



# Planning for Rising Seas and Coastal Change Hazards

## “What’s new from the USGS?”

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# Coastal and Marine Hazards and Resources Program

## Preparing the Nation for Coastal and Ocean Changes

**NOW**

### Forecast storm impacts

Coastal erosion & flooding from extreme storms

**FUTURE**

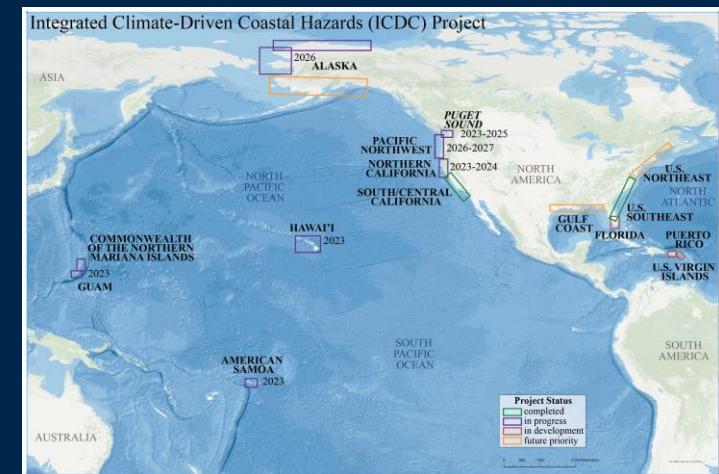
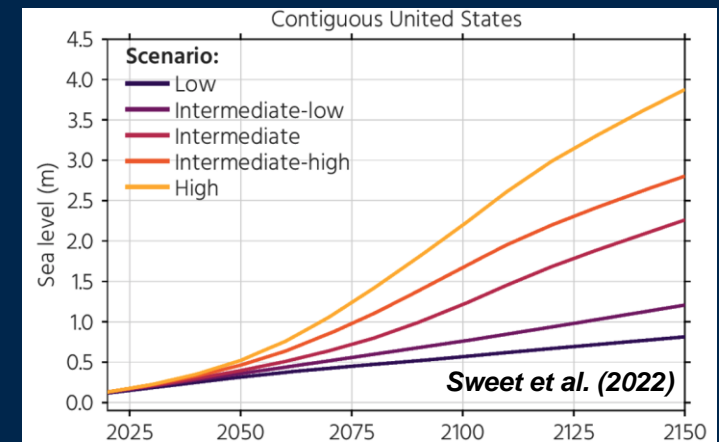
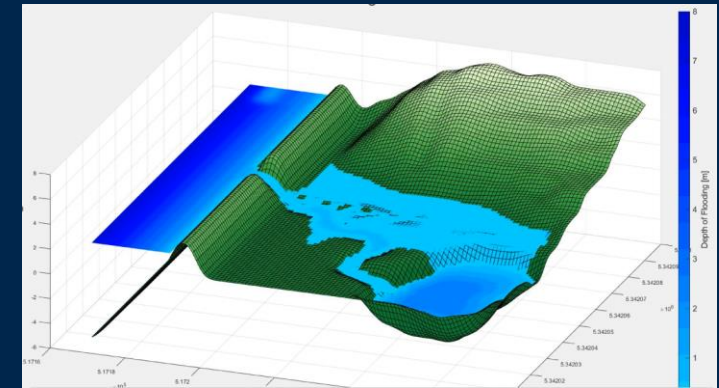
### Plan for climate change

Visualize sea-level rise and associated impacts



# Supporting Climate Adaptation Planning with the Coastal Storm Modeling System

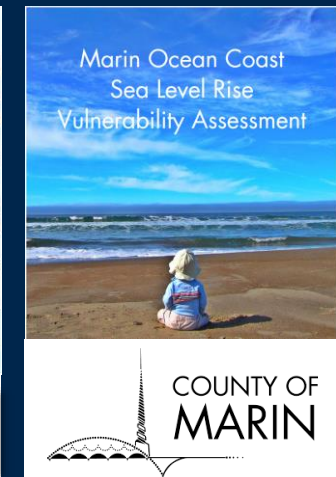
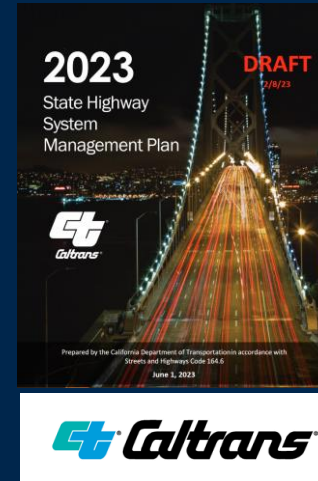
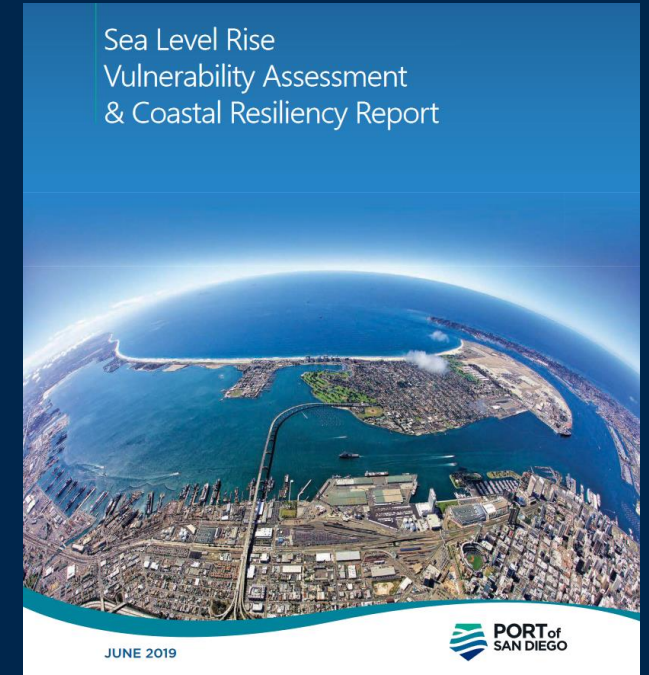
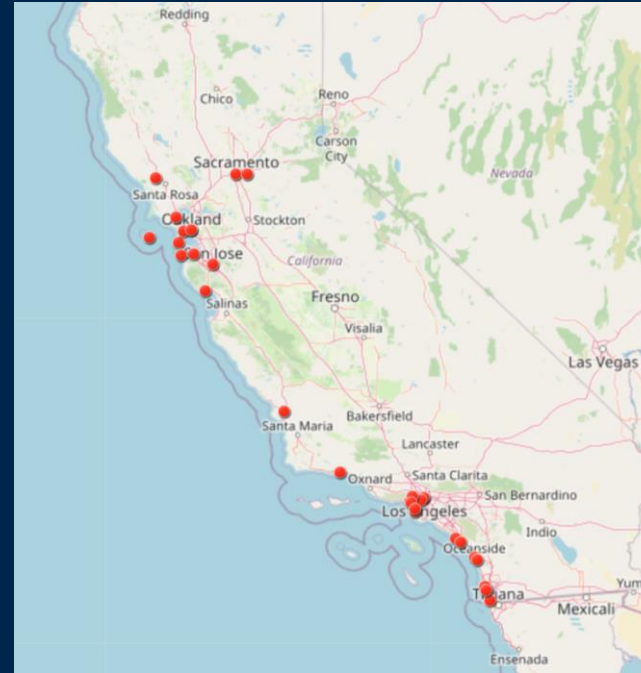
- CoSMoS is a model for assessing coastal hazards due to climate change
- Goal: Provide consistent, sound, cutting-edge science to **reduce risk, increase resilience**, and better **direct adaptation efforts**
- Predicts coastal hazards for the full range of sea level rise and storm possibilities
  - Flooding
  - Coastal erosion
  - Groundwater
- Geographic Expansion: Southeast, Hawaii and Pacific Island Territories, Northern California, Pacific Northwest, Alaska



# How has CoSMoS been used?

In California, 164 organizations using products for climate adaptation planning

- Local Coastal Program updates
  - Municipal Plans (General Plans, Hazard Mitigation Plans)
  - Infrastructure or Capital Investment Plans
  - Development permit review
  - Public engagement and communication
- 
- Examples: Port of San Diego, Caltrans, Marin and San Mateo counties



# User-centered Web Tools in California

ourcoastourfuture.org

The screenshot shows the homepage of ourcoastourfuture.org. At the top, there is a navigation menu with links for HOME, ABOUT, HAZARD MAP, CASE STUDIES, and SCIENCE AND MODELING. The main content area features a large background image of a beach at sunset. A central text box reads: "Welcome to Our Coast, Our Future. Understand, visualize, and adapt to sea level rise, coastal storms, and erosion hazards. WHAT'S NEW? Updated website, new mapping user interface, new groundwater data." Below this, a section titled "Planning for and Adapting to Changing Coastal Climate" is visible.

usgs.gov/apps/hera

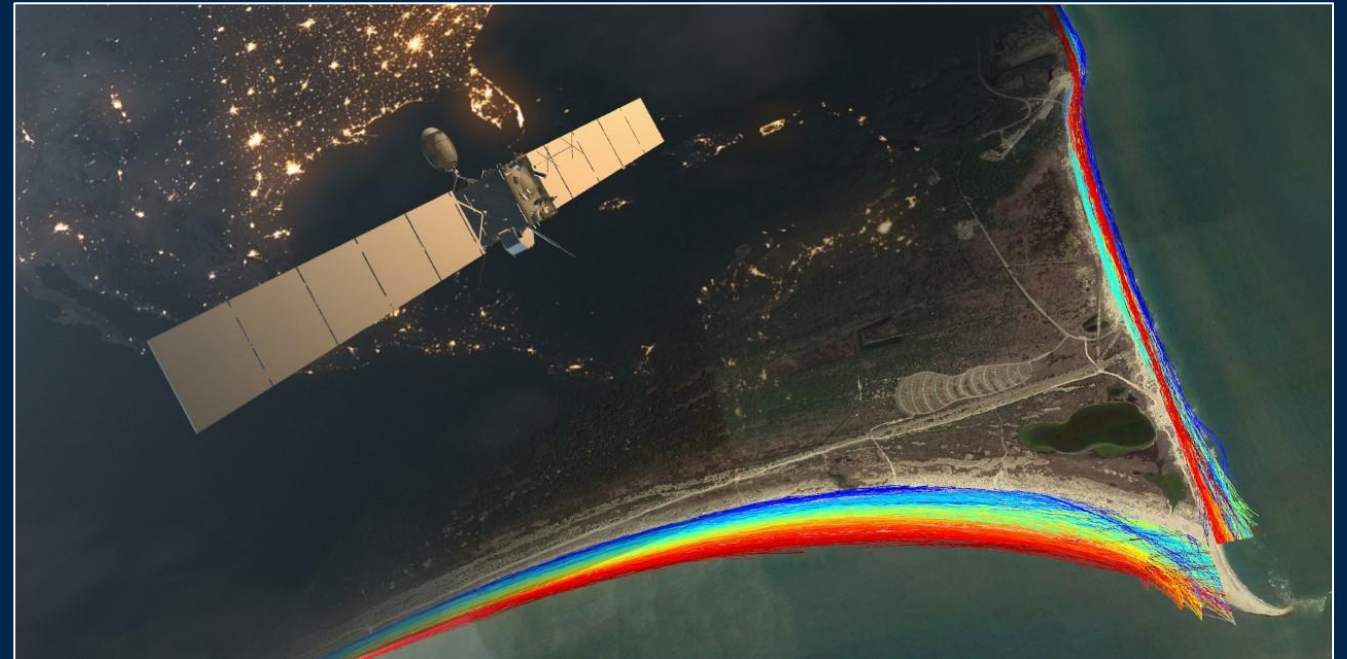
The screenshot shows the homepage of the USGS Hazard Exposure Reporting and Analytics (HERA) application. The USGS logo is at the top left, and navigation links for HERA Home, Get Started, Tools, Help, Contact, and About are at the top right. A central banner reads "Welcome to HERA" and explains that the website helps communities understand natural hazards. Below the banner, there are two main sections: "Learn About Our Tools" with links for Get Started, Guided Tour, and Data & Methods; and "Use Our Tools" with four launch buttons for Coastal Flooding, Coastal Groundwater, Shoreline Change, and Multi-Hazard Viewer.

This screenshot shows the "HAZARD MAP" interface on ourcoastourfuture.org. It features a search bar at the top left and a map of the California Coast. On the left side, there are controls for "Explore Scenarios", including a "Scenario" dropdown set to "100 year" and "Sea Level Rise" and "Storm Frequency" sliders. A legend on the right side lists hazard types: Maximum Wave Runup, Flood-prone Low Lying, Flood Extent, and Flood Depth, each with a corresponding color-coded legend. The map shows various coastal areas with different hazard levels overlaid.

This screenshot shows the "Impact of Sea Level Rise and Storms on Coastal Flooding Hazards" interface in the USGS HERA application. It displays a map of Long Beach, Los Angeles, CA, with various hazard zones overlaid. On the left, there are controls for "Choose Your Flood Hazard" (Coastal Storm Frequency, Sea Level Rise, Flood Hazard) and "Choose Your Asset" (Residents, Economy, Employees, Parcel Values, Land Type, Infrastructure, Critical Facilities). Below the map, there are several data visualization charts, including a gauge chart for "Amount of Parcel Value (Dollars) in Hazard Zone" and bar charts for "Amount of Parcel Value (Dollars) in Hazard Zone as Sea Level Rises" and "Amount of Parcel Value (Dollars) in Hazard Zone as Storm Frequency Changes".

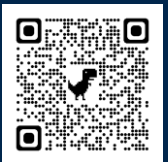
# New Coastal Change Projections Powered by Satellites

- Projects coastal erosion hazards incorporating SLR, cross-shore and longshore transport, and sediment supply
- Uses hundreds of thousands of satellite-derived historical shorelines to calibrate and validate the model
- Produces erosion hazard maps for daily and storm conditions



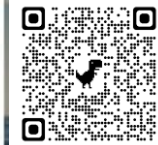
## OPEN ACCESS JOURNAL

A Model Integrating Satellite-Derived Shoreline Observations for Predicting Fine-Scale Shoreline Response to Waves and Sea-Level Rise Across Large Coastal Regions  
Vitousek et al. 2023, JGR: Earth Surface



## DATA RELEASE: [sciencebase.gov](https://sciencebase.gov)

Projections of shoreline change for California due to 21st century sea-level rise



## USGS NEWS SUMMARY

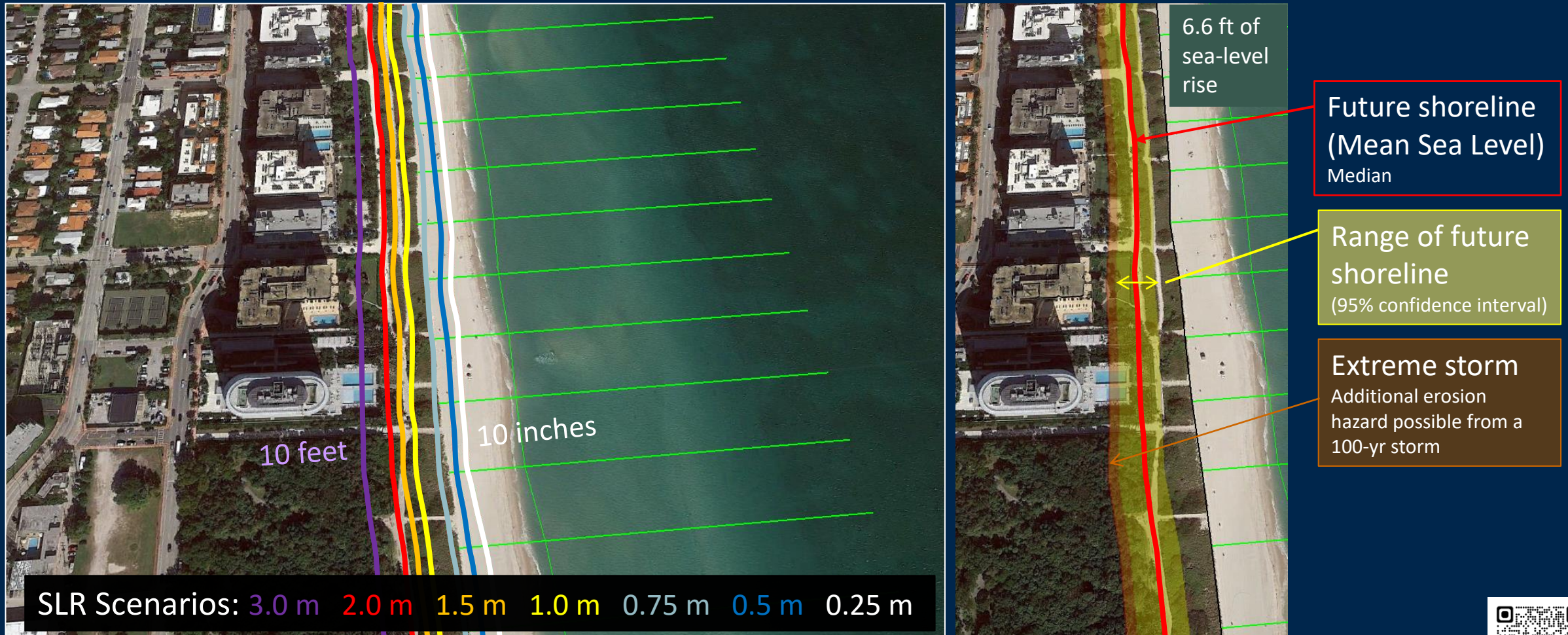
[usgs.gov/centers/pcmssc/news](https://usgs.gov/centers/pcmssc/news)

JUNE 8, 2023

**New Research Reveals Alarming Future for California's Coastline**

# New Coastal Change Projections Powered by Satellites

- Developing guidance and implementing outreach and engagement for end-users in early 2024
- Results are being incorporated into the Our Coast Our Future and HERA web tools



# Hidden Hazards: Rising Groundwater

## WEB TOOLS

Available in OCOF and HERA  
[ourcoastourfuture.org](http://ourcoastourfuture.org)  
[usgs.gov/apps/hera](http://usgs.gov/apps/hera)



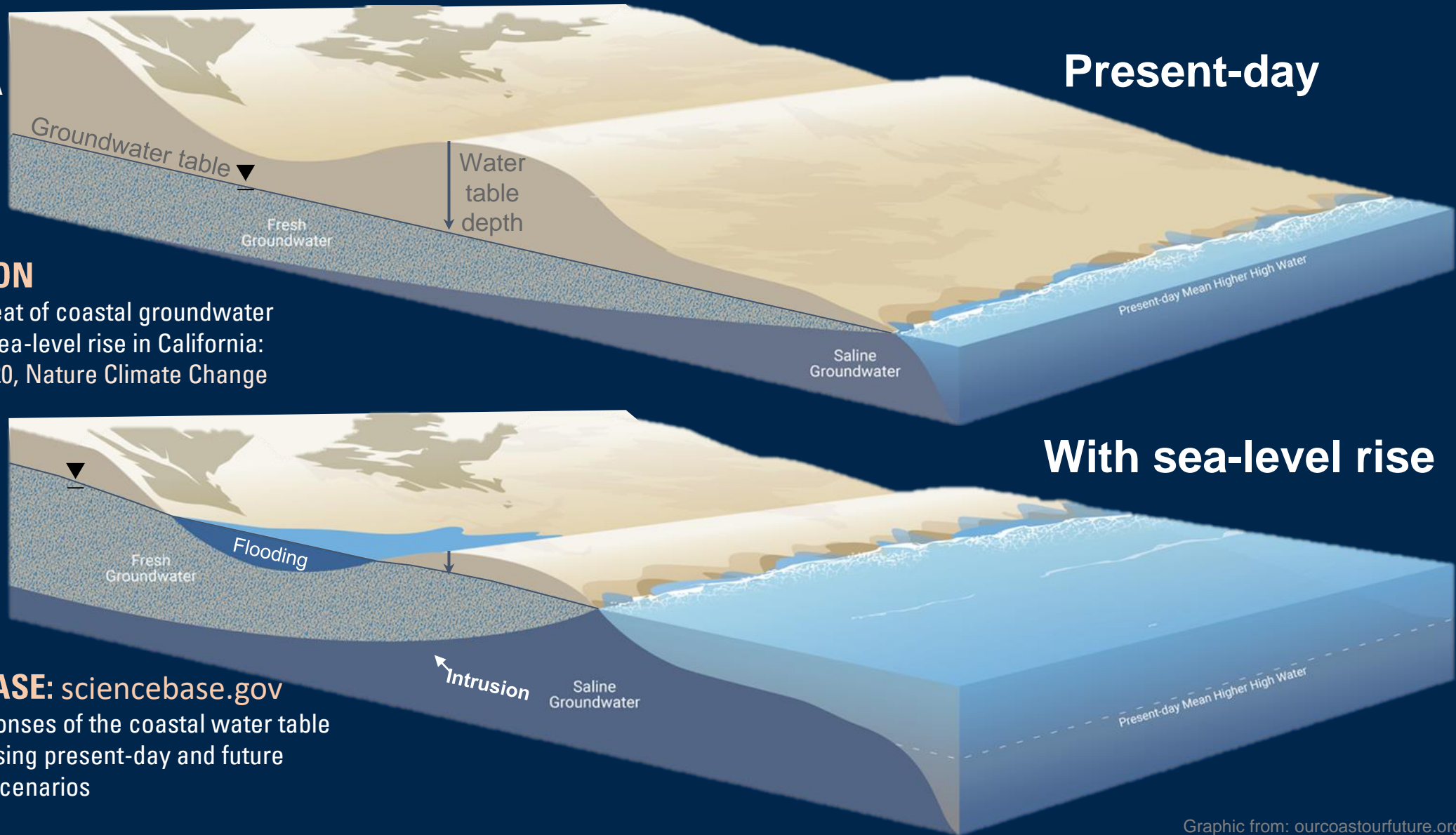
## PUBLICATION

Increasing threat of coastal groundwater hazards from sea-level rise in California: Befus et al. 2020, Nature Climate Change



## DATA RELEASE: [sciencebase.gov](http://sciencebase.gov)

Projected responses of the coastal water table for California using present-day and future sea-level rise scenarios



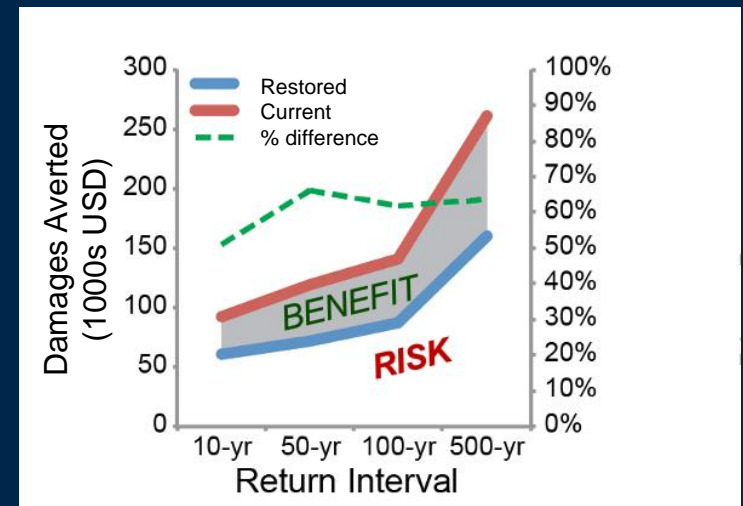
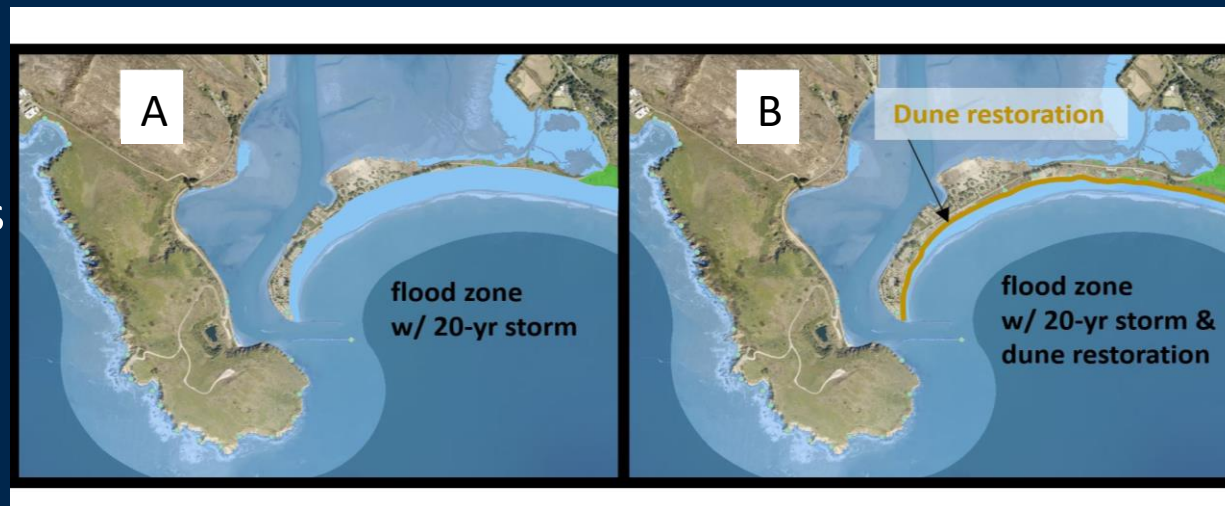
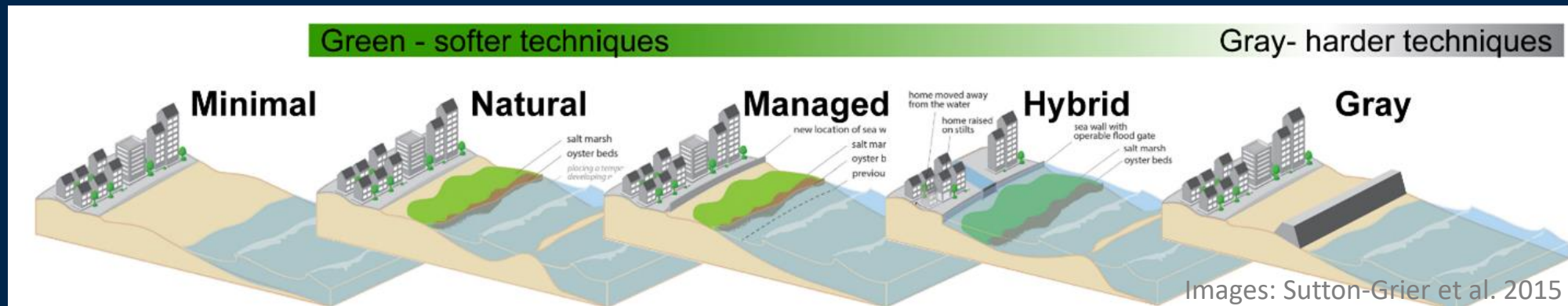


# Adaptation Scenarios and Nature-based Solutions with CoSMoS-ADAPT

- Methods and tools for evaluating adaptation and nature-based strategies: 4 current projects
- Leveraging CoSMoS modeling frameworks

## Partners

- UC Santa Cruz (Reguero)
- UC Santa Barbara (Walker)
- U. Texas Arlington (Hummel)
- Univ. Arkansas (Befus)
- Greater Farallones NMS (Kordesch)

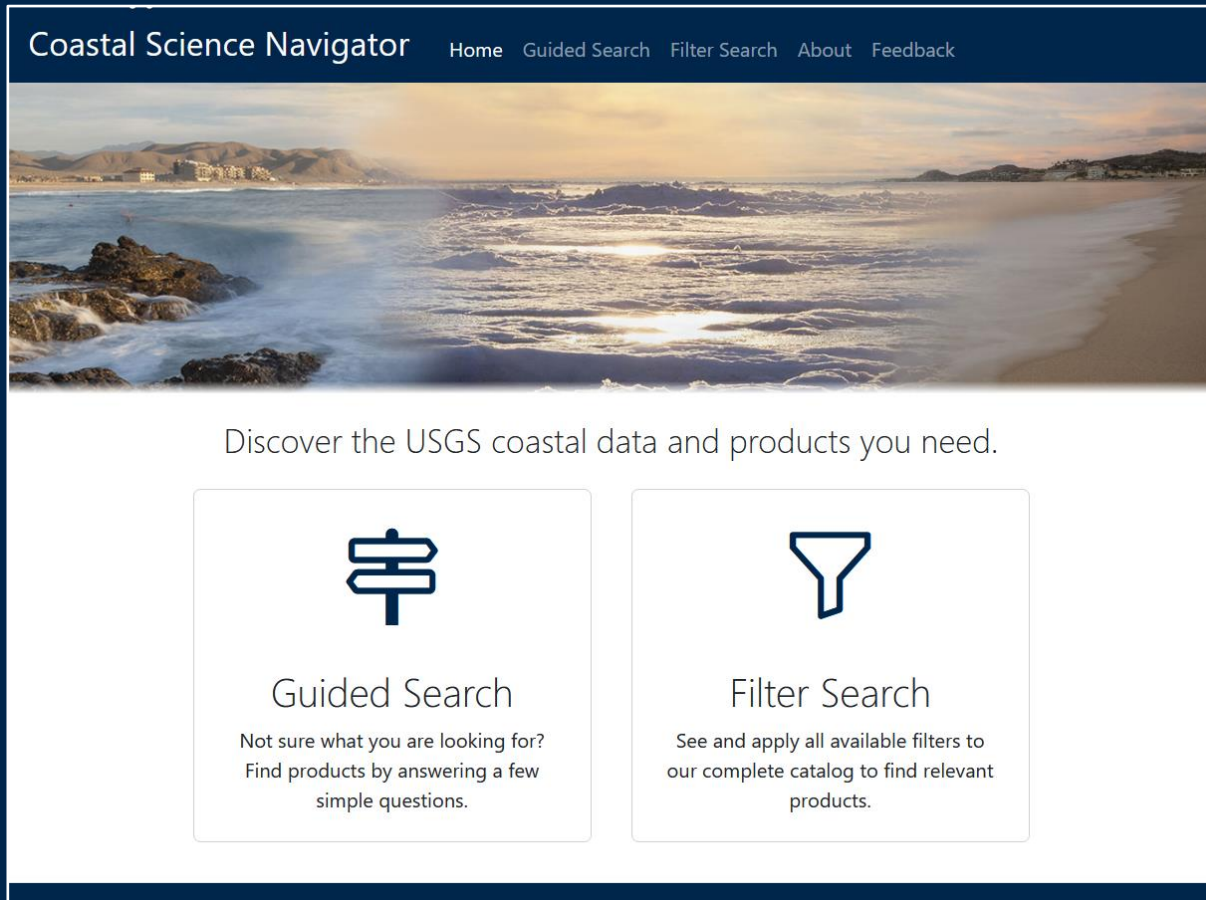


# Coastal Science Navigator

Discover USGS Coastal Change Hazards information, products, and tools relevant to your decision-making needs





- Find relevant products using either the Guided Search or Filter Search functions
- Comprehensive product summaries

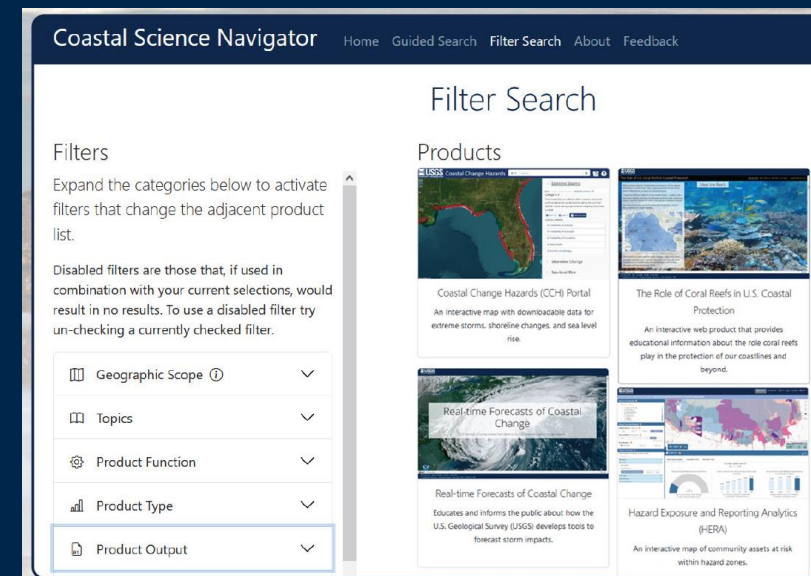


Coastal Science Navigator Home Guided Search Filter Search About Feedback

Discover the USGS coastal data and products you need.

  
Guided Search  
Not sure what you are looking for?  
Find products by answering a few simple questions.

  
Filter Search  
See and apply all available filters to our complete catalog to find relevant products.



Coastal Science Navigator Home Guided Search Filter Search About Feedback

## Filter Search

**Filters**  
Expand the categories below to activate filters that change the adjacent product list.  
Disabled filters are those that, if used in combination with your current selections, would result in no results. To use a disabled filter try un-checking a currently checked filter.

- Geographic Scope
- Topics
- Product Function
- Product Type
- Product Output

**Products**

- Coastal Change Hazards (CCH) Portal  
An interactive map with downloadable data for extreme storms, shoreline changes, and sea level rise.
- The Role of Coral Reefs in U.S. Coastal Protection  
An interactive web product that provides educational information about the role coral reefs play in the protection of our coastlines and beyond.
- Real-time Forecasts of Coastal Change  
Educates and informs the public about how the U.S. Geological Survey (USGS) develops tools to forecast storm impacts.
- Hazard Exposure and Reporting Analytics (H-ERA)  
An interactive map of community assets at risk within hazard zones.



**Thank you!**

## Maya Hayden

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Coastal and Marine Hazards and Resources Program  
[usgs.gov/programs/cmhrp](https://usgs.gov/programs/cmhrp)