

# A case-study of the Tasman Seabed within the southern province of the continental margin

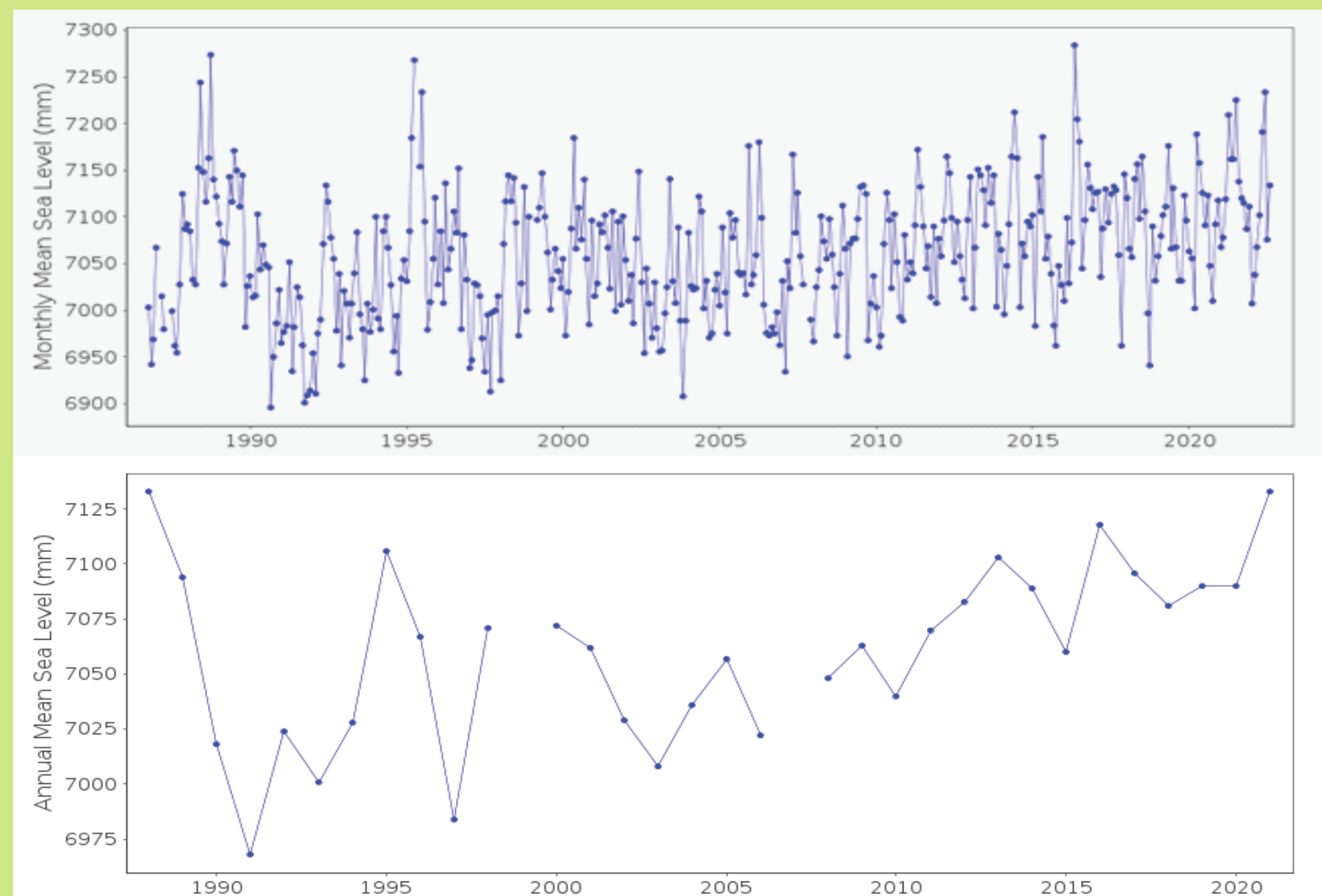
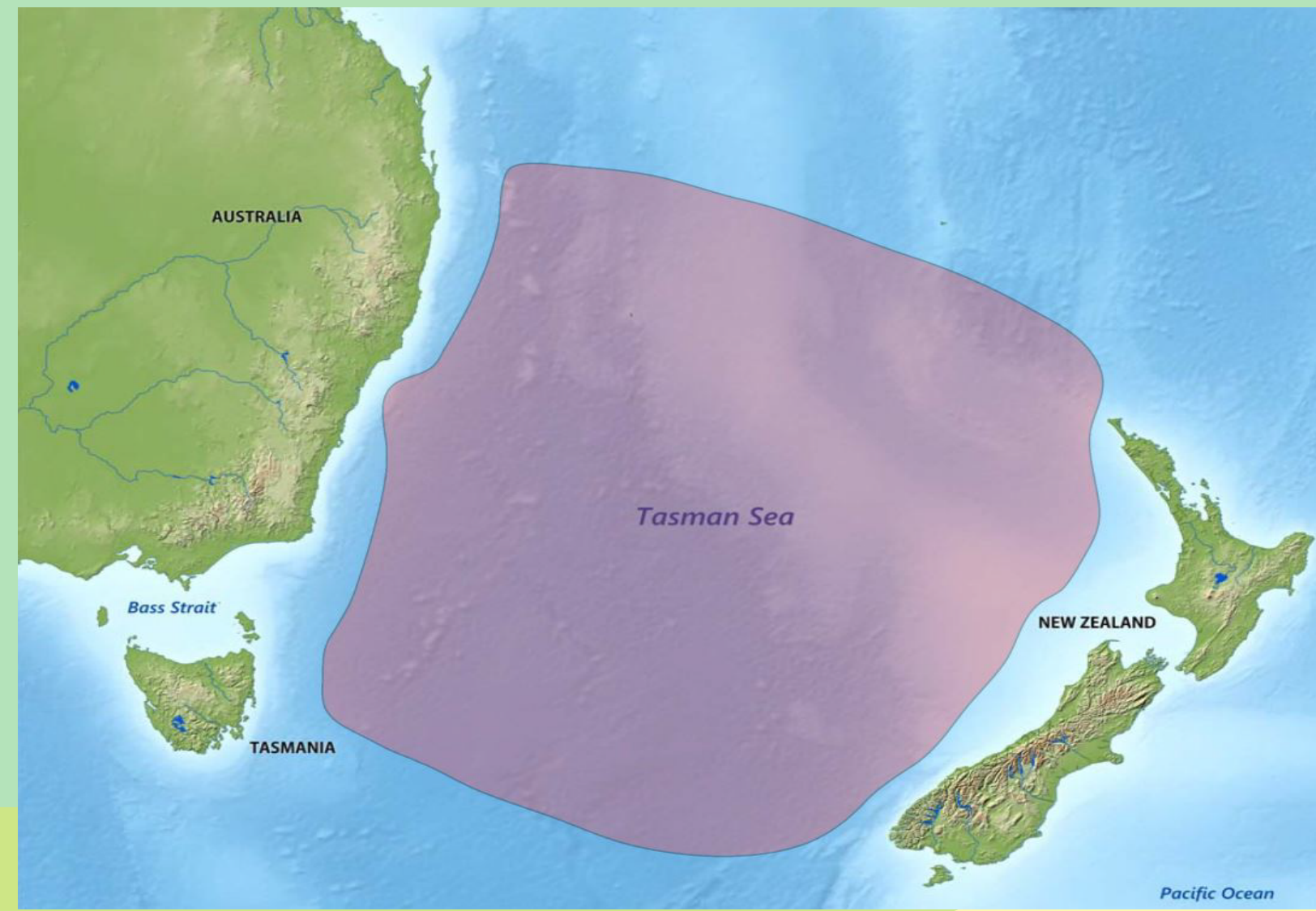
What is the potential for Aboriginal cultural heritage material to be present following the inundations and movement of the ocean on the NSW south coast?



This poster presentation hopes serves as an exploration of the natural forces which assail remnant archaeological material following the inundation of the NSW far south coastline. Through maritime research a new set of parameters presented themselves as causes for loss of in situ material culture, presented in poster form by consultant archaeologist Nathan Windram.

## Sea-state

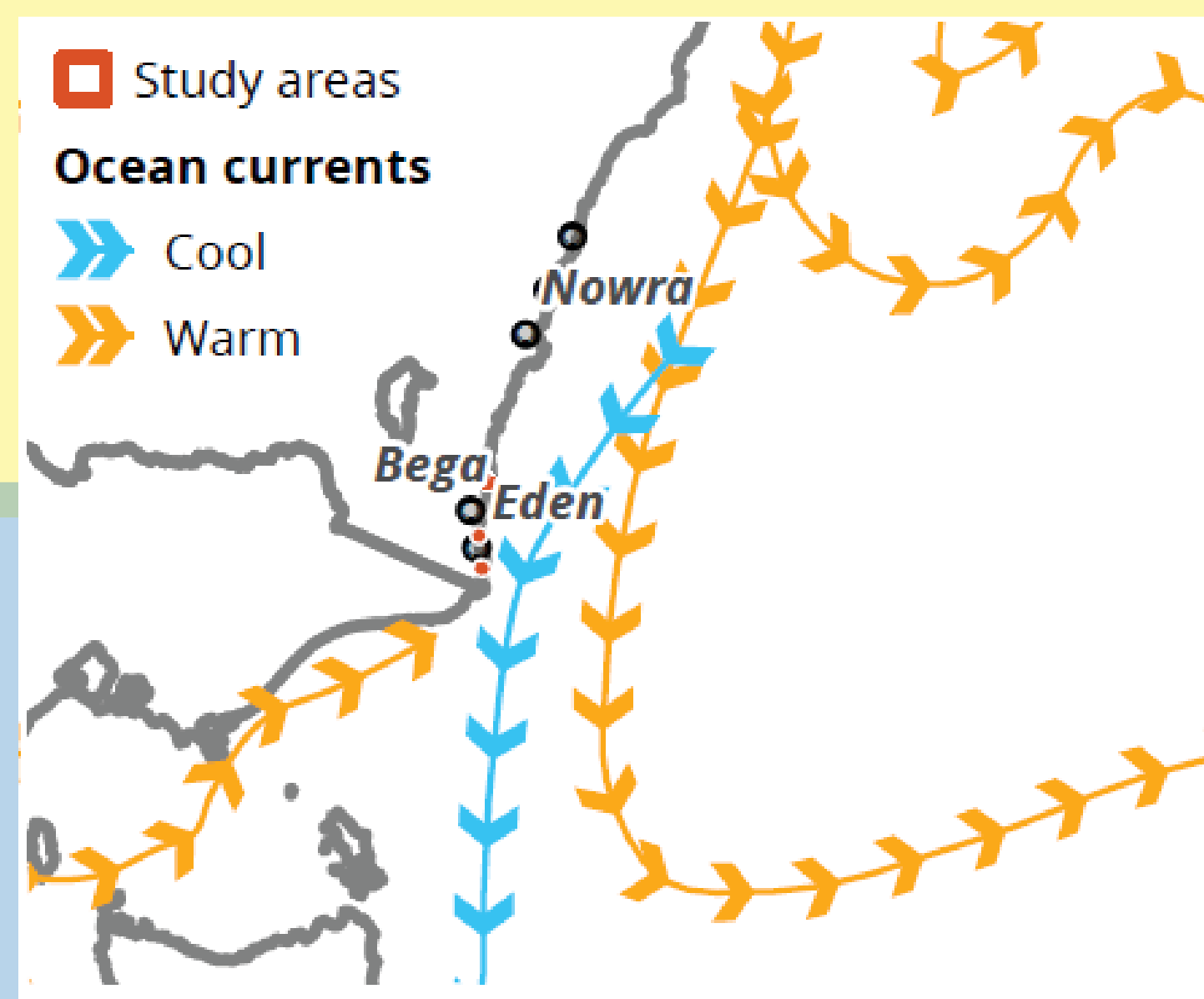
The Tasman Sea is infamous among sailors, referred to as 'the Ditch', it is notorious for its unpredictable nature. Wind and wave conditions remain rough for the majority of the year, leading to many sailors regarding it as the most dangerous stretch of water in the world.



Sea levels based off tidal gauge data sourced from the Permanent Service for the Mean Sea Level Eden Station indicates that mean sea level is approximately 7100mm but has fluctuated with lows of 6900mm and highs of 7300mm. This information illustrates the tempestuous nature of the Tasman Sea.

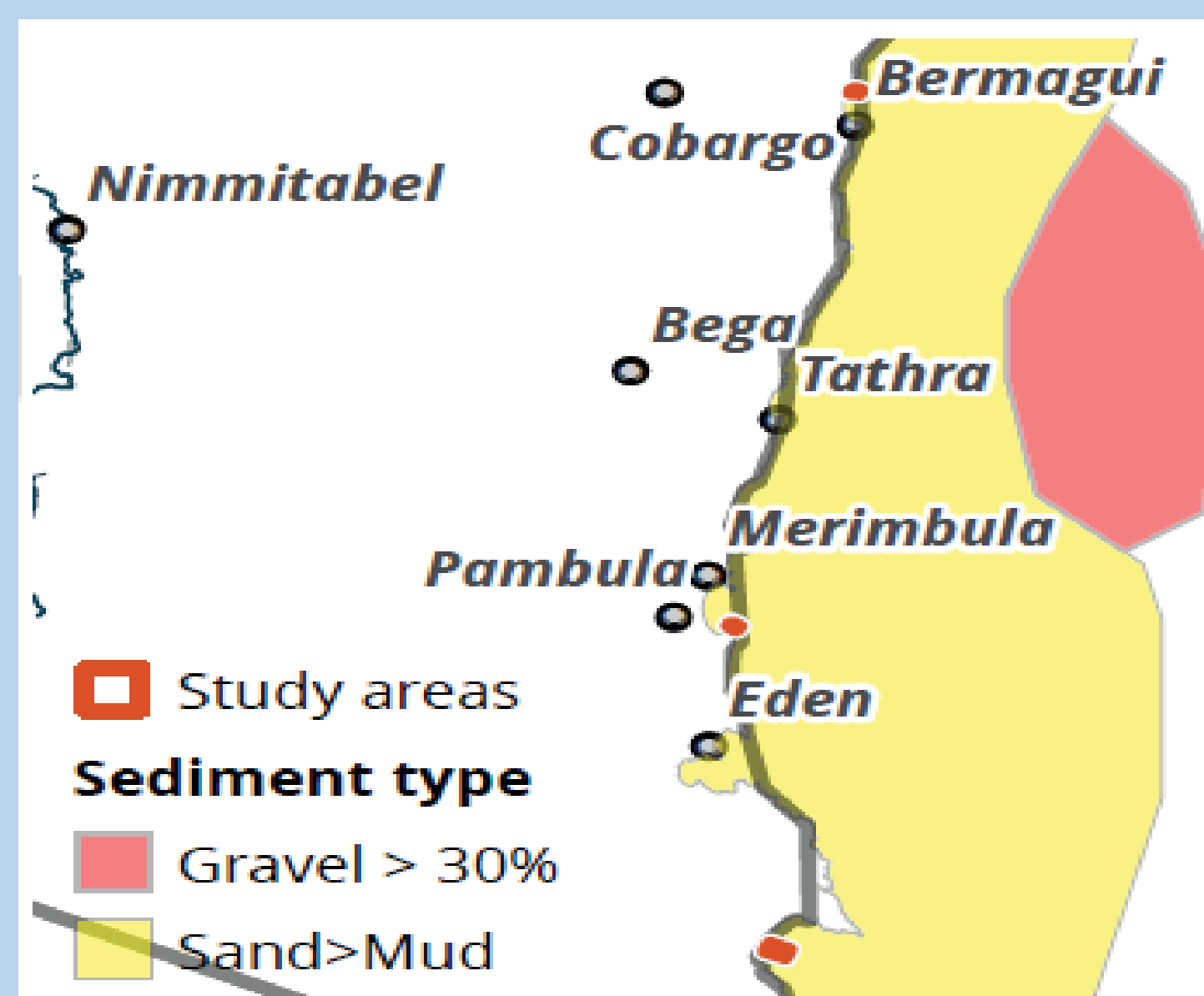
Permanent Service for Mean Sea Level (PSMSL) Retrieved 13 November 2023 <https://psmsl.org/>

The East Australian Current (EAC) flows parallel to the Australian coastline, and it is here that it reaches its maximum rate of seabed sediment transportation prior to separation occurring towards the north of Sydney. Exact measurements remain uncertain, however a mean estimation places the rate of flow at approximately 15 Sverdrup (15 million cubic metres per second).



## Study area oceanography

Seabed composition for the three study areas is made up exclusively of sand. Although sand particles dominate the seabed it may still contain small amounts of gravel and/or mud. Sand is a product of erosion and associated with bottom currents. This implies that the forces associated with the study area may have impacted material remains in the seabed.

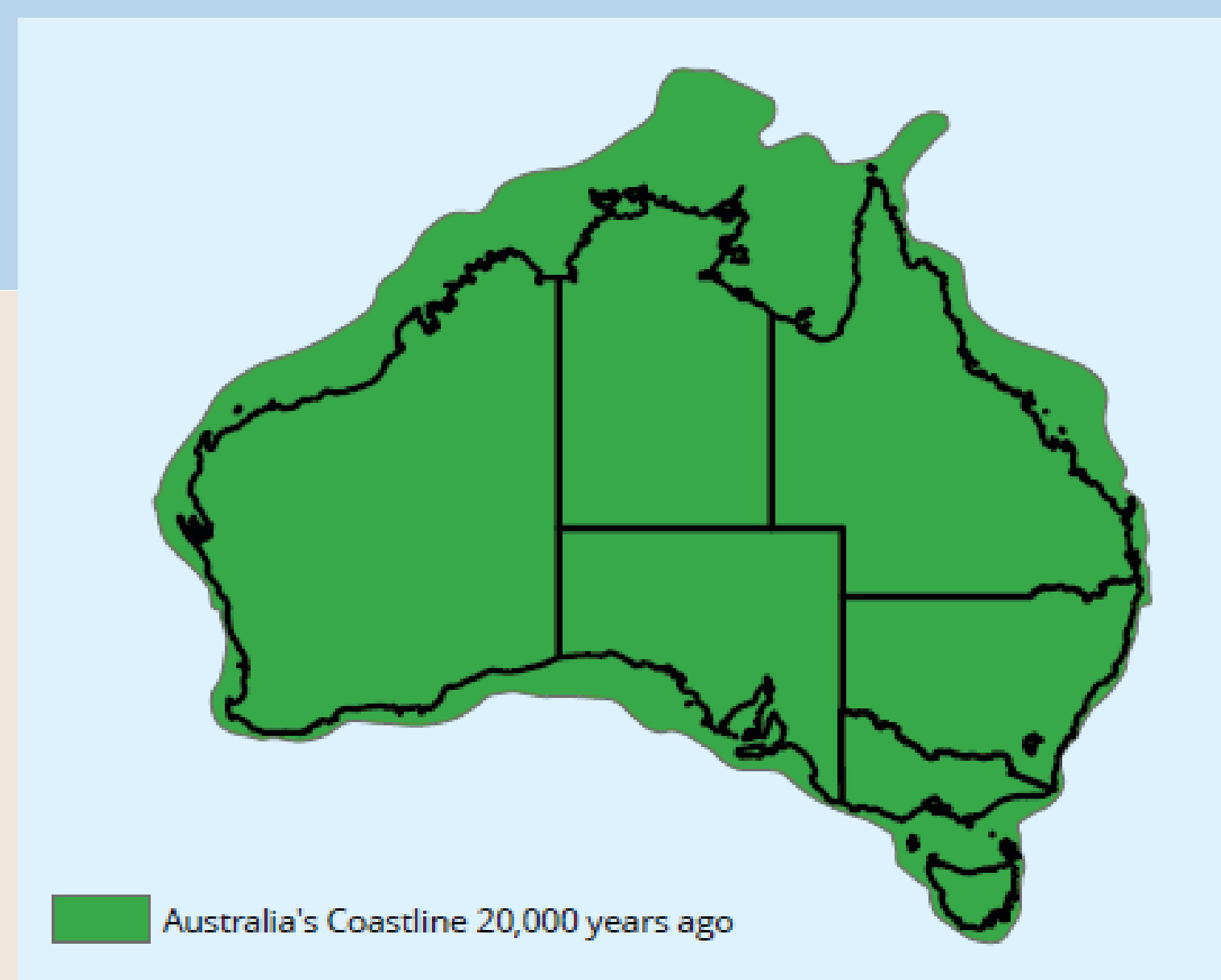


Reidulv Boe, Lija Run Bjarnadottir 2019, Sedimentary environment, accessed 13 November 2023, <https://www.mareano.no/en/topics/sedimentasjonsmiljo>

## Cultural importance and memories of inundation

The Australian Institute of Aboriginal and Torres Strait Islander Studies describes cultural fishing practices along the far south coast of NSW and Victoria as 'adaptive'. Fishers had to adapt to sea level change occurring over the past 20,000 years, with the sea reaching modern levels at approximately 6000 B.P.

Abalone was an important marine resource for the Aboriginal people of the far south coast. They would collect it at high tide, crack the shell in two and place one half of the shell over the other half to cook on a fire. Saltwater people saw fishing as an integral part of culture. Fishing was a way to connect with Country, and the catching and sharing of fish and shellfish was how culture was practiced daily, involving knowledge passed down from parents, grandparents, uncles and aunts.



## Acknowledgements

Biosis Pty Ltd  
The people of the Yuin nation, including but not limited to the Thawa (or Thawa / Dhawa) and the Djiringanji peoples  
The material presented in figures constitute a Biosis rendition of material presented within the referenced material.

## References:

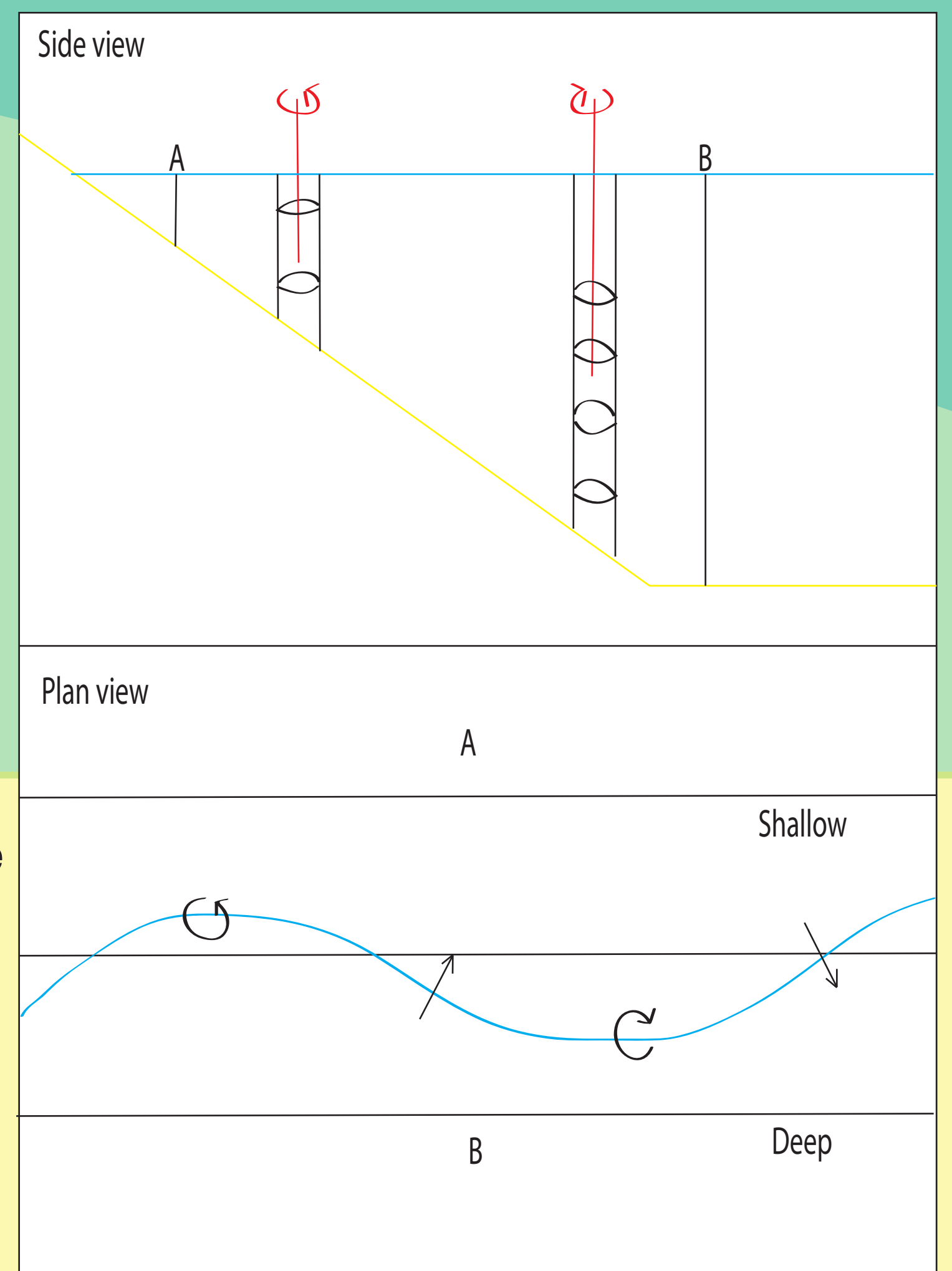
Godfrey, J.S. and Golding, T.J. 1981 The Sverdrup Relation in the Indian Ocean, and the Effect of Pacific-Indian Ocean Throughflow on Indian Ocean Circulation and on the East Australian Current, *Journal of Physical Oceanography* 11 (6): 771-776  
Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) 2022: South Coast NSW fishing, accessed 13 November 2023, <https://aiaa.gov.au/research/south-coast-nsw-fishing>  
Oxfam Australia 2020, The Yuin people and their traditional fishing practices,

## Rosby waves

The far NSW south coast experiences a form of Rosby wave, a feature generated from the rotation of the Earth, called a Topographic Rosby wave.

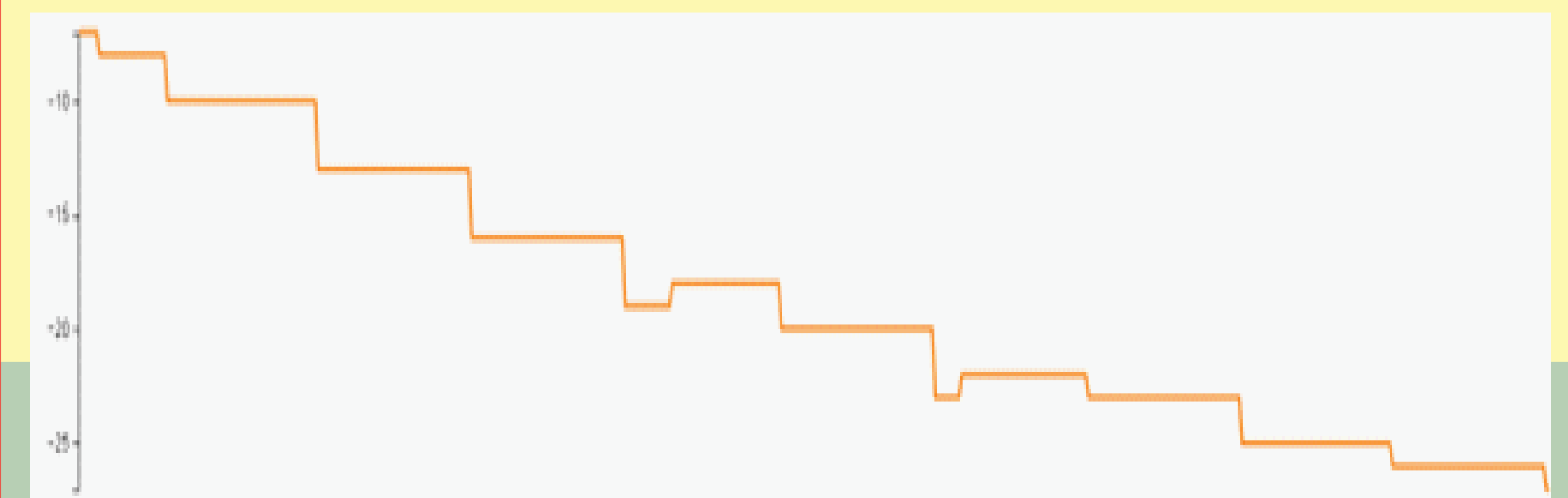
These deep waves are generated within coastally trapped waters, such as bays and coves. This phenomenon takes the form of a column of fluid which develops anticyclonic (anti-clockwise) rotation if moving towards the shore, and cyclonic (clockwise) rotation if moving towards deeper waters.

These Topographic Rosby waves produce upwelling, moving deeper water towards the surface while also affecting sea level changes, causing further transportation of seabed sediment, and affecting the flow of currents.



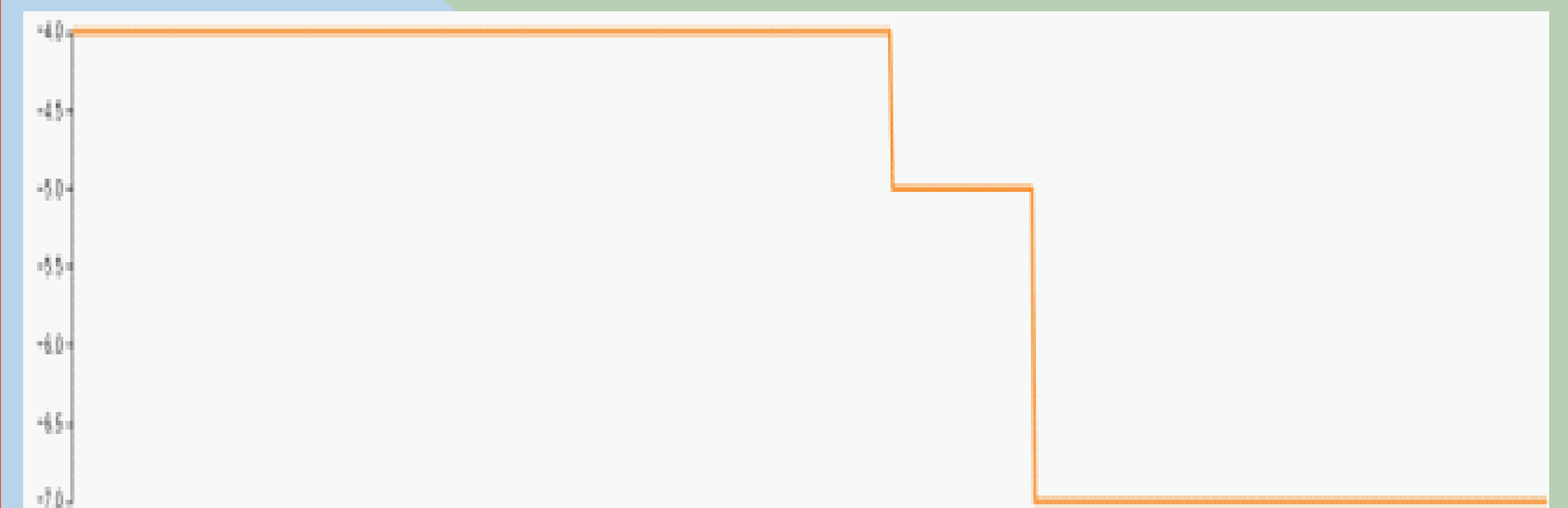
P.G. Baines 1989 The physical oceanography of Australian waters - a review\* *Australian Meteorological Magazine* 37: 155-192.

Each of the three study areas had an elevation profile compiled via the Aus Seabed Bathymetry Coverage project. These diagrams can assist us with visualising the impact of oceanic transport on the seabed. The Disaster Bay study area (below) had an increase in depth at a gradient 1.1 degrees. Beginning at -5m at shallowest and ending at depths of -25m.



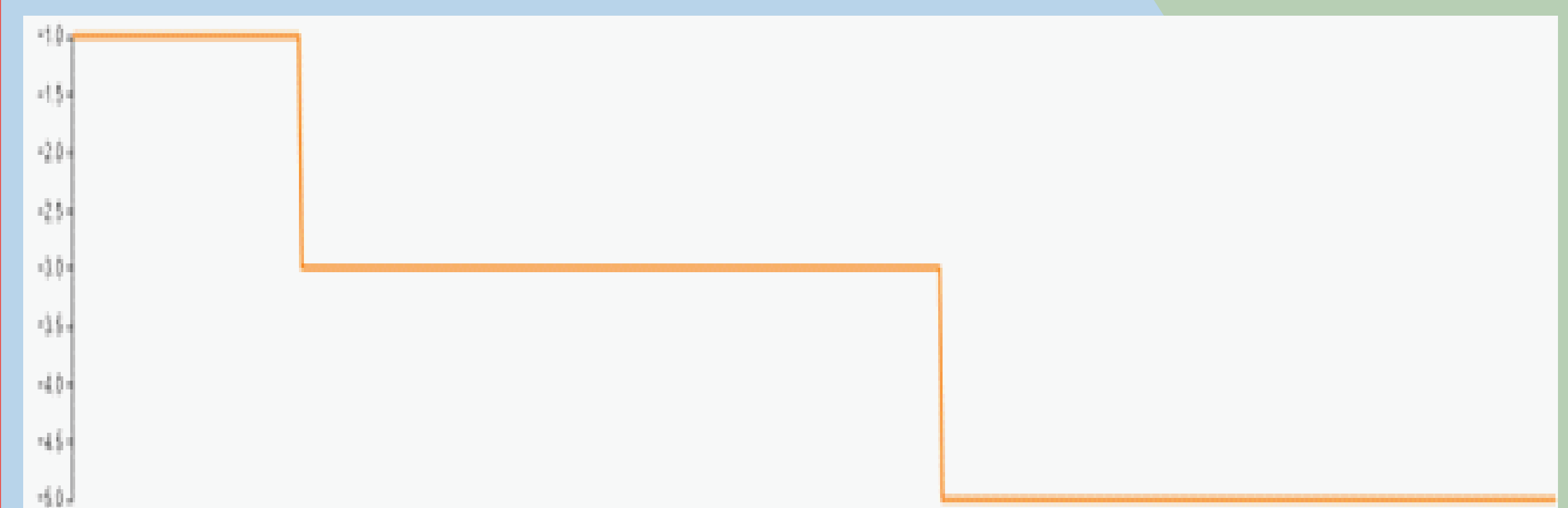
DER SRTM1 Second Over Australia Bathymetry topography - Aus Seabed Marine International Institute for Law of the Sea Studies 2023, Retrieved 13 November 2023, [https://gaservices.ga.gov.au/site\\_9/rest/services/DEM\\_SRTM\\_1Second\\_over\\_Bathymetry\\_Topography/MapServer](https://gaservices.ga.gov.au/site_9/rest/services/DEM_SRTM_1Second_over_Bathymetry_Topography/MapServer)

The Pambula study area (below) boasts plateau features as it increases in depth at a gradient of 1.72 degrees. Depth ranges from -4m at shallowest to -7m at depth.



DER SRTM1 Second Over Australia Bathymetry topography - Aus Seabed Marine International Institute for Law of the Sea Studies 2023, Retrieved 13 November 2023, [https://gaservices.ga.gov.au/site\\_9/rest/services/DEM\\_SRTM\\_1Second\\_over\\_Bathymetry\\_Topography/MapServer](https://gaservices.ga.gov.au/site_9/rest/services/DEM_SRTM_1Second_over_Bathymetry_Topography/MapServer)

The Bermagui study area (below) displays numerous plateaus similar to the Pambula study area (above) and increases in depth at a gradient of 2.29 degrees. Depth ranges from -1m at shallowest to -5m at depth.



DER SRTM1 Second Over Australia Bathymetry topography - Aus Seabed Marine International Institute for Law of the Sea Studies 2023, Retrieved 13 November 2023, [https://gaservices.ga.gov.au/site\\_9/rest/services/DEM\\_SRTM\\_1Second\\_over\\_Bathymetry\\_Topography/MapServer](https://gaservices.ga.gov.au/site_9/rest/services/DEM_SRTM_1Second_over_Bathymetry_Topography/MapServer)

## Conclusion

The three study areas outlined within this case study share a location within 1 kilometre of the east Australian seaboard, but are separated by vast distance. Although shell middens are found in close proximity to each study area along beachfronts, the seabed itself is subject to erosional forces that render the potential of holding remnant archaeological material unlikely, it's these erosional forces that break down seabed material into sand and mud. This can be attributed primarily to the majorly disruptive force of the EAC, with the unique Topographic Rosby waves taking shape within trapped coastal waters creating a great amount of disturbance by natural forces. The turbulent Tasman Sea with its fluctuating sea-level creates steep seabed compositions via transportation - with archaeological material being pulled out and disbursed into deeper waters.