Project Manta

East Australian Current (EAC) Region Oceanographic conditions report

May 2012

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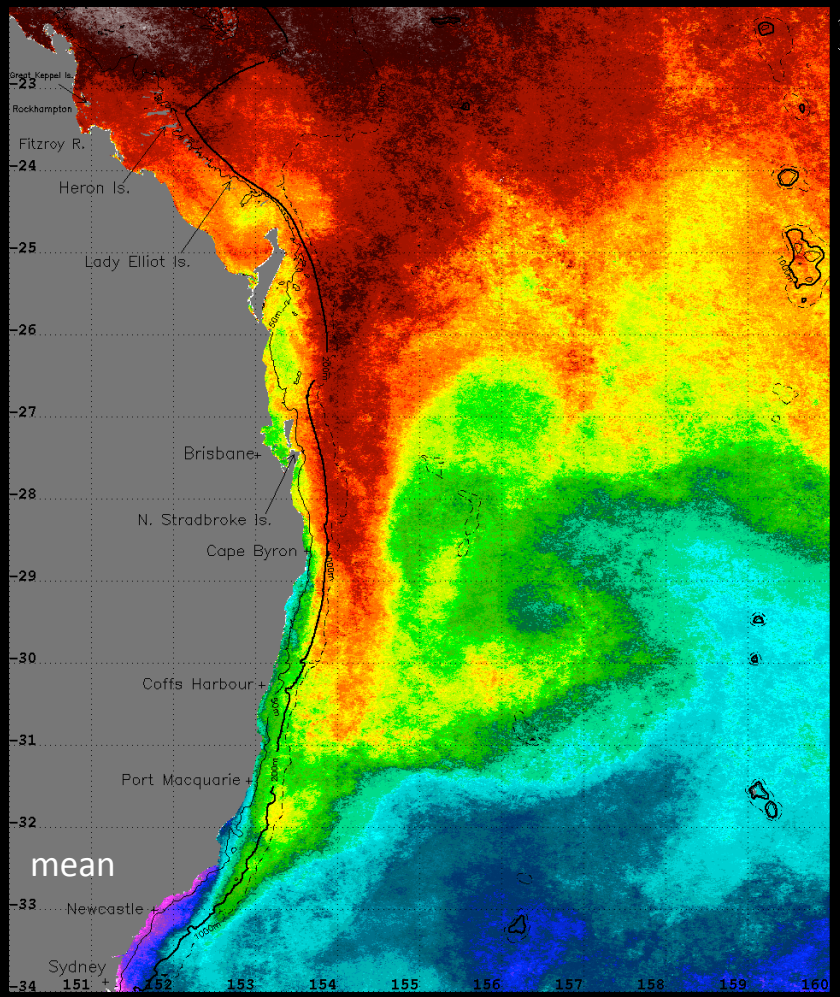
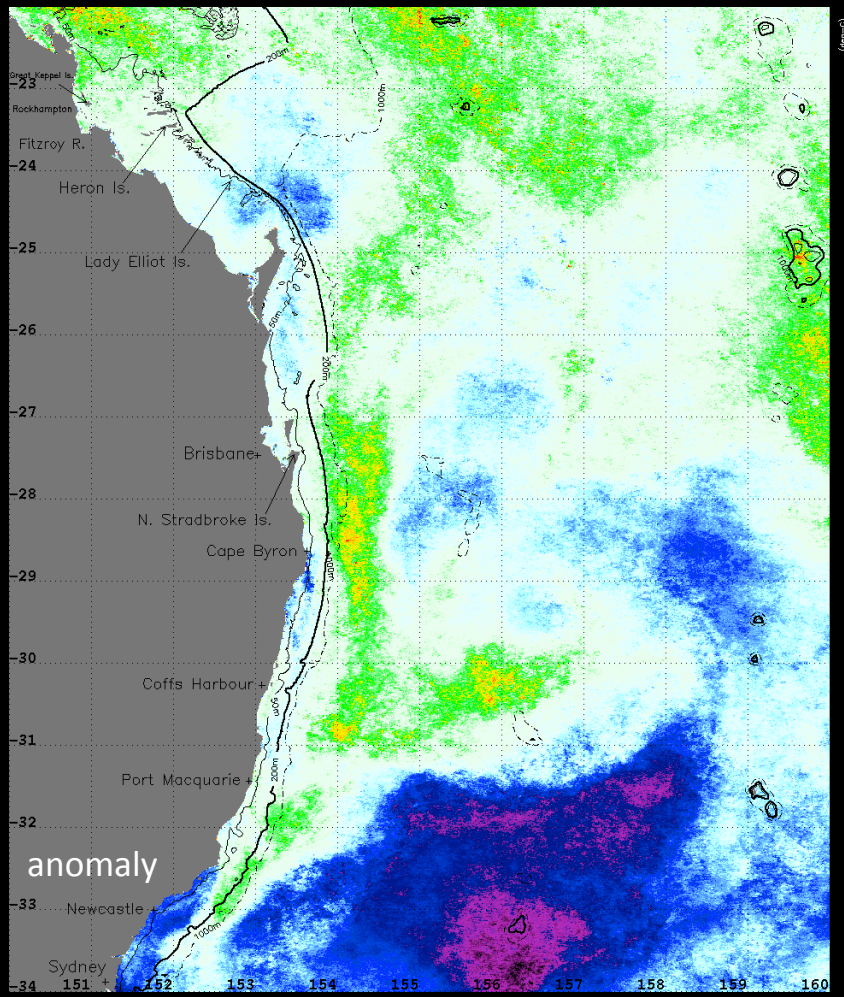
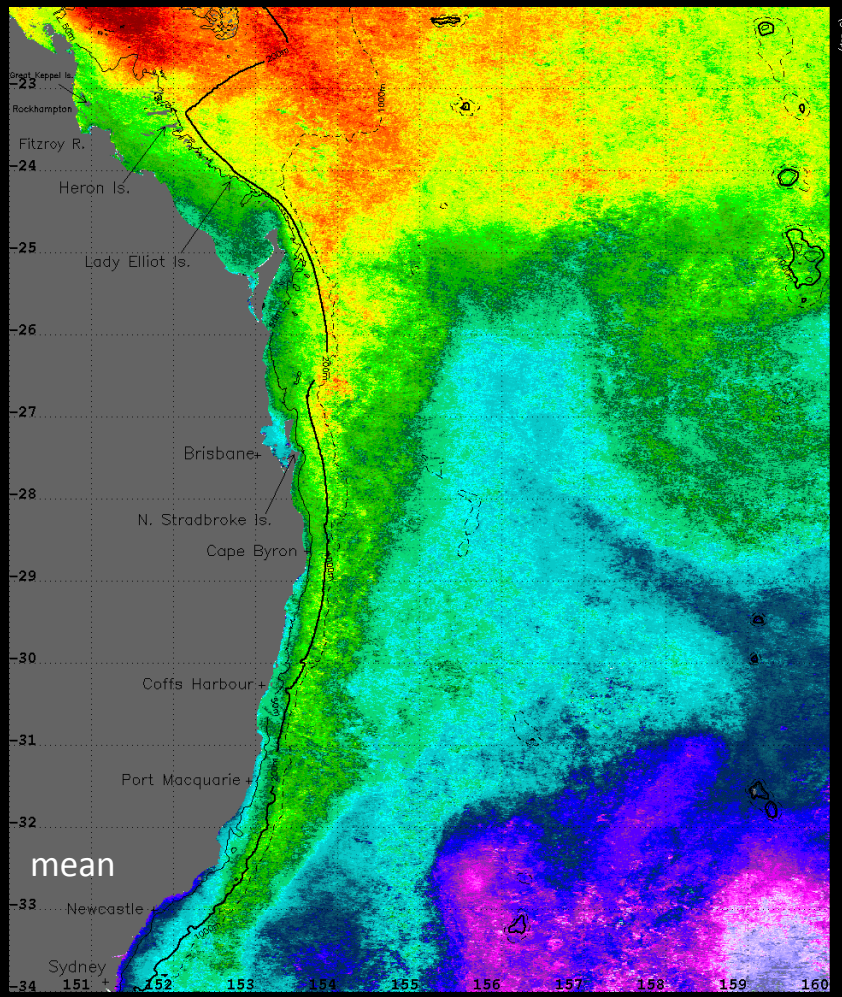
EAC Monthly MODIS SST (D+N): March 2012

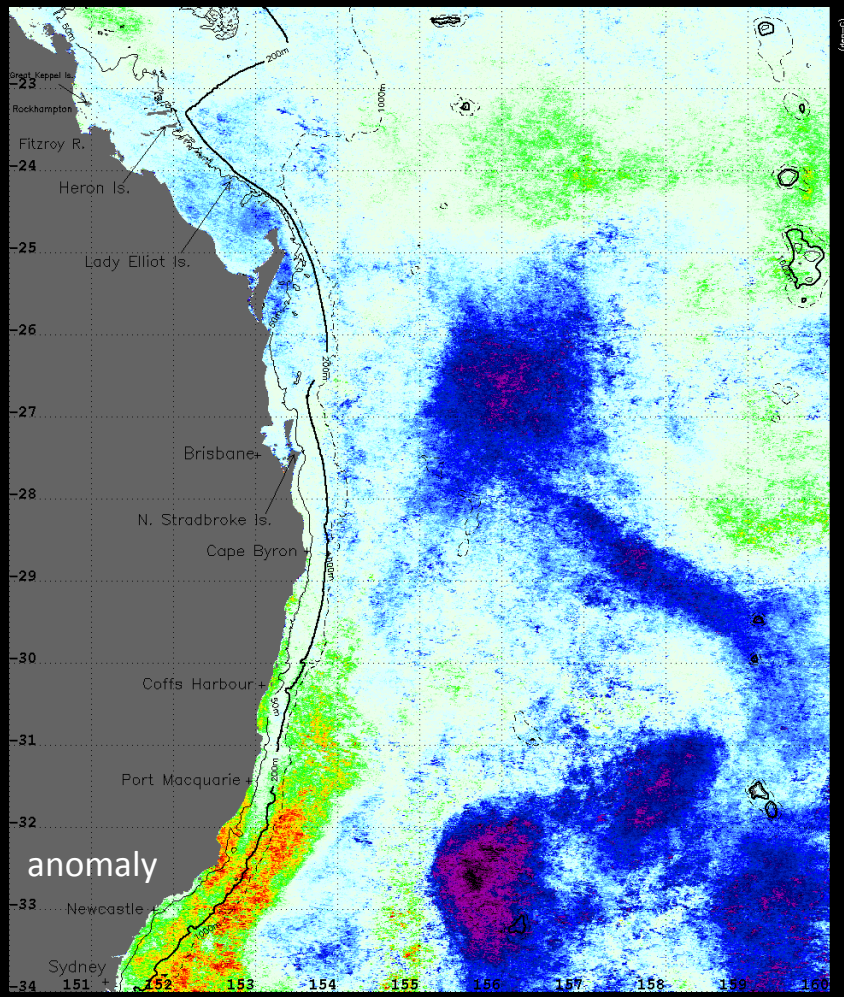




- Broad EAC flow with the main current tracking the continental shelf
- Moderate positive anomalies along the direct path of the EAC
- Moderate negative SST anomalies apparent north of Fraser Island
- Strong negative anomalies on the inner shelf south of 32.5°S due to upwelling, and offshore, corresponding to the northward position of the Tasman Front

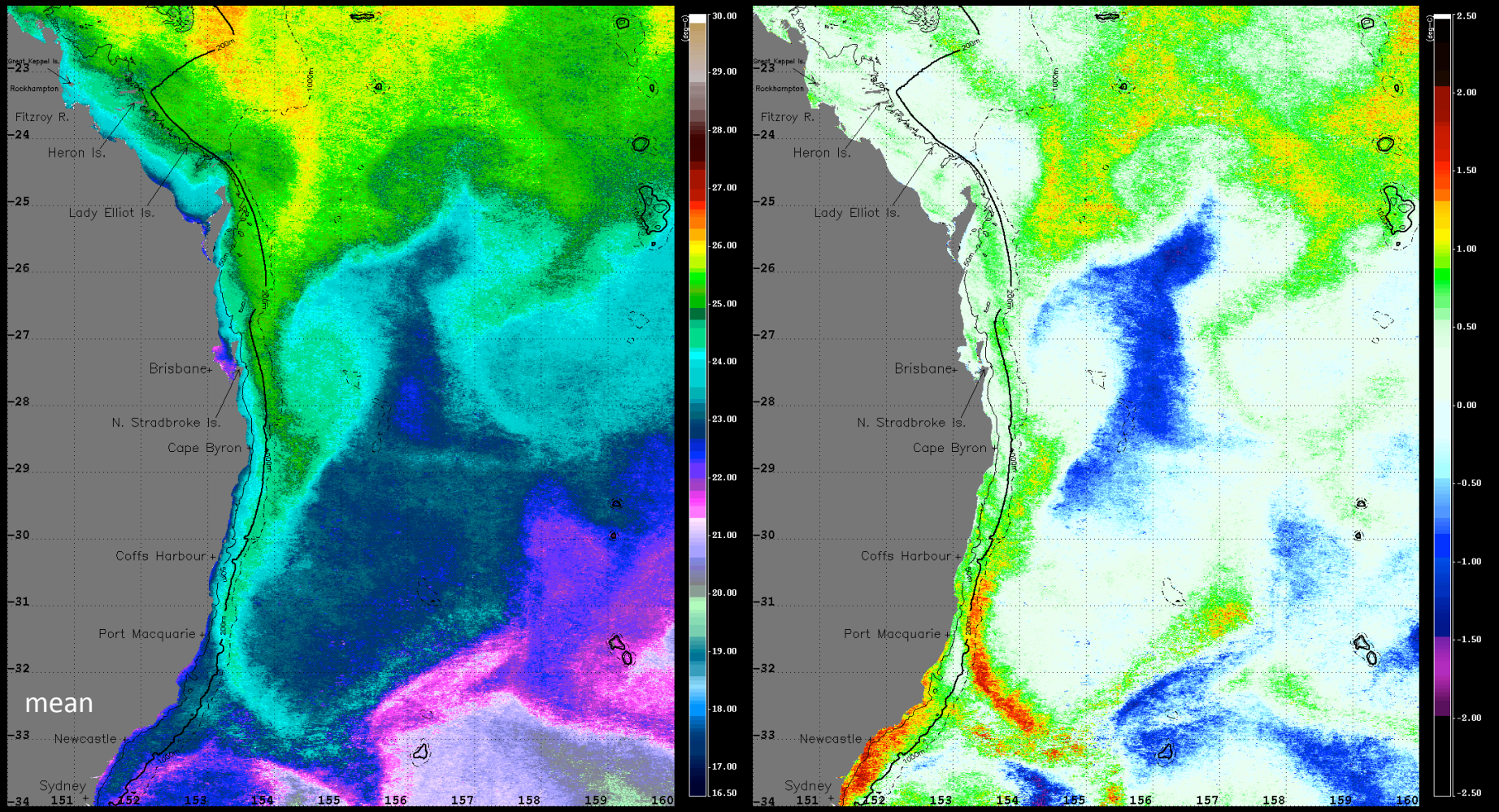
EAC Monthly MODIS SST (D+N): April 2012





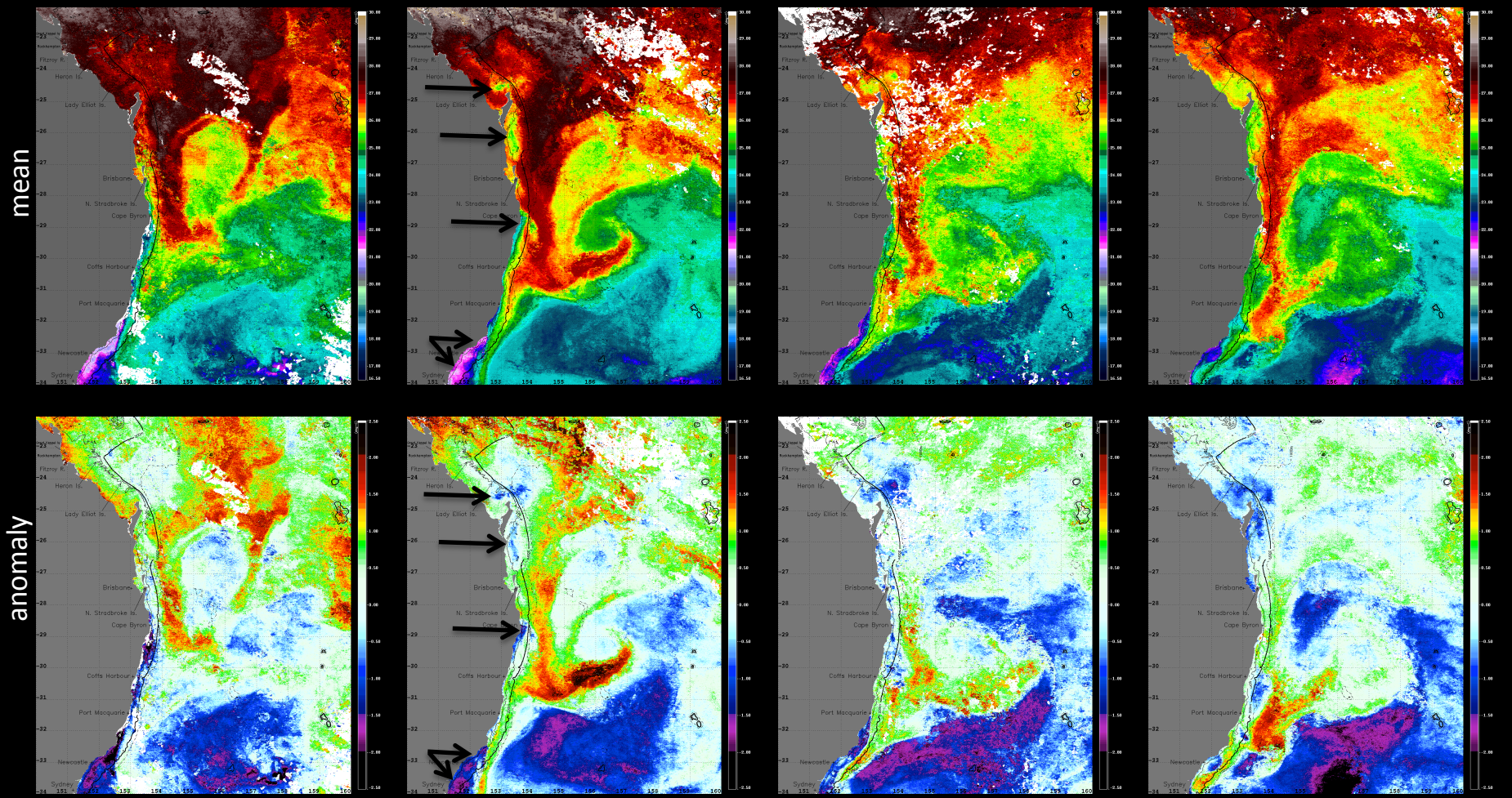
- The broad EAC core flow along the continental shelf shows a significantly cooler surface temperature signal in April
- Intense positive anomalies between 30 – 34°S due to a more southward than usual position of the EAC
- Strong negative anomalies related to the Tasman Front remain further offshore, although weakened
- Close to average conditions on the shelf further north and around the LEI

EAC 15D Mean MODIS SST (D+N): May 2012



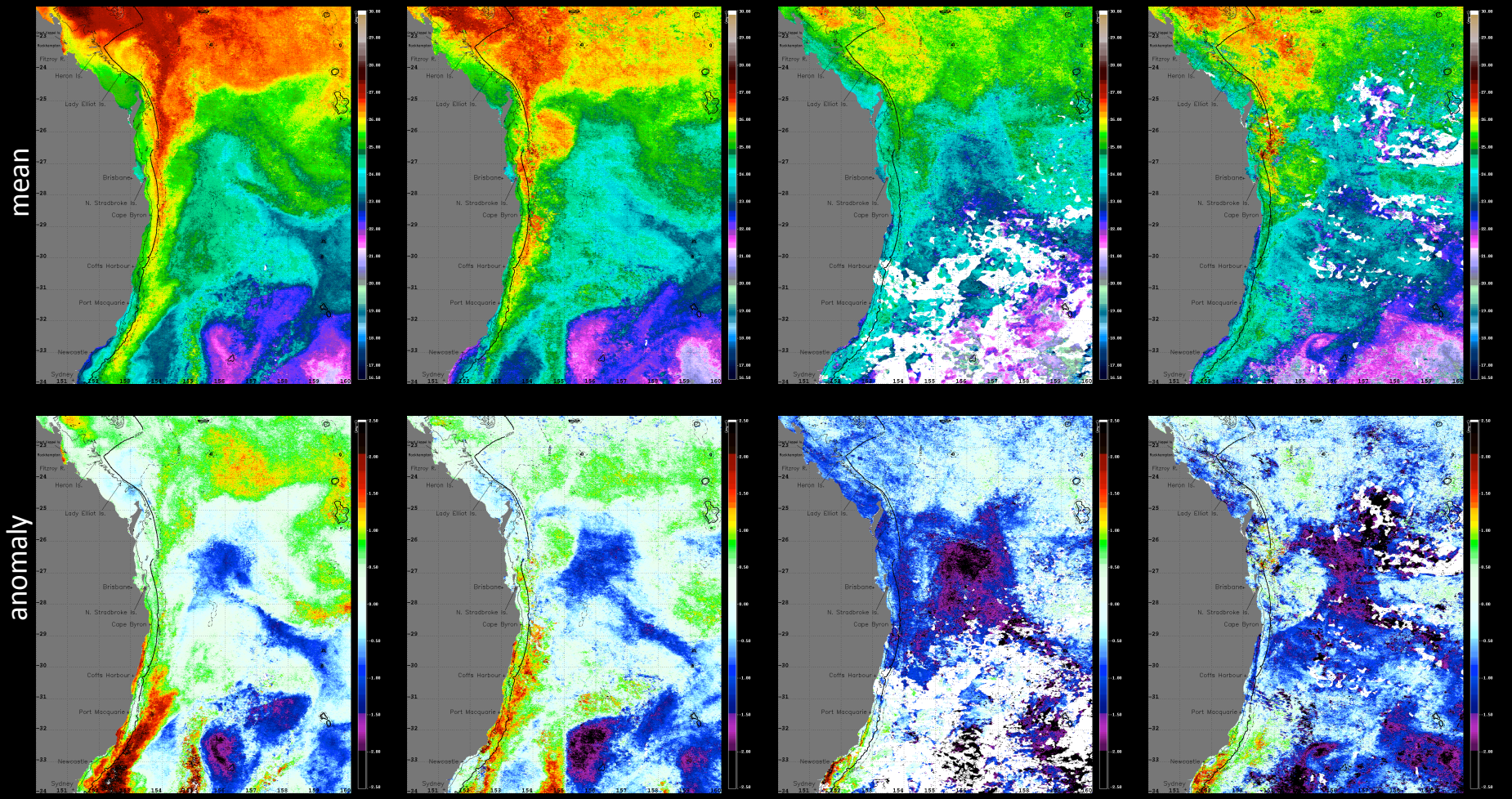
- Seasonal cooling of the EAC apparent
- Strong inshore positive anomalies south of 29°S related to:
  - (i) the eastward retroflection of the warmer EAC waters along the Tasman Front
  - (ii) the southward extension limb of the EAC

EAC Weekly MODIS SST (D+N): starting from 1-7 March 2012



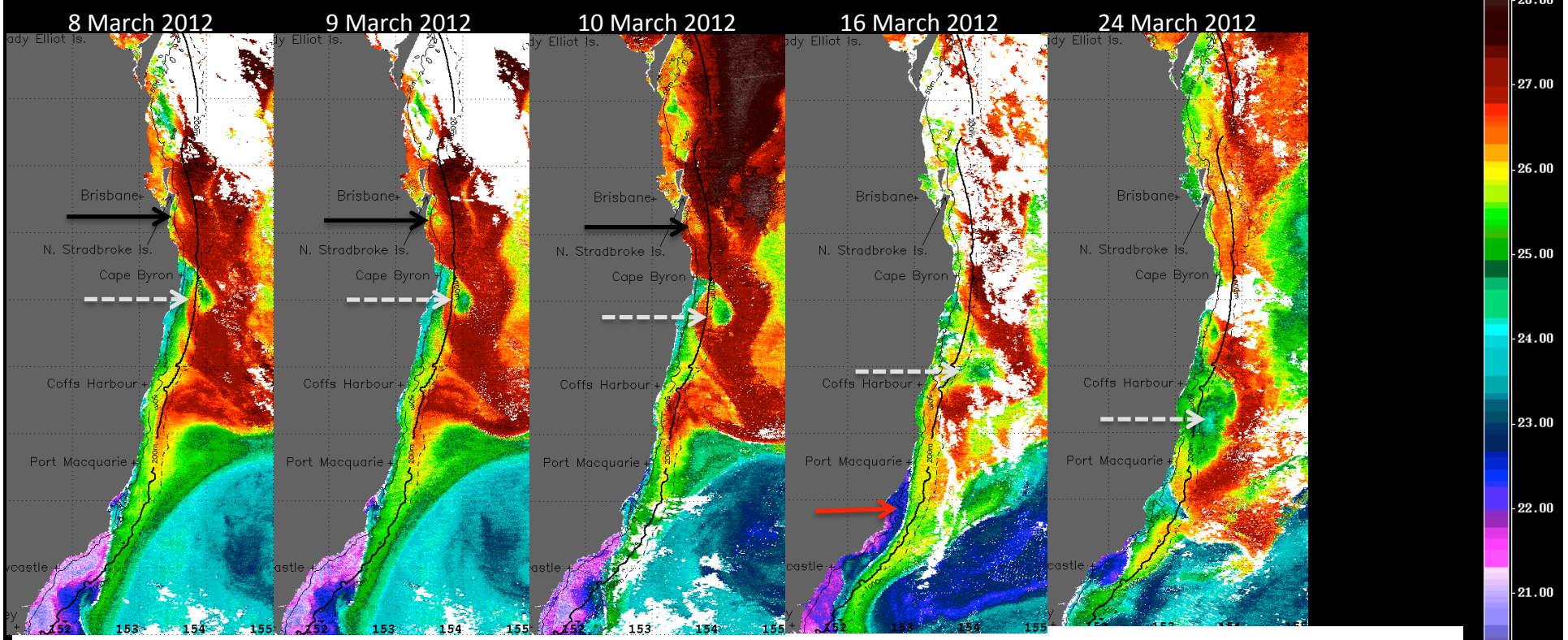
- Progressive enhancement and southward propagation of the EAC during March, with associated intense positive anomalies
- The development and evolution of a cold-core cyclonic eddy is evident just off the shelf east of Cape Byron (detail on Slide 8)
- Strong frontal features between the warm EAC and shelf waters (most pronounced in the 2nd week, black arrows) with corresponding negative anomalies
- Progressively stronger offshore negative anomalies increase during March, corresponding to position of the Tasman Front

EAC Weekly MODIS SST (D+N): starting from 1-7 April 2012



- Notable seasonal change mid-April:
  - strong southward penetration of the EAC core (& associated intense positive anomalies) during the first half of April
  - considerable surface cooling and cloud cover during the latter half

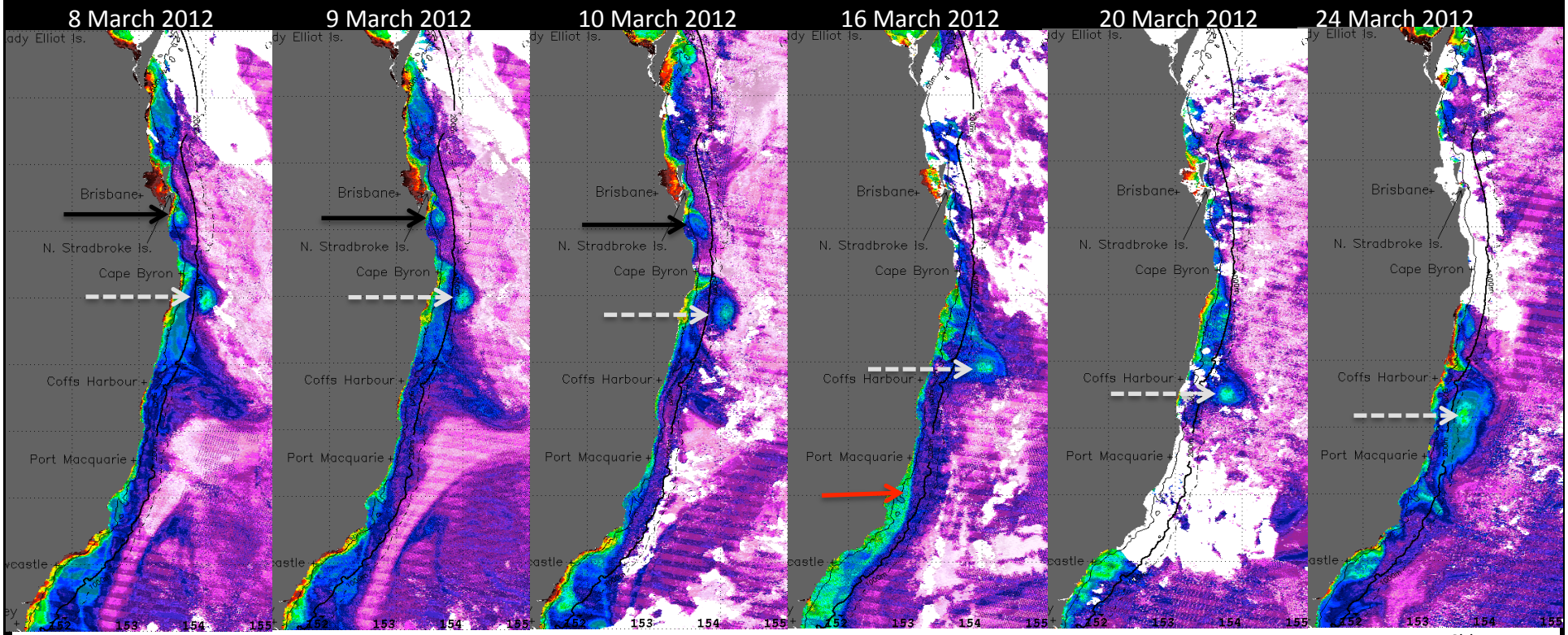
Development of cyclonic eddies and shelf-break front/upwelling using March SST images



MODIS SST mean images

- Development and southward propagation and of a cyclonic eddy southeast of Cape Byron (white dashed arrows)
  - relatively colder temperature within its core
- Also apparent is a smaller cyclonic eddy off N. Stradbroke Island (black arrows) that appears to merge with the EAC
- Note the strong upwelling southward of Port Macquarie & resultant intense fronts with the warm core of the EAC (especially apparent on 16 March)

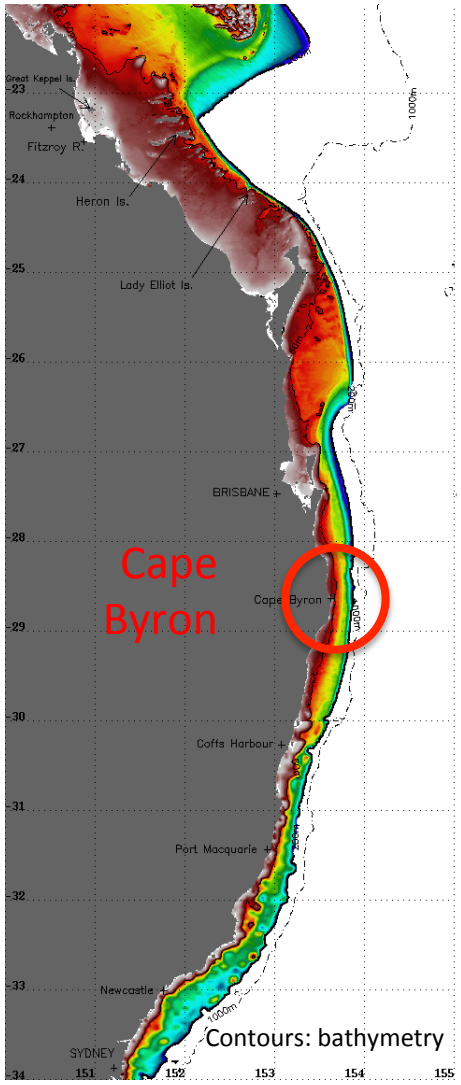
Development of cyclonic eddies and shelf-break front/upwelling using March Chlorophyll-a images



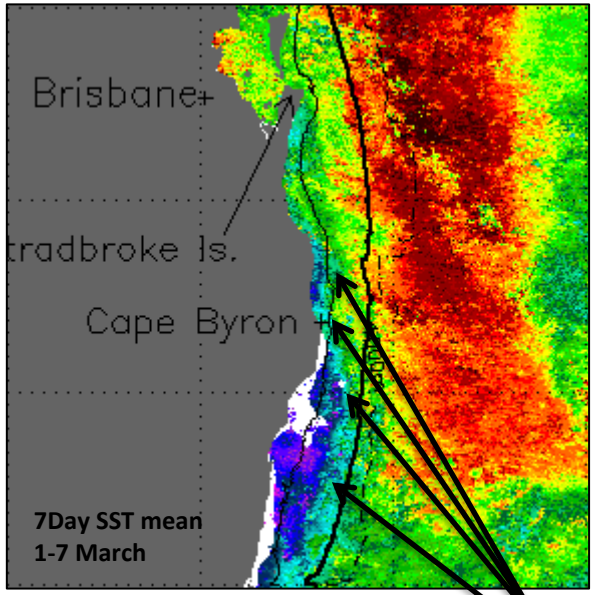
MODIS (Aqua + Terra) Chlorophyll-a mean images

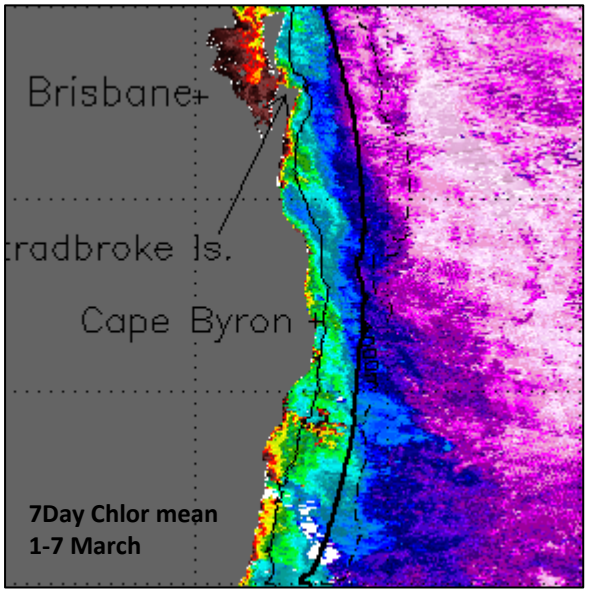
- Note the elevated chlorophyll-a levels within the core of the cyclonic eddy that developed off southeast of Cape Byron (white dashed arrows)
- Similarly for the smaller cyclonic eddy off N. Stradbroke Island (black arrows)

Physical-biological ocean features coincident with manta sightings



- Manta sightings reported off Cape Byron on 3rd and 5th March, images below are mean of 1-7 March

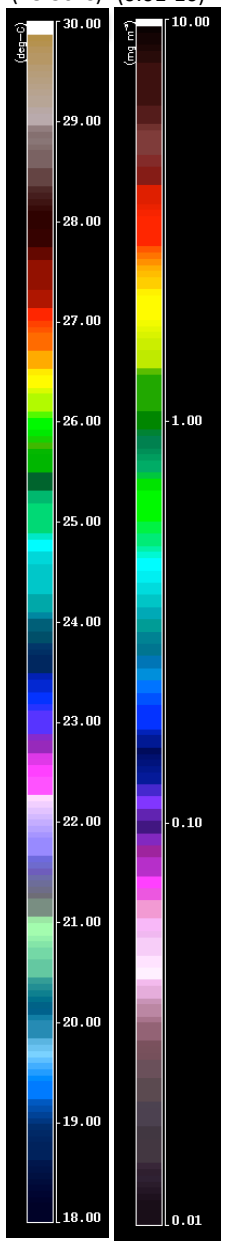




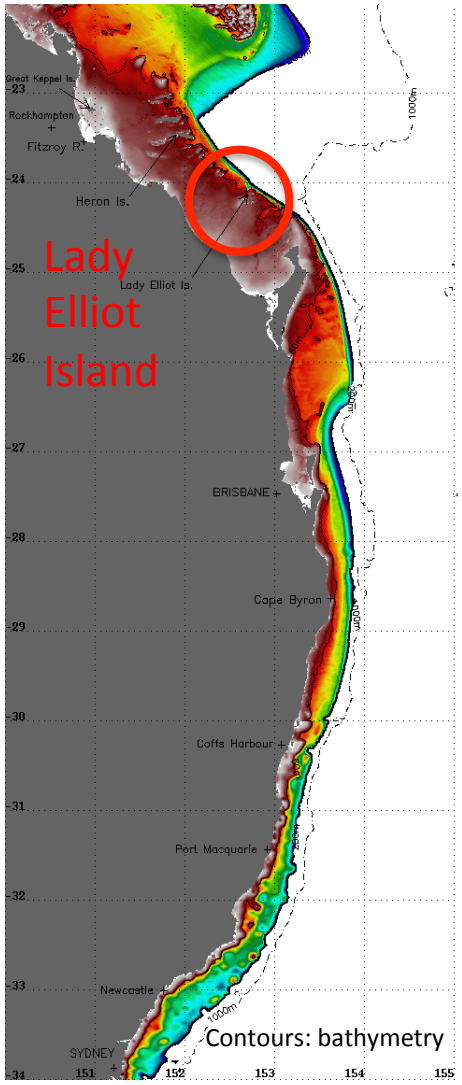
Sharp SST front on shelf as the EAC propagates southward

Enhanced chlorophyll-*a* on shelf concentrated and retained inshore of sharp SST front.

SST range (18-30°C) Chl range (0.01-10)

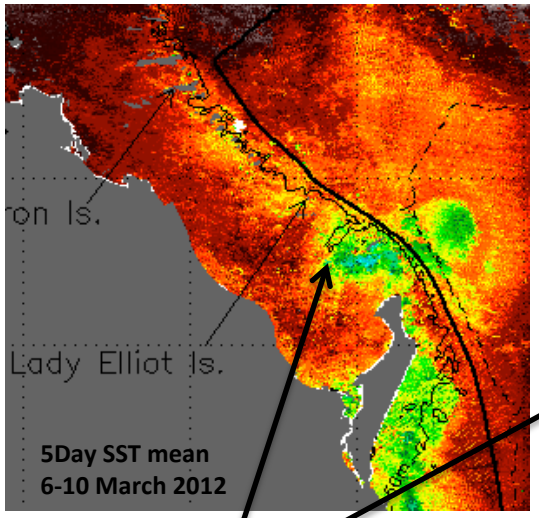


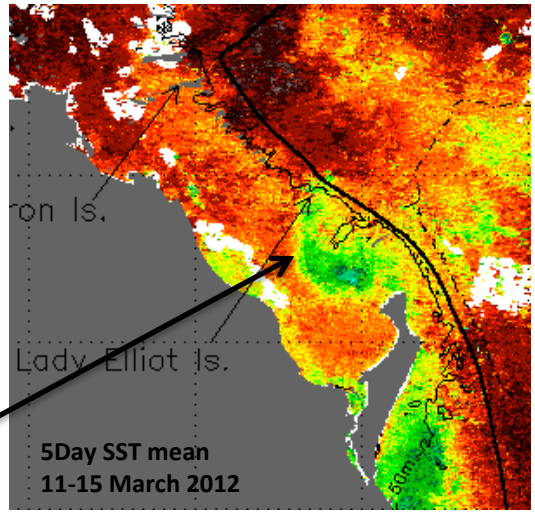
Physical-biological ocean features coincident with manta sightings



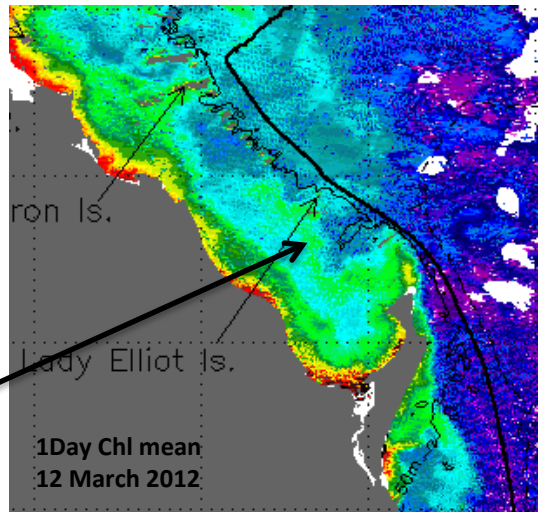
LEI:

- ✧ 8th March: 20+ mantas feeding, high plankton density
- ✧ 13th March: 30+ mantas feeding



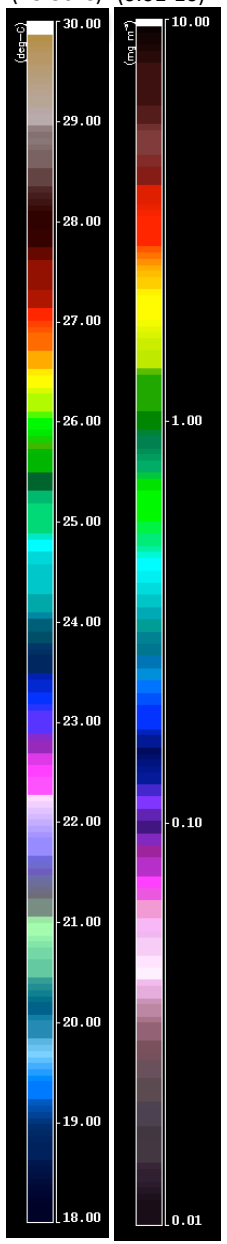


Sharp SST front



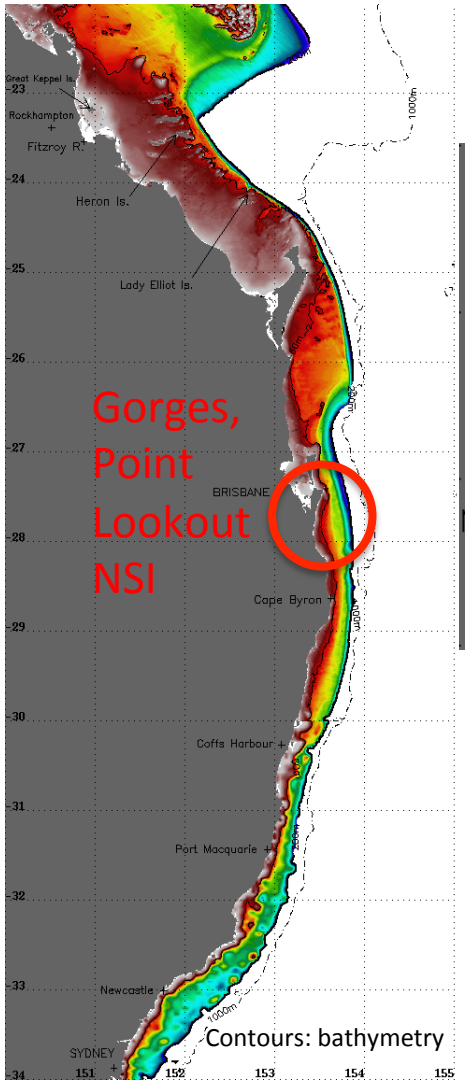
Band of elevated chlorophyll-a waters coincident with the inner boundary of the SST front

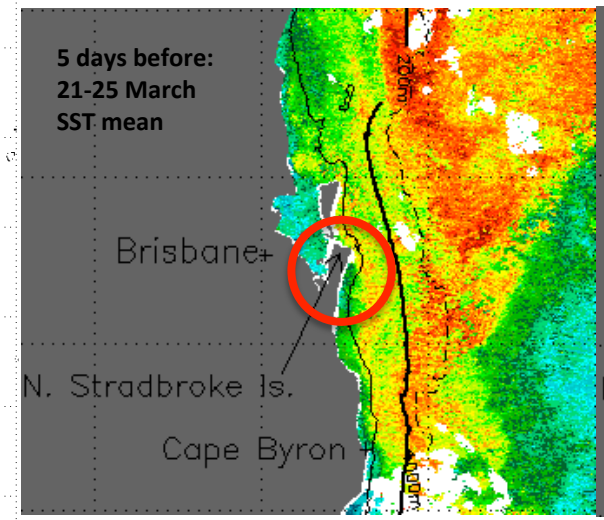
SST range (18-30°C) Chl range (0.01-10)

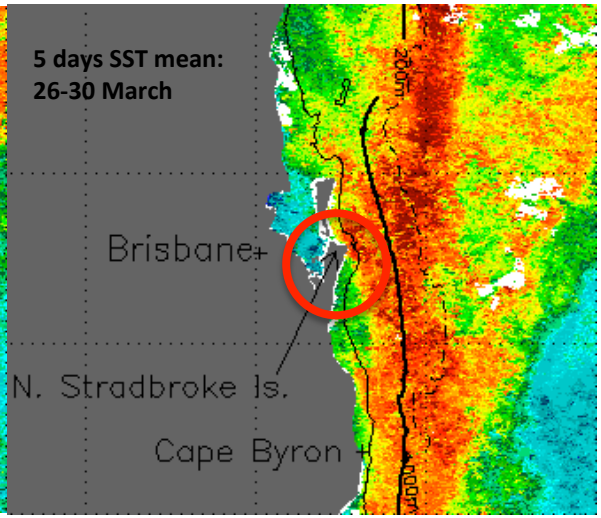


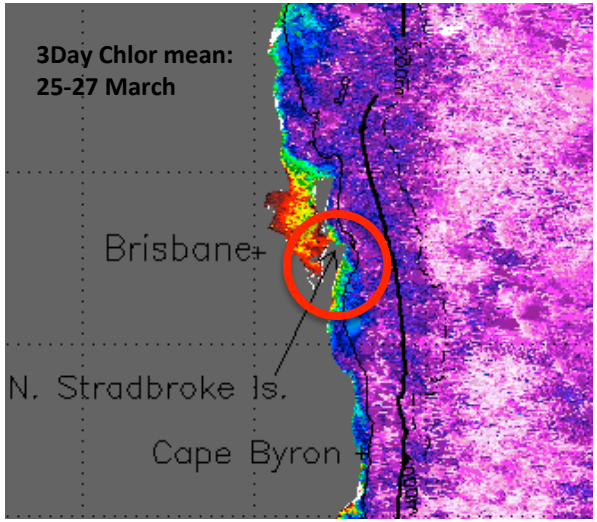
Physical-biological ocean features coincident with manta sightings

- ✧ 26th March
  - 4 mantas feeding off Pt. Lookout along the SST front between warmer EAC water and cooler shelf waters

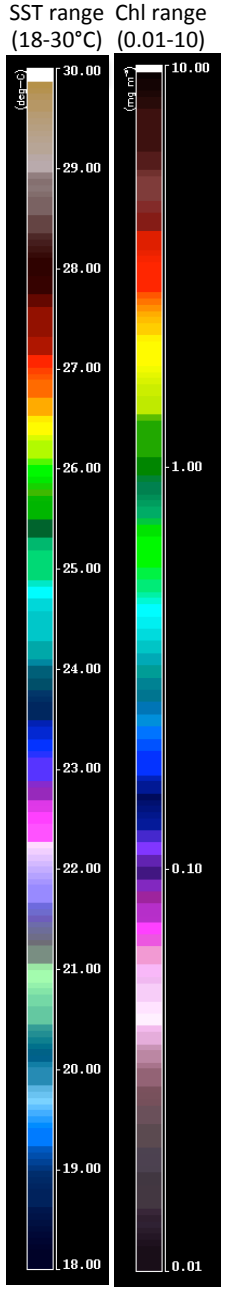




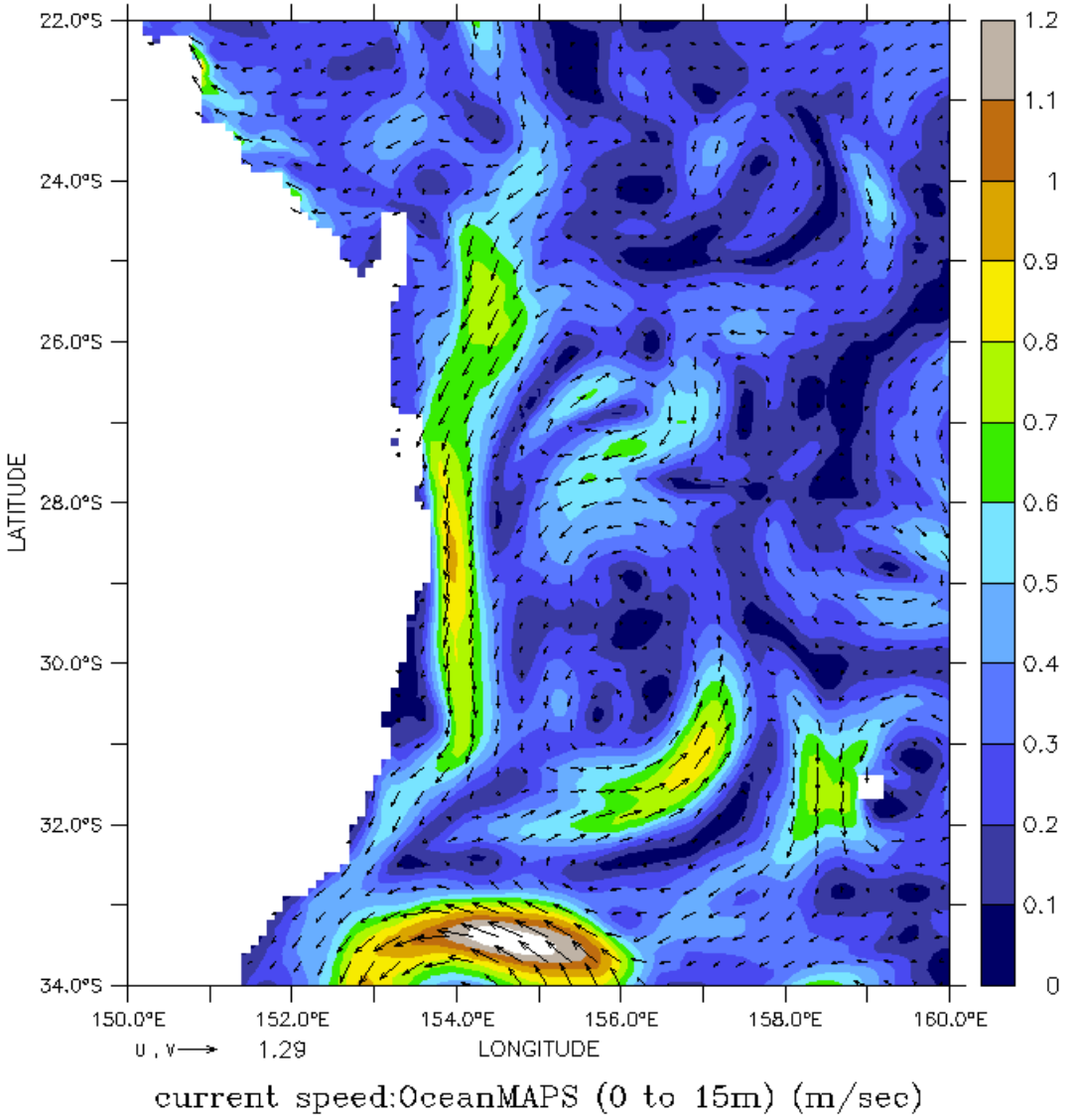




Elevated chlorophyll-a concentrated and retained inshore of the SST frontal boundary



OceanMaps : March 2012 mean



Depth integrated (0-15m) currents from OceanMaps confirm the well-defined EAC flow along the shelf edge from 24-32°S during March, creating the strong frontal features seen in the SST and chlorophyll-a images