

How will our kūpuna islands respond to climate change? A look at past, present, and future sea level change and storms within Papahānaumokuākea

Haunani Kane, John Burns, Chip Fletcher, Kammie Dominique Tavares, Kristian McDonald, Tiffany Anderson, Kailey Pascoe

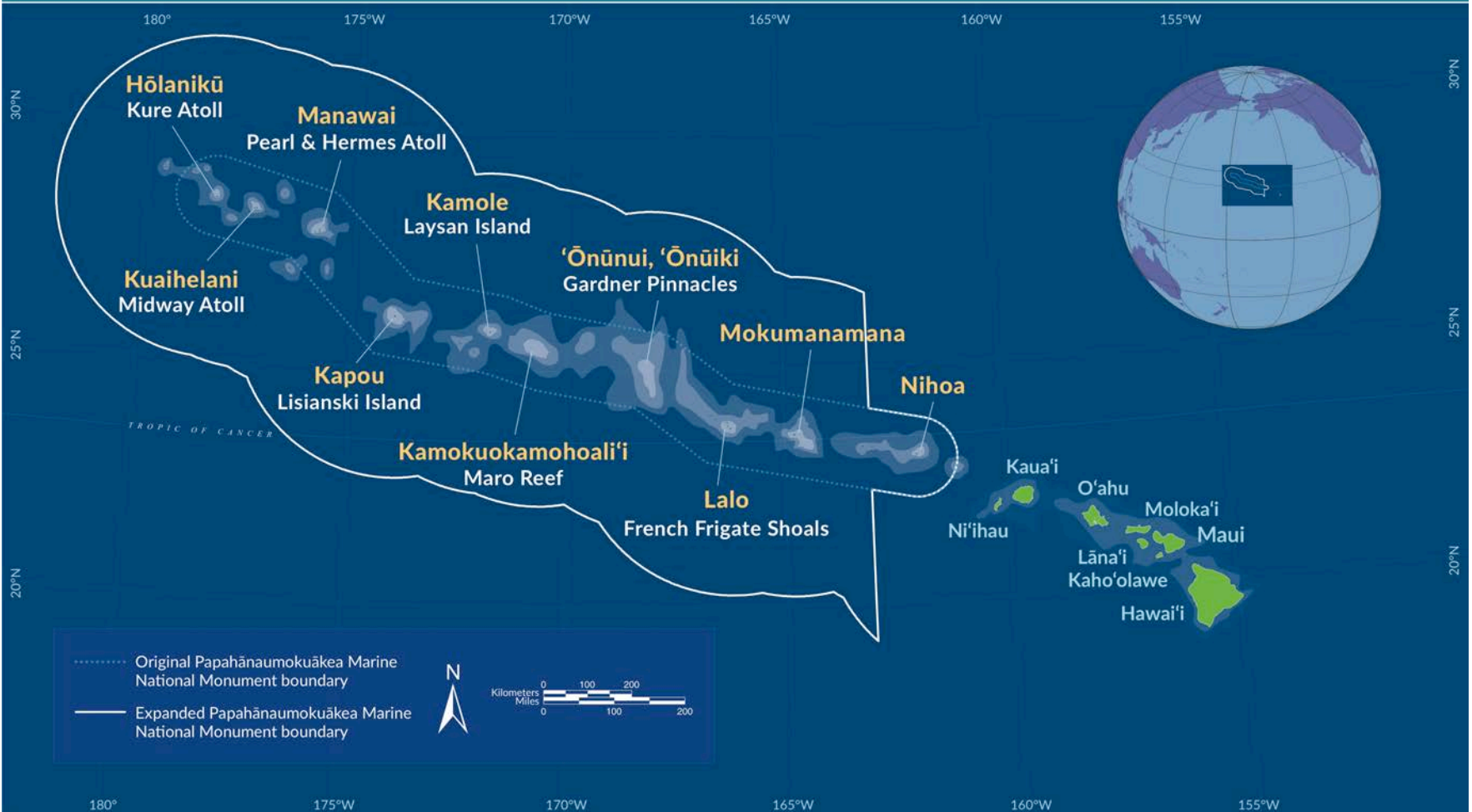


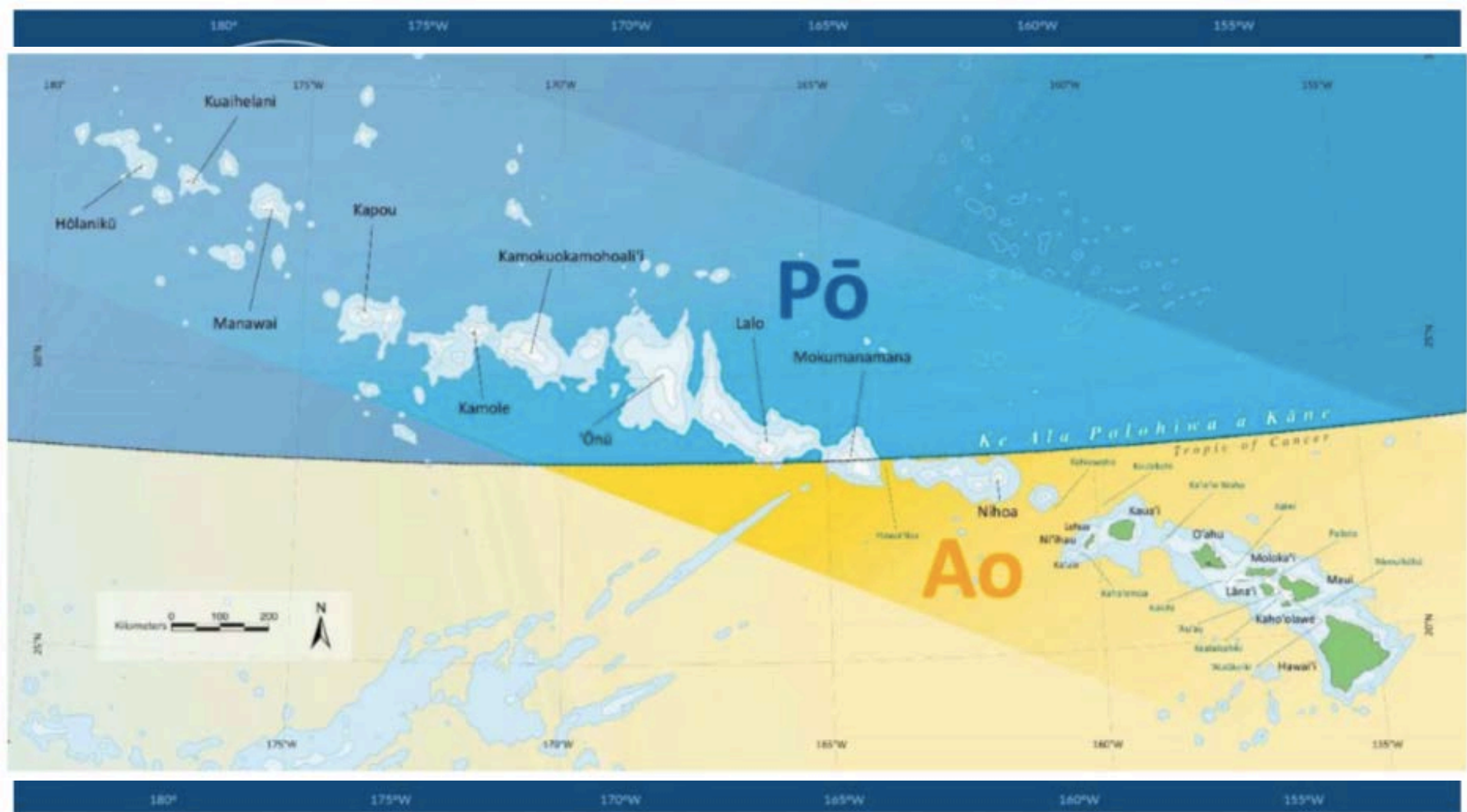
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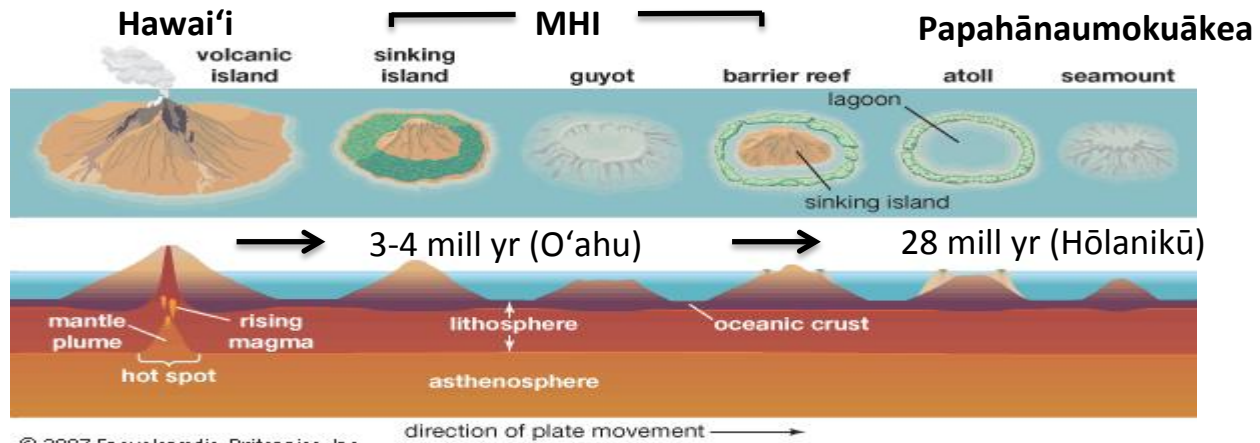


» Ko Hawai'i Pae 'Āina - Hawaiian Archipelago





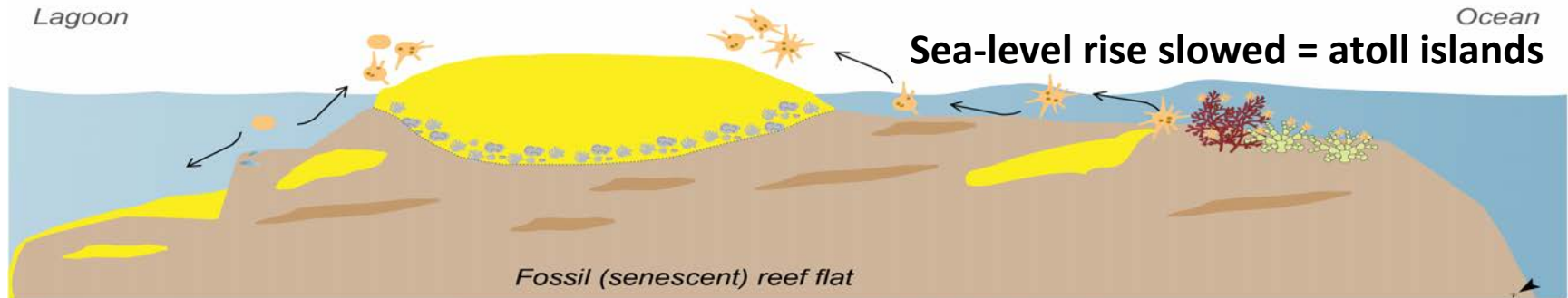
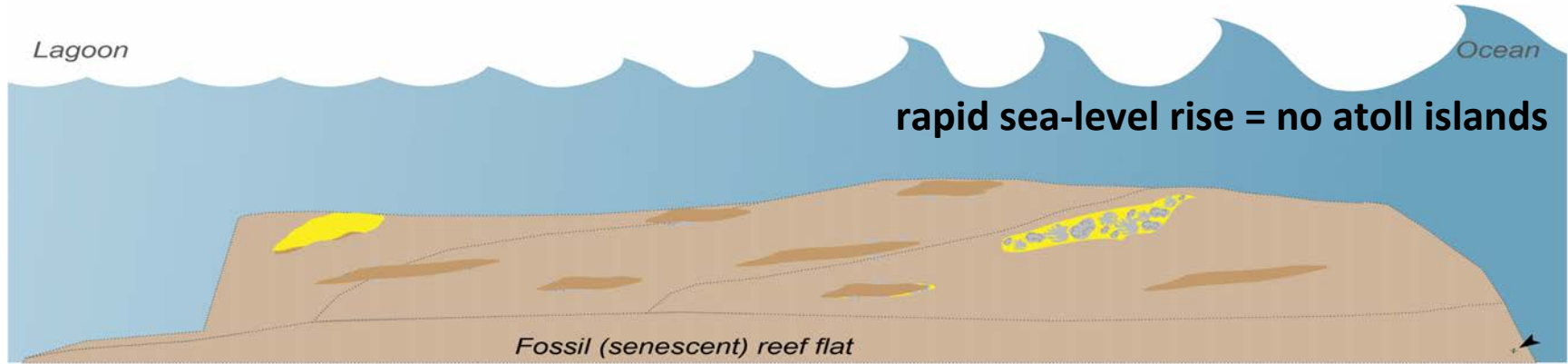


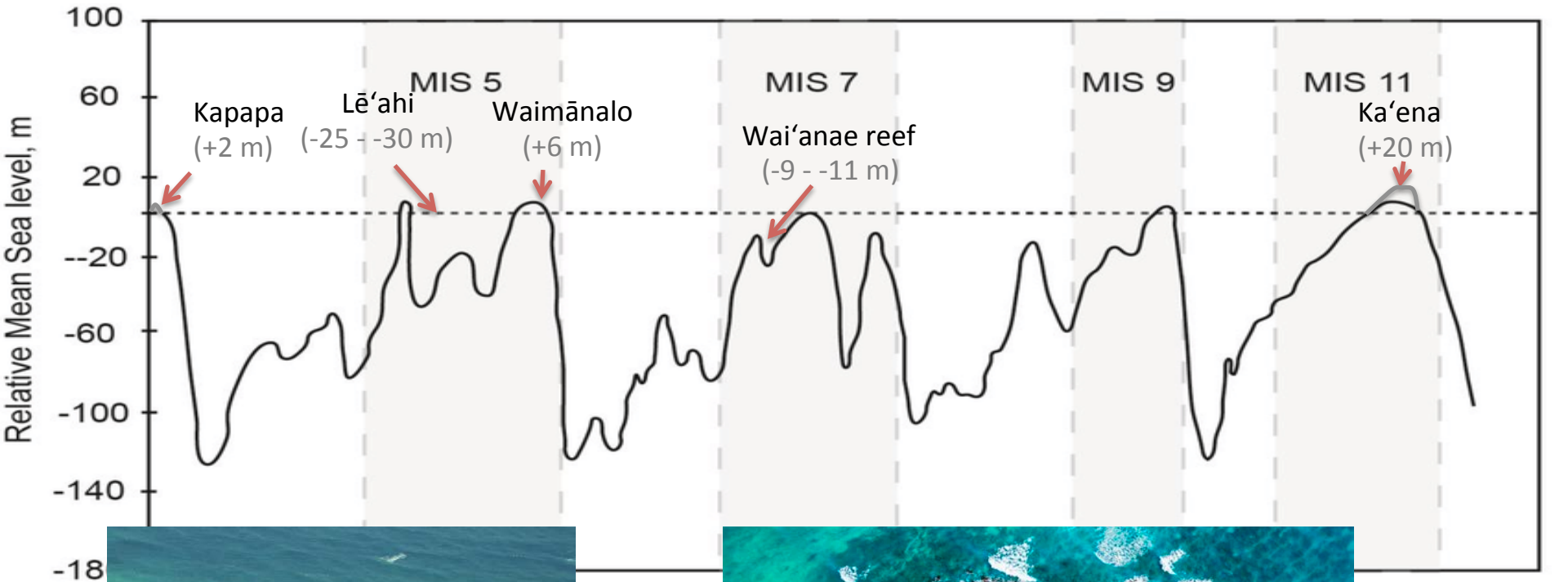


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Reef island formation is linked to sea-level change





-18



150



400

450

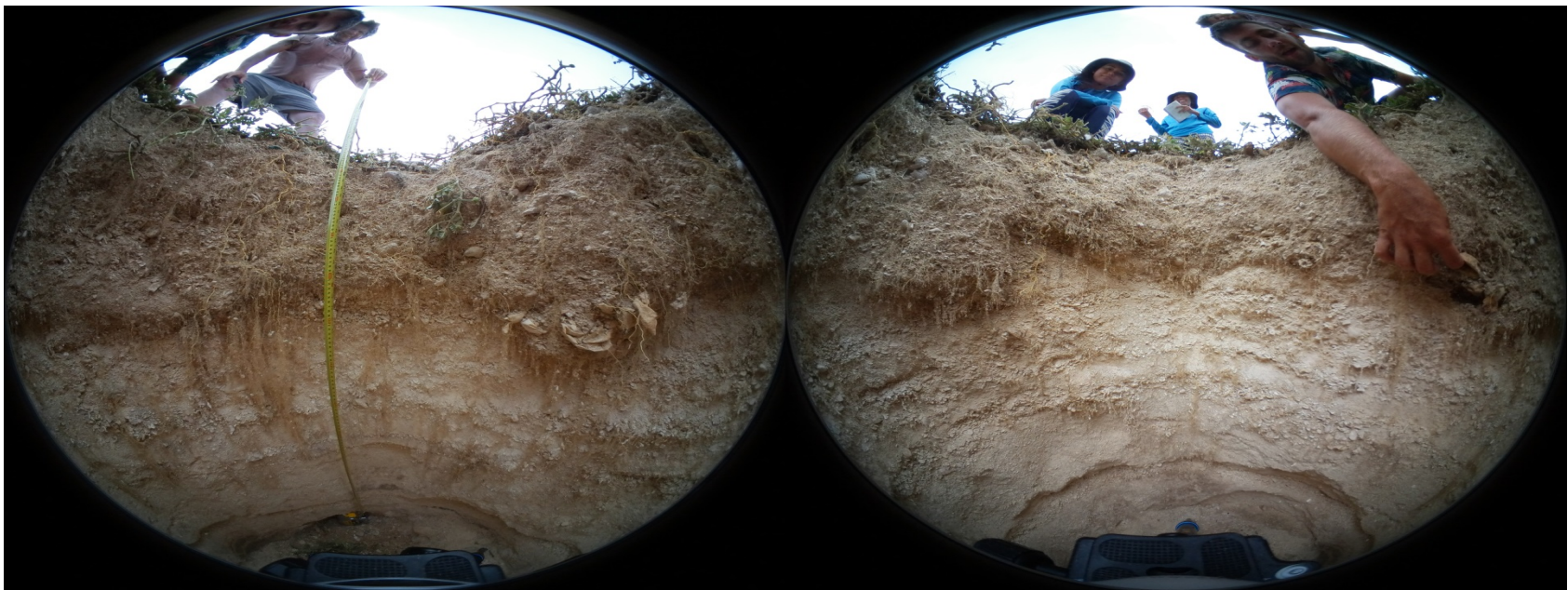
He pūko‘a kani ‘āina

A coral reef that grows into an island.



He pūko‘a kani ‘āina

A coral reef that grows into an island.





GC3



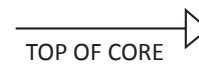
T2



T3



T4



EC5



1 cm

Environment ► Climate change Wildlife Energy Pollution

Hawaii

Hawaii

Remote Hawaiian island vanishes under water

USA TODAY NETWORK Josh Hafner, USA TODAY Published 6:33 p.m. ET Oct. 24, 2018 | Updated



(Photo: Twitter/@NathanEagle)

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A remote Hawaiian island vanished underwater after powerful hurricane struck earlier this month, according to federal officials citing satellite images.

East Island, a strip of gravel and sand northwest of Honolulu, "appears to be under water"

after Hurricane Walaka surged past the state, the Papahānaumokuākea Marine National Monument said in a Tuesday statement.

The island has played a key role in the survival of beleaguered seals and sea turtles, said the officials, who are "working to better understand the implications" of the sunken status.

"There's no doubt that it was the most important single islet for sea turtle nesting," Charles Littnan, a biologist with the National Oceanic and Atmospheric Administration, told the Honolulu Civil Beat, which first reported the island's disappearance.

The 11-acre isle acted as nesting grounds for half the world's Hawaiian green sea turtles, the Civil Beat reported. It served as the birthplace for roughly one-seventh of all Hawaiian monk seals.

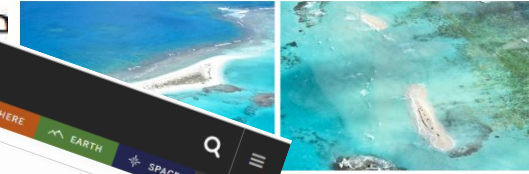


Video credit: Chip Fletcher and Honolulu Civil Beat.

The recent loss of East Island in the Papahānaumokuākea Marine National Monument to rising sea level demonstrates the need to stop climate change. Now, Chip Fletcher, earth sciences professor and associate dean in SOEST, published a video op-ed in the Honolulu Civil Beat. Watch the video here.

\$14... shocked by Quicken Loans

East Island, Remote Hawaiian Sliver of Sand, Is Largely Wiped Out by a Hurricane



...it, was an 11-acre sliver of land in the ... appeared. Dan Link/US Fish and Wildlife Service

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f t e r

...then, it was mostly gone.

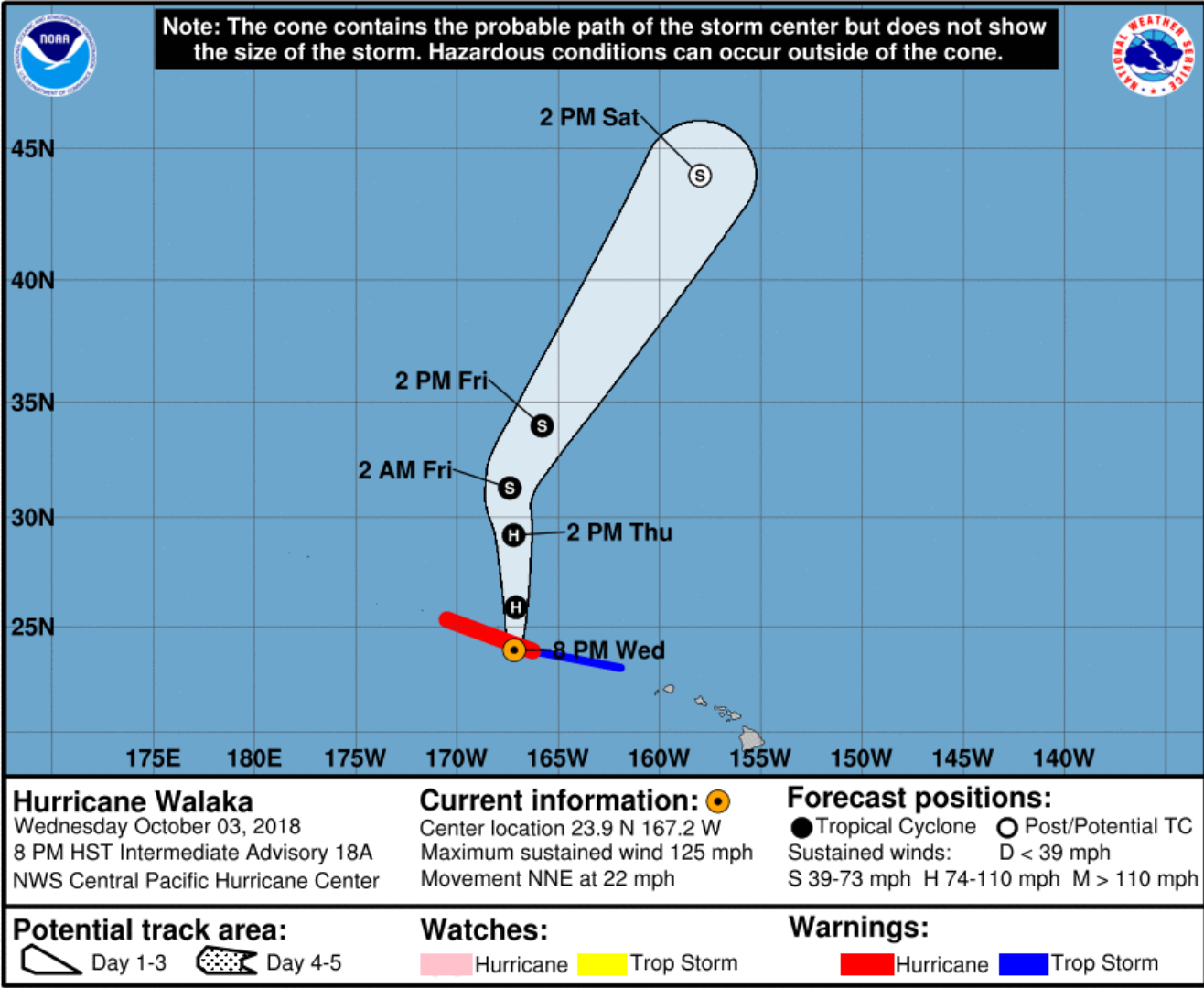
...swept through the central Pacific this month, captured in images as an 11-acre sliver of sand on the turquoise ocean.

...government officials confirmed that the island, in the Hawaiian archipelago, had been largely missing for several months from French Frigate Shoals, a crescent-shaped many islets, Ms. Clark said.

...a climate scientist with the University of Hawaii who is studying East Island's natural history, said it comprises loose coral rubble rather than solid rock. His team had just taken several samples from the island in July. But late last week, he said, he was alerted by government officials that it had mostly disappeared.

Hurricane Walaka

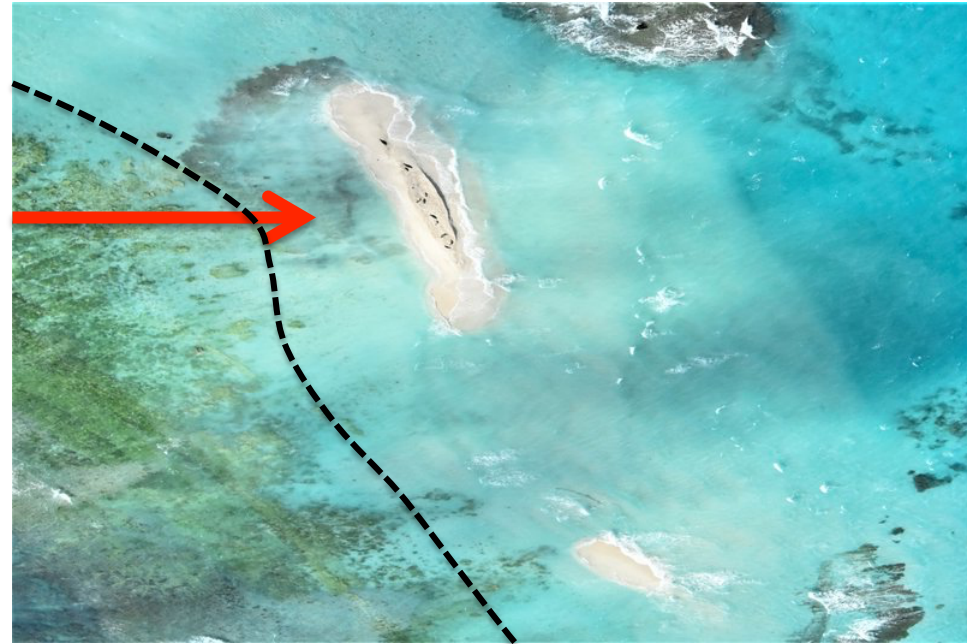
- Wed. Oct 3, 2018: 100 miles west of Lalo
- Cat 3: sustained winds of 125 mph w/ stronger gusts
- Increased occurrence of of Hurricanes in Hawaiian waters is projected due to climate change.



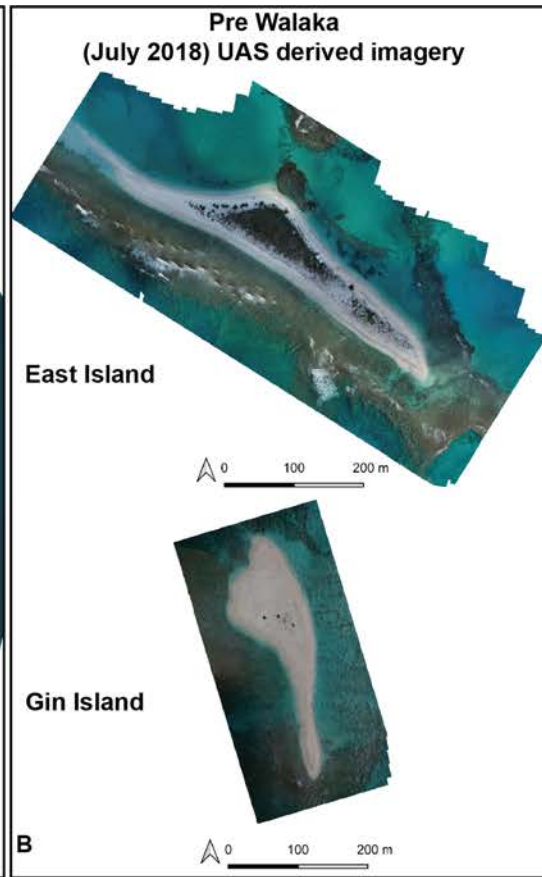
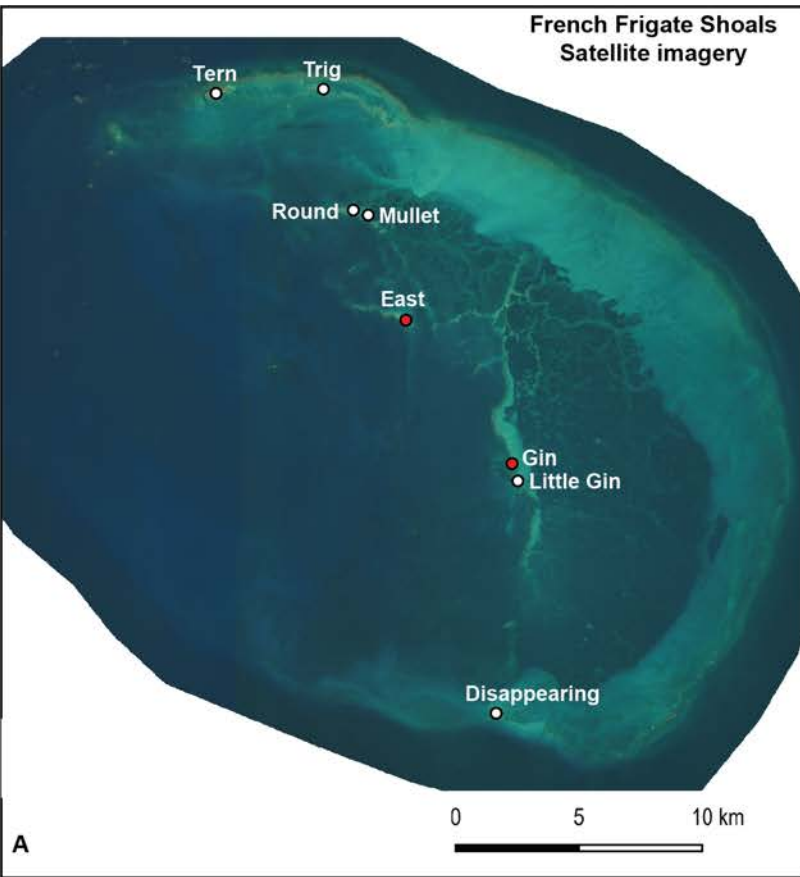


East prior to Hurricane (Aug. 2018)

**Island
moved
offshore**



East after Cat 3 Hurricane (Oct 2018)

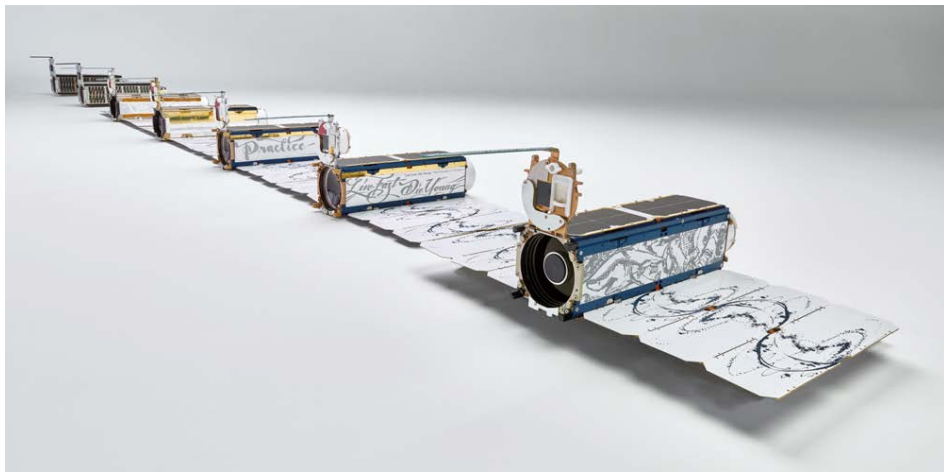




Resolution: 3.7 m²

Time Series

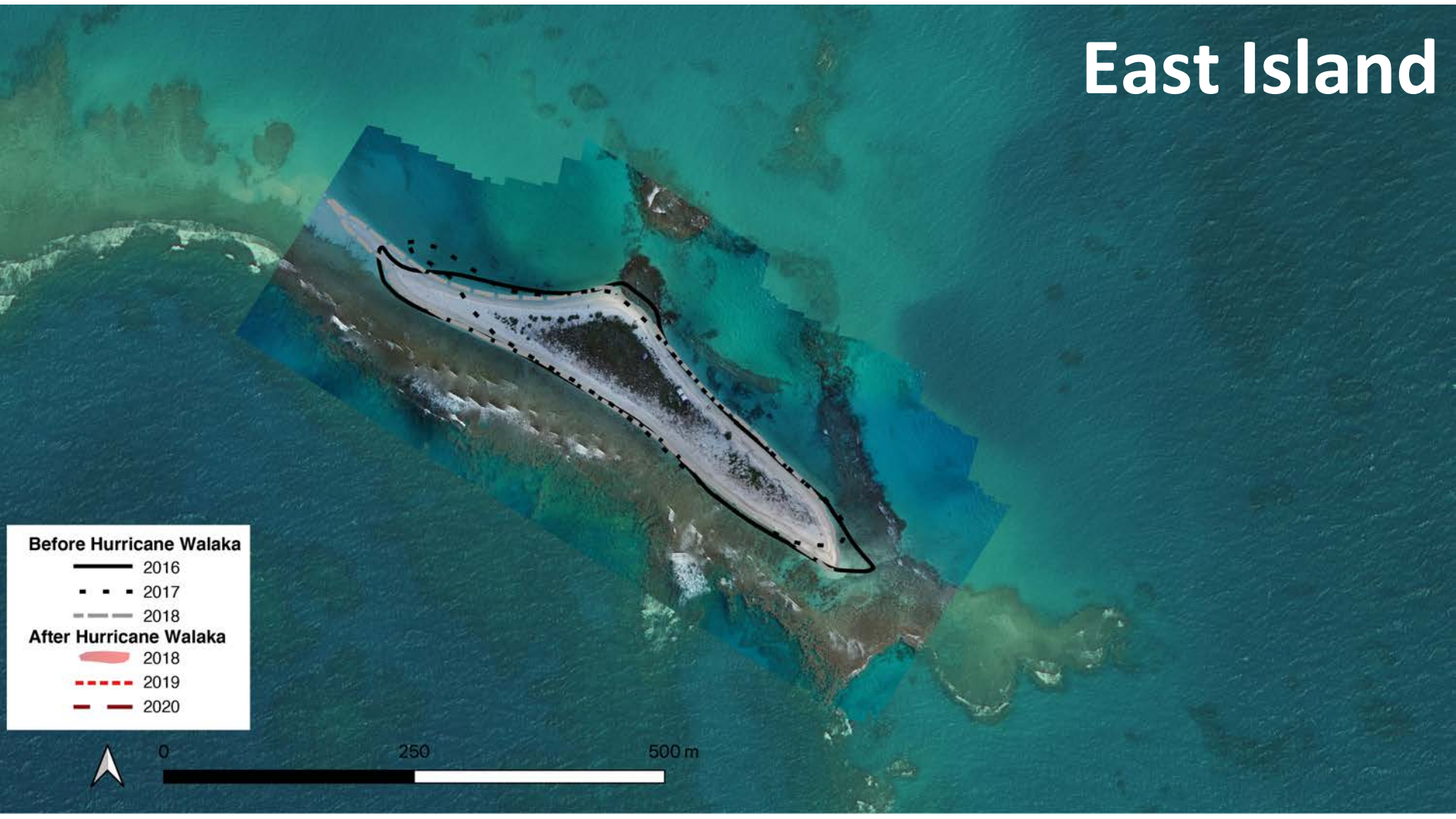
- Sept 25, 2018 (Prior to Walaka)
- Oct 13, 2018
- Dec 13, 2018
- Jan 09, 2019
- Feb 22, 2019
- April 01, 2019



Photos: Planet Labs

Data provided by Keo Lopes

East Island



Before Hurricane Walaka

- 2016
- - - 2017
- - - 2018

After Hurricane Walaka

- 2018
- - - 2019
- 2020



0

250

500 m

East Island



Before Hurricane Walaka

- 2016
- - - 2017
- - - 2018

After Hurricane Walaka

- 2018
- - - 2019
- - - 2020

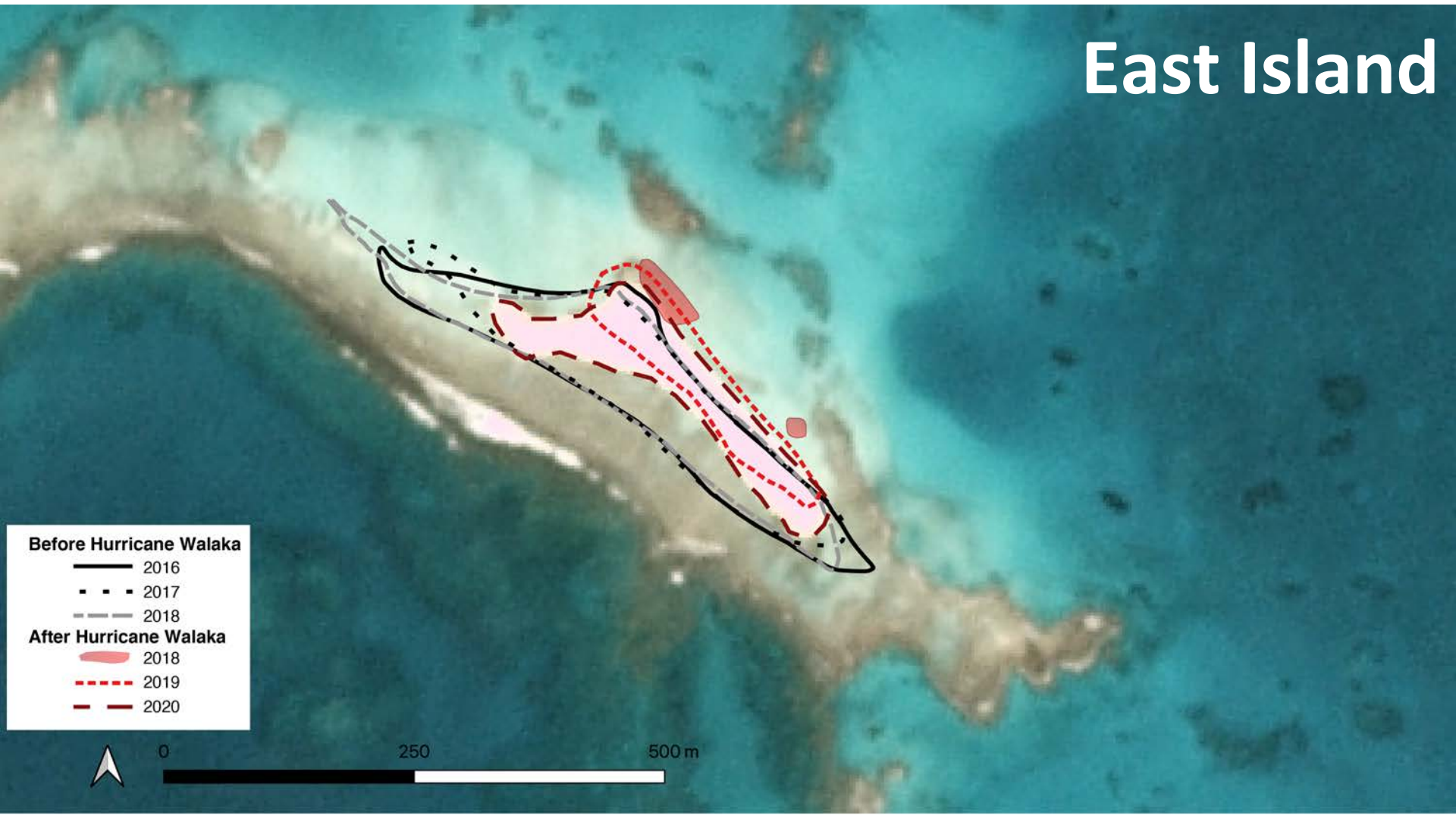


0

250

500 m

East Island



Before Hurricane Walaka

- 2016
- - - 2017
- - - 2018

After Hurricane Walaka

- 2018
- - - 2019
- . - 2020



0

250

500 m





Tern

Before Hurricane Walaka

- 2016
- 2017
- 2018

After Hurricane Walaka

- 2018
- 2019
- 2020





Direction of wave overwash

Tern Island



Direction of wave overwash



Tern Island

Removed vegetation & elevated portions of the island



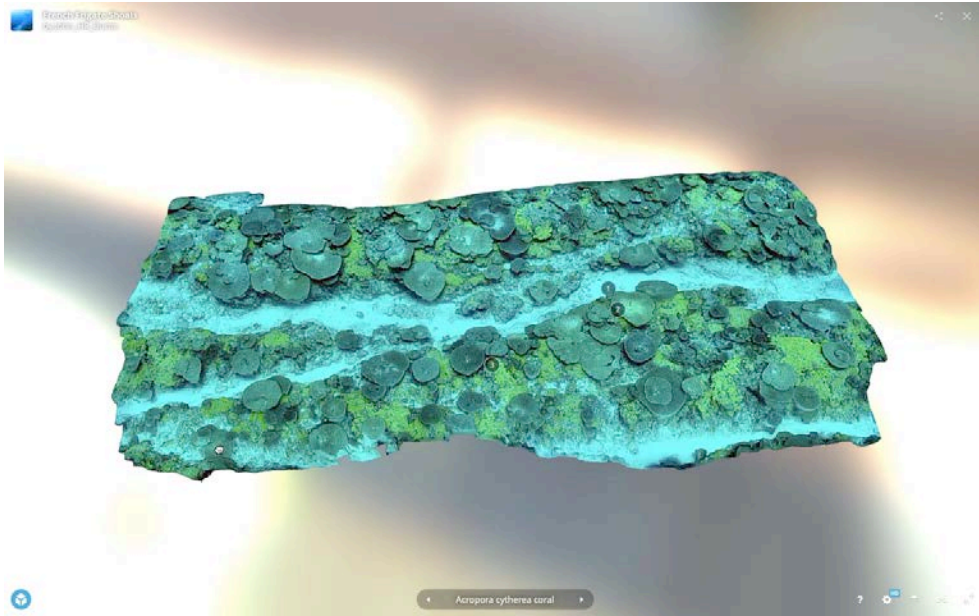
**Hurricane
overwash**

Pre hurricane soil layer



He pūko‘a kani ‘āina

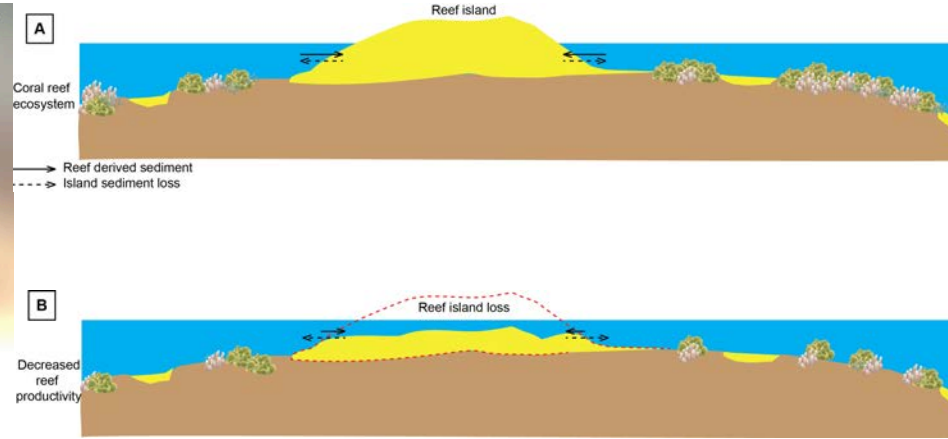
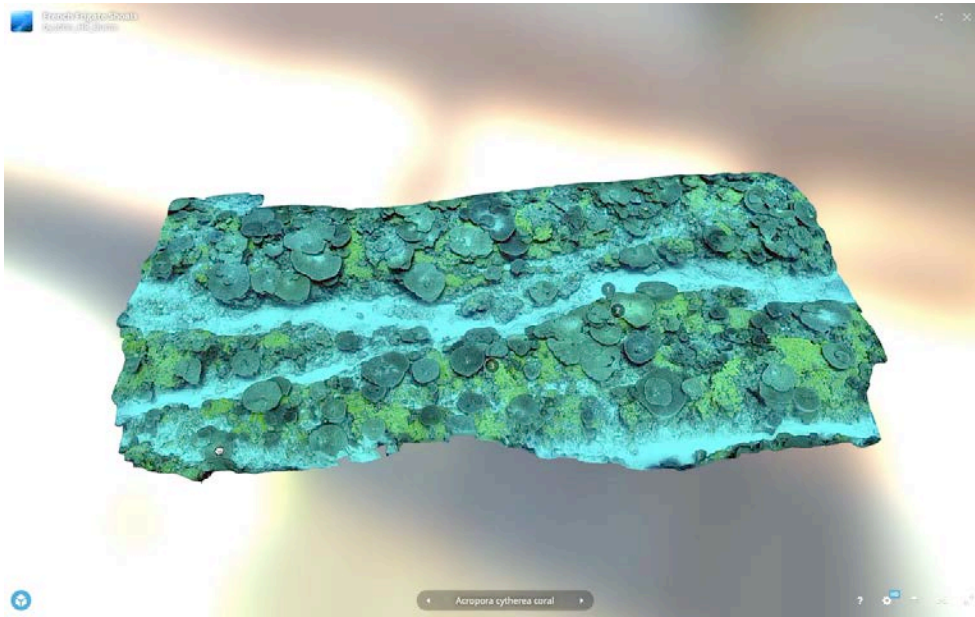
A coral reef that grows into an island.



How does the biodiversity & productivity of coral reefs impact island composition? Island resiliency?

He pūko‘a kani ‘āina

A coral reef that grows into an island.



How does the biodiversity & productivity of coral reefs support island resiliency to sea level rise and storms?

