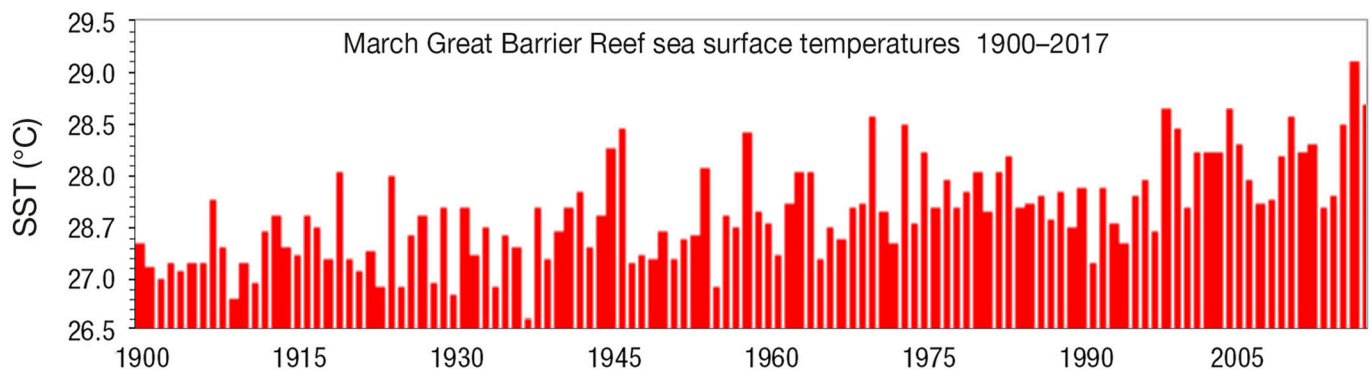




# 2017 marine heatwave on the Great Barrier Reef

## High sea surface temperatures for second consecutive year

Sea surface temperatures (SSTs) on the Great Barrier Reef (GBR) during February, March and April of 2016 were the hottest on record since 1900, at a little over 1°C warmer than the long-term average. In January, February and March 2017, SSTs over the reef were again considerably warmer than average. In particular, warm ocean waters meant March 2017 was the second hottest March on record after 2016. These anomalously warm conditions led to a second consecutive year of mass coral bleaching on the GBR.



March mean sea surface temperatures 1900–2017 (based on [9 ERSSTv4](#) grid cells within the Great Barrier Reef Marine Park)

## What caused record warm ocean temperatures in 2017?

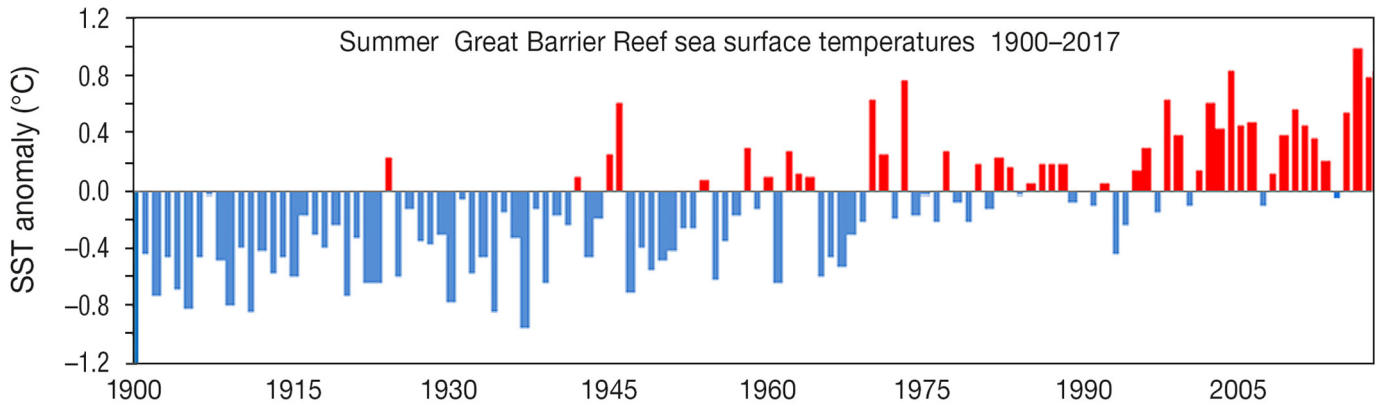
Two factors led to the high ocean temperatures on the Reef:

1. Global warming
2. Local weather patterns

### Global warming

The global ocean is warmer than at any time since 1900 when the instrumental record began. Of the heat being gained from enhanced greenhouse warming, 93% is going into the oceans.

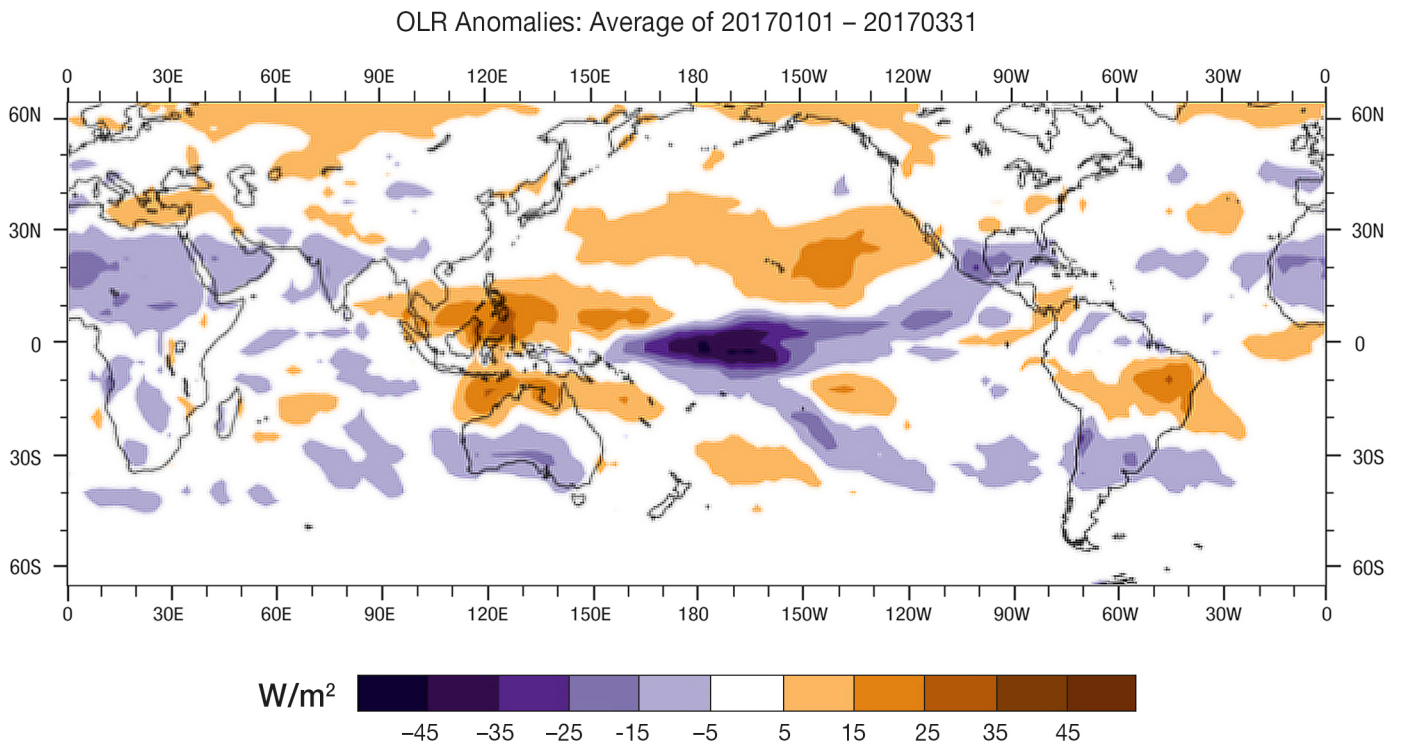
Summer (January–March) sea surface temperatures over the GBR have risen substantially over the past century due to climate change. Summer 2017 was the third hottest since 1900.



Summer sea surface temperature anomaly (difference from normal) within the Great Barrier Reef Marine Park compared to the 1961–1990 average (Data from [ERSST.v4](#))

### Local weather patterns

Cloudiness was normal in 2017, compared to summer 2016 which was less cloudy than usual. However a relatively low number of summer storms occurred over the Reef until late in the season. This led to increased surface heating and reduced mixing.



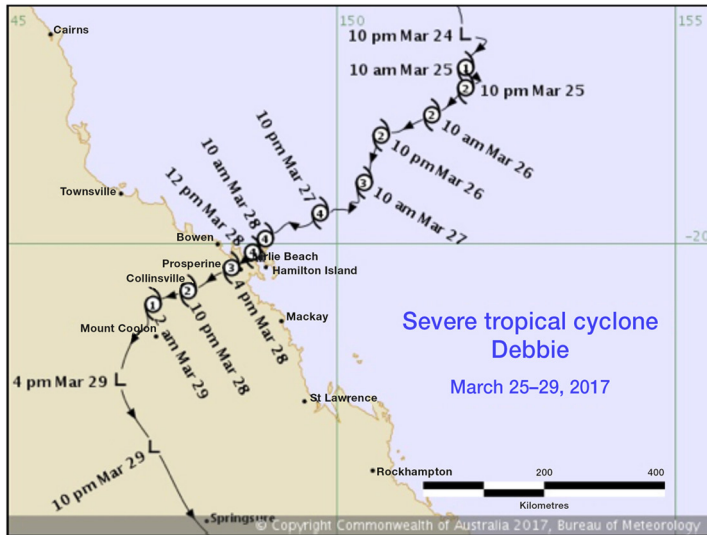
Near zero outgoing longwave radiation (OLR) anomalies (white) indicate normal cloudiness (data from 1 January – 31 March 2017)

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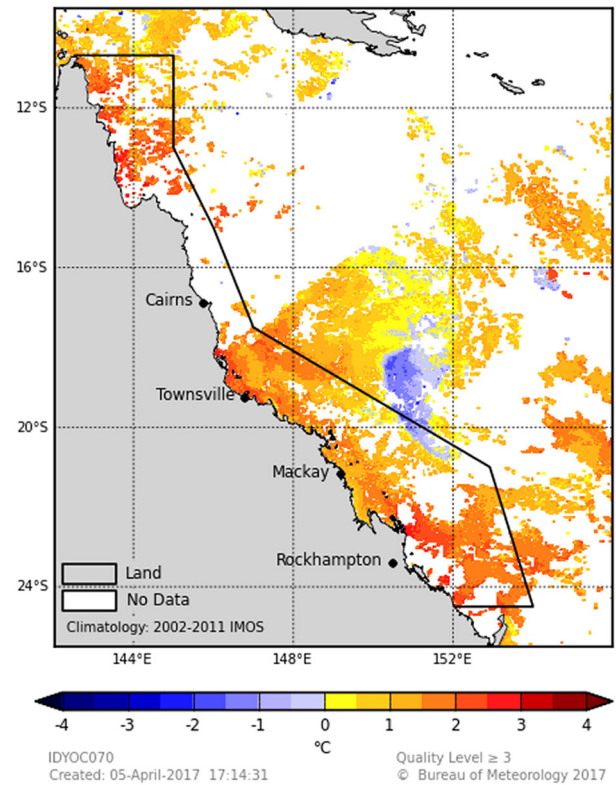


Tropical cyclone (TC) Debbie led to cooling of surface waters over the mid and southern GBR in late March. This is reflected in cooler mean sea surface temperatures for April 2017 than seasonal outlooks predicted prior to TC Debbie. These values are significantly cooler than April 2016 which was the highest on record since 1900 for April (27.9 °C).

IMOS 1- day: SST Anomaly  
1 April 2017 GBR REgion



Severe TC Debbie track and severity for 25–29 March 2017. The cyclone led to localised cooler SSTs over the central GBR in late March, as seen in daily satellite SST anomalies in [ReefTemp Next Generation](#) (1 April 2017).



### Comparisons with 2016 marine heatwave

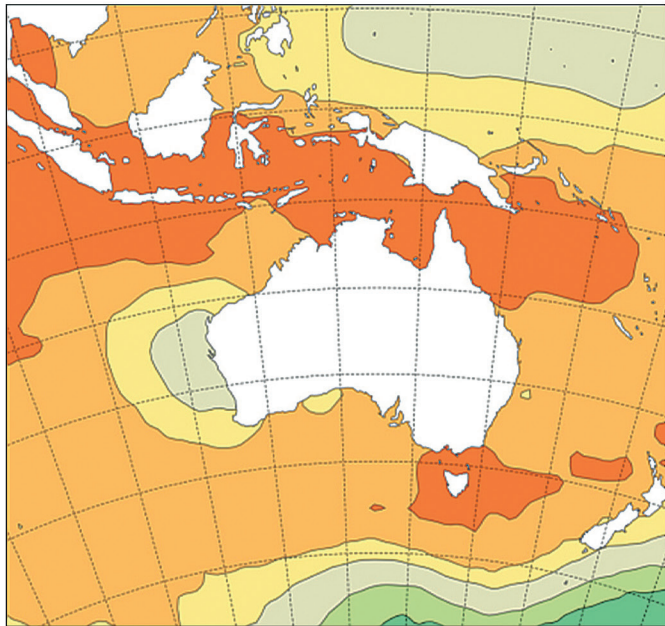
In 2017, mean SSTs over the GBR were 28.8 °C in January, 28.8 °C in February and 28.7 °C in March which is 0.73 °C, 0.76 °C and 0.91 °C warmer than the long-term monthly averages, respectively. SST observations across the reef show that January 2017 was warmer than January 2016. March 2017 was the second warmest March on record after March 2016.

Ocean temperatures over the GBR can often be higher than normal during El Niño events, leading to mass coral bleaching as seen in 1998 and 2016.

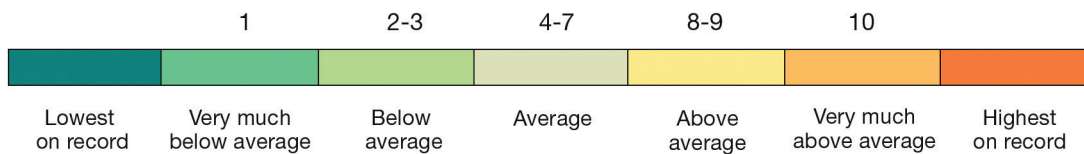
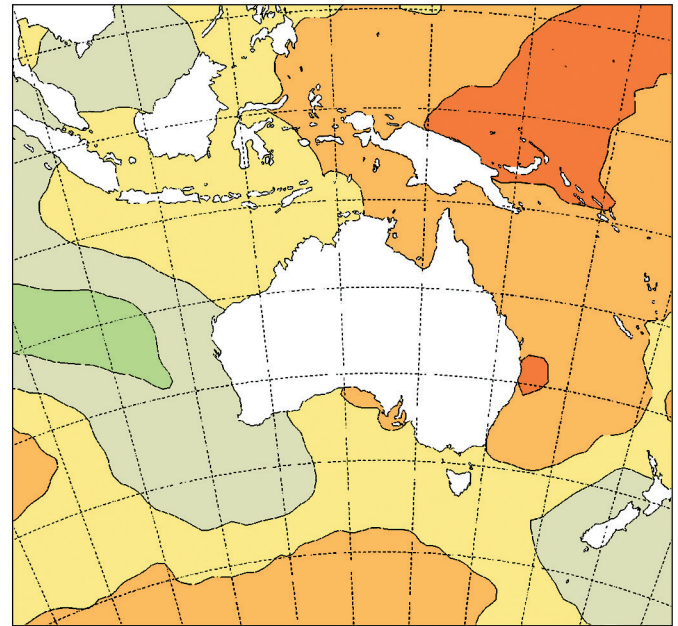
	2016	2017
<b>ENSO</b>	El Niño	Neutral
<b>Cloudiness</b>	Less cloudy than normal	Normal
<b>Sea surface temperatures</b>	February, March and April hottest since 1900	January third hottest and March second hottest since 1900
<b>Tropical cyclones</b>	None over GBR (but TCs Tatiana and Winston in Coral Sea) <a href="#">Link</a>	Severe TC Debbie late March



January – March 2016 sea surface temperature percentiles



January – March 2017 sea surface temperature percentiles



SST percentiles for January–March 2016 (left) and January–March 2017 (right) (Data from ERSST.v4). Dark orange indicates highest SSTs on record since 1900. Light orange indicates SSTs in the top 10% of those observed for that season since 1900.

## Further information

- [Seasonal Great Barrier Reef forecasts:](#)  
 The latest seasonal SST anomaly outlooks from the Bureau of Meteorology’s dynamical climate model POAMA (Predictive Ocean Atmosphere Model for Australia), for the next six months, over the GBR.
- [ReefTemp Next Generation:](#)  
 ReefTemp Next Generation is a set of high resolution daily satellite SST products that provide information on coral bleaching risk for the GBR region. The system was developed by the Bureau of Meteorology for [eReefs](#), under the [National Plan for Environmental Information initiative](#).
- [Great Barrier Reef Marine Park Authority](#)  
 Coral bleaching resources
- [Reef 2050 Long-term Sustainability Plan](#)