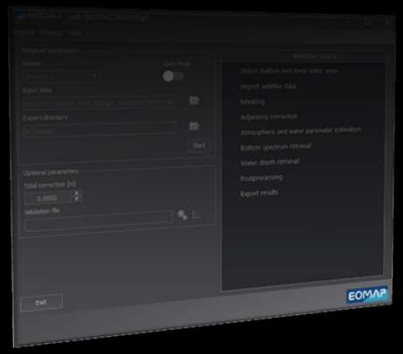
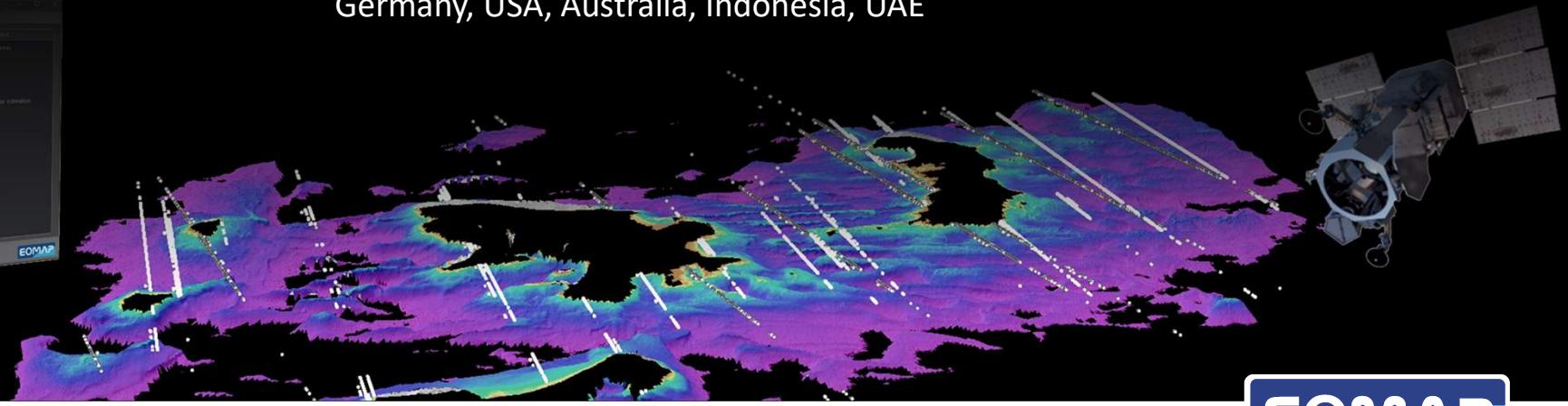
EOMAP SDB uses and benefits for Small Island Developing States

MACHC 2021
Dec 1st, 2021

Edward Albada

EOMAP GmbH & Co. KG
Germany, USA, Australia, Indonesia, UAE





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About EOMAP

- Experts in **Aquatic Earth Observation** services, established 2006
- Satellite-Derived Bathymetry (SDB) solution provider to global initiatives (EMODnet, Seabed2030, GEBCO), HO's for charting update (NZ, UK, AU, others) and industry
- Capability on accessing various satellite sources (active, passive) and analytical methods (physics-based, ML, AI, image interpretation)
- **Seafloor related portfolio**: SDB data, SDB software, Satellite-Lidar databases, seafloor mapping and characterisation, capacity building

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EOMAP's SDB projects in the MACHC region

Darker blue represents higher frequency

Selected SDB projects

1. Coastal Zone Management
2. Coastal Engineering
3. Update of nautical charts (UKHO)
4. Coastal Resilience
5. Safety of navigation

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What is Satellite-Derived Bathymetry (SDB)?

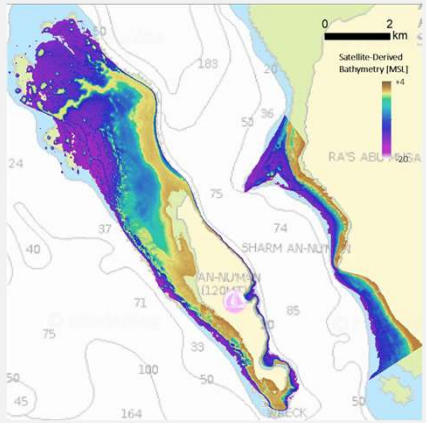
Bathymetry mapping from space (airborne) sensors relies (a) on passive or active **sensors** measuring the reflected light from the seafloor (b) the **analytics**.

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



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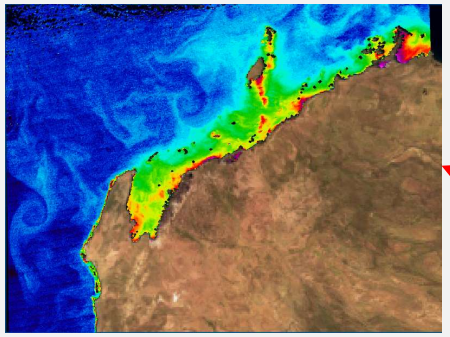
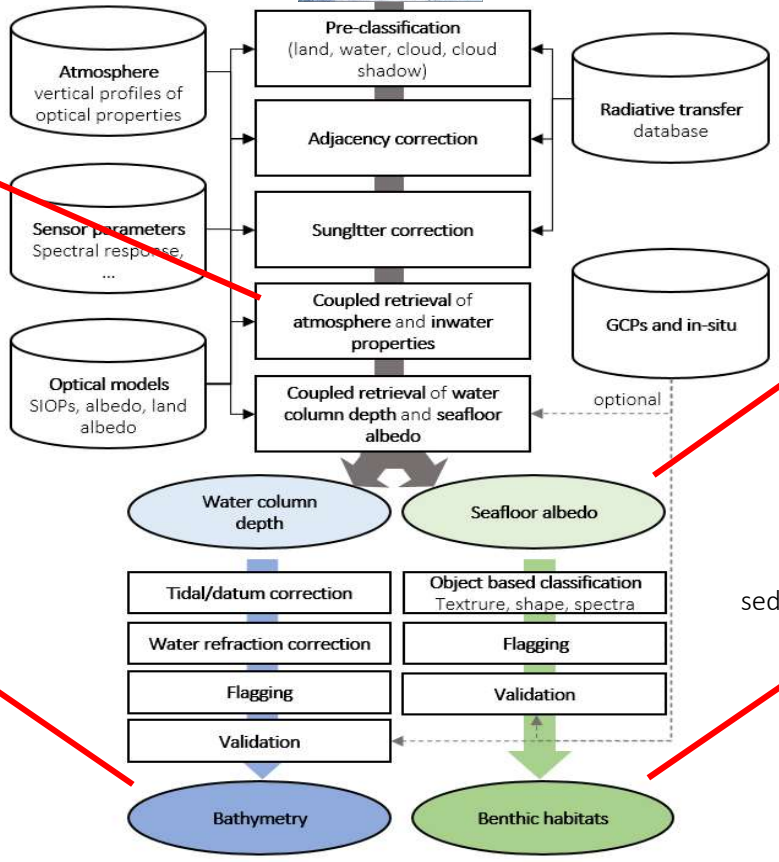
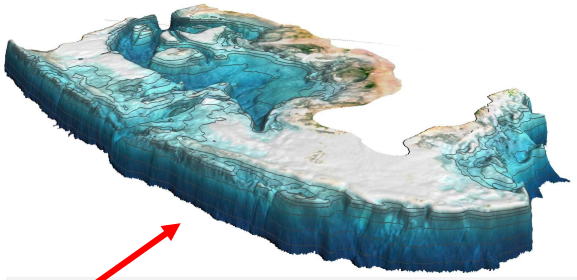
EOMAP's Physics-based SDB methods

Water quality

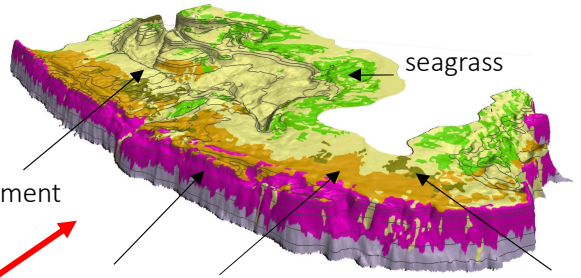


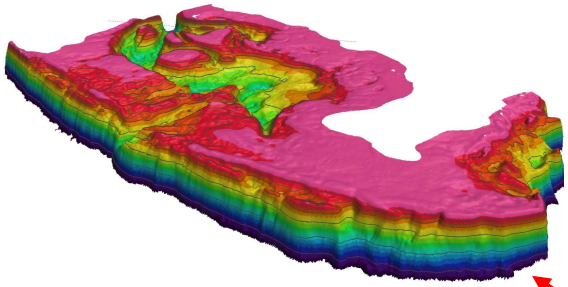


Seafloor reflectance (colour)



Benthic habitats





SDB (Satellite-derived bathymetry

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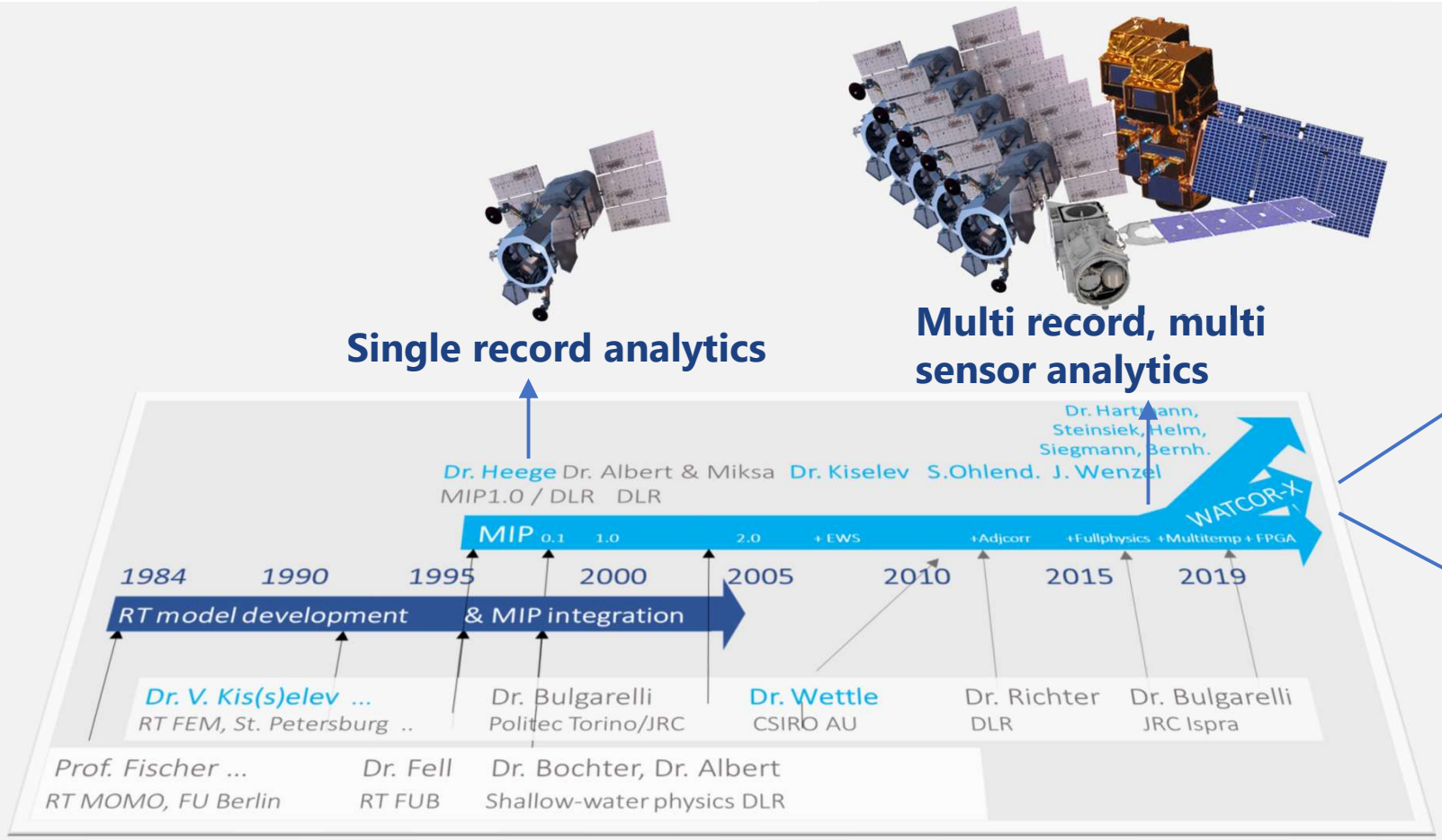
EOMAP Physics-based SDB history



Desktop software

Online software

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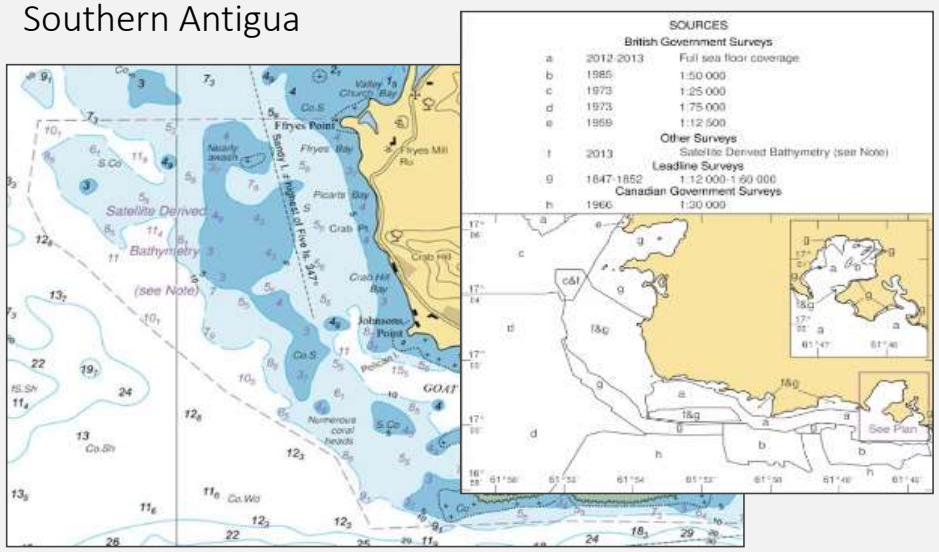
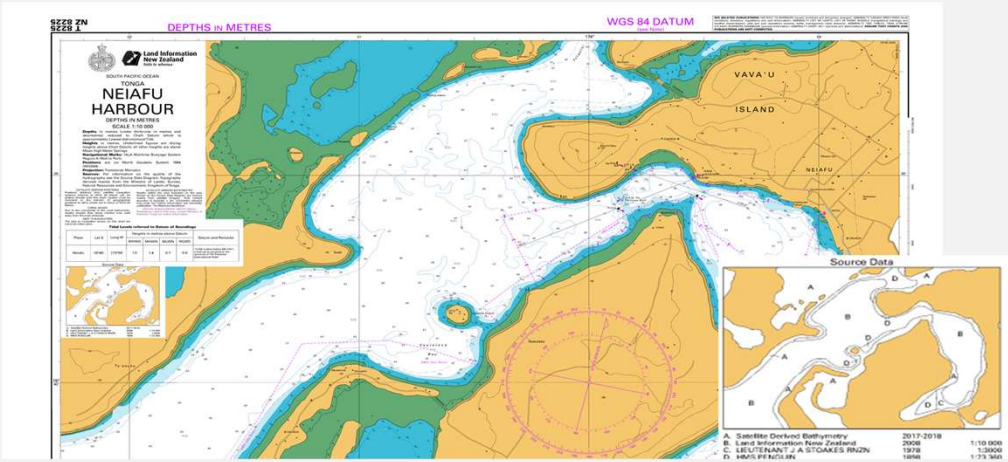
EOMAP's SDB highlights: Charting

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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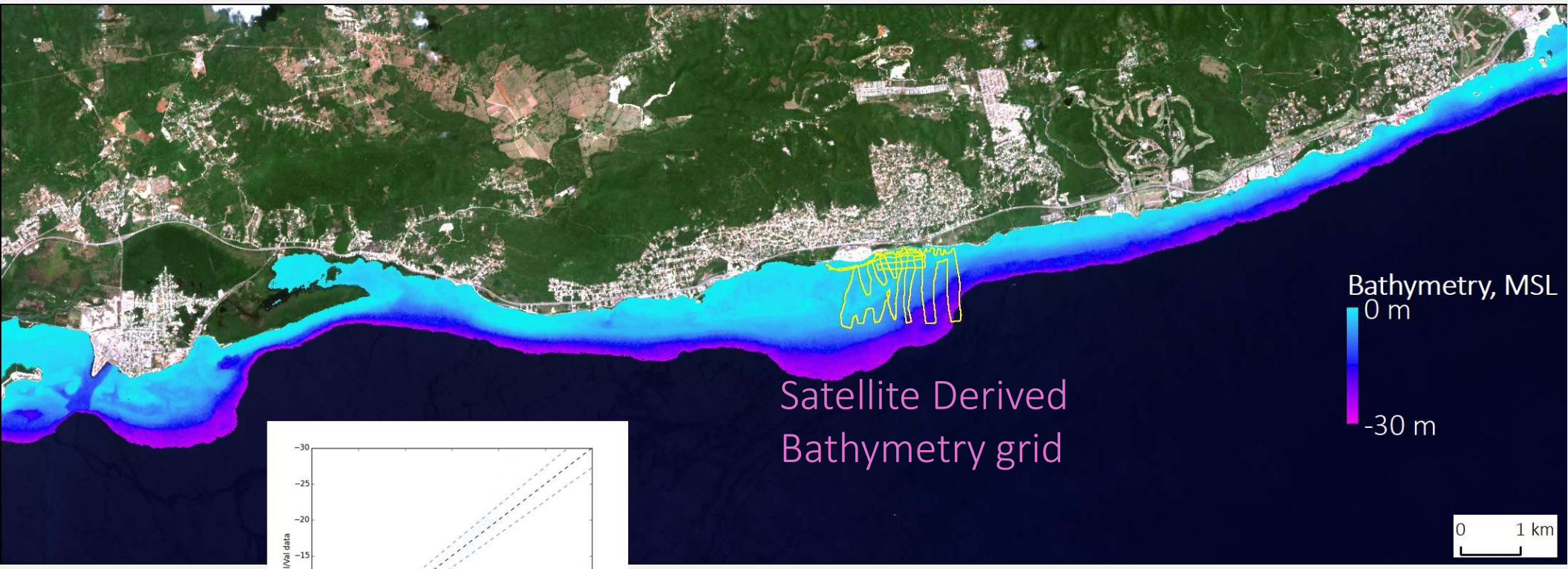
EOMAP's SDB to support single beam surveys



90% of SDB data within 50cm accuracy compared to single beam transects

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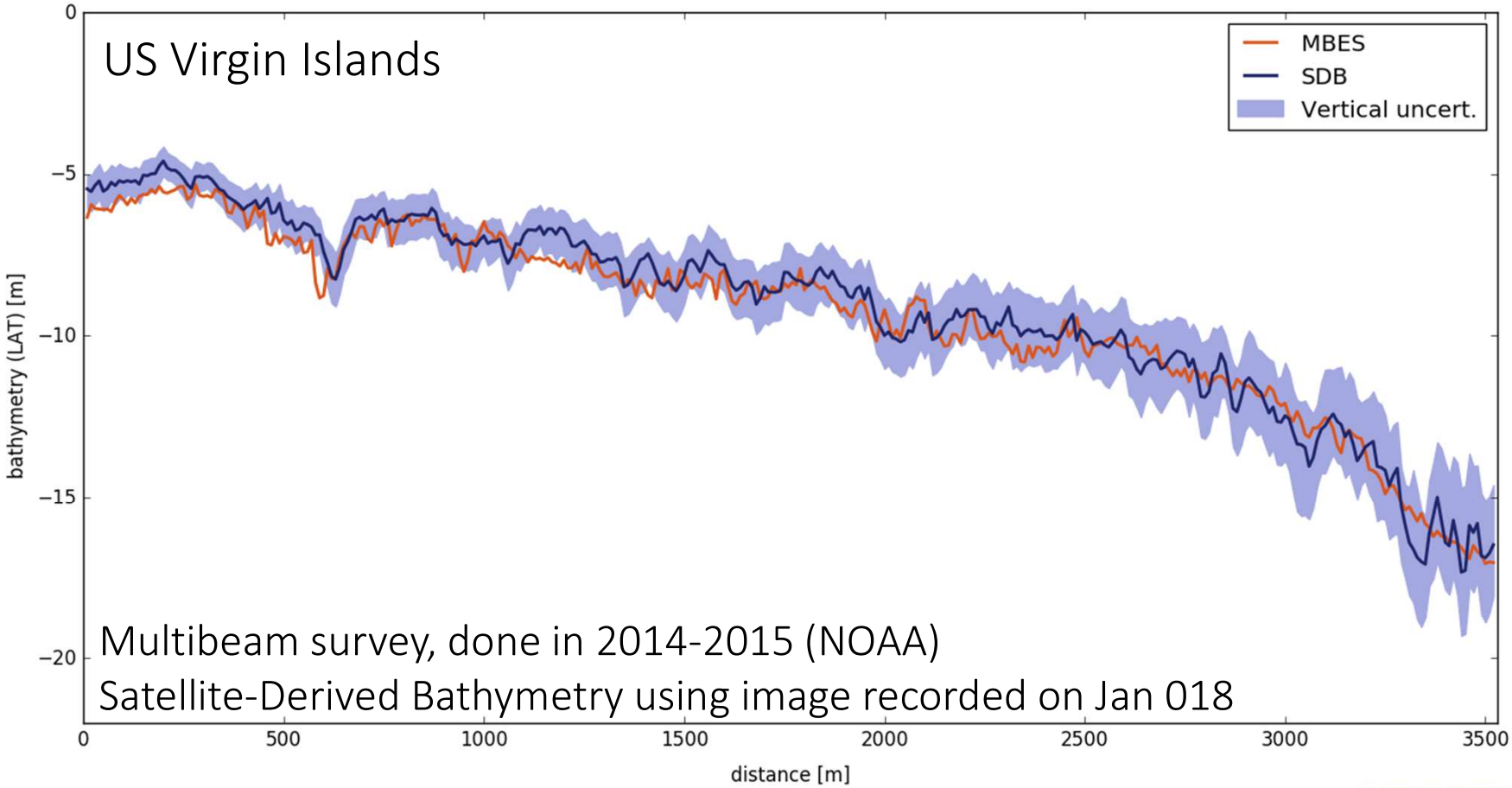
SDB and MBES comparison



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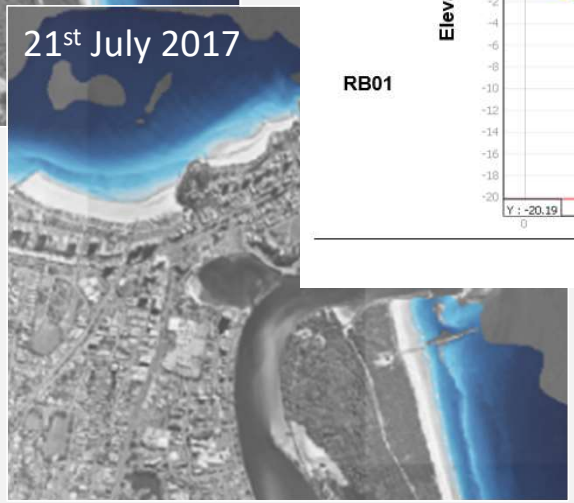
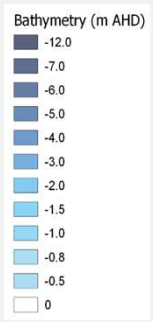
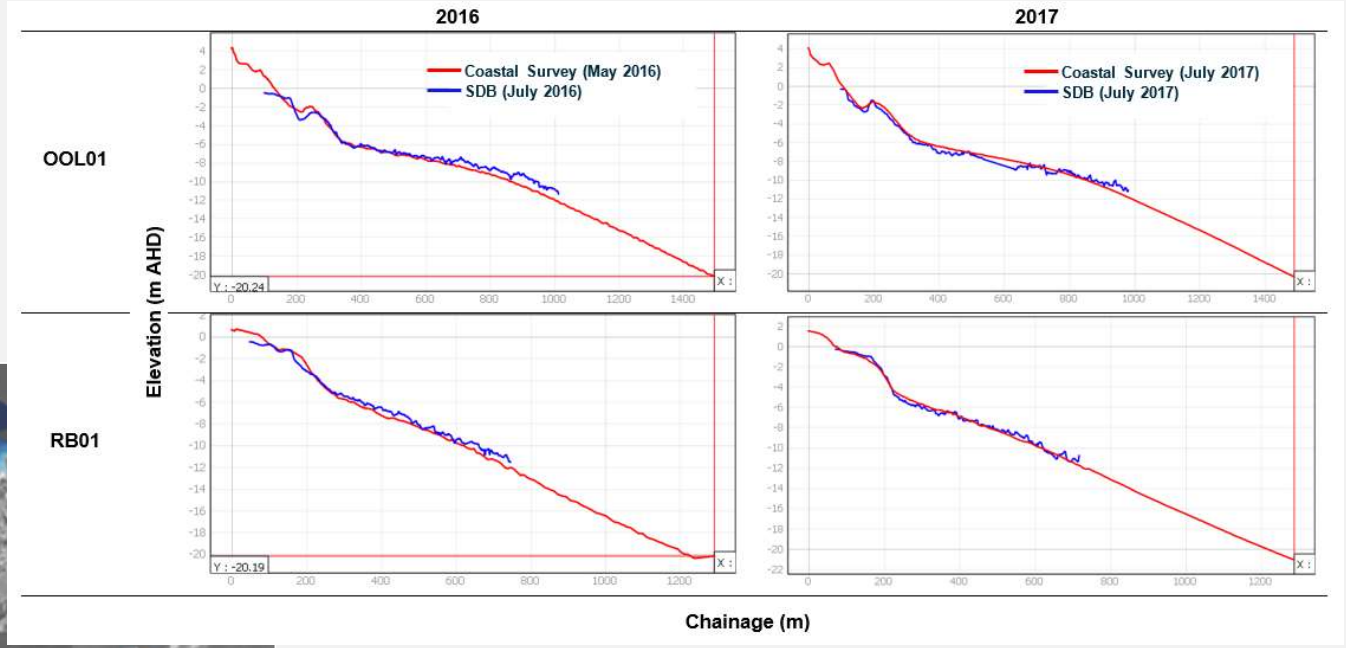
SDB bathymetric change: Dynamic coastal change







bluecoast CONSULTING ENGINEERS

Heiko Loehr, Evan Watterson, Matthew Harry presentation held at the SDB Day 2019

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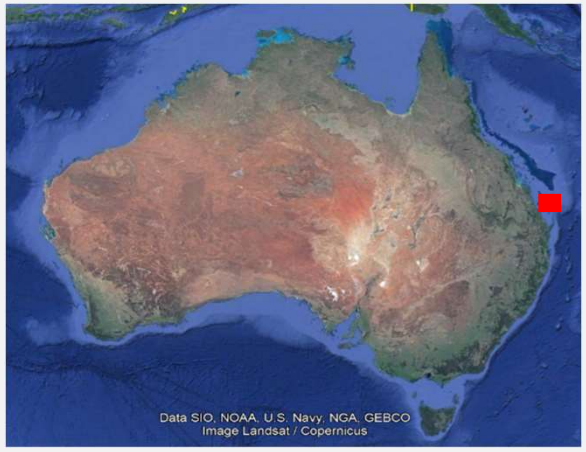
SDB bathymetric change: Dynamic coastal change

Satellite imagery allow to track every place on earth every week to every day.
→ SDB can **continuously monitor** shallow water dynamics



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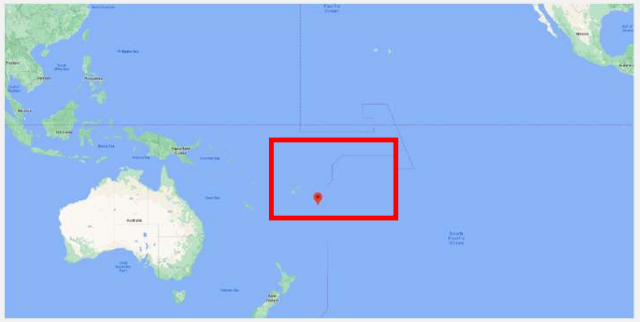
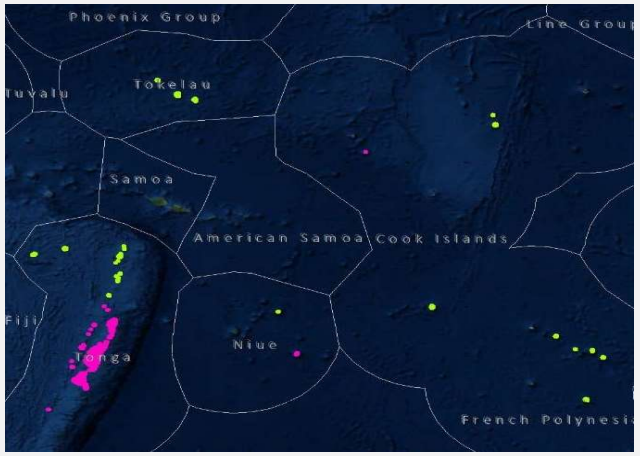
SDB for Survey Optimization

- Review > 350,000 sq km using 15m resolution imagery
- 52 Areas of Interest identified
- Over 6,000 sq km of SDB using 2m resolution imagery
- Follow up with topo-bathy Airborne Lidar, Multibeam
  - 635 sq km of topo-bathy lidar data
  - Hydrographic Object Detection to 20m
  - 590 sq km of MBES data
  - 20m to 400m depths





Charting products containing SDB data from this project have already been published by LINZ

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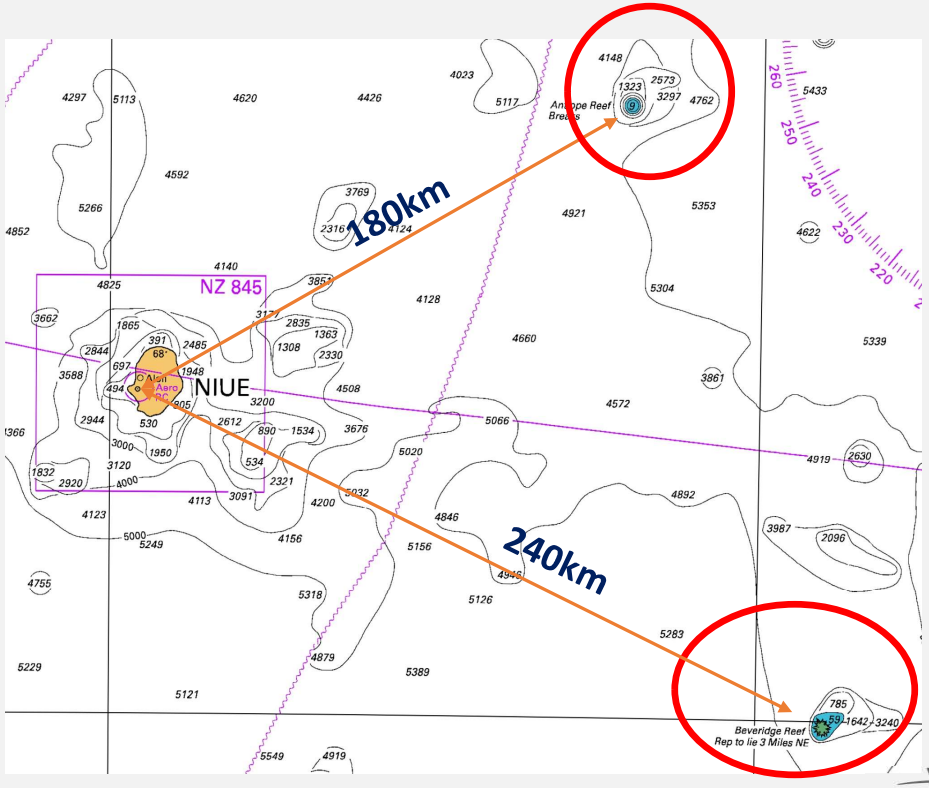
SDB for Survey Optimization

Prior to any Project Phases

- Antiope Reef
  - 180km from Niue (aircraft base)
  - Appeared as large area on chart
- Beverage Reef
  - 240km from Niue
  - Safe Haven for Vessels



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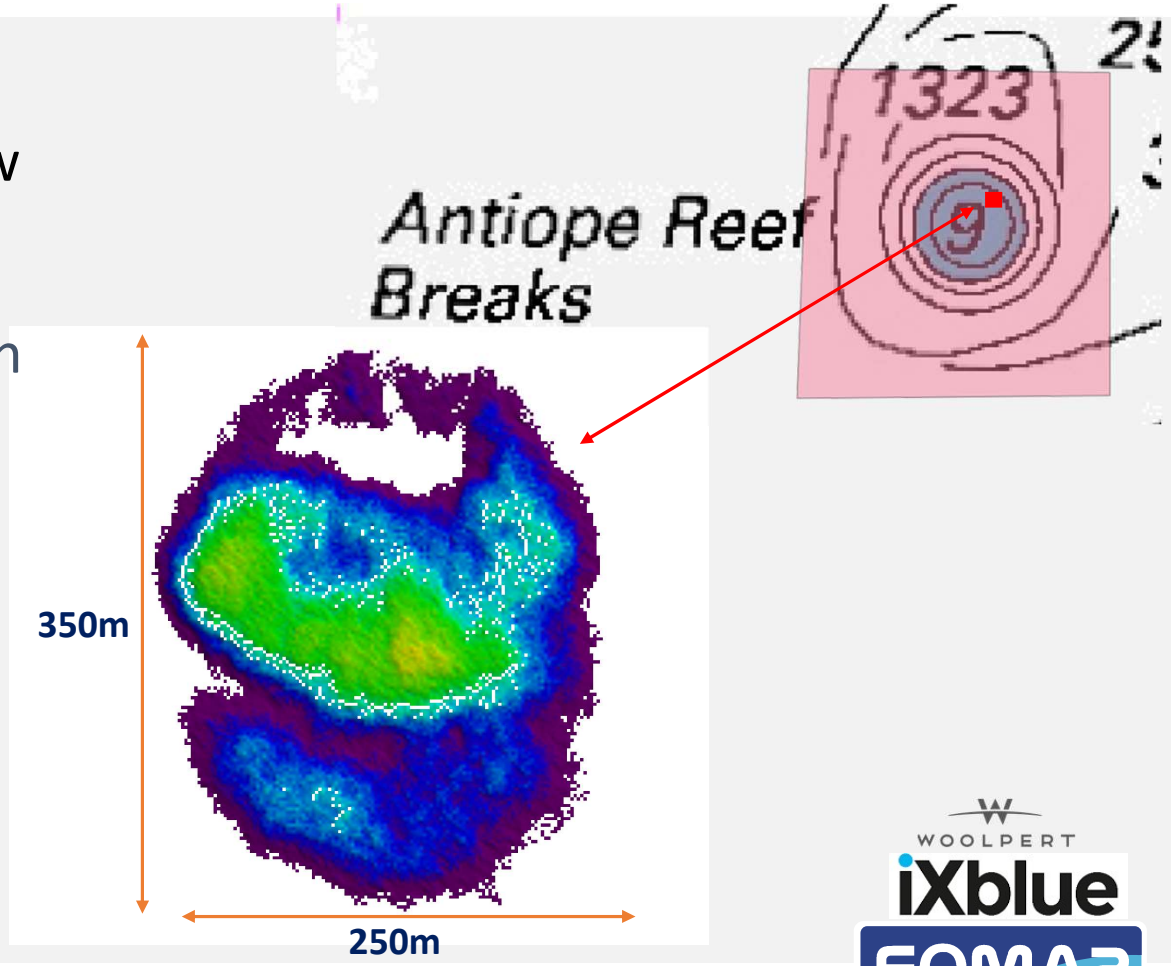
SDB for Survey Optimization - Removal

Antiope Reef - After SDB Review

- Small Area 250m x 350m
- Not significant for Navigation
- Lidar not acquired



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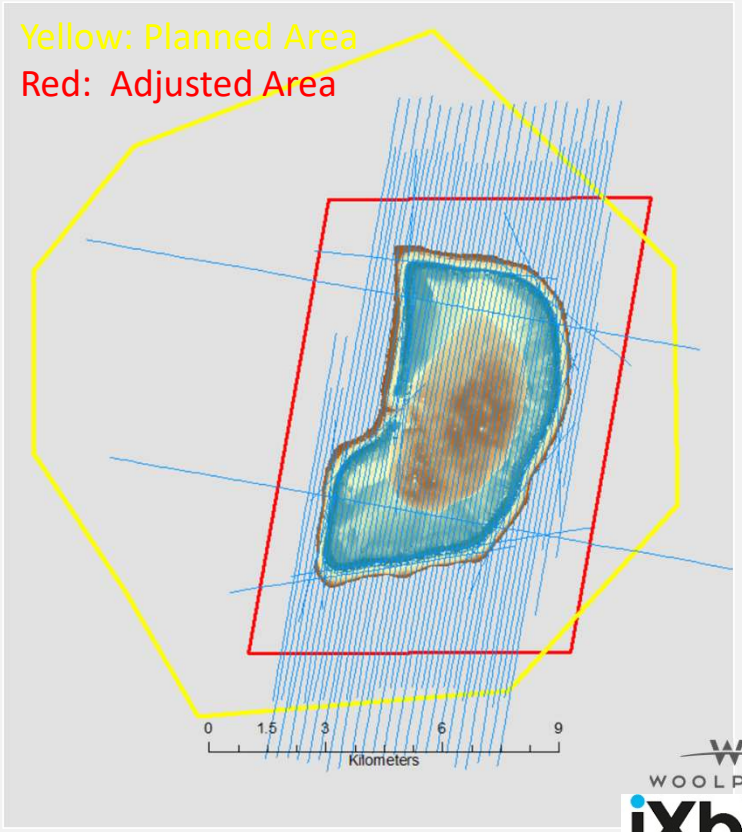
SDB for Survey Optimization - Refinement

Beveridge Reef – After SDB review

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



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Satellite-Derived Bathymetry (SDB)
&
Satellite-Lidar Bathymetry

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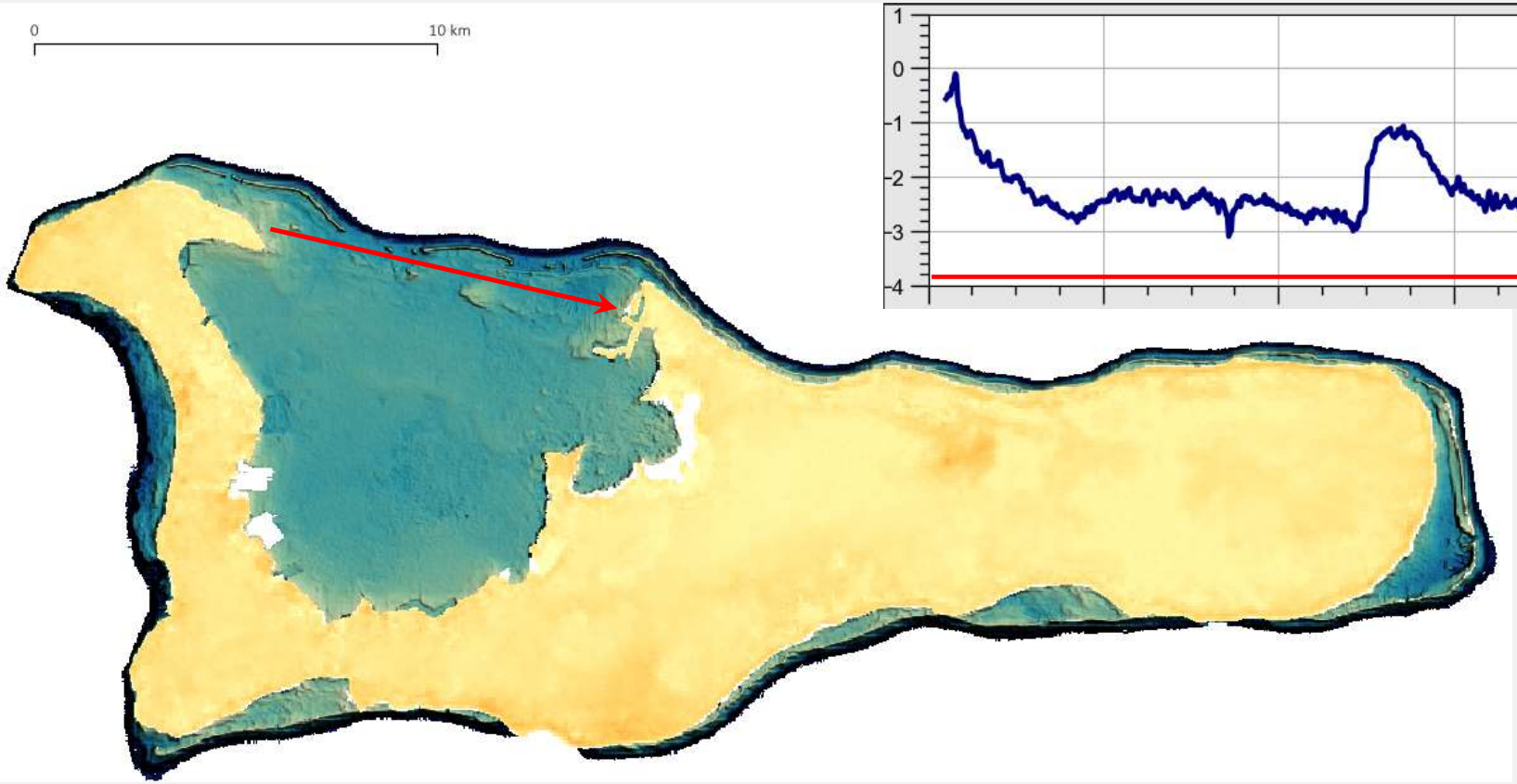
Satellite-Derived Bathymetry (SDB), Grand Cayman



EOMAP is data provider to

EMODnet

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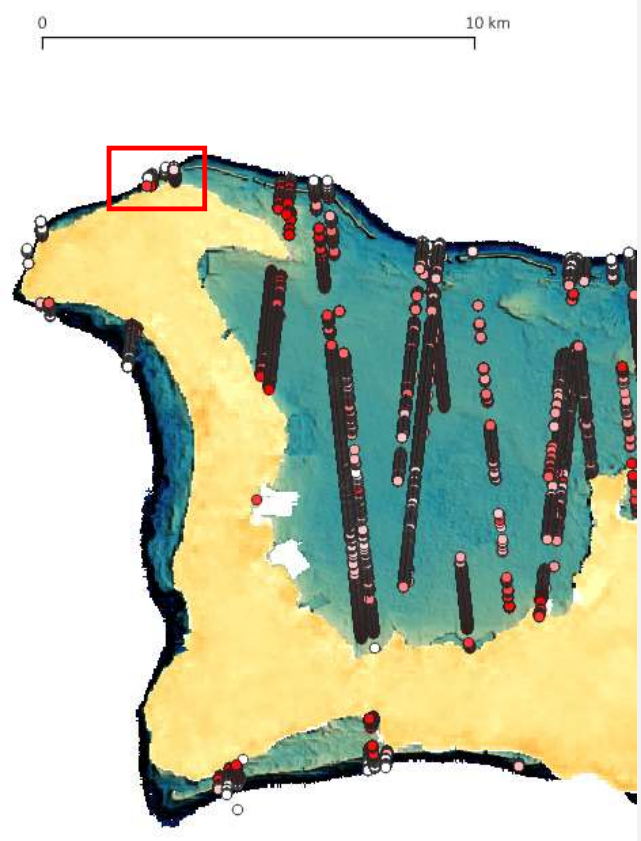
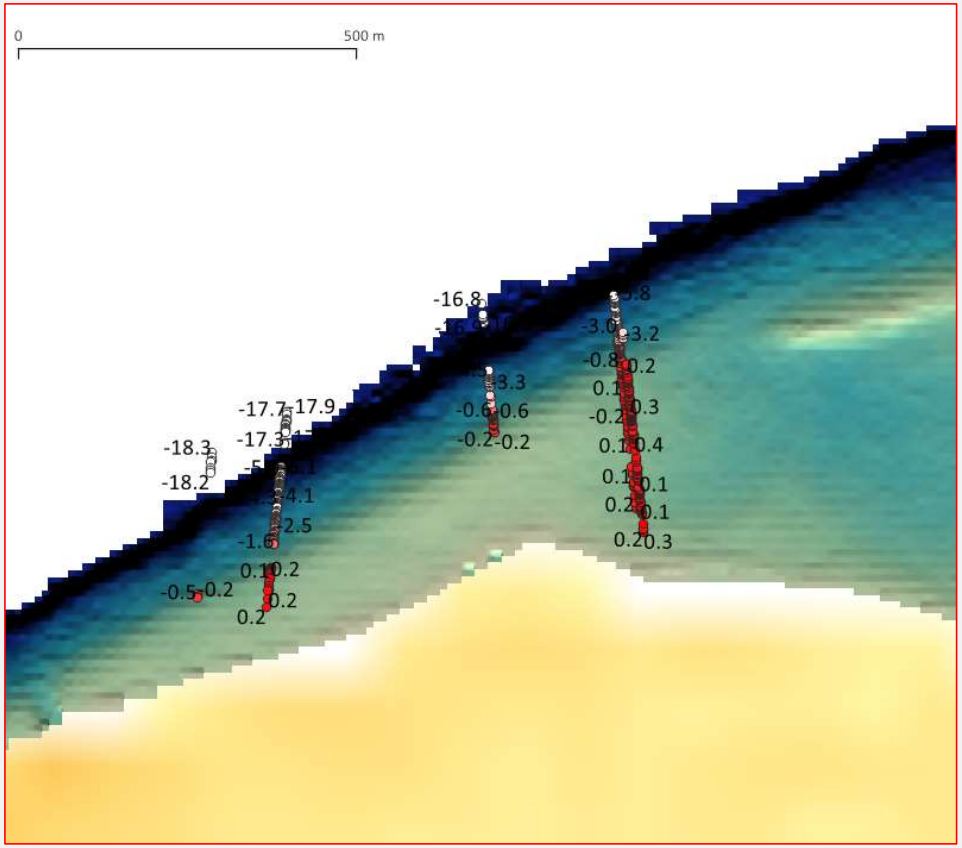
Satellite-Derived Bathymetry (SDB) and Satellite-Lidar Bathymtery (SLB), Grand Cayman





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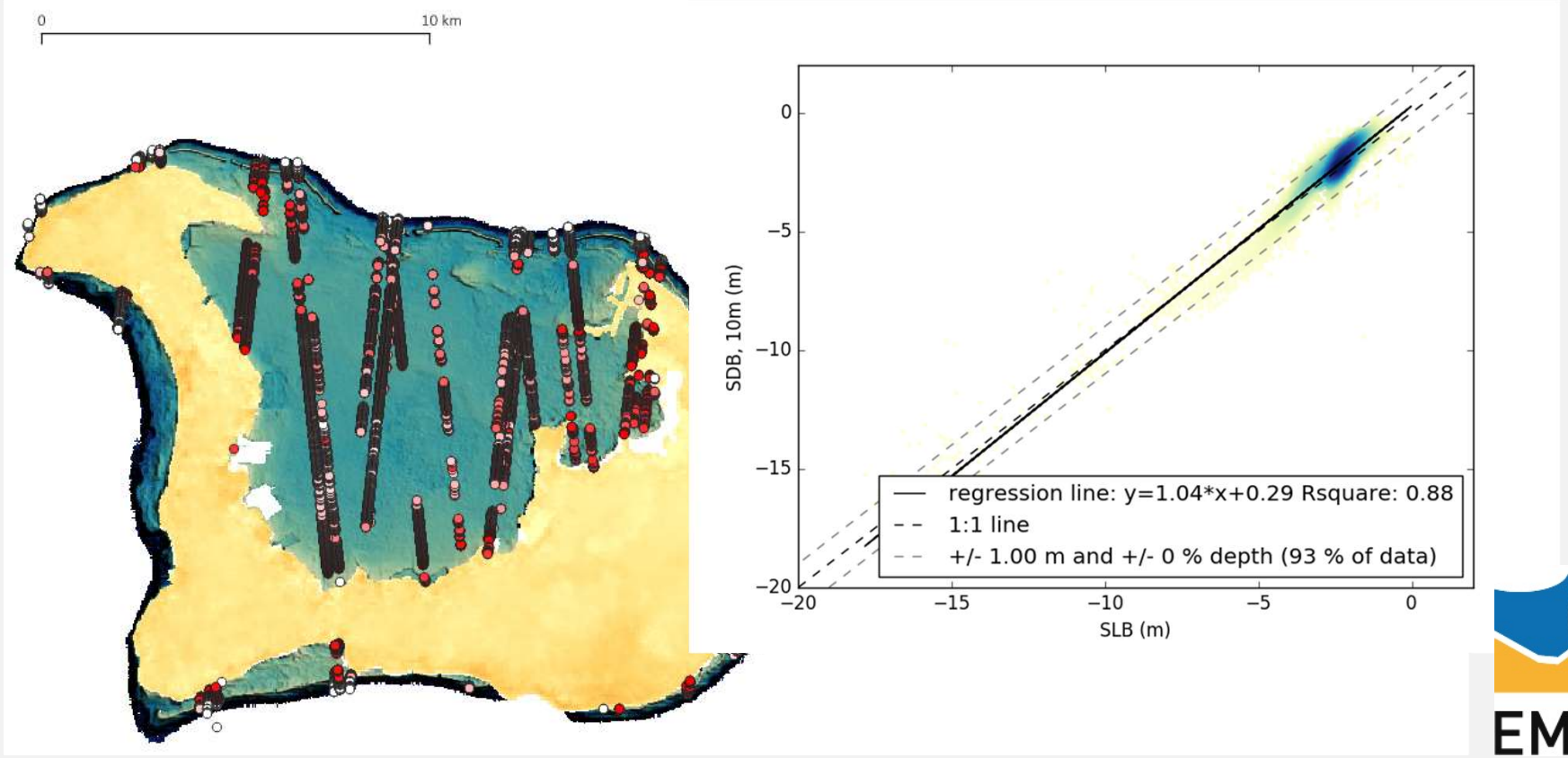
Satellite-Derived Bathymetry (SDB) and Satellite-Lidar Bathymtery (SLB), Grand Cayman



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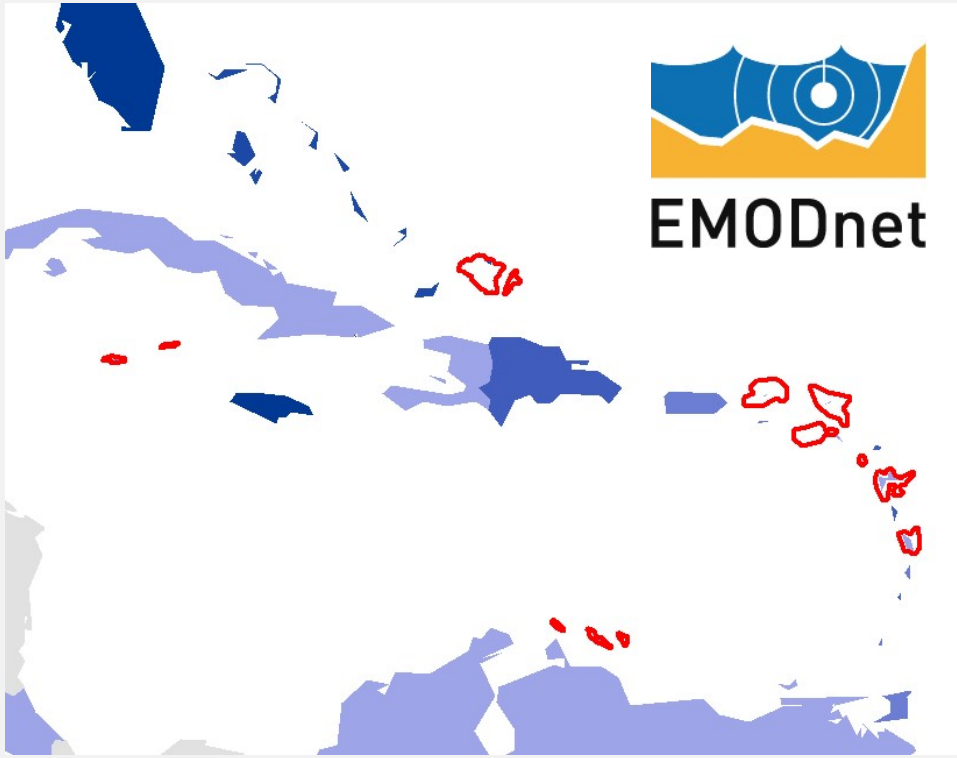
Satellite-Derived Bathymetry (SDB) and Satellite-Lidar Bathymtery (SLB) grids

Data provision to EMODnet Bathymetry → Seabed2030 → global bathymetric grid GEBCO for EU / UK overseas region.

Release in early 2022



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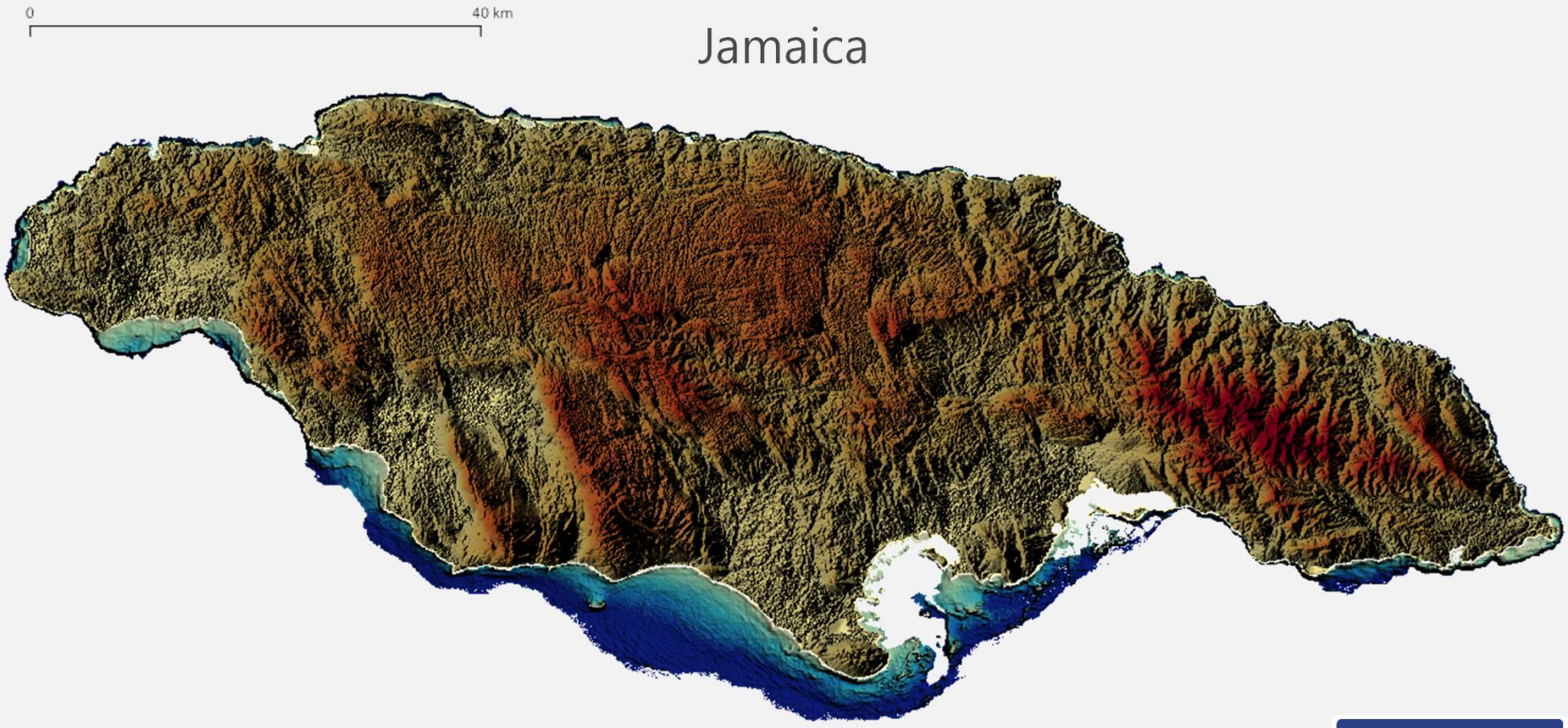
Merged Satellite-Derived Bathymetry and Elevation Model



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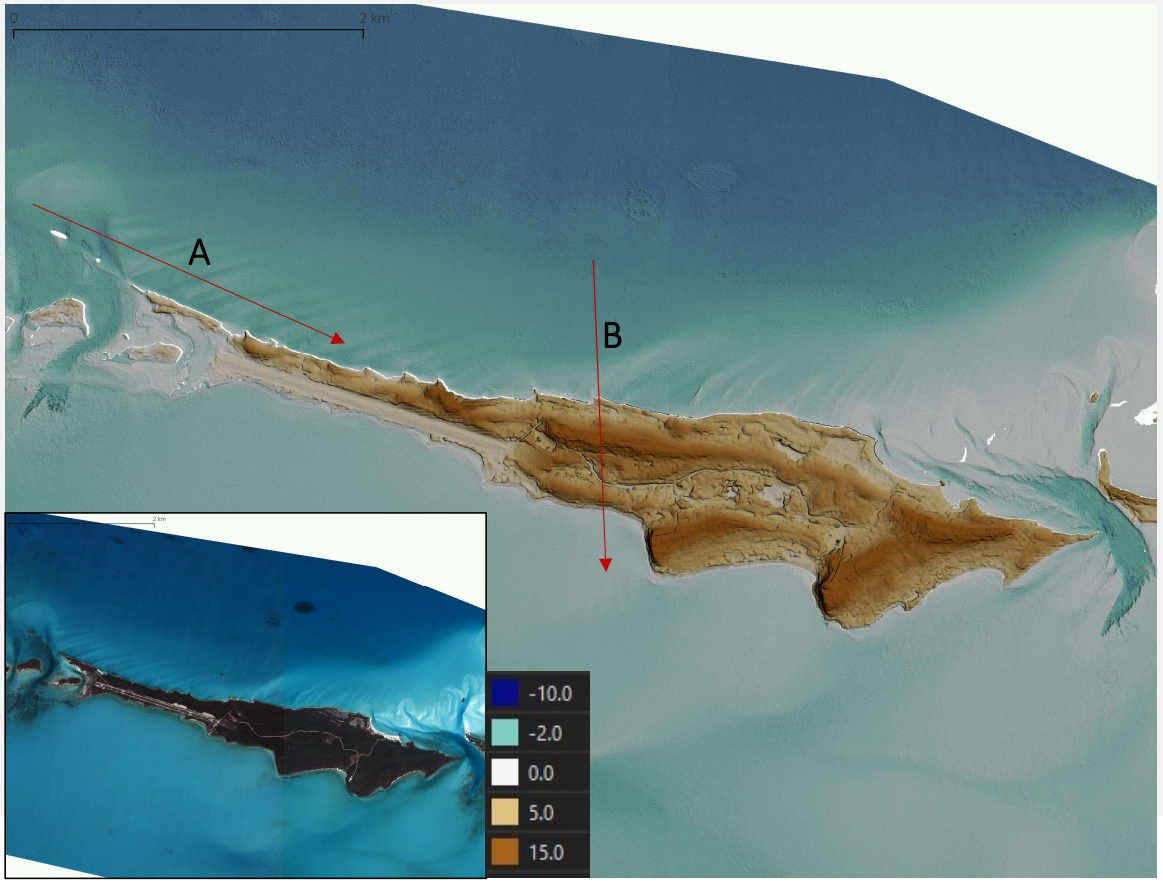
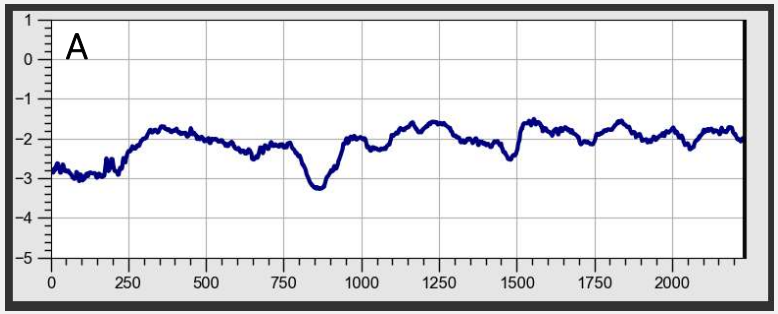
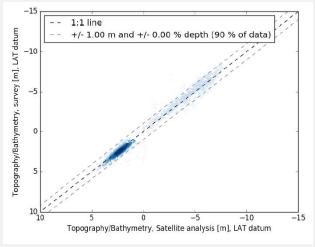
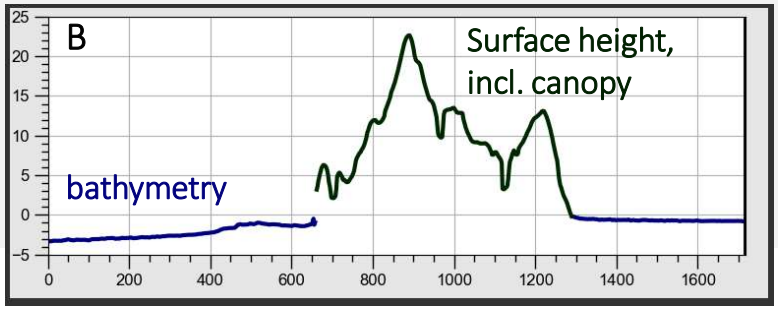
2m resolution Digital Surface Model combined with Satellite-Derived Bathymetry, Bahamas, Hog Cay

Bathymetry-Topography models for coastal management and planning.









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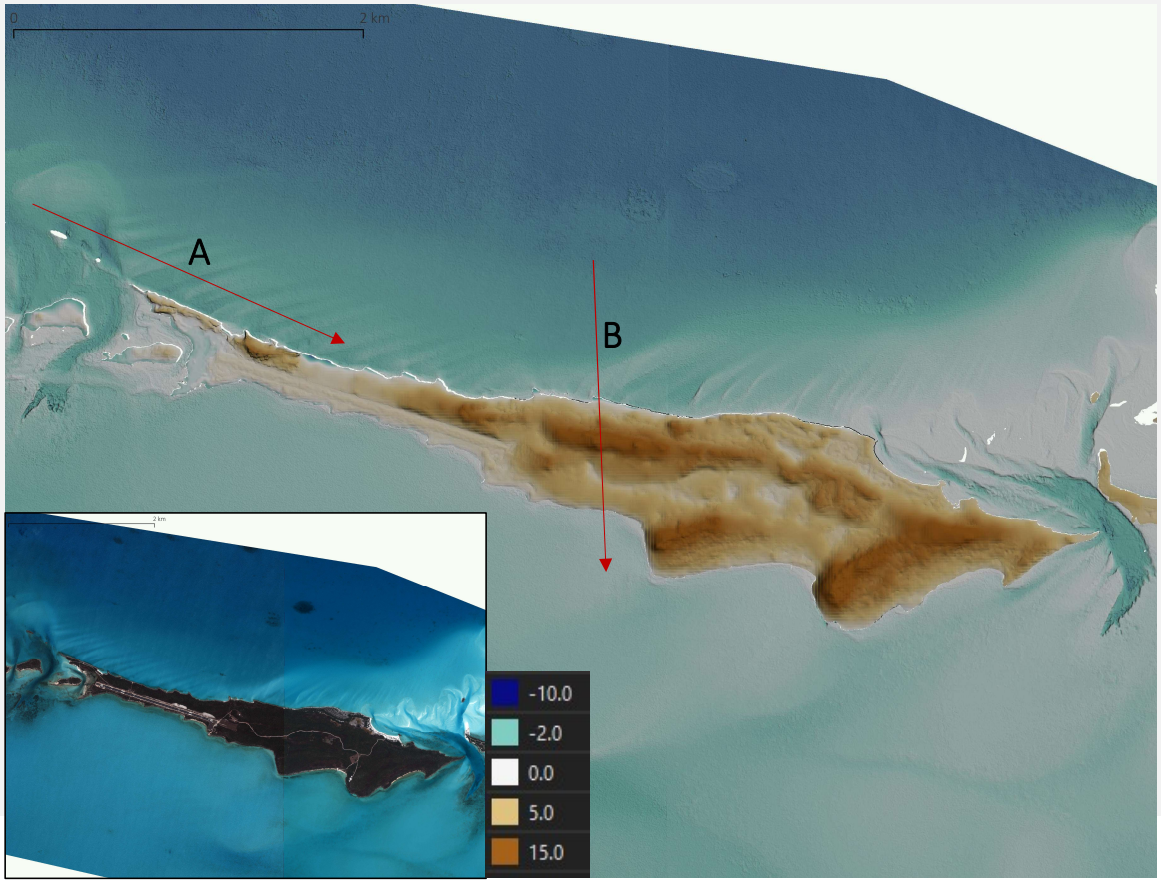
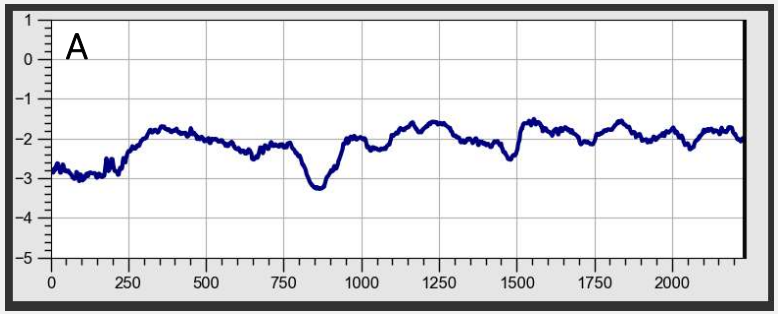
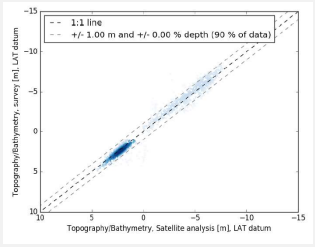
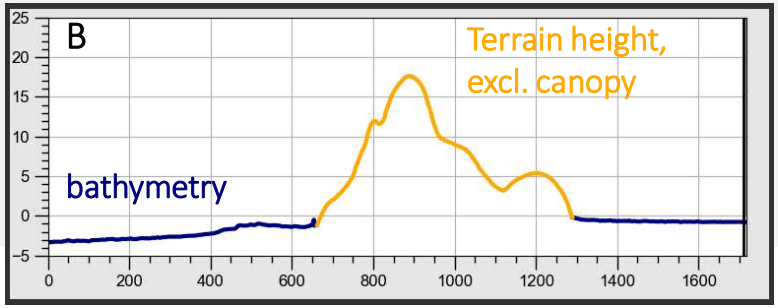
2m resolution Digital Terrain Model combined with Satellite-Derived Bathymetry, Bahamas, Hog Cay

Bathymetry-Topography models for coastal management and planning.









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Summary

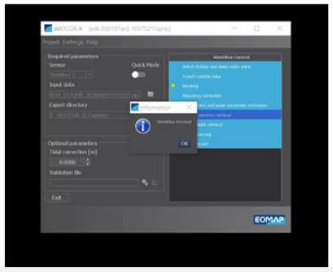
We support you with tools, data and capacity to make full use of modern SDB and remote mapping solutions for shallow waters

Data/database offers

- Satellite-Derived Bathymetry (SDB) database and on-demand data in different spatial resolution
- Satellite-Lidar Bathymetry (SLB) database for the Caribbean
- Seafloor classification and characterization

Software offers

- SDB software, online and desktop
- SDB image support tools
- Databases and API access



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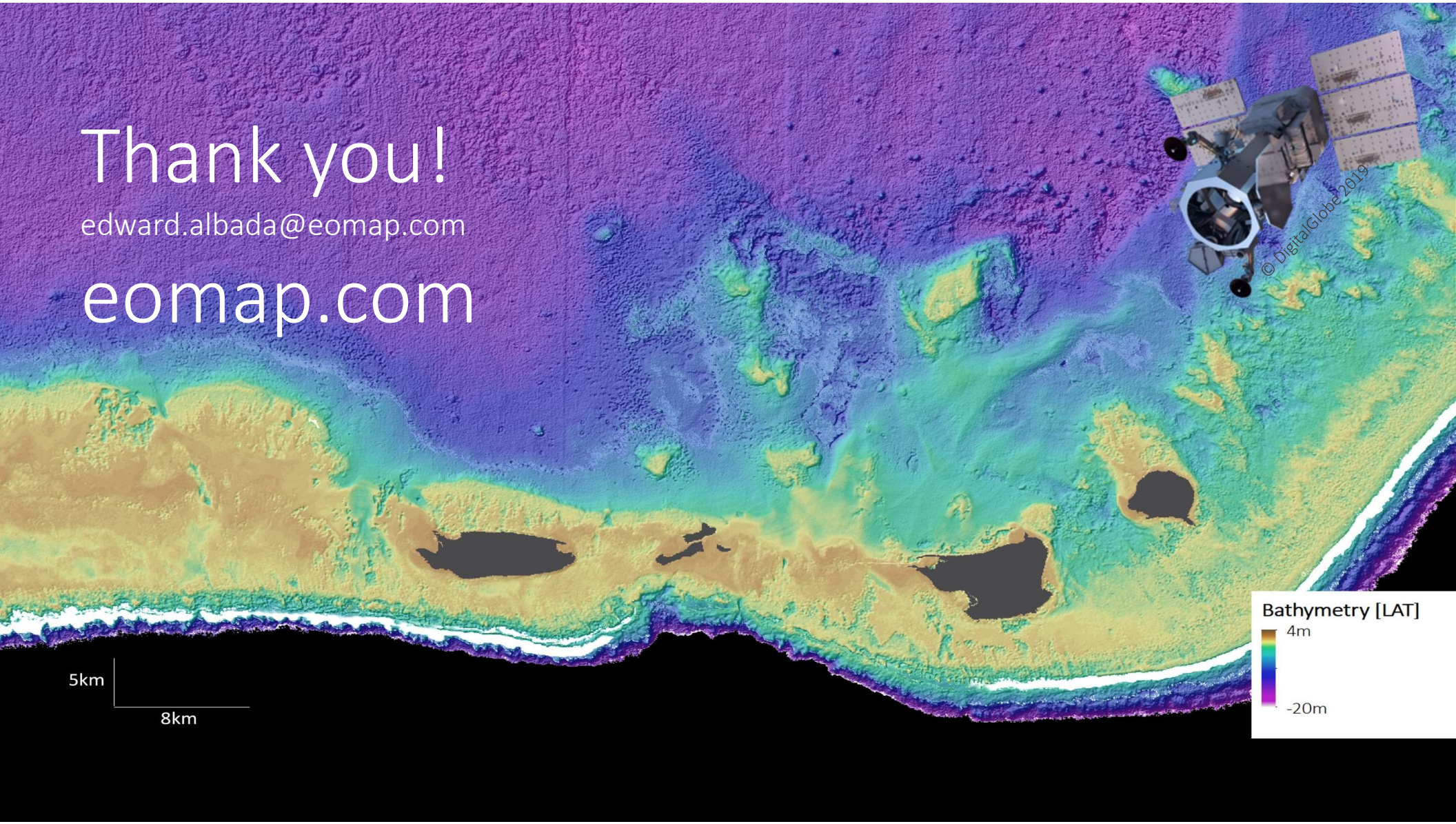
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Bathymetry [LAT]
4m
-20m
5km
8km