Professor Margaret Anne McManus
Director - Uehiro Center for the Advancement of Oceanography
Chairwoman - Department of Oceanography (returning 1 July 2024)
University of Hawai'i at Mānoa

22 May 2024

National Academies of Sciences, Engineering and Medicine's Decadal Survey of Ocean Sciences for the NSF consensus study: Urban Seas and Coastal Oceans

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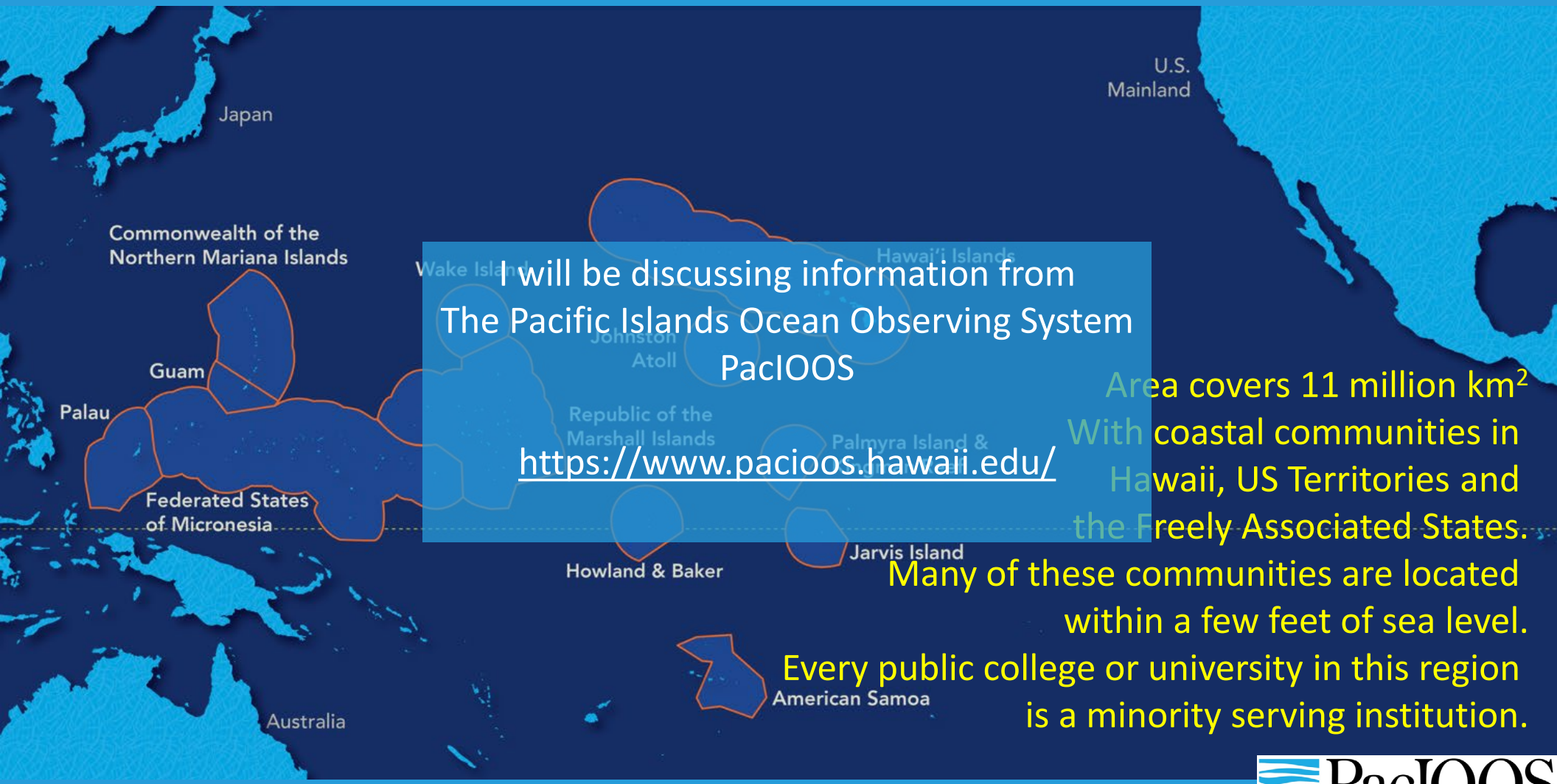
Hawai‘i and U.S. Affiliated Pacific Islands



I will be discussing information from
The Pacific Islands Ocean Observing System
PacIOOS

https://www.pacioos.hawaii.edu/

Area covers 11 million km^2
With coastal communities in Hawaii, US Territories and the Freely Associated States.
Many of these communities are located within a few feet of sea level.
Every public college or university in this region is a minority serving institution.

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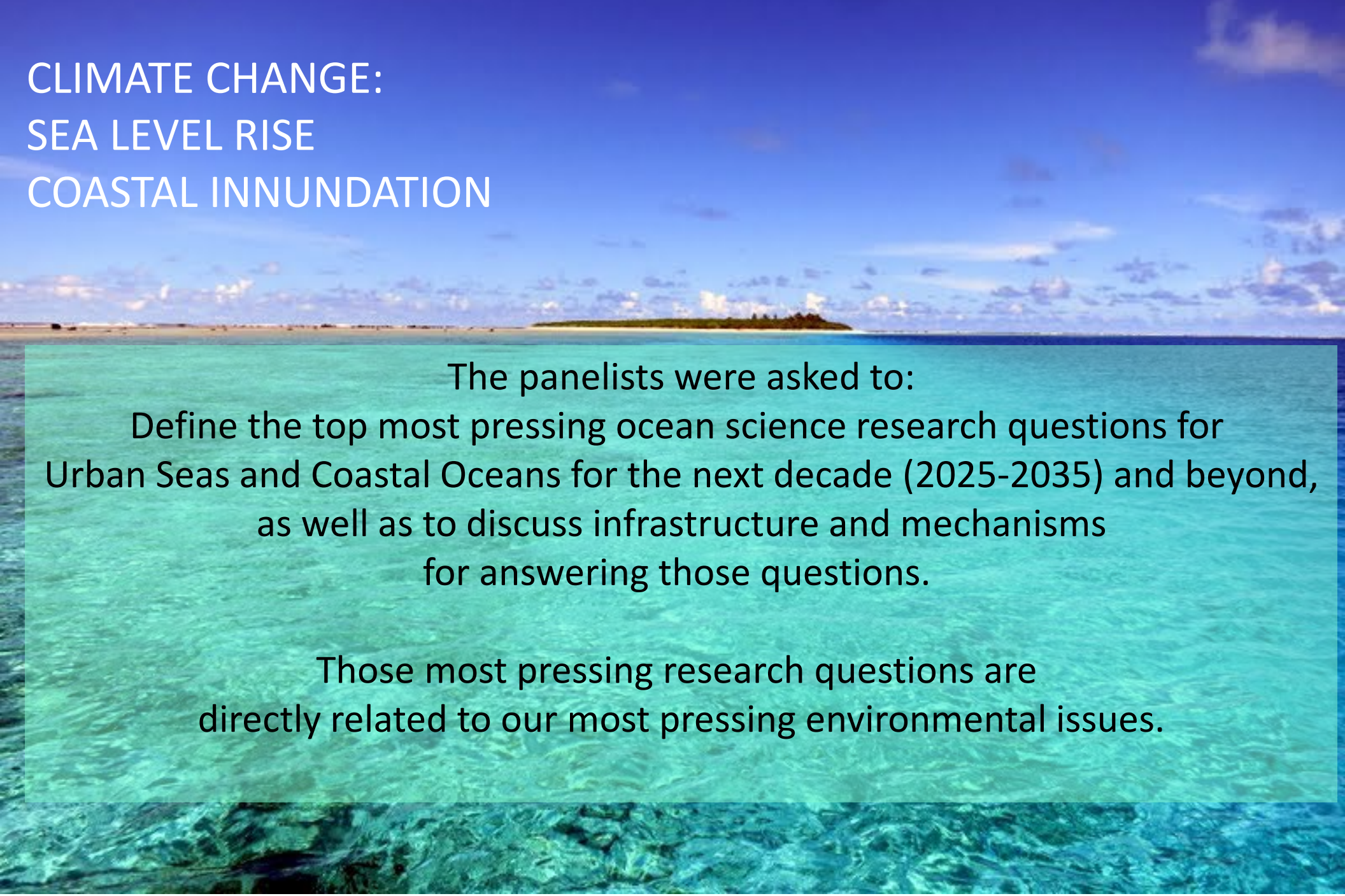
State of Hawai'i

US Territories: CNMI, Guam, American Samoa. Each has delegate in House

Freely Associated States: Republic of Palau, FSM, Republic of Marshall Islands

Outlying Islands & Atolls: Wake, Johnston, Palmyra, Kingman, Howland, Baker, Jarvis



CLIMATE CHANGE:
SEA LEVEL RISE
COASTAL INNUNDATION

The panelists were asked to:
Define the top most pressing ocean science research questions for Urban Seas and Coastal Oceans for the next decade (2025-2035) and beyond, as well as to discuss infrastructure and mechanisms for answering those questions.

Those most pressing research questions are directly related to our most pressing environmental issues.

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CLIMATE CHANGE:
SEA LEVEL RISE
COASTAL INNUNDATION

Saltwater intrusion associated with sea level rise will impact freshwater in coastal aquifers, especially on low islands


North Shore Oahu, HI
Pat Caldwell


Majuro, RMI


Waikiki, Oahu, HI


Dolan Eversole


Dolan Eversole

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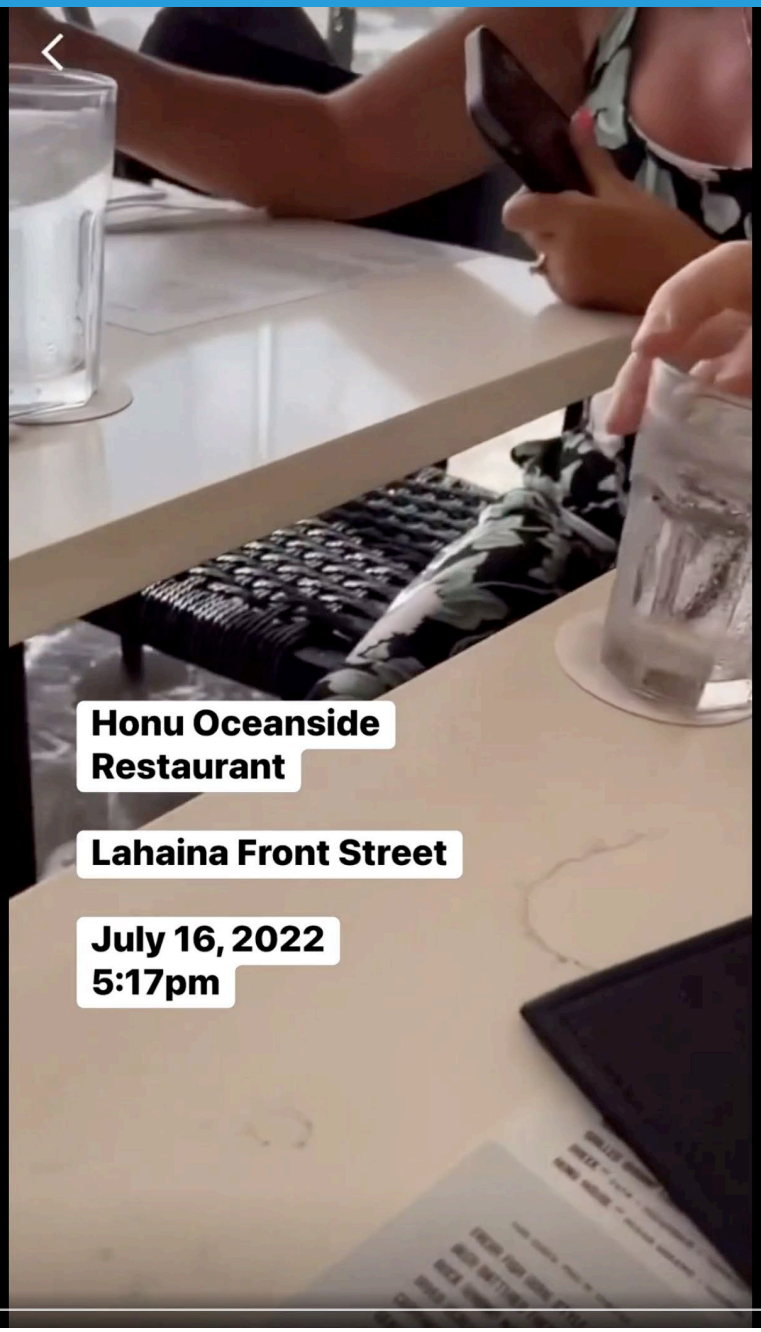
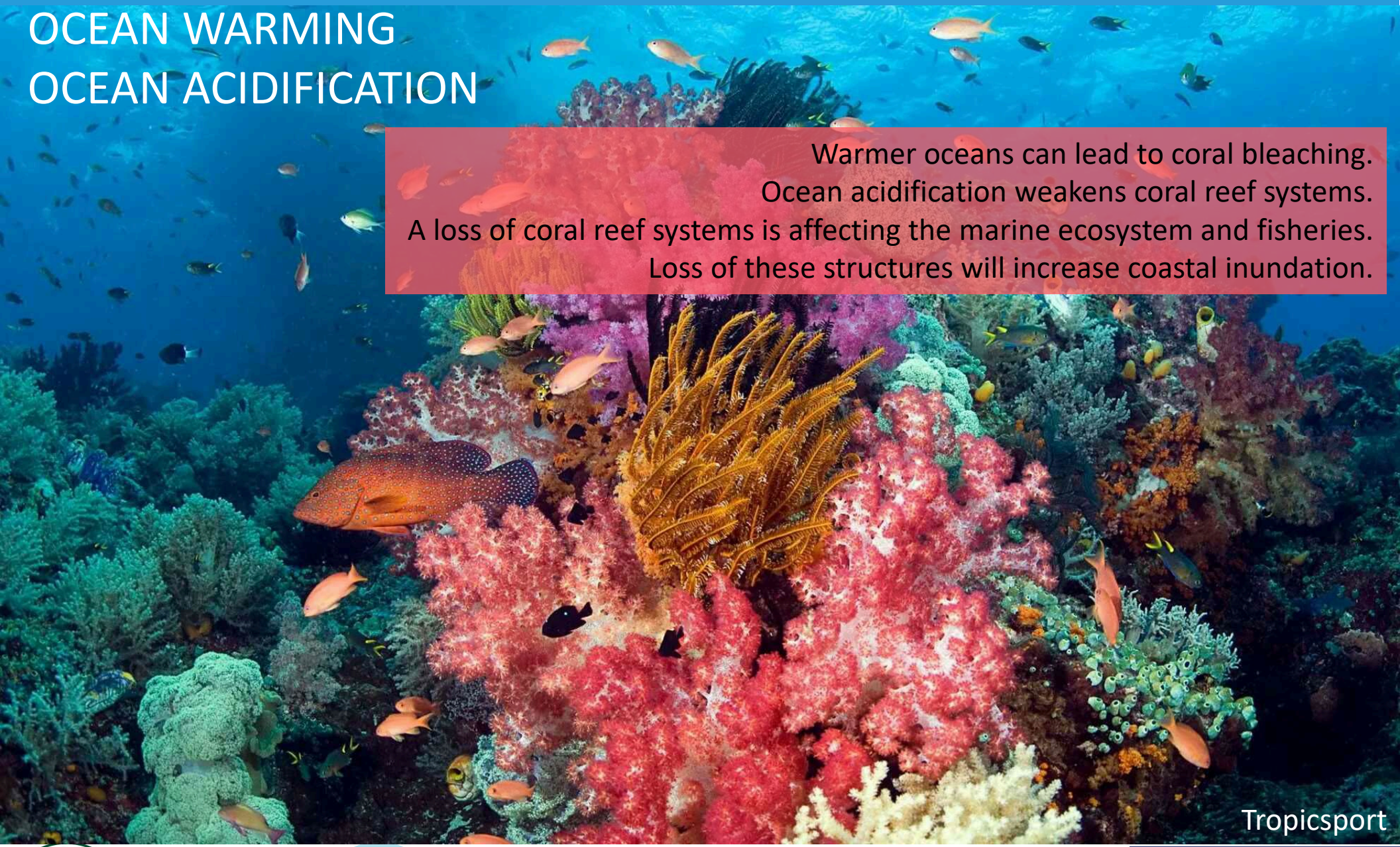


Video of coastal flooding from a citizen scientist at a restaurant in Lahaina, Maui on a Saturday afternoon in July of 2022.

Movie courtesy of Camilla Tognacchini

CLIMATE CHANGE:
OCEAN WARMING
OCEAN ACIDIFICATION



Warmer oceans can lead to coral bleaching.
Ocean acidification weakens coral reef systems.
A loss of coral reef systems is affecting the marine ecosystem and fisheries.
Loss of these structures will increase coastal inundation.

Tropicsport

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NEARSHORE WATER QUALITY:
With increased coastal inundation and increased development our coastal water quality is suffering

Current methods to detect wastewater pollution are not adequate to reduce public health risk

- Regulatory agencies use culture-based methods to detect fecal bacteria
- Testing occurs weekly to monthly
- 1-2 days before public can be notified of wastewater pollution in swimming areas
- The publics exposure to polluted waters is not being reduced effectively

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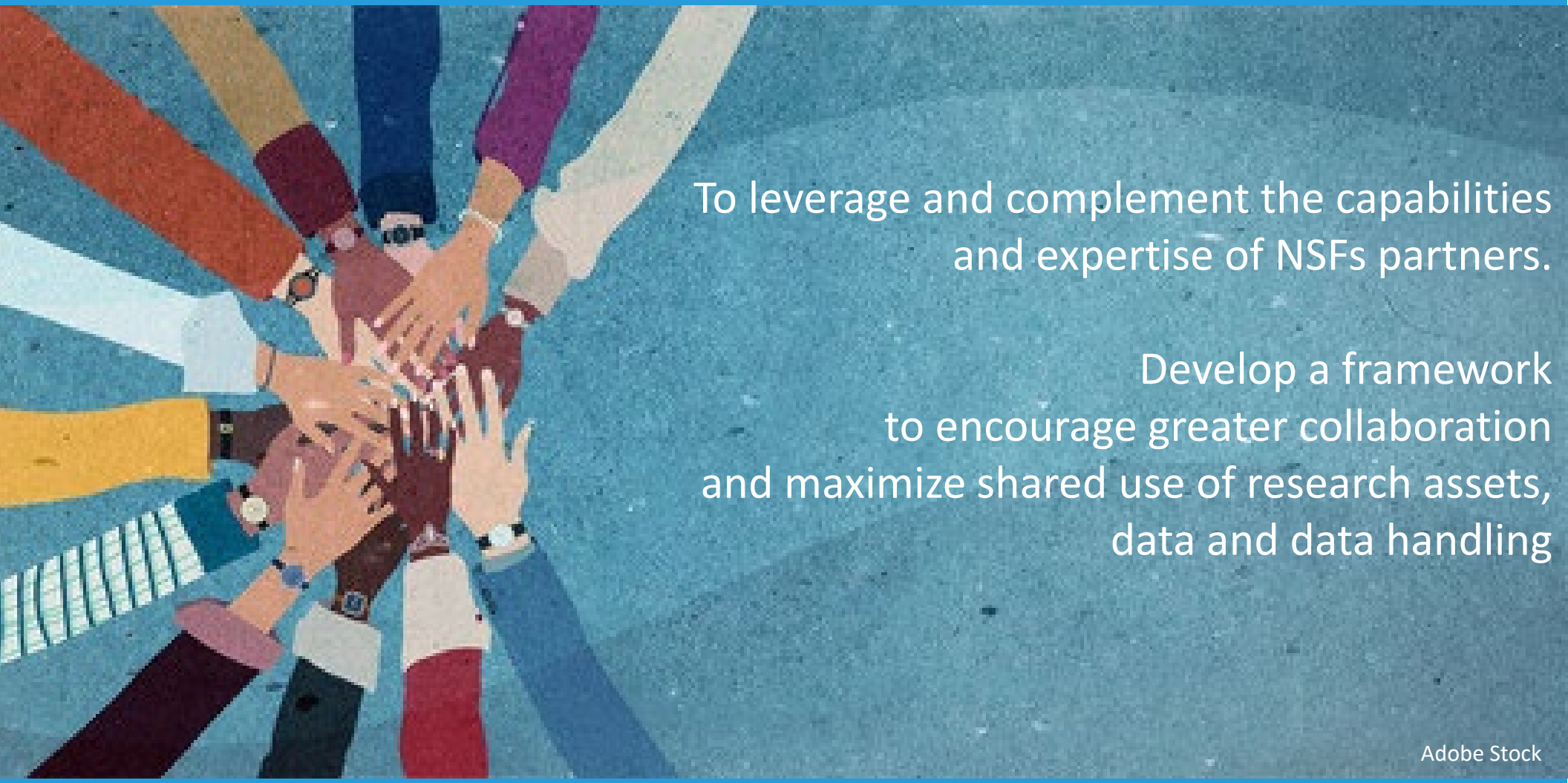
THE GOAL

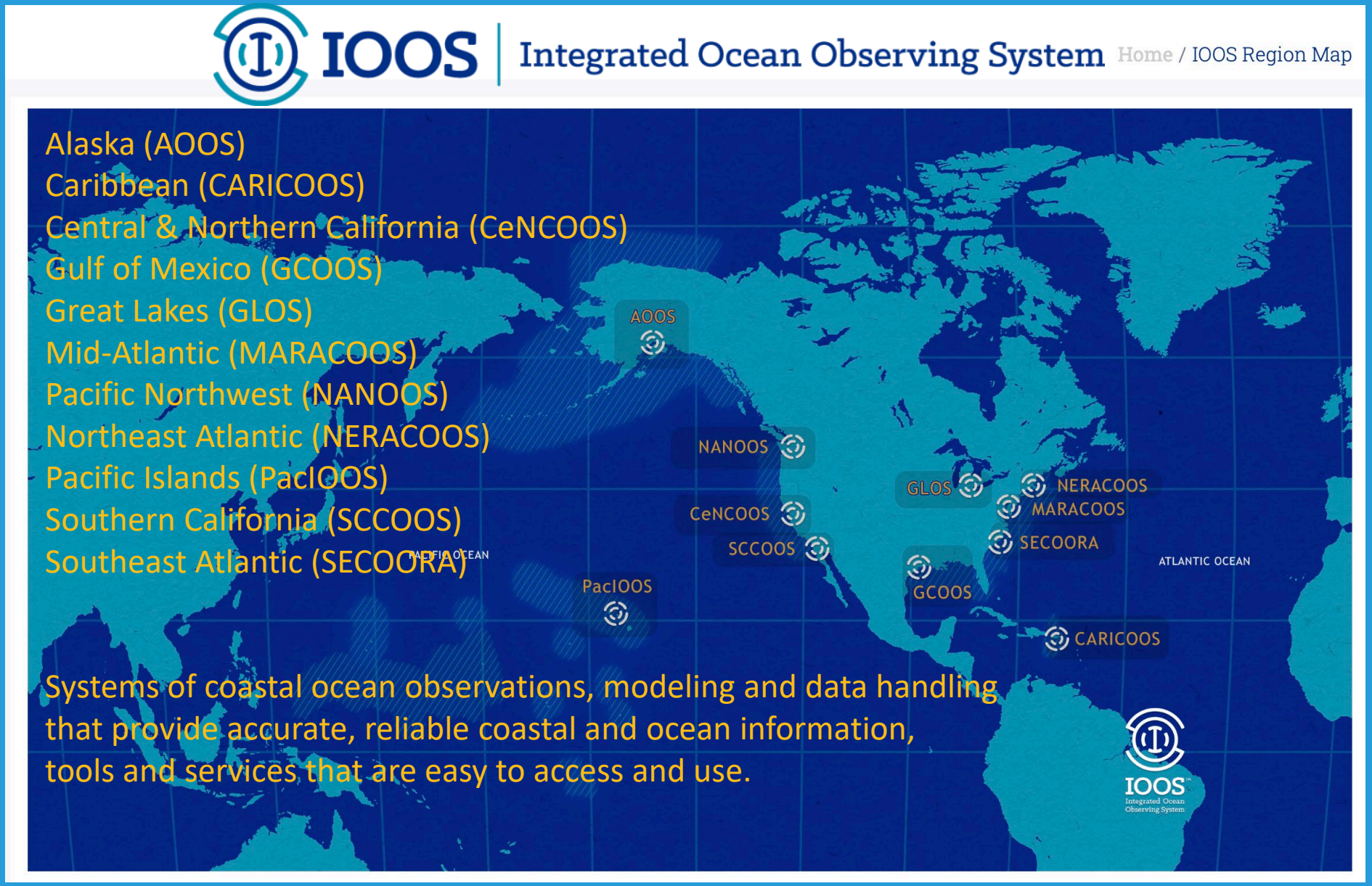


To leverage and complement the capabilities and expertise of NSFs partners.

Develop a framework to encourage greater collaboration and maximize shared use of research assets, data and data handling

Adobe Stock

STRONG PARTNERSHIPS



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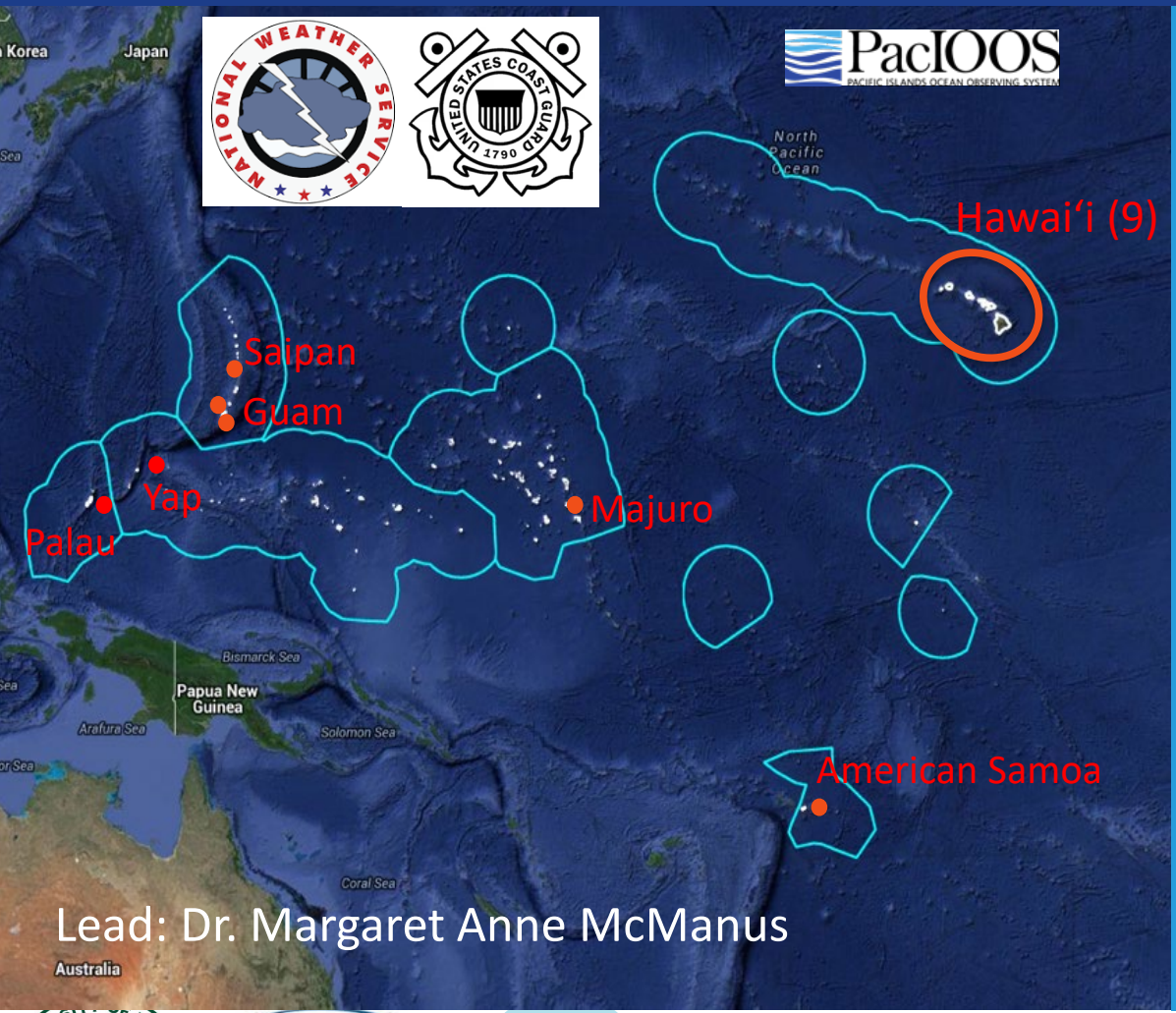
ONE EXAMPLE OF A SUCCESSFUL PARTNERSHIP

PacIOOS has oceanographic instruments deployed across Hawaii, the US Territories and Freely Associated States

PacIOOS Wave Buoy Group. Near real-time wave observations



Couple in-water infrastructure to PacIOOS Models

- Regional Ocean Modeling System
  Dr. Brian Powell UH Oceanography
  currents
  temperature
  salinity
  turbidity plume model

- Weather models
  Dr. Yi-Leng Chen UH Atmospheric Sci

- Shoreline impact models
  Dr. Doug Luther UH Oceanography
  wave run-up forecast
  high sea level forecast
  harbor surge forecast

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ONE EXAMPLE OF A SUCCESSFUL PARTNERSHIP

PacIOOS in-water infrastructure and models contribute to a research project in Lahaina, Maui.

Wave-driven flooding forecast with sea level rise
Lead: Dr. Doug Luther UH Oceanography

Gray landscape is the wildfire area of Lahaina, Maui, Hawai'i

Model with present day sea level and maximum waves

ONE EXAMPLE OF A SUCCESSFUL PARTNERSHIP

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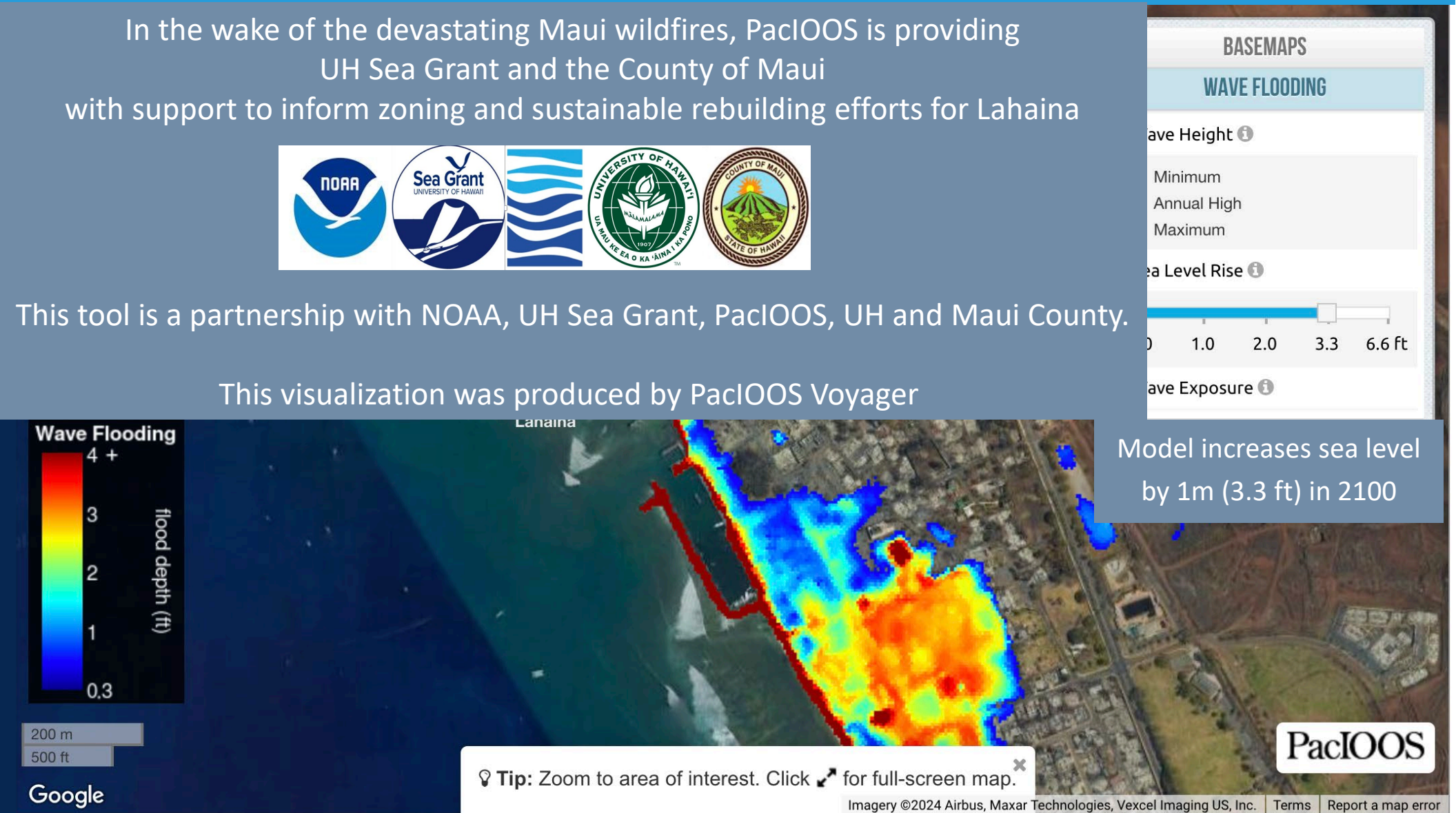
Wave-driven flooding forecast with sea level rise
Lead: Dr. Doug Luther UH Oceanography

In the wake of the devastating Maui wildfires, PacIOOS is providing
UH Sea Grant and the County of Maui
with support to inform zoning and sustainable rebuilding efforts for Lahaina

This tool is a partnership with NOAA, UH Sea Grant, PacIOOS, UH and Maui County.

This visualization was produced by PacIOOS Voyager



Model increases sea level by 1m (3.3 ft) in 2100

DATA INFRASTRUCTURE

PacIOOS Voyager is an interactive map interface for visualizing and downloading oceanographic observations, forecasts, and other geospatial data and information related to the marine environment. PacIOOS Voyager connects to backend data services (e.g., THREDDS, ERDDAP).

PacIOOS helps numerous projects make their data FAIR (findable, accessible, interoperable, and reusable). Voyager facilitates data access and visualization.

Nationally all 11 IOOS regions have open data: accessible to K-12, college, researchers and the community. The IOOS mission is to support Open Data.

Seamless interoperability between BCO-DMO (biological & chemical oceanography data management office) and IOOS data platforms like Voyager

Photo Credit: John Voo

The panelists were also asked to consider workforce development and incorporating the principles of diversity, equity, inclusion, and environmental justice.

Successes through an NSF TCUP (Tribal Colleges and Universities Program): Halau Ola Honua, Our Living World. State-wide collaboration, University of Hawaii at Mānoa and several community colleges (Windward, Honolulu, and Kauai Community Colleges). This NSF TCUP successfully created pathways between the UH community colleges and UH Manoa: several Native Hawaiian and Pacific Islander students did transition into four year colleges in STEM after our program.

The fundamental issue I see is the lack of Native Hawaiian and Pacific Islander faculty. The few we have are highly sought-after, and are asked to do too much "invisible labor" (requests from University, State, Federal and community).

We need programs to enhance representation of Native Hawaiian and Pacific Islander Faculty, Postdoctoral Researchers and Graduate Students. This would help to make our Institutions more representative of, and responsive to, the communities that we serve.

Photo: Paula Moehlenkamp

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THANK YOU

Dr. Jordan Watson

Ms. Christina Comfort

Ms. Paula Moehlenkamp

Ms. Camilla Tognacchini

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