

The background of the slide is a satellite map of the MACHC region, showing bathymetry and ocean currents. The map uses a color scale from dark blue (deep) to light blue/cyan (shallow). Swirling patterns indicate ocean currents, and various landmasses and islands are visible. The EOMAP logo is in the top right corner.

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APPLICATION AND BENEFITS OF PHYSICS-BASED SATELLITE DERIVED BATHYMETRY WITHIN THE MACHC REGION

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2022-11-03 MACHC 2022 St. Louis, MS, USA

WHO IS EOMAP?



Private technology company



Focus on satellite data analytics and software solutions



Specialises in aquatic environments



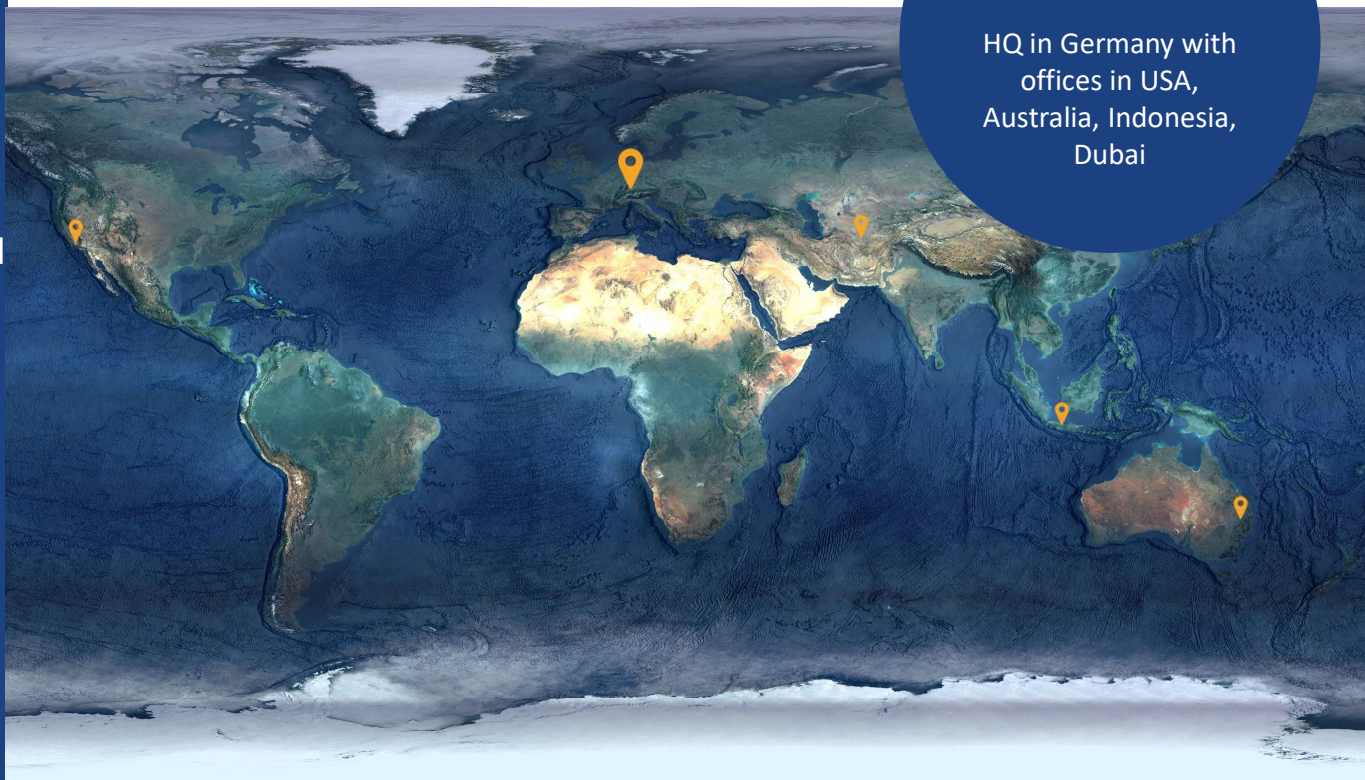
International team of 40 employees



Serves clients worldwide, e.g. hydrographers (UKHO, AHO, others), coastal / offshore industry etc.



HQ in Germany with offices in USA, Australia, Indonesia, Dubai



WHAT IS SATELLITE DERIVED BATHYMETRY (SDB)?

Bathymetry mapping from space (airborne) sensors relies on

- (a) passive or active **sensors** measuring the reflected light from the seafloor
- (b) the **analytics**.

Satellite-Derived Bathymetry (SDB)

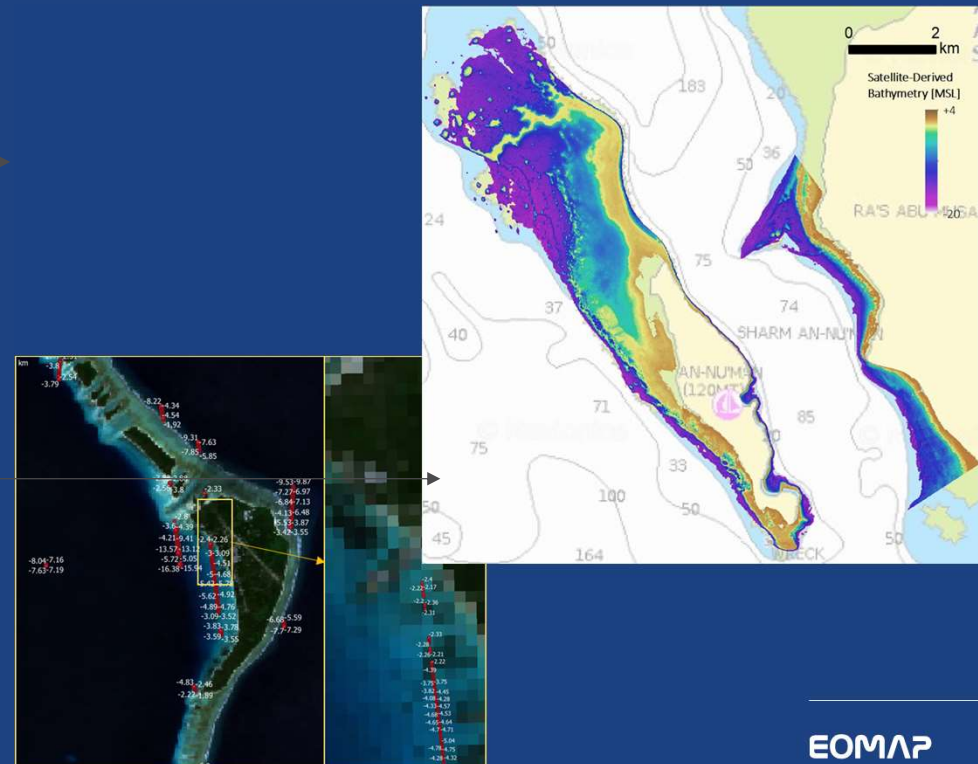
Bathymetric data using hyper/multi-spectral data, passive sensors

→ Dense bathymetric grids from shore to 1 time Secchi Depth

Satellite-Lidar Bathymetry (SLB)

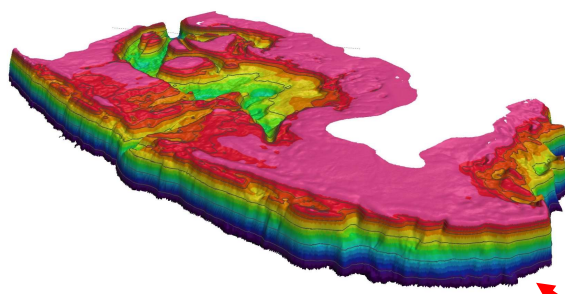
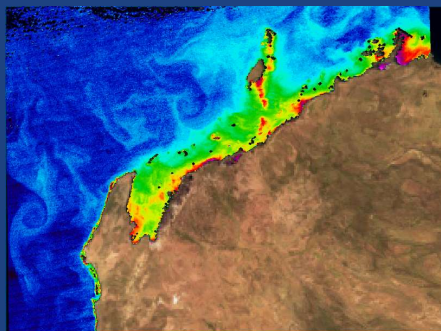
Analysis of space born, active green lidar satellite sensor (ICESat 2 - ATLAS)

→ Point measurements along the tracklines down to 0.8-0.9 Secchi Depth

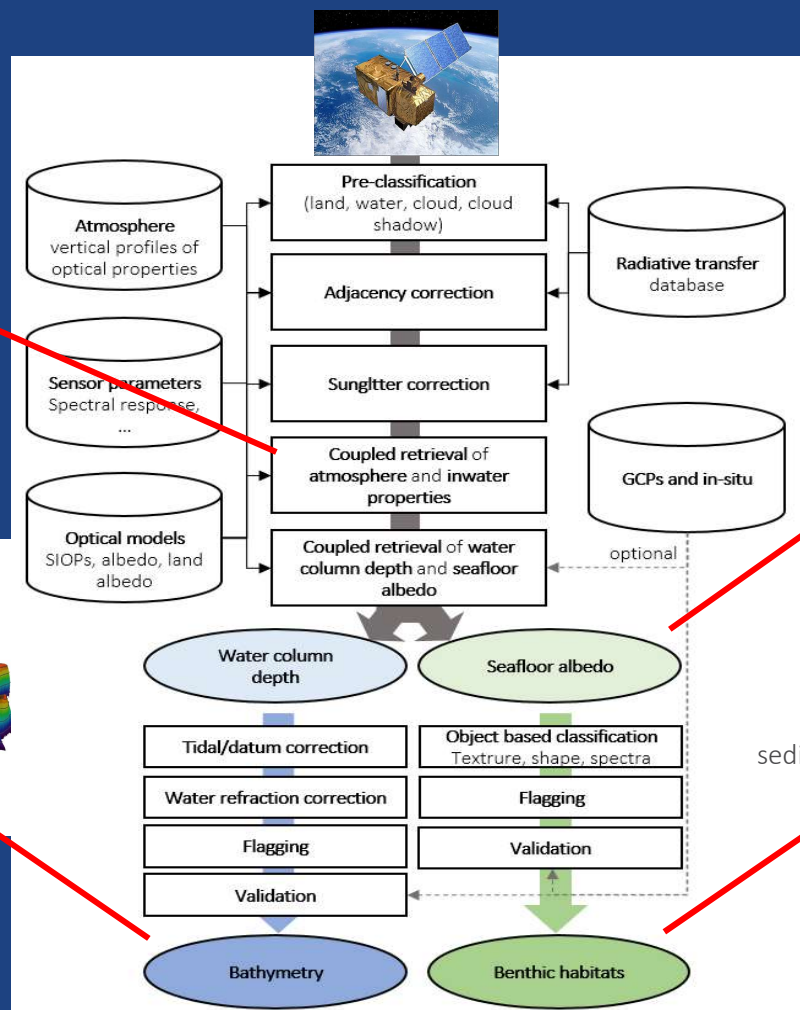


EOMAP'S PHYSICS-BASED SDB METHODS

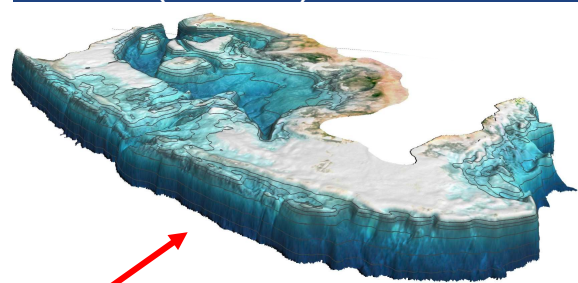
Water quality



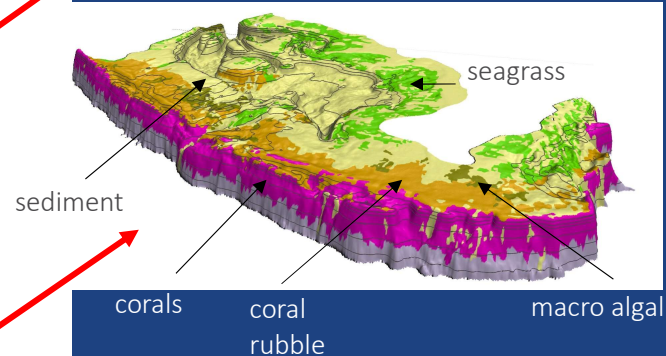
SDB (Satellite-derived bathymetry)



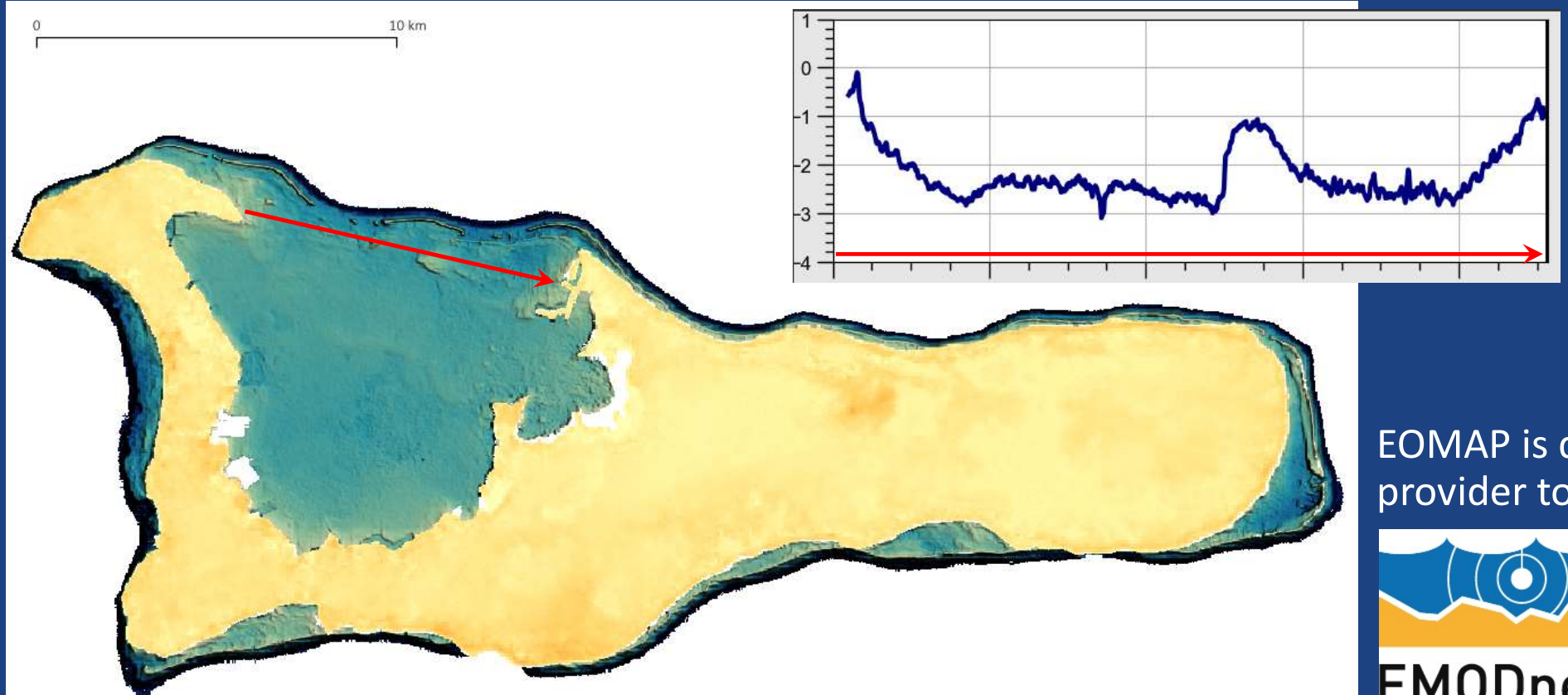
Seafloor reflectance (colour)



Benthic habitats



SATELLITE-DERIVED BATHYMETRY (SDB), GRAND CAYMAN

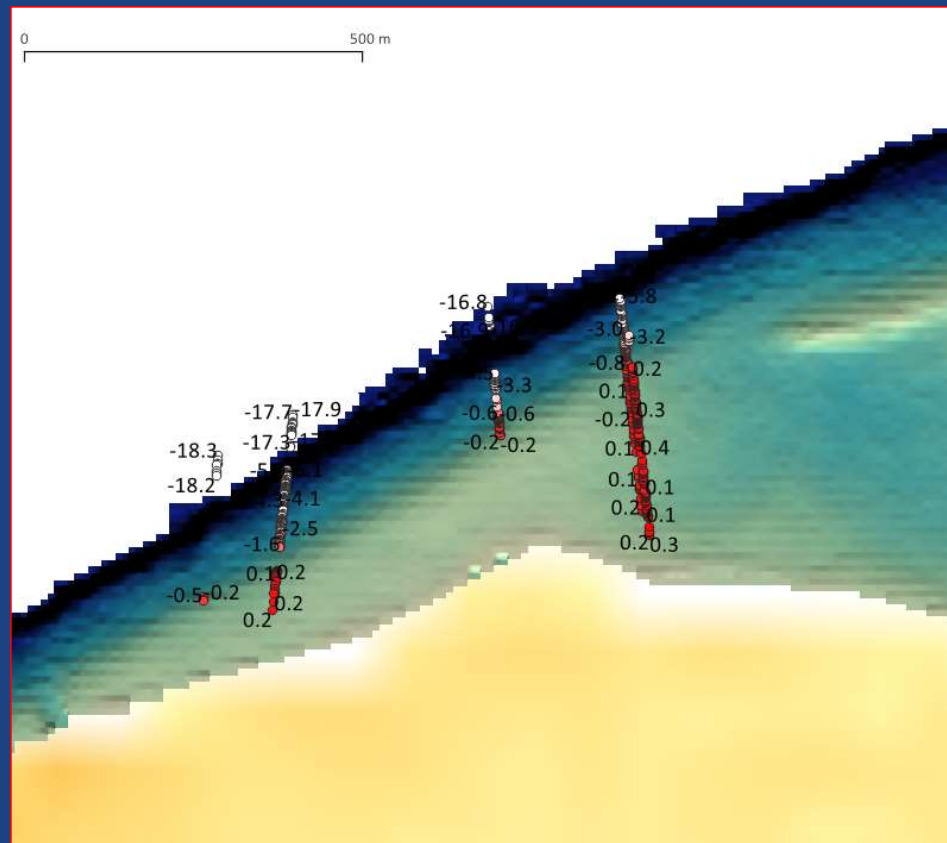


EOMAP is data
provider to

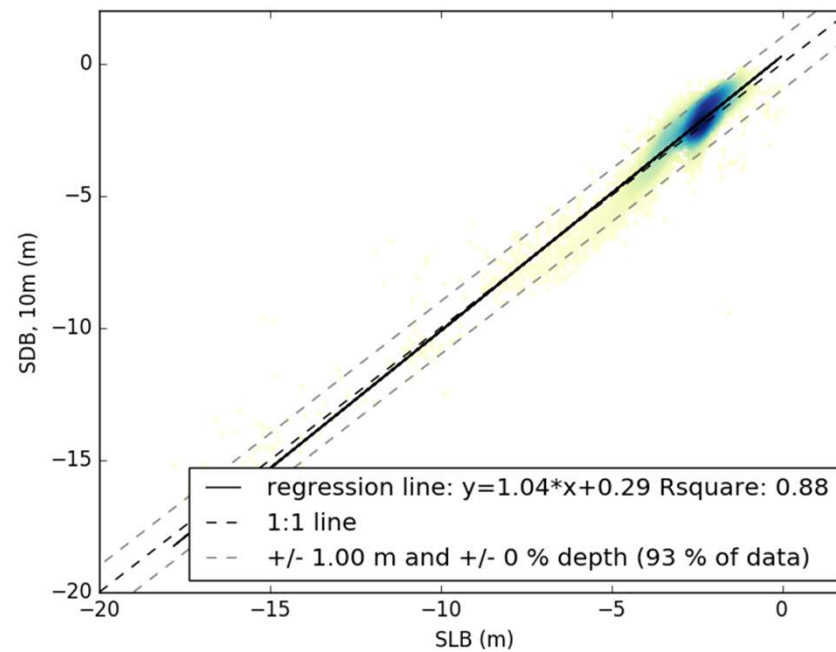
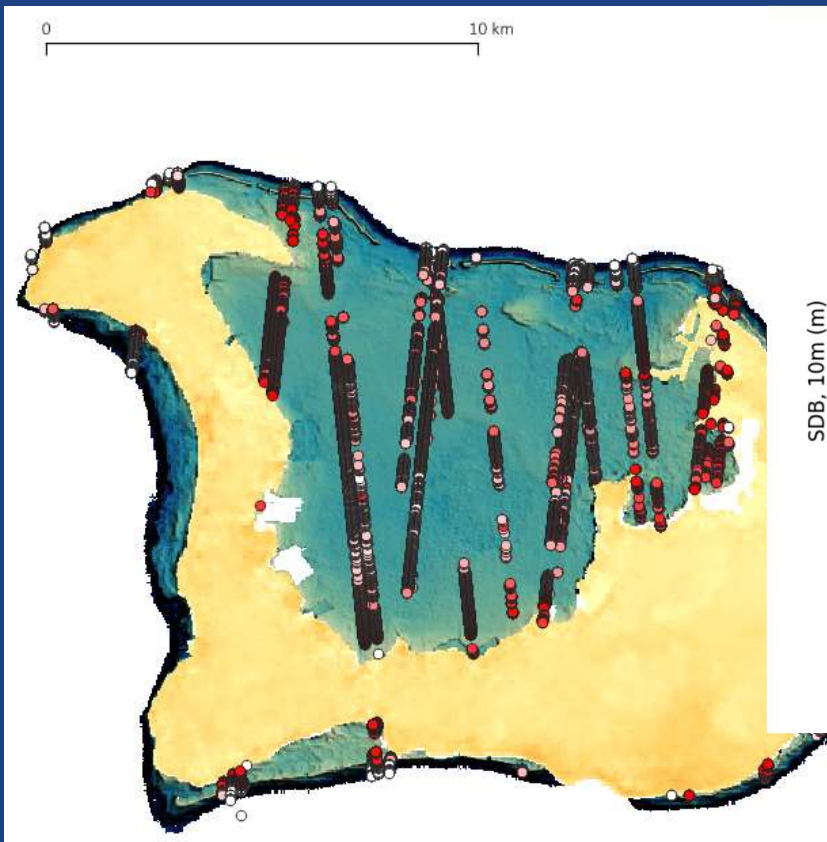


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SDB & SLB, GRAND CAYMAN



SDB & SLB, GRAND CAYMAN



EOMAP's SDB PROJECTS in the MACHC REGION

- ① Coastal Zone Management, Update of Admiralty Chart (UKHO)
- ② Coastal Engineering
- ③ Update of Admiralty Chart (UKHO)
- ④ Coastal Resilience
- ⑤ Safety of navigation

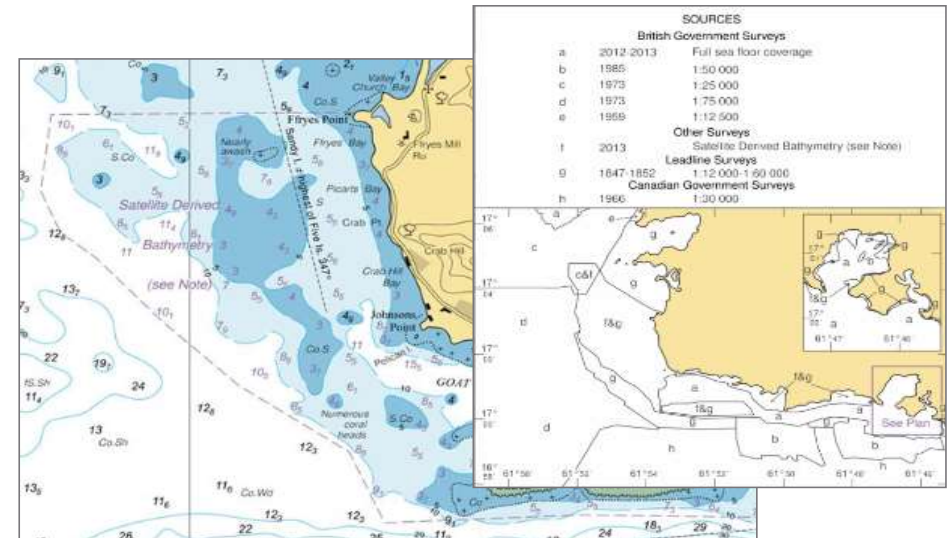


Darker blue represents higher frequency

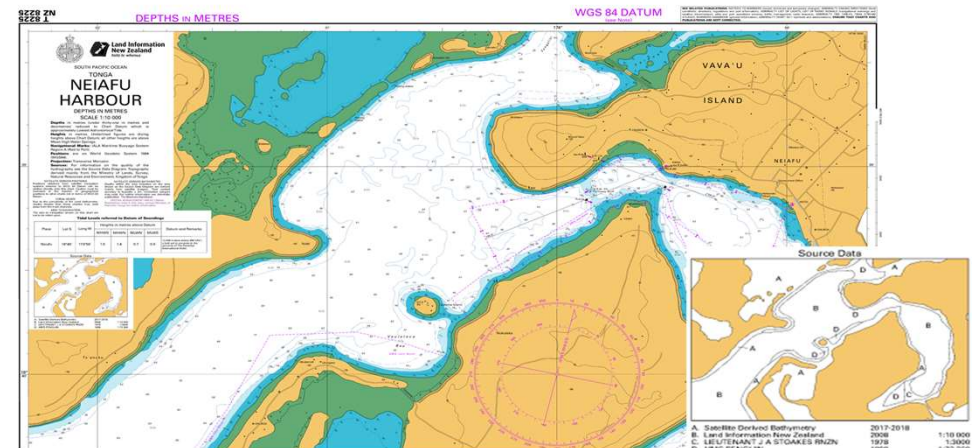
CHARTING

EOMAP's SDB integrated in nautical charts of the UK and NZ Hydrographic Offices in the Caribbean and Pacific region.

British
Admiralty
Chart BA 2066
Southern
Antigua



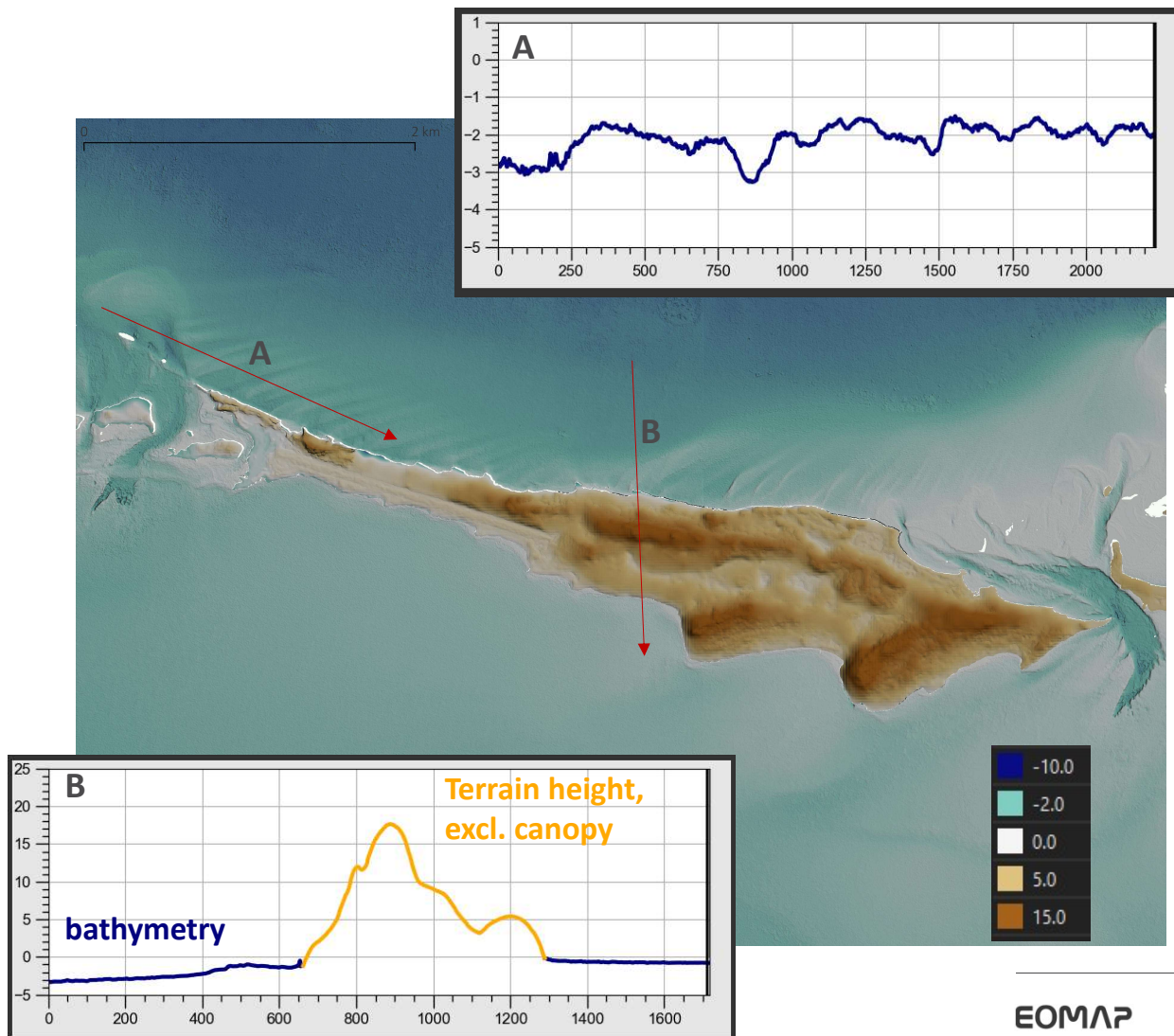
New Zealand
LINZ
NZ8225
Neifu
Harbour,
Tonga



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SEAMLESS, INTEGRATED SURVEYING

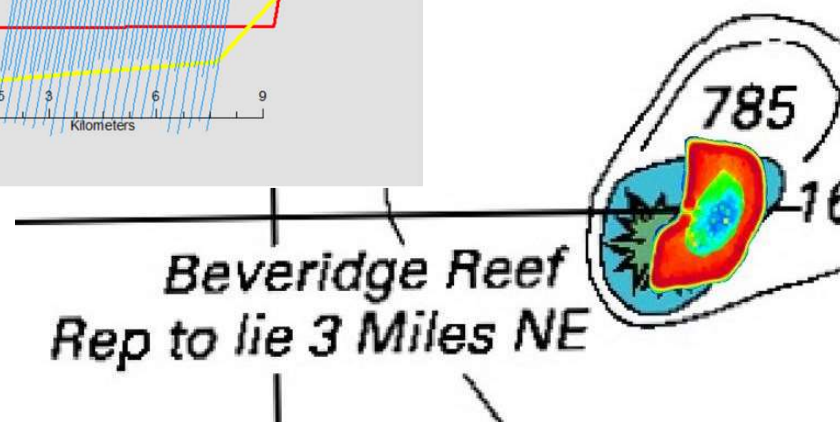
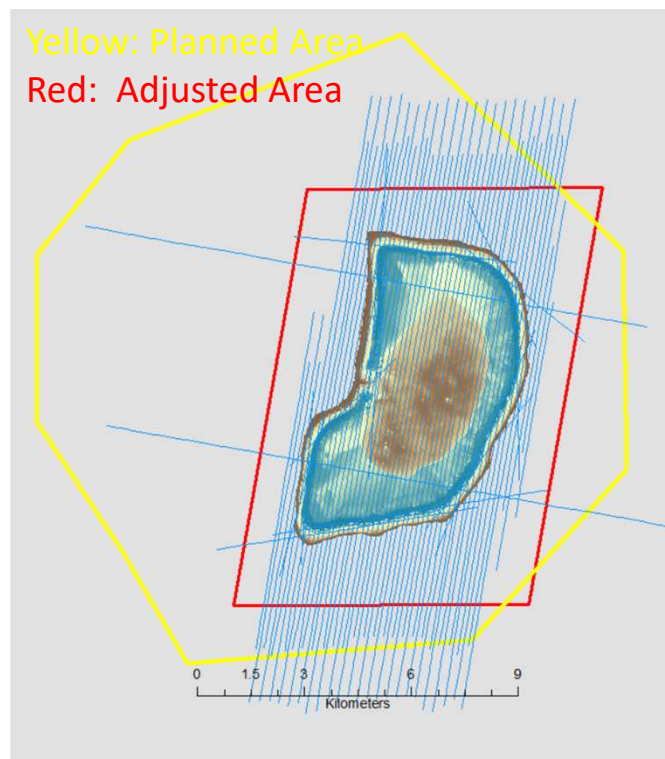
2m resolution Digital Surface Model combined with Satellite-Derived Bathymetry, Bahamas, Hog Cay



ALB, MLB SURVEY OPTIMIZATION

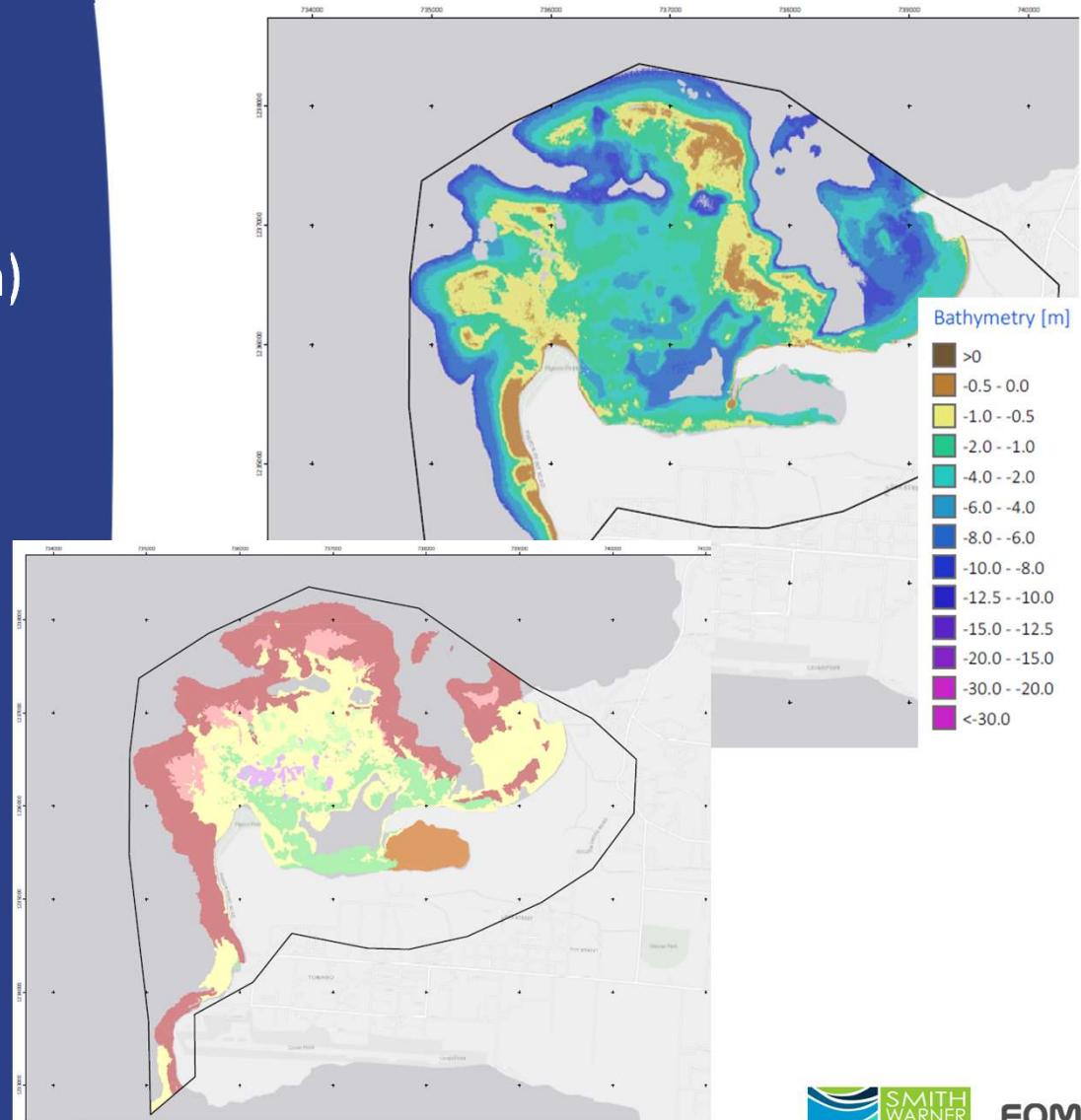
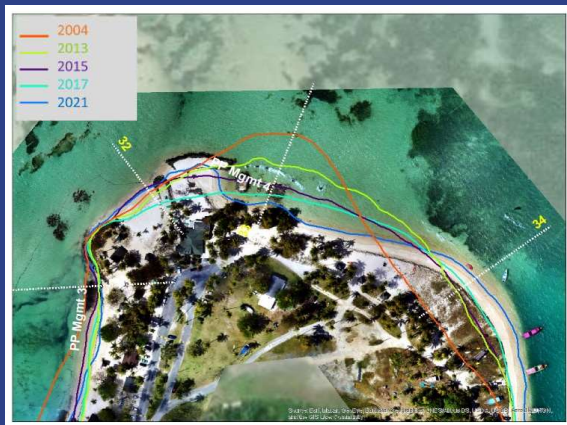
Beveridge Reef –
After SDB review

- Reduction in ALB, MLB tracklines
- Allow technology comparison
- Add charting confidence



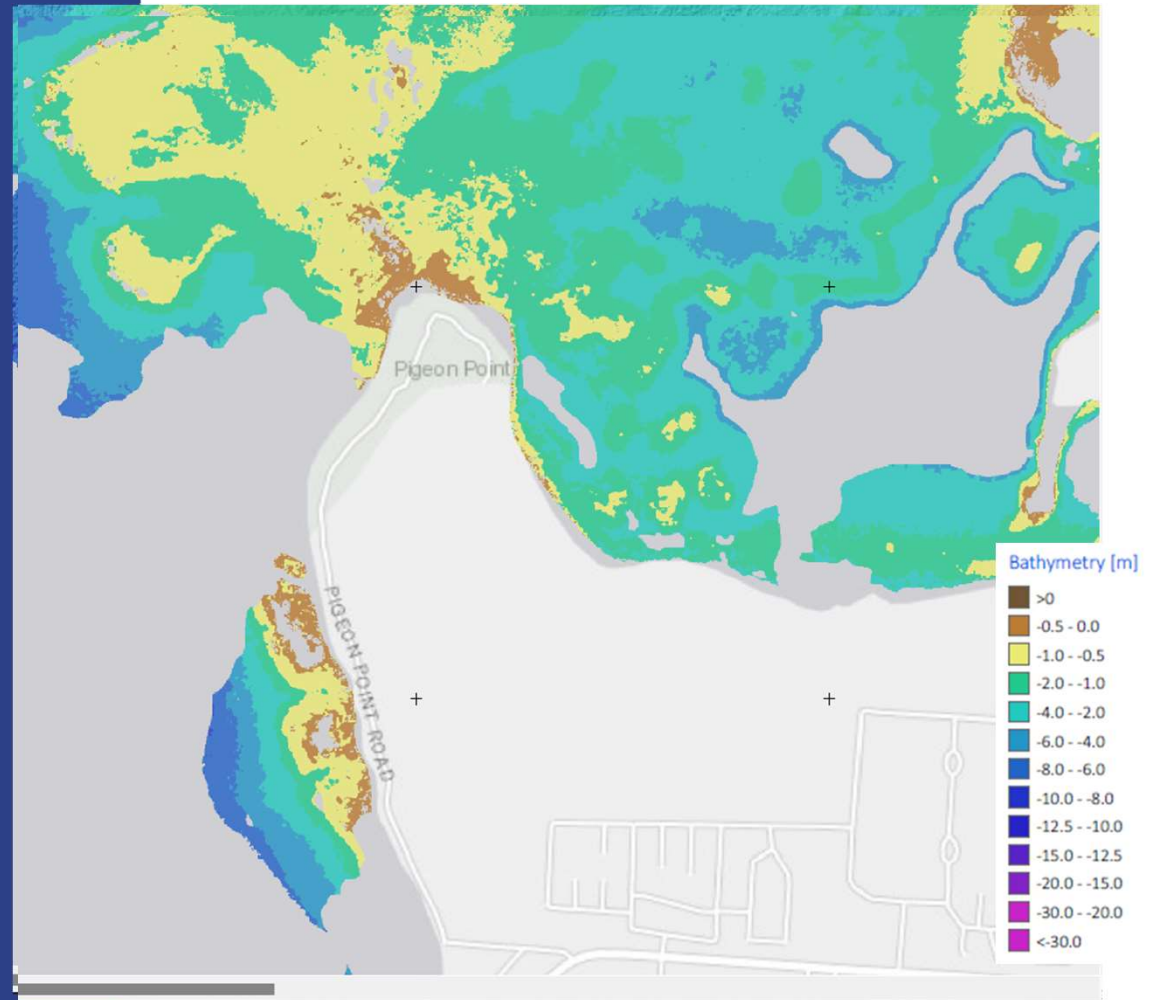
UNDERSTANDING OF NEARSHORE PROCESSES

- Satellite derived bathymetry (2m)
 - 2004, 2013, 2015, 2017, 2021
- Sea Floor classification
 - 2004, 2021
- Shoreline mapping
 - 2004, 2013, 2015, 2017, 2021



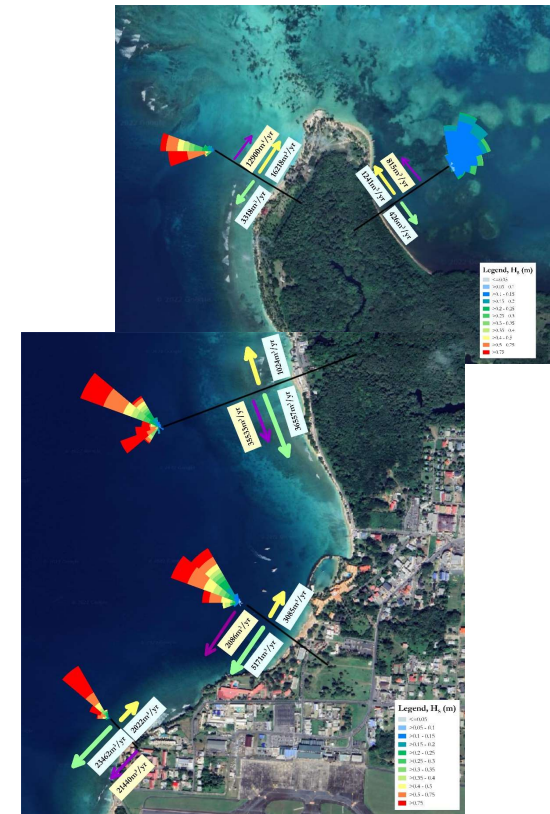
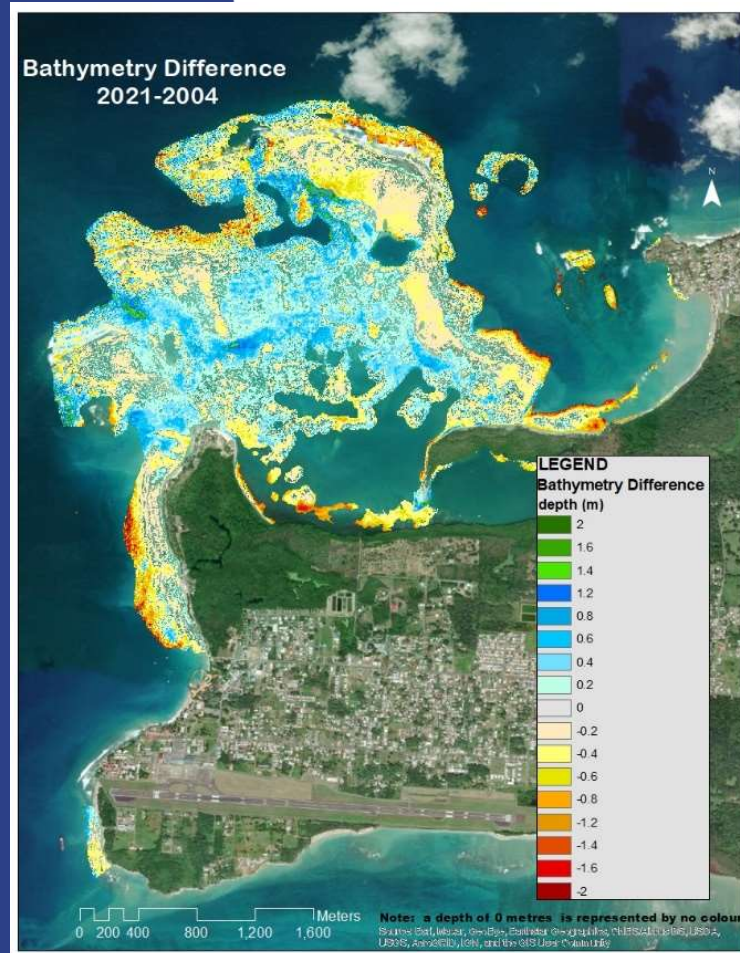
SDB “Time travel data”

- Historical evolution of seabed features
- Demonstration of formation of key shoreline features



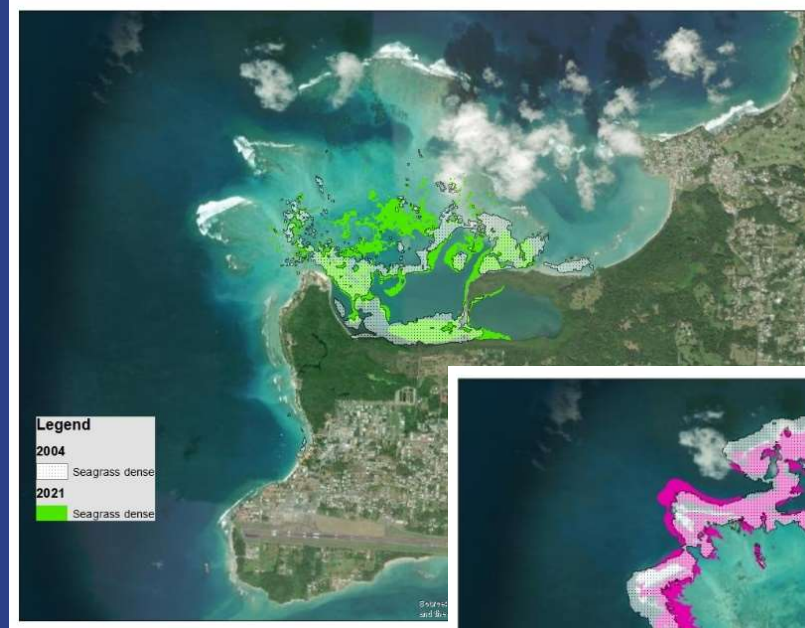
SDB Difference plots

- Better understanding of spatial & temporal movement of sandbeds
- Volumetric analysis
- Sediment budget



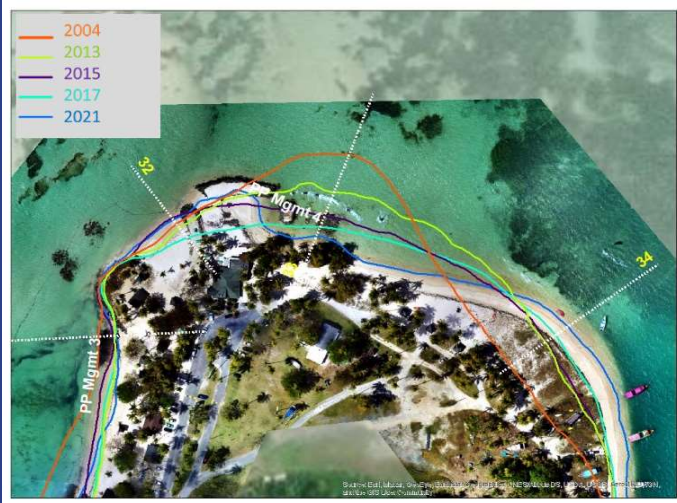
SFC Difference plots

- Identification of sensitive habitat areas
- Ability to track changes
- Seagrass coverage area stable, BUT meadow locations have migrated



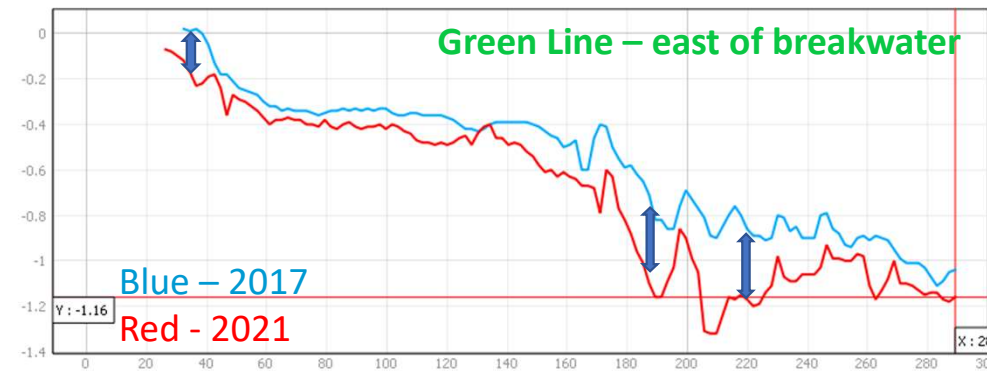
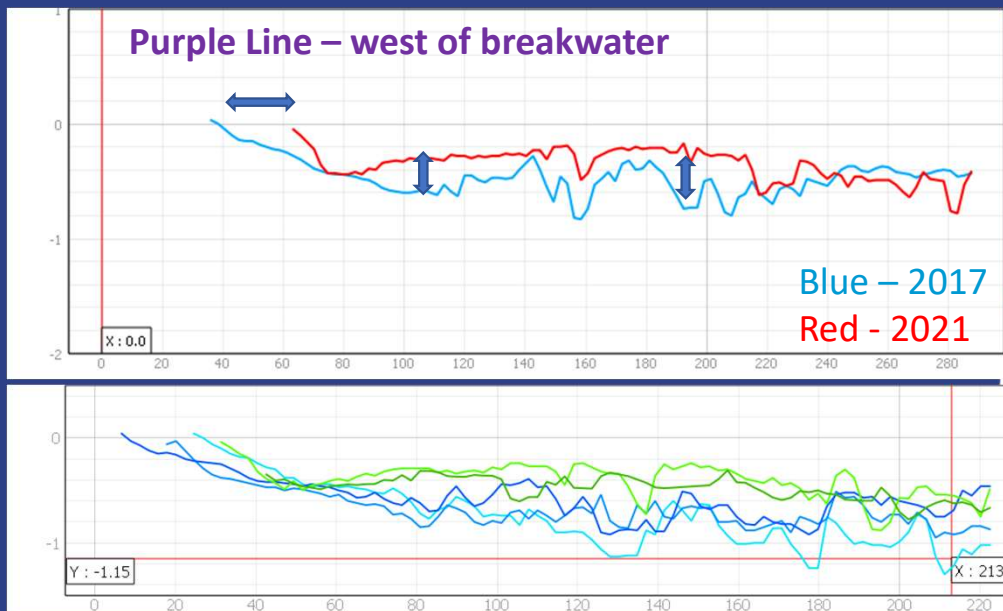
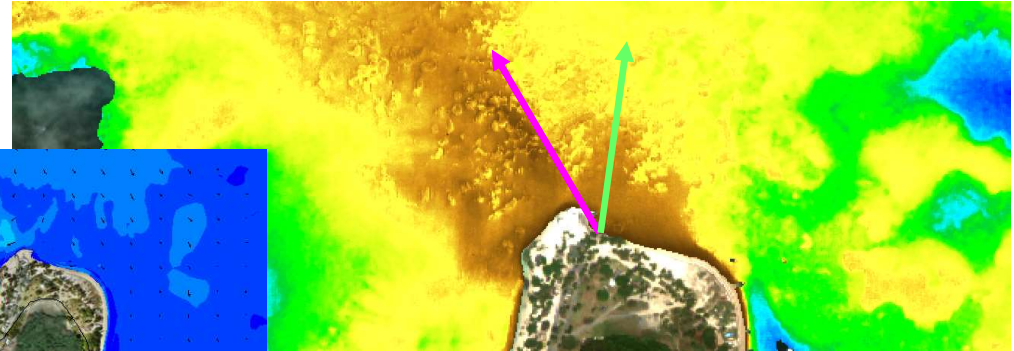
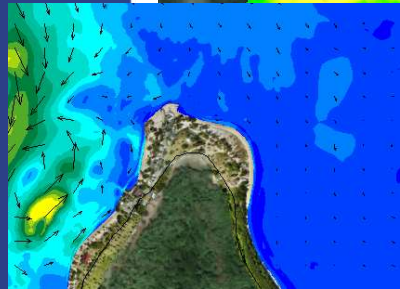
Understand structure impacts

- Structure built in 2020 with no feasibility assessment completed
- Highly dynamic shoreline
- Immediate shoreline reaction



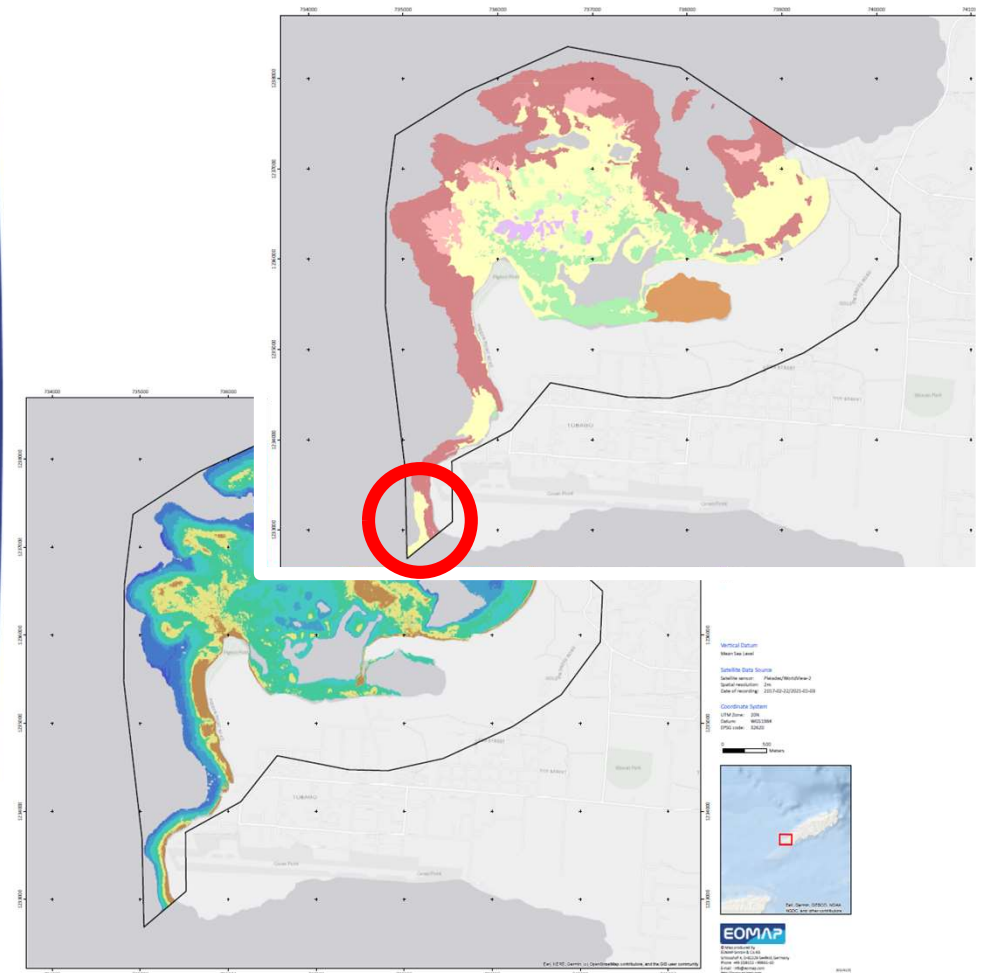
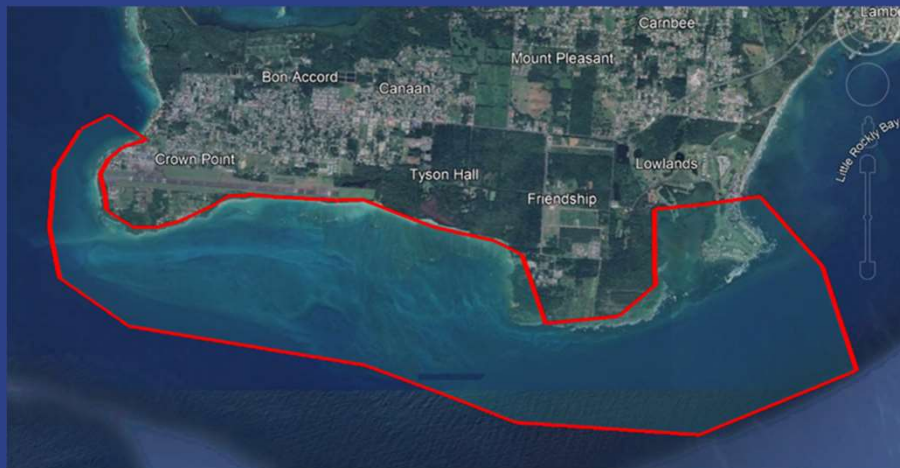
Understand structure impacts

- Demonstration of effects of structure
 - Accretion on updrift side
 - Erosion on downdrift side
- Justification for sound decision making



Sand Sourcing

- SDB and SFC combined
 - Identify potential borrow areas for beach nourishment



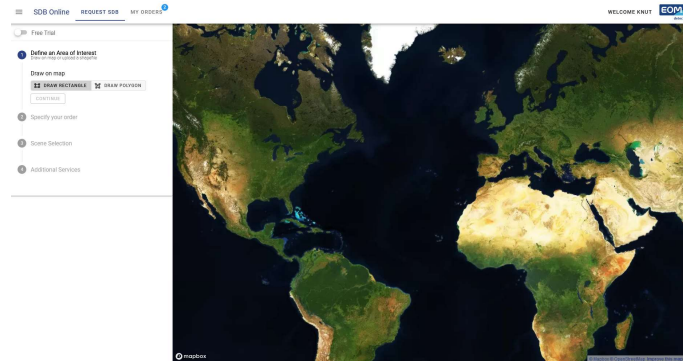
Summary of benefits

- Better data = improved modelling
- Minimize nearshore “guesswork”
- Understanding of coastline formation / coastal dynamics
- Quantification
 - Volumetric changes
 - Sediment budget
- Sand sourcing
- Webapp allows for a mechanism to showcase data
 - Convenient, accessible data storage
 - Transparency
 - Public relations
 - Project awareness



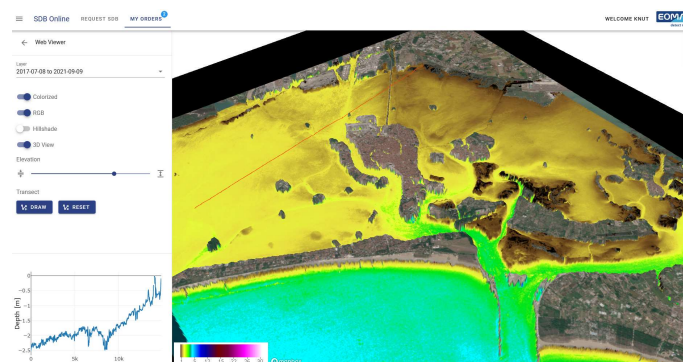
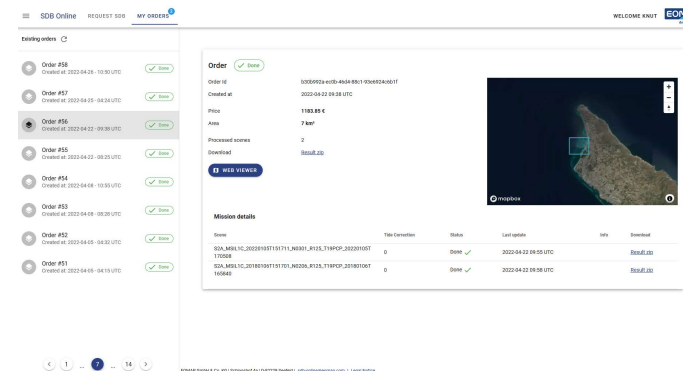
SDB-ONLINE

- Cloud backend, fully **scalable**
- **Physics-based SDB** concept (radiative transfer inversion)
- **Coupled** with satellite archives (currently Sentinel-2)
- **Automatic** mode (image selection, full processing workflow)
- **Multi-image** mode
- **Webapp** user interface
- Machine-to-machine (**API**)



Define your site

Download data



Visualize data online

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