Pacific Community
Communauté du Pacifique

What is Digital Earth Pacific

Alex Leith
FIG/Locate25, Brisbane, April, 2025

The Pacific Community (SPC)

27
Member Countries and Territories

900 + staff

6 Regional campuses

8 Technical divisions

- Fisheries, Aquaculture & Marine Ecosystems
- Education Quality & Assessment
- Human Rights and Social Development
- Statistics
- Public Health
- Land Resources
- Climate Change Environmental Sustainability

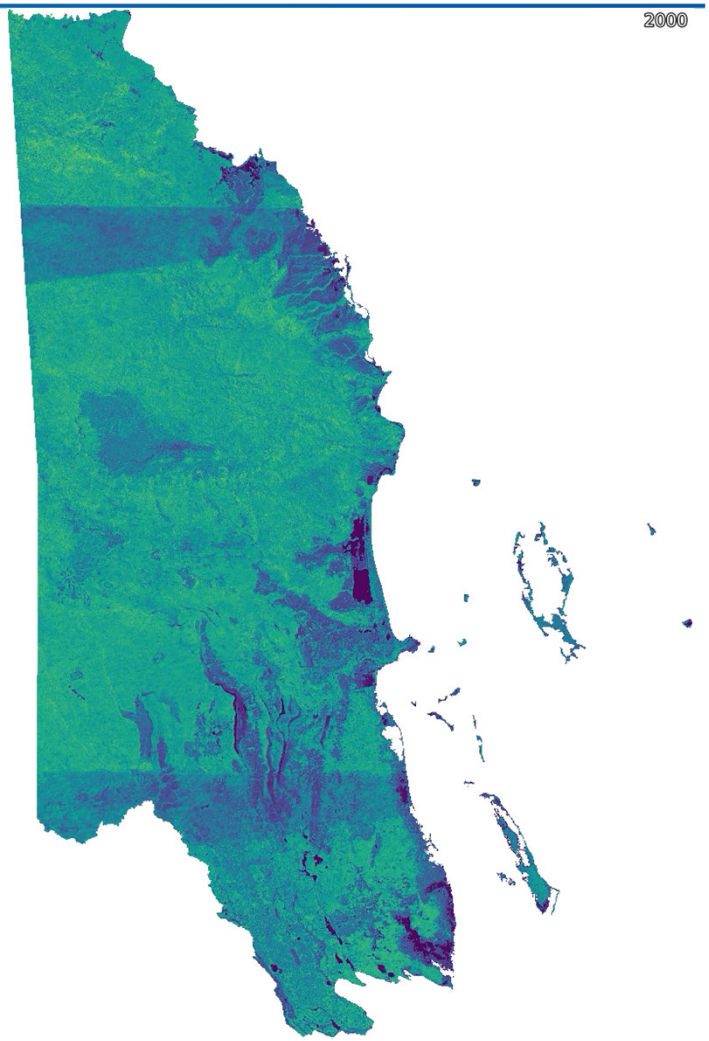
Geoscience, Energy and Maritime

- Ocean Science, Governance,Maritime Transport
- Georesources and Energy
- Water and Sanitation
- Disaster Risk Reduction
- **Earth and Oceans Observation**

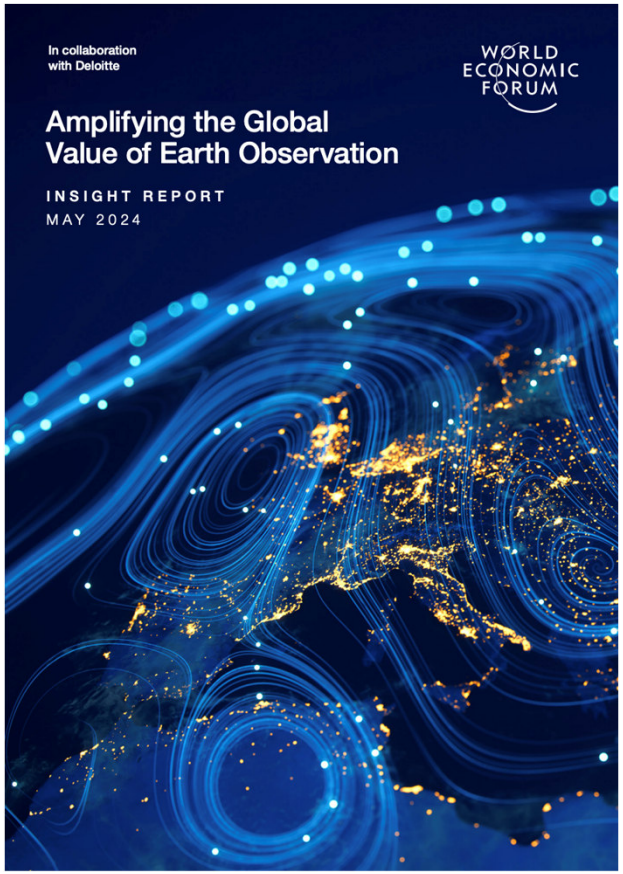
Auspatious

- Started my own company in 2023
- Focus on Cloud Native Geospatial
- Half of my time I Digital Earth Pacific

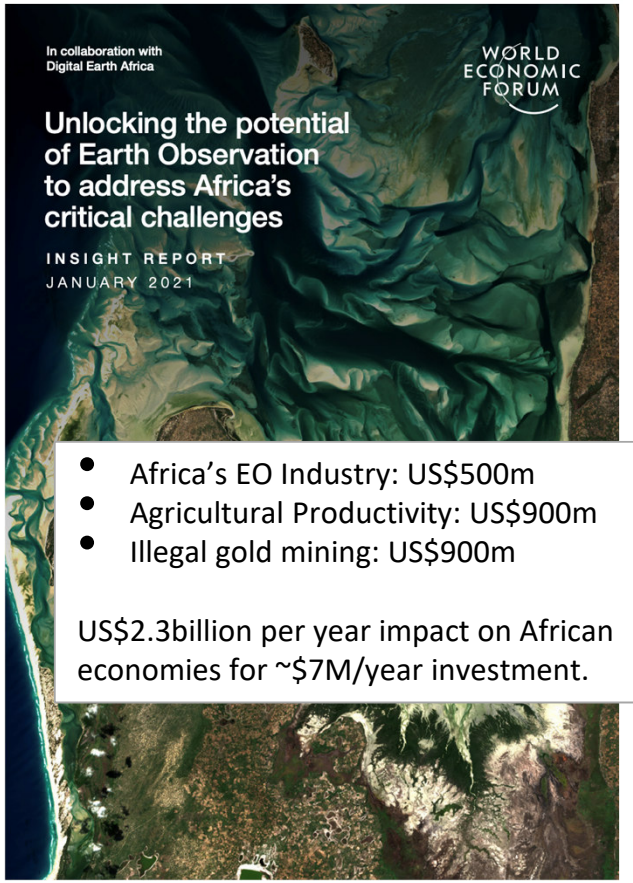
```python
def udf(
    from pystac import Item

    item_dicts = stacrs.search(
        "https://data.ldn.auspatious.com/geo_ls_lp/geo_ls_lp_0_1_0.parquet",
        bbox=bbox.total_bounds,
        datetime=f"{year}-01-01T00:00:00.000Z/{year}-12-31T23:59:59.999Z",
    )

    items = [Item.from_dict(d) for d in item_dicts]

    # Calculate the resolution based on zoom level.
    power = 13 - bbox.z[0]
    if power < 0:
        resolution = 30
    else:
        resolution = int(20 * 2**power)
```



Economic value of Earth observation



- EO could add **$703 billion**, yearly, to the global economy while eliminating **2 gigatons** of GHG emissions by 2030.
- The Asia Pacific region is poised to capture the **largest share of EO's value** in this period, reaching a potential value of **$315 billion**.
- Top sectors benefiting being agriculture, electricity, government services, insurance, mining, and supply chain



- Africa's EO Industry: US$500m
- Agricultural Productivity: US$900m
- Illegal gold mining: US$900m

US$2.3billion per year impact on African economies for ~$7M/year investment.

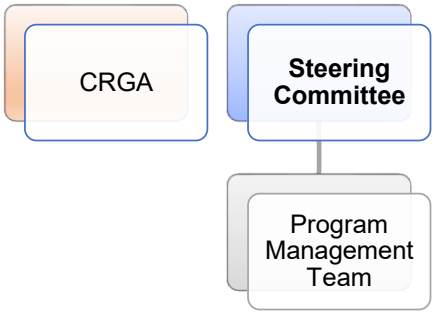
Why all the fuss about EO?

- Countries have **expressed a need for better access and increased capacity** for applying Earth observation data to national priorities.
- Digital Earth Pacific will deliver an **operational Earth and ocean observation system** that takes decades of satellite data and makes it easier to access and use.
- DEP will provide a fundamental digital infrastructure that will ensure every nation in the Pacific has access to tools, technologies and capacity to **routinely monitor and track challenges from climate change, food insecurity or disaster risk**.

Roadmap 2022-2030

- Phase 1 (2022-2024): 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 (2025-2027): 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 (2028-2030): 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.

DEP Governance

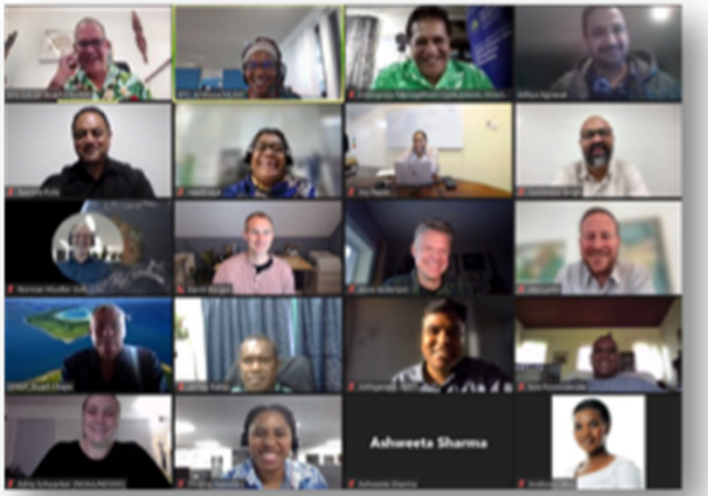


Countries

- Australia
- **Cook Islands**
- Fiji
- Papua New Guinea
- Marshall Islands
- Solomon Islands
- Tonga
- Tuvalu
- Vanuatu

Organizations

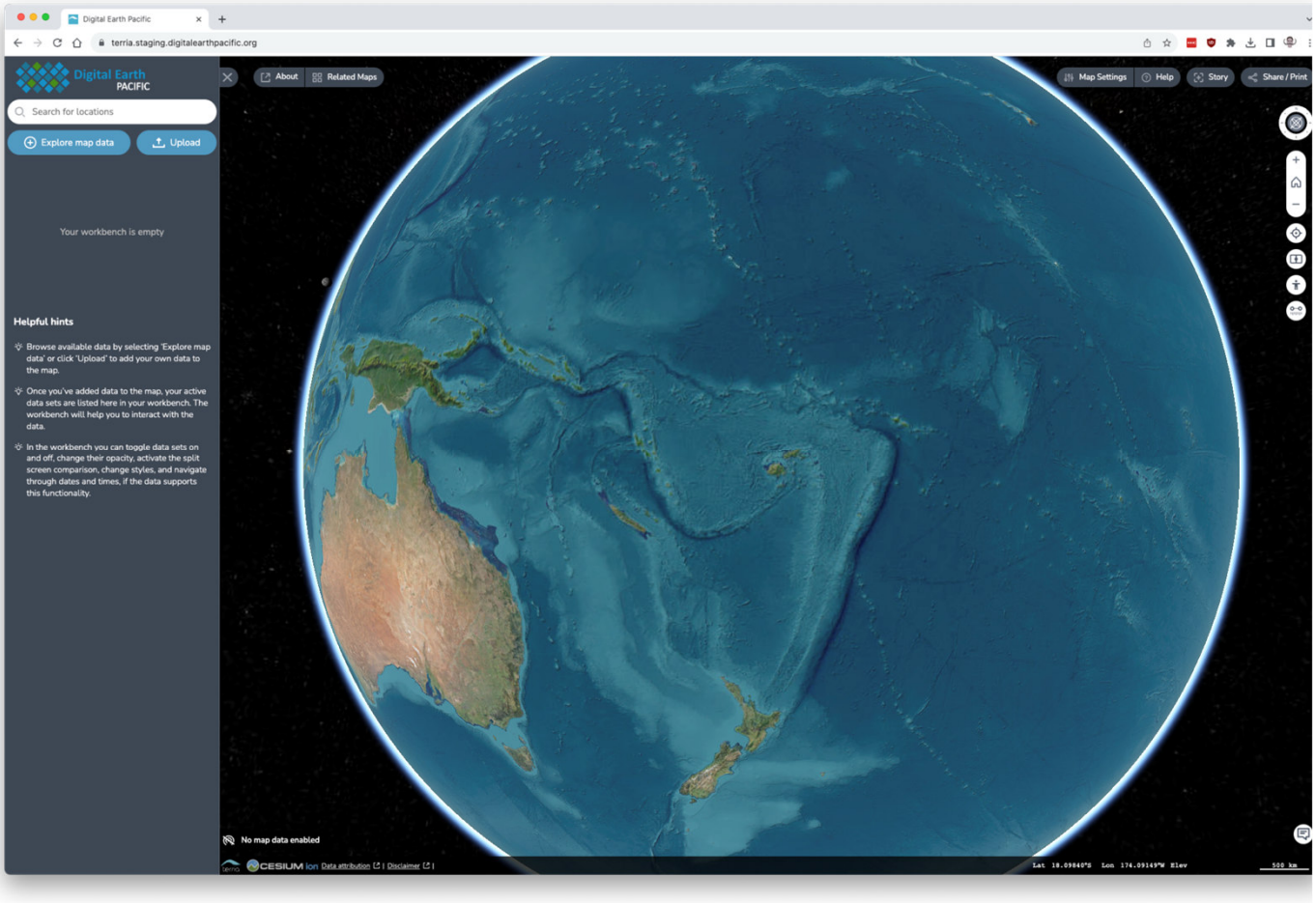
- Committee on Earth Observation Satellites (CEOS)
- Group on Earth Observations (GEO)
- National Oceanic and Atmospheric Administration (NOAA)
- Secretariat of the Pacific Regional Environment Programme (SPREP)
- University of South Pacific (USP)
- World Food Programme (WFP)



DEP Steering Committee supports policy alignment, offers expert guidance, provides insights on emerging issues and country engagements, informs technical roadmaps, aligns with existing projects, enhances communication and outreach, and aids fundraising efforts.

Meetings (virtual) held every quarter since 2022.

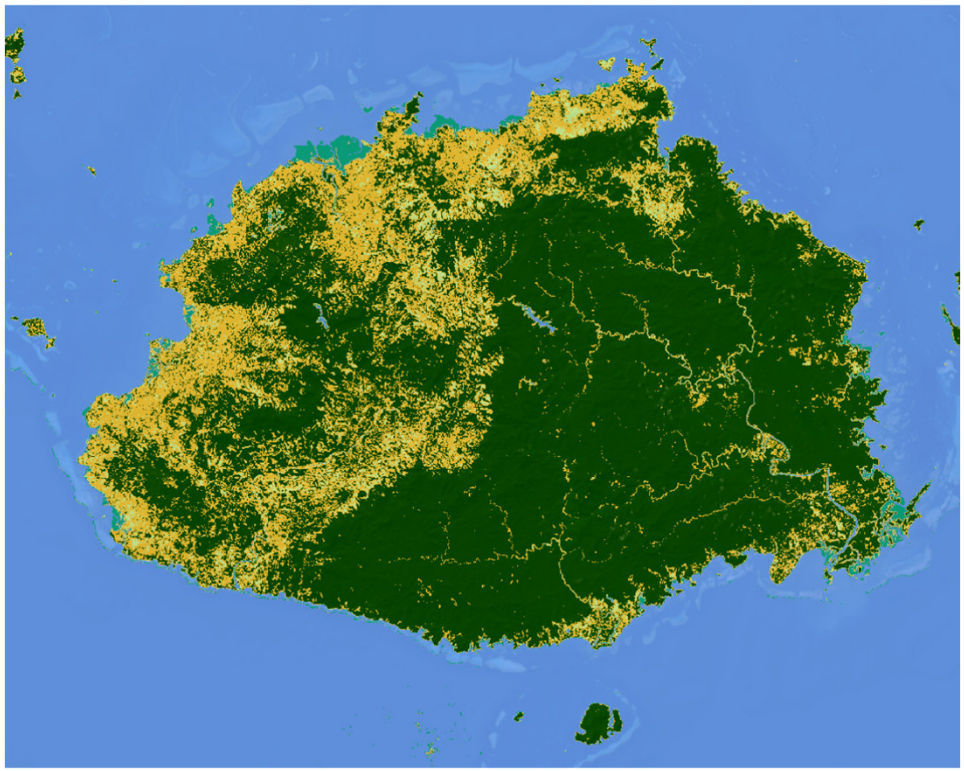
A Regional Public Good



- **Free and open** data products and services for every member country
- **A digital public infrastructure** serving the needs and priorities of Pacific Island Countries and Territories

Digital Earth Pacific Tech Strategy

- **Empower** more people from the Pacific to access and analyse data.
- **Simplify** access to Earth and Ocean Observation data.
- **Deliver** new products specific to the needs of the Pacific.



Cloud Native Geospatial

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Capability	Digital Earth Australia (2010)	Digital Earth Africa (2020)	Digital Earth Pacific (2023)
Landsat archive fully accessible	❌	✅	✅
Analysis Ready Data definition available	❌	✅	✅
Landsat level 2 data available	❌	✅	✅
Sentinel-2 level 2 data available	❌	✅	✅
Landsat and S-2 accessible in the Cloud	❌	❌	✅
Sentinel-1 level 2 (RTC) available	❌	❌	✅
STAC for data access widely supported	❌	❌	✅

Pacific Coastlines (1999-)

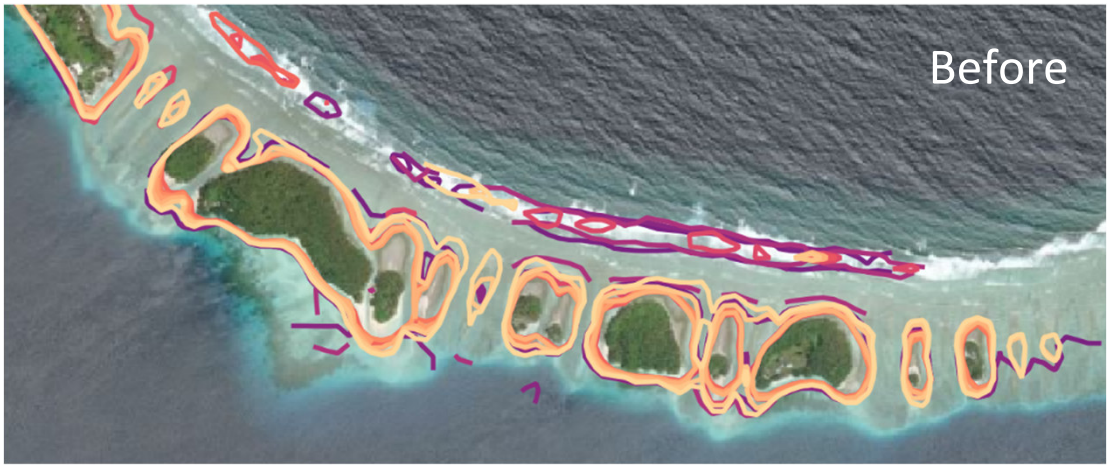
Landsat annual mosaics were created by calculating the median image values among times of near-average (0-m) sea level using a tidal model. A water discrimination technique was applied which allowed delineation of exact coastlines at the subpixel level.

Improving Coastlines

Current product has been further refined with additional noise removal techniques; such as improved cloud masking, masking out surf/waves.

Improvements in extracting land-water delineation and vectorisation processes.

Calculation of rates of changes at 30m intervals to identify hotspots. Using rates of change to do targeted clean-up, artefact removals etc.



- Water Observations from Space 2012-2020
- In more recent years, you start to see further encroachment of possible wet areas on Tuvalu

Sentinel-1 Annual Mosaic

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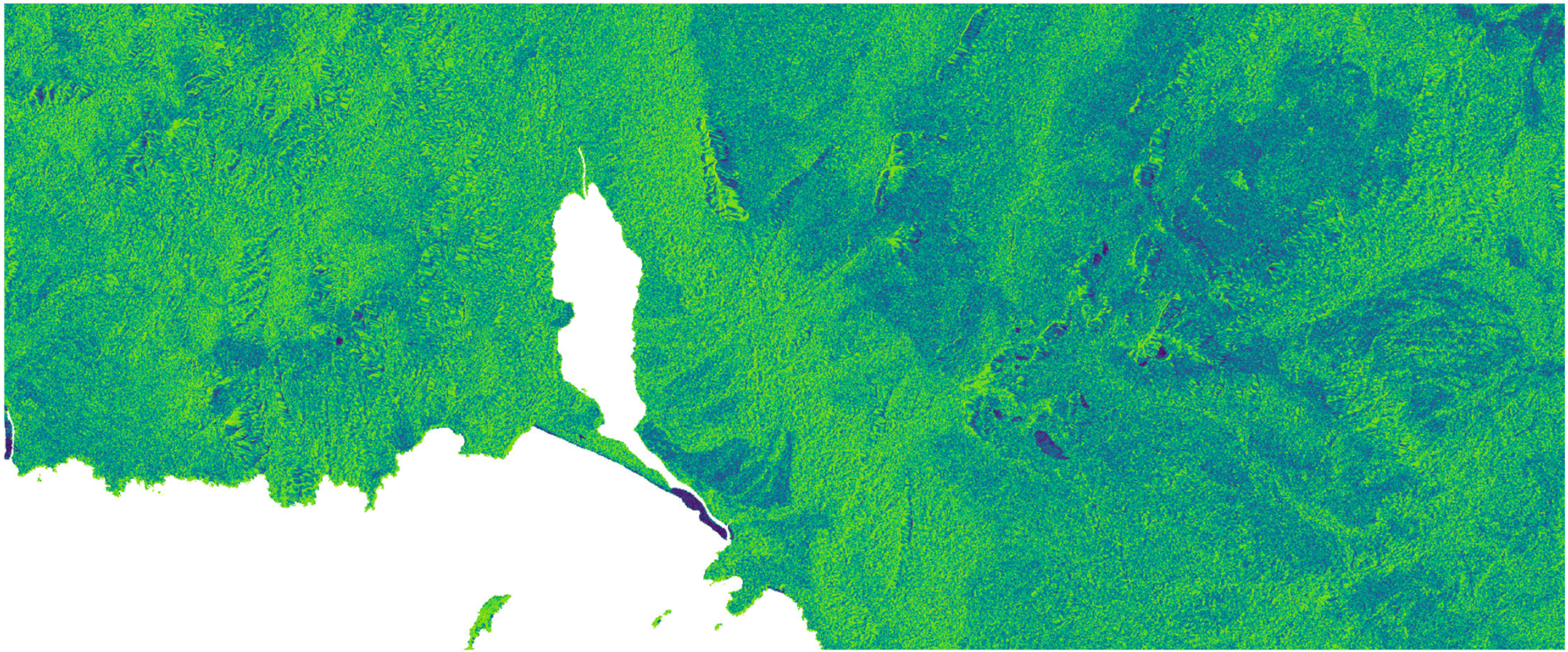


Satellite Derived Bathymetry

Product name: Satellite Derived Bathymetry (SDB)

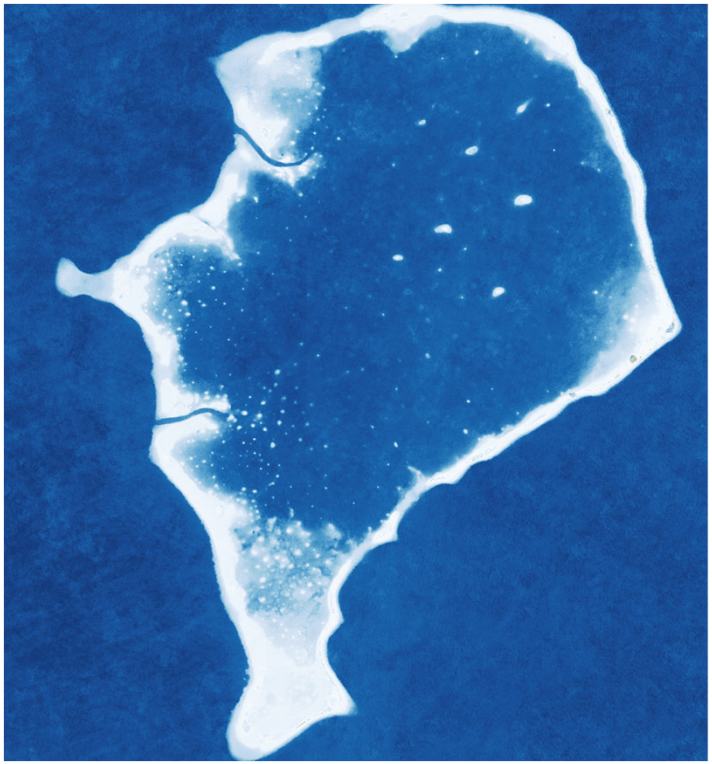
Intended application areas: Fisheries management - mapping fishing grounds. Environmental management - monitor coastal erosion and sea level rise, map and monitor benthic habitats to identify and protect sensitive marine habitats. Studying ocean currents, tsunamis, and other marine processes. Safety of navigation and marine transportation - nautical charts that help ships navigate safely.

Status of development: Regional Machine Learning Workflow Developed. Validation Surveys Pending.

Are we on track according to WP timeline: Product Development On Track

Key asks / challenges:

- SDB modelled is trained on legacy multibeam surveys from 3 decades till 2017.
- Additional multibeam surveys are critical for validation, especially within countries where not sufficient depth data is available via surveys.



Capacity Development Strategy

DEP has a **Capacity Development Strategy**, inclusive of outreach and awareness, published in January 2024. The document provides a strategy for developing a holistic capacity development program for DEP aimed at enhancing decision-making, policy formulation and practical action. **The success of DEP is ultimately based on its usage and the related impact it delivers.**

Capacity Building Objectives	Outreach Objectives
Technical proficiency Data literacy Problem-solving and decision-making Policy integration Community engagement Sustainable practices Networking and collaboration	Increase awareness and understanding of DEP Foster engagement and stakeholder relations Promote data access and capacity development Position DEP as a thought leader

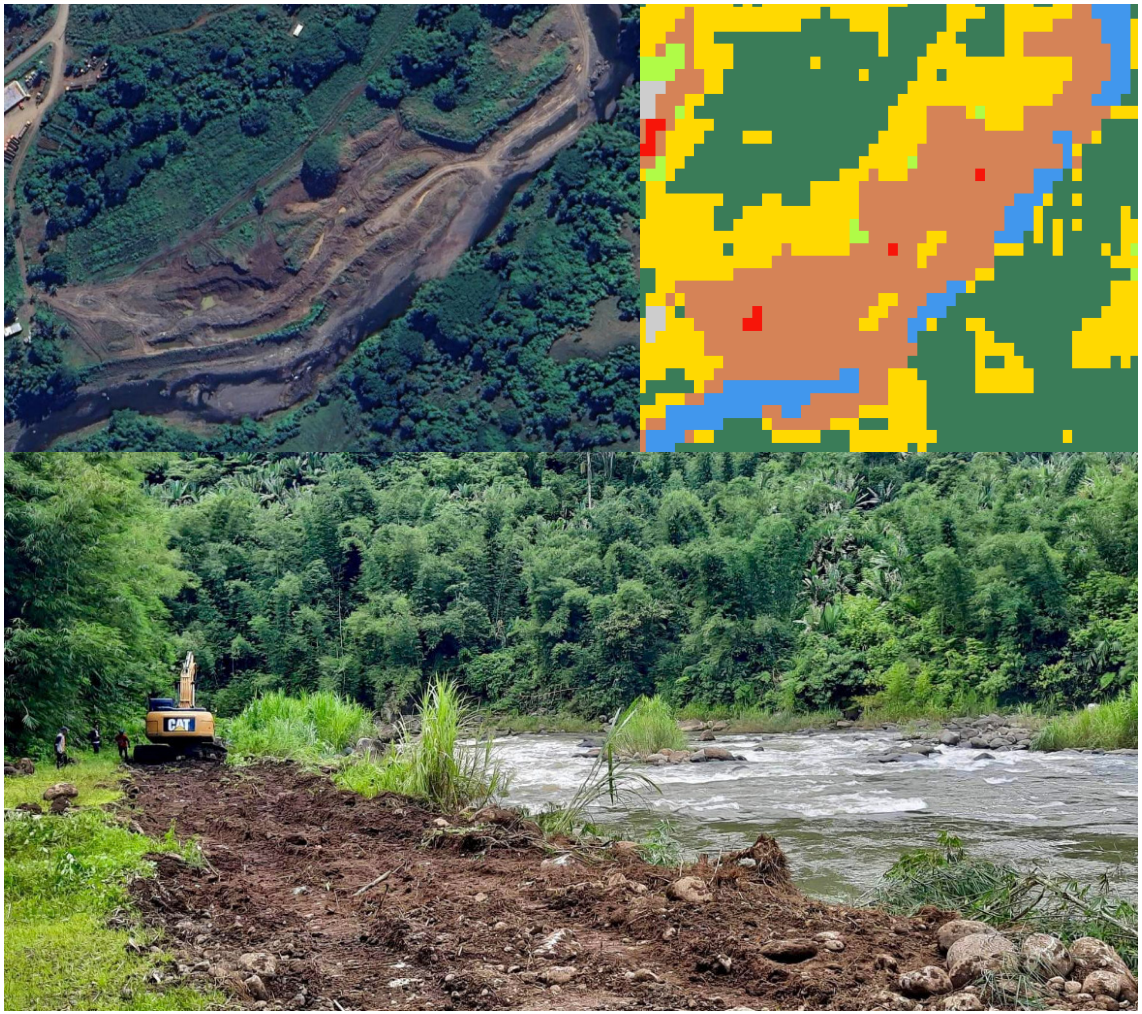
In-Country Workshops (2023, 2024)

SPC has conducted capacity building activities for TV, RMI, CK, TO, PL, FJ, PNG across landcover and coastal classification (inclusive of mangroves) and coastline change analysis, and field data points collections (inclusive of LULC data points and coastal habitats)

2025 MACBLUE Workshop PNG

Mineral Resource Extraction

- Goal to find areas of illegal mineral extraction along rivers
- Land use/land cover model developed using machine learning
- Applied across all of Fiji
- Used in compliance and enforcement
- Utilising Sentinel-2 and Sentinel-1 GeoMAD as inputs



Thank you!

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