

# Collaborative Satellite Derived Bathymetry Mapping Projects for Seabed 2030



International  
Hydrographic  
Organization



Seabed 2030 5th SaWPac Regional Mapping Community Meeting  
12 July 2023

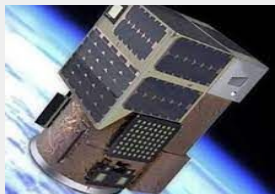
Kyle Goodrich, *President & Founder*  
kg@tcarta.com

# Team TCarta

Denver | Kingston | Vancouver



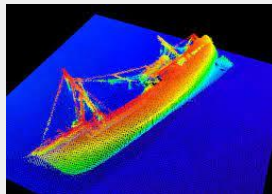
Remote Sensing



Physics



Hydrography



Geospatial Programming



Oceanography



Nautical Charting



Kyle Goodrich  
Owner, President &  
Founder



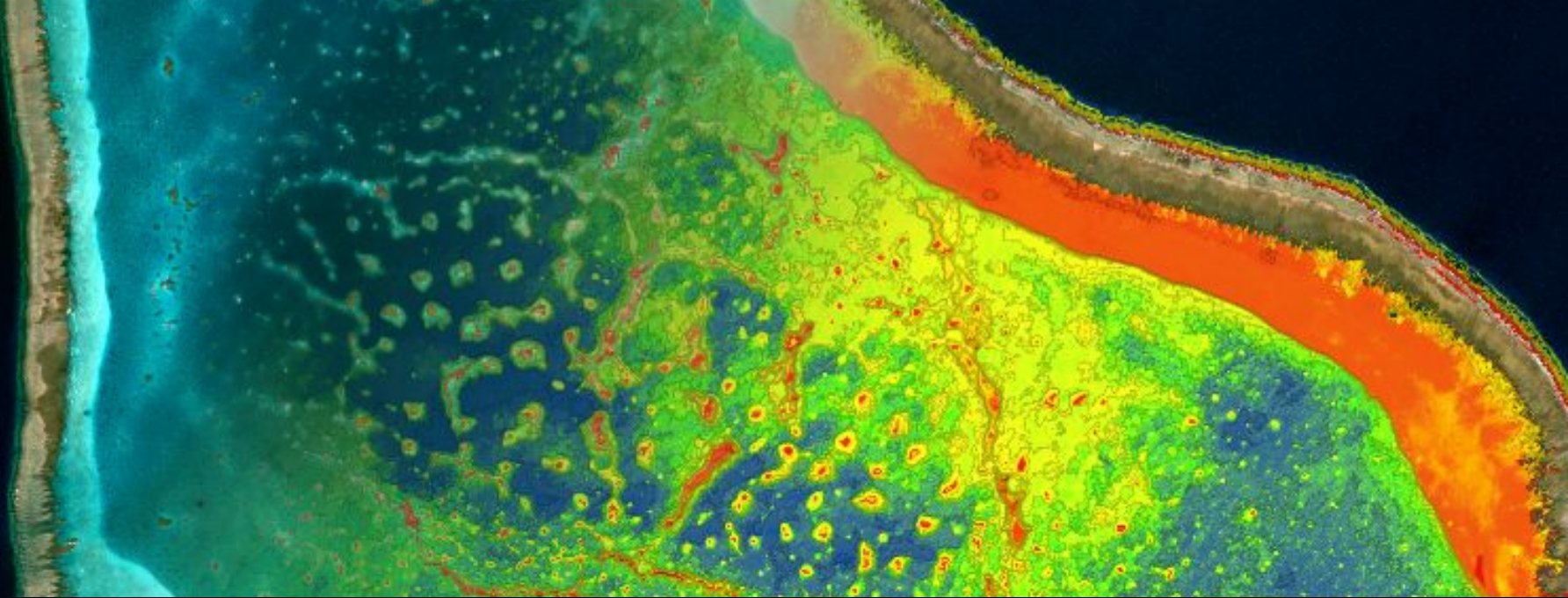
Corey Goodrich  
Owner,  
Managing Partner

## 18 person team

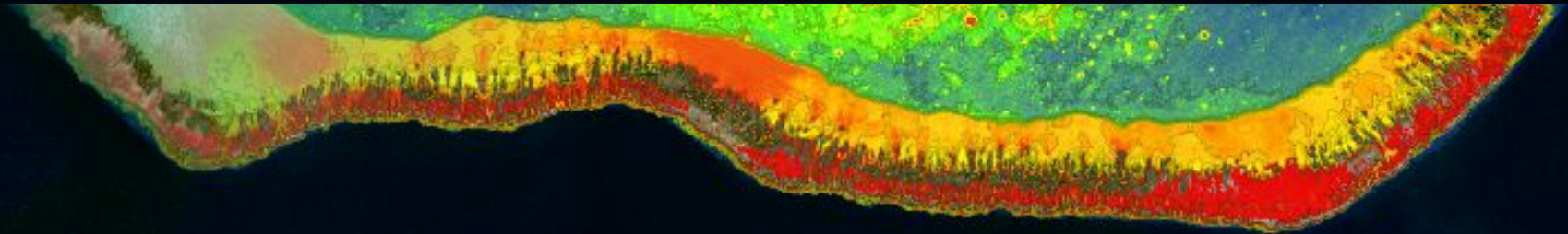
- Denver (11)
- Alaska (1)
- California (1)
- Canada (4)
- Jamaica (1)

## 9 Women in Hydrospatial





Satellite Derived Bathymetry





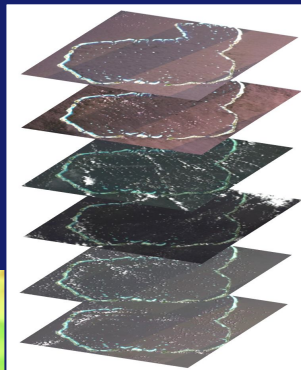
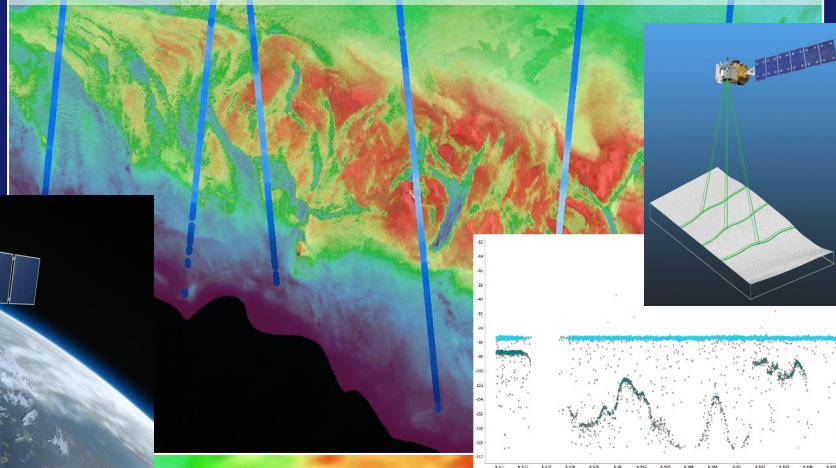
# Technology to Facilitate Regional Mapping



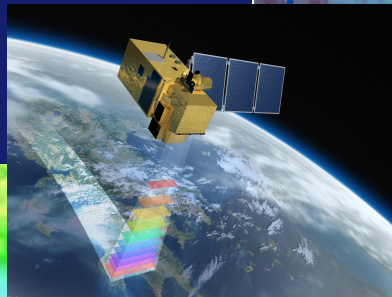
**National Science Foundation Small Business Innovation  
Research Grant Phase II: Oct 2019 -December 2021**

Trident Bathymetry Mapping System: A Multi-Pronged Automated  
Solution to Satellite Derived Shallow Seafloor Surveying. Award No:  
1927058

## Active & Passive Sensor Integration



Multi-Image SDB



"Passive" - Earth Observation

"Active" - laser pulse

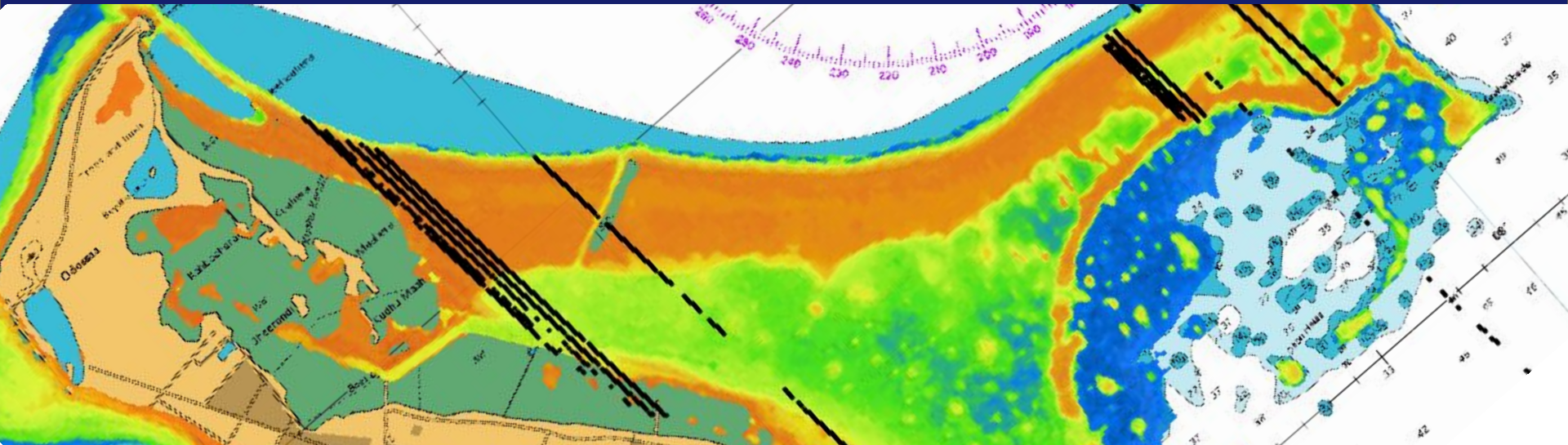
  
**PROJECT  
TRIDENT**





# Regional Demonstration Project

## Maldives - 2021



# Whole Country | Regional SDB

## Demonstration Tally

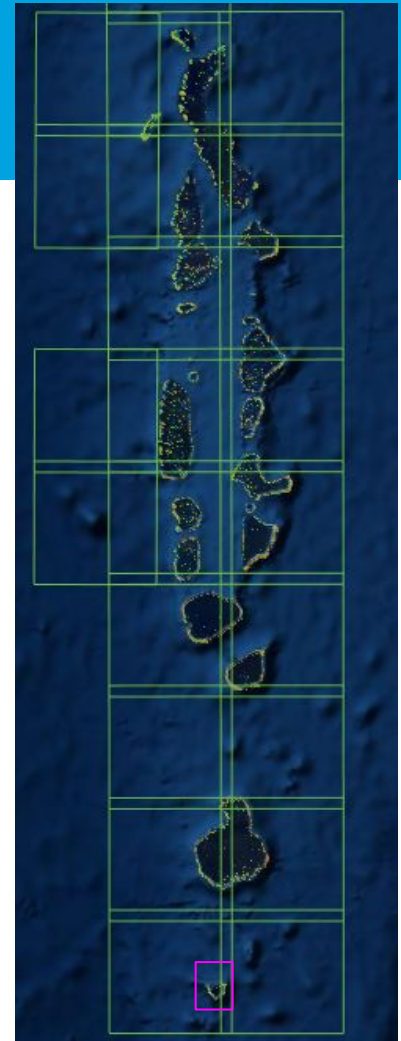
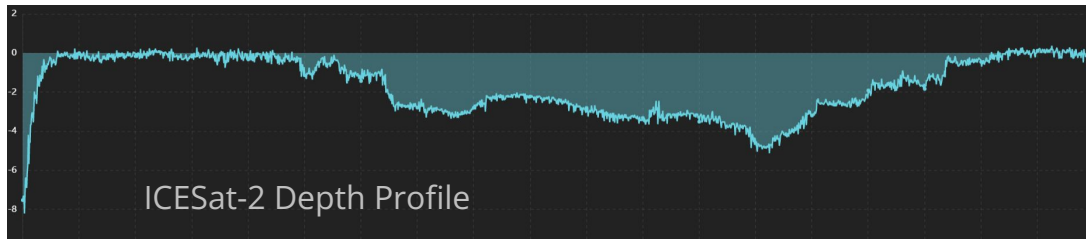
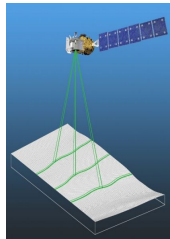
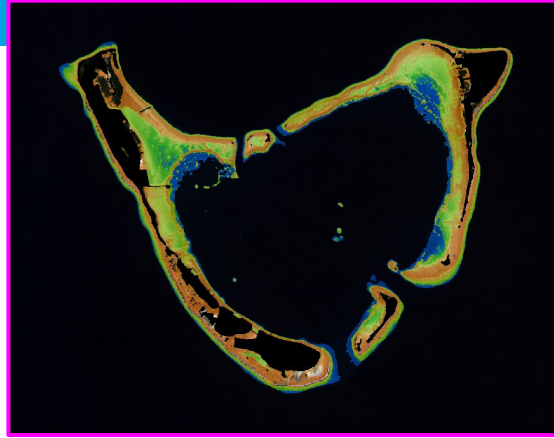
3200+ Sentinel Images Assessed  
- 509 Images Processes

~4,200 sq km of 10m SDB produced

1,136,608 ICESat-2 points.

~1 month production time

Imagery sourced from existing archives of freely available US & European government sources - no new collection of any data, no mobilization of equipment for this project





# Follow-On Collaboration Project

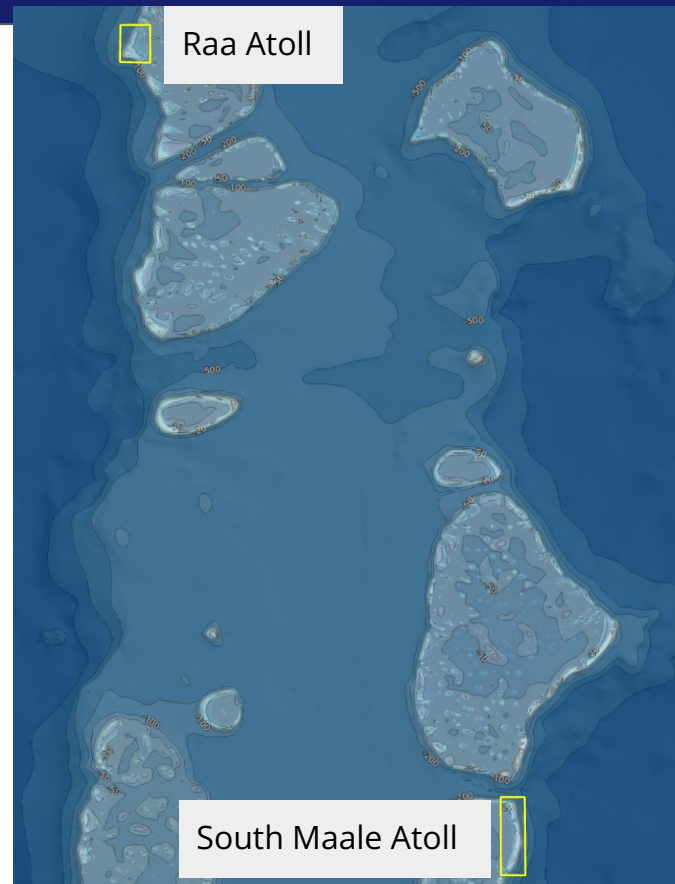
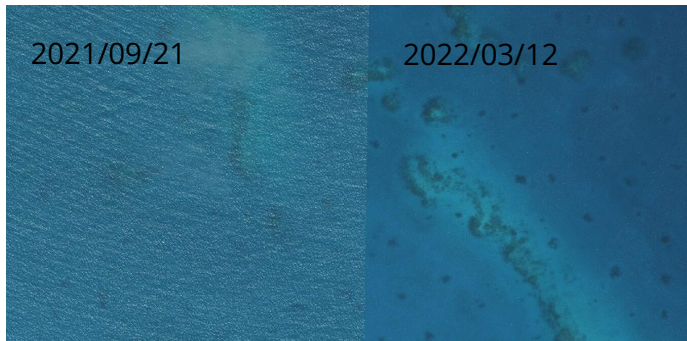
## Satellite Derived Bathymetry Multibeam Echosounder



Maldives Land and Survey Authority  
Republic of Maldives

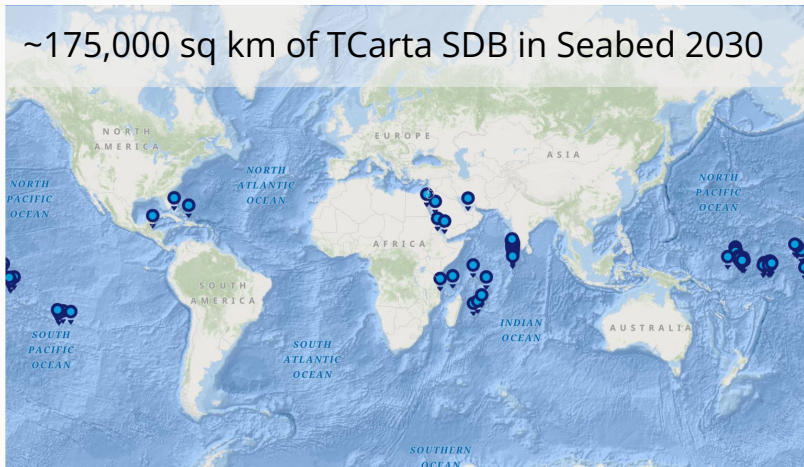
2021/09/21

2022/03/12



# TCarta SDB in Seabed 2030

~175,000 sq km of TCarta SDB in Seabed 2030



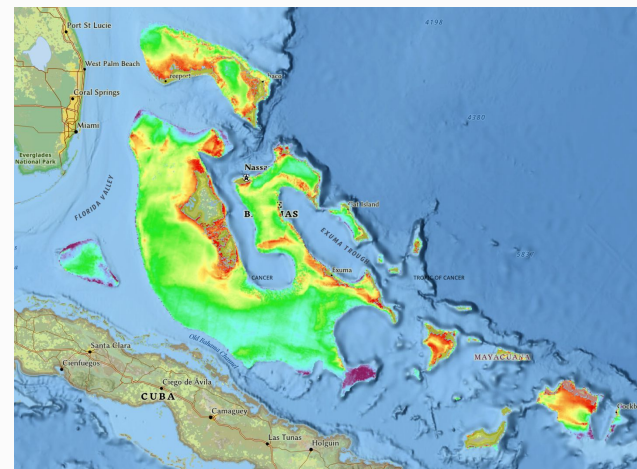
UK Hydrographic  
Office



● Maldives

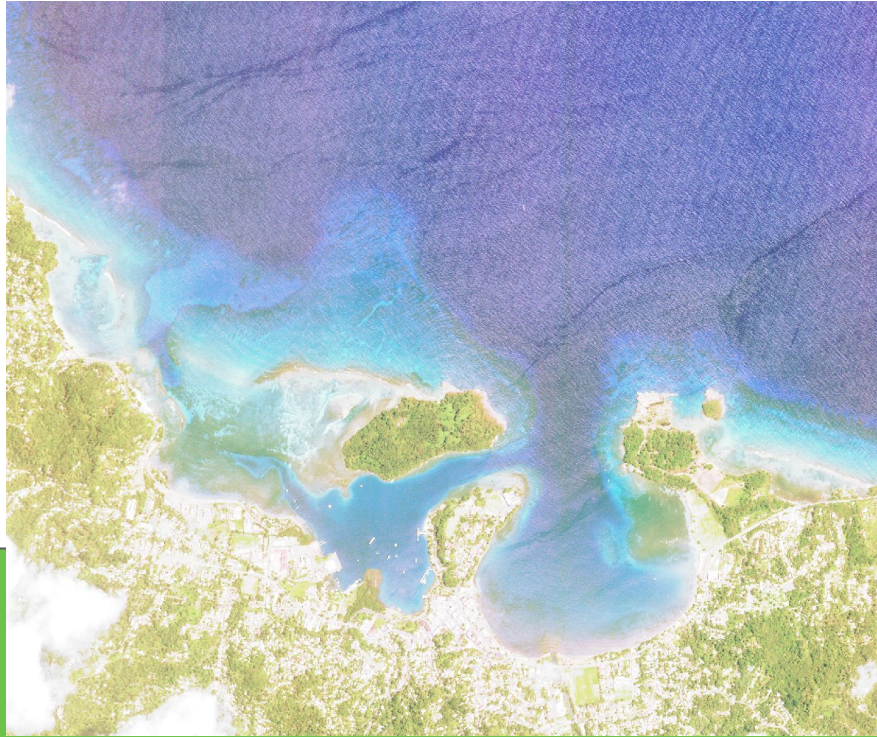


- Bahamas
- Belize
- Red Sea
- UAE
- Reunion
- Mauritius
- St. Brandon
- Seychelles





# Satellite Derived Bathymetry Capacity Building



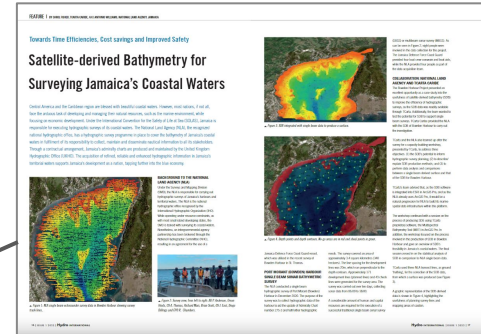
March, 2023

# National Land Agency (NLA), Jamaica SDB Integration

## *from a healthy skepticism to strategic planning*

2021

- April 2021 - TCarta provides a half-day virtual SDB intro, across NLA ranks, initiates proof of concept collaboration
- Integrated surveying of Bowden Harbour (TCarta SDB & NLA SBES)
- Co-authoring of Hydro International Article; debate over hydrographic applications of SDB
- Hydro International article receives a lot of positive attention; TCarta pursues further collaboration with NLA; Favorable leadership changes at NLA



2023

- May 2023 NLA / GEBCO Alumni Proposal to map all of Jamaica w/ combined technologies & team

NIPPON FOUNDATION / GEBCO  
TRAINING PROGRAM ALUMNI

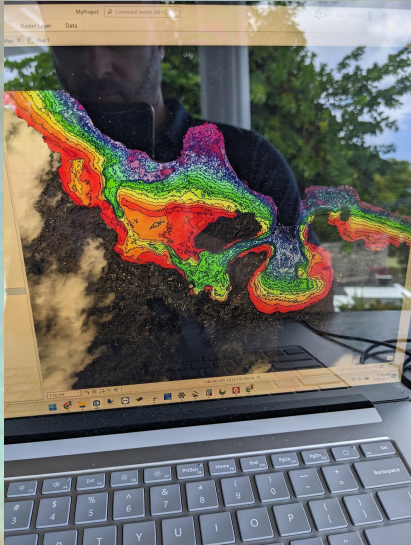


NIPPON FOUNDATION- GEBCO ALUMNI PROJECTS -  
CALL FOR PROPOSALS

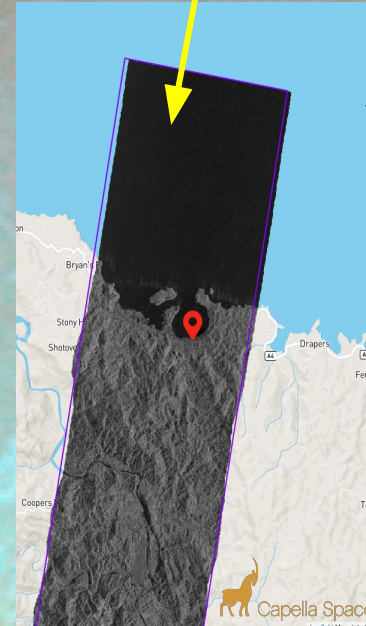


# Leads to Port Antonio MBES & SDB & UAV Integration Project

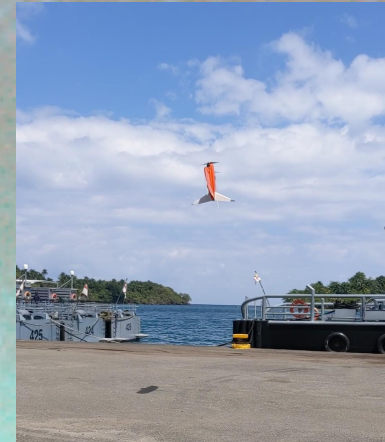
MBES | SDB | SAR | UAV



Imagery Tasked  
During Survey

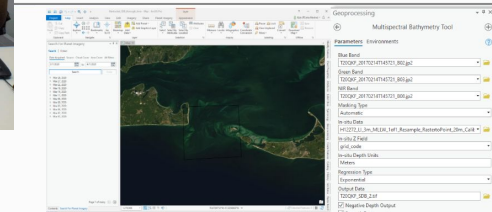
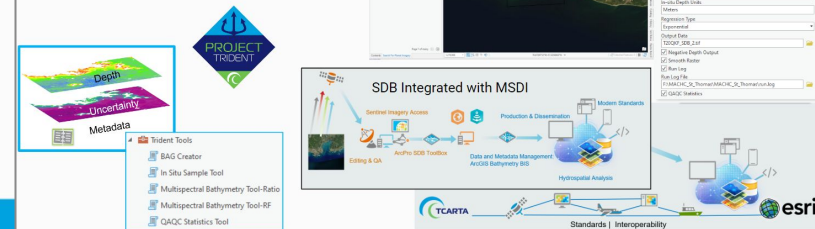


- 1 Crewed Survey Vessel
- 1 UAV
- 4 Satellites
  - WorldView
  - Planet
  - Satellogic
  - Capella (SAR)



# In-Person and Remote SDB Capacity Building

Partnering to develop the next generation of  
SDB-Ready Hydrospatial Professionals  
It's about people too!





# Marine Institute Summer Work Term Program



Co-funded by:



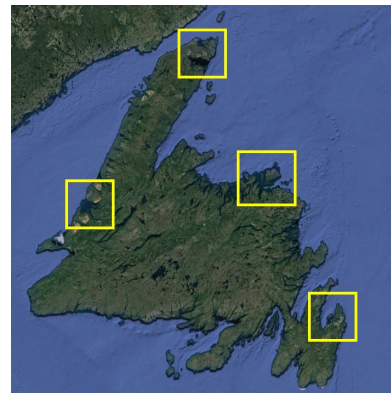
2 graduate students - ongoing

6 undergraduate - 12 week summer work term



## Real World Satellite Derived Bathymetry Work

- In-person instruction and virtual workrooms
- Student-generated SDB
- Marine Institute Native Village Research Sites AOIs
- SDB produced contributed to Seabed 2030



# An Offer to the SaWPaC Regional Mapping Community

Summer staff ready to produce SDB for Seabed 2030

Extra production capacity for collaborative mapping projects - month of August



Kyle Goodrich  
*Founder and President*  
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[www.tcarta.com](http://www.tcarta.com)

Thank you.



Let's collaborate to map the South and West Pacific Region

Seabed 2030 5th SaWPac Regional Mapping  
Community Meeting  
12 July 2023

