Allen Coral Atlas:

A New Tool for Coral Conservation

planet.

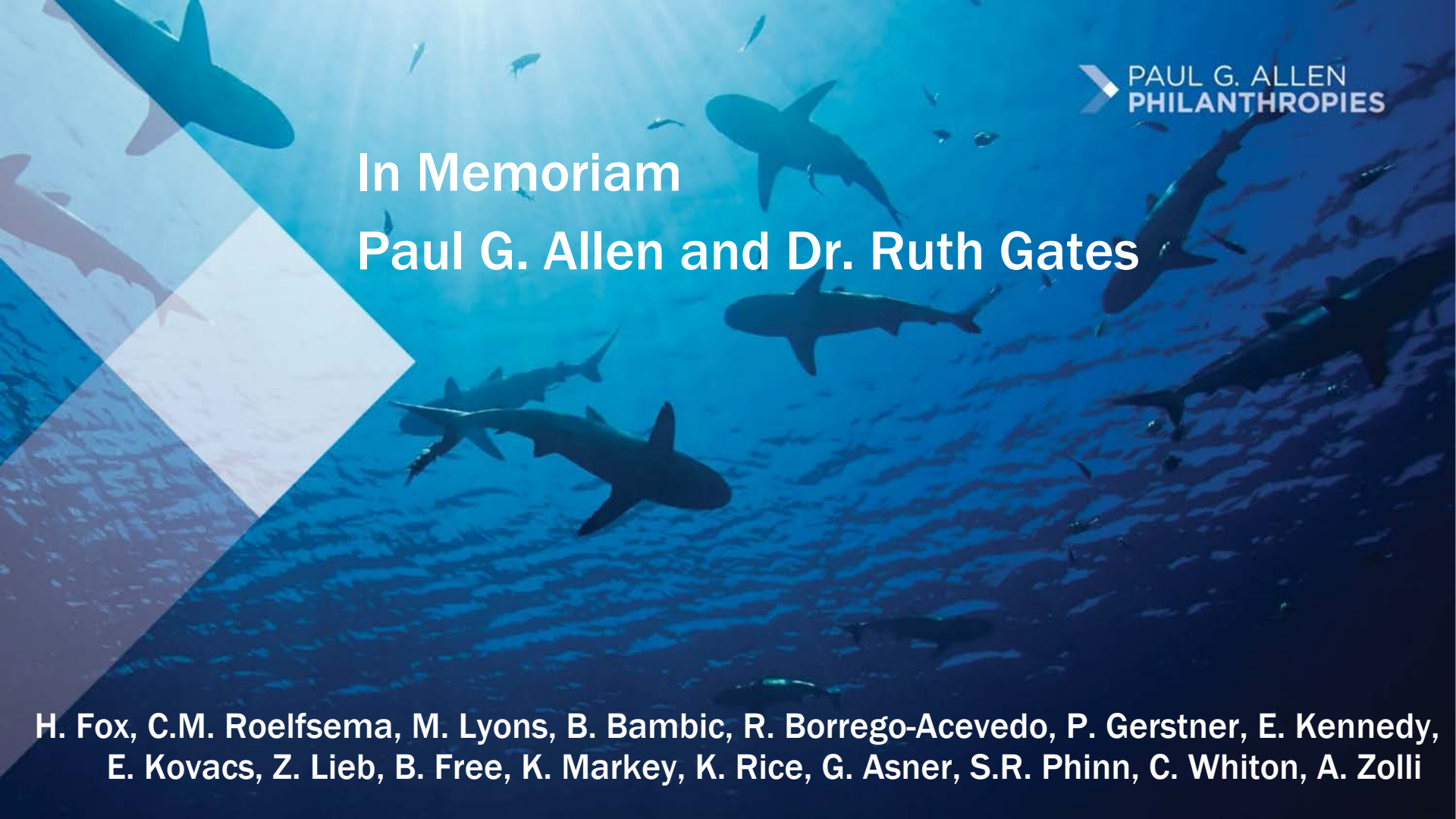
Arizona State University

The University Of Queensland
AUSTRALIA

NATIONAL GEOGRAPHIC

VULCAN

KOMODO, INDONESIA CREDIT: BETH WATSON/ CORAL REEF IMAGE BANK


PAUL G. ALLEN
PHILANTHROPIES
In Memoriam
Paul G. Allen and Dr. Ruth Gates
H. Fox, C.M. Roelfsema, M. Lyons, B. Bambic, R. Borrego-Acevedo, P. Gerstner, E. Kennedy,
E. Kovacs, Z. Lieb, B. Free, K. Markey, K. Rice, G. Asner, S.R. Phinn, C. Whiton, A. Zolli

AN INTERNATIONAL COLLABORATIVE PARTNERSHIP

Planet provides satellite data, technical support, and platform services to the partnership.

planet.

The ASU team is responsible for calculating ocean depth and benthic reflectance, as well as building a first-of-its-kind coral reef monitoring and alert system capable of detecting changes such as hot-water bleaching and destruction caused by coastal development.

ASU Arizona State University

Creating benthic and geomorphic maps of the world's coral reefs. These maps are crucial to conservationists in identifying the reef composition and will be used for planning and managing marine protected areas.

The University Of Queensland
AUSTRALIA

Field engagement and capacity development work to enhance the usage and impact of Atlas products. The Society's work will also help build understanding of the Atlas and its capability as a new standard of coral reef mapping and monitoring.

NATIONAL GEOGRAPHIC

Vulcan team leads development of the website platform, as well as strategy and impact goals, project and data management and user engagement.

VULCAN

ALLEN CORAL ATLAS

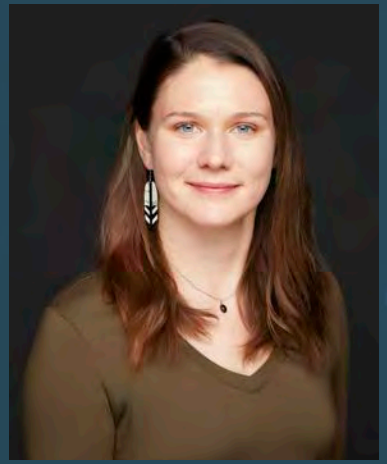
Field Engagement Team - National Geographic Society

Presented by:

Brianna Bambic

Program Manager
Allen Coral Atlas
Field Engagement Team

bbambic@ngs.org



Zoë Lieb

Project Coordinator
Allen Coral Atlas
Field Engagement Team

zlieb@ngs.org

NATIONAL GEOGRAPHIC

Mission

Developing the first ever global, high resolution map and dynamically updated monitoring system of the world’s shallow coral reefs.

Outline

What is the Allen Coral Atlas?

Making the Atlas

Advantages and Limitations

Demo

Atlas impact

Questions

KOMODO, INDONESIA CREDIT: BETH WATSON/ CORAL REEF IMAGE BANK

Coral reefs in crisis

Half of the world's coral reefs have died over the past 50 years (from bleaching, destructive fishing, algal overgrowth, etc.)

70 - 90% of the remainder could bleach and die from ocean warming by 2050.

Photos: American Samoa bleaching 2014/2015. XL Catlin Seaview Survey.

Status of coral reef mapping and monitoring

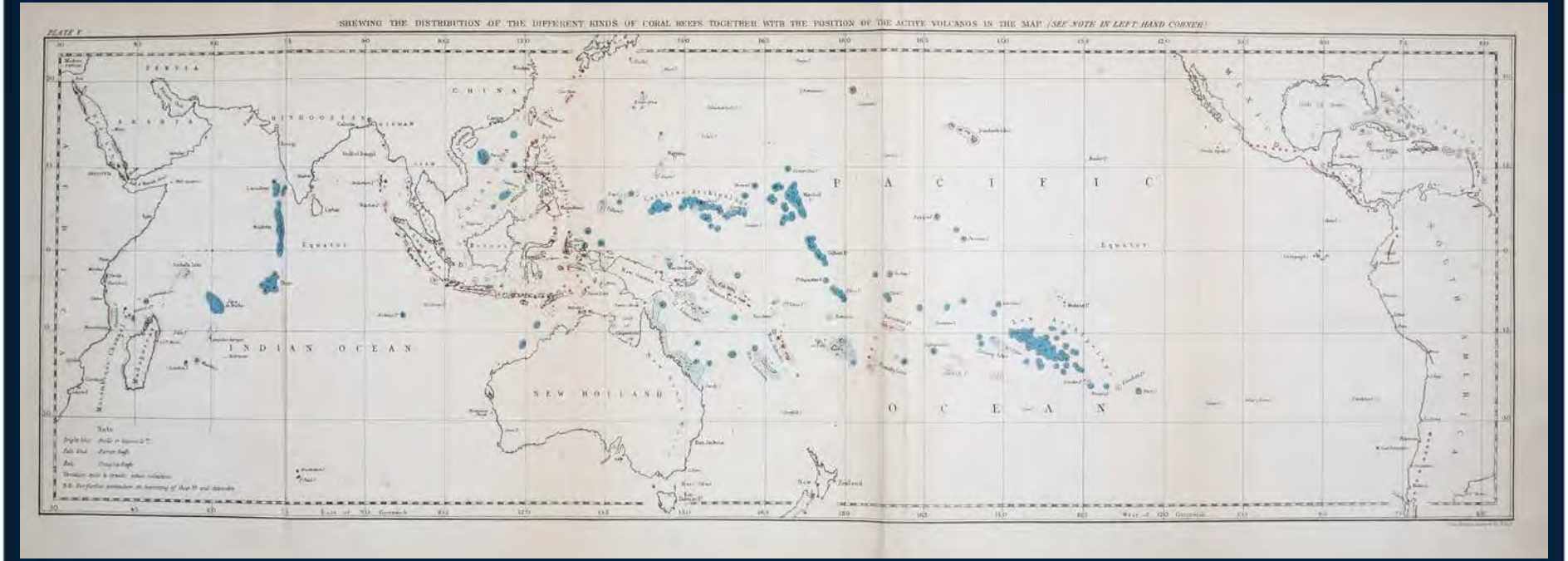


Image credit: Darwin, C W 1842. The structure and distribution of coral reefs.

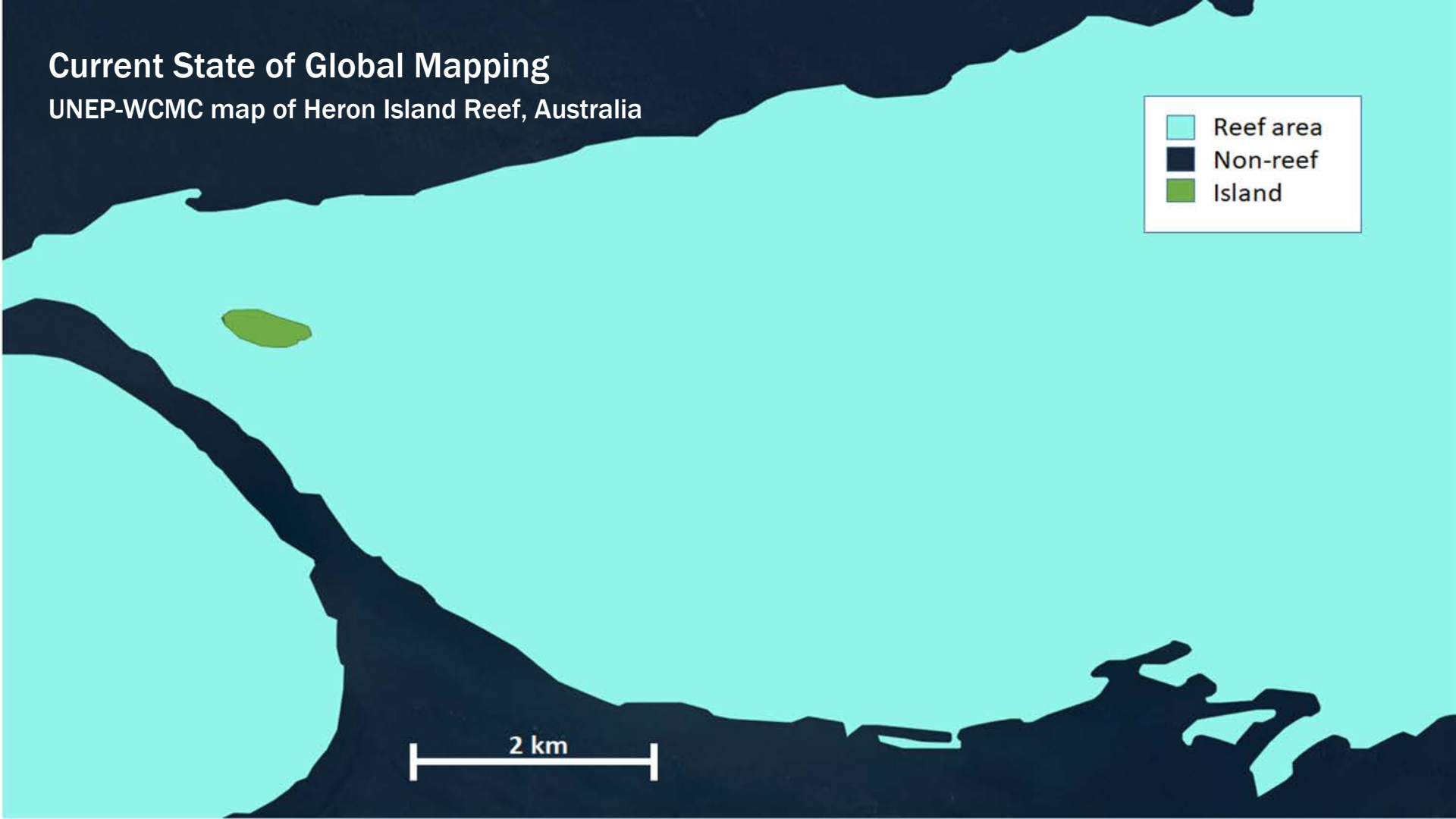
Planet Dove Imagery

Heron Island, Australia

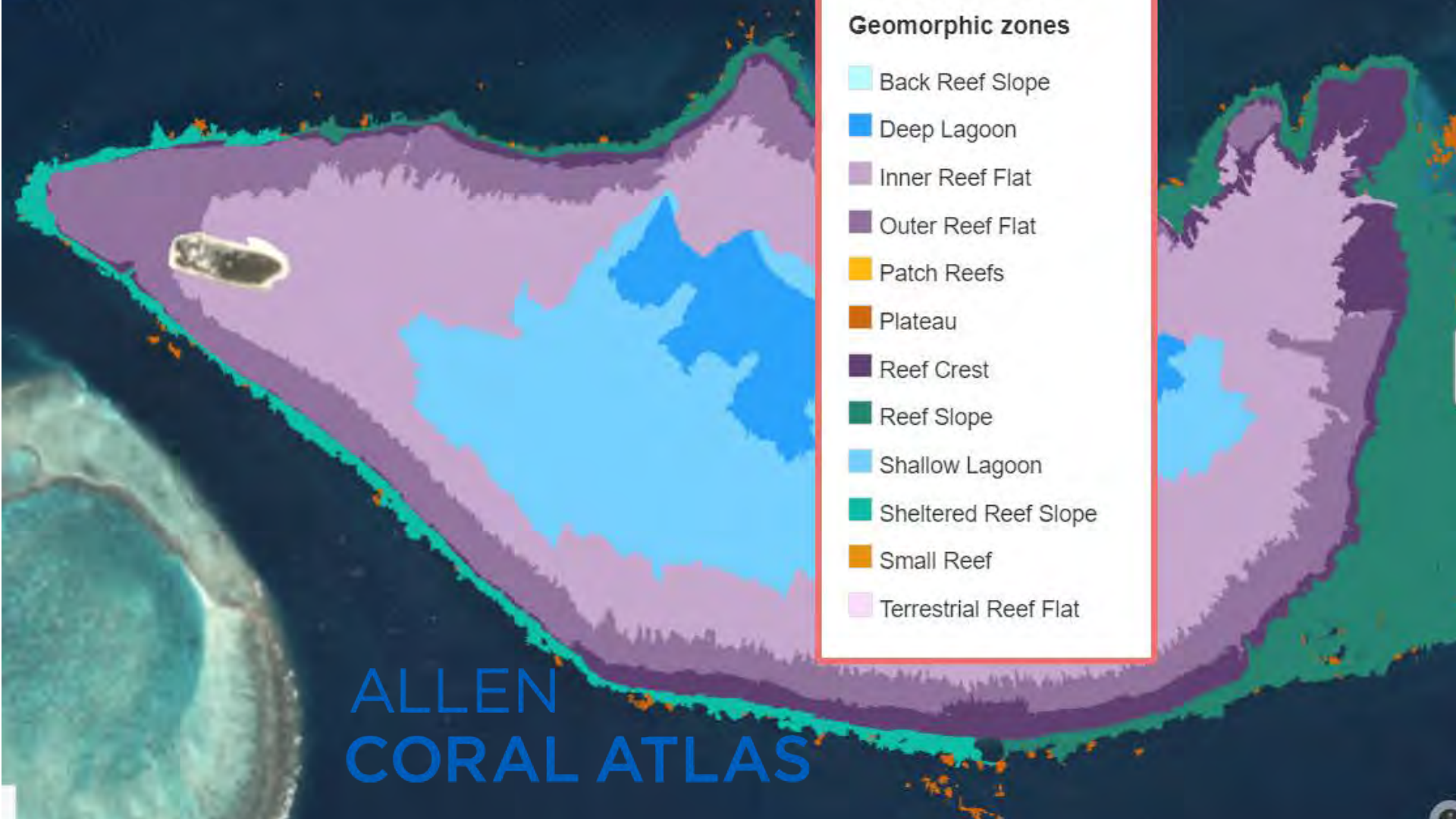
3.7 meter resolution

Current State of Global Mapping

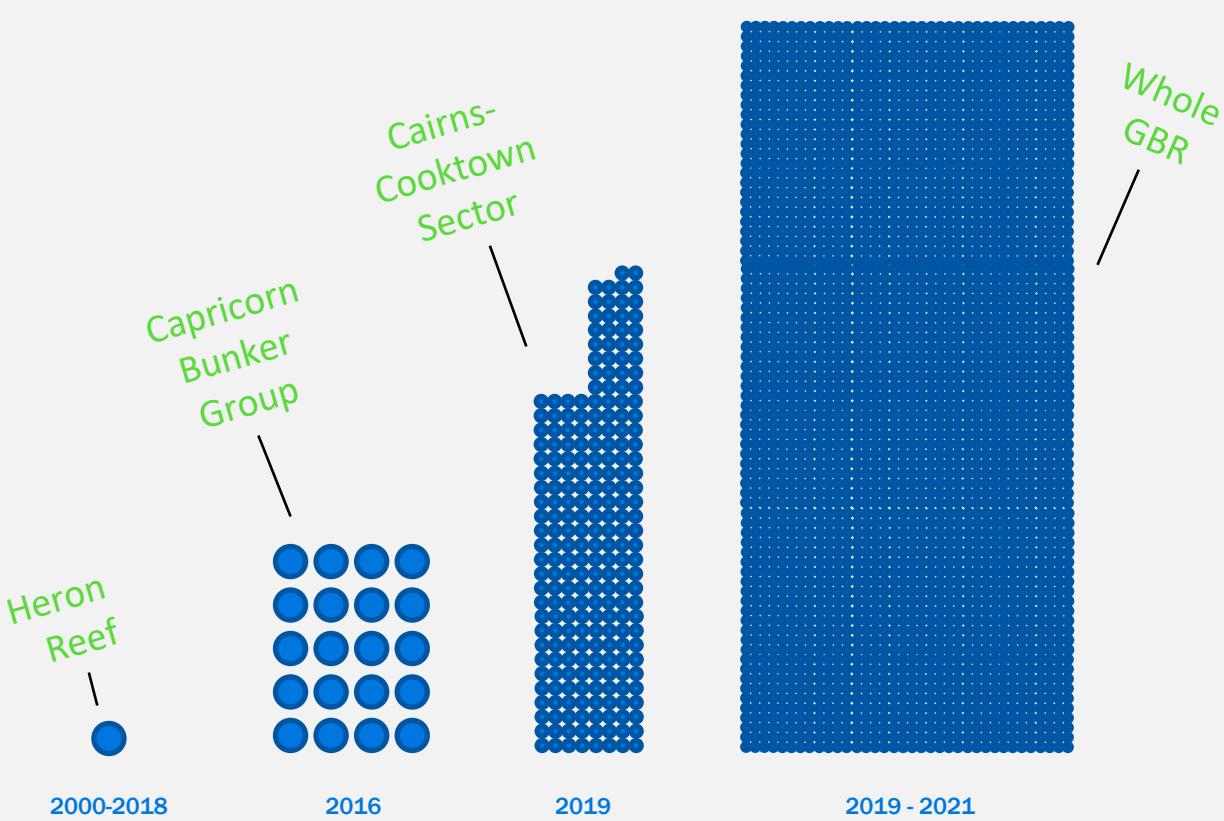
UNEP-WCMC map of Heron Island Reef, Australia

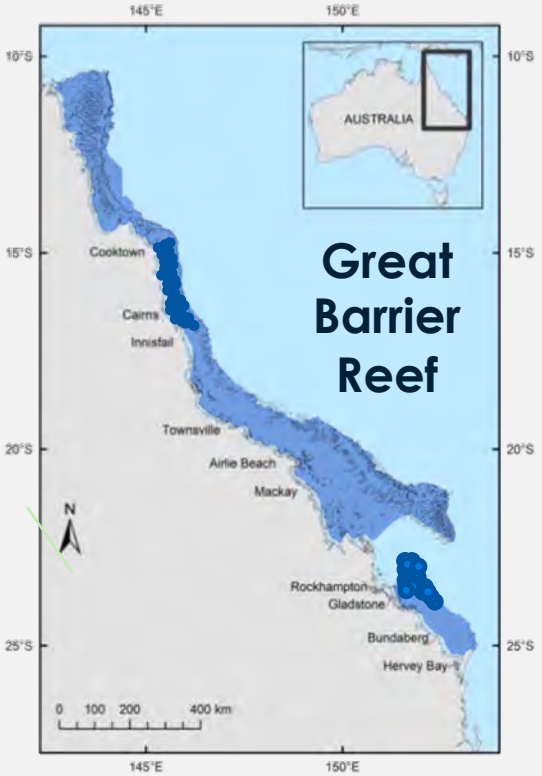



Benthic classes
Coral/Algae
Microalgal Mats
Rock
Rubble
Sand
Seagrass
ALLEN
CORAL ATLAS

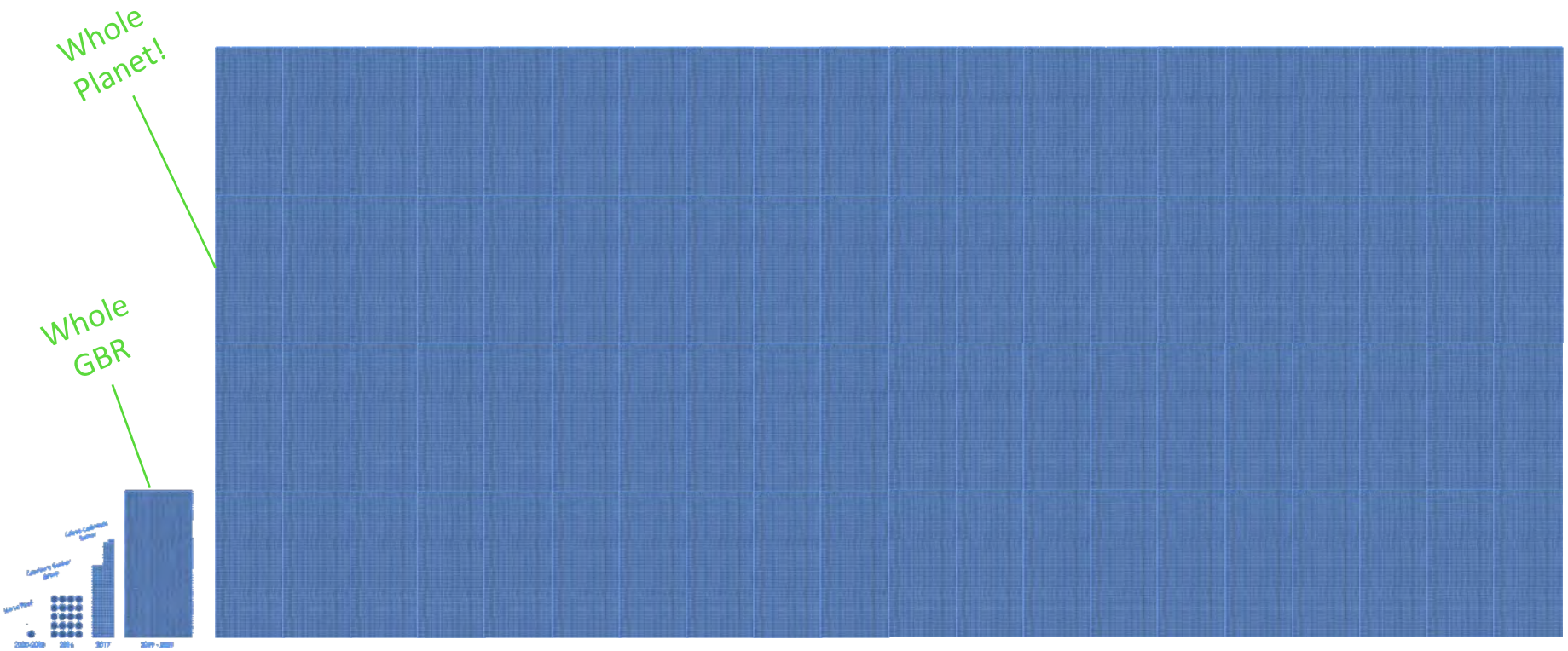

Geomorphic zones
Back Reef Slope
Deep Lagoon
Inner Reef Flat
Outer Reef Flat
Patch Reefs
Plateau
Reef Crest
Reef Slope
Shallow Lagoon
Sheltered Reef Slope
Small Reef
Terrestrial Reef Flat
ALLEN
CORAL ATLAS

Making a Global Habitat Map





Making a Global Habitat Map



Allen Coral Atlas (2018 – 2021)

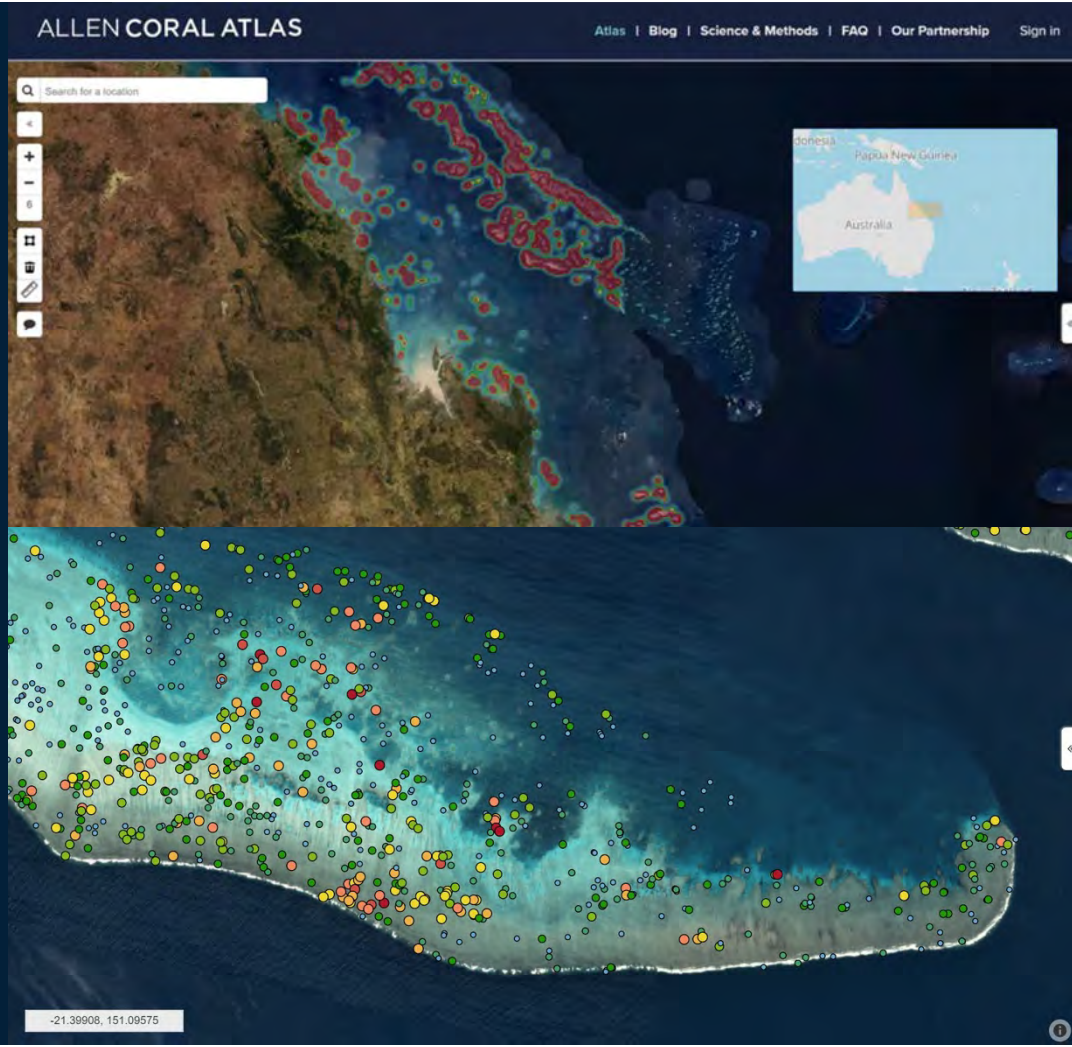
Monitoring

Change detection…

- “brightening” (=bleaching?)
- turbidity

- with an on-the-ground network (building on Reef Check, MERMAID, etc.)

Protoype only (Vulcan, Inc. & Arizona State University, Center for Global Discovery and Conservation Science)



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Planet

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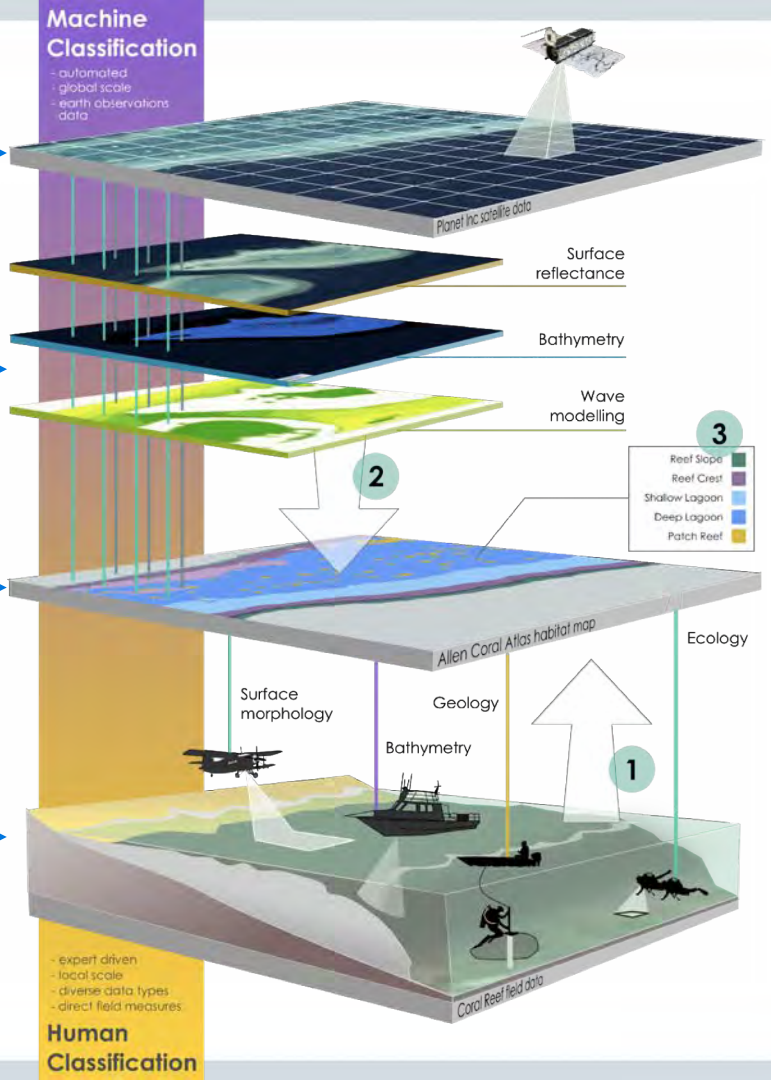
University of Queensland

Field teams & existing data



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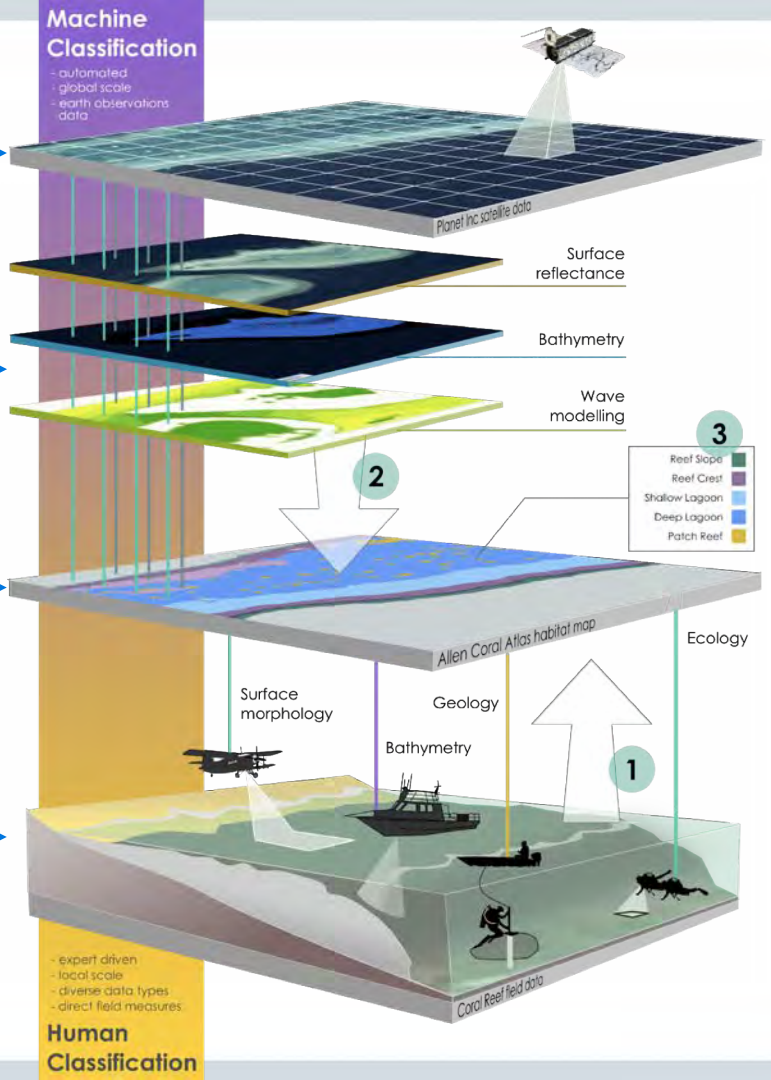
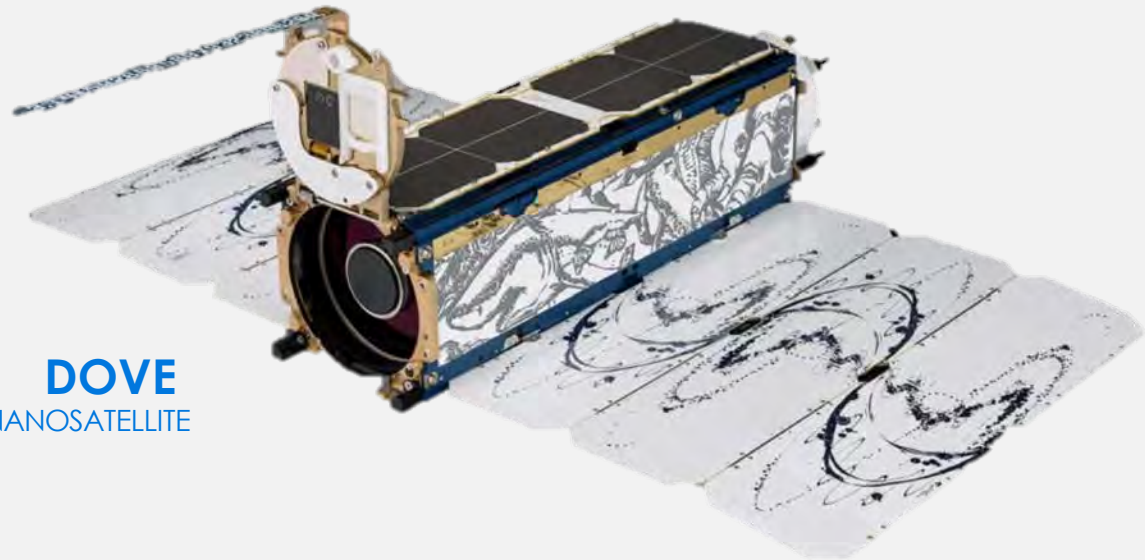


STEP 1: High-quality imagery

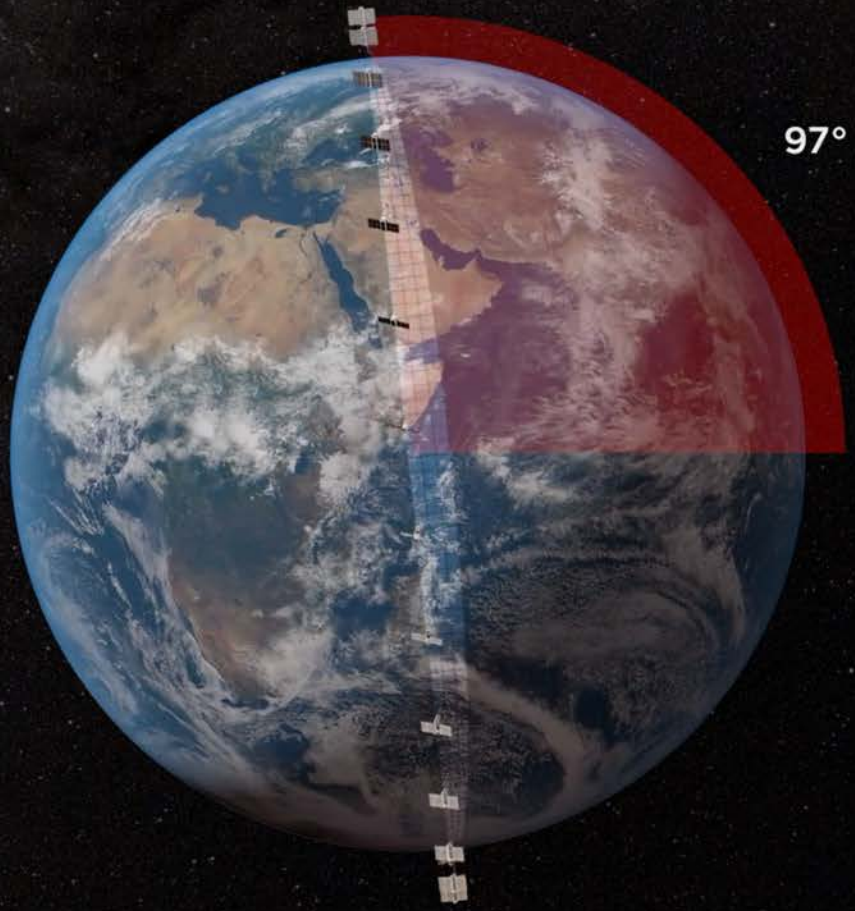
planet.



DOVE
NANOSATELLITE

Planet Dove Satellite

- Always-on, broad-area monitoring
- 3 meter resolution
- RGB and NIR bands



97° Orbital Inclination


Planet Dove Satellite
• Always-on, broad-area monitoring
• 3 meter resolution
• RGB and NIR bands

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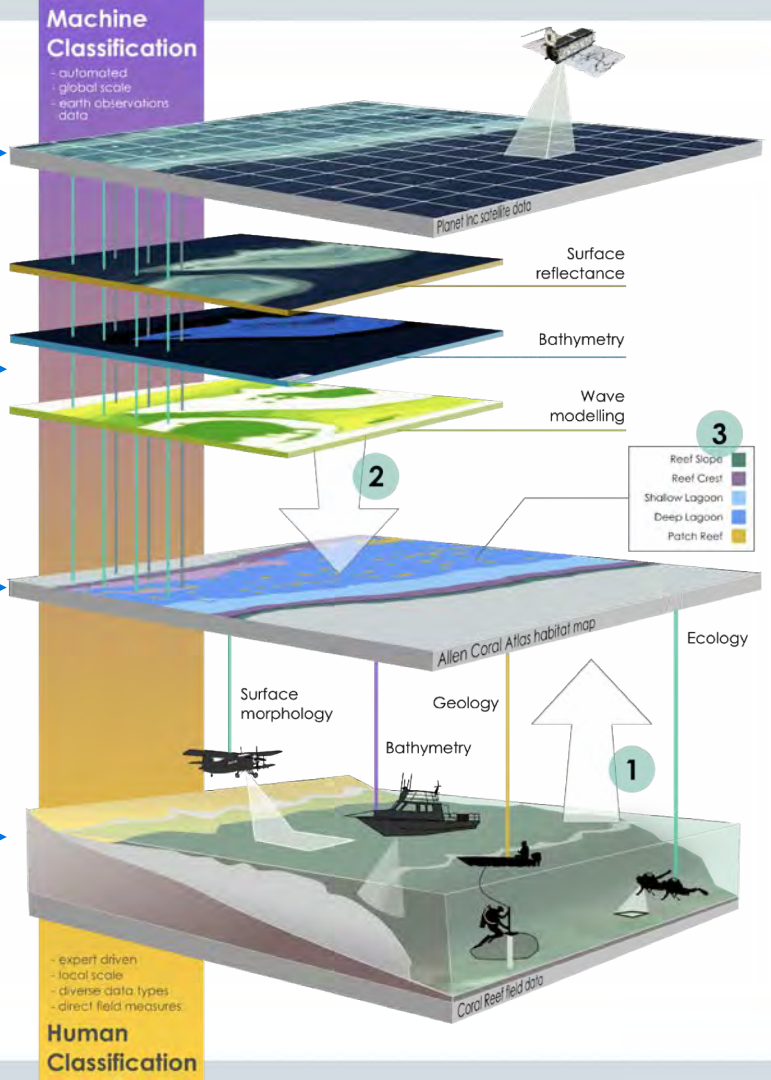
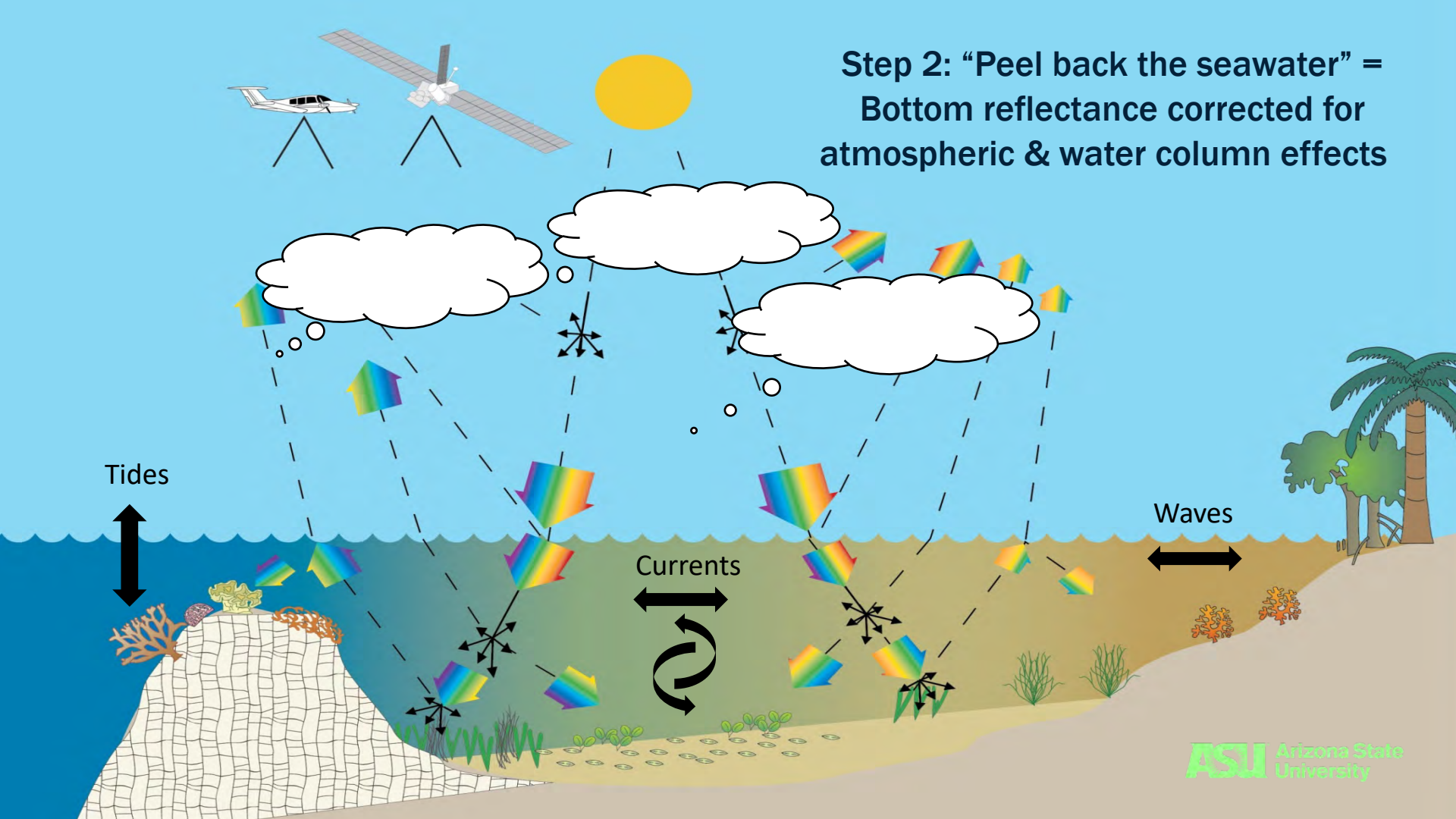
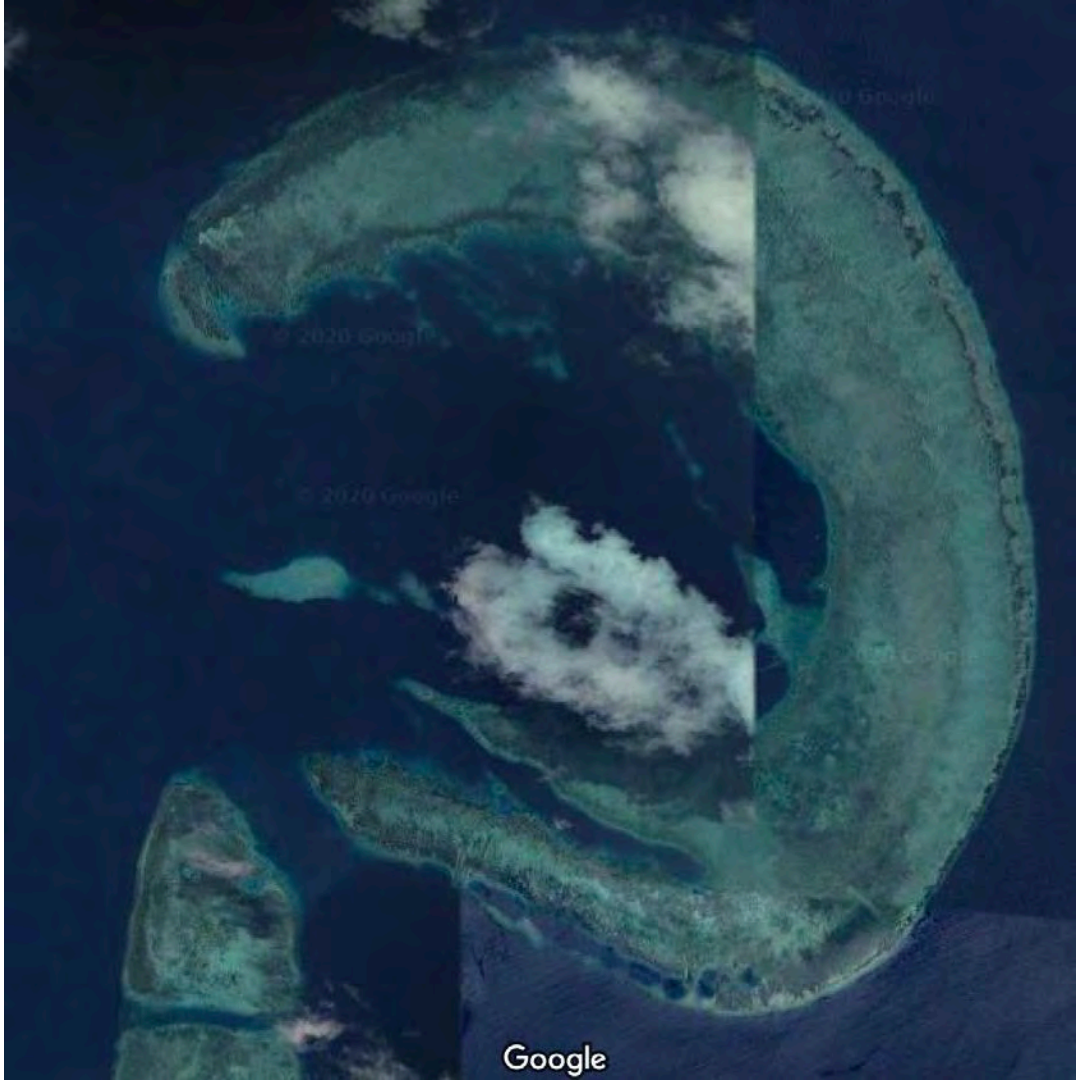



Step 2: “Peel back the seawater” = Bottom reflectance corrected for atmospheric & water column effects
Tides
Currents
Waves
ASU Arizona State University


© 2020 Google
© 2020 Google
Google


1km
-3.45919, 122.96875

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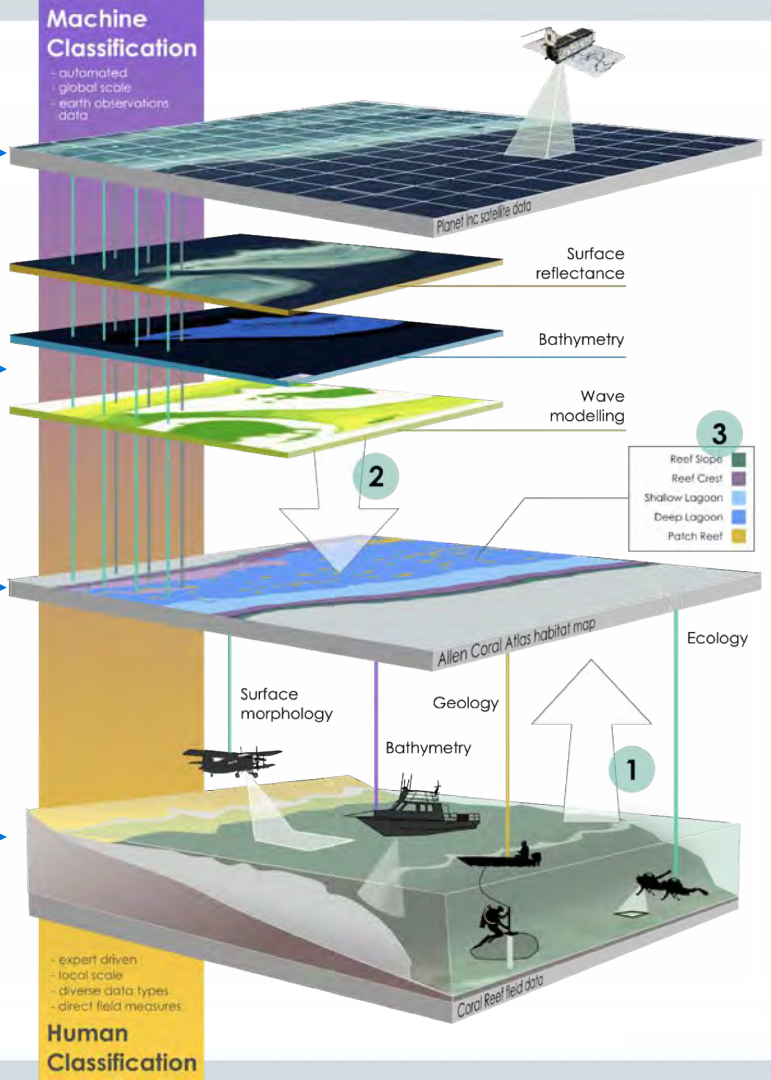
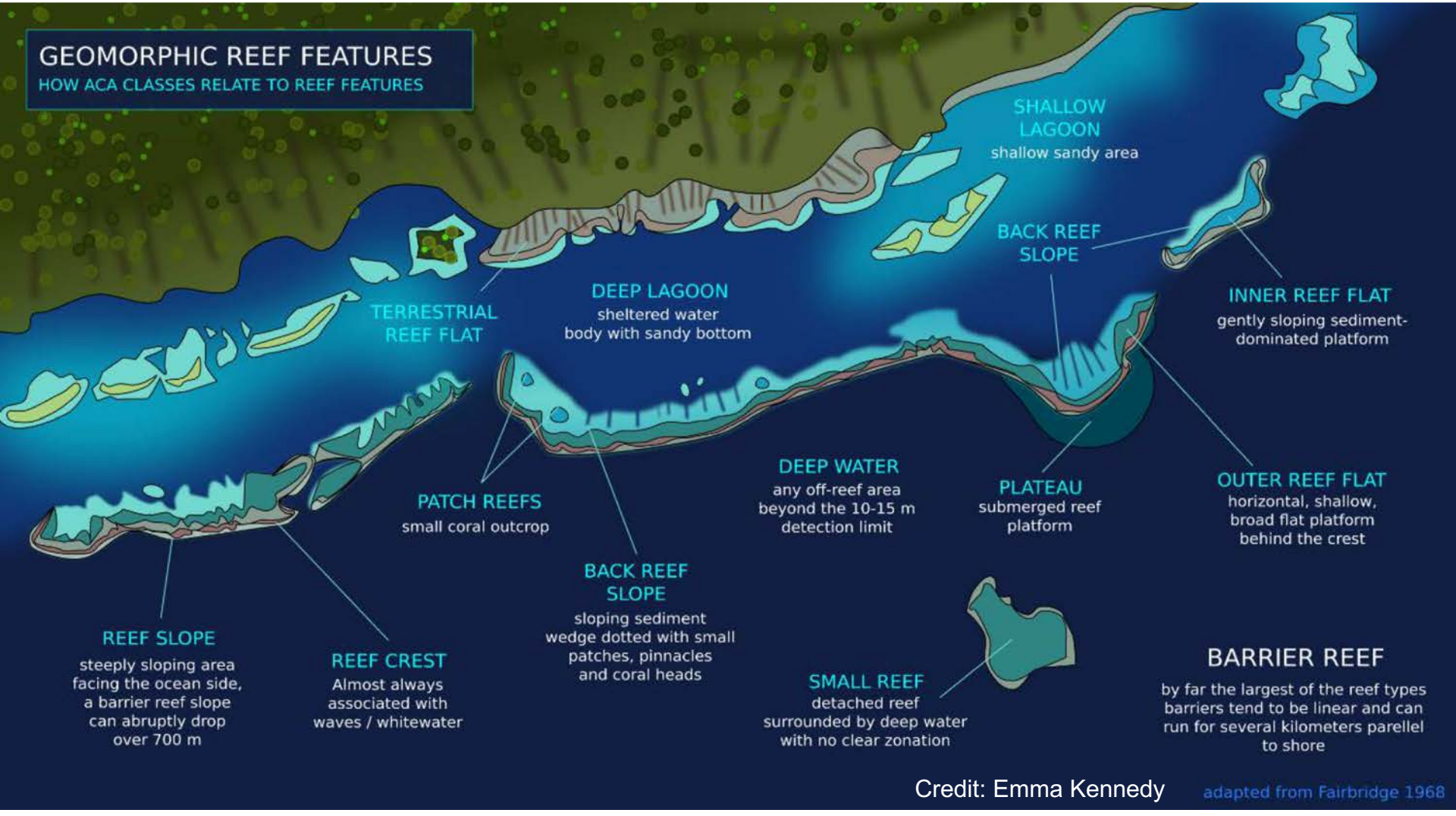
Field teams & existing data



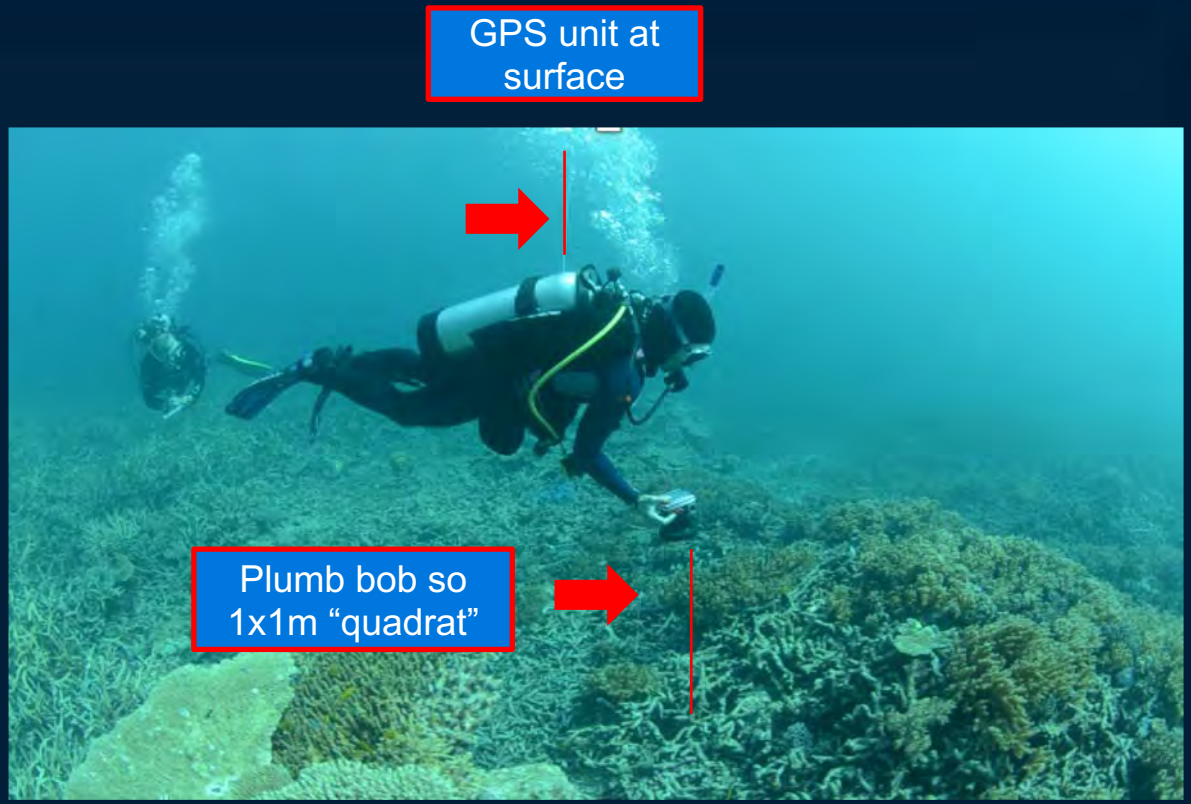

GEOMORPHIC REEF FEATURES
HOW ACA CLASSES RELATE TO REEF FEATURES
SHALLOW LAGOON
shallow sandy area
BACK REEF SLOPE
INNER REEF FLAT
gently sloping sediment-dominated platform
TERRESTRIAL REEF FLAT
DEEP LAGOON
sheltered water body with sandy bottom
PATCH REEFS
small coral outcrop
DEEP WATER
any off-reef area beyond the 10-15 m detection limit
PLATEAU
submerged reef platform
OUTER REEF FLAT
horizontal, shallow, broad flat platform behind the crest
BACK REEF SLOPE
sloping sediment wedge dotted with small patches, pinnacles and coral heads
REEF SLOPE
steeply sloping area facing the ocean side, a barrier reef slope can abruptly drop over 700 m
REEF CREST
Almost always associated with waves / whitewater
SMALL REEF
detached reef surrounded by deep water with no clear zonation
BARRIER REEF
by far the largest of the reef types barriers tend to be linear and can run for several kilometers parellel to shore
Credit: Emma Kennedy
adapted from Fairbridge 1968

STEP 4

Field data inputs for benthic classes:

Calibration – train algorithm to classify

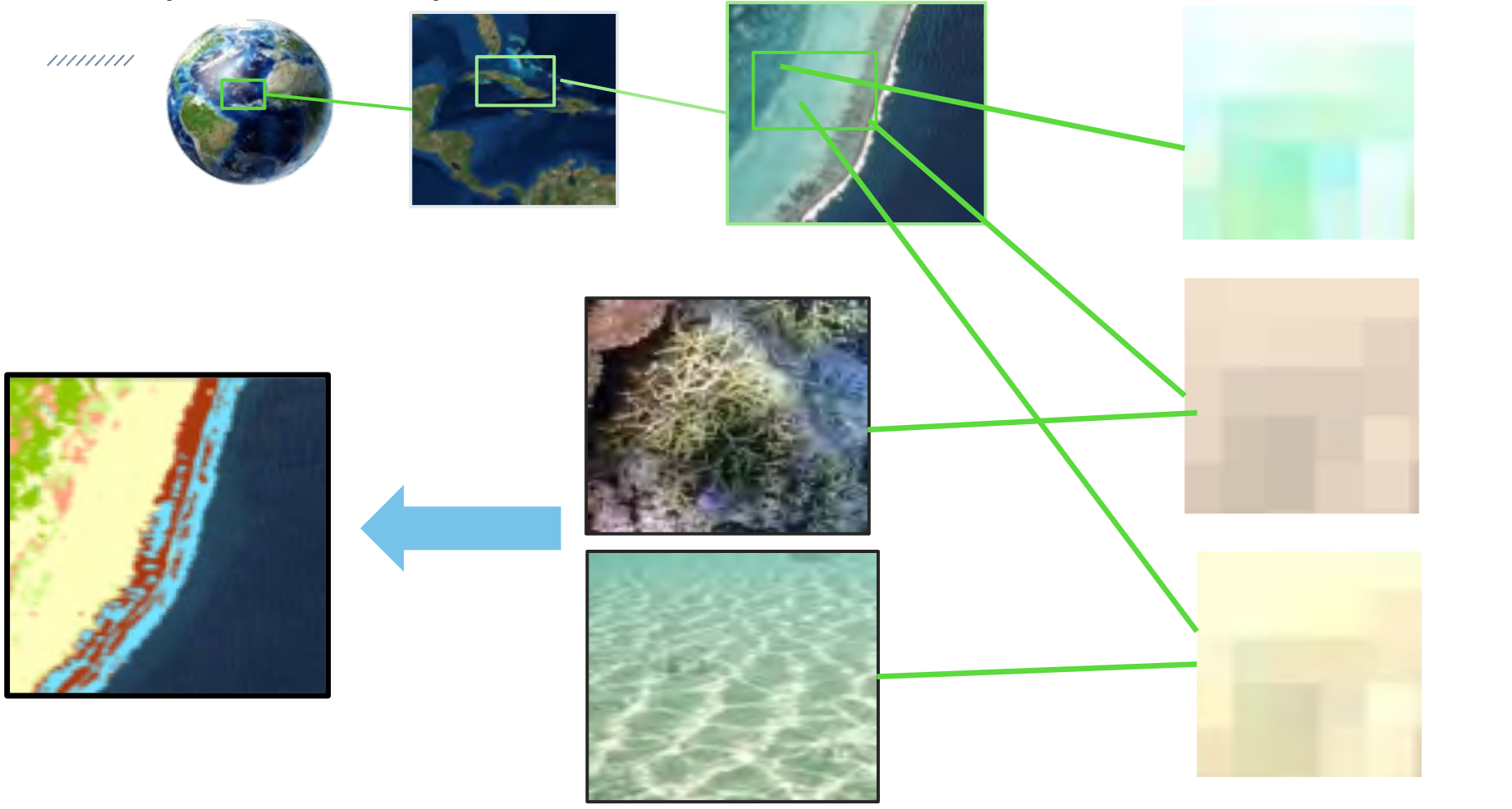
Validation – assess maps for accuracy



Engage With Us

- Connection to existing and new data: submissions@allencoralatlas.org

From pixels to map classes



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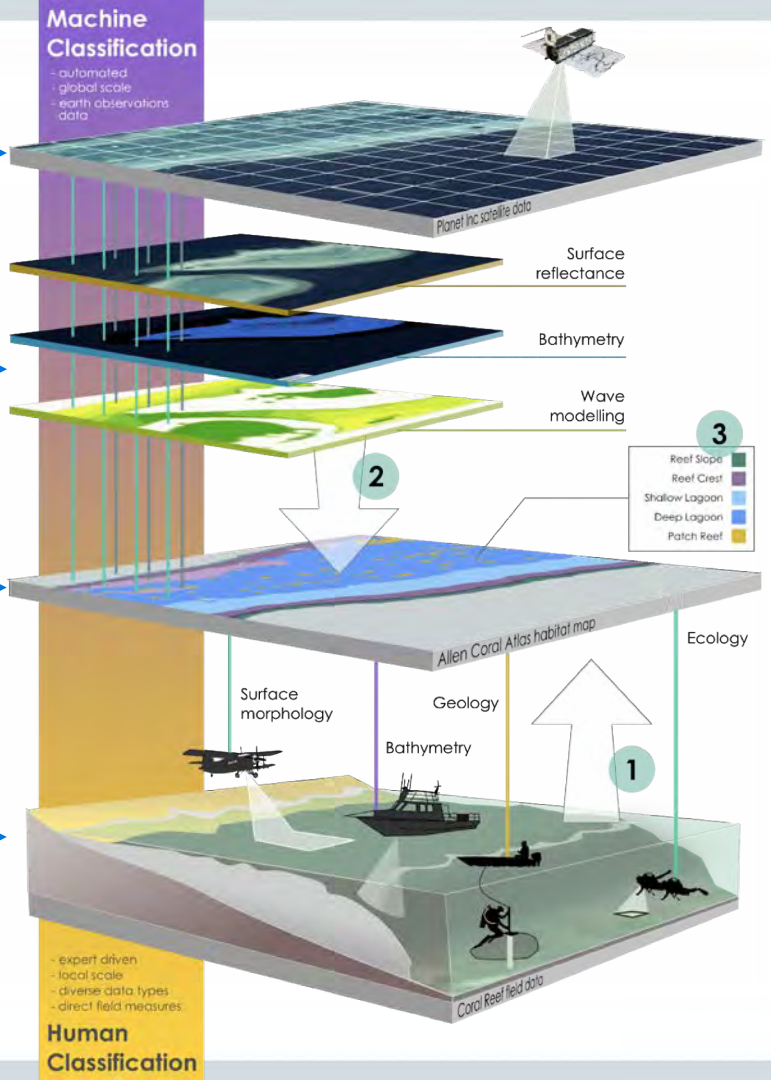
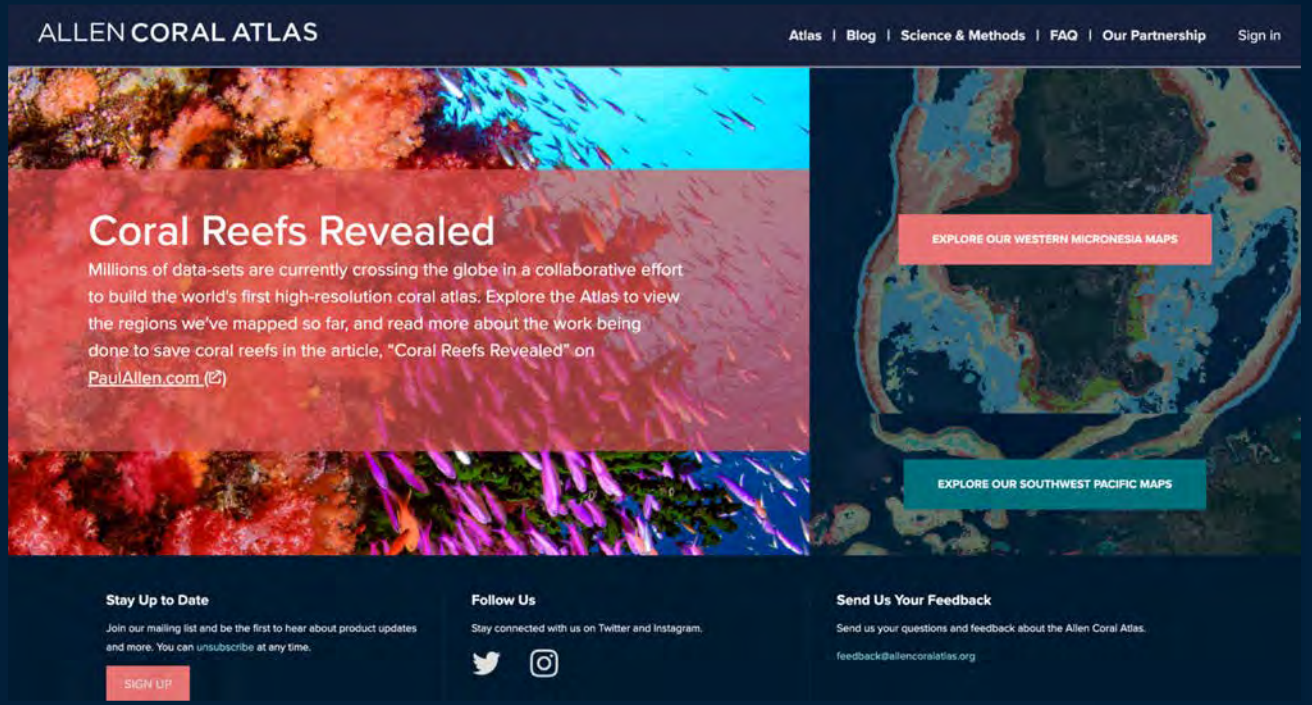
Field teams & existing data



Share maps and related products on website: allencoralatlas.org



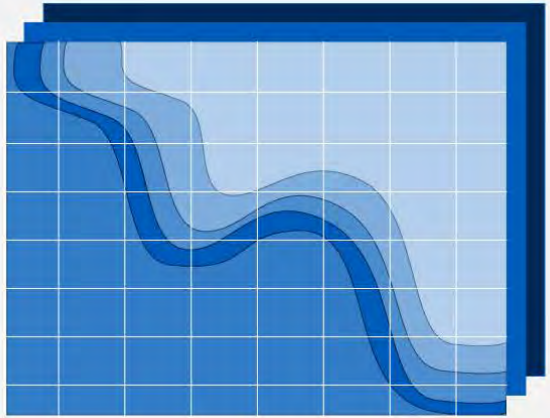
VULCAN

Allen Coral Atlas.org

SATELLITE IMAGERY

DEPTH DATA

FIELD VERIFICATION



CONSERVATION

RESTORATION

PROTECTION

The Allen Coral Atlas provides the first regularly updated 3.7-meter resolution satellite images of the world's coral reefs. With the Atlas, coral conservationists, reef managers and scientists have access to information that has never before been available at this scale.

Field Engagement

- Expand the reach and impact of the Atlas products
- Develop capacity within the conservation sector to utilize the tools and resources
- Facilitate the collection of new and existing data

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Advantages of the Atlas

GLOBAL SCALE and consistency

HIGH RESOLUTION satellite imagery

FREE ACCESS to expand usability

GLOBAL SCALE and consistency

Filling the data gap

“These maps are very important to our country, as we have a data gap and need more information for our marine spatial plan”

– Zau Lunn, Myanmar


HIGH RESOLUTION satellite imagery
Binnacle Rock
Coco Island Airport
Rat Island
Google Earth
Allen Coral Atlas

FREE ACCESS to expand usability

Photo credit: John Kaitu'u 2020

Photo credit: Charlie Whiton, Vulcan Inc. 2019

Limitations of the Atlas

Bathymetric constraint

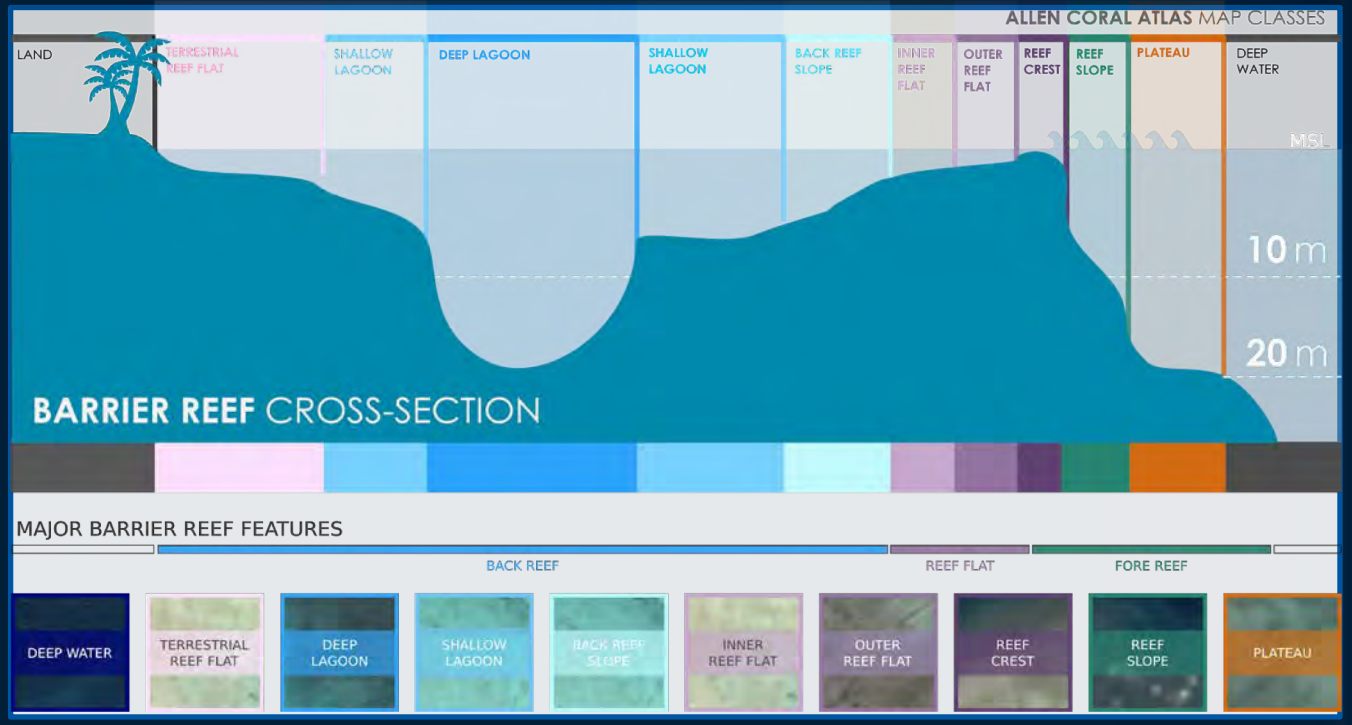
Biological constraint

Temporal Constraints

Spatial Constraint

Bathymetric Constraint

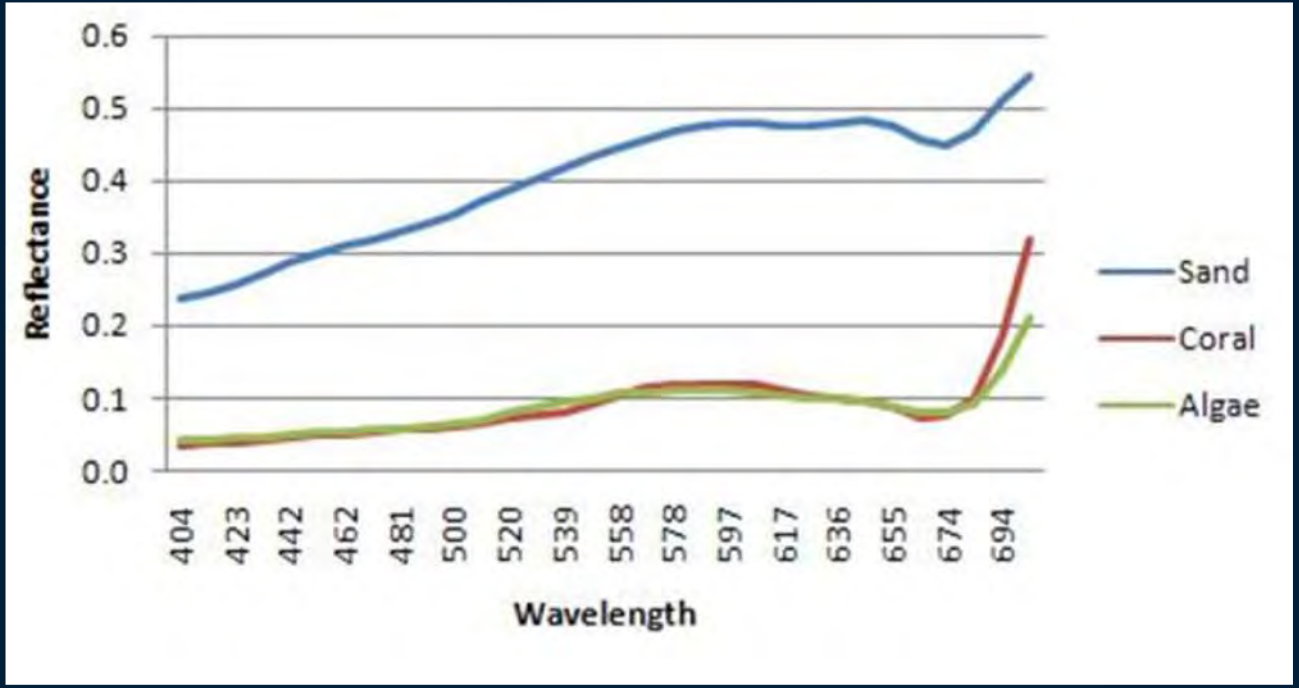
10 m benthic,
15 m geomorphic



Emma Kennedy, 2020

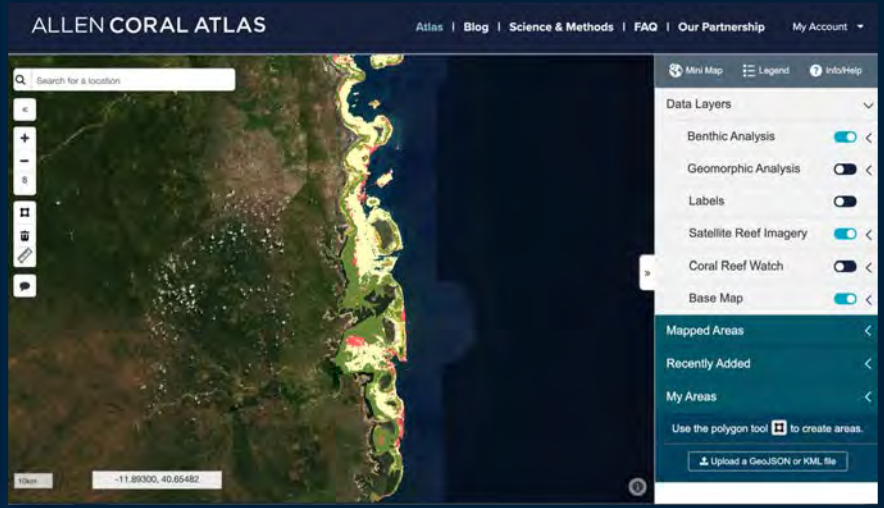
Biological Constraint:

cannot distinguish coral from algae

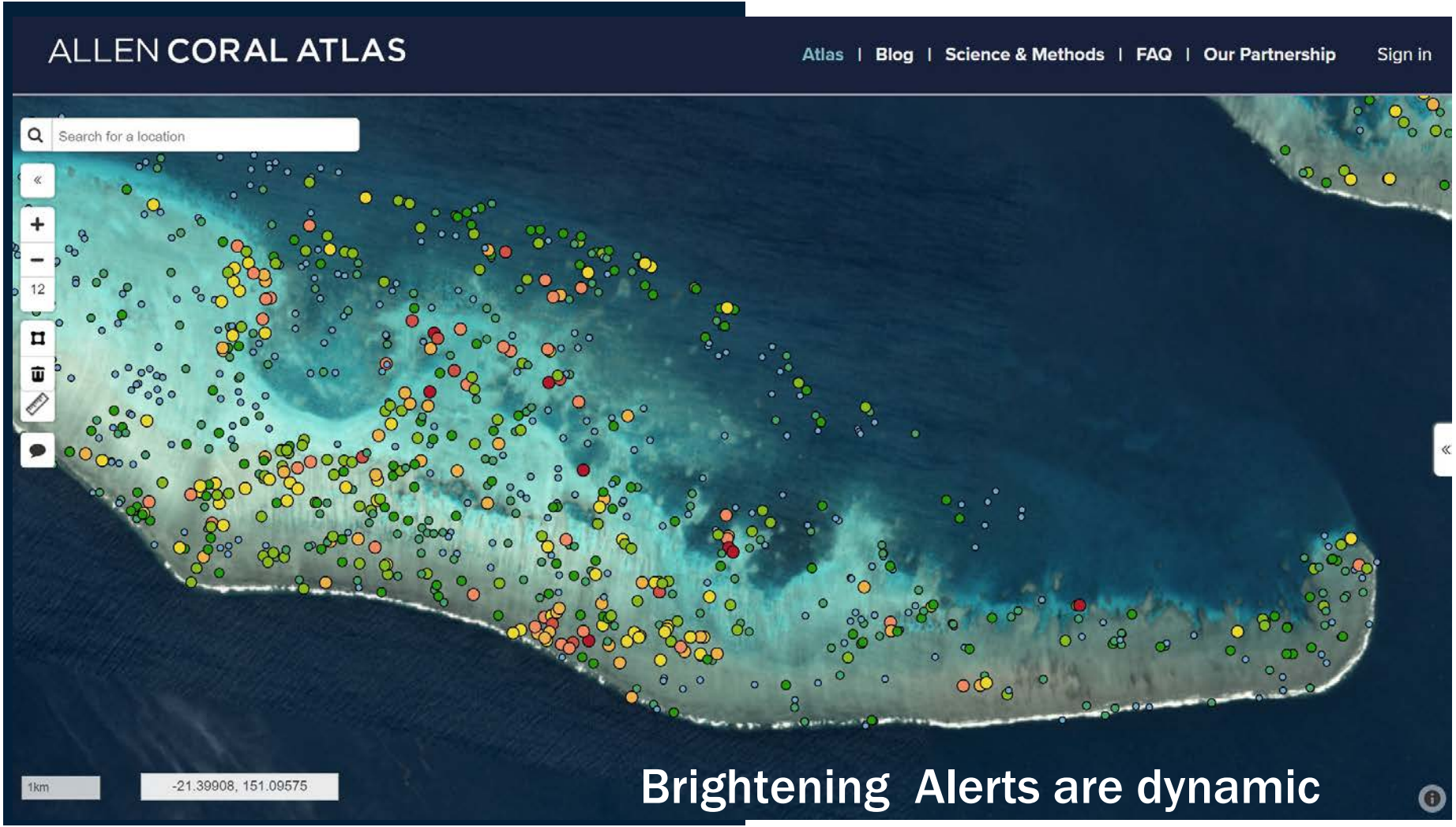


Maria C. Torres-Madronero, Miguel Velez-Reyes, James A. Goodman (2009). Proceedings Volume 7473, Remote Sensing of the Ocean, Sea Ice, and Large Water Regions; https://doi.org/10.1117/12.835896

Temporal Constraint



Habitat map is static (2018-2021)


ALLEN CORAL ATLAS
Atlas | Blog | Science & Methods | FAQ | Our Partnership
Sign in
Search for a location
12
1km
-21.39908, 151.09575
Brightening Alerts are dynamic

Spatial Constraints

Emma Kennedy, 2020

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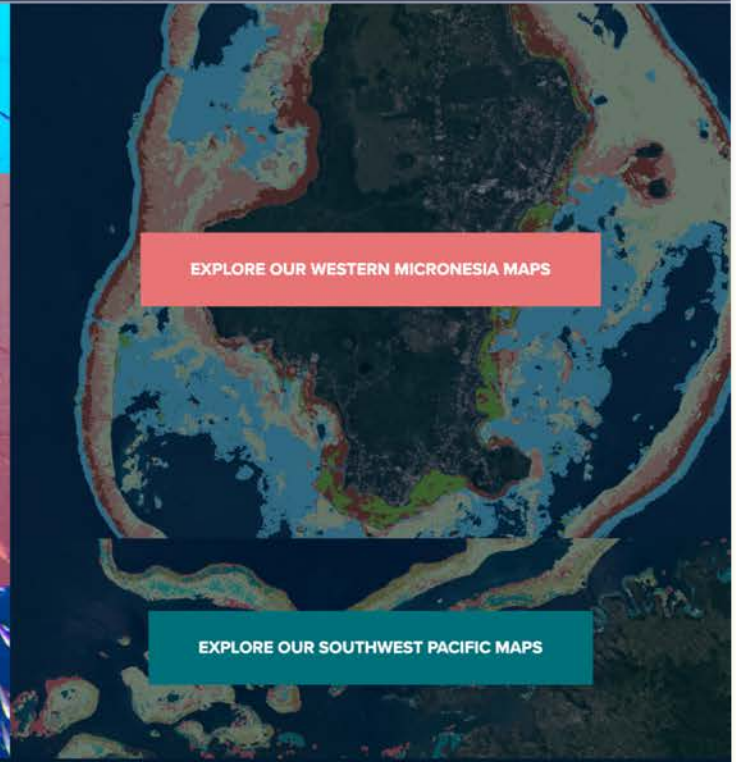
Coral Reefs Revealed

Millions of data-sets are currently crossing the globe in a collaborative effort to build the world's first high-resolution coral atlas. Explore the Atlas to view the regions we've mapped so far, and read more about the work being done to save coral reefs in the article, "Coral Reefs Revealed" on PaulAllen.com



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Join our mailing list and be the first to hear about product updates and more. You can unsubscribe at any time.

SIGN UP

Follow Us

Stay connected with us on Twitter and Instagram.

Send Us Your Feedback

Send us your questions and feedback about the Allen Coral Atlas.

feedback@allencoralatlas.org

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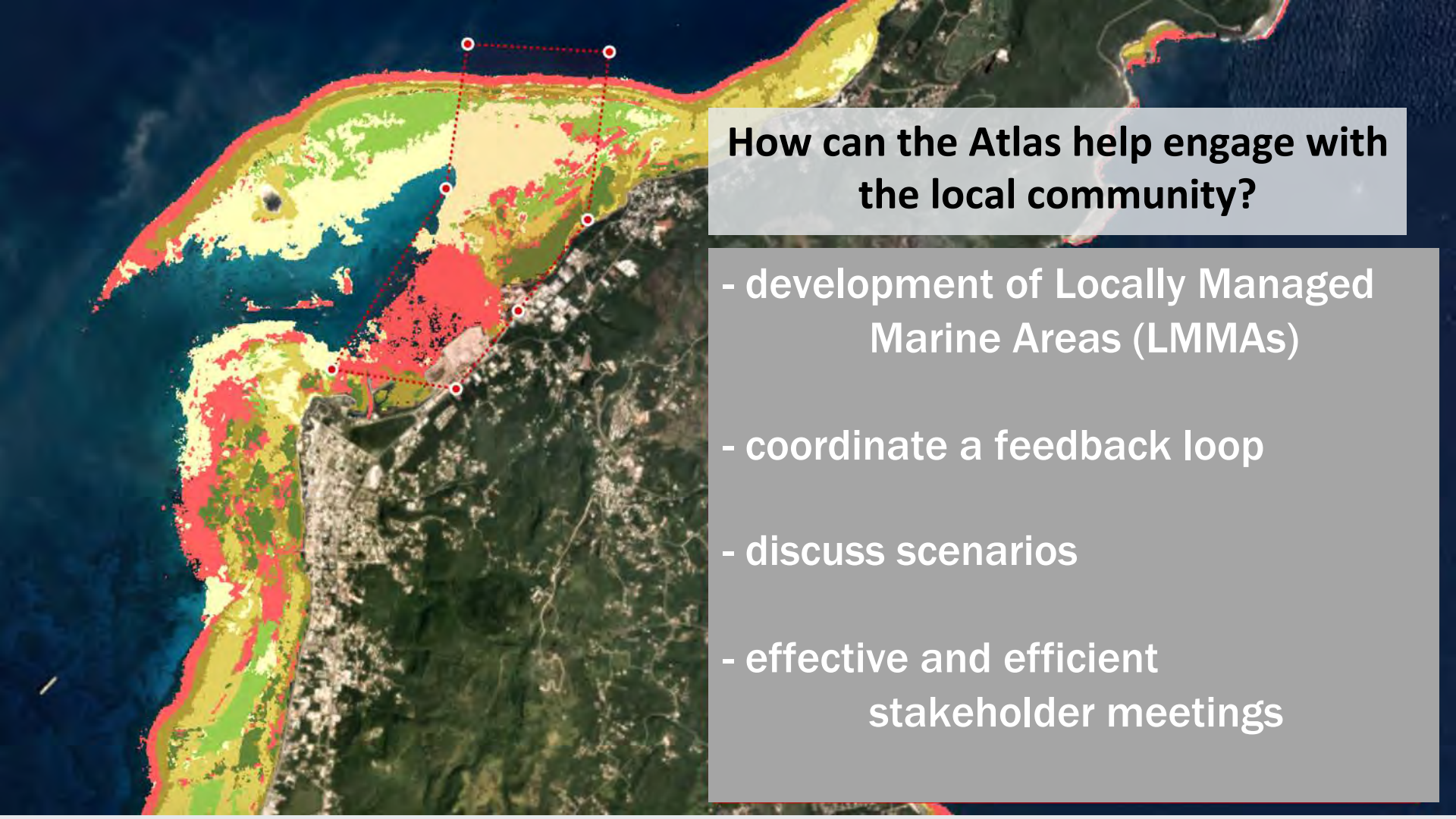
Expand the reach and impact of the Atlas products



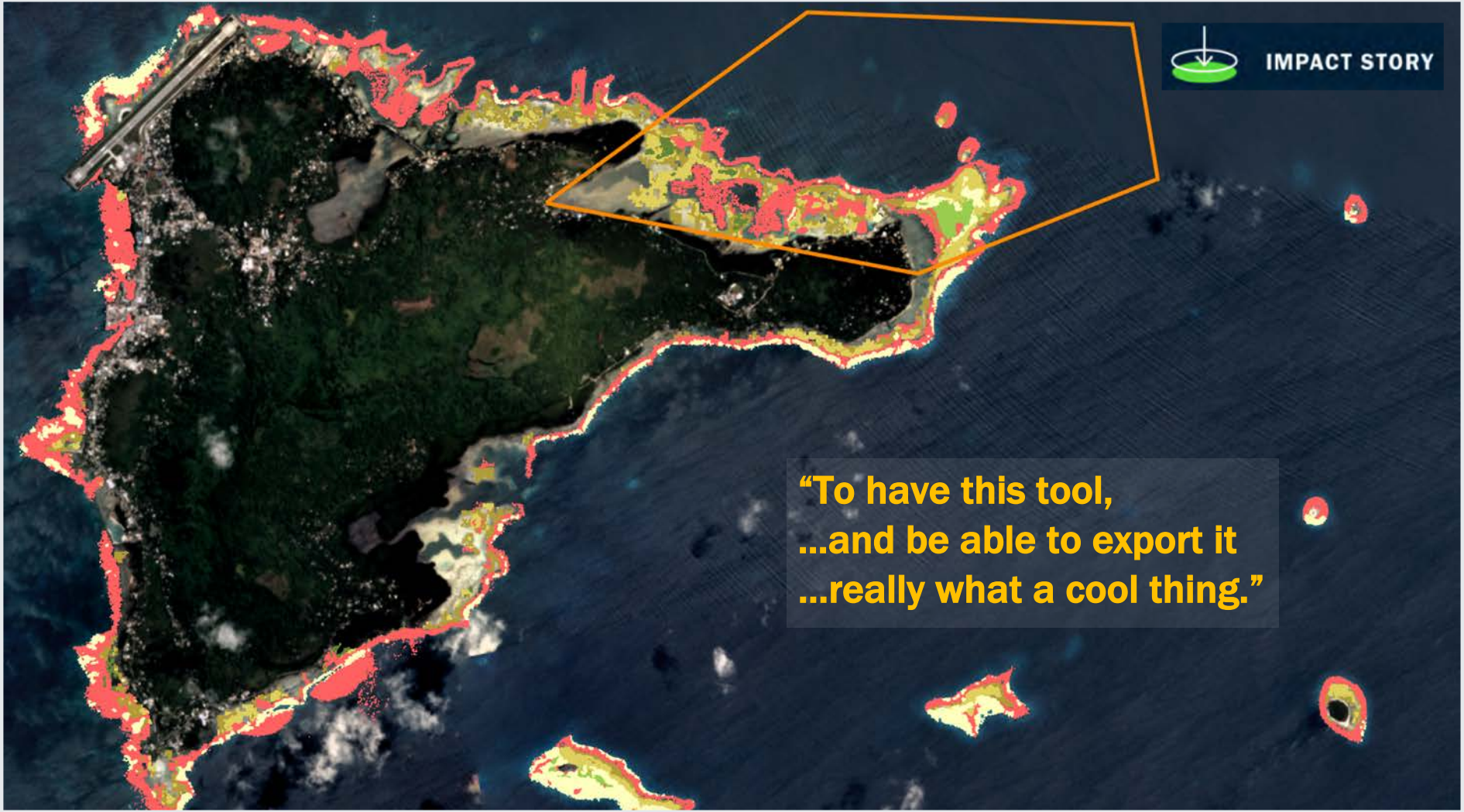
How can the Atlas help engage with the local community?

- development of Locally Managed Marine Areas (LMMAs)

- coordinate a feedback loop

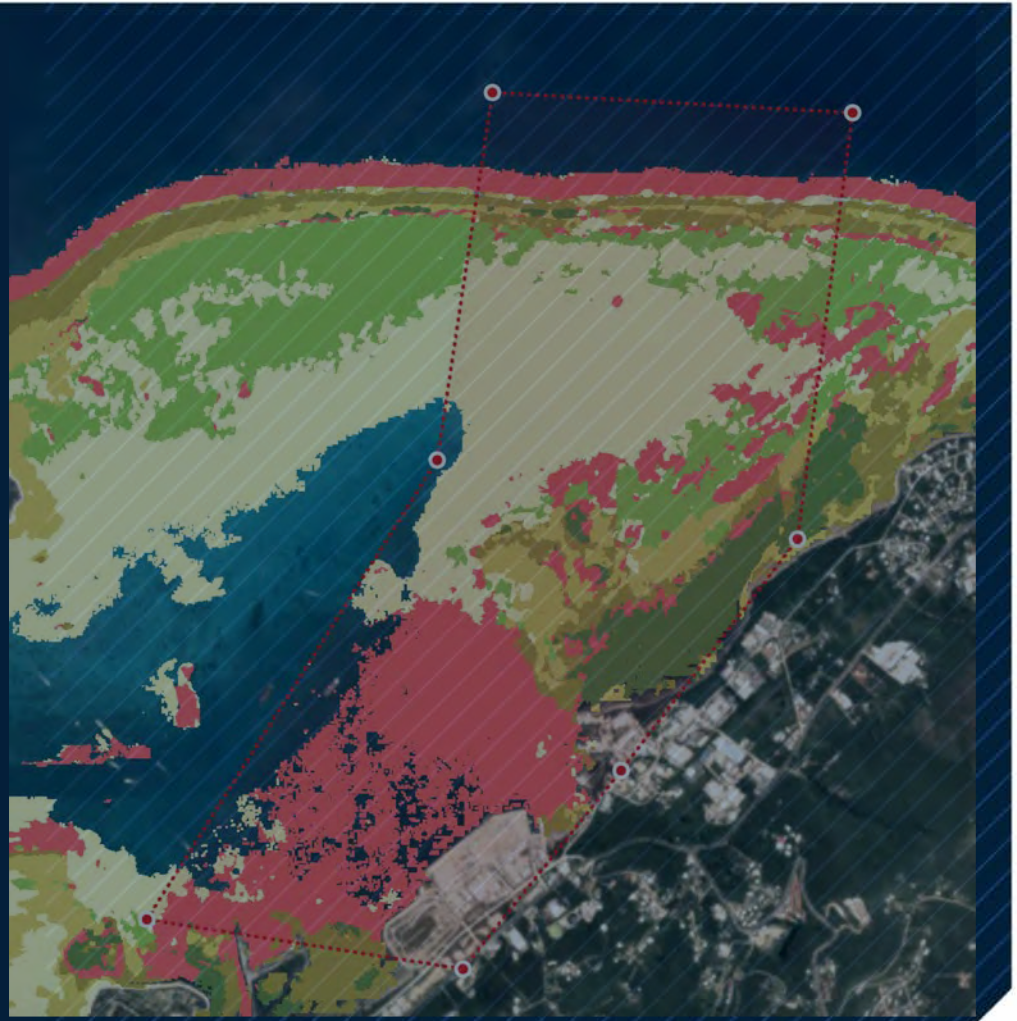
- discuss scenarios

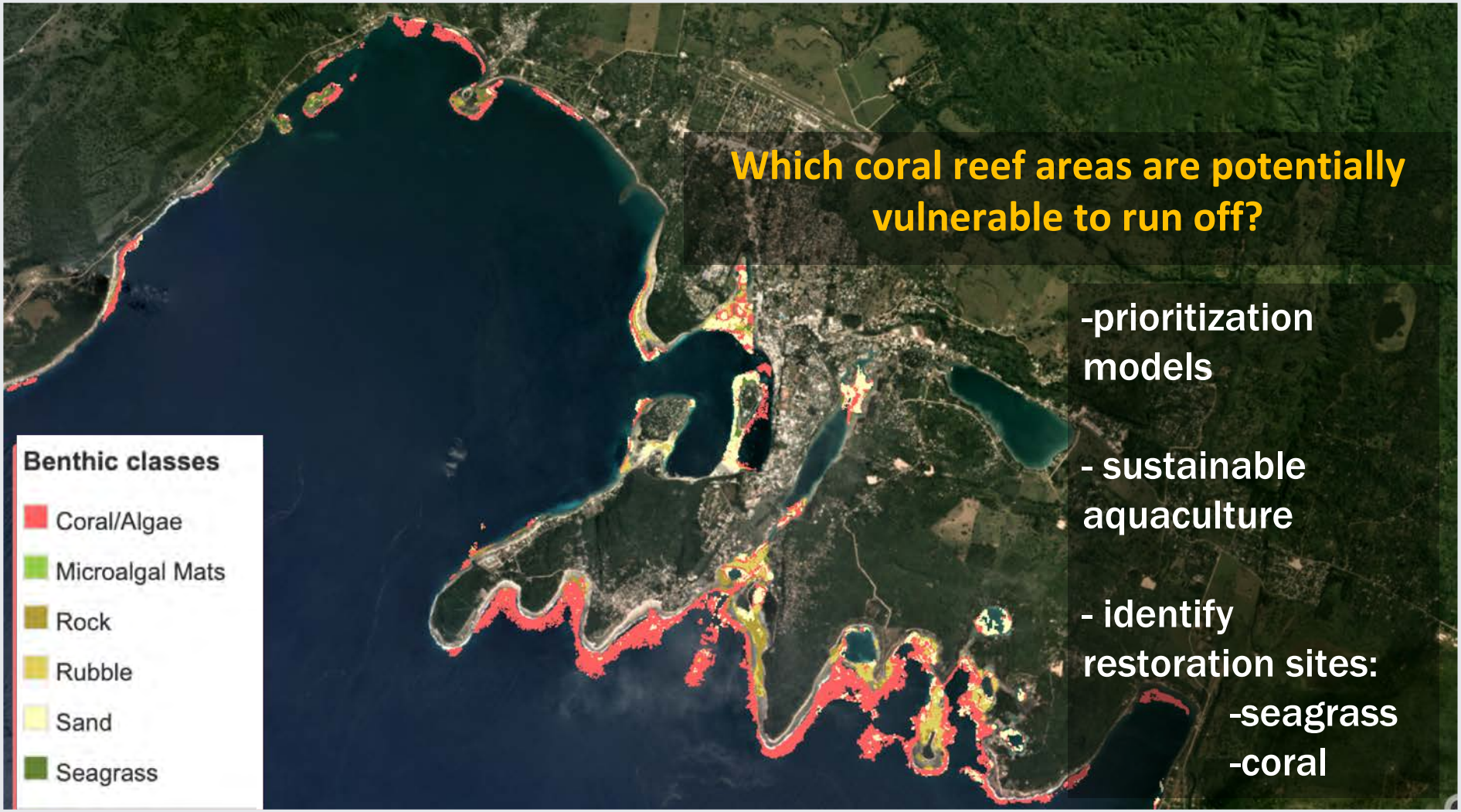
- effective and efficient stakeholder meetings


IMPACT STORY
“To have this tool,
...and be able to export it
...really what a cool thing.”

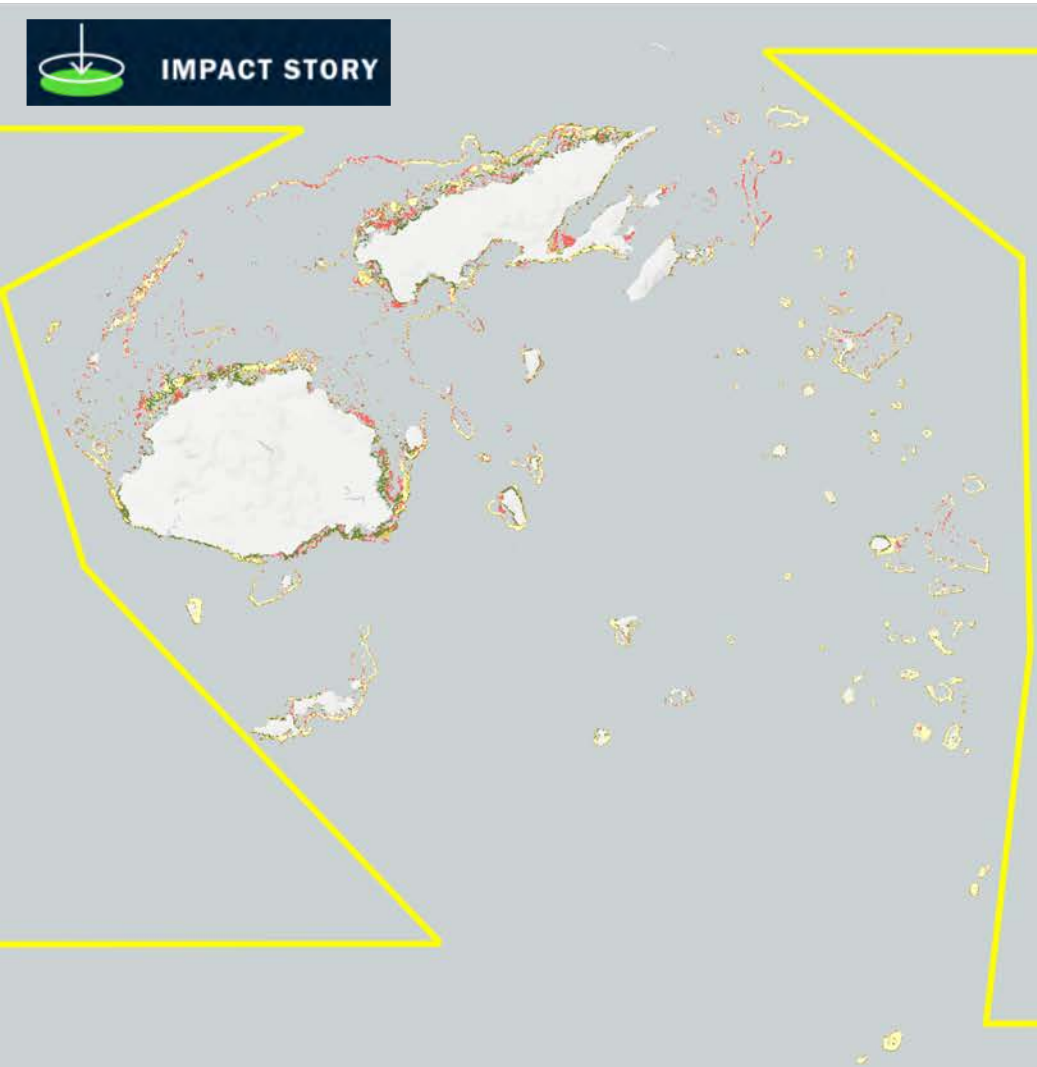
IMPACT STORY

Where are vulnerable habitats?




Which coral reef areas are potentially vulnerable to run off?
-prioritization models
- sustainable aquaculture
- identify restoration sites:
-seagrass
-coral
Benthic classes
Coral/Algae
Microalgal Mats
Rock
Rubble
Sand
Seagrass

IMPACT STORY



How can the Atlas support decision makers?

- country wide analysis

- identify region by region statistics

- Marine Spatial Planning (MSP) efforts (e.g. Vanuatu)

Atlas impact

Develop capacity to use the Atlas

Develop Capacity

Reef Resilience Network

The Nature Conservancy

Online Course(s):

Fall 2020

ITMEMS-6, INDONESIA
MANADO 14 - 17 APRIL 2020

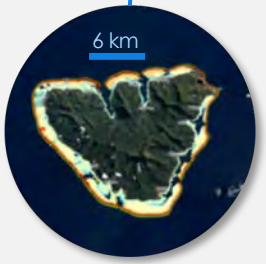
Training workshops:

in conjunction with symposia and conferences

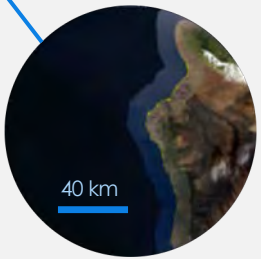
Demo videos:

YouTube videos and online materials

Progress so far



Moorea
French Polynesia



Big Island
Hawaii

Lighthouse Reef
Belize

Kayankerni
Sri Lanka

Karimunjawa
Indonesia

Heron Island
Australia

7 Central, GBR, Australia
8 Fiji, SW Pacific
9 West Micronesia
10 N. Caribbean & Bahamas
11 Eastern Africa

More maps to come...

West Indian Ocean

Andaman Sea

Timor Sea

South Asia

Eastern PNG, Solomon Islands

Philippines

Indonesian Archipelago

Central Indian Ocean

China Sea

Mesoamerica

Coral Sea

Red Sea

Mapping Timeline for the Coral Triangle

Country	Contributed Data Deadline	Map Release (approximate)
Timor-Leste	--	October 2020
Papua New Guinea	--	October 2020
Solomon Islands	--	October 2020
Indonesia	August 26, 2020	December 2020 / January 2021
Malaysia – Straight of Malacca	August 26, 2020	December 2020 / January 2021
Eastern Malaysia	December 15, 2020	March-April 2021
Philippines	December 15, 2020	March-April 2021

submissions@allencoralatlas.org

Engage With Us

- Tell us: How would you use the Atlas? community@allencoralatlas.org
- Connection to existing and new data, or to policy and decision makers: support@allencoralatlas.org
- Spotting errors: corrections@allencoralatlas.org

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Thank you!

Get in touch with us directly

Presented by:

Brianna Bambic

Program Manager
Allen Coral Atlas
Field Engagement Team

bbambic@ngs.org

Zoë Lieb

Project Coordinator
Allen Coral Atlas
Field Engagement Team

zlieb@ngs.org

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