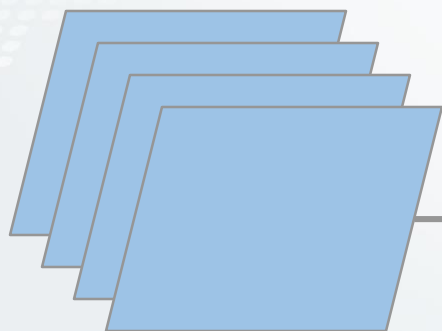


- TWCC cloud
- Spatial + temporal
- Fully support OGC standards

OGC Services,
WCS, WPS, WMS



File based image

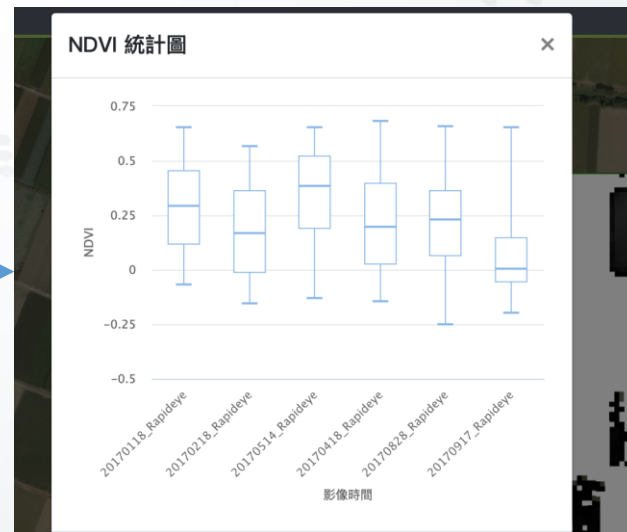
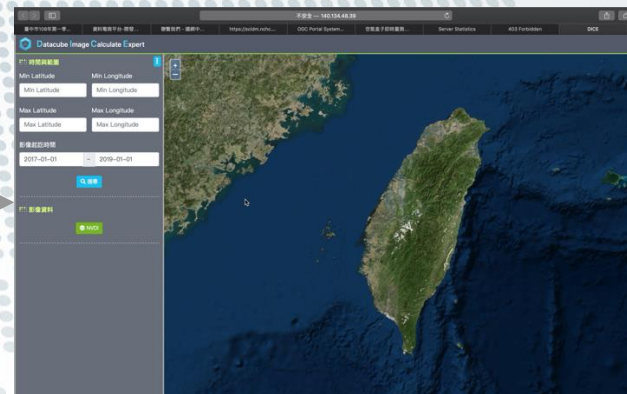


RapidEye Images repo
UAV images repo

OGC WCPS



Agri-cube(Web)



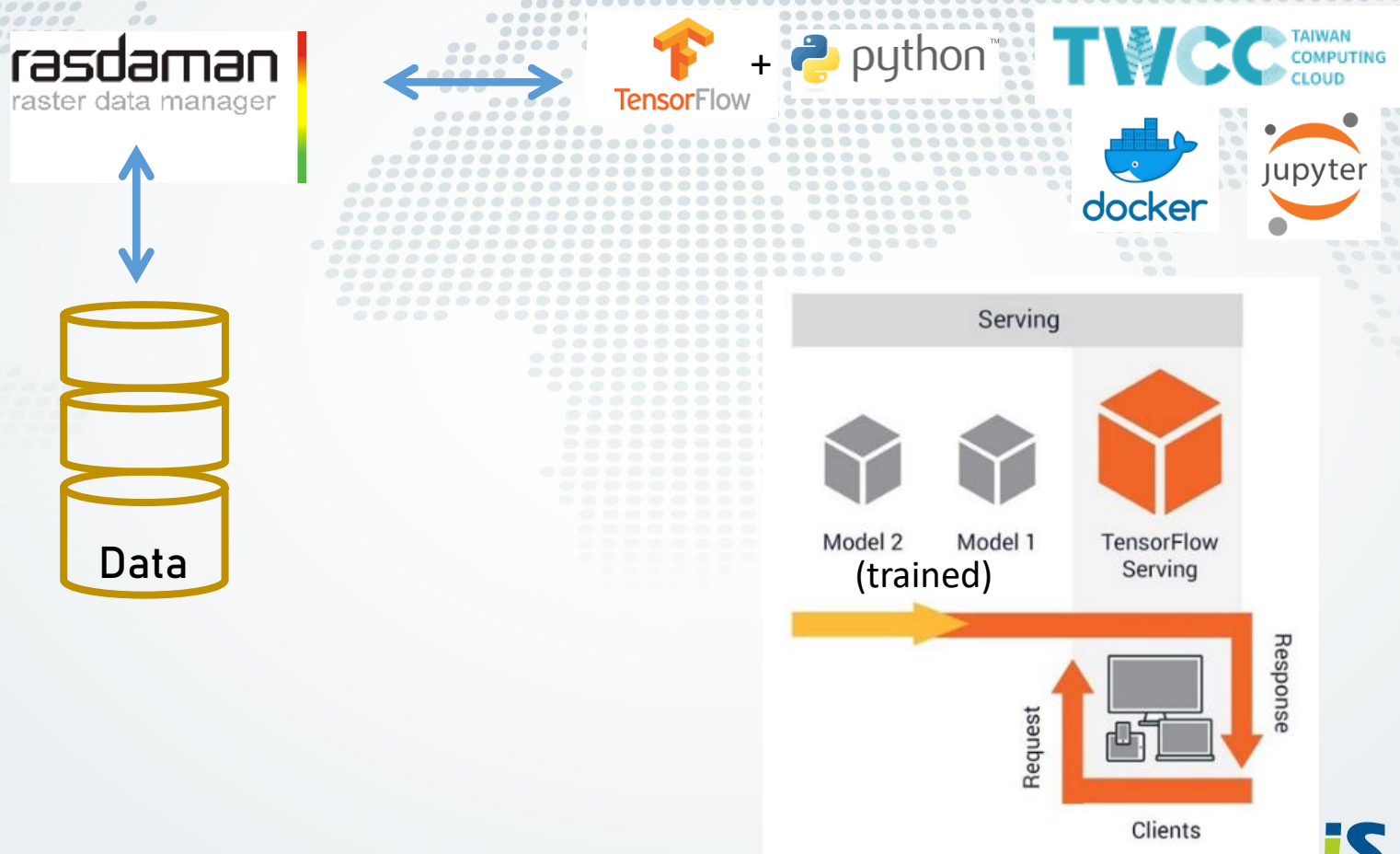
NDVI calculation on the fly

The screenshot displays the Datacube Image Calculate Expert web application. The browser's address bar shows the URL `https://scidm.nchc...`. The application's sidebar on the left is titled "時間與範圍" (Time and Range) and contains the following fields:

- Min Latitude:
- Min Longitude:
- Max Latitude:
- Max Longitude:
- 影像起訖時間 (Image Start/End Time): ~

A blue "搜尋" (Search) button is located below the time range fields. Under the "影像資料" (Image Data) section, there is a green button labeled "NDVI". The main map area shows a satellite view of the East Asia region, with a mouse cursor hovering over the sea to the west of Taiwan.

Integration with datacube and AI model on “cloud”



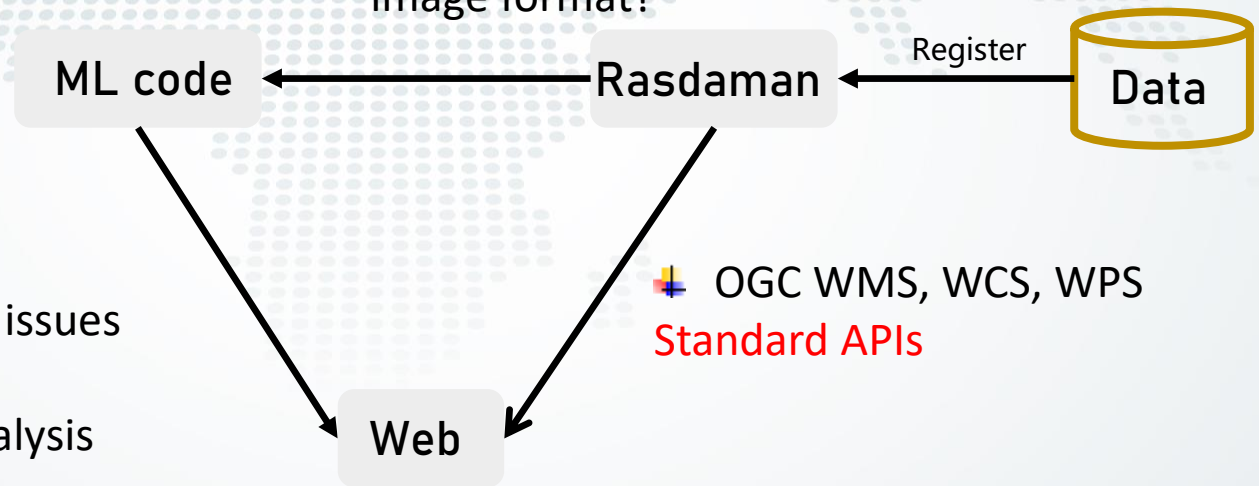
Integration Processes

Access Constraints	
GetCapabilitiesUrl	http://140.110.141.155:8080/rasdaman/ows?version=1.3.0&time="2018-11-23T00:00:00.000Z"&styles=&
GetMapUrl	http://localhost:8080/rasdaman/ows? (advertised but ignored)
GetFeatureInfoUrl	http://140.110.141.155:8080/rasdaman/ows?version=1.3.0&time="2018-11-23T00:00:00.000Z"&styles=&
GetLegendGraphic	(advertised but ignored)
Image Formats	image/jpeg image/png image/tiff
Identify Formats	
Laver Count	19

✚ Image Recognition
output file format
.shp .jpg
Support most GIS
formats

✚ read file
image format?

✚ S3 supported



✚ Web application issues
- Performance
- cross-coverage analysis

Web designation
(1).shp boundaries +WMS/WCS
(2).jpg output

Agri. AI + Datacube on TWCC

DICE tm.gis.tw/dice/

應用程式 Bookmarks 常用 專案 英 IE 車 財報狗 FB EIP Wrike BBC Google 股市 零股價格 翻譯 飲 ICON 字典 其他書籤

Datacube Image Calculate Expert

UAV | **Aerial** | Satellite

時間與範圍

Min Latitude	Min Longitude
<input type="text" value="22.48357341650651€"/>	<input type="text" value="120.54018974304199"/>
Max Latitude	Max Longitude
<input type="text" value="22.491583154381658"/>	<input type="text" value="120.55014610290529"/>


影像起訖時間

~

分析 模型種類

AI model

影像資料



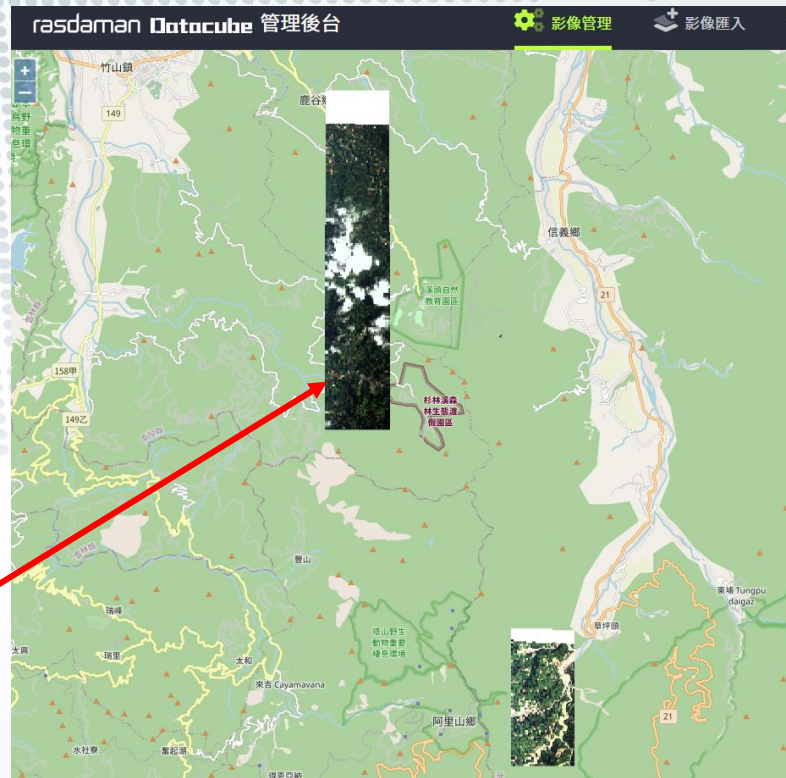
GIS RESEARCH CENTER, TCU

Easy to search and retrieve the data

查詢結果共 190 組影像 (影像大小: 7.74TB)

全選	圖層名稱	影像類別	影像地區	影像大小	授權狀態	詳細資訊
<input type="checkbox"/>	AER_ASO_3826	航照影像		6.62TB	已授權 農業局,內政部	圖台顯示
<input type="checkbox"/>	AER_ASO_ORT_95174033_025_20170101_20200714	航照影像		58.74GB	已授權 全部單位	圖台顯示
<input type="checkbox"/>	AER_ASO_ORT_94191069_025_20180502_20200713	航照影像		2.03GB	已授權 全部單位	圖台顯示
<input type="checkbox"/>	AER_ASO_ORT_94181009_025_20180409_20200713	航照影像		78.02GB	已授權 全部單位	圖台顯示
<input type="checkbox"/>	AER_ASO_ORT_94182004_025_20160918_20200714	航照影像		9.66GB	已授權 全部單位	圖台顯示
<input type="checkbox"/>	AER_ASO_ORT_95201021_025_20181202_20200713	航照影像		2.02GB	已授權 全部單位	圖台顯示
<input type="checkbox"/>	AER_ASO_ORT_95183004_025_20160820_20200714	航照影像		7.35GB	已授權 全部單位	圖台顯示
<input type="checkbox"/>	AER_ASO_ORT_95203006_025_20081128_20200713	航照影像		19.27GB	已授權 全部單位	圖台顯示
<input type="checkbox"/>	AER_ASO_ORT_95202001_025_20090825_20200713	航照影像		18.2GB	已授權 全部單位	圖台顯示
<input type="checkbox"/>	AER_ASO_ORT_95203008_025_20100519_20200713	航照影像		21.96GB	已授權 全部單位	圖台顯示

項次	拍攝日期	上傳日期	備註	功能
1	2008-11-28			圖台顯示 下載
2	2009-08-25			圖台顯示 下載
3	2010-05-19			圖台顯示 下載
4	2016-08-20			圖台顯示 下載





Thanks for listening

