Project Manta

East Australian Current (EAC) Region: Oceanographic conditions report

March – May 2013
(Part 2)

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Overview

PART 1

- Monthly and weekly means and anomalies of MODIS SST for March and April 2013 indicating strong eddy activity.

PART 2

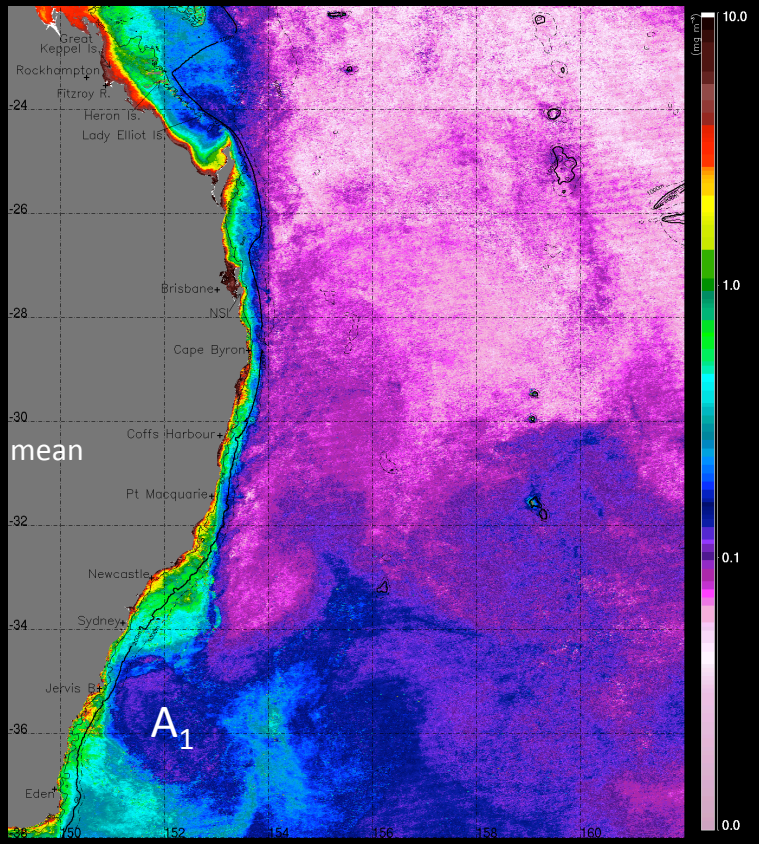
- Monthly and weekly means and anomalies of MODIS chlorophyll-a concentrations for March and April. Chlorophyll patterns related to the behavior of the EAC and strong eddy activity.

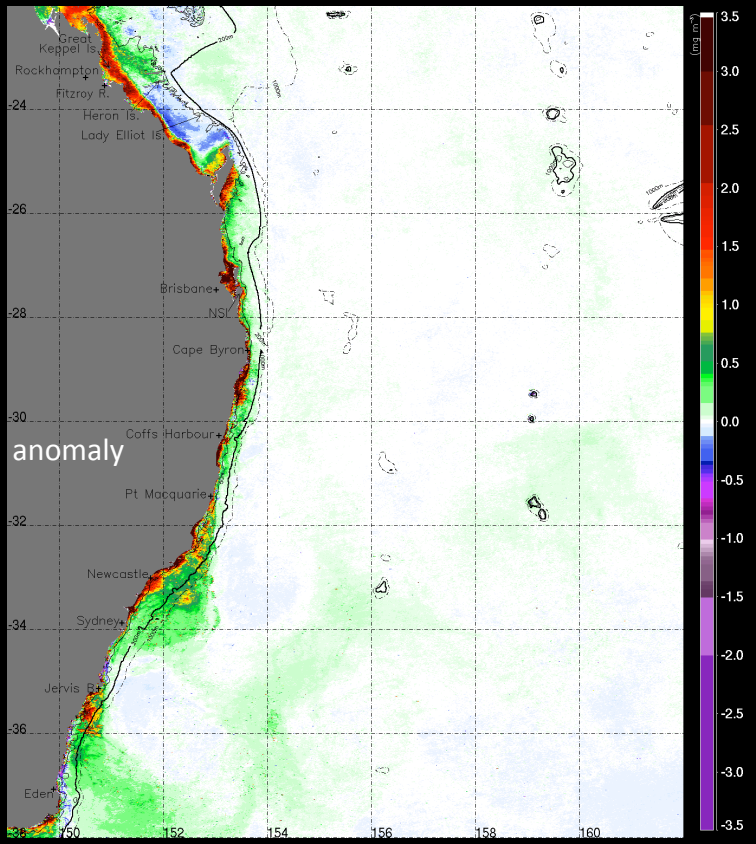
- Monthly means and anomalies of photic depth for March and April.

- Monthly means of surface oceanic currents (OceanMAPS).

- Summary of manta sightings at NSI and Byron Bay during April.

EAC Monthly MODIS Chlorophyll: March 2013

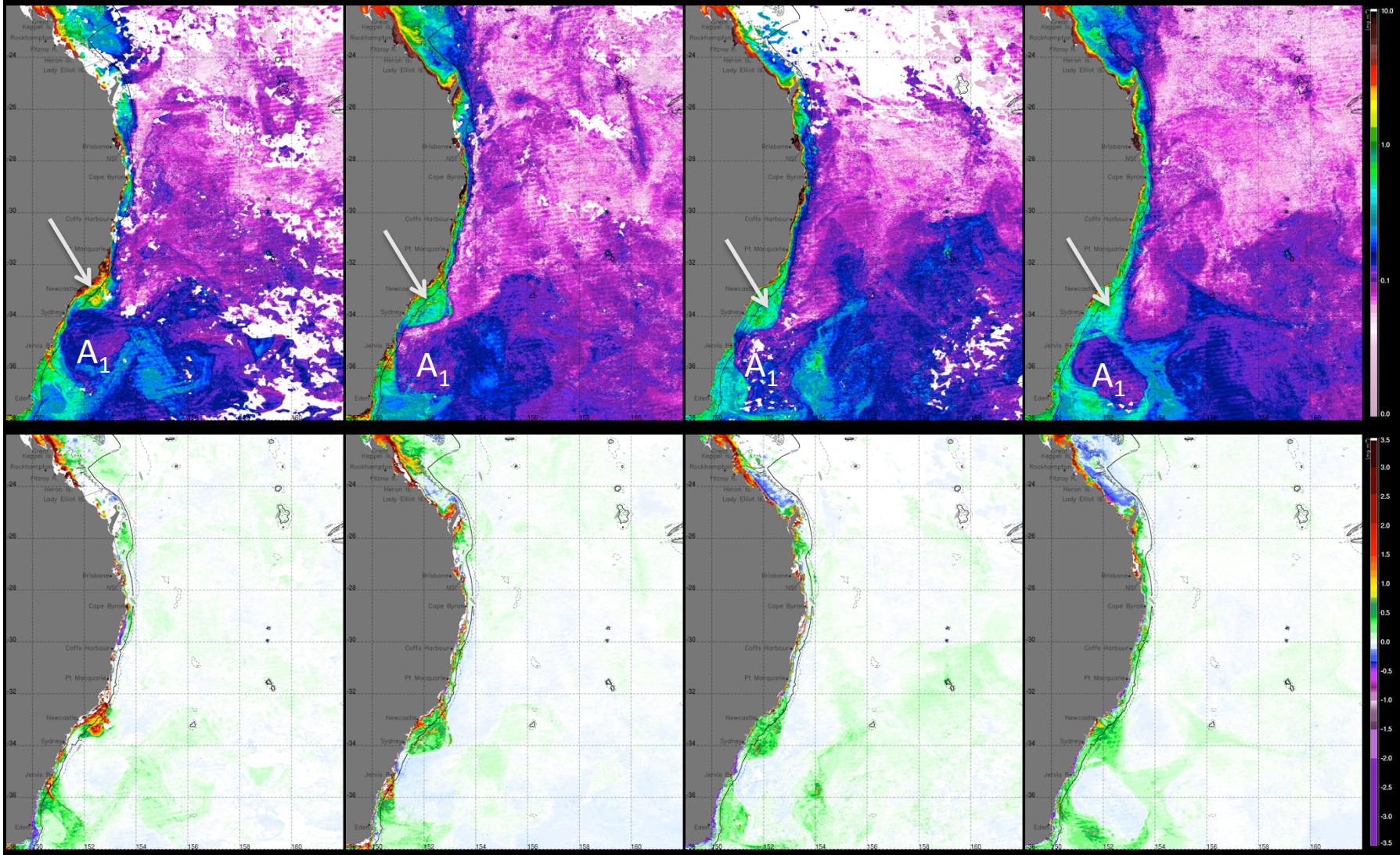




- Intense chlorophyll-a signal inshore in the southern GBR region due to river outflow and intense vertical mixing
- Sharp chlorophyll-a gradient along the length of the shelf down to 32°S as EAC flow very close inshore. Close coastal proximity of the EAC uplifts the thermocline and nutrients (shelf-edge upwelling), leading to increased phytoplankton (high chlorophyll concentrations).
- Intense positive chlorophyll-a anomalies off Newcastle and Sydney resulting from a localised cyclonic eddy inshore of primary EAC flow
- Elevated chlorophyll-a concentrations also apparent along the outer boundaries of the anticyclonic eddy (A_1) but most pronounced inshore south of Jervis Bay and along the eddy's southwestern boundary

Weekly MODIS Chlorophyll means (top panel) and anomalies (bottom panel)

From 1-7 Mar 2013



- Weekly means showing the dynamics of the anticyclonic eddy (A_1) pinching off from the main EAC flow and continuing southwestward, & associated with intense low chlorophyll signal.
- Weekly means also showing the evolution of the Intense positive chlorophyll-a anomalies off Newcastle and Sydney resulting from a localised cyclonic eddy inshore of primary EAC flow

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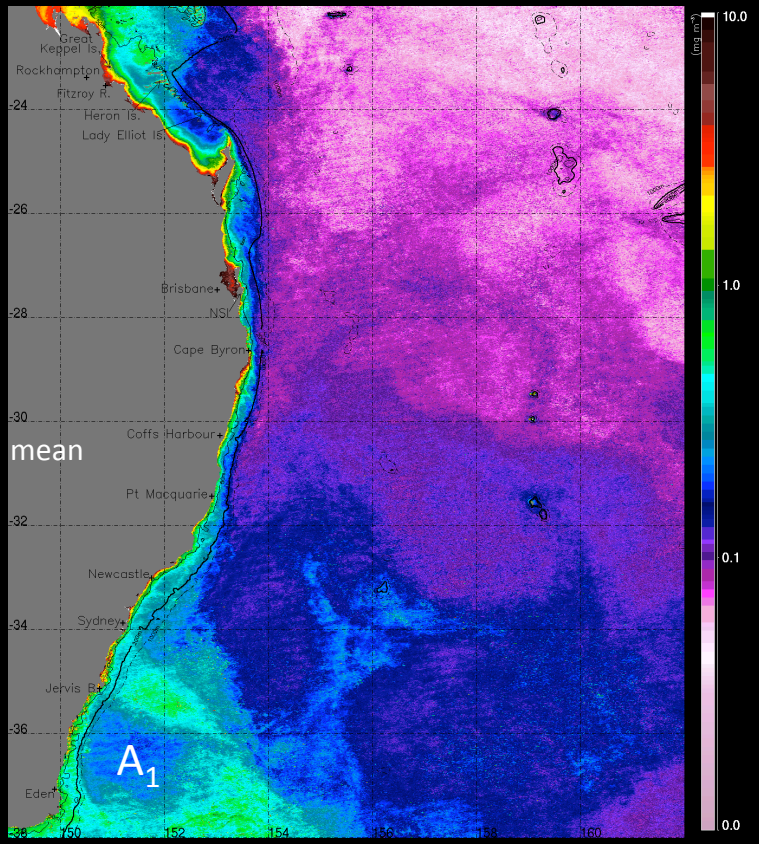
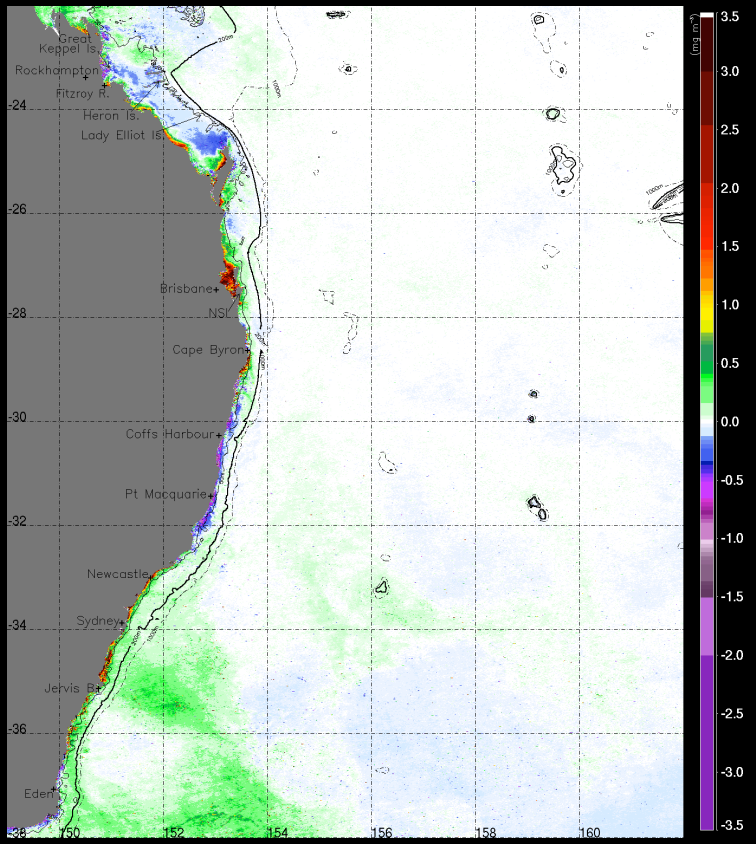
EAC Monthly MODIS Chlorophyll: April 2013



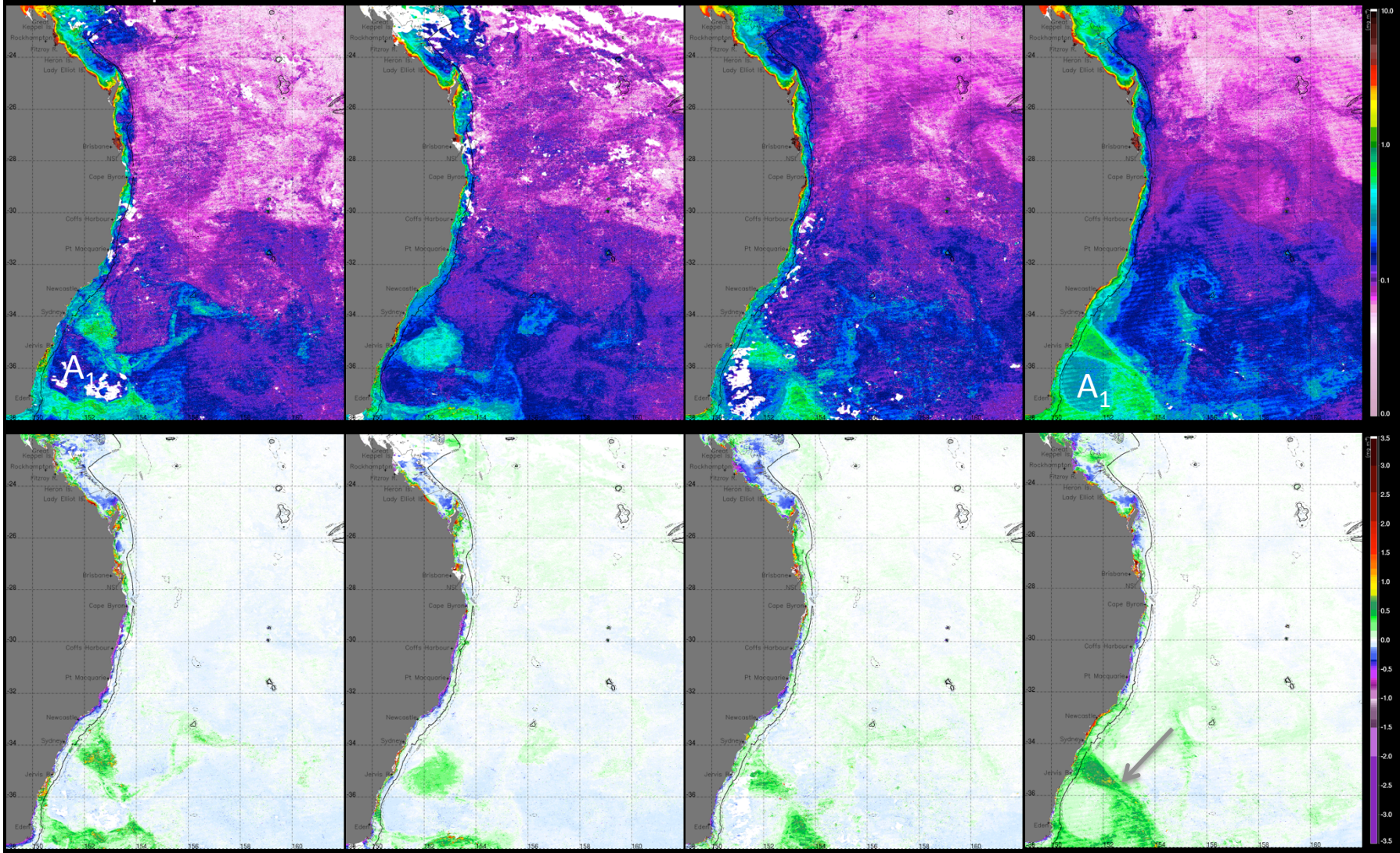


- Chlorophyll-a gradient along the shelf still apparent
- intense chlorophyll-a signal inshore in the southern GBR from previous month has significantly dissipated

- Elevated chlorophyll-a anomalies concentrations still apparent along the boundaries of anticyclonic eddy A_1
  - –indicates offshore advection of these productive waters as anticyclonic eddy (A_1) is shed from the primary EAC

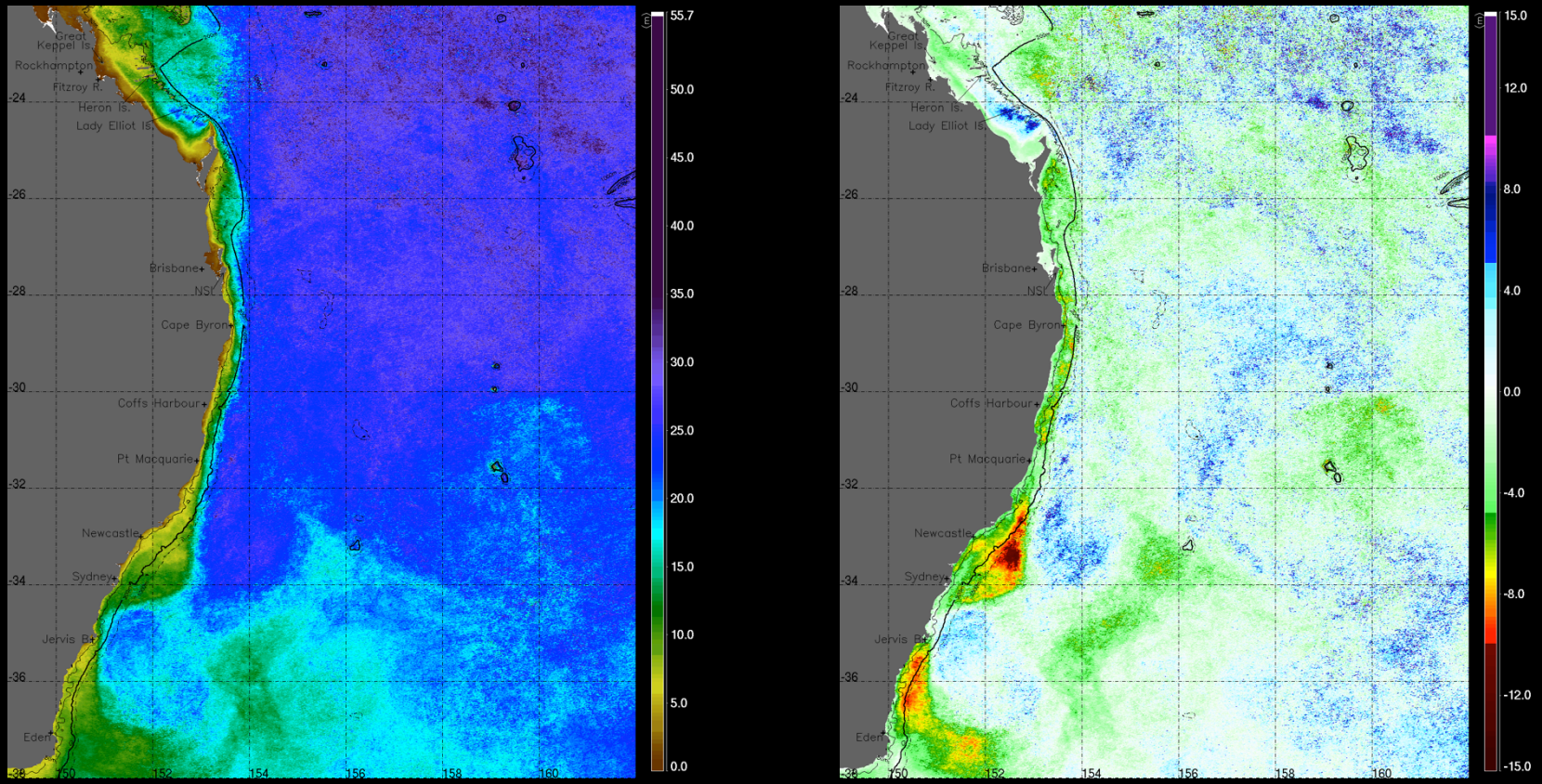
Weekly MODIS Chlorophyll means (top panel) and anomalies (bottom panel)

From 1-7 Apr 2013



- Weekly means showing the movement Anticyclonic eddy (A_1) further southwestward as it is shed from the primary EAC flow.
- The chlorophyll-a anomalies concentrations along the boundaries of the anticyclonic eddy strengthen towards the end of the month.

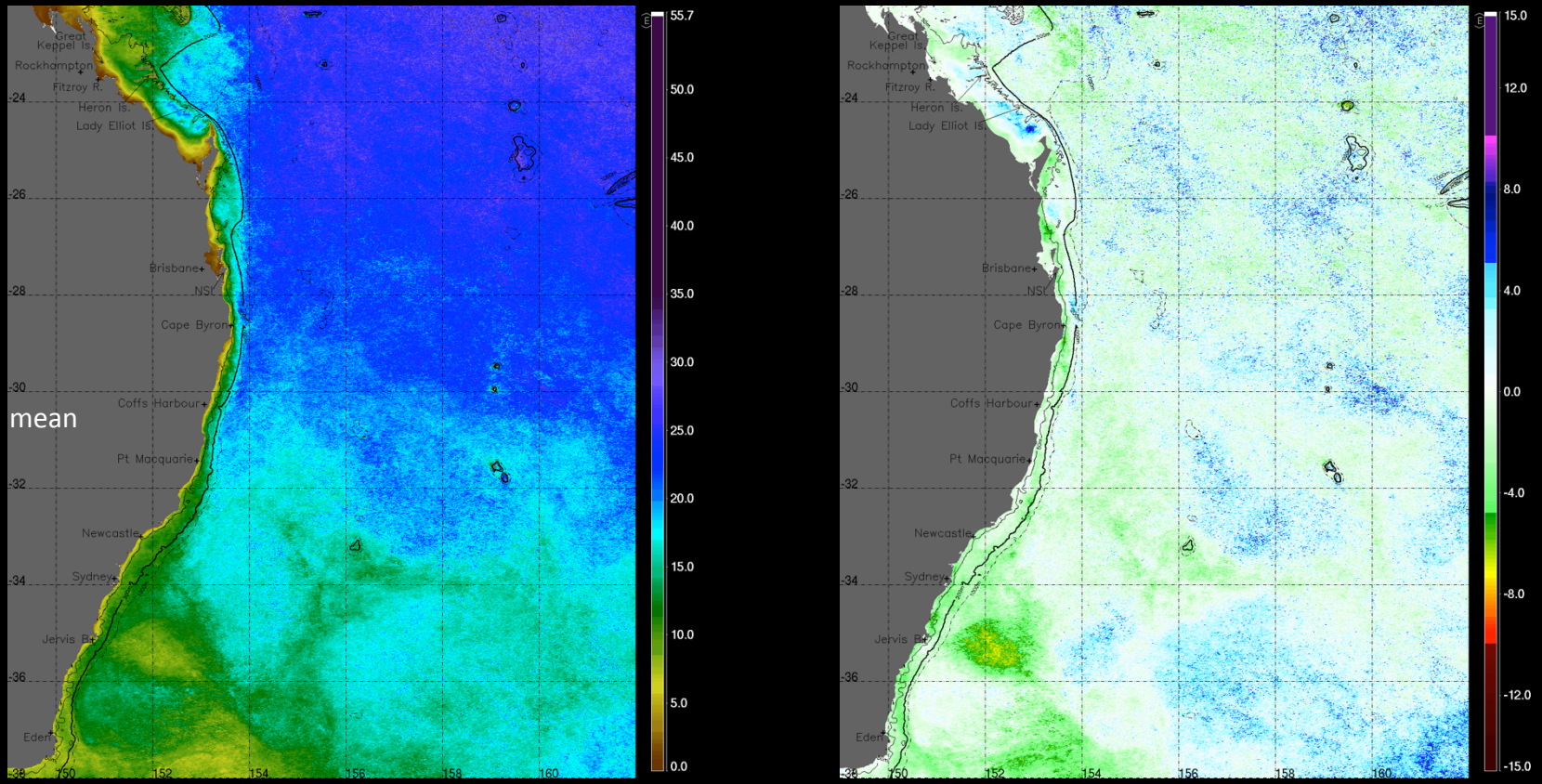
EAC Monthly MODIS Photic Depth: March 2013



- Satellite-derived photic depth mean for March generally indicative of reduced water clarity along the coast.
- In the southern GBR region, very shallow photic depth likely due to river influence and intense vertical mixing, and is associated with weak negative anomalies.

- Anomalously low water clarity further south coincide with regions of high eddy activity:
  - (i) at 32-34.5°S due to the localised cyclonic eddy and associated intense eddy upwelling; and
  - (ii) south of 35°S due to frontal boundary and associated upwelling.

EAC Monthly MODIS Z-Secchi Depth: April 2013



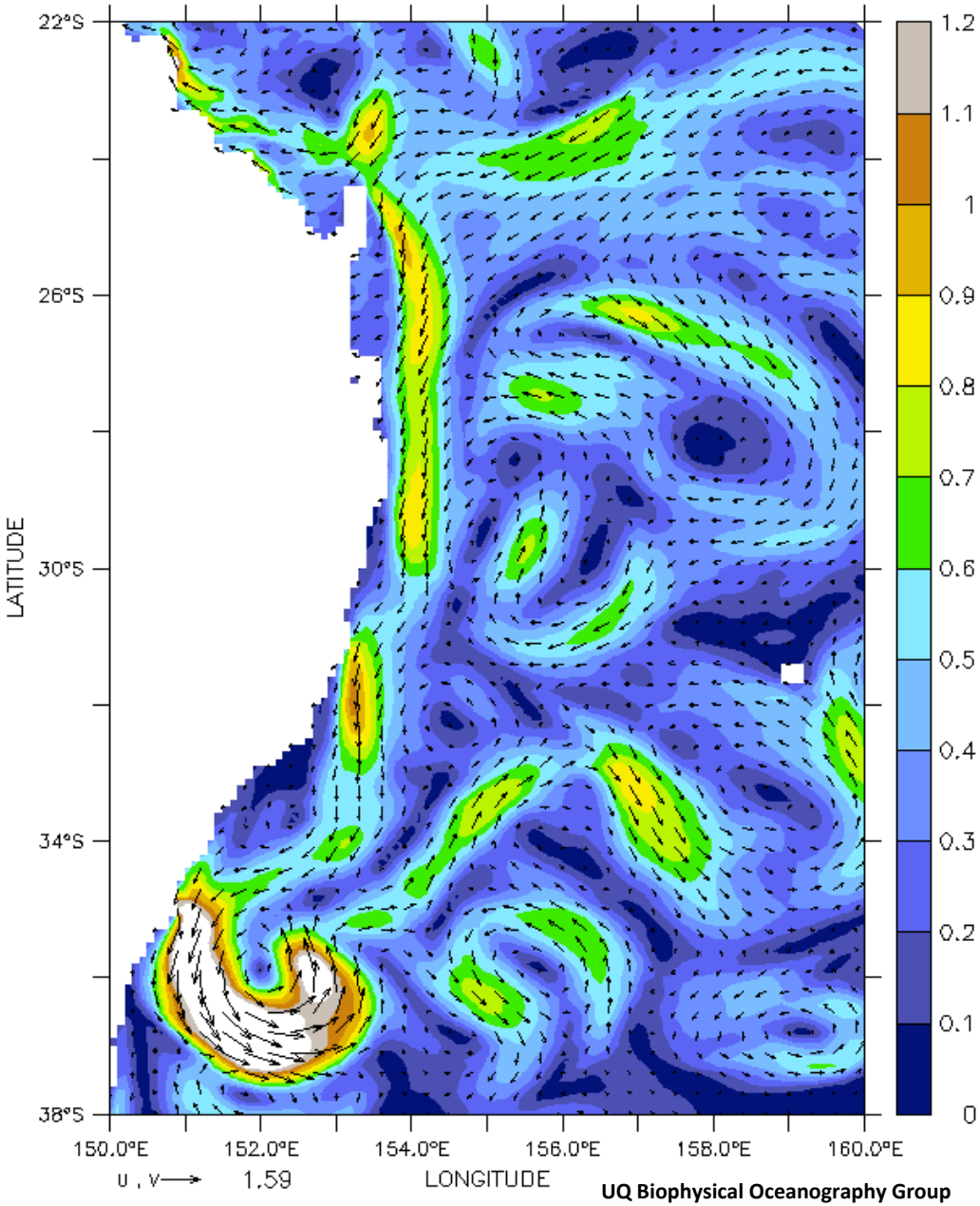
- Photic depth gradient along the shelf still apparent – due reduced water clarity along the coast
- In the southern GBR region, very shallow photic depth likely due to river influence and intense vertical mixing, has significantly dissipated since March

- Anomalously low water clarity further south still apparent in regions of high eddy activity:
  - (i) between Sydney & Jervis Bay, due to offshore movement of the localised cyclonic eddy; and
  - (ii) south of 35°S due to frontal boundary and associated upwelling.

OceanMaps: March 2013 mean

Depth integrated (0-15m) currents from OceanMaps reveal intensified EAC flow along the shelf edge from ~24°S off Fraser Island during March

Further south, the southern limb of the EAC particularly strengthened from 31°S (off Smoky Cape), feeding the strong anticyclonic eddy (A_1)as previously described using the MODIS images.



http://godae.bom.gov.au/oceanmaps_analysis/ocean_diag_brt/ocean_diag.shtml

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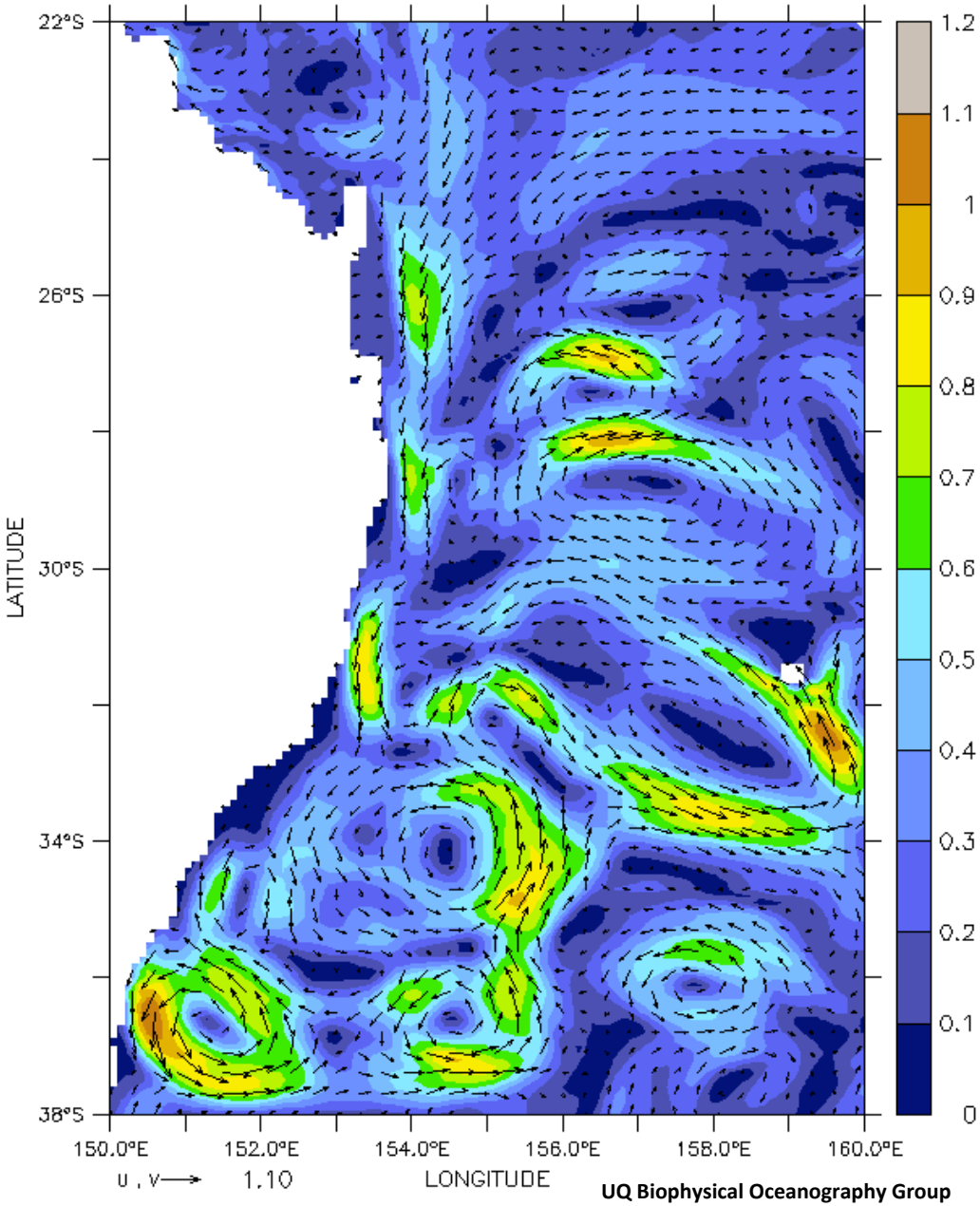
OceanMaps: April 2013 mean

Depth integrated (0-15m) currents from OceanMaps for April shows a much weaker EAC flowing along the shelf which is typical during this period.

Further south, the currents confirms the presence of the persistent A_1 anticyclonic eddy seen from the MODIS images.

Strong eddy activity further offshore in the Tasman Sea.



http://godae.bom.gov.au/oceanmaps_analysis/ocean_diag_brt/ocean_diag.shtml

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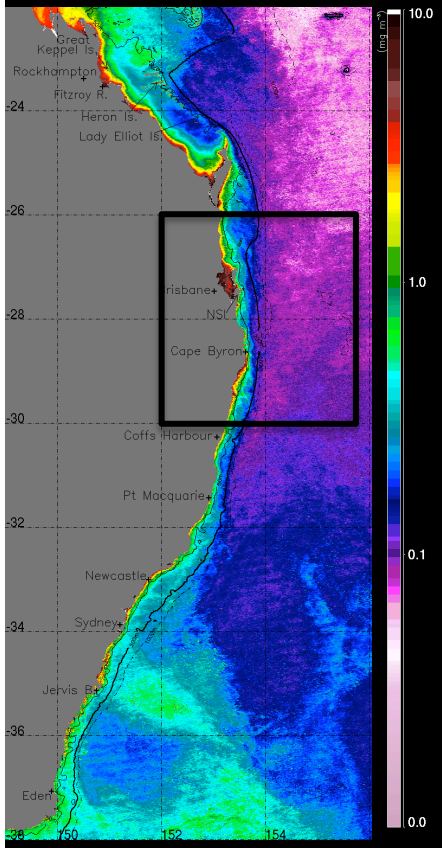
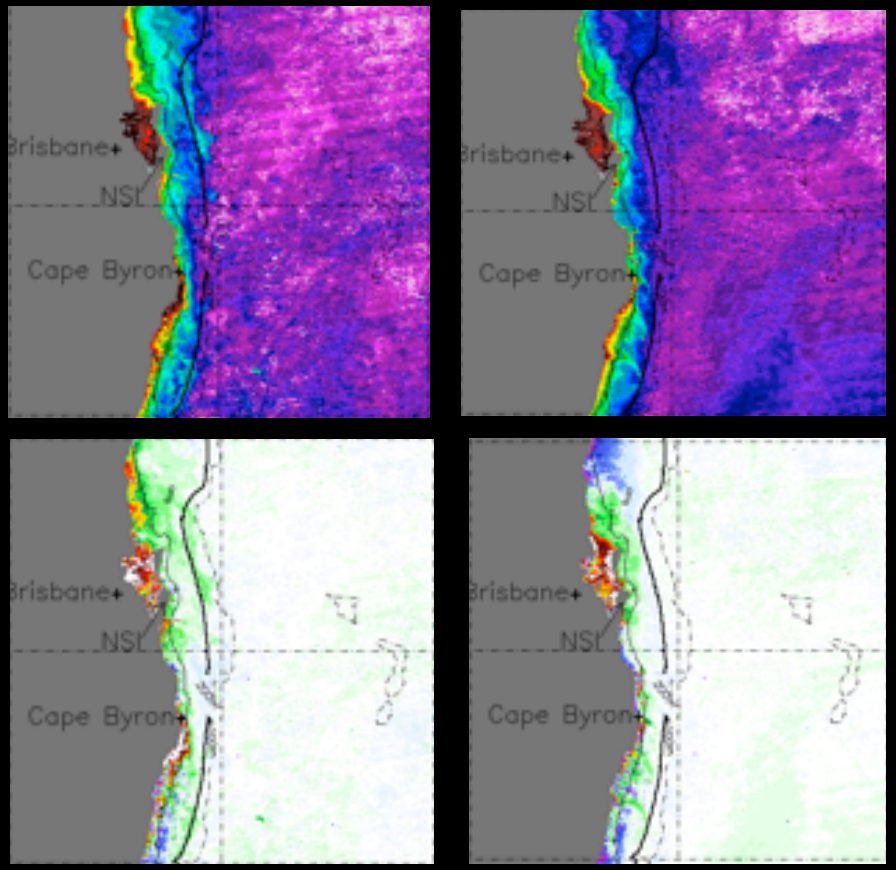
Manta sightings



Mean Monthly MODIS Chlorophyll

16-23 Apr 2013

24-30 Apr 2013



Mean (top) and anomaly (bottom) weekly MODIS Chlorophyll

Manta sightings at NSI (April)

12/04 (1)
17/04 (3 - including Pinocchio which was tagged at LEI in Feb 2013)
18/04
19/04 (7)
25/04 (3)

Manta sightings at Byron Bay (April)

27/04(1)
03/05(1)
there were a few mantas seen throughout the month there. (without photos, ~6-7 reported)