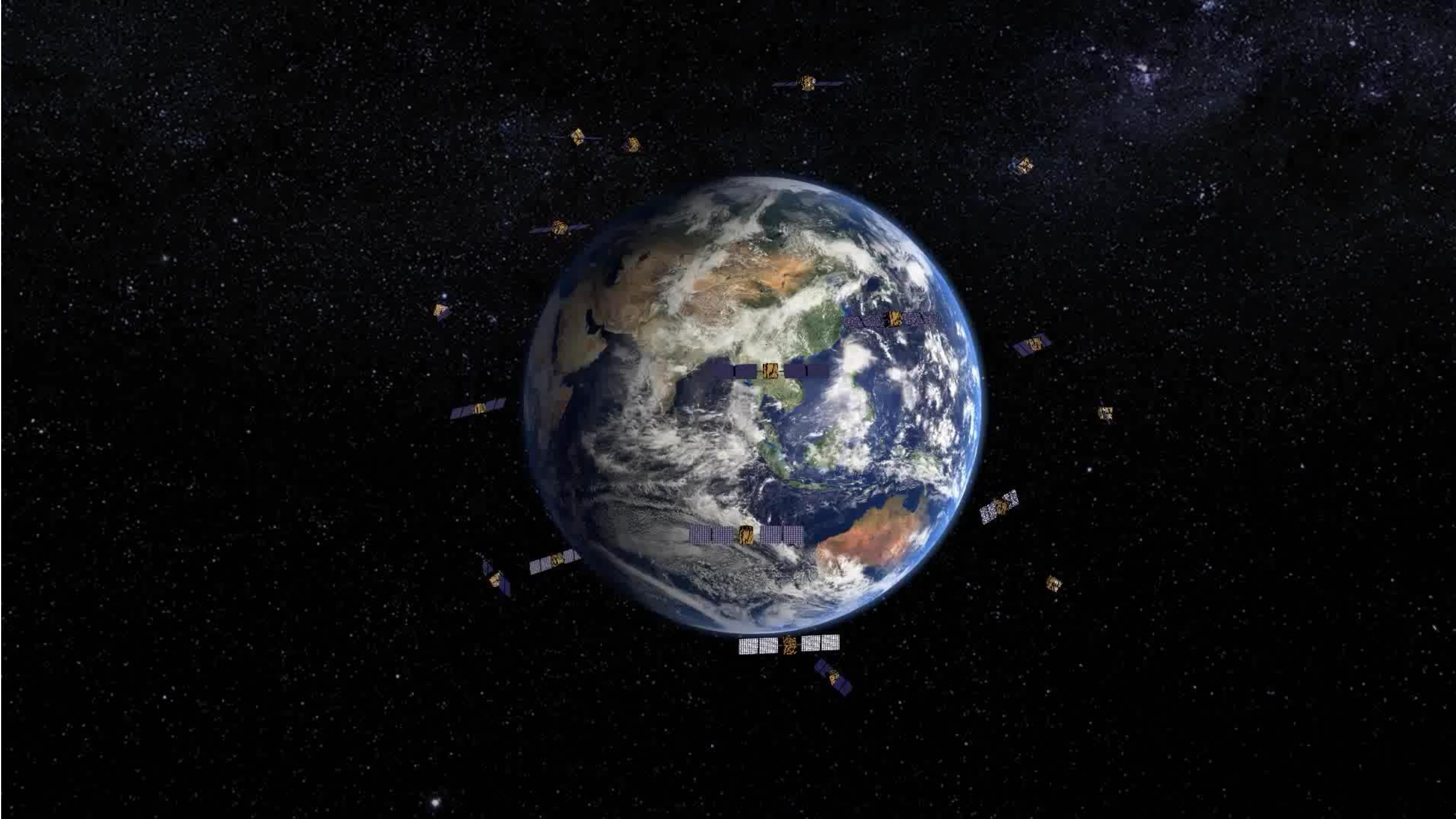




Digital Earth Pacific: A Demand-Driven Approach to Addressing Climate Change Vulnerability in the Pacific

Aditya Agrawal, Founder



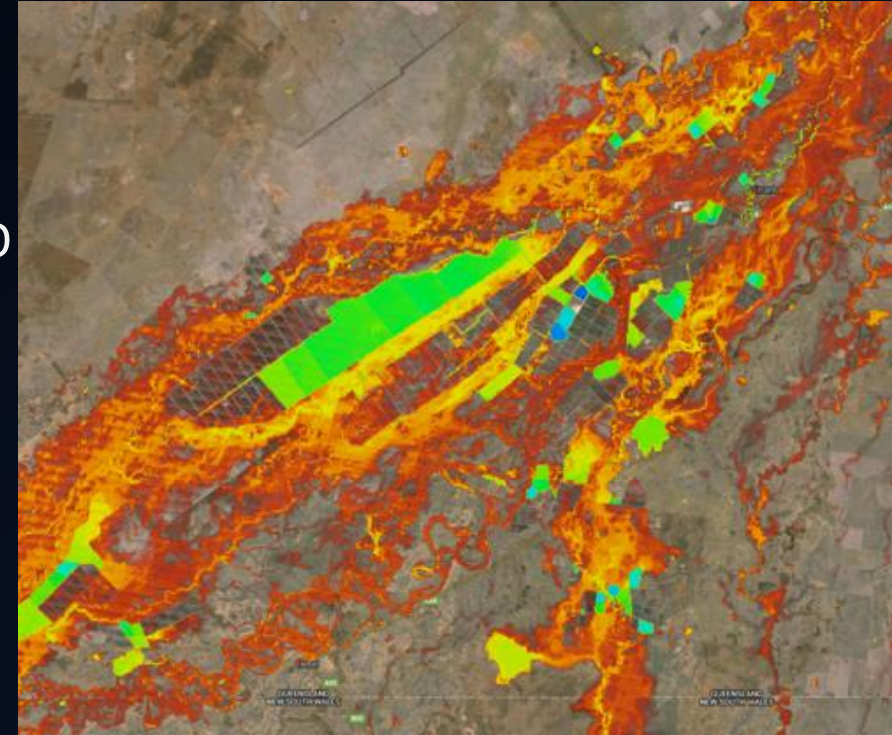
- Countries have expressed a need for better access and capacity for applying Earth observation data to national development priorities and sustainable development.
- The **Digital Earth** programs will provide an operational data infrastructure deployable in the cloud or locally that gives the host organization and stakeholders control over its use and management.
- Products and services are responsive to priorities across countries and a multi-stakeholder approach is encouraged to create an innovative data ecosystem.



Digital Earth

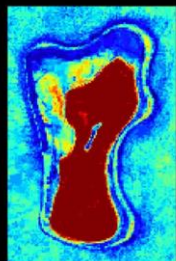
Developing the Business Case

- Understand needs and priorities of countries on the use of EO data
- Undertake significant stakeholder engagement and outreach
- Develop a prototype infrastructure
- Develop a series of early win products and services
- Understanding the landscape to identify alignment opportunities
- Developing a coalition of partners and investors;
- Identify the key political, institutional, financial, capacity building and technical requirements for a sustainable program

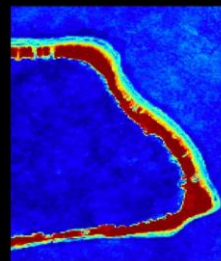




Example Water History products for the Marshall Islands



Mejit Island Water History
2014 through 2021
Landsat-8



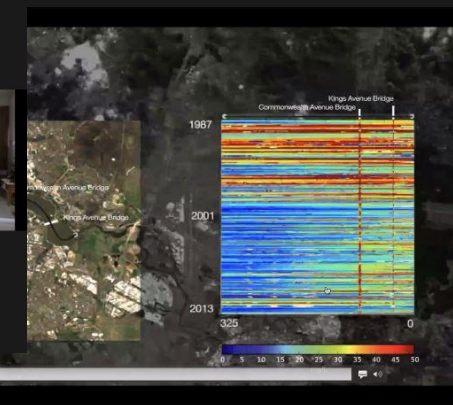
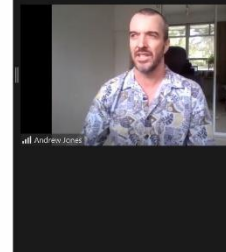
East Majuro Island Water History
2014 through 2021
Landsat-8

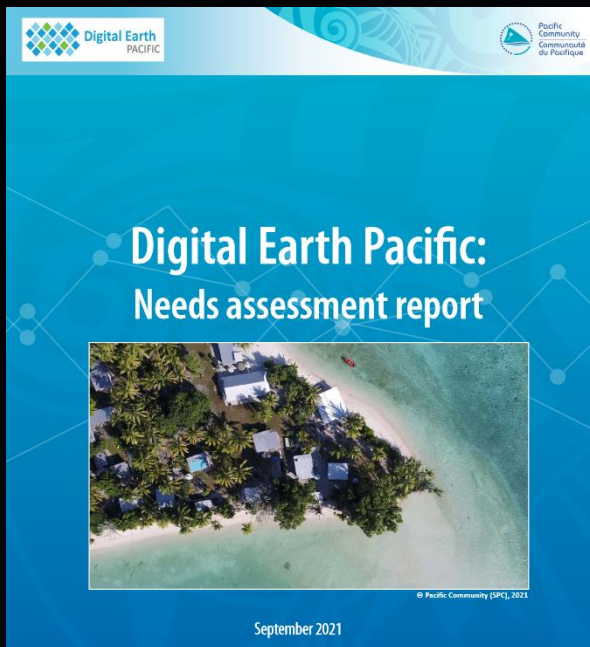


A time-series history of water presence for every 30-meter pixel from 2014 to 2021



In 2021 the strategic plan is informed by:





- Climate Change
- Disaster Management
- Food Security

Tier I Use Cases

Category	Needs and Use Cases
Agriculture	Vegetation index - crop detection
Climate Change	Coastline change detection
Conservation	Forest cover change detection
Disaster Management	Cyclones
Disaster Management	Inundation modeling/Flooding
Disaster Management	Digital Elevation Model
Urban Development	Land use/land cover mapping and change

Tier II Use Cases

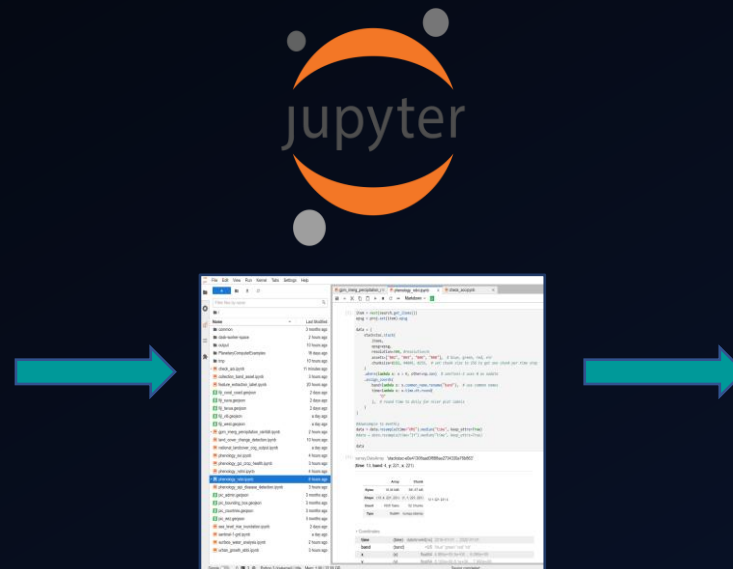
Category	Needs and Use Cases
Agriculture	Agricultural census
Climate Change	Coastal area change
Conservation	Invasive species
Disaster Management	Tsunami
Disaster Management	Hazards mapping
Disaster Management	Droughts
Fisheries Management	Vessel tracking
Fisheries Management	Fisheries stock assessments
Geology and Mines	Sand resourcing
National Statistics	Mapping buildings and associated populations
National Statistics	Household census - cost of household listings
National Statistics	Household census - annual community-based household counts
Water Resource Management	Identification of new water sources
Water Resource Management	River morphology
Water Resource Management	Groundwater mapping

DEP in a (technical) nutshell

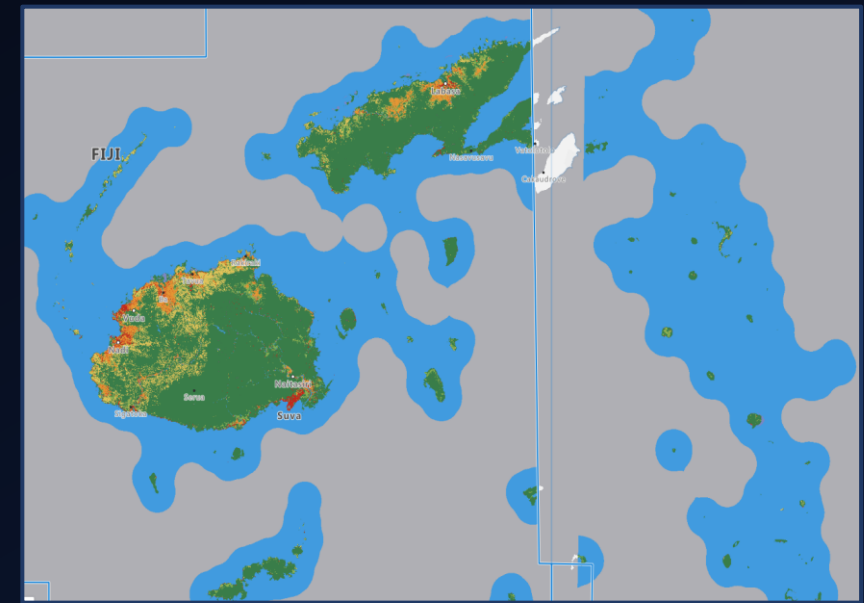
Digital Earth Pacific is an analytical cloud platform that makes remotely-sensed analysis ready data (ARD) accessible* via well-defined standards ; and enables users to perform highly scalable EO tempo-spatial analysis* using open source data science libraries and models.



Multi-spectral Satellite Imagery
Thanks to Sachindra Singh, SPC



Notebooks are RESUABLE components that combines live code, visualisations, documentation and configurations to enable EO analysis at scale.



Earth Observation Product

DEP Implementation - MSPC

The Microsoft Planetary Computer (MSPC) is a platform that lets users leverage the power of the cloud to accelerate environmental sustainability and Earth science

The Planetary Computer consists of 3 major components:

1. The Data Catalog - which includes petabytes of up-to-date and historical data about Earth systems.
2. Data Science Ecosystem - libraries/API's that allow users to search for the data they need across space and time.
3. The Hub - a computing environment that allows scientists to process/analyse massive geospatial datasets.



Microsoft Planetary
Computer

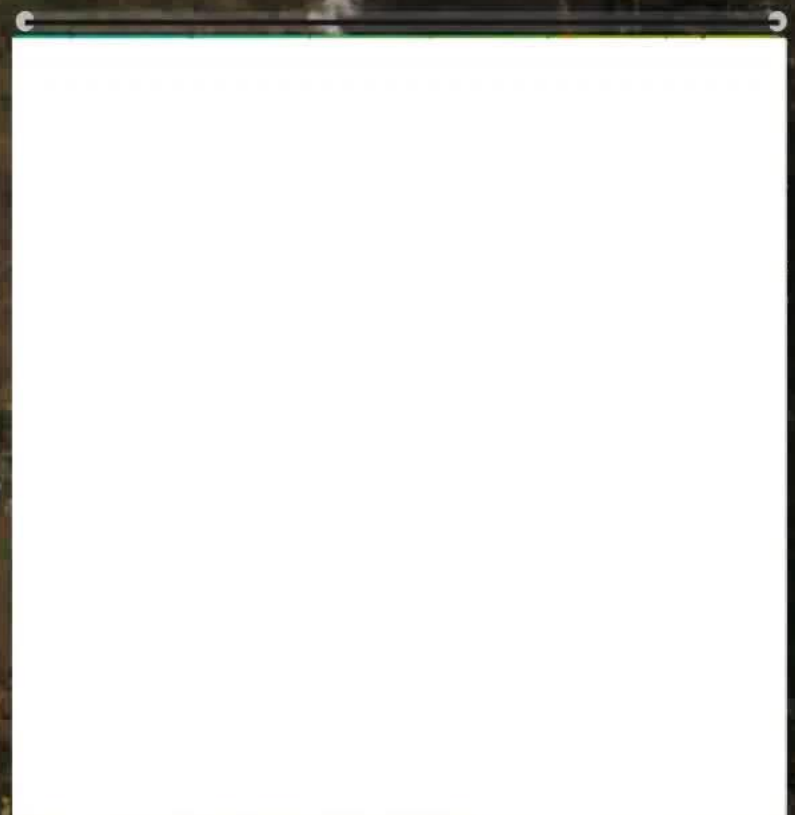




1987

2001

2013



325

0





■ green

■ dry

■ soil

1988

2000

2006

2014



1987

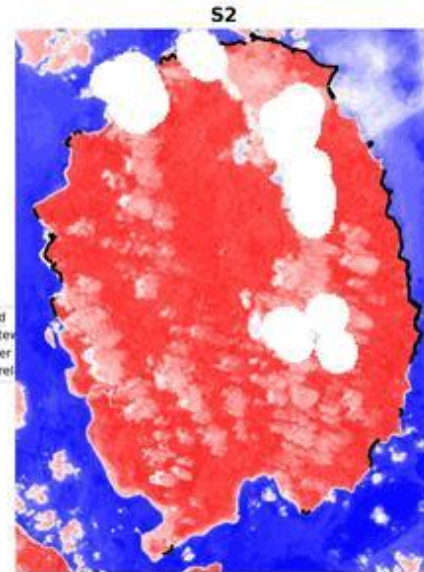
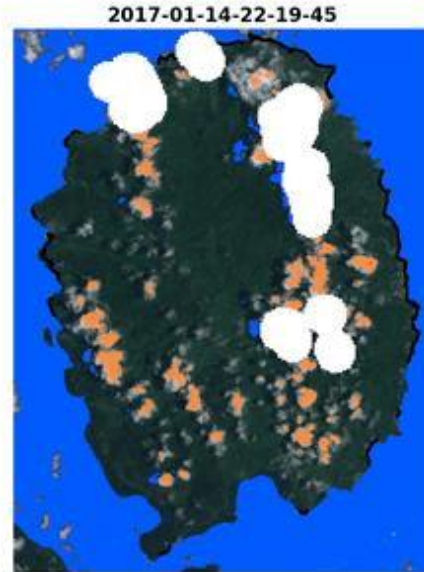
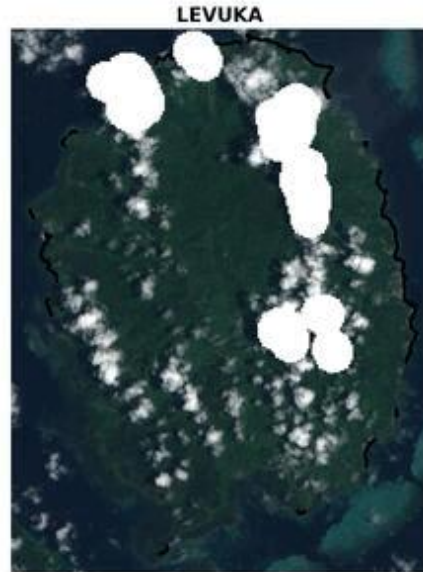
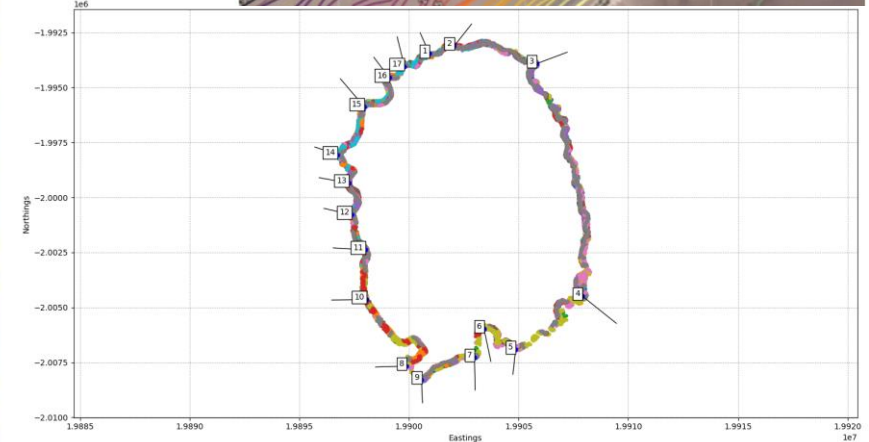
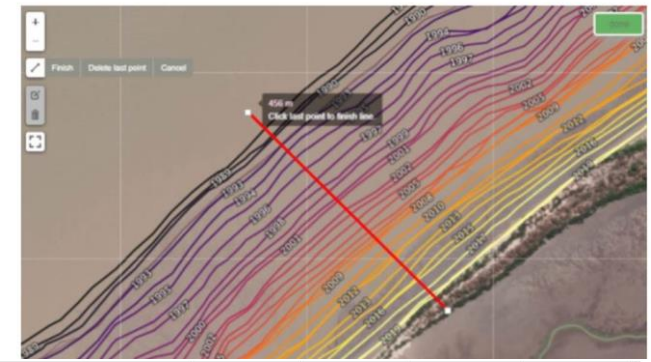
This aerial photograph shows a coastal region with a prominent river system and extensive wetlands. The land is characterized by a complex network of channels and meanders, indicating significant erosion and land loss over time. The water bodies are a mix of dark blue and light green, suggesting varying depths and sediment levels. The surrounding land is a mix of brown and green, likely representing different types of vegetation or soil. The overall scene depicts a dynamic and changing coastal environment.



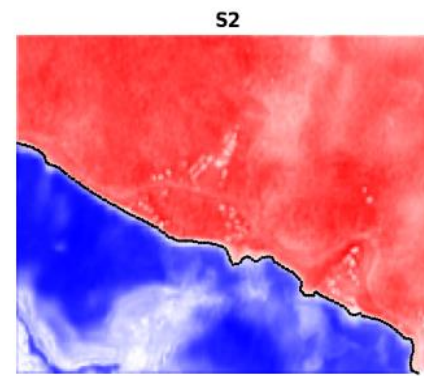
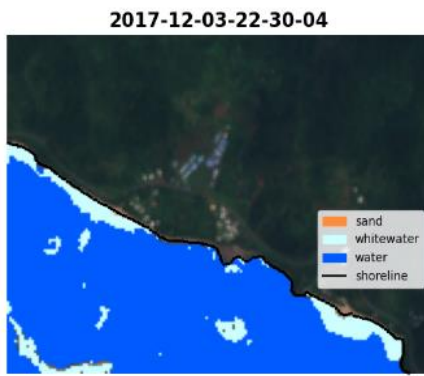
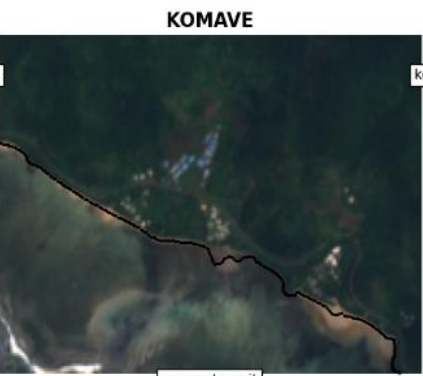
GEM

Geoscience, Energy and Maritime Division

WIP: COASTLINE CHANGE W/TIDAL ELEV.



Legend:
sand
white
water
shoreline

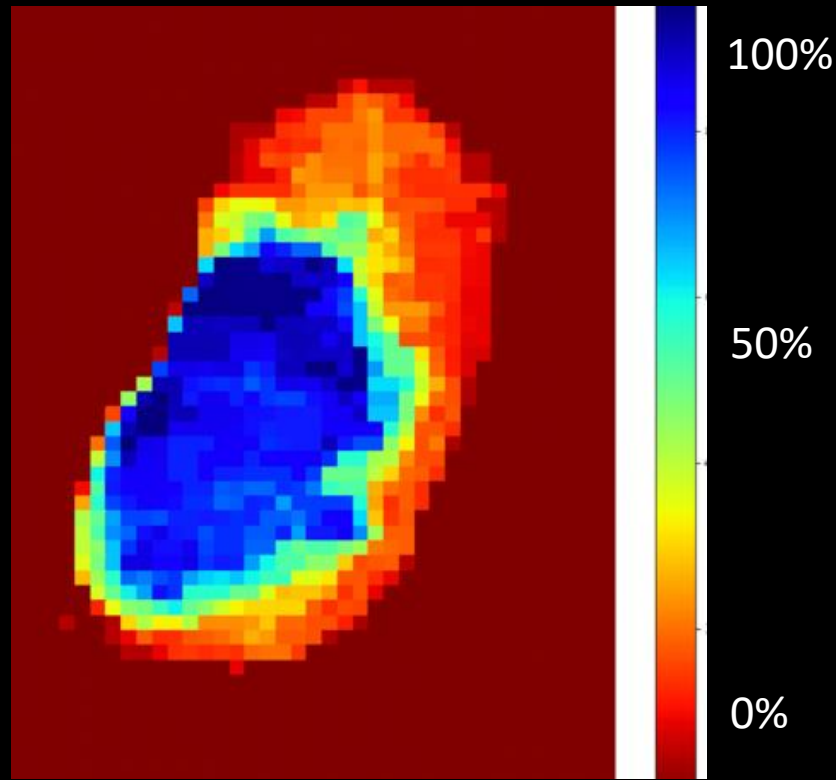
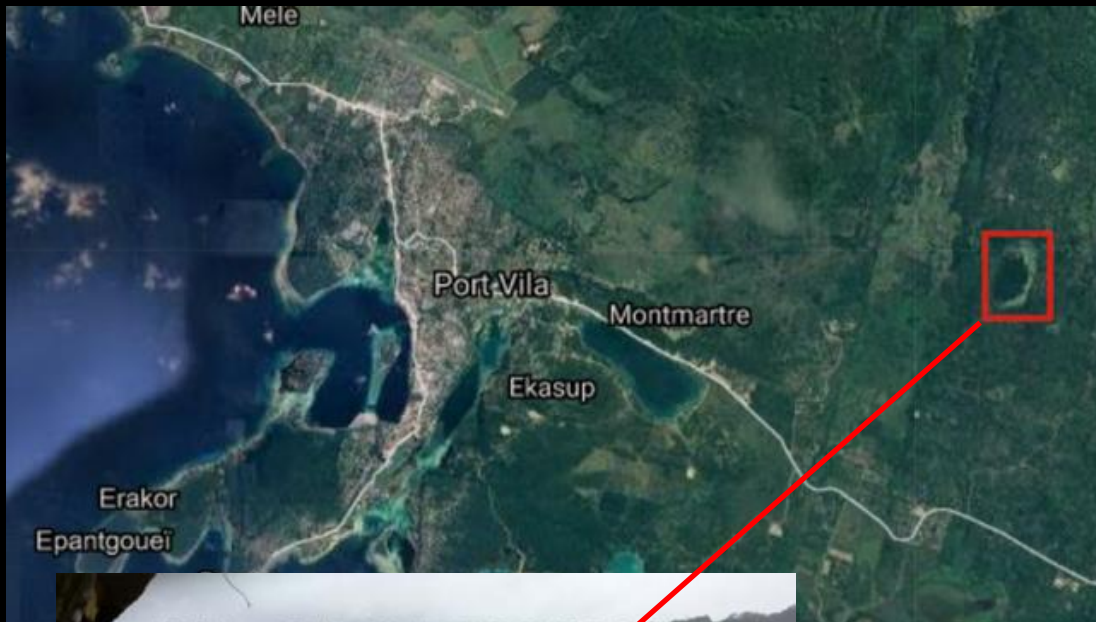


Legend:
sand
whitewater
water
shoreline

- Experimental Shoreline extraction and analysis at sub-pixel resolution from co-registered S2,L8 imagery.
- **NOT corrected on Tidal Elevation Models (due to missing capabilities)**
- DEP Platform to be enhanced in Phase 2 to support FES2014 (time-series of tide level) to strengthen shoreline change outputs.

SDG 6.6.1 = Water Extent

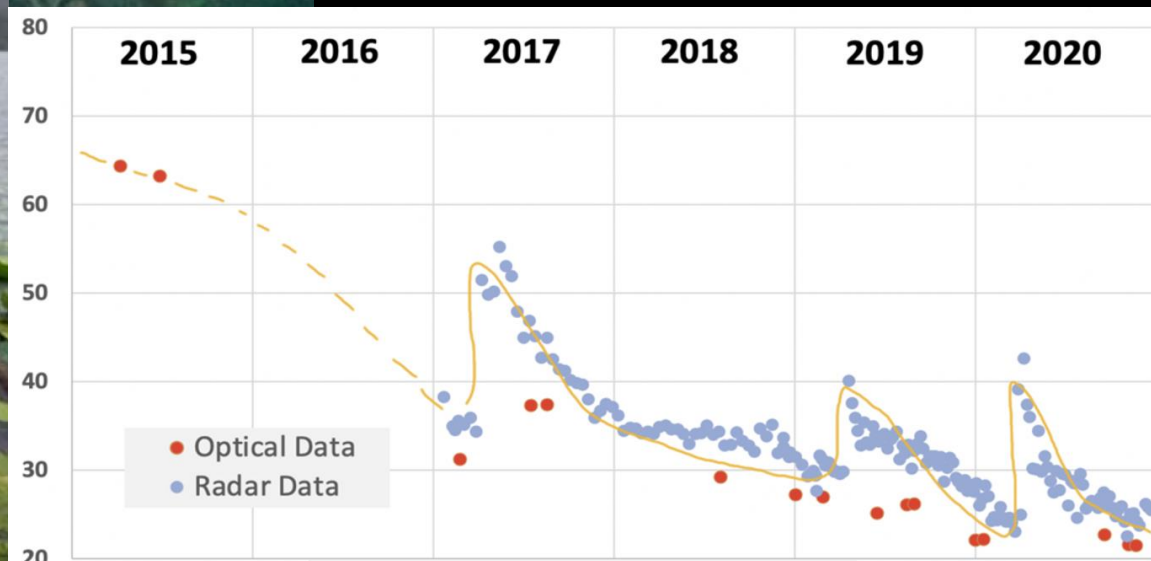
Duck Lake, Vanuatu



A time-series history of water presence for every 30-meter pixel from 2013 to 2021

Duck Lake is a freshwater wetland and important water supply for the local people (collection by hand).

Since 2015, the lake is drying and has lost 62% of its area.



Guidelines for Developing a Locally Relevant Program

- Be demand-driven
- Build high-level political support
- Institutionalize
- Develop a top down/bottom - up governance model
- Create a multi-stakeholder approach
- Develop a data ecosystem
- Co-design
- Address capacity development holistically
- Develop a plan for sustainable financing
- Trust, accountability and transparency!

<https://www.d4dinsights.com/post/reflections-digitalearthafrika>

DE Pacific – Interim Steering Group

Organization

Pacific Community

RMI Office of the Chief Secretary

Fiji Lands and Survey Department

Tonga Ministry of Land and Natural Resources

Vanuatu Ministry of Lands and Natural Resources

University of South Pacific

Committee on Earth Observation Satellites

NOAA

Geoscience Australia

Group on Earth Observations

World Food Program



Digital Earth Pacific Business Case

Centered on a demand-driven, user-centric design approach.

- Create a **multi-stakeholder and inclusive governance structure** that provides expert and political guidance, is transparent and provides for accountability.
- Create a **strong engagement and outreach** mechanism to keep users informed, drive input, support **co-design and capacity development**, and build buy-in.
- Develop an **agile** approach to technology development that is **user-centric**.

DEP Principles:

1. Demand-driven.
2. User-centric design.
3. Accountability and transparency.
4. Partnerships.
5. Public goods.
6. Data ecosystem.
7. Holistic capacity development.
8. Diversity and inclusion.
9. Nimble and agile.
10. Interoperable

Roadmap 2022-2030



- **Phase 1 (2022-2023): Setting the Foundation**
 - Set the strategic foundations, iterating on the technical infrastructure and related use cases, engage stakeholders and develop a fully operational program.
- **Phase II (2024-2026): Increase Capacity, Uptake and Engagement**
 - Fully operationalize DEP. Existing capabilities will be leveraged and built upon to create new innovative, decision-ready products and applications with a focus on engagement, capacity development to ensure uptake and usage, and impact.
- **Phase III (2027-2029): Establish a Data Ecosystem**
 - DEP will have a network of data, users, applications and knowledge in place where data is flowing bidirectionally across organizations and platforms creating a data ecosystem approach. Governments, private sector and civil society are not only using data, products and services provided by DEP, but creating their own innovations powered by DEP.

Thank you!

ADITYA AGRAWAL
FOUNDER, D4DINSIGHTS

WWW.D4DINSIGHTS.COM/
TWITTER.COM/D4DINSIGHTS
ADITYA@D4DINSIGHTS.COM

WWW.SPC.INT/DIGITALEARTH PACIFIC