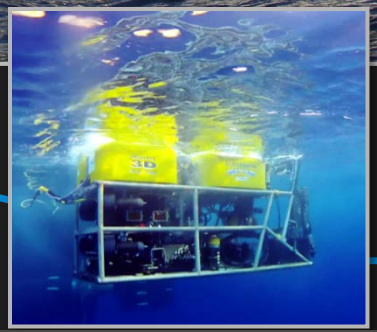
Planning Aircraft-Supported Oceanographic Research at Sea onboard Schmidt Ocean Institute's R/V *Falkor*



SCHMIDT OCEAN INSTITUTE

The world's ocean understood through technological advancement, intelligent observation, and open sharing of information.

Schmidt Ocean Institute Program Development

Schmidt Ocean Institute was founded in 2009 by **Eric and Wendy Schmidt** to advance the frontiers of ocean exploration and research through innovative technologies, intelligent observation, and open sharing of information

2009 – SOI founded, R/V Falkor purchased

2010 – Dept. of Marine Operations established

2011 – Initial Strategic Plan developed

2012 – Falkor refit and sea trials completed

2013 – First year of Falkor research cruises, First datasets shared with the public

2014 – 9 research cruises completed

2015 – Construction of ROV program, 8 research cruises planned

Vision and Mission

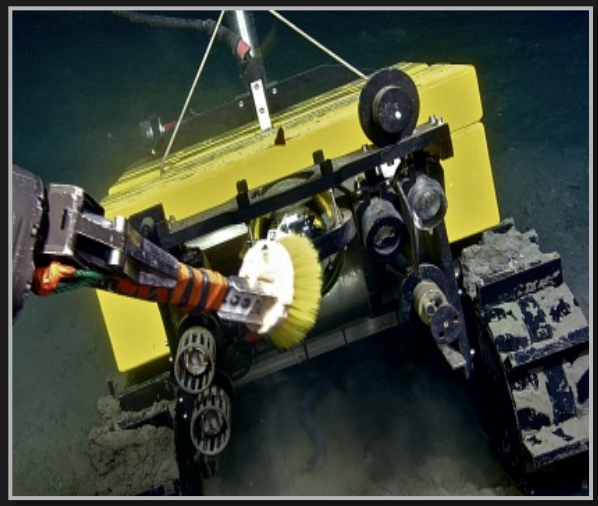
Vision: The world's oceans understood through technological advancement, intelligent observation, and open sharing of information.

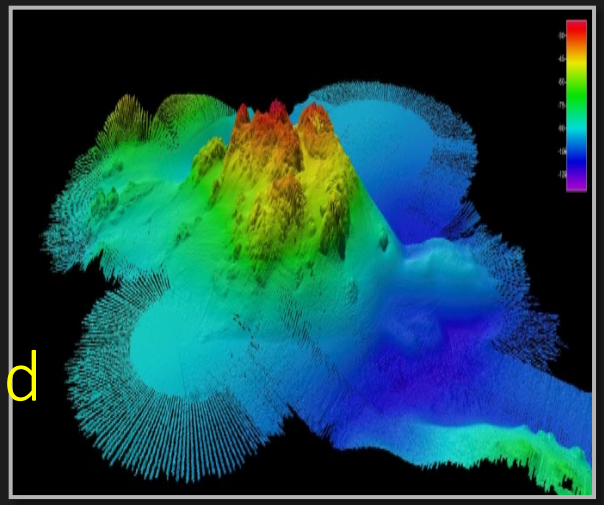
Mission: We combine advanced science with state-of-the-art technology

- to achieve lasting results in ocean research,
- to catalyze open sharing of the information,
- and to communicate this knowledge to audiences around the world.

Strategic Focus Areas

- Commitment to Excellence in Oceanographic Research Operations
- Infrastructure, Platform, and Technology Development for Marine Sciences
- Collaborative Scientific Research aboard Falkor
- Communications, Education, and Outreach Program
- Open Sharing of Information, Data, and Research Outcomes



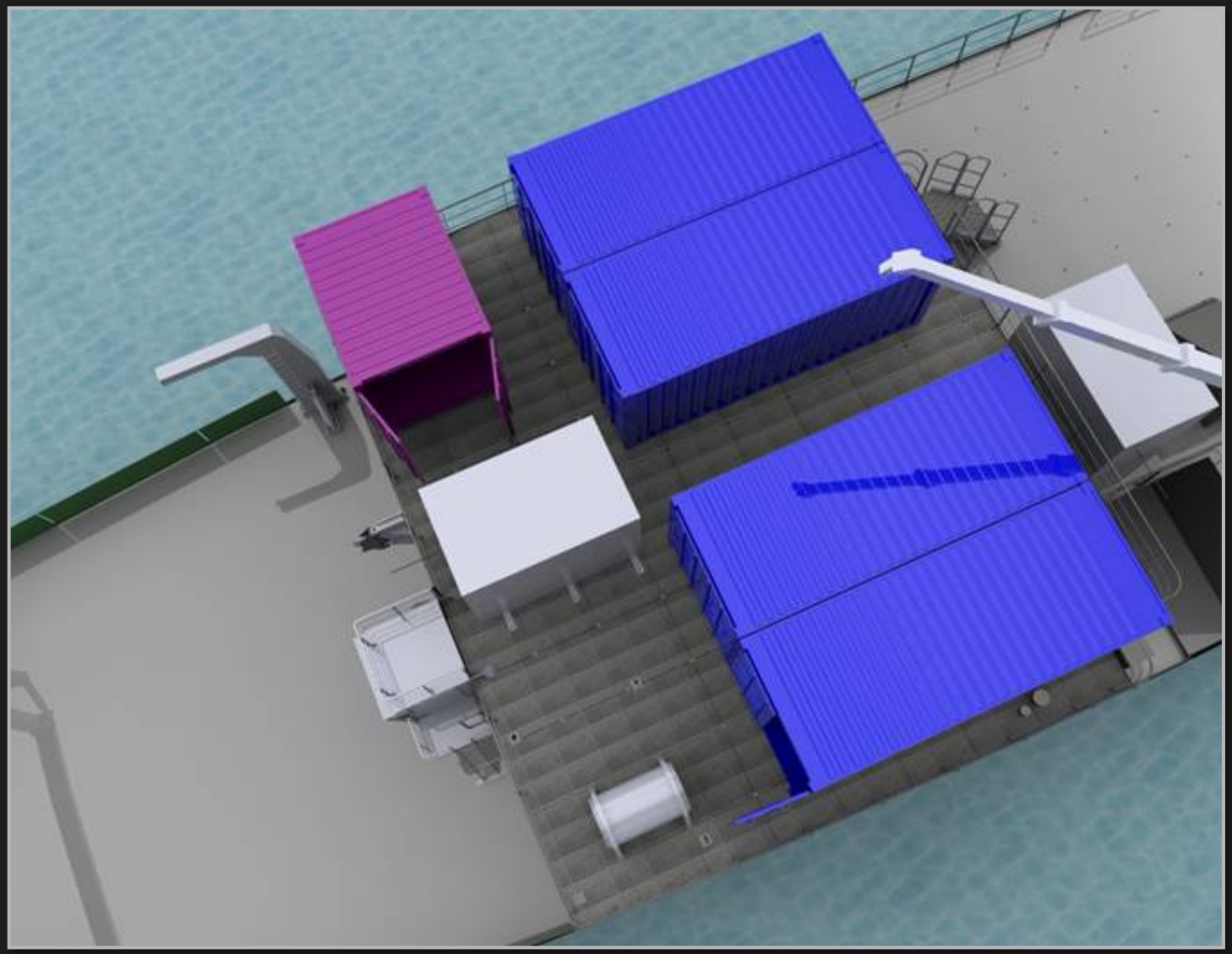


Infrastructure & Instrumentation: R/V *Falkor*

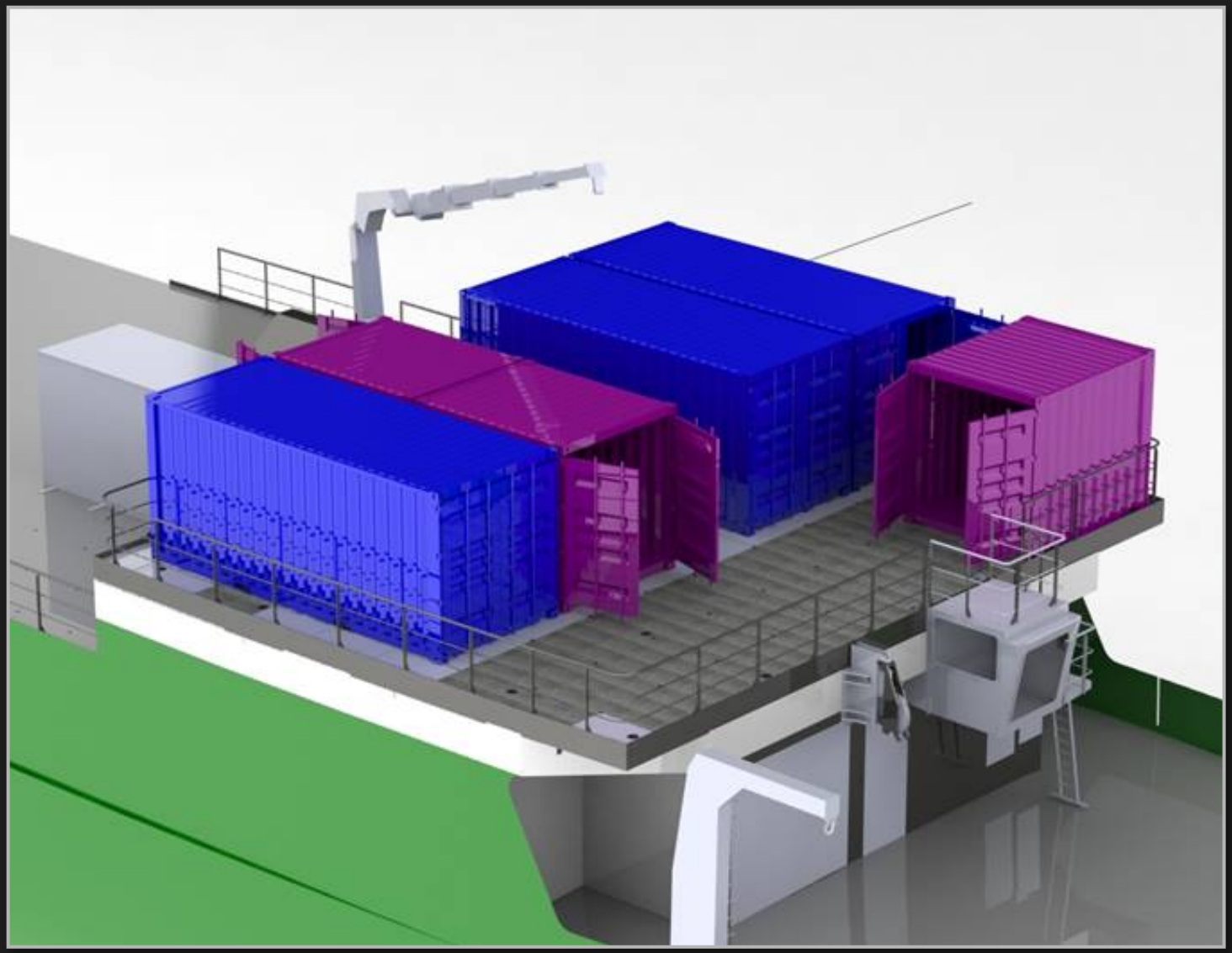
R/V Falkor, SOI's Largest Infrastructure Development Project

- 82.9 m (272 ft) LOA
- Cruising Range 8,000 nm
- 36 days of steaming
- Speed 12 knots
- 20 international crew
- 17 science berths
- 2 diesel engines driving
- controllable pitch propellers
- 6.3 meter aluminum hull 350 HP jet-drive work boat

R/V *Falkor* New Storage Deck



R/V *Falkor* New Storage Deck



Sea-Surface Microlayer and Air-Sea Interaction Study

Dedicated multidisciplinary research to better understand the significance of the air-sea interface (Sea Surface Microlayer) as the boundary layer controlling atmosphere-ocean interactions. The research project will focus on the following topics:

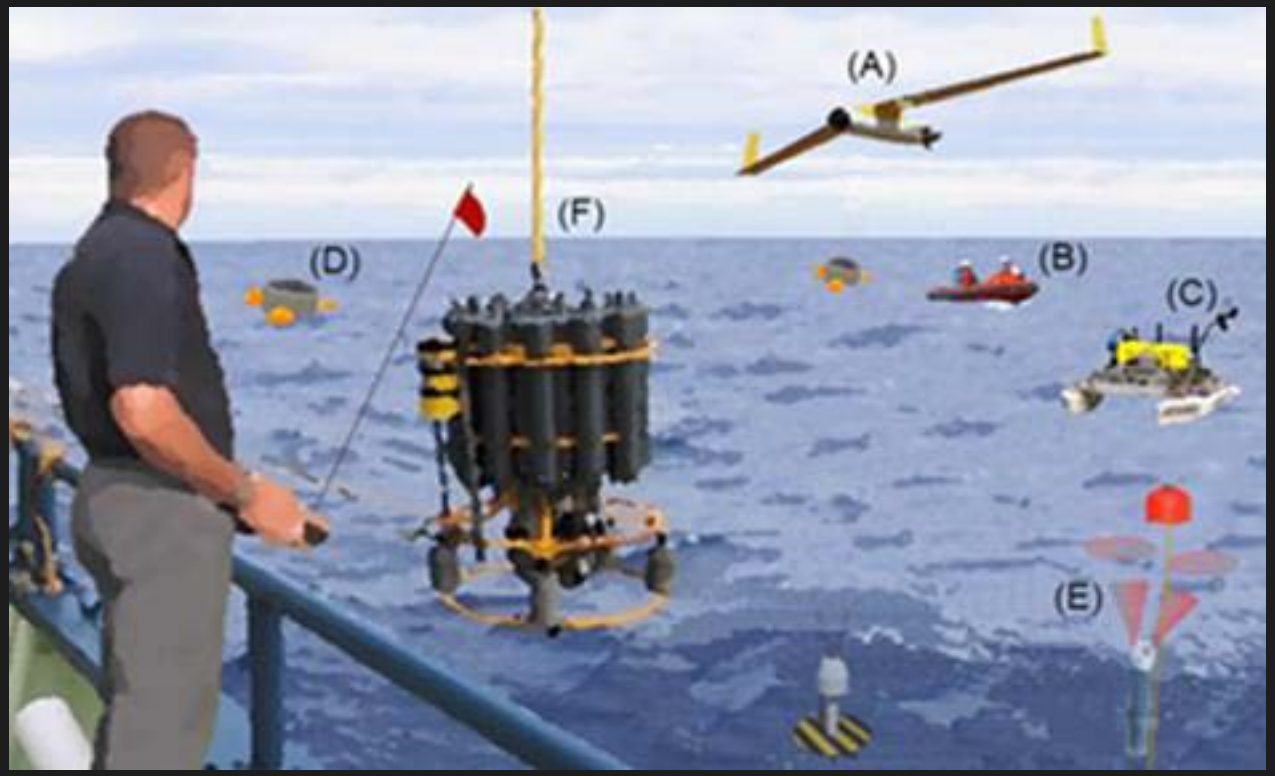
(i) exchange of bio-limiting trace elements and organic compounds between the atmosphere and the sea surface,

(ii) technological advancement of in situ techniques to characterize sea surfaces,

(iii) new parameterization for air-sea exchange of climate-relevant gases and heat, and

(iv) the sea surface as a habitat for complex microbial communities

Sea-Surface Microlayer and Air-Sea Interaction Study



(A) unmanned airborne systems, (B) small boat operation for manual sampling and deployments, (C) a remote controlled catamaran for surface skimming and near-surface processes, (D) free-floating chambers for measurements of gas exchange, (E) sensor packages for near-surface measurements and (F) CTD profiles.

Sea-Surface Microlayer and Air-Sea Interaction Study

Payloads for the UAS:

i) high-resolution high-sensitivity broadband visible (400-700 nm) and infrared (8-9.5 µm) imaging,

ii) hyperspectral visible (VIS; 300-1000 nm) and near-infrared (NIR; 900-1700 nm),

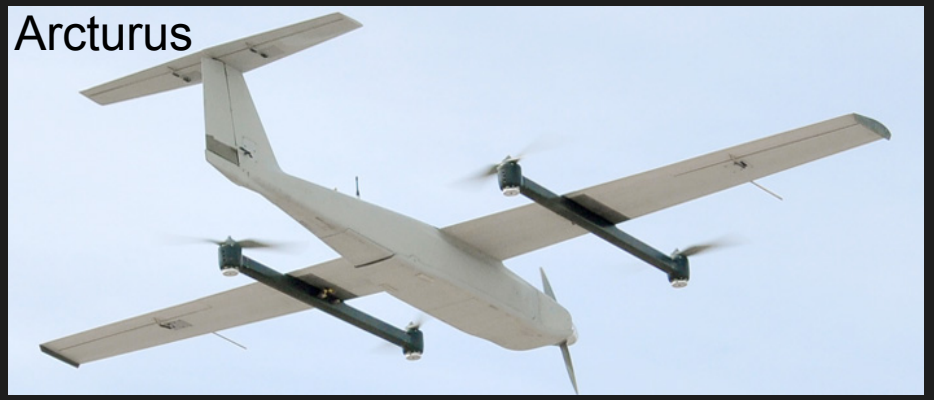
iii) Met.: wind speed/direction, momentum, latent and sensible turbulent fluxes, LIDAR wave measurements, net solar and longwave radiation, skin SST,

iv) UAS-launched dropsondes to profile the RH/T of the atmosphere and microbuoys that measure T/S of the near-surface 2m of the ocean for two weeks duration and telemeters the data.

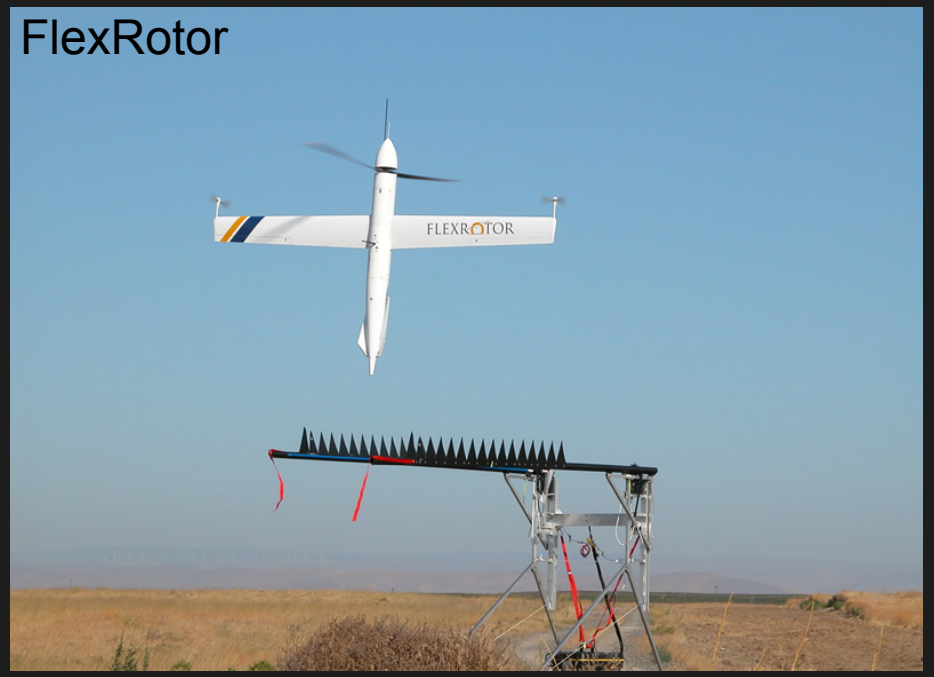
Potential Support Platforms Considered

ScanEagle

Arcturus



FlexRotor



RELATED CONTENT : VIEW ALL








Opportunities for Students to Sail Aboard Research Vessel Falkor

Schmidt Ocean Institute seeks to provide undergraduate and graduate students with a chance to take part in meaningful scientific research in coordination with our organization and the principal investigators leading at-sea research projects.

Student berthing space may be made available if a science party has unused berthing*. Students should be interested in taking part in their own research or working alongside a science team already scheduled to conduct research aboard *Falkor* and must possess knowledge in at least one of the following disciplines: biology, chemistry, physics, geology, oceanography, or technology (e.g. engineering, software, etc.).

Institute of European Marine Sciences graduate student Isabelle Bacconais demonstrates a water sample from Loihi that shows the presence of iron. Photo credit: Carlie Wiener/ SOI.

UPCOMING CRUISE OPPORTUNITIES

Cruise Number: FK150728 - Mixing Up the Tropical Pacific

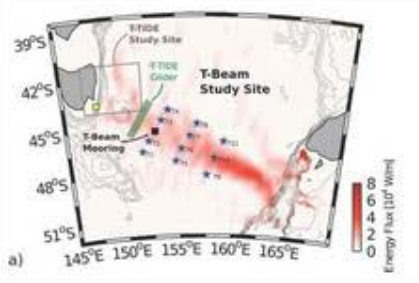
July 28 - August 19, 2015 - Majuro, Marshall Islands to Honolulu, Hawaii, USA

During this expedition the team will deploy instrumentation such as current and turbulence profilers from *Falkor* to gather data on ocean mixing. Relevant physics governing this ocean mixing are poorly understood, limiting the accuracy and usefulness of climate models that can provide the advance warning needed to prepare for El Niño Southern Oscillation climate events. The team's working hypothesis is that small-scale features not accounted for in existing climate models have a major impact on mixing. If further work continues to support this idea then substantial improvements to climate models will become possible.

Student Application Deadline: Monday May 11, 2015 6:00 p.m. Pacific Daylight Time.

APPLICATION PROCESS

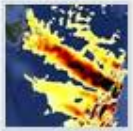
RELATED PROJECT



Tasman Sea Project Pa ...

The Tracking the Tasman Sea's Hidden Tide expedition runs from January 17th to February 13th, 2015. To learn about the research, and for links to the Cruise Log and Expedition Map, please visit ...

RELATED STORIES : VIEW ALL



Two ships passin ...
The T-Beam project is one piece of a well-coor ...

Working in an Un ...
Doing science so close to the Southern Ocean c ...

Calibration Cele ...
Calibrating instruments for work in the open o ...

CTDs Away!
Getting in some practice in preparation for ou ...

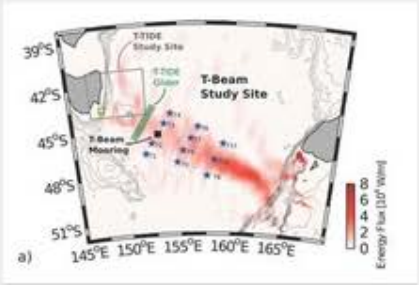
TRACKING THE TASMAN SEA'S HIDDEN TIDE

Every day, the ocean's tides create massive underwater waves known as internal tides that radiate around the globe with major impacts on the ocean's heat budget and climate. Little is known about how these subsurface water movements propagate and dissipate in the open ocean, but that's set to change during *Falkor*'s first expedition of 2015. Collaborators from U.S. and Australian institutions will run the first comprehensive study of the largest, most focused internal tide on the planet, which moves across the Tasman Sea each day. In the process they will amass data that will improve general understanding of the phenomenon, as well as researchers' ability to incorporate internal tide effects accurately in climate models.

Amy Waterhouse, at the **Scripps Institution of Oceanography**, and Samuel Kelly, from the **University of Minnesota, Duluth**, will co-lead the January 17th to February 13th expedition, called T-Beam. Other team members will come from the **University of Washington's Applied Physics Lab**, the **University of Alaska Fairbanks**, the **University of Tasmania**, the **Commonwealth Scientific and Industrial Research Organisation (CSIRO)**, and the **Environmental Protection Agency of Victoria**.

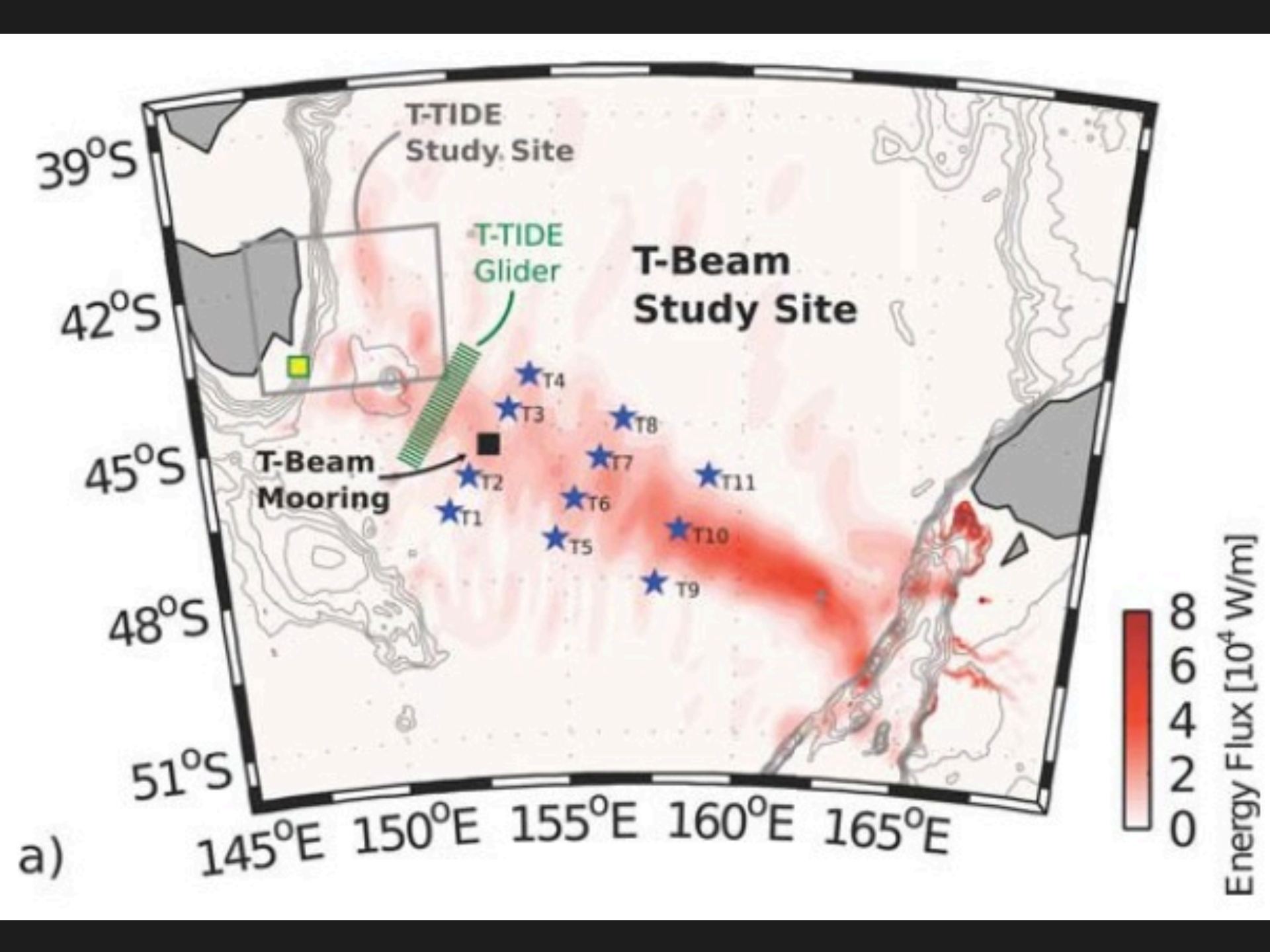
What's an Internal Tide?

Internal tides form when regular tides that we are more familiar with push water up and over seafloor features such as seamounts or ridges. The turbulence created by that movement spawns underwater waves that can move out in multiple horizontal directions. These



A map showing both the Tasman Sea's internal tide energy (in red), and the locations of planned study sites for both the work aboard Falkor (numbered stars) and the Roger Revelle. Credit: Amy Waterhouse

The Tasman team uses moorings like this one that typically include dozens of temperature sensors at varying depths, and multiple current profilers and conductivity, temperature, depth (CTD) profilers. Credit: Amy Waterhouse


T-TIDE
Study Site
T-TIDE
Glider
T-Beam
Study Site
T-Beam
Mooring
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
39°S
42°S
45°S
48°S
51°S
145°E
150°E
155°E
160°E
165°E
a)
8
6
4
2
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Energy Flux [10^4 W/m]

CRUISE LOG

EXPEDITION MAP

RELATED PROJECT

Coordinated Robotics ...

The Coordinated Robotics expedition in the TImor Sea runs from March 24th to April 6th, 2015. To learn about the research, and for links to the Cruise Log and Expedition Map, please visit the ...

RELATED STORIES

Timor Sea Reef C ...
The Timor Sea expedition will explore factors ...

Coordinated Robo ...
See the Coordinated Robotics Live ...

Team Bios, Coord ...
...

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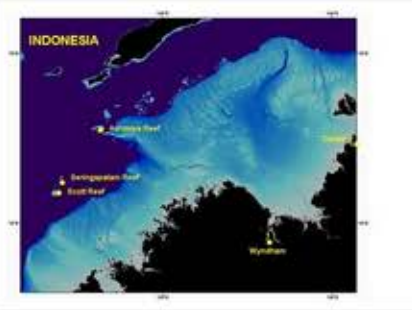
Don't forget to follow the cruise on our social media site #CoordinatedRobotics

A view of Scott Reef. Credit: Andrew Heyward/AIMS



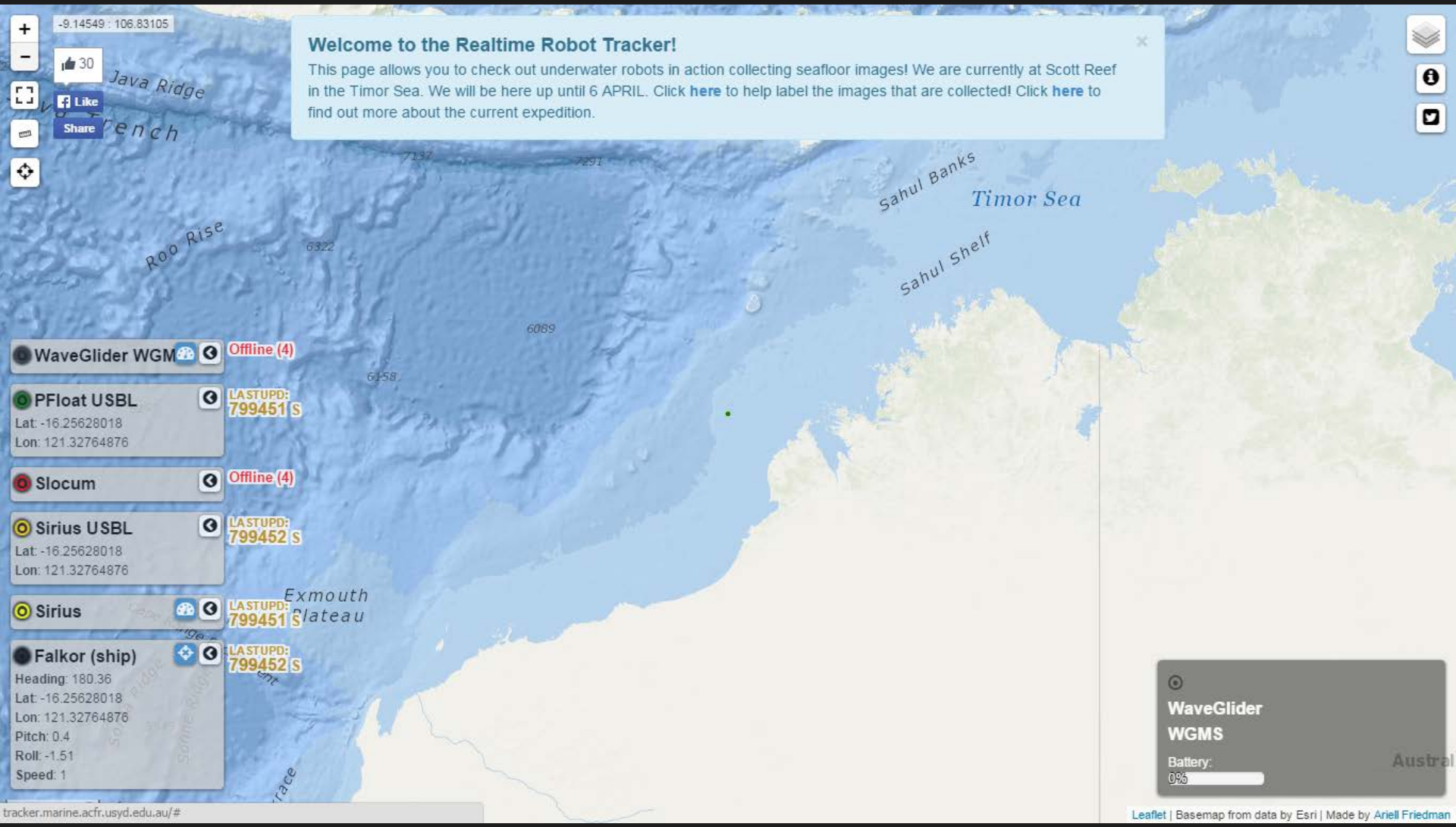
A satellite view of the study region. Credit: Australian Institute of Marine Science

At the end of March, Falkor will cruise north from Australia to a spectacular, isolated, coral wonder known as Scott Reef—but biology will not be the primary concern. While most expeditions are designed to explore a specific area or oceanographic question, this research focuses more directly on pushing oceanographic technology forward. The goal will be to expand and improve techniques and algorithms for efficiently coordinating deployments of multiple exploratory vehicles and tools. The work will bring engineers closer to being able to leave groups of robotic vehicles untended for long stretches to accomplish tasks like detailed seafloor mapping and chemical analyses across wide areas. Such capabilities would dramatically improve ocean exploration and research by increasing observations while reducing costs.

Dr. Oscar Pizarro, an oceanographic robotics researcher from the **Australian Centre for Field Robotics at the University of Sydney**, will lead the expedition, which runs from March 24th to April 6th. Other team members will come from the **Woods Hole Oceanographic Institution**, the **University of Rhode Island**, the **University of Sydney**, the **University of Hawaii at Manoa**, the **University of Michigan**, and **James Cook University**.

The group will be launching an arsenal of different tools that will use Scott Reef as a test site for experiments

Real Time Robot Tracking



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About the Project

What is this all about? Who is involved? Why should you care?

Click for more

How to…

Tutorials and videos that provide useful tips on how to use the system.

Click for more

Diving Deeper

Check out more details about the project and for more info about automated tools designed to make life easier.

Click for more

Get started!

Click here to log in or sign up and jump straight into labeling seafloor images!

Click to start

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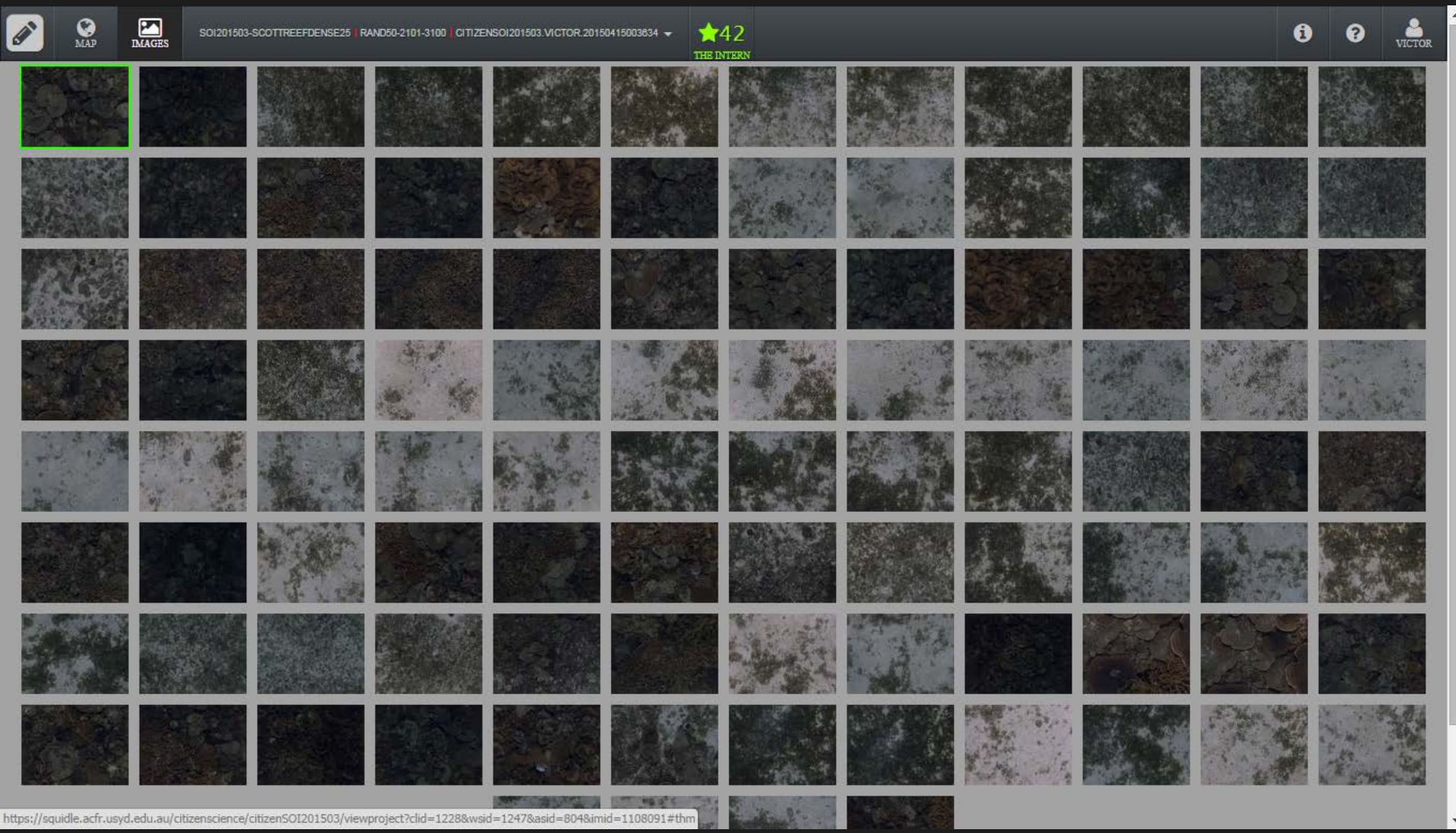

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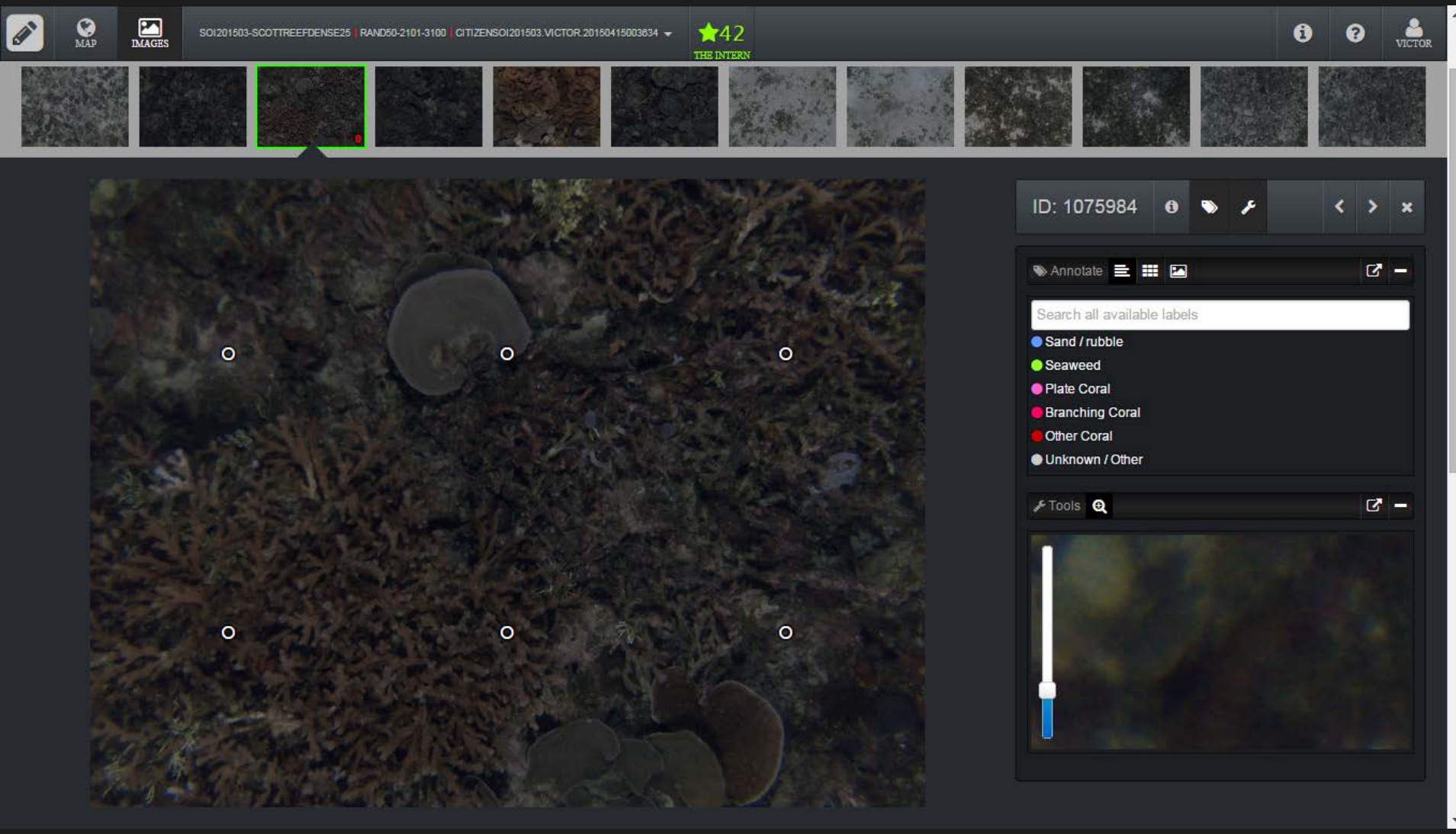

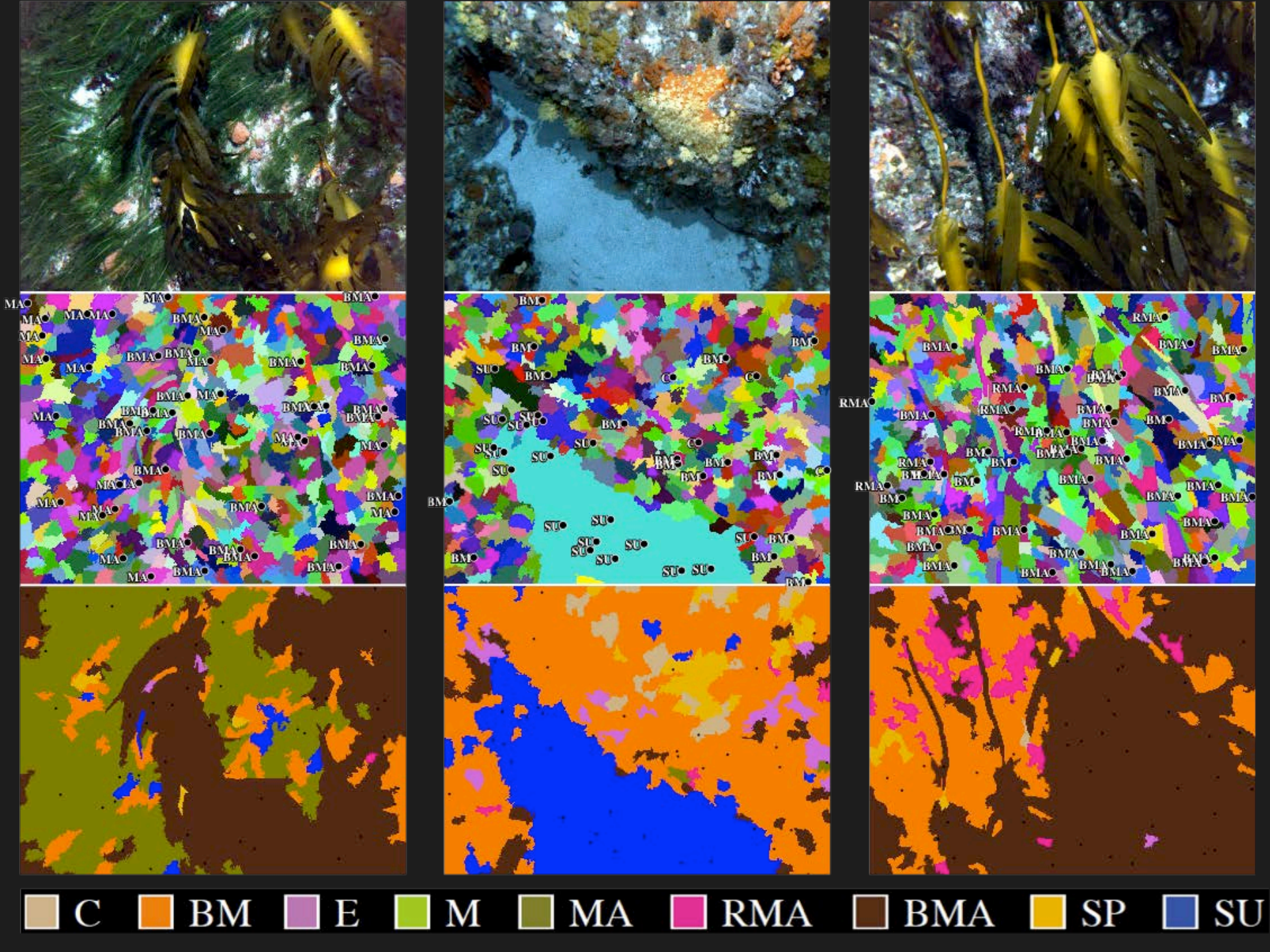
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Understanding the world's oceans using innovative technologies, intelligent observation, and open sharing of information

SCHMIDT OCEAN INSTITUTE

2015 TIMOR REEF CONNECTIONS

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