

The East Australian Current

What is it?

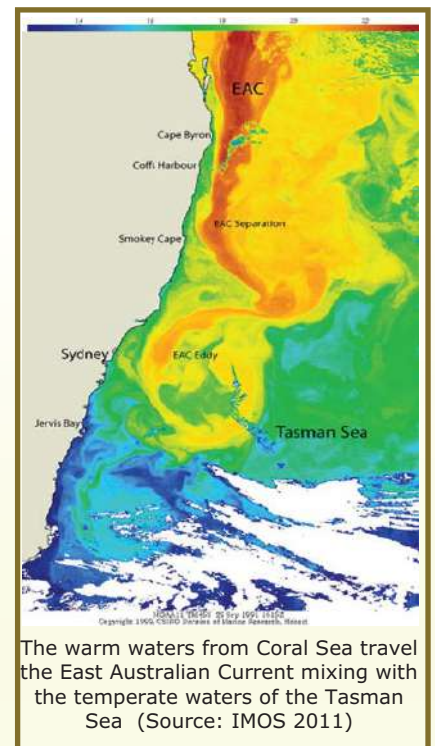
The East Australian Current, made famous by the Disney movie Finding Nemo, is a large scale flow of water that runs south along the east coast of Australia. It sweeps warm tropical waters from the Coral Sea southwards to interact with the cool temperate waters of the Tasman Sea.

The large mass of tropical water transported south by the East Australian Current is low in nutrients but remains an important process within the marine ecosystem. The interaction of processes associated with the southward movement of warm water and the formation of eddies is an important gateway for the flourishing biodiversity of the Coral and Tasman Seas.

How does it interact with coastal processes on the Gold Coast?

At a regional scale, the East Australian Current skirts the coastline and begins to intensify along south-east Queensland and northern New South Wales. The more prominent headlands of Point Lookout and Point Danger can influence the direction of the current when it meanders close to the coast. On a local scale, the predominant northward transport of sand on the Gold Coast is caused by waves and the local wave climate resulting in long stretches of white sandy beaches (see *Coastal Processes* information sheet).

The main impacts of the East Australian Current on our city's coast are caused by the transport of warmer waters south. As heat is transported southward, it can be expected to affect intensities and locations of storms. This, in turn, has the potential to influence the intensity of wave action and therefore the movement of sand during storm events. There is potential for longer term changes to the coastline associated with the East Australian Current. For example, climate change is a topical interest for research: if warmer waters travel further south than they presently do this may change the frequencies, intensities and locations of storms we experience, resulting in long-term changes to the wave-induced movement of sand.



How does the EAC work?

The prevailing winds of the South Pacific Ocean create an anti-clockwise circulation of water with the assistance of the Coriolis effect (the rotation of the Earth). The East Australian Current is created by the water that flows toward the western edge of the Pacific Ocean.¹ It is also referred to as the 'Western Boundary Current of the South Pacific Ocean'. The current then meanders south along the east coast of Australia.

Eddies are created as the current curves and a swirling pool of fluid rotates clockwise or anti-clockwise within/ from the main flow. The core of an eddy may be warm (anti-clockwise) or cool (clockwise) and affect the transfer of physical properties of seawater such as nutrients, temperature and salinity. The East Australian Current varies in size and can be between 15–100km wide, 200–500m deep and flow at speeds of up to 4 knots.^{1,2} There is much variation in the current along the coast, as a result of coastal and oceanic processes, changes in the continental shelf and seasonal fluctuations, see Figure 1.¹

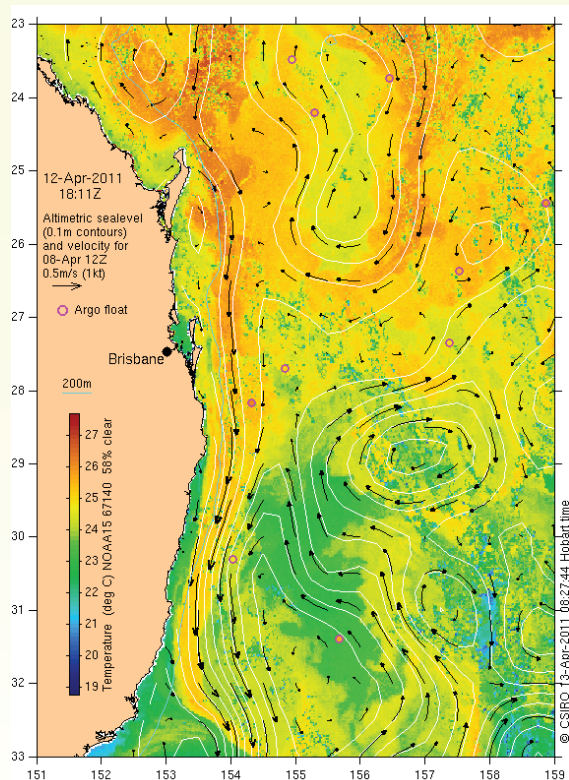


Figure 1. A map showing the water temperatures and interaction with the currents off the coast of SEQ Queensland and northern NSW (Source: CSIRO, 2011)

Are there any ecological ramifications for the Gold Coast?

As the warm tropical waters of the north-east meet the cooler temperate waters of the south, the clockwise eddies typically transport nutrients upward from cooler deep waters resulting in localised high productivity. Satellite technology can be used to track these areas as the locations change. This is critical for sustainable management of fisheries. The Australian CSIRO continually monitor the East Australian Current and analyse the ocean surface currents and temperatures. The Gold Coast has many important reefs (see *Reefs of the Gold Coast* information sheet) that provide essential habitat for a flourishing myriad of marine life.



Southern Yellowtail Sead enjoying the warmer waters of Narrownneck Reef (Source: Ian Banks 2009)



Stars and Stripes Toadfish enjoying the warmer waters of Narrownneck Reef (Source: Ian Banks 2005)

For more information

Visit CSIRO website:

cmar.csiro.au/remotesensing/oceancurrents/

¹ Editorial (2011) The strengthening East Australian Current, its eddies and biological effects – an introduction and overview, *Deep-Sea Research II*, Vol, pp: 538-546.

² Nasa (2006) http://visibleearth.nasa.gov/view_rec.php?id=20183

³ IMOS (2011) New South Wales IMOS (NSW-IMOS) www.imos.org.au/nswimos.html