Climate and Oceanographic Summary, Great Australian Bight 2018 - 3

Kirsten Rough – 15th December 2017

Summary:

The GAB continues to warm progressively at the sea surface and the warm water at a number of key locations is extending deeper into the water column.

Longer-term forecasts are indicating a fishing season where conditions will be suitable for SBT over a wide area.

Upwelling continues to be a prominent feature on satellite images and is leading to marked differences between water temperatures at the sea surface and the sea floor, especially below Eyre Peninsula.

Chlorophyll levels are ideal for SBT across a very wide area of the GAB; and responding to nutrient input from the upwelling particularly adjacent to the area known as the Kangaroo Island Pool.

The distribution and area of warm water adjacent to Western Australia is slightly reduced compared with the previous 3 years.

Warm water adjacent to the East Coast is extending further southwards compared to the previous 3 years.

Forecast Sea Surface Temperature and SBT Habitat:

This year conditions are warming over a broader area at a much earlier point in time compared to what occurred coming into the previous (2017) fishing season (see the late December forecasts from 2016 and now in Figure 1). In these images the plot on the left shows forecasted sea surface temperature and the plot on the right shows the areas that have conditions suitable for juvenile Southern Bluefin Tuna. Preferred habitat includes areas with a value of one or more (i.e. green to bone colour). Note that the shallow water and low resolution of the current satellite and modeling system mean that these forecasts cannot be displayed for the Sanders and Young Rocks regions.

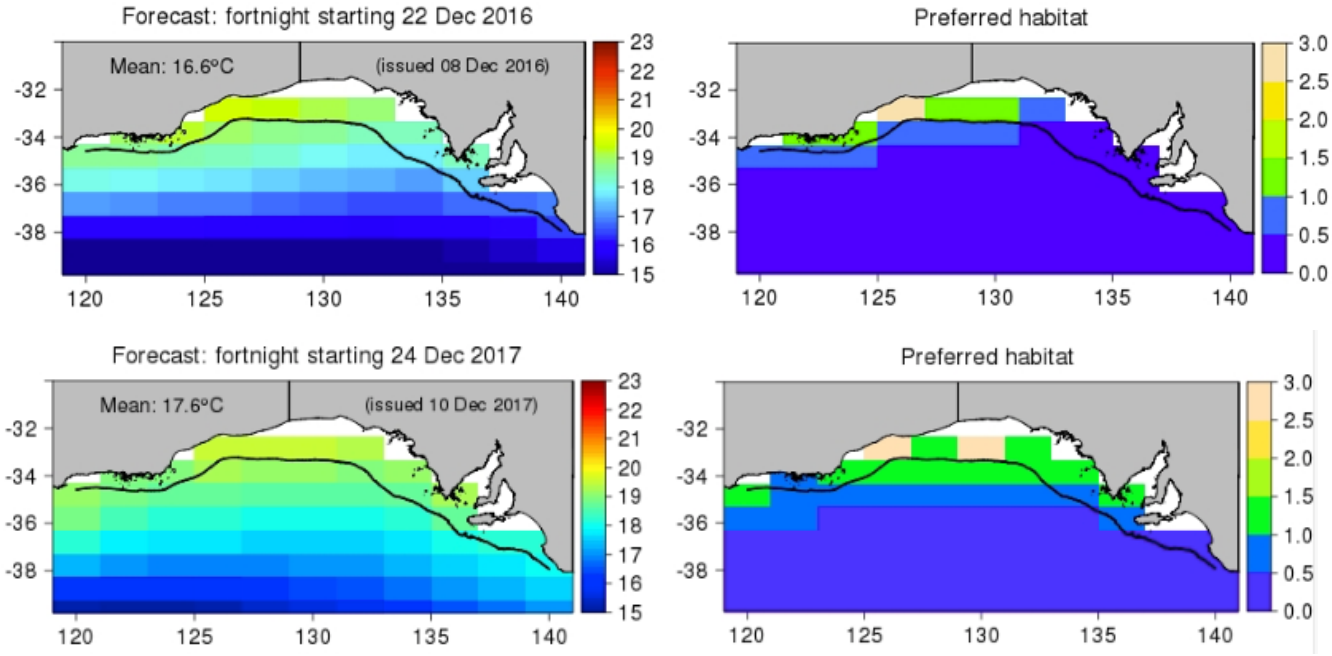

Figure 1: Sea Temperature and SBT Habitat forecasts issued mid December 2016 (top) and now 2017 (bottom) (CSIRO 2017 – GAB Forecasting Website).

Longer-term forecasts of conditions in the GAB through the 2018-fishing season are shown in Figure 2. These are indicating that the sea conditions this season will be warmer over a much broader area than they were last season. This could mean a higher proportion of smaller fish amongst the normal cohorts in the eastern areas. Also that target SBT could be located within and in the vicinity of the "South East Commonwealth Marine Park" network through February – these parks have restrictions for catching locations and the requirement to notify tow cage movements. Marine Park considerations for this season currently remain the SAME as issued to each company for the 2017-fishing season.

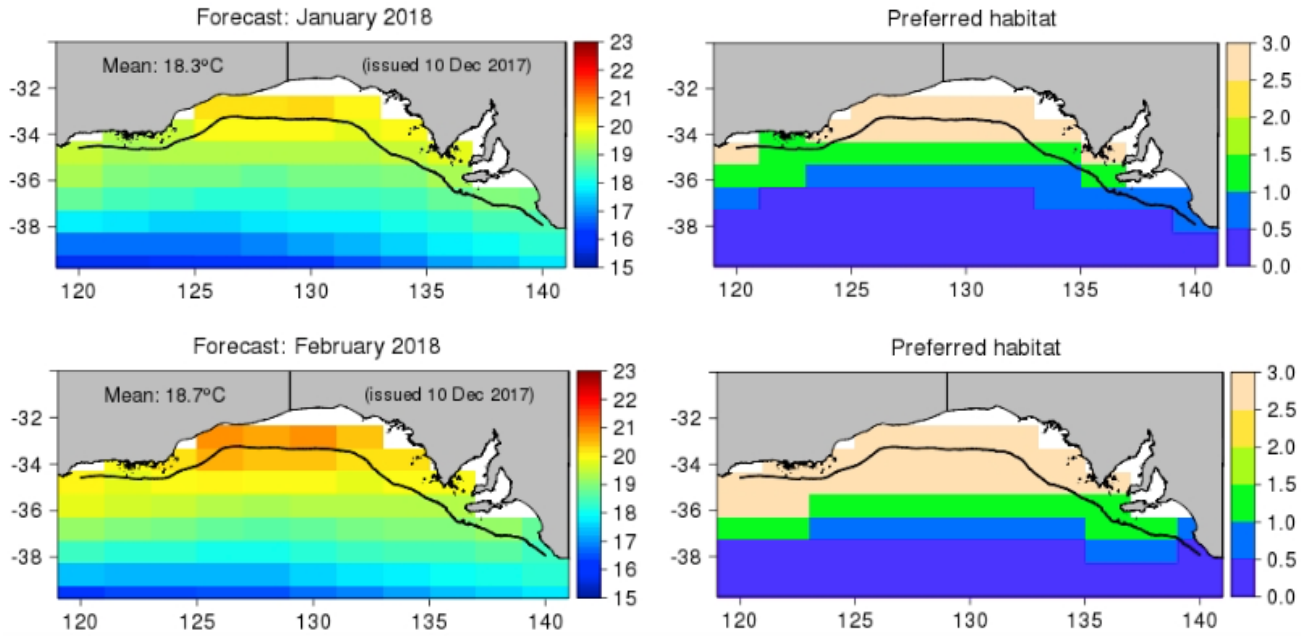

Figure 2: Sea Temperature and SBT habitat forecasts issued mid December for the months of January and February 2018) (CSIRO 2017 – GAB Forecasting Website).

GAB Sea Surface Temperature (SST):

The broader GAB area is progressively warming with warm currents continuing to round Cape Leeuwin in the west and cool water from the Bonney Upwelling remains a prominent feature in the east (Figure 3). Actual SST along the 200m-depth contour is shown in Figure 4. This year (now), SST along the shelf-break is at or exceeds 18°C from longitude 120 to 138°E. At a similar point in time for the most recent warm year (coming into the 2016-fishing season), SST along the shelf-break was at or exceeded 18°C from longitude 120 to 135°30'E.

How the SST conditions of December appeared over the past 6 seasons is shown in Figure 5.

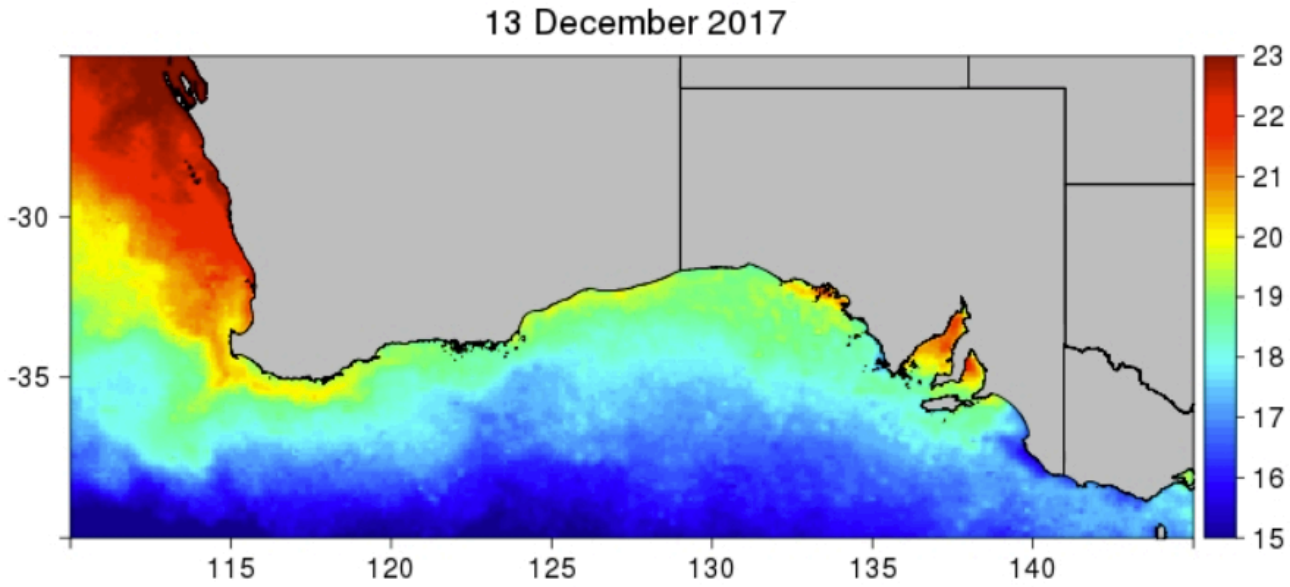

Figure 3: Sea Surface Temperature across southern Australia over the past week (CSIRO 2017 - GAB Forecasting Website)

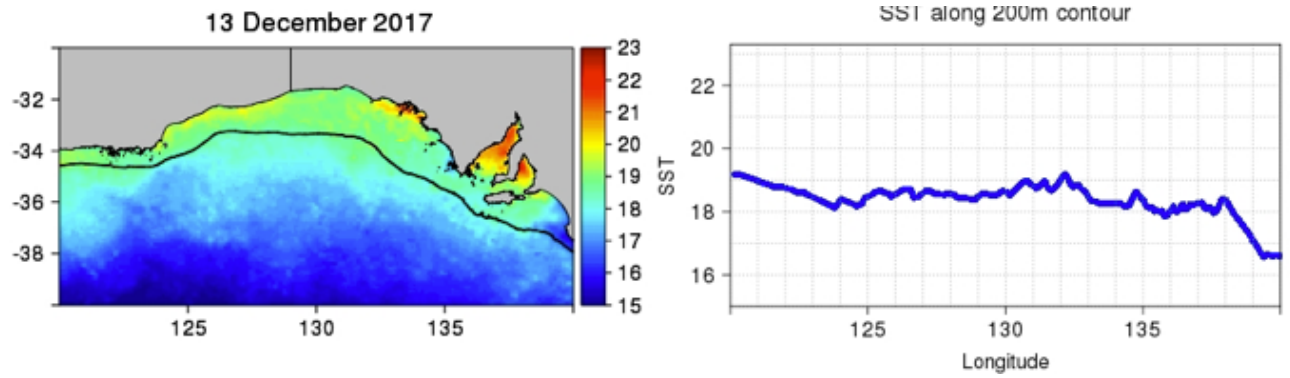

Figure 4: Most recent SST satellite image between longitudes 120° to 140°E (left) and corresponding graph of SST along the shelf break (right) (CSIRO 2017 - GAB Forecasting Website)

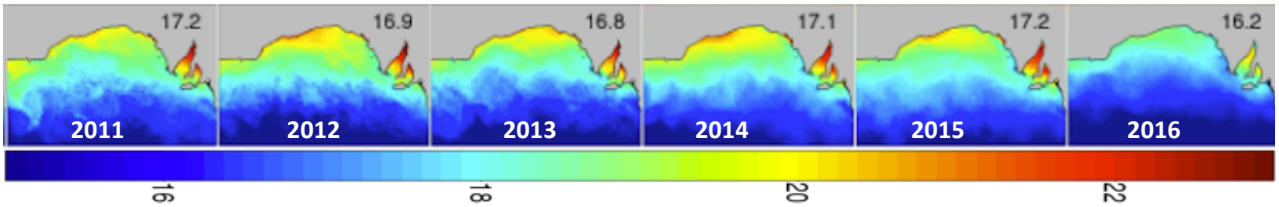

Figure 5: December Sea Surface Temperatures of the GAB area (between longitudes 120 and 140°E) for the previous 6 years (CSIRO 2017 - GAB Forecasting Website)

The most recent fine-scale Sea Surface and Sea Floor Temperatures are shown in (Figure 6 and Figure 7); these are indicating progressive warming of the Gulfs and shallow areas adjacent to fishing grounds of recent seasons. Water temperature profile snapshots of the situation down through the water column at five locations across the GAB; west to east: Outer Shelf area at longitude approximating 132°E; 134°E south west of Rocky Island; 135°E near the Cabbage Patch, 137°E near Young Rocks and 138°E in the vicinity of Sanders Banks are shown in Figure 8. This week at all of these locations the warm water is extending deeper into the water column. Full details on salinity profiles, wind and water current speed and direction can be found on the e-SA Marine website link listed at the end of this document.

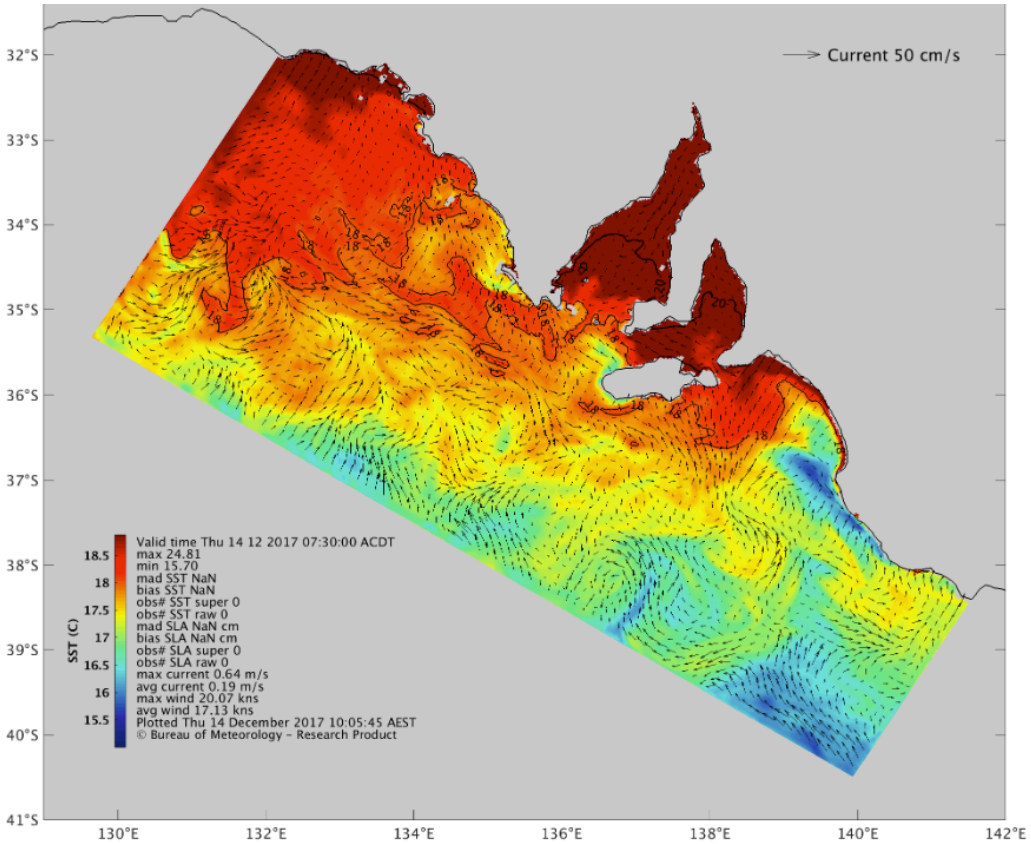

Figure 6: Snapshot of the actual Sea Surface Temperature on the 14th December 2017, the 18 and 20°C temperature contours are marked by solid black lines, the direction and strength of the water currents are indicated by the black arrows (SARDI-BoM 2017 – eSA Marine website).

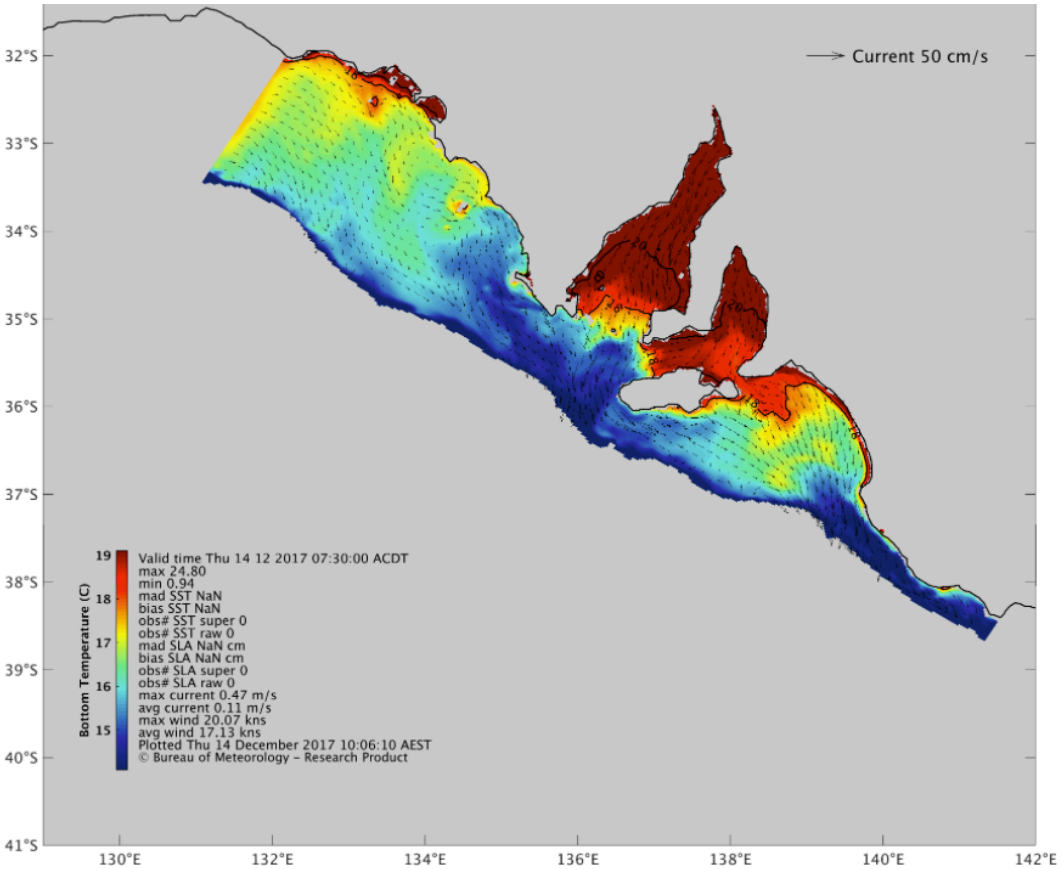

Figure 7: Snapshot of the actual Sea Floor Temperature on the 14th December 2017; the 18 and 20°C temperature contours are marked by solid black lines, the direction and strength of the water currents are indicated by the black arrows (SARDI-BoM 2017 – eSA Marine website).

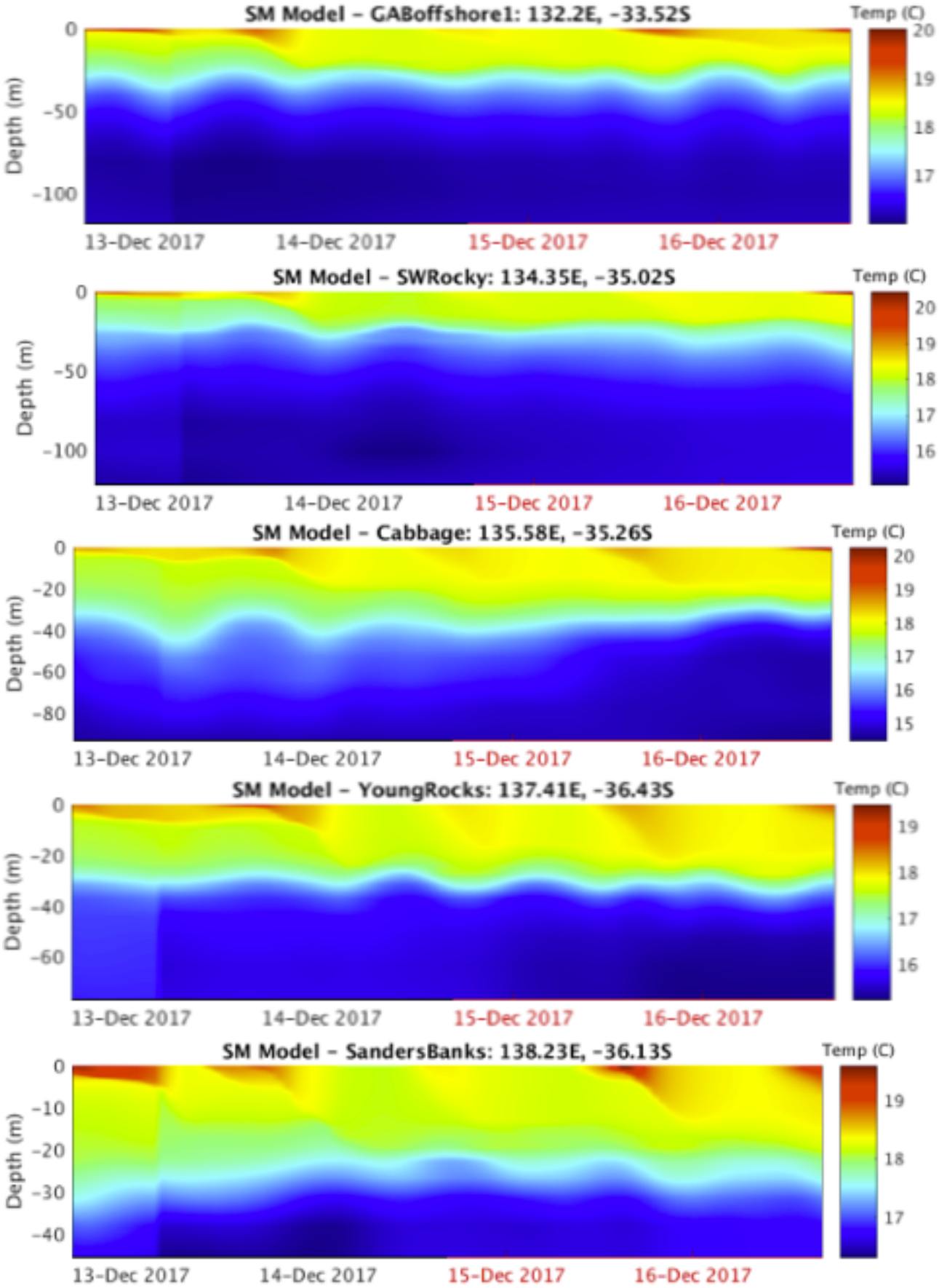

Figure 8: Water temperature profile from sea surface (0m) to sea floor (-m) for the previous (black) and future (red) 2-days for the Outer Shelf area Central GAB 132°E (top); Rocky Island (second); Cabbage Patch (third); Young Rocks (fourth) and Sanders Banks (bottom) – Please note that the scale bars for depth and temperature vary**

between each of these images due to variations in the local conditions at each site (SARDI-BoM 2017 – eSA Marine website).

SST Western Australia and East Coast:

The recent sea surface temperatures of regions adjacent to Western Australia and the East Coast of Australia now compared with recent years are shown in Figure 9 and Figure 10.

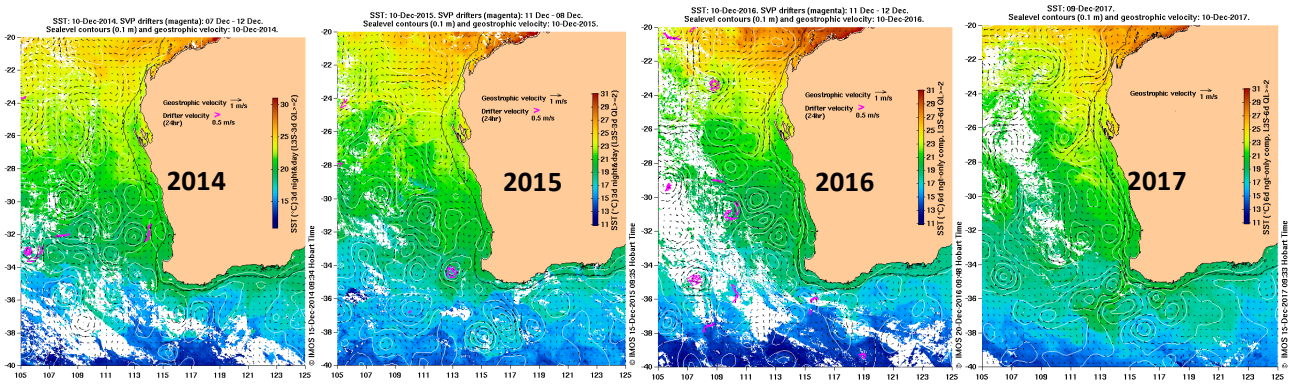

Figure 9: Snap shot of SST adjacent to Western Australia midway through December 2014, 2015, 2016 and now 2017 (IMOS 2017)

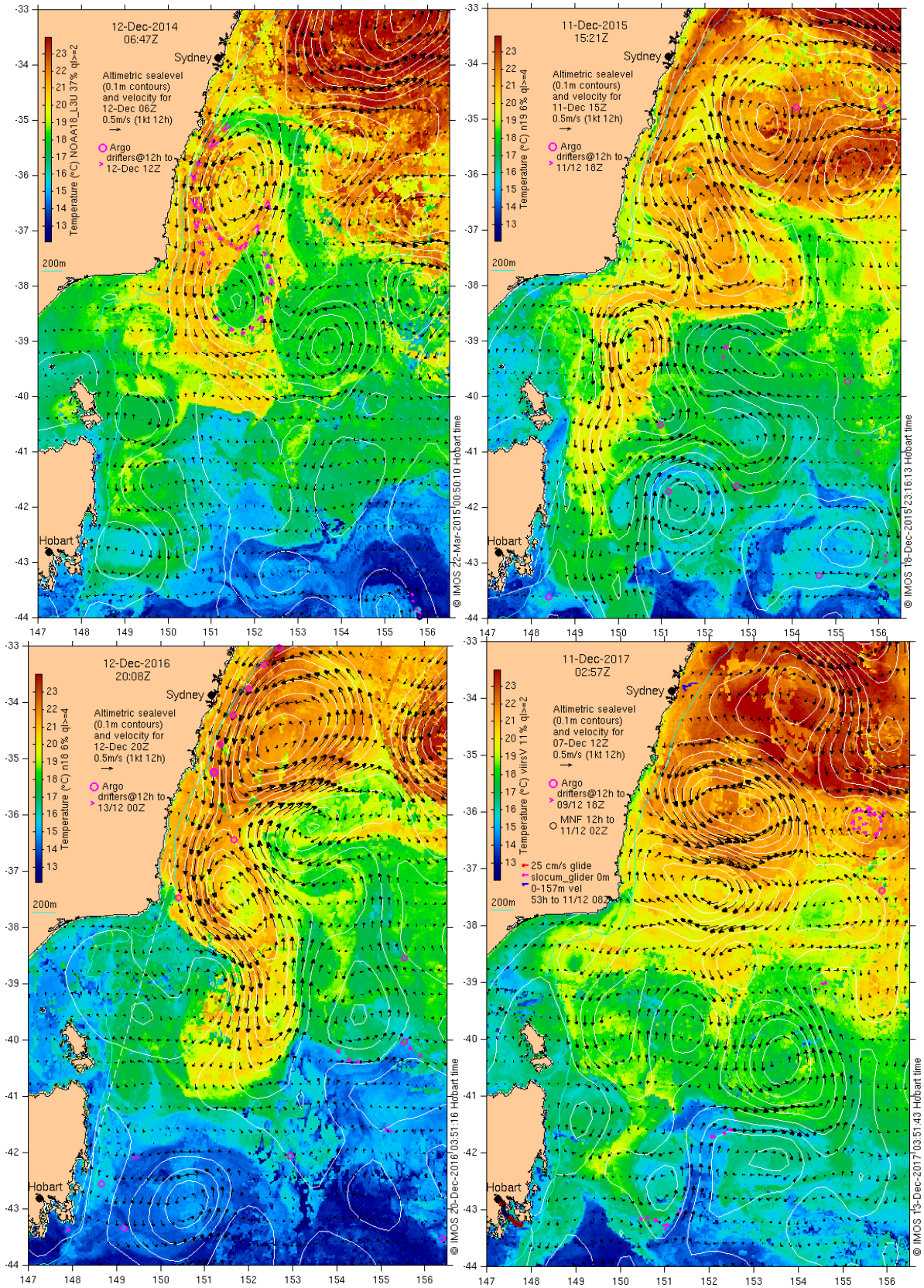

Figure 10: The situation for Sea Surface Temperature along the East Coast of Australia for mid December 2014 (top left) 2015 (top right), 2016 (bottom left) and this week now (bottom right) (IMOS 2017)

Chlorophyl/productivity levels:

A single snapshot from an individual satellite pass is shown in Figure 11; this is showing conditions highly suited to SBT over much of the GAB. Areas of particular interest include the shelf break of traditional fishing grounds and the inshore lumps and hot spots, also southwest of Rocky Island, south and southeast of Kangaroo Island. Upwelling is leading to higher levels to the southwest of Kangaroo Island.

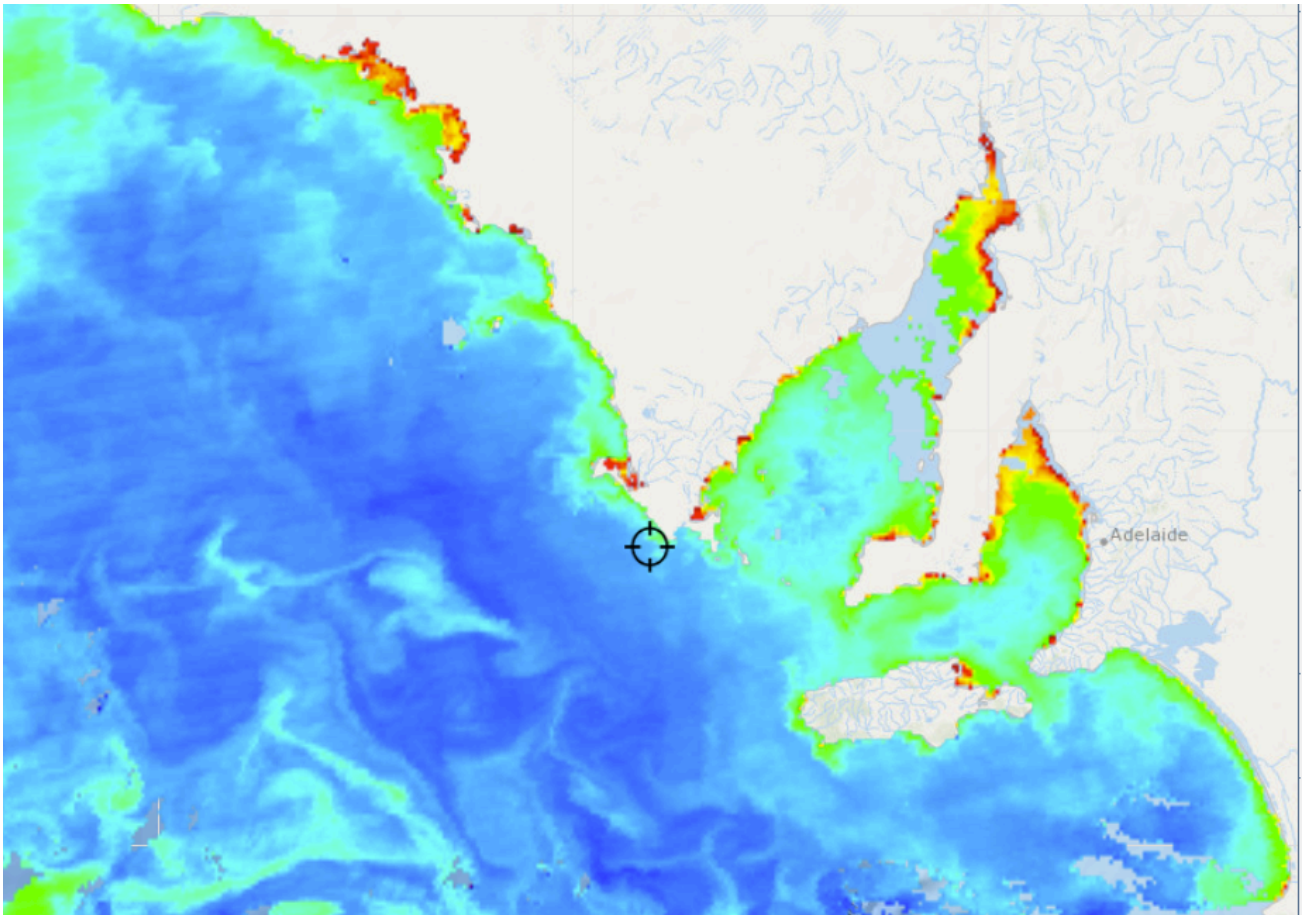

Figure 11: Chlorophyll plot from 10th December 2017, the grey and white areas are due to cloud cover.

Relevant Websites:

GAB SBT Habitat Forecasts: http://www.cmar.csiro.au/gab-forecasts/env-observed.html

eSA Marine: http://pir.sa.gov.au/research/esa_marine/sarom

IMOS ocean monitoring: http://oceancurrent.imos.org.au/index.php

Bureau of Meteorology: http://www.bom.gov.au

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