



Climate and Oceans Support
Program in the Pacific

ACCESS-S Workshop

MODULE: ACCESS-S Model Outputs





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Topics in this module

- Higher definition maps
- Seasonal applications
- Atmospheric variables
- Oceanic variables
- Skill maps
- Sp

Expected learning out

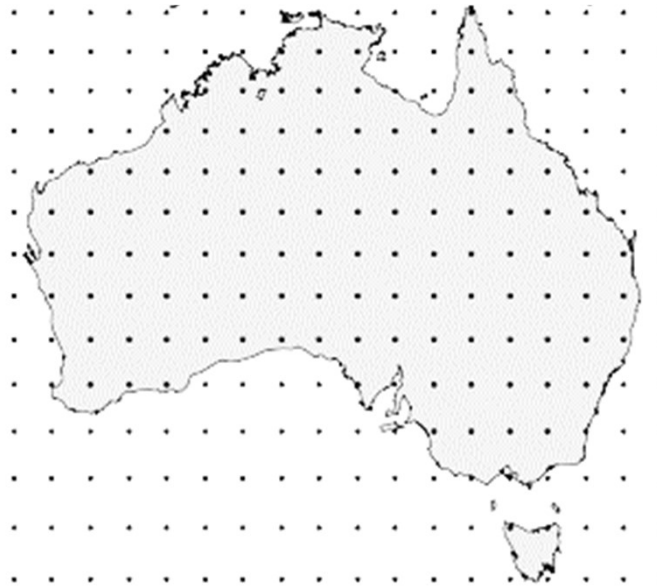
- Und...ats that can
ang

preview into what is available

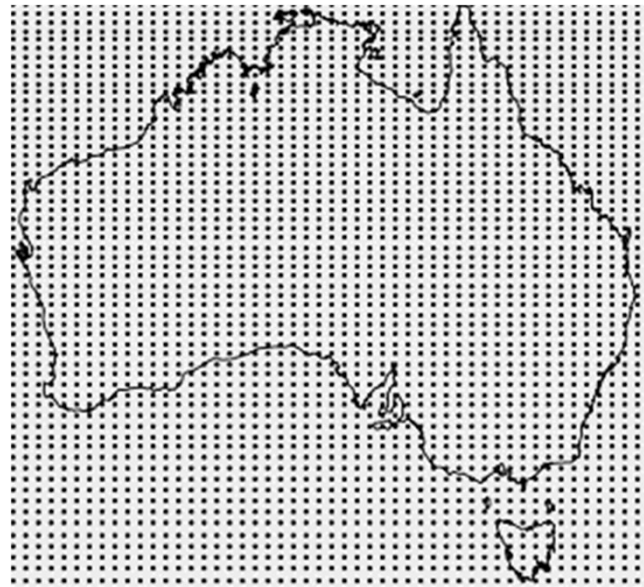


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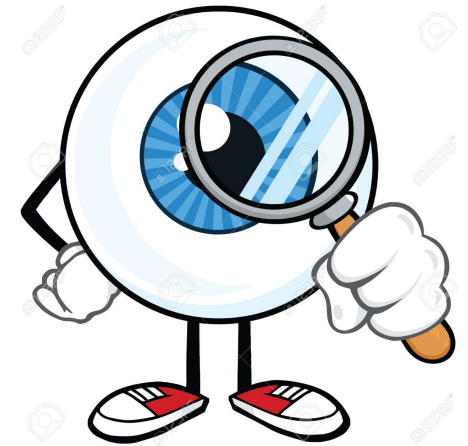
Higher definition maps



POAMA 250km resolution



ACCESS-S 60km resolution

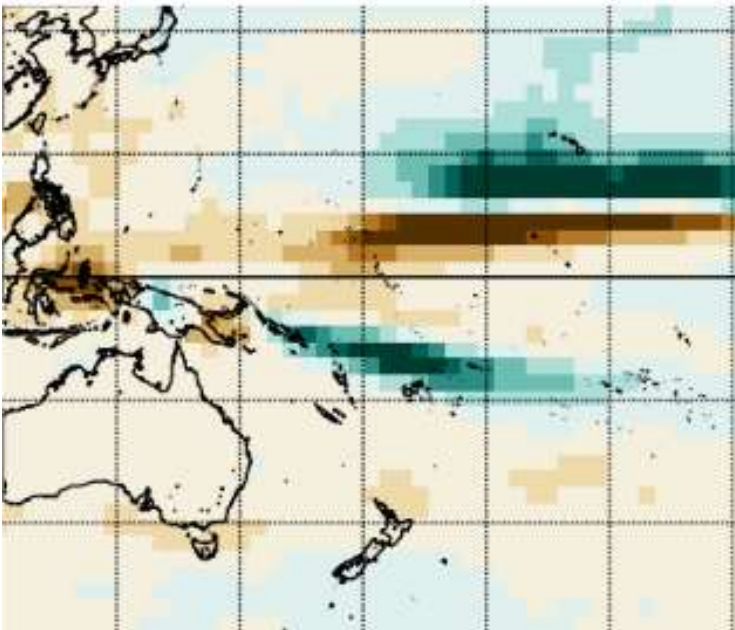


60km instead of 250km resolution

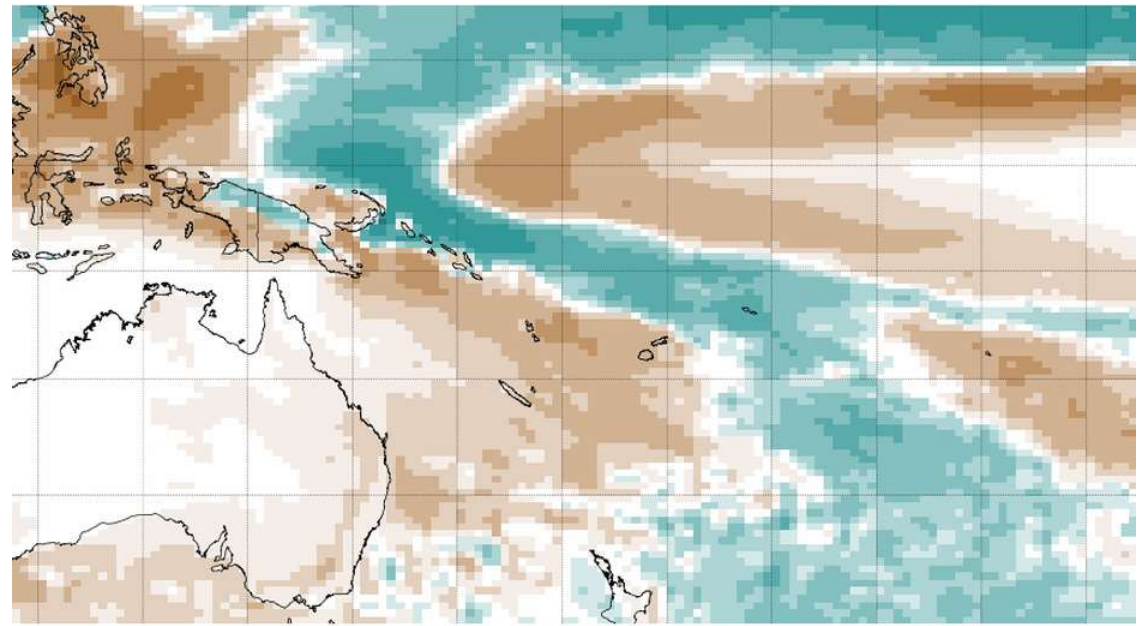


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Higher definition maps



POAMA 250km resolution

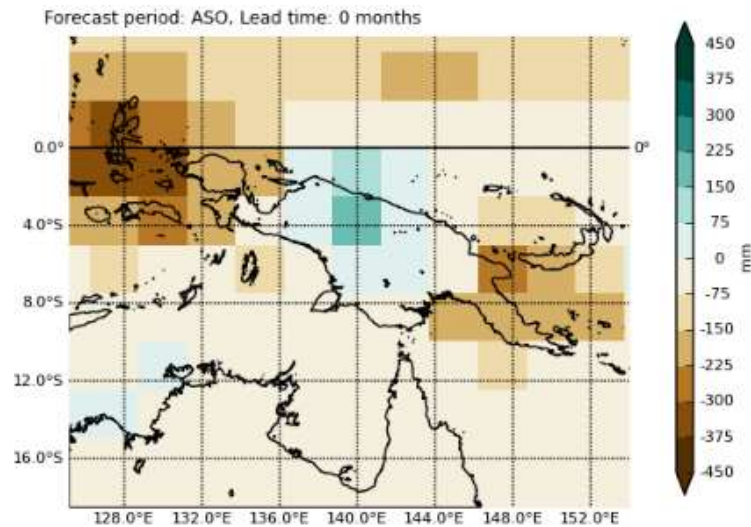


ACCESS-S 60km resolution

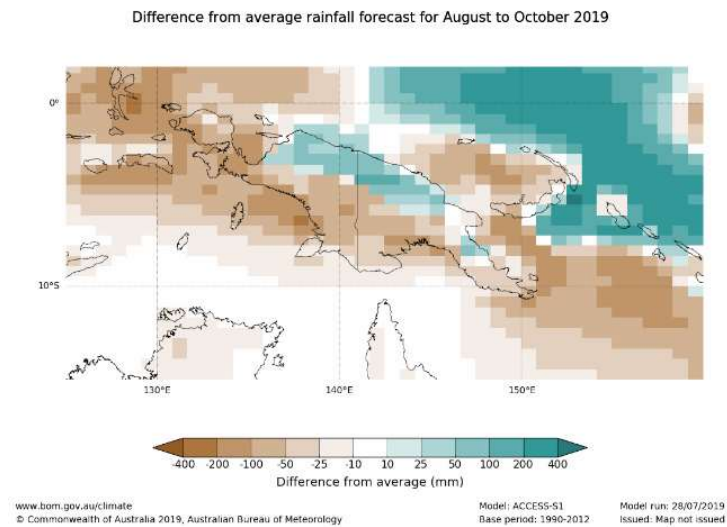


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Higher definition: topography



POAMA



ACCESS-S

Areas such as the Great Dividing Range, Tasmania and WA Darling Ranges resolved



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What's available?

- Atmospheric variables (rainfall, temperature, pressure)
- Climate driver tracking (ENSO, MJO, tropical cyclones)
- Specific projects (EAR Watch, Fiji Sugar stations, PNG CREWS)
- Oceanic variables (sea surface temperature, sea level height)
- Seasonal marine applications (coral reef management, fisheries)



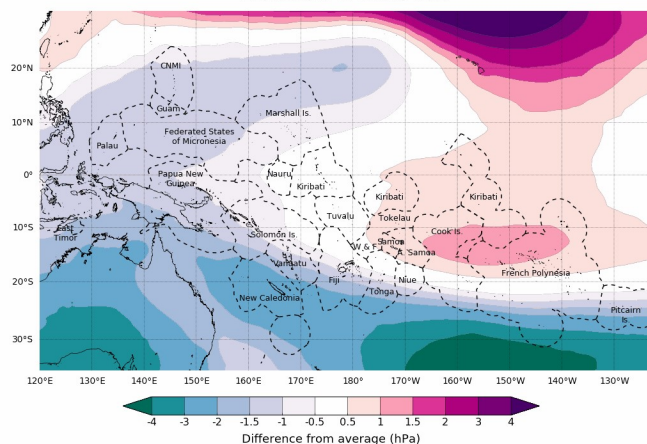
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Pacific Forecasts – atmospheric variables

Forecasts are:

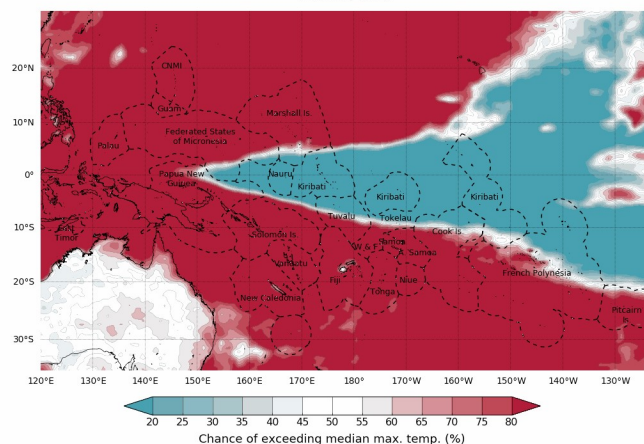
- Weekly
- Fortnightly
- Monthly
- Seasonal

Difference from average mean sea level pressure forecast for
23 January to 5 February 2021



© Commonwealth of Australia 2021, Australian Bureau of Meteorology
Model: ACCESS-S1
Base period: 1990-2012
Model run: 16/01/2021
Issued: 18/01/2021
Shapefile data extracted from Flanders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (2006), version 11. Available online at <http://www.marinegovernance.org/>

Chance of exceeding the median maximum temperature for
February 2021

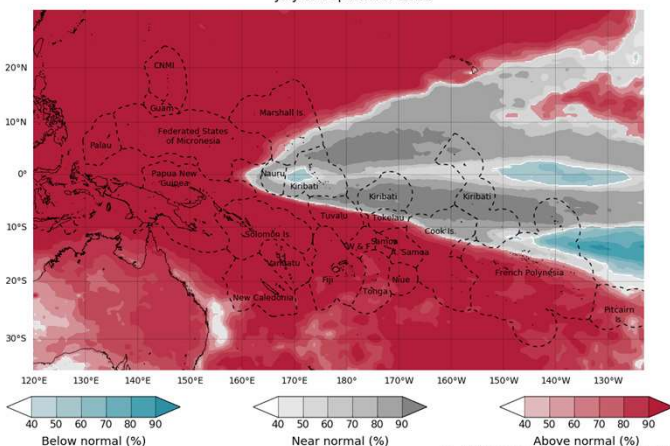


© Commonwealth of Australia 2021, Australian Bureau of Meteorology
Model: ACCESS-S1
Base period: 1990-2012
Model run: 16/01/2021
Issued: 18/01/2021
Shapefile data extracted from Flanders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (2006), version 11. Available online at <http://www.marinegovernance.org/>

Outputs:

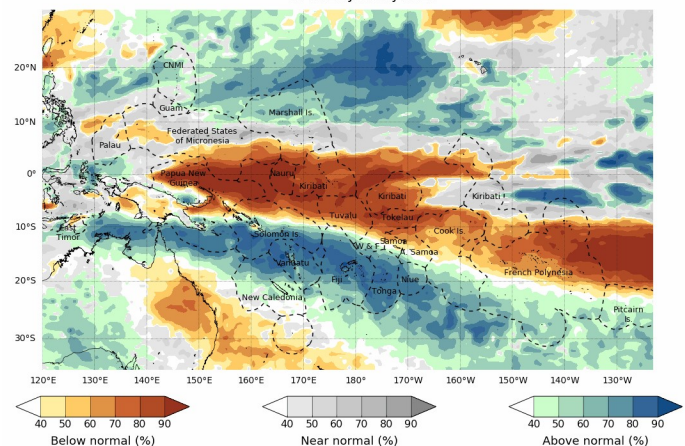
- Anomaly
- Tercile
- Chance of above median

Tercile minimum temperature probabilities for
July to September 2021



© Commonwealth of Australia 2021, Australian Bureau of Meteorology
Model: ACCESS-S1
Base period: 1990-2012
Model run: 07/06/2021
Issued: 10/06/2021
Shapefile data extracted from Flanders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (2006), version 11. Available online at <http://www.marinegovernance.org/>

Tercile rainfall probabilities for
23 to 29 January 2021



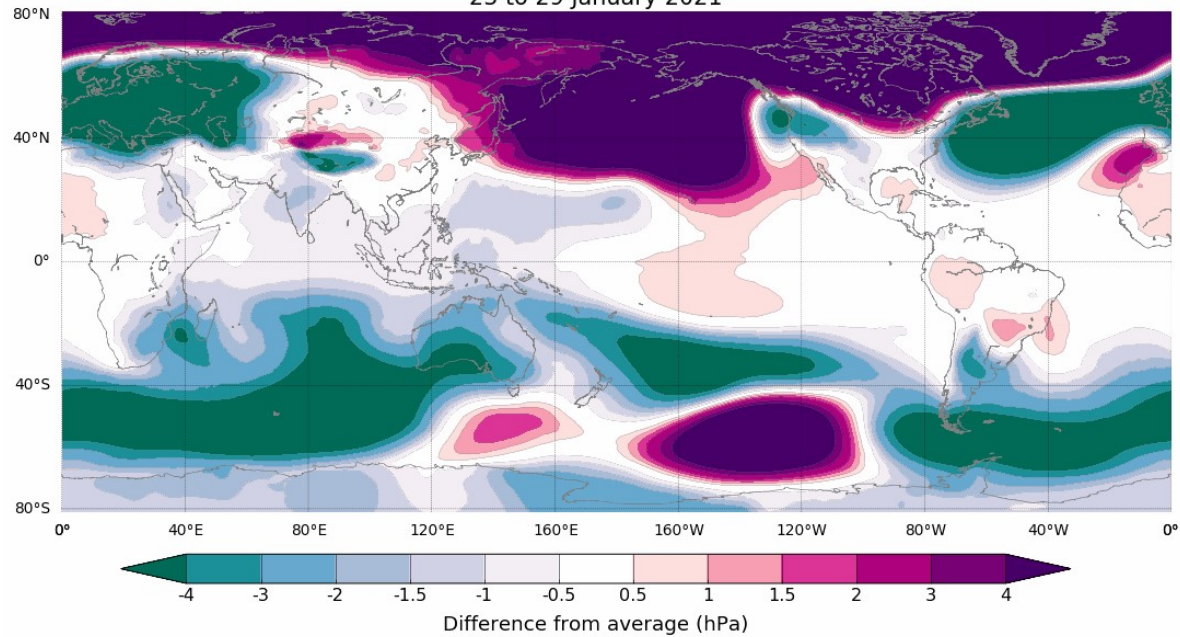
© Commonwealth of Australia 2021, Australian Bureau of Meteorology
Model: ACCESS-S1
Base period: 1990-2012
Model run: 16/01/2021
Issued: 18/01/2021
Shapefile data extracted from Flanders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (2006), version 11. Available online at <http://www.marinegovernance.org/>



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Regional forecasts

Difference from average mean sea level pressure forecast for
23 to 29 January 2021

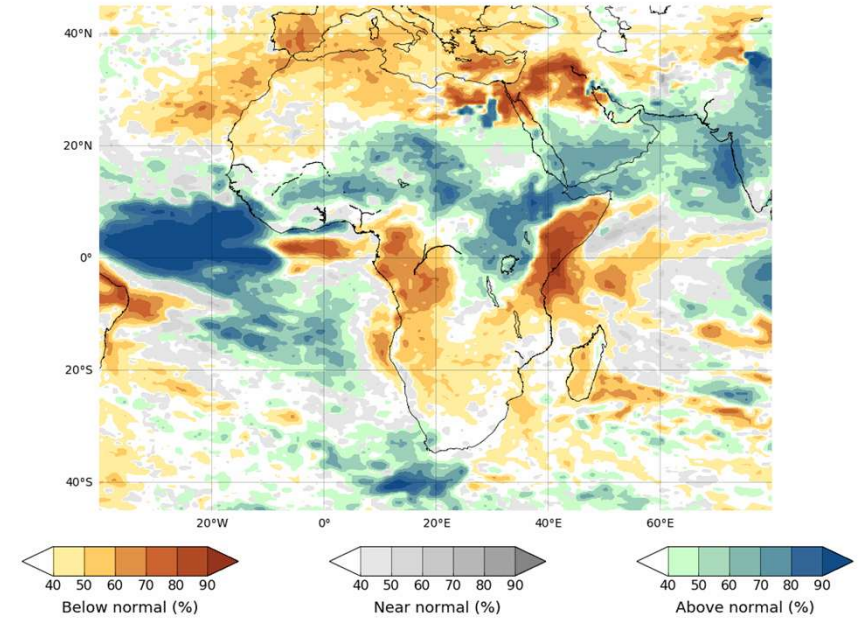


www.bom.gov.au/climate
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Model: ACCESS-S1
Base period: 1990-2012

Model run: 16/01/2021
Issued: 18/01/2021

Tercile rainfall probabilities for
July to September 2021



www.bom.gov.au/climate
© Commonwealth of Australia 2021, Australian Bureau of Meteorology

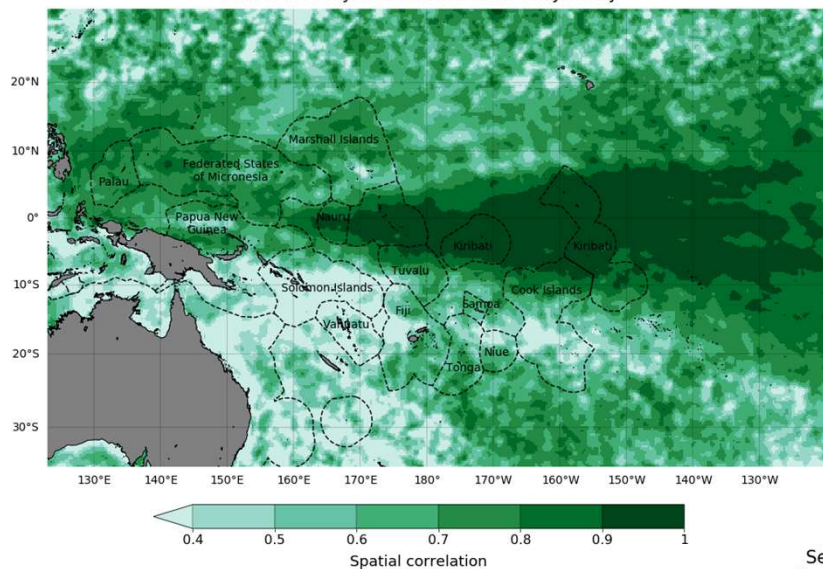
Model: ACCESS-S1
Base period: 1990-2012

Model run: 07/06/2021
Issued: 10/06/2021

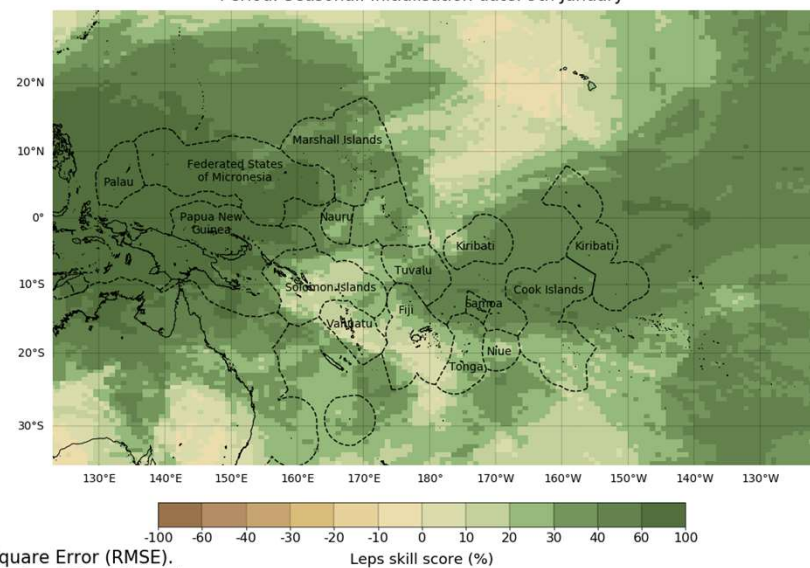


Every forecast has a skill map

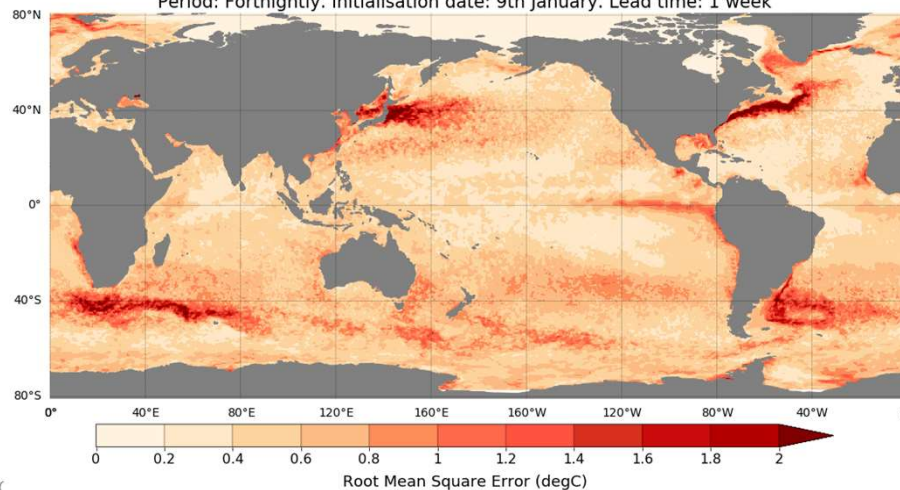
February sea surface temperature anomaly spatial correlation.
Period: Monthly. Initialisation date: 9th January



FMA mean sea level pressure Linear Error in Probability Space (LEPS) score.
Period: Seasonal. Initialisation date: 9th January



Sea surface temperature anomaly Root Mean Square Error (RMSE).
Period: Fortnightly. Initialisation date: 9th January. Lead time: 1 week





Multi-week Tropical Cyclone forecasts

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Regions available:

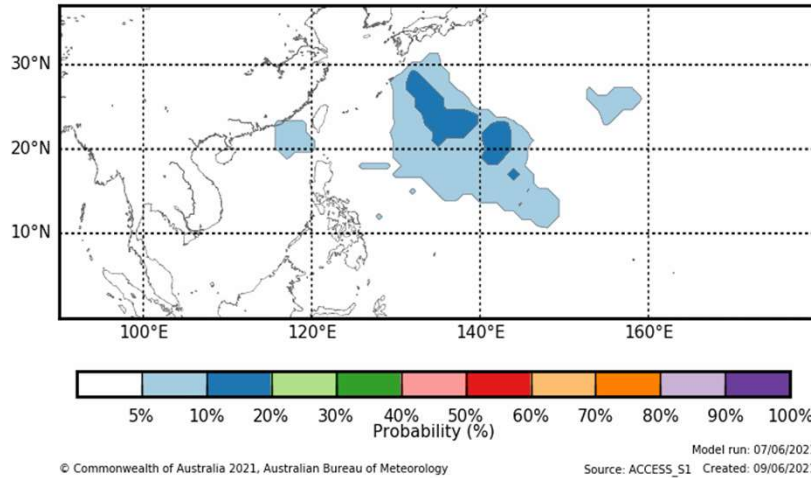
- NW Pacific
- South Pacific

Raw and **calibrated**
model output

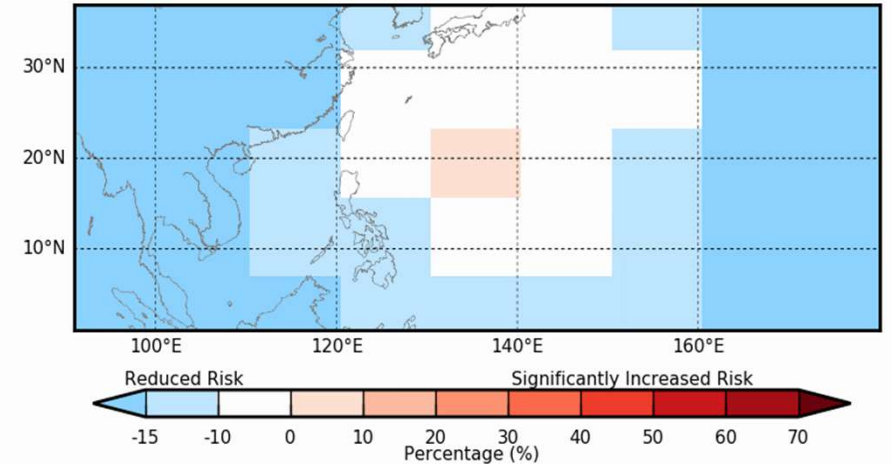
Raw gives spatially
sharp forecasts

Calibrated forecasts are
more reliable

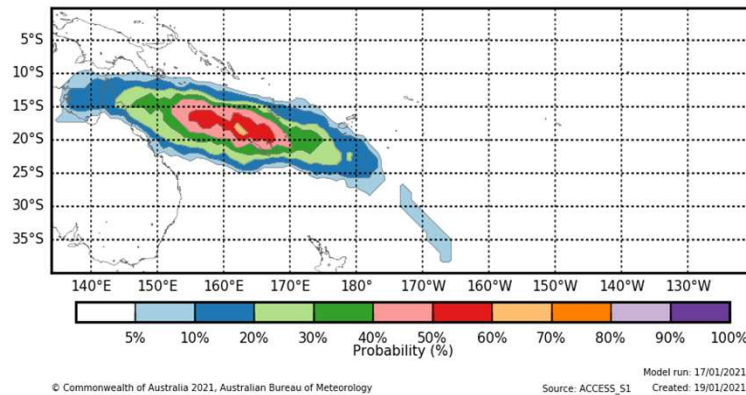
Tropical Cyclone probabilities in the Northern Pacific
Forecast period: 22/06/2021 - 28/06/2021



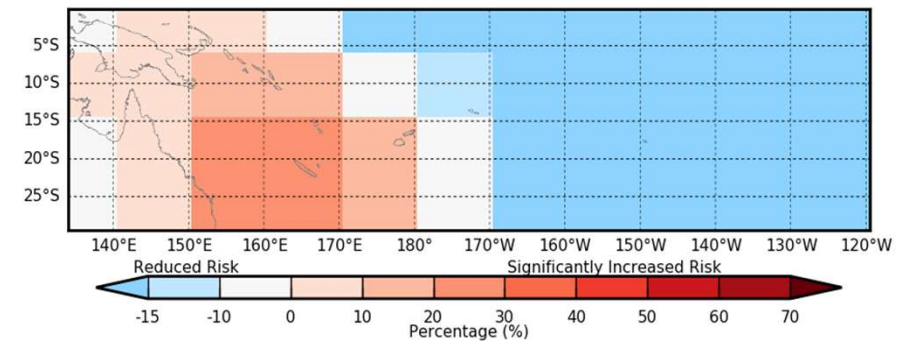
Difference from normal chance of Tropical Cyclone's in the Northern Pacific
Forecast period: 22/06/2021 - 28/06/2021



Tropical Cyclone probabilities in the South Pacific
Forecast period: 25/01/2021 - 31/01/2021



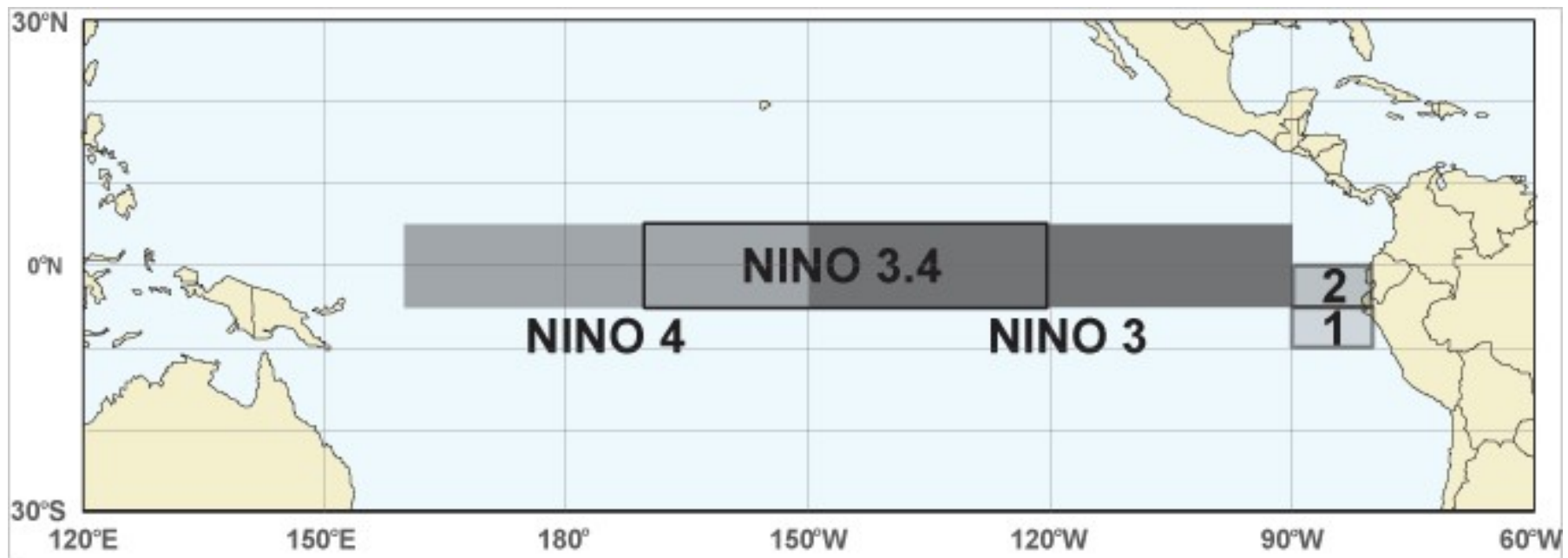
Difference from normal chance of Tropical Cyclone's in the South Pacific
Forecast period: 25/01/2021 - 31/01/2021





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ACCESS-S Sea Surface Temperature and ENSO



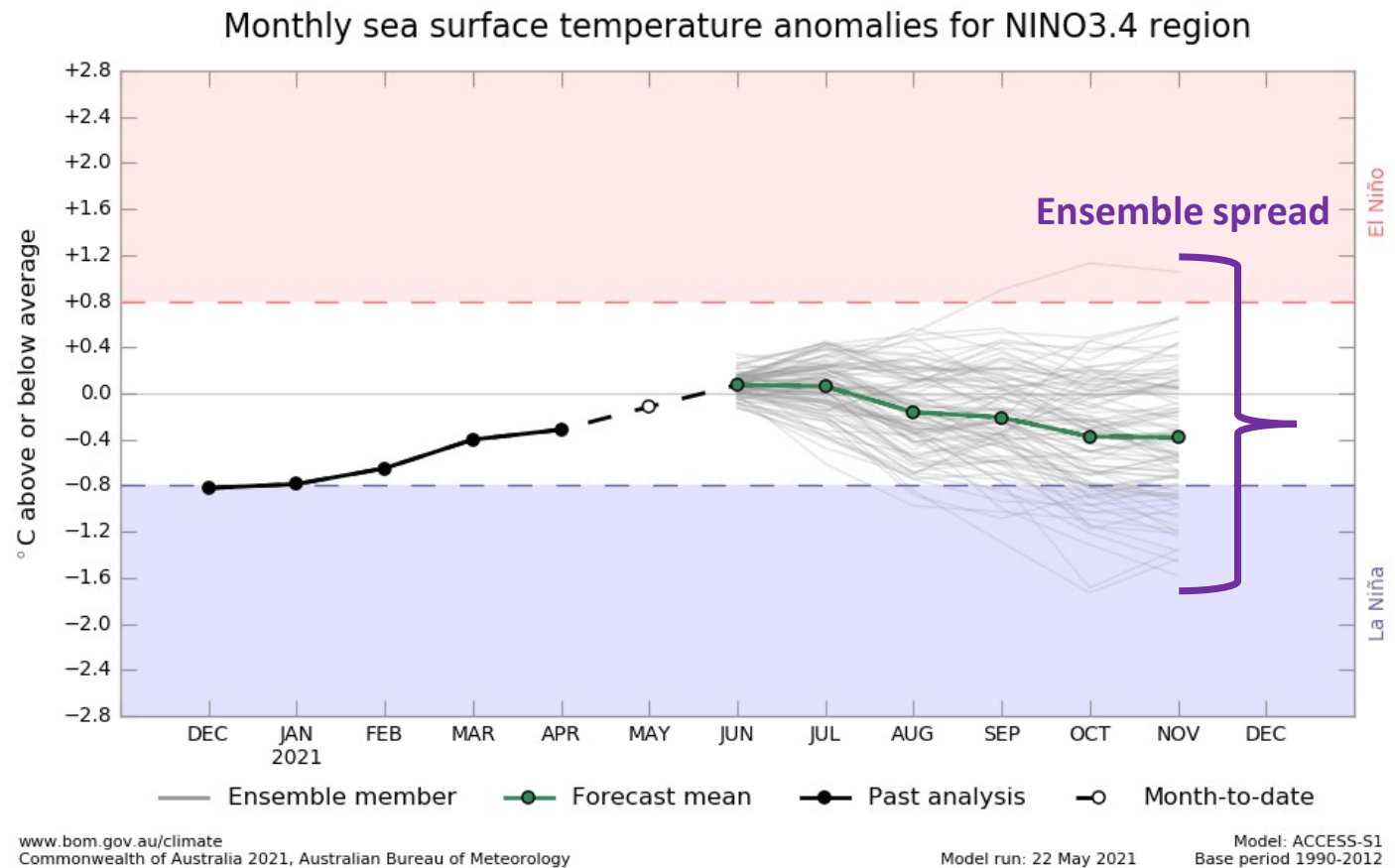
- Predictions for ENSO Indices



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ACCESS-S Sea Surface Temperature ENSO plumes

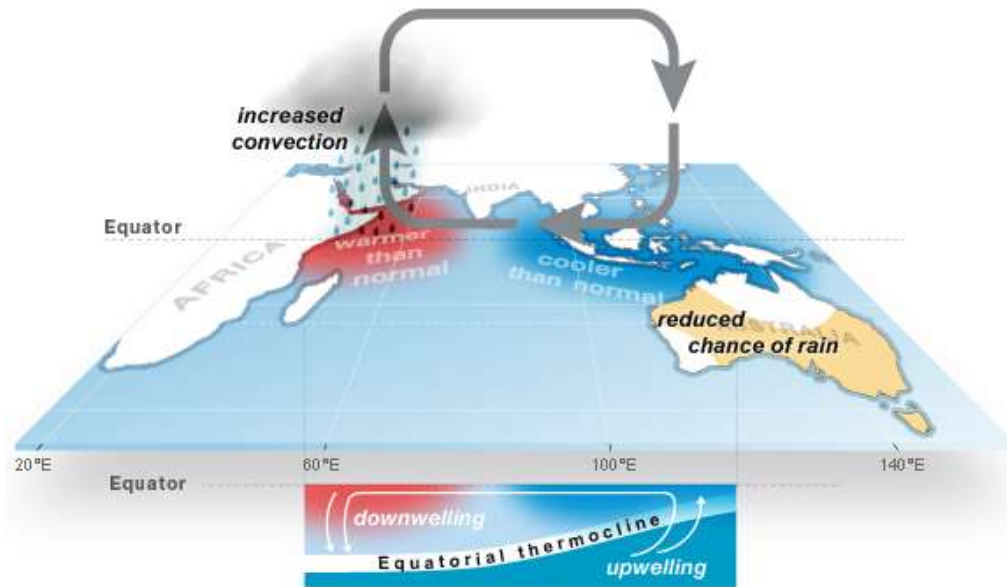
- Plumes of SST predictions for 6 months into the future
- NINO1
- NINO2
- NINO3
- NINO4
- NINO3.4
- Important for long-term prediction of ENSO





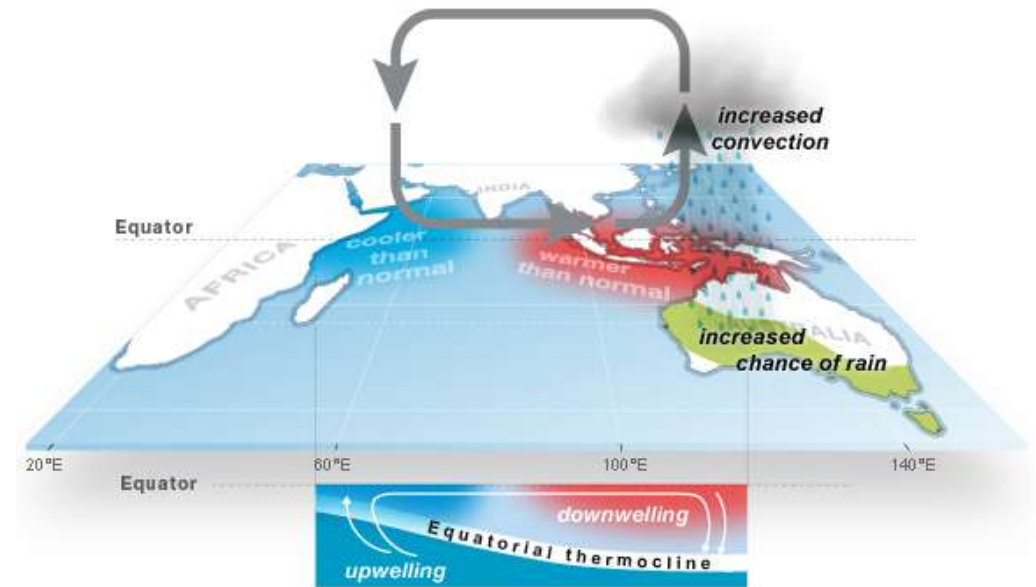
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What is the Indian Ocean Dipole?



Indian Ocean Dipole (IOD): **Positive phase**

© Commonwealth of Australia 2013.



Indian Ocean Dipole (IOD): **Negative phase**

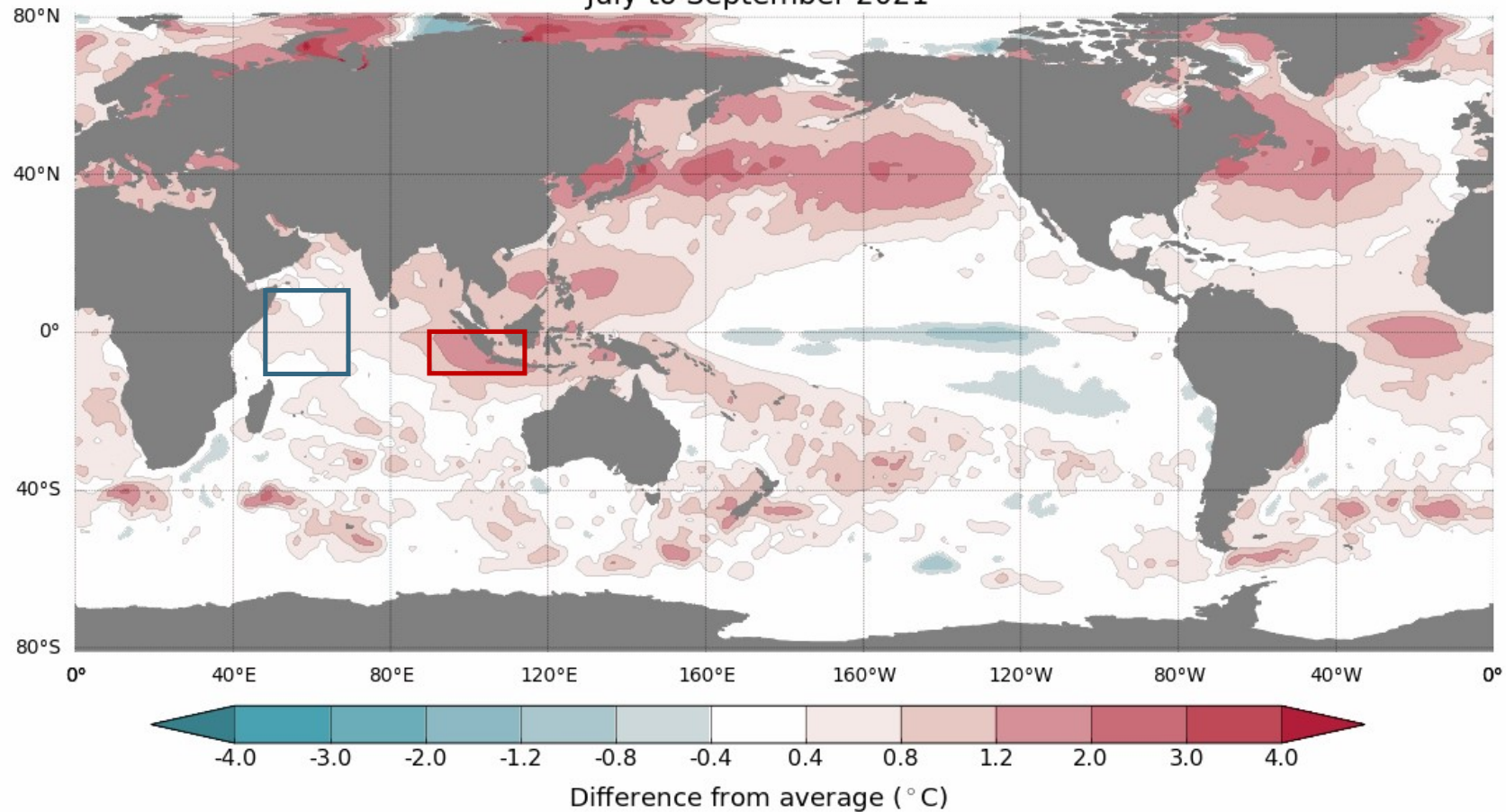
© Commonwealth of Australia 2013.



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Indicators of the Indian Ocean Dipole

Difference from average sea surface temperature forecast for
July to September 2021



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Model: ACCESS-S1
Base period: 1990-2012

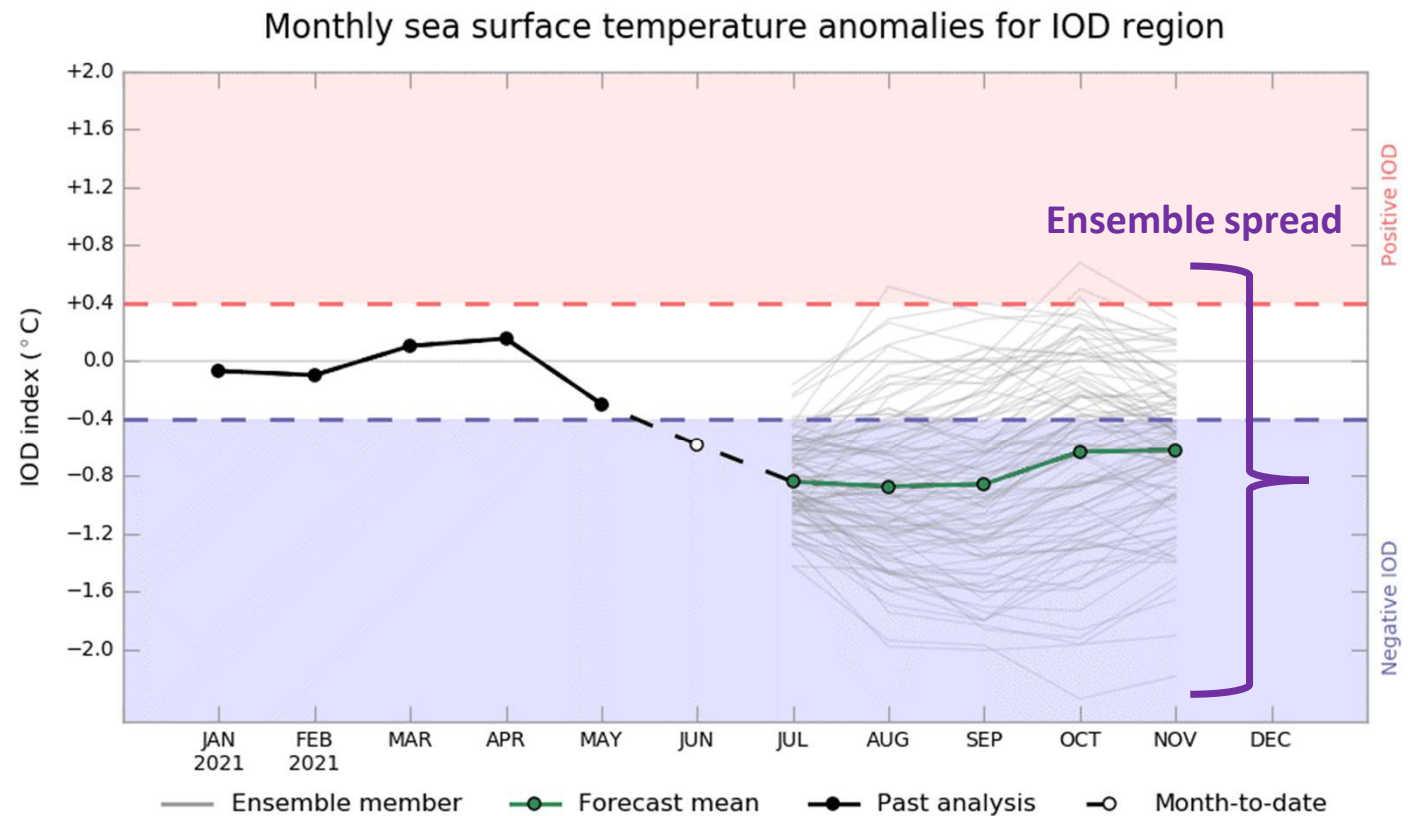
Model run: 18/06/2021
Issued: 20/06/2021



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ACCESS-S Sea Surface Temperature IOD plumes

- Plumes of SST predictions for 6 months into the future
- Important for long-term prediction of Indian Ocean Dipole



www.bom.gov.au/climate
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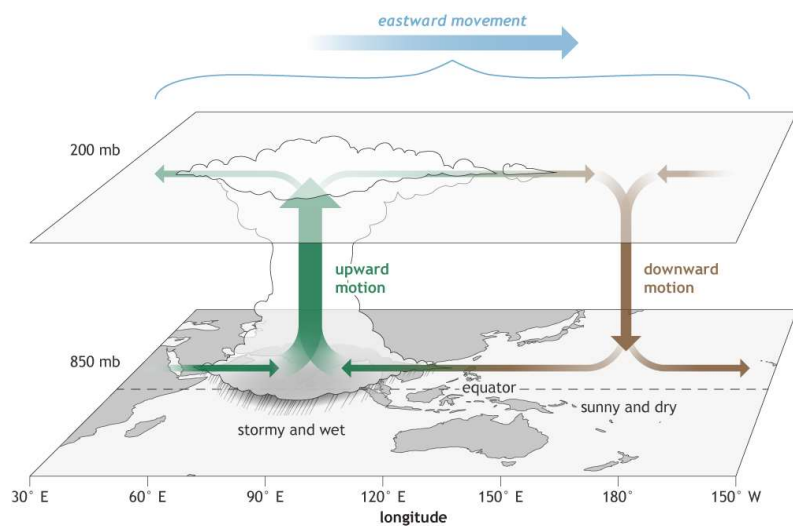
Model run: 19 Jun 2021
Model: ACCESS-S1
Base period 1990-2012



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ACCESS-S and Madden-Julian Oscillation (MJO)

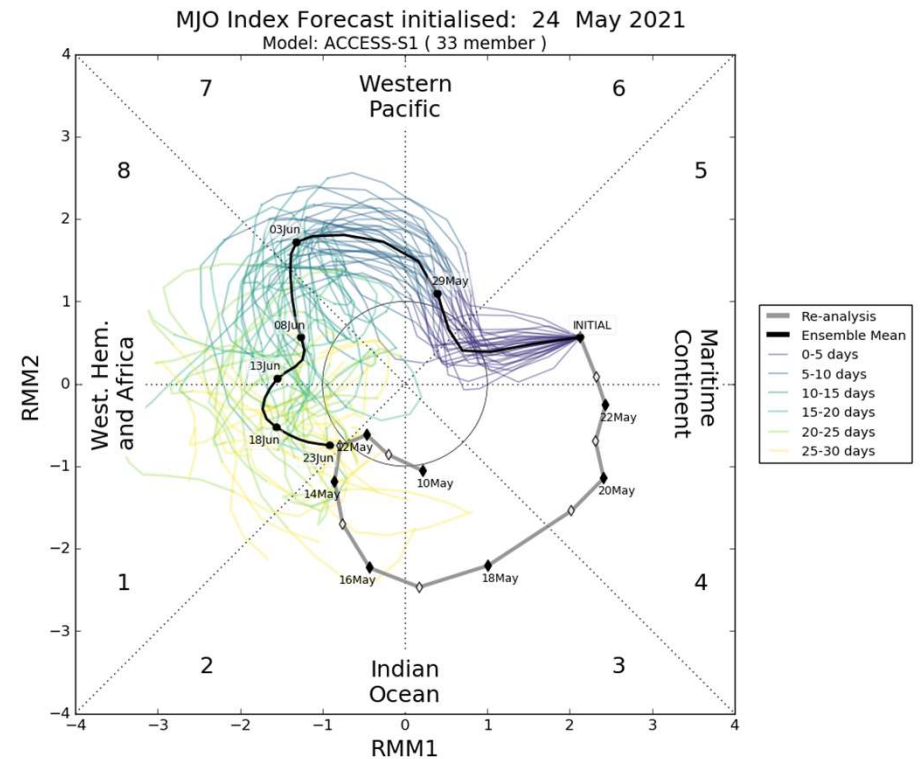
- Forecasts of the MJO for 30 days
- Important for prediction of MJO including location and strength



Madden-Julian Oscillation

NOAA Climate.gov

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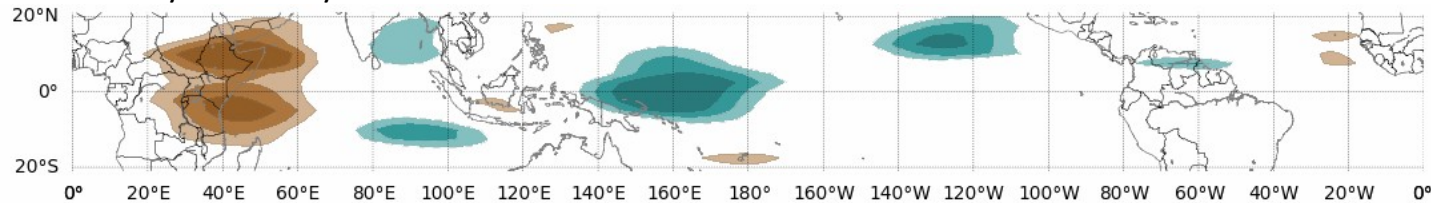


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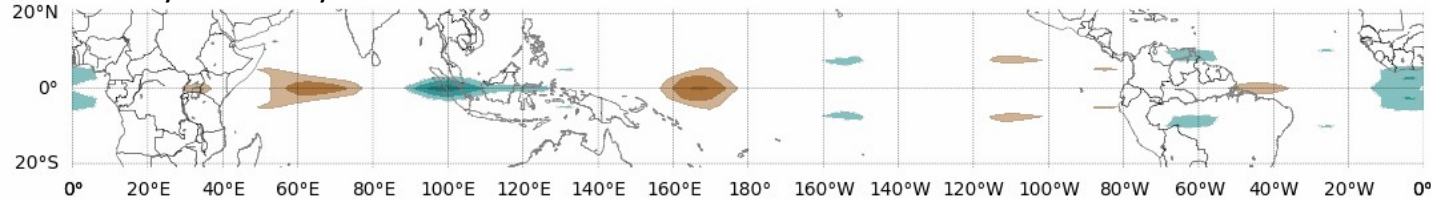
ACCESS-S and tropical waves

- Forecasts of:
 - MJO
 - Kelvin waves
 - Equatorial Rossby wave
- Important for visualising the future movement of the MJO and tropical waves which can affect oceans and the atmosphere
- Maps available from bom.gov.au/climate/enso

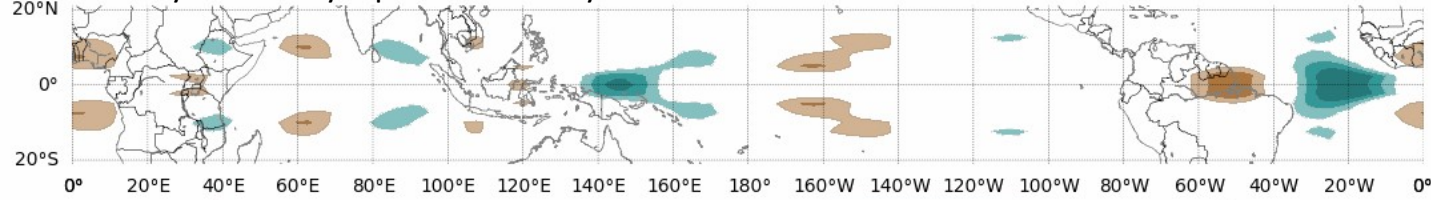
31 May 2021 daily Madden-Julian Oscillation



31 May 2021 daily Kelvin wave



31 May 2021 daily Equatorial Rossby wave



Difference from average (W/m2)

www.bom.gov.au/climate
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Model: ACCESS-S1 Forecast date: 31/05/2021
Base period: 1990-2012 Model run date: 28/05/2021

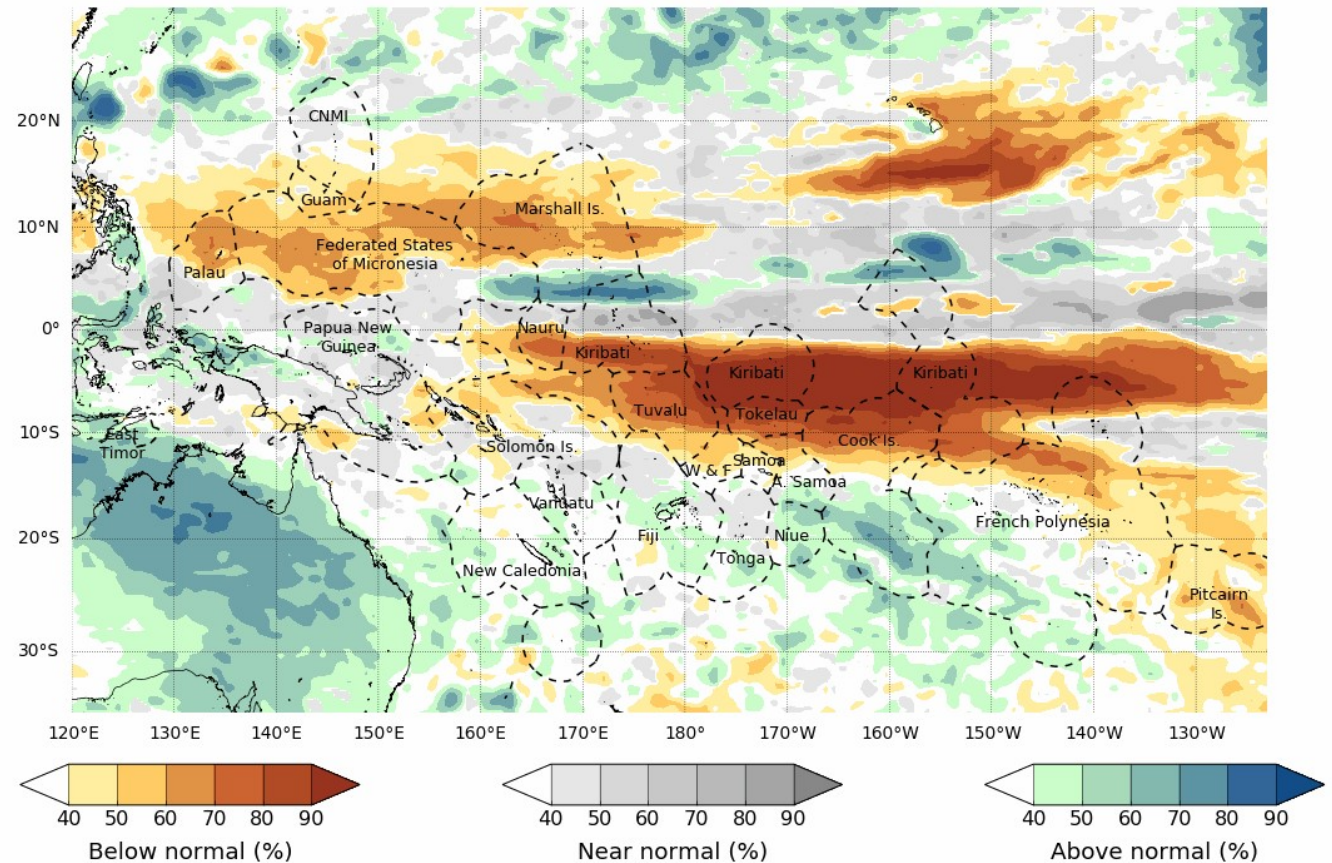


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ACCESS-S COSPPac Bulletin

- Month 1 tercile outputs for rainfall, maximum temperature and minimum temperature
- Country names and EEZs mapped
- Important for understanding climate outlooks in the coming month

Tercile rainfall probabilities for
June 2021



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Shapefile data extracted from Flanders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <http://www.marineregions.org/>.

Model: ACCESS-S1

Model run: 24/05/2021

Base period: 1990-2012

Issued: 27/05/2021

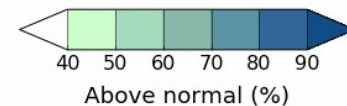
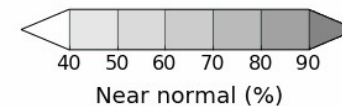
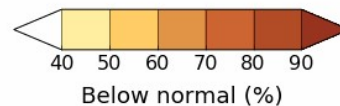
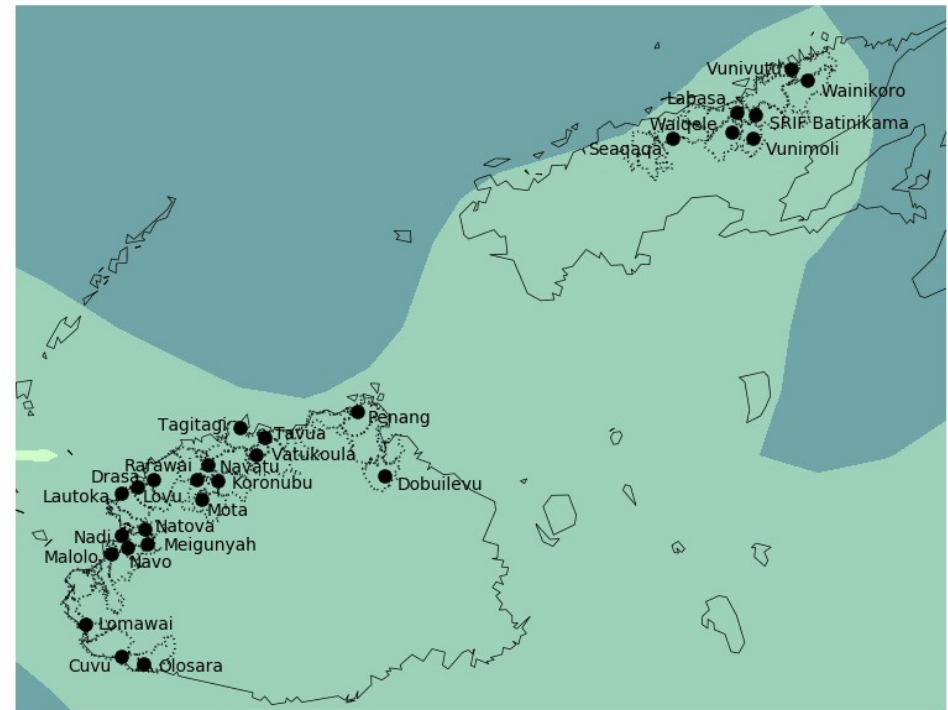


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ACCESS-S sugar stations

- Rainfall, Tmax and Tmin forecasts for Fiji sugar stations
- Important for understanding the outlook in detail for each agricultural zone
- More collaboration opportunities?

Tercile rainfall probabilities for
June to August 2021



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Shapefile data extracted from Flanders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <http://www.marineregions.org/>.

Model: ACCESS-S1
Base period: 1990-2012
Model run: 15/05/2021
Issued: 01/06/2021



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EAR Watch – previously SCOPIC

- Only data for specific locations

Rainfall Outlook: March to August 2020

The alert levels provide the likelihood of receiving above normal or below rainfall over the next 3 and 6 months. The alert levels do not indicate the amount of rainfall that may be received, how intense the rain may be in any one event, nor how it may vary from month to month.

	3-months March to May 2020	6-months March to August 2020
Goroka		
Madang		
Wewak		
Nadzab		
Vanimo		
Kavieng		
Momote		
Port Moresby		
Misima		

Outlook Key	Alert 3 Dry	Alert 2 Dry	Alert 1 Dry	Outlook not available	No Alert	Alert 1 Wet	Alert 2 Wet	Alert 3 Wet
-------------	-------------	-------------	-------------	-----------------------	----------	-------------	-------------	-------------

***No alert:** Normal rainfall is favoured in the next three months or there are equal chances of below normal, normal and above normal rainfall.

The rainfall status been calculated using the percentile (decile) index and the rainfall outlook using SCOPIC v4.4.17, a statistical prediction tool.

PNG rainfall monitoring stations



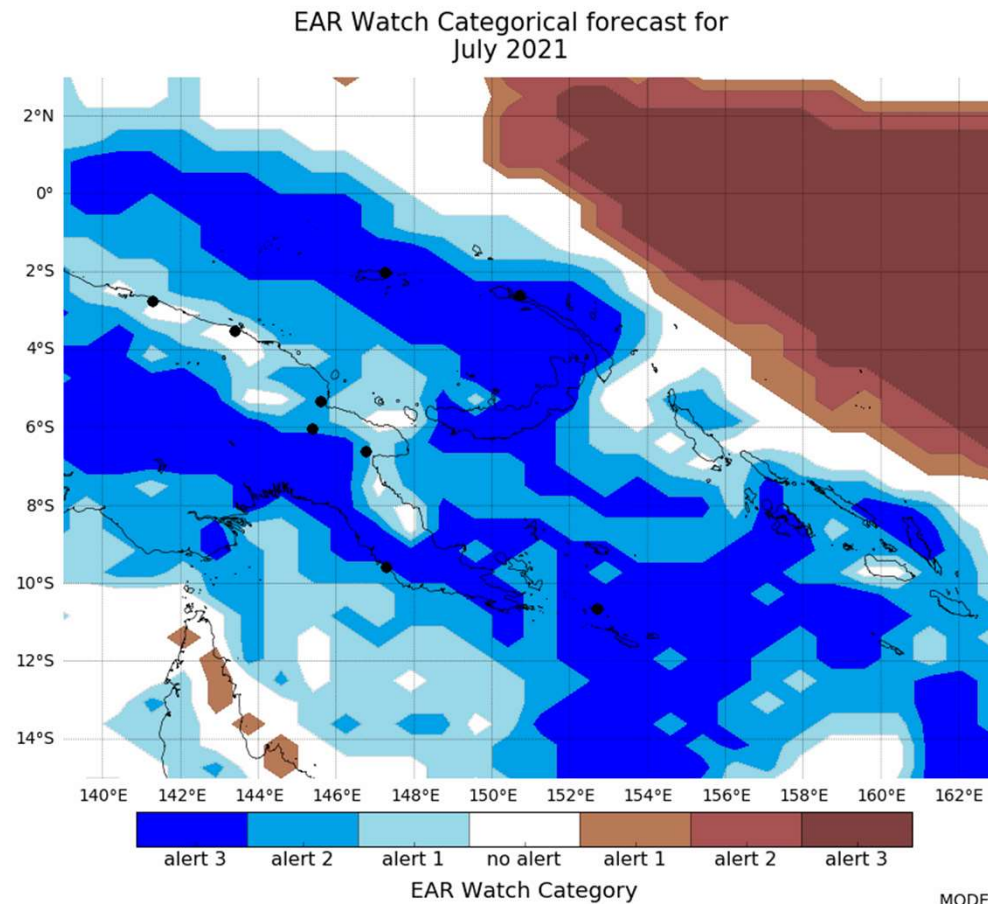
Contact the PNG National Weather Service for further information.



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ACCESS-S EAR Watch

- Wet and dry alerts for the whole country
- Same method as SCOPIC
- Month 1, 2 and 3
- Season 1 and 2



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Shapefile data extracted from Flanders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <http://www.marineregions.org/>.

MODEL RUN: 01/06/2021

Base period: 1990-2012

Model: ACCESS-S1

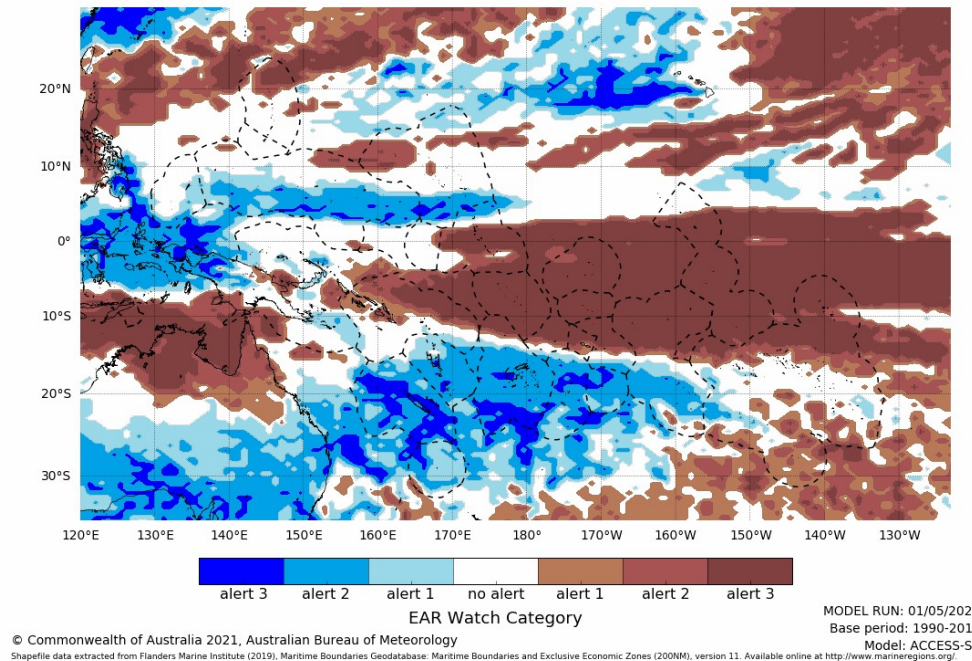


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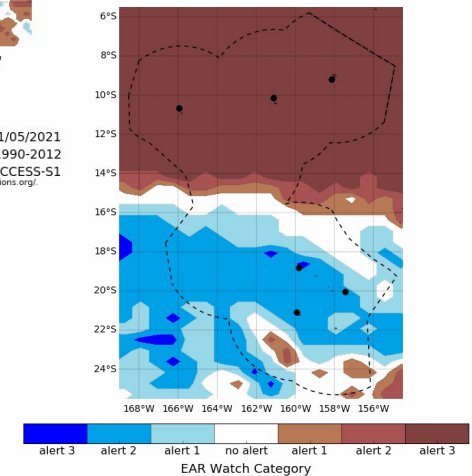
ACCESS-S EAR Watch

- Pacific wide EAR Watch
- Individual countries
- Important for understanding how the outlook may affect countries through drought or a wet periods as well as:
 - Agriculture
 - Hydrology
 - Socio-economics
 - Health
- Will eventually have spatial monitoring EAR Watch too

EAR Watch Categorical forecast for
May 2021



EAR Watch Categorical forecast for
May 2021



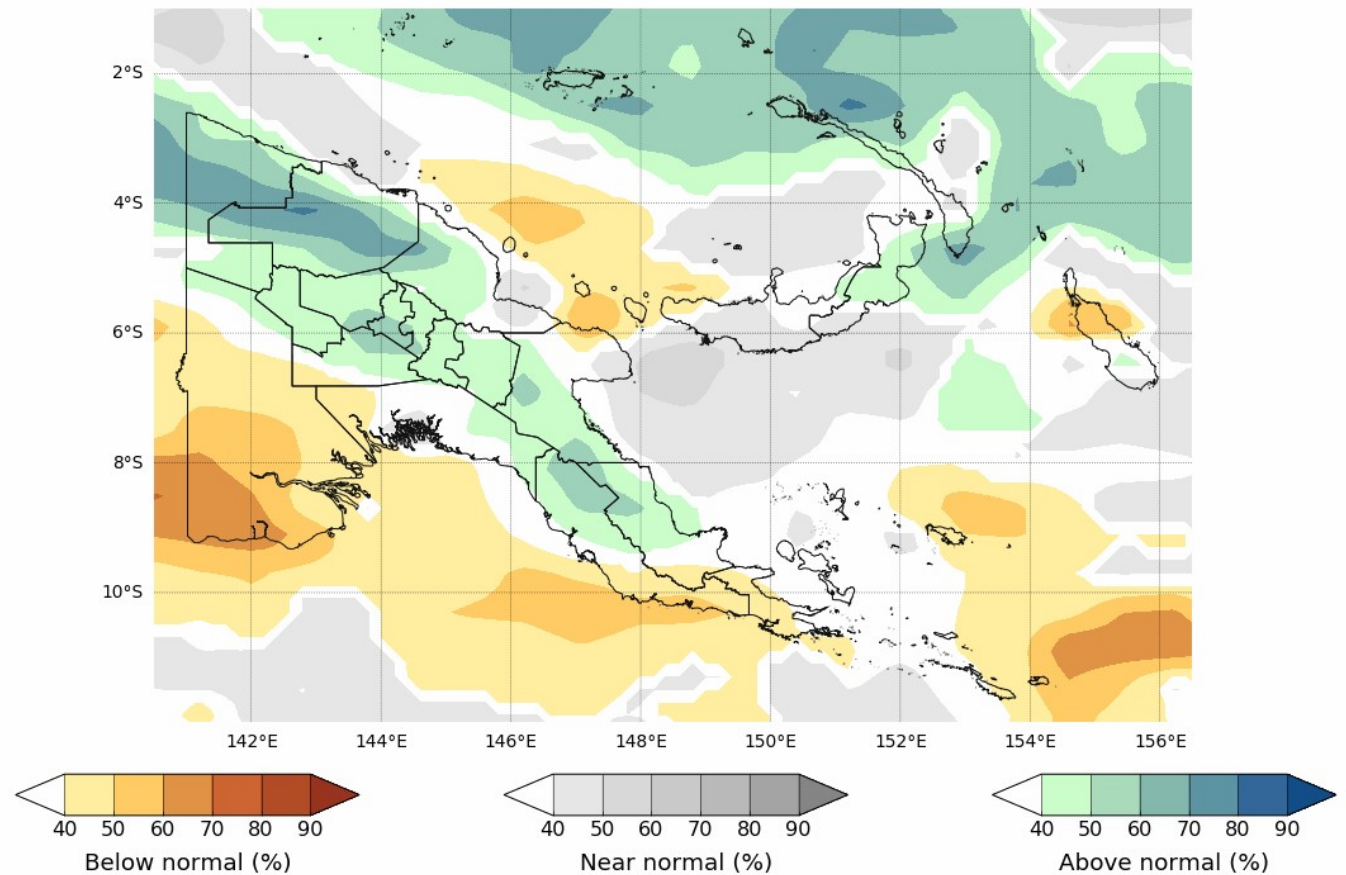


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ACCESS-S PNG CREWS

- Detailed forecasts for PNG with provinces overlaid including:
 - Rainfall
 - Mean sea level pressure
 - Maximum temperature
 - Minimum temperature
 - Sea surface temperature
- Important for understanding the outlook in detail for each province

Tercile rainfall probabilities for
4 to 10 June 2021



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Model: ACCESS-S1

Base period: 1990-2012

Model run: 28/05/2021

Issued: Map not issued

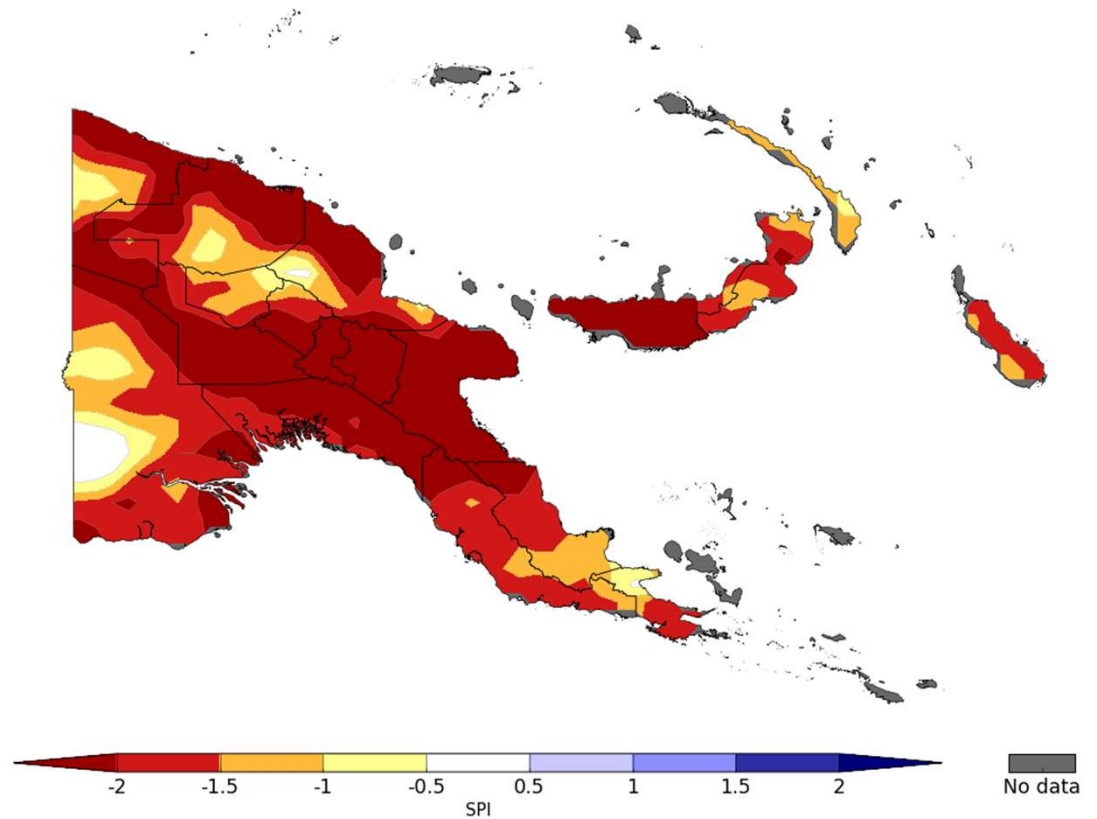


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Drought monitoring – SPI

- A common index used to characterise drought and measures how different the rainfall observed is to the average for that time period.
- Values under -1 indicate dry conditions, under -2 indicate extremely dry.

3-month SPI ending September 2015



Source: GSDaP

Map created: 09/11/2020 (UTC)

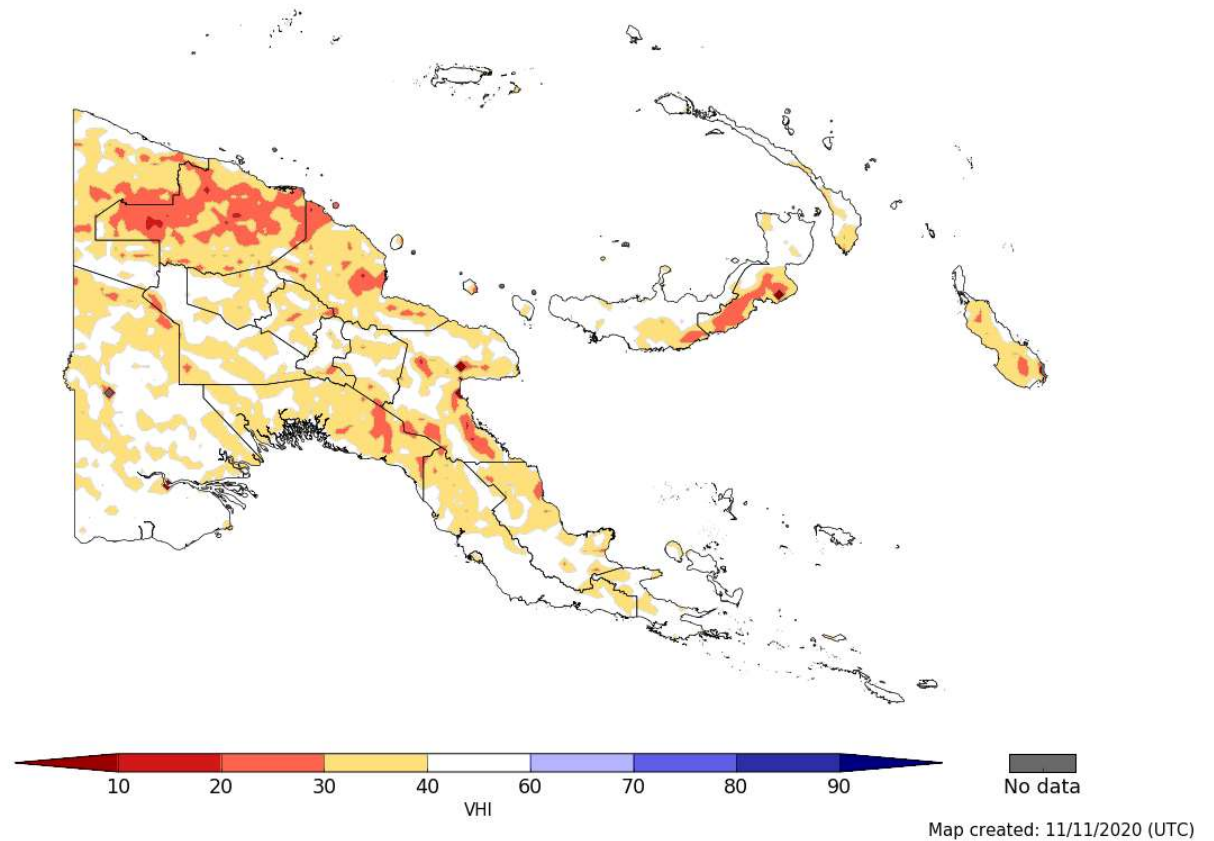


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Drought monitoring – VHI

- Combines anomalies of Normalized Difference Vegetation Index (NDVI) and land surface temperature (LST) – anomalies in photosynthetic rates.
- Indicator of stress on vegetation.

3-month VHI for September 2015

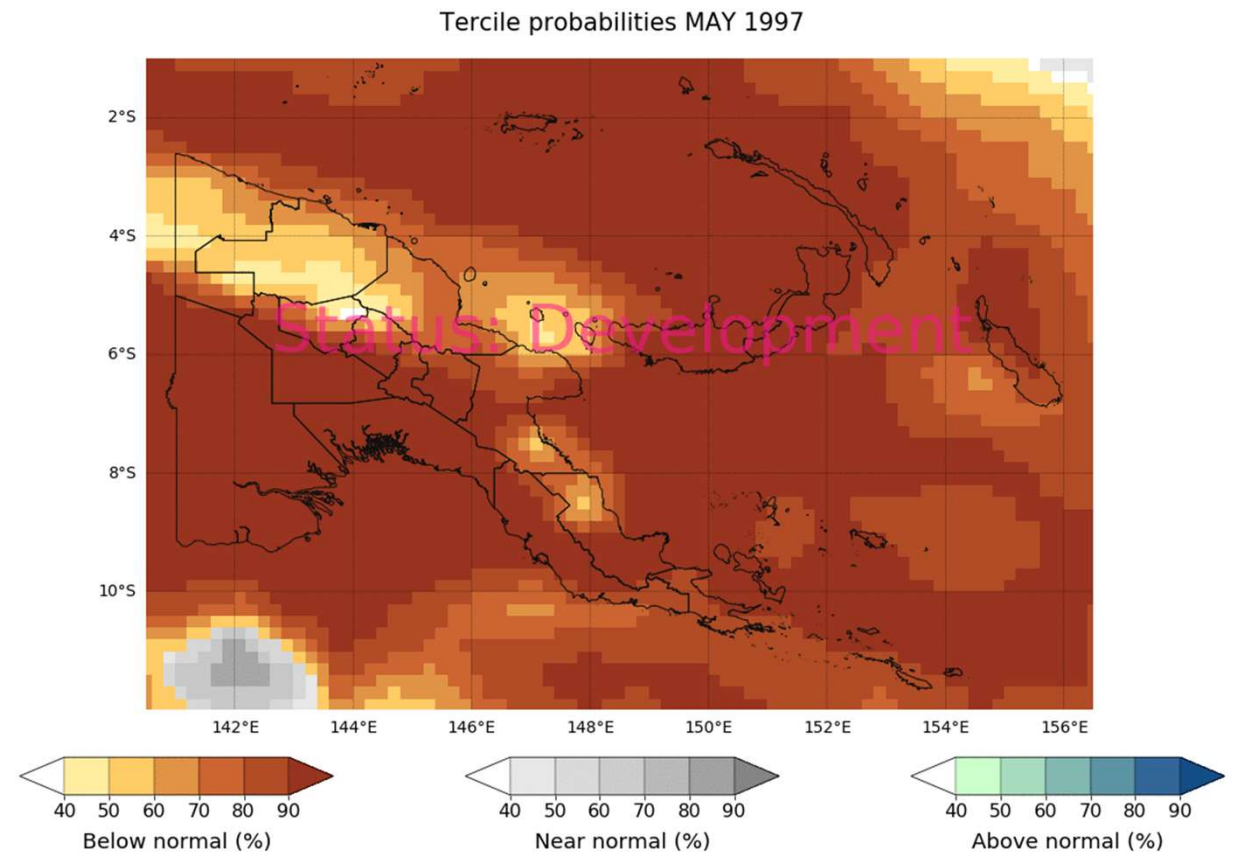




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Drought prediction – 1997/1998 PNG drought

- The lead time of the onset of dry conditions was not that good.
- BUT the continuation of dry conditions was represented well.



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Model: ACCESS-S1

Base period: 1990-2012

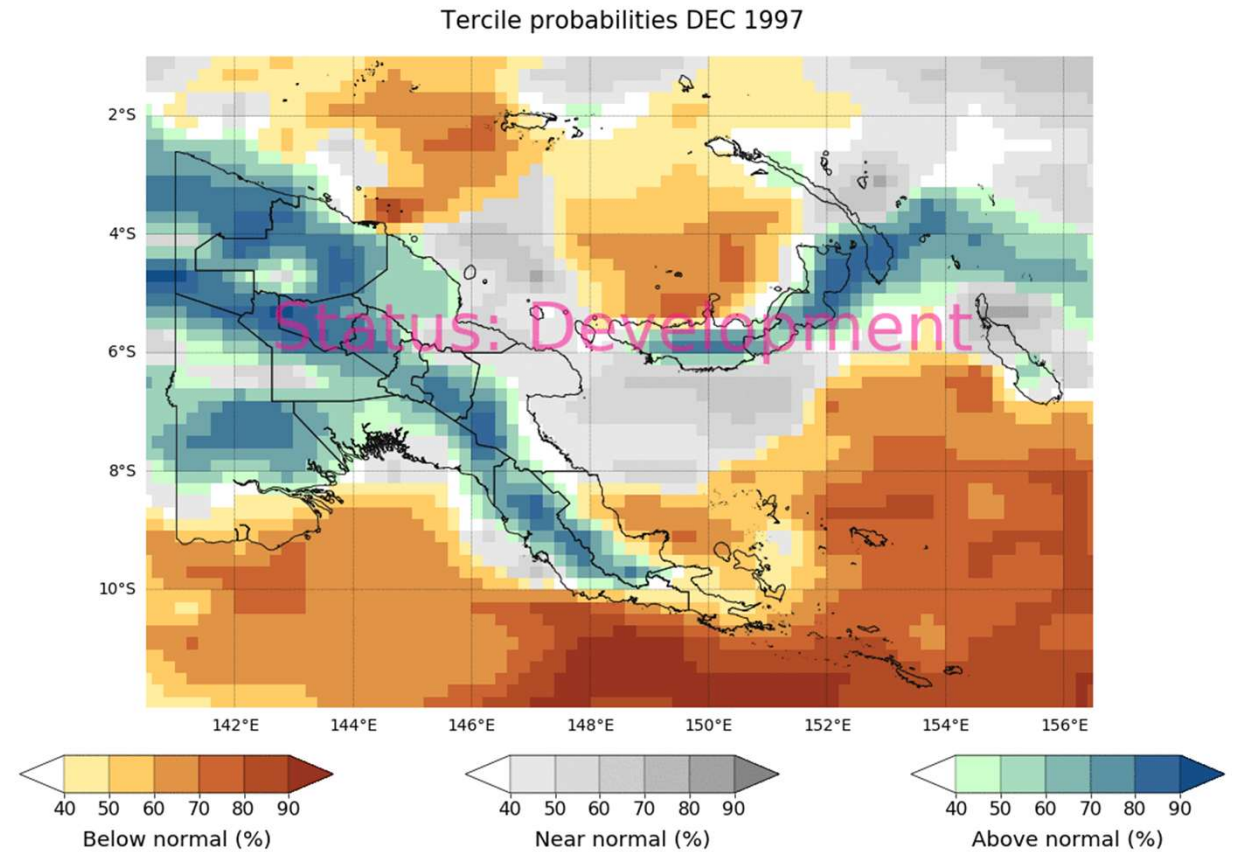
Issued: 08/06/2020



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Drought prediction – 1997/1998 PNG drought

- The easing of dry conditions was also captured with decent skill.



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Model: ACCESS-S1

Base period: 1990-2012

Issued: 08/06/2020



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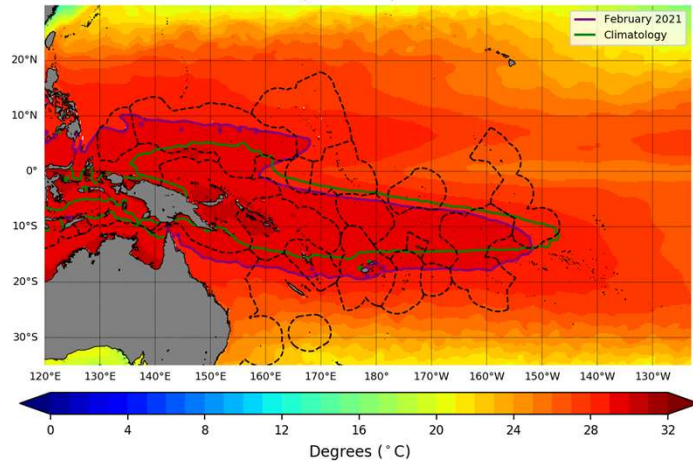
Seasonal Marine Applications

- Coral Reef Management (bleaching, disease)
- Marine Heatwaves
- Fisheries (Tuna)
- Inundation risk & Reef exposure
- Ocean Outlooks



Pacific Forecasts – oceanic variables

Sea surface temperature forecast for
February 2021 to April 2021

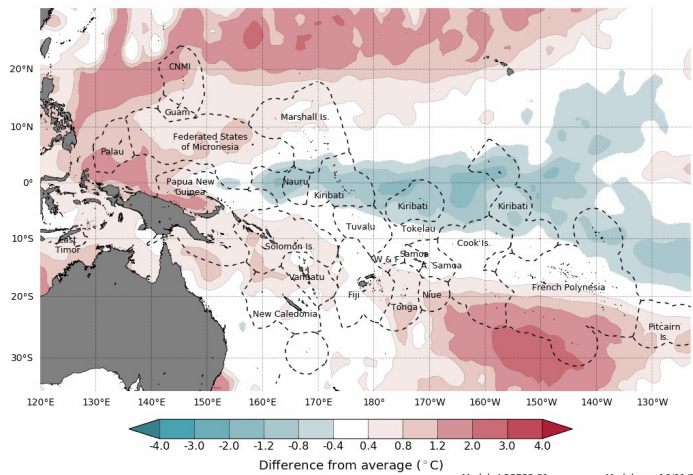


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Bure

Model: ACCESS-S1

Model Run:

Difference from average sea surface temperature forecast for
23 to 29 January 2021

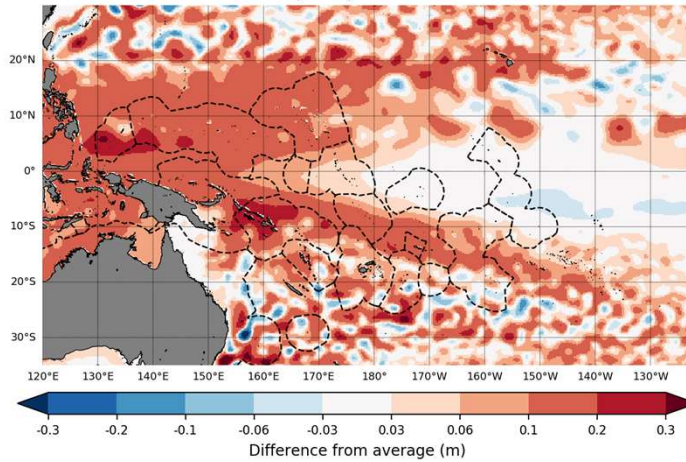


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Shapefile data extracted from Flanders Marine Institute (2019). Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (2000NM), version 11. Available online at: <http://www.maritimerregions.org/>

Model: ACCESS-S1
Base period: 1990-2012

Model run: 16/01/2021
Issued: 16/01/2021

Difference from average sea surface height forecast for
January 2021



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Bureau of Meteorology

Model: ACCESS-S1
Base Period: 1990-2012

Model Run: 27/12/2020
Issued: Map not issued

Outputs for:

- Sea surface temperature
- Sea surface height



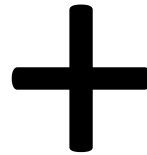
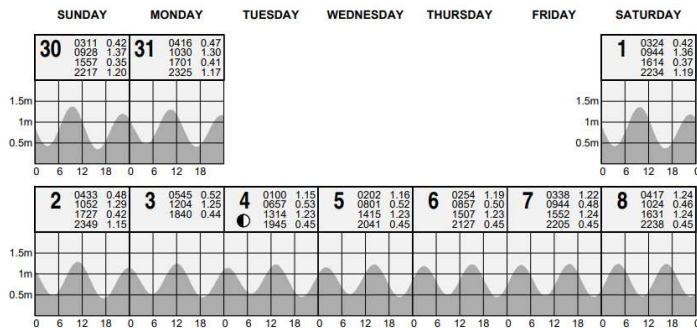
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Inundation or Reef Exposure Risk

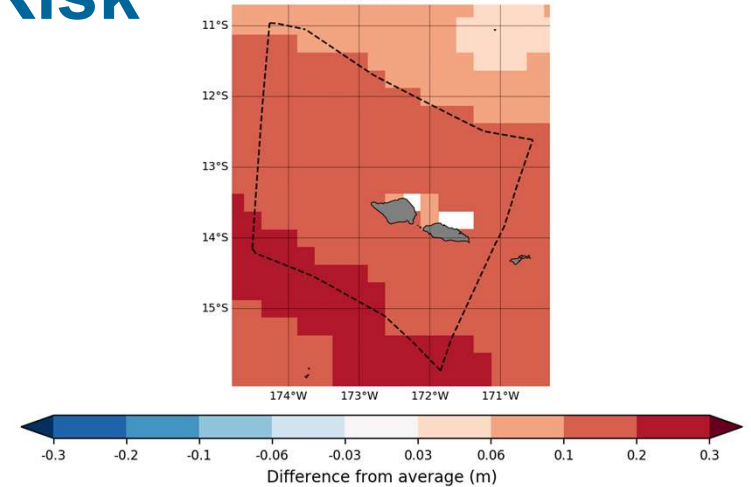
TIDAL PREDICTIONS FOR SAMOA - APIA

MAY 2021

Local Standard Time



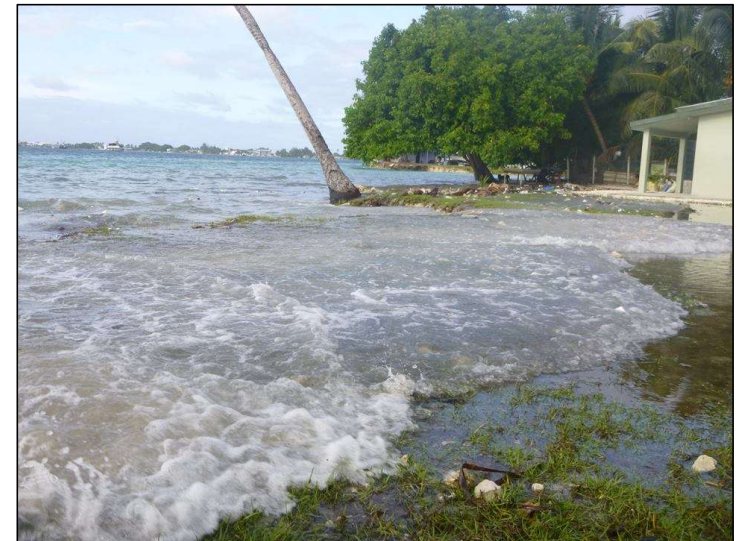
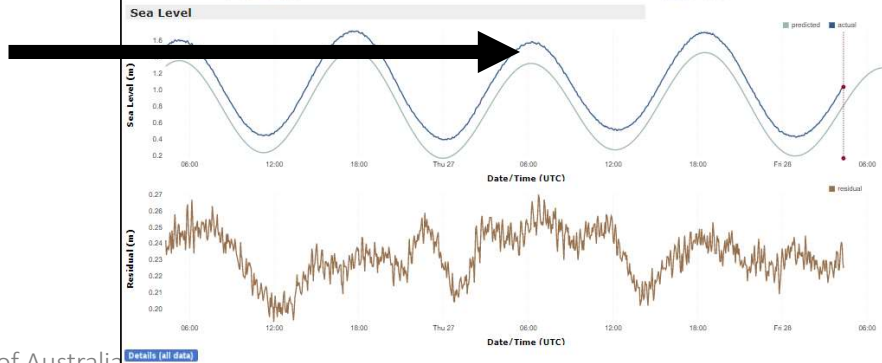
Difference from average sea surface height forecast for
May 2021



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Model: ACCESS-S1
Base Period: 1990-2012

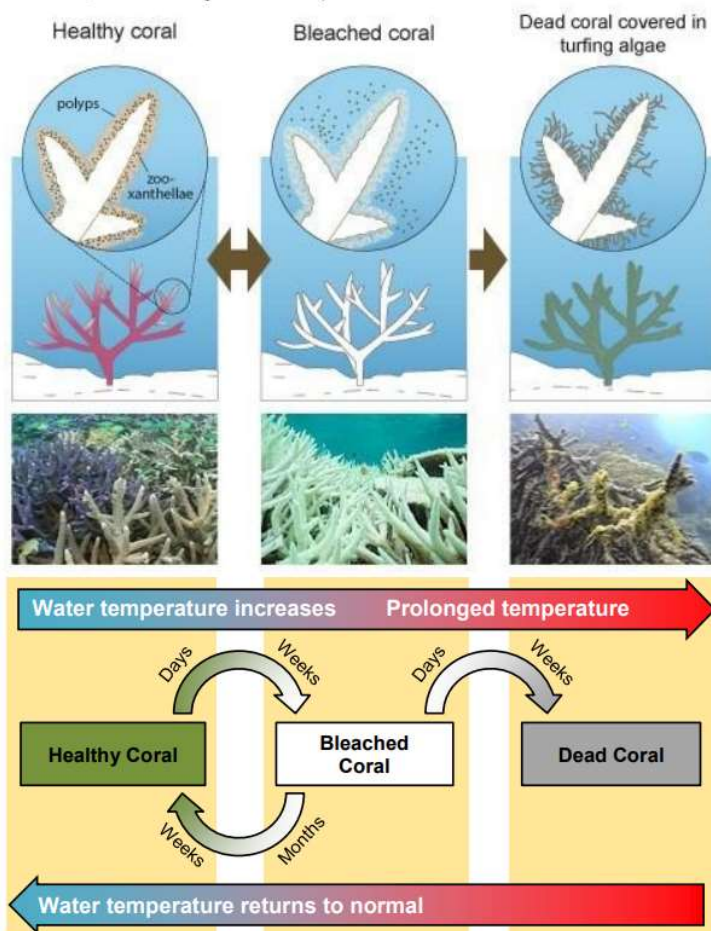
Model Run: 27/04/2021
Issued: Map not issued





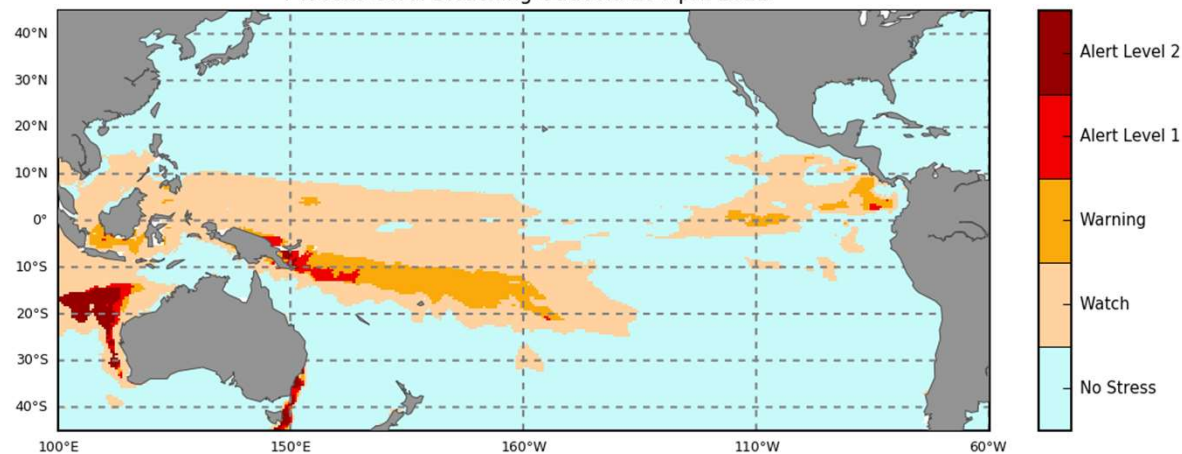
Climate and Oceans Support
Program in the Pacific

Coral Bleaching



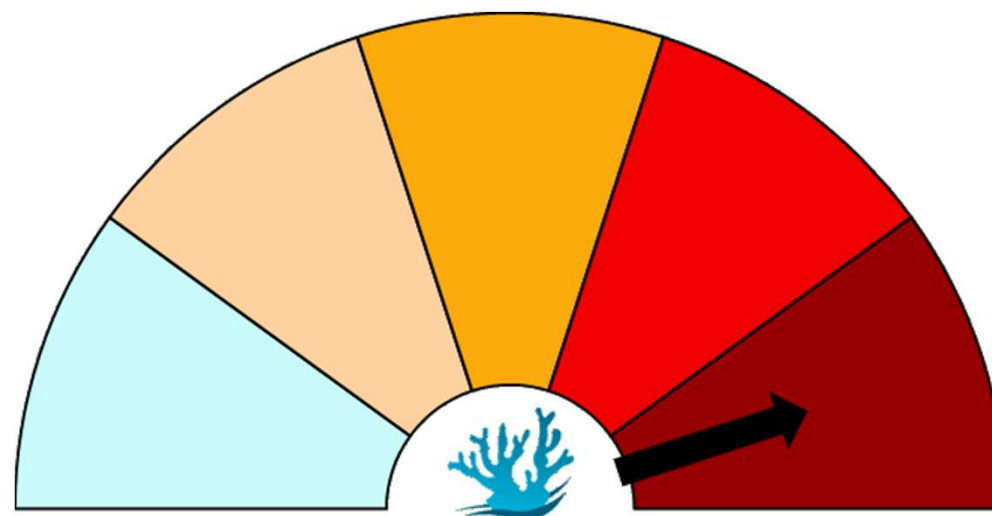
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Pacific Ocean
4 Weeks Coral Bleaching Outlook: 25 April 2021



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Geoscience Energy and Maritime Division, COSPPac SPP

NOAA Coral Reef Watch





Climate and Ocean Support
Program in the Pacific

Marine Heatwaves: Impacts

HUFFPOST

NEWS CORONAVIRUS POLITICS 2020 ELECTIONS ENTERTAINMENT LIFE PERSONAL VIDEO SHOPPING

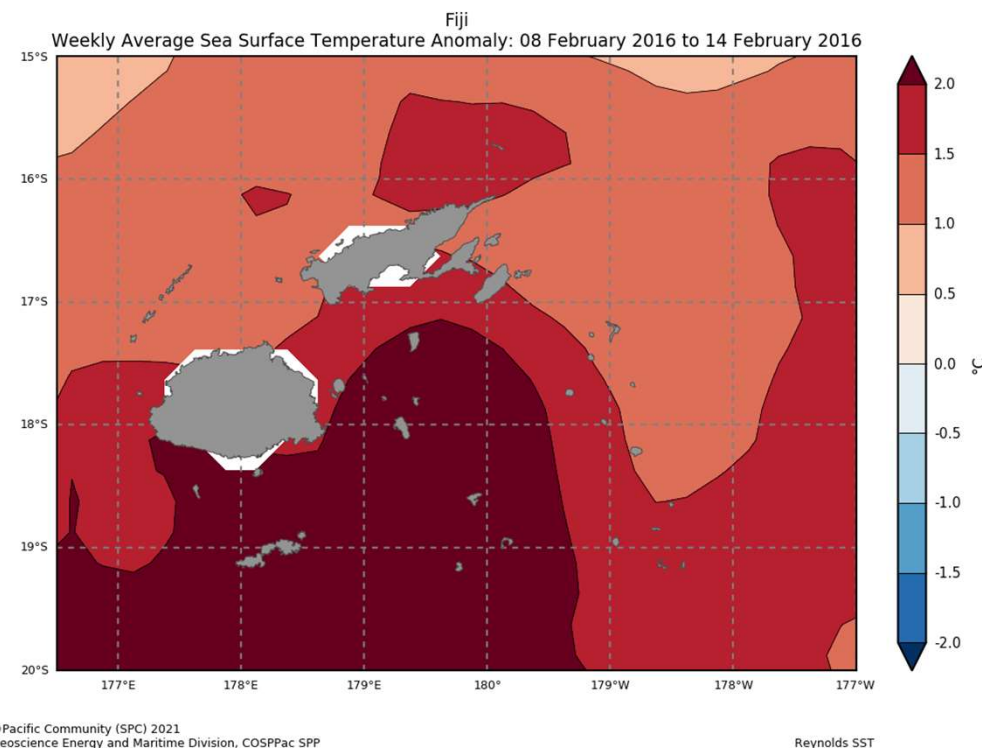


Lagipolva Cherele Jackson, Contributor
Independent Samoan Writer

Fish Kills Reported in Fiji and Vanuatu

02/15/2016 03:43 pm ET | Updated Dec 06, 2017

You know how we talk about worst case scenario of climate change impacts? Well, it's happening now in some Pacific islands. All across the Pacific, high temperatures have been recorded and residents reported the hottest months they have ever experienced. For some islands however, the impacts have gone beyond a daily nuisance to a serious marine threat. Last week reports from Vanuatu and Fiji showed fish kills by the thousands as a result of the temperatures.

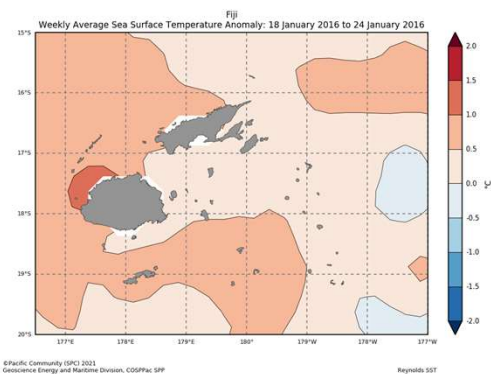




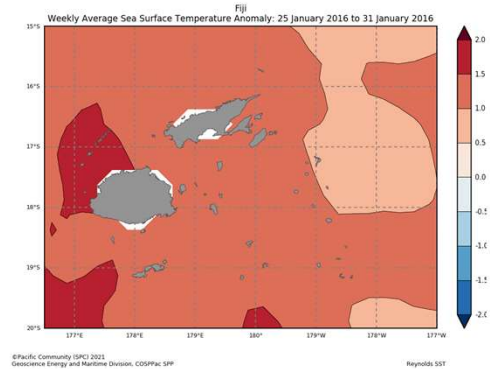
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Marine Heatwaves: Impacts (Fiji)

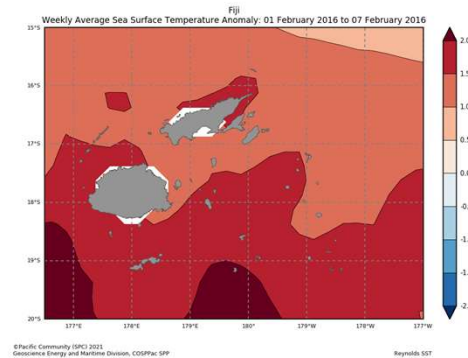
- 21 January 2016



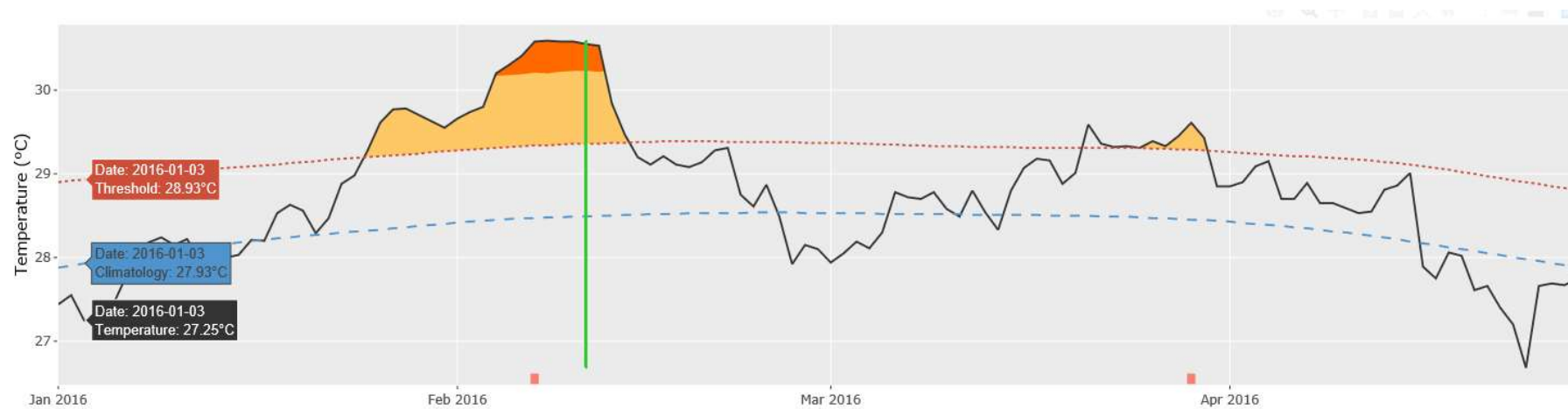
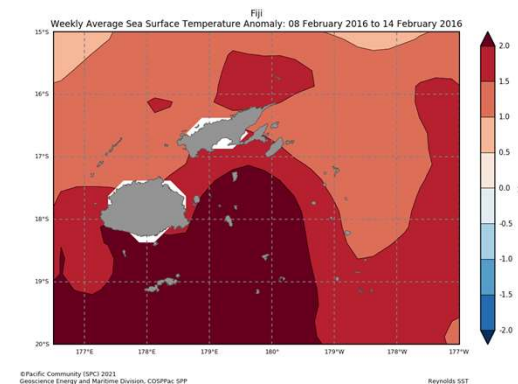
28 January 2016



4 February 2016



11 February 2016



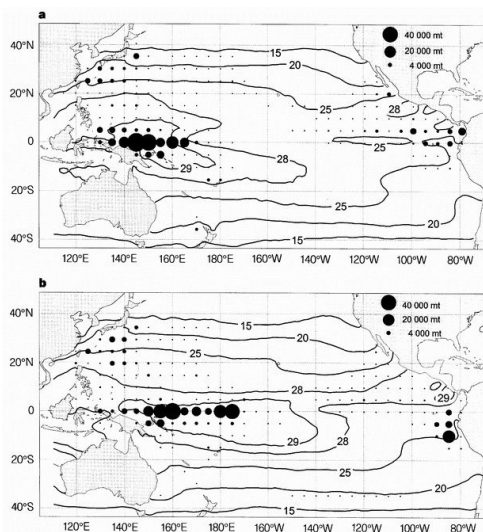


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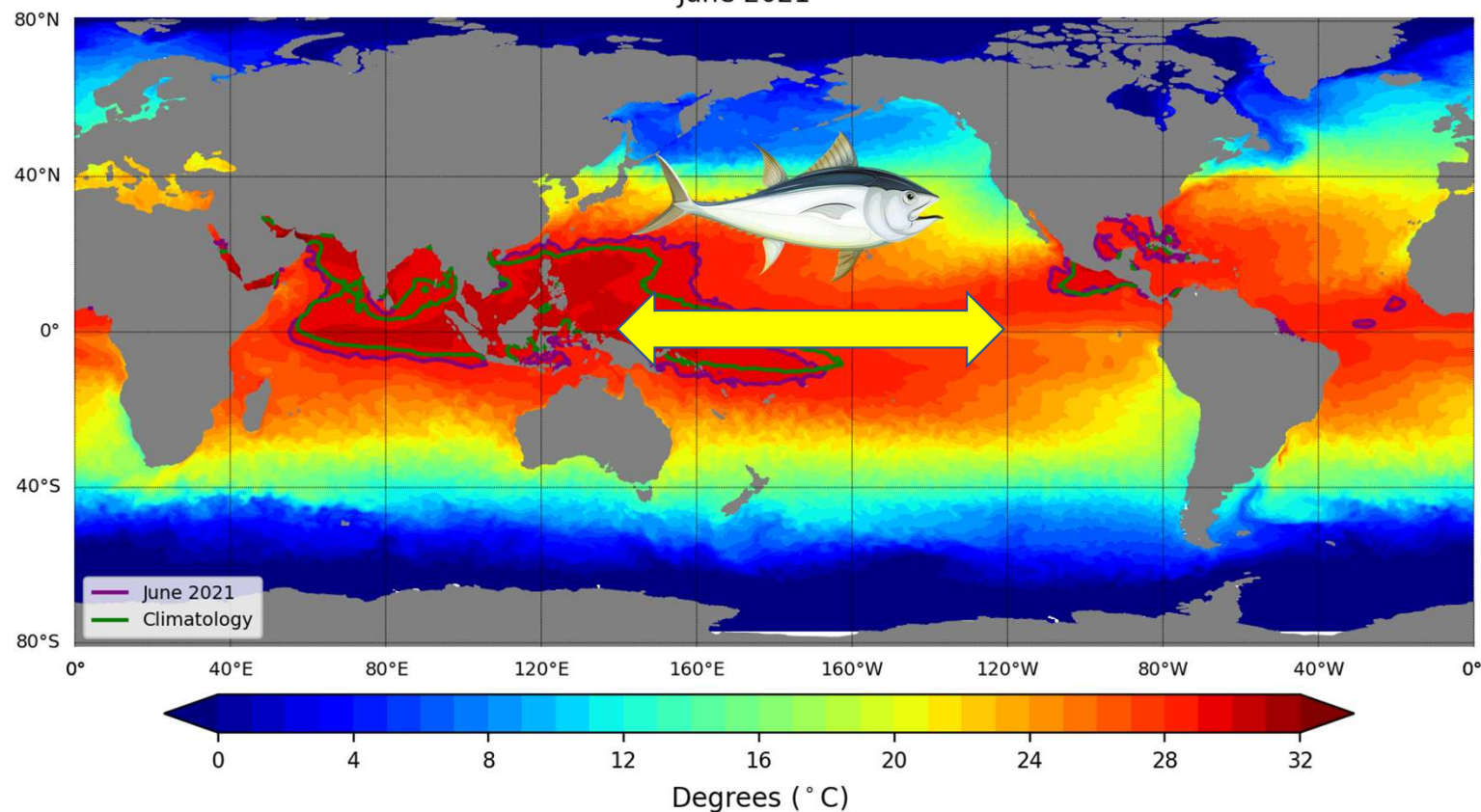
Seasonal Outlooks for Fisheries

SeasOx^F

- Tuna (skipjack in below example) drifts with the Western Warm Pool boundary



Sea surface temperature forecast for
June 2021



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Model: ACCESS-S1
Base Period: 1990-2012

Model Run: 03/05/2021
Issued: Map not issued



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Ocean Outlooks

- Seasonal outlooks for Ocean Outlook Bulletins
- Commonly use SST Anomaly, Sea Level, Coral Bleaching, SST for Fisheries
- Released on monthly or 3-monthly timeframes
- Also include recent observations and tide predictions

