

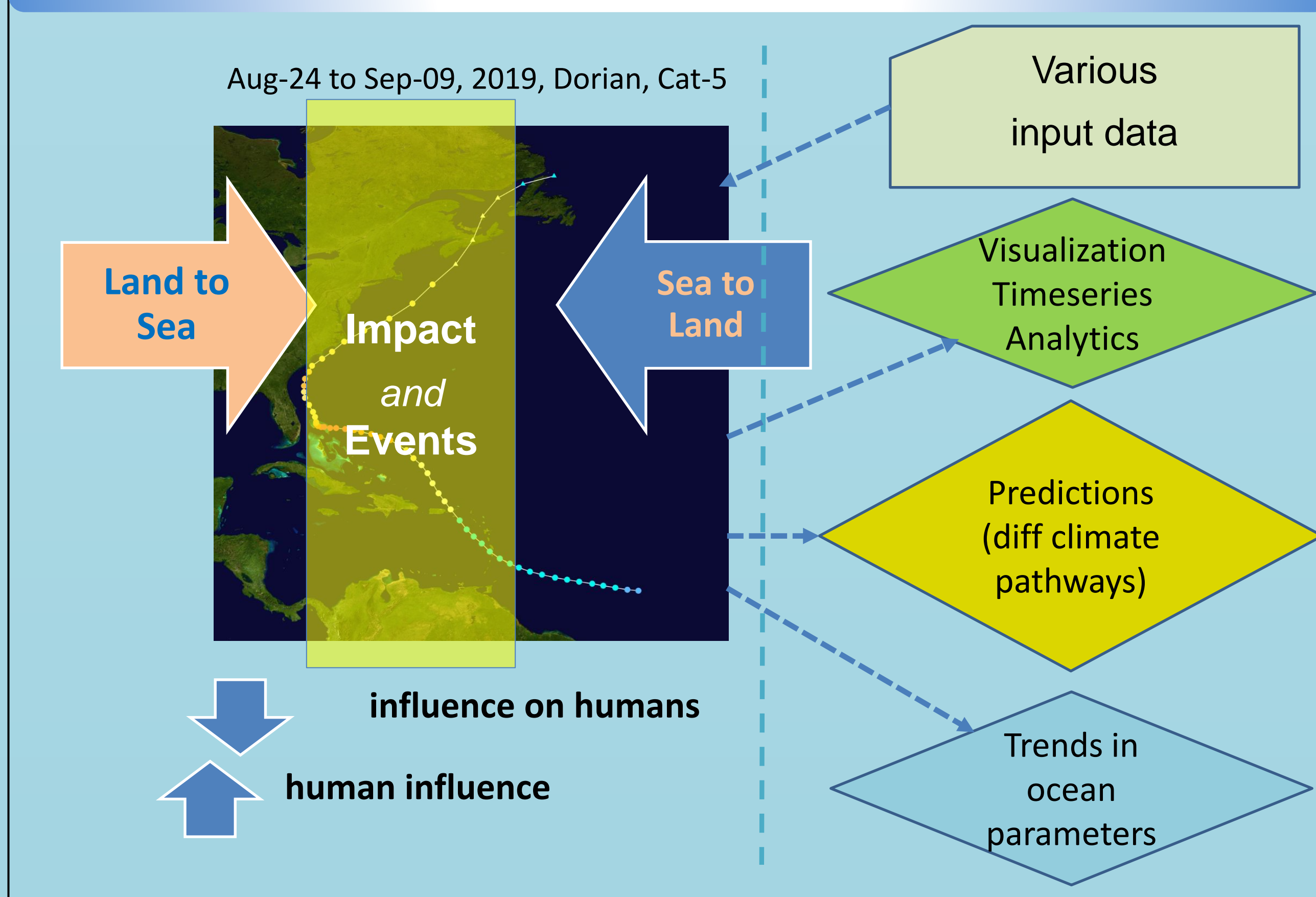
Monitoring coastal events and changes using satellite data and contextual information: Towards a CEOS COAST application knowledge hub

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55. Computing and products
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Purpose: To serve as a web-based knowledge hub employing satellite observations, *in situ* measurements, and other multidisciplinary data with the vision to contribute to coastal awareness, safety, and restoration efforts.

The overall concept



Infographics

- Satellite data in routine**
 - Sea Surf. Temp (SST), Ocean Color (OC), Sea Surf. Height (SSH), Sea Surf. Salinity (SSS), Sea Surface Wind (SSW).
 - Backbone of **moderate resolution** data sets that provide high repeat spatial/temporal coverage
 - **High resolution (HR)** data for deep dive; CEOS (L8/9; S2) w. potential for comm. imagery in the future, e.g., Planet
- Curated information**
 - Events** spread (timeline). Associated with story maps and use of HR satellite images. *Storms, oil spills, HABs, ecological*
 - Station data** Standard met, water quality, Tsunameter, currents etc. Active and Historical (source: NOAA DBC, USGS)
- Contextual information**
 - Hydrology** basin outlines, basin climate atlas, waterways, dams, reservoirs
 - Social** population density, vulnerability indicators (poverty etc.), human base
 - Land** digital elevation, land-use land-classification
 - Seabed** bathymetry
 - Ecology** seagrass, mangroves, salt marshes, other flora and fauna
 - LandSea** ecological coastal units (classification), shoreline
 - Model** NOAA Global Forecast System (GFS)
- Parameter trends** trend (rate of change/time) maps and trend line-plots of ocean parameters (SST, OC, SSS, SSW)
- Future projections** episodic extreme sea level events (scientific studies); mean sea level rise (IPCC/JPL/NOAA report)
- Analytics** #1 through #5 interaction (data sci, ML). Trans- disciplinary/boundary. Integration of non-satellite info. Alerts
- Economic impact case studies**

Application features

- ### Map-controls and interactions
- zoom, pan
 - raster (satellite and base maps)
 - vector (events, contextual info)
 - interactive pop-ups for all features
 - transparency, show value, legend
 - coordinate ref sys (EPSG:4326)
 - export screen display.
 - session-storage albums
 - permalink, social media share
 - mobile-screen compatible
 - event story maps for quick review
 - download links for active layers
- ### Scientific
- global and regional (RoI) focus
 - change visualization
 - what-if scenario for projections
 - basic GIS operations
 - searchable events and deep dive
- ### Technology
- opensource tools (Python, GDAL/OGR, Leaflet, Vector tiling for large data, e.g., hydrobasins)
 - client-side proc. architecture

Station data

Fig 1: Ocean temperature station data, Chesapeake Bay Interpretive Buoy Sys (CBIBS), Potomac, MD. The hub will track met., water quality, and Tsunameter data from NOAA Data Buoy Center (NDBC).

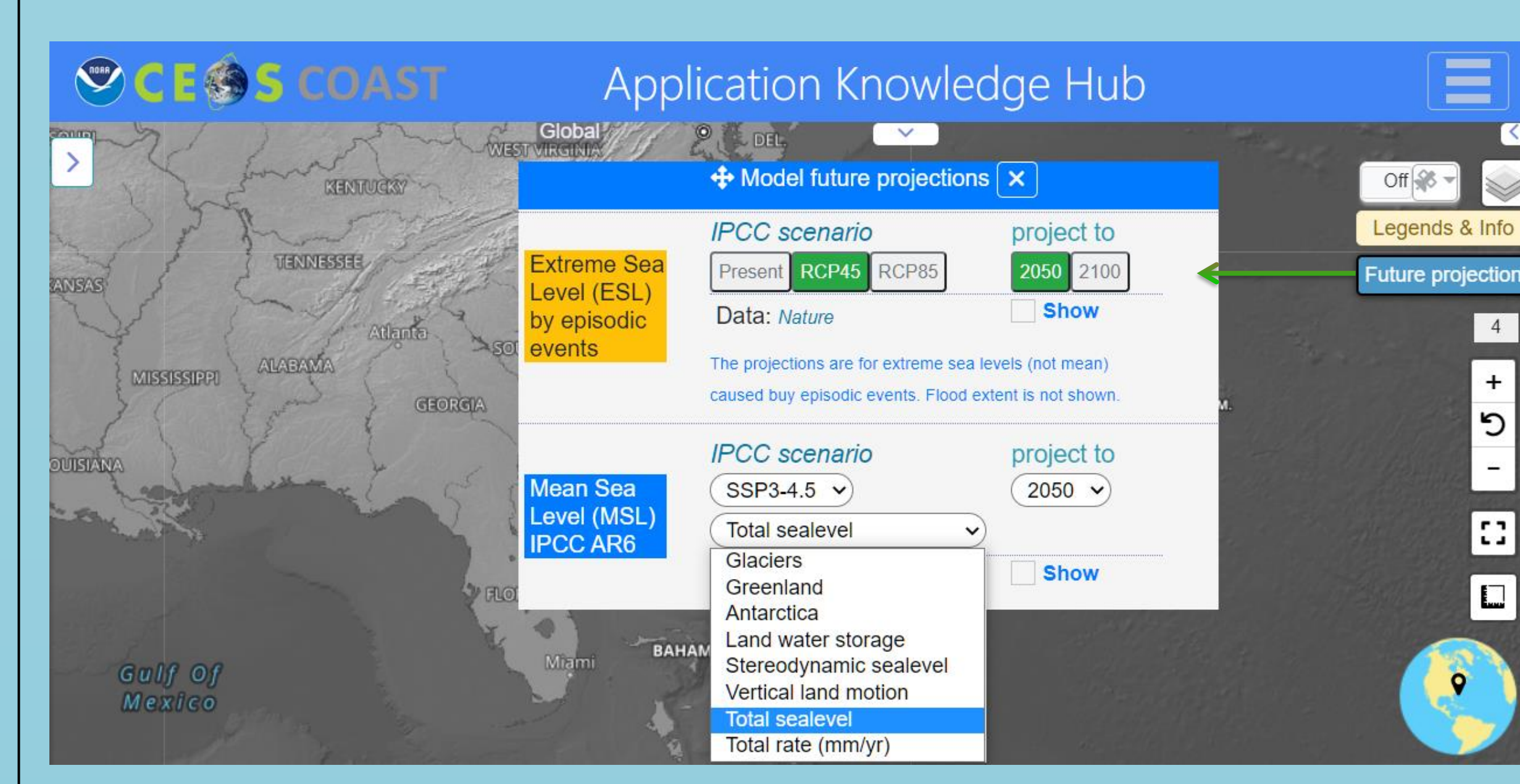
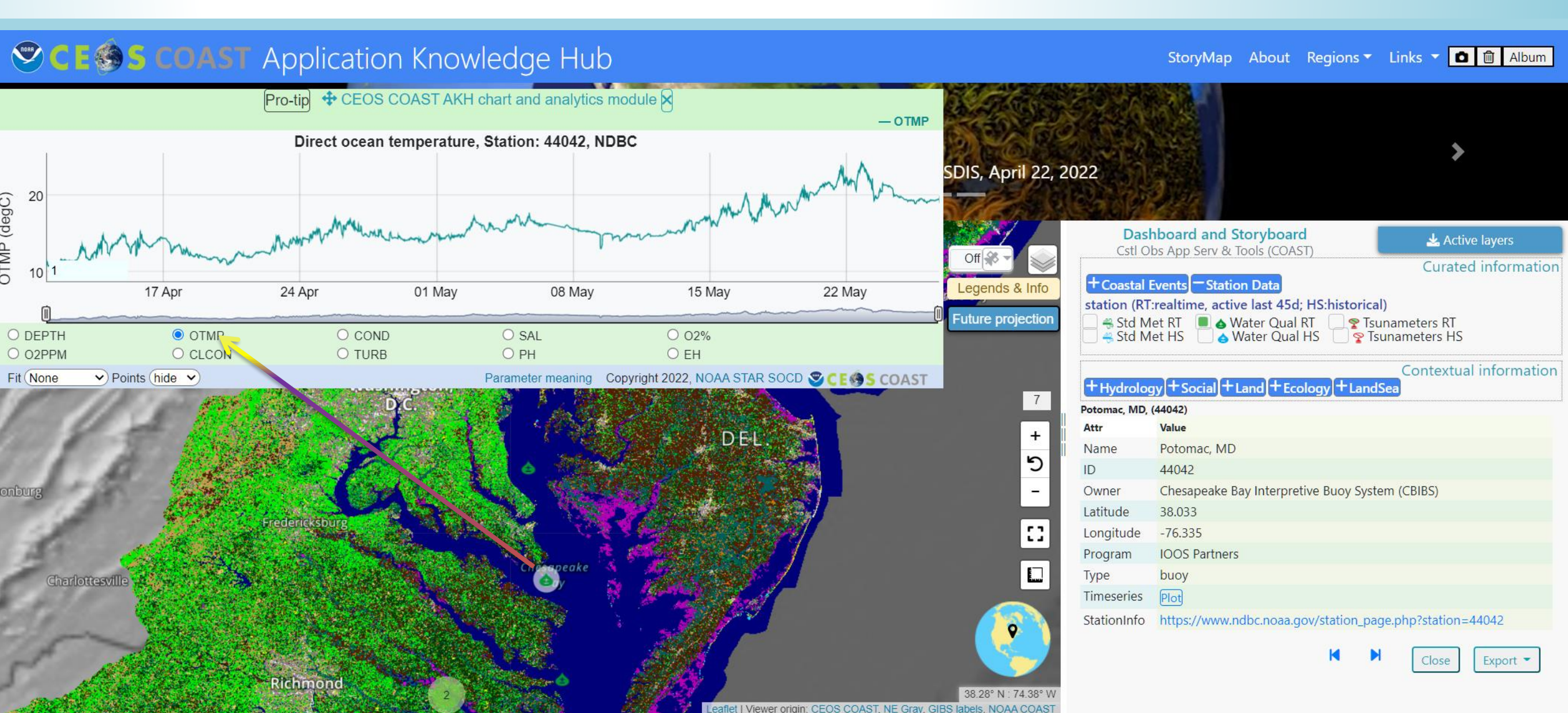


Fig 2: Modeled future prediction component of CEOS COAST AKH. The application will leverage from existing scientific studies, and IPCC and NOAA reports to display future predictions for *episodic and mean sea level changes* in different climate pathways.

Summary

The Satellite Oceanography and Climate Division (SOCD) of NOAA STAR is actively pursuing an effort to provide a knowledge base for coastal events and processes in an easy and less resource consuming web-interface.

We are conceptualizing the CEOS COAST Application Knowledge Hub (AKH) to enable simultaneous displaying of:

- [a] satellite-based ocean parameters
- [b] social data, [c] shoreline characteristics, [d] seabed properties, [e] station measurements, [f] a set of base maps to provide context, [g] waterways, [h] elevation, and [i] a set of curated major coastal events that caused significant damage (storms, HABs, etc.).

Foreseen v1.0 release and demo/presentation: **Q1 2023**

Acknowledgment

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