

# Pacific Islands - Ocean and Climate Outlook Forum (OCOF) No. 189

Country: Tonga

## Part 1: Recent climate

**TABLE 1: Monthly Rainfall**

Station (include data period)	Mar-2023	Apr-2023	May-2023				
			Total (mm)	33%tile	67%tile	Median	Rank
	Total (mm)	Total (mm)	Rainfall (mm)				
Northern Division							
Niuafo'ou (1971-2023)	328.0		362.0	136.0	211.0	160.0	48/52
Niuaatoputapu (1947-2023)	369.5	102.5	644.4	124.0	181.0	152.0	73/73
Central Division							
Vava'u (1947-2023)	295.7	101.0	357.6	97.0	193.0	140.0	73/77
Ha'apai (1947-2023)	221.6	110.6	338.8	68.0	135.0	92.4	73/76
Southern Division							
Fua'amotu (1979-2023)	295.5	296.7	75.1	68.5	174.1	123.5	16/43
Nuku'alofa (1944-2023)	304.0	198.5	119.5	68.0	139.0	94.0	50/79

**TABLE 2: Three-month Total Rainfall for March to May 2023**

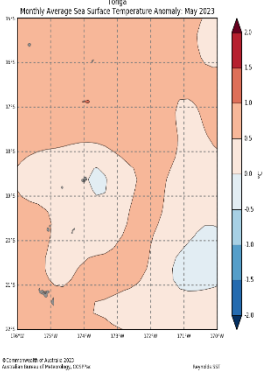
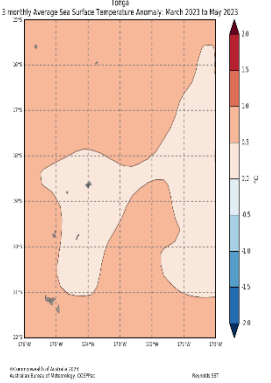
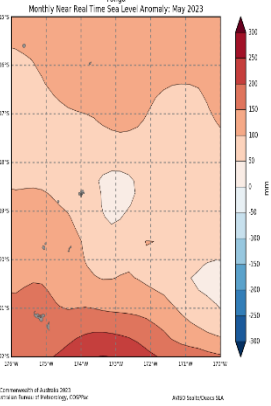
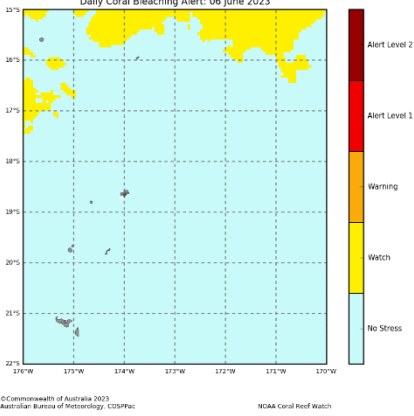
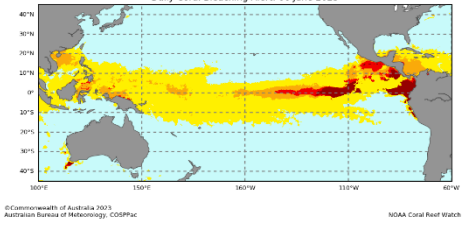
Station	Three-month Total		33%tile	67%tile	Median	Rank
	Rainfall (mm)					
Northern Division						
Niuafo'ou (1971-2023)			639.4	796.1	743.0	
Niuaatoputapu (1947-2023)	1116.4	Above normal	562.0	741.0	629.0	67/68
Central Division						
Vava'u (1947-2023)	754.3	Normal	592.0	780.0	707.1	48/77
Ha'apai (1947-2023)	671.0	Above normal	445.8	656.3	564.5	53/78
Southern Division						
Fua'amotu (1979-2023)	667.3	Above normal	436.0	623.0	536.8	32/43
Nuku'alofa (1944-2023)	622.0	Above normal	453.3	601.0	522.5	59/78

## Part 1i. Monthly and Seasonal Outlooks for July and July to September 2023

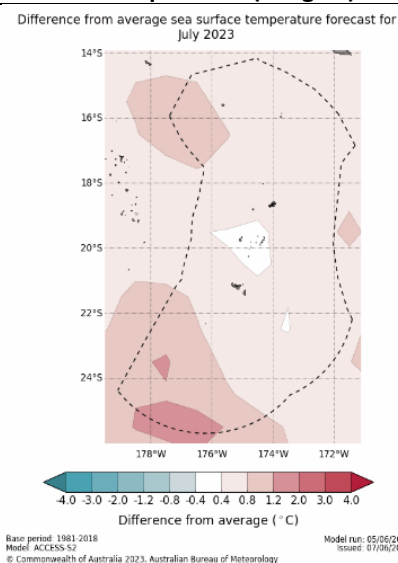
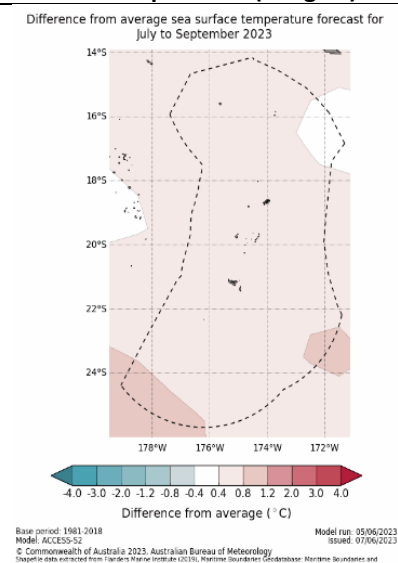
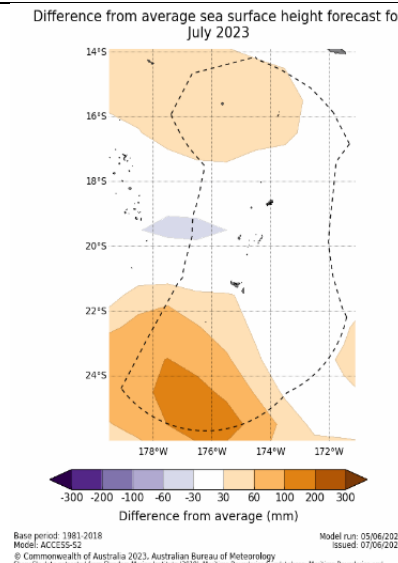
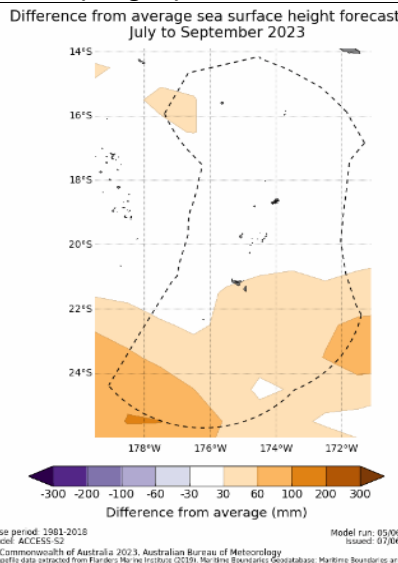
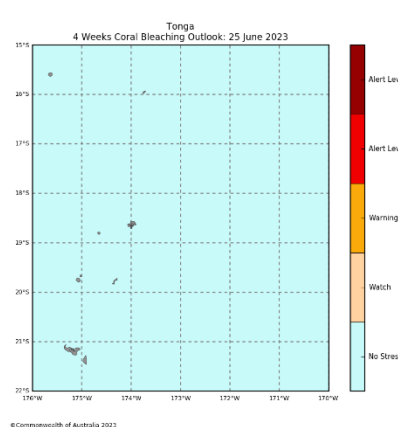
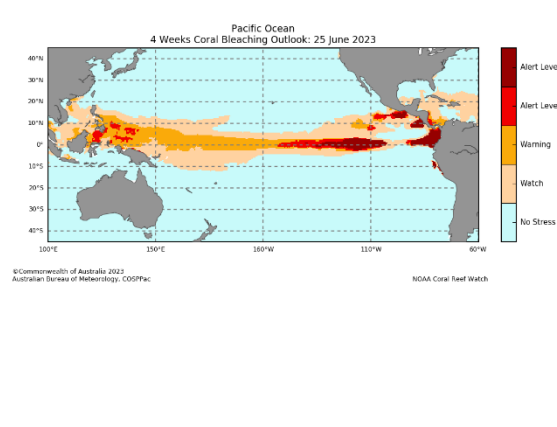
Monthly: July	Seasonal: July to September
Rainfall (Image 1)	Rainfall (Image 2)
<p>Tercile rainfall probabilities for July 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2023, Australian Bureau of Meteorology Shapefile data extracted from Flinders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <a href="http://www.marinegovernance.org/">http://www.marinegovernance.org/</a></p>	<p>Tercile rainfall probabilities for July to September 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2023, Australian Bureau of Meteorology Shapefile data extracted from Flinders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <a href="http://www.marinegovernance.org/">http://www.marinegovernance.org/</a></p>
Monthly Maximum temperature (Image 3):	Seasonal maximum temperature (Image 4):
<p>Tercile maximum temperature probabilities for July 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2023, Australian Bureau of Meteorology Shapefile data extracted from Flinders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <a href="http://www.marinegovernance.org/">http://www.marinegovernance.org/</a></p>	<p>Tercile maximum temperature probabilities for July to September 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2023, Australian Bureau of Meteorology Shapefile data extracted from Flinders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <a href="http://www.marinegovernance.org/">http://www.marinegovernance.org/</a></p>
Monthly minimum temperature (Image 5):	Seasonal minimum temperature (Image 6):
<p>Tercile minimum temperature probabilities for July 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2023, Australian Bureau of Meteorology Shapefile data extracted from Flinders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <a href="http://www.marinegovernance.org/">http://www.marinegovernance.org/</a></p>	<p>Tercile minimum temperature probabilities for July to September 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2023, Australian Bureau of Meteorology Shapefile data extracted from Flinders Marine Institute (2019), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <a href="http://www.marinegovernance.org/">http://www.marinegovernance.org/</a></p>

Part 2: Recent Ocean Observation

Monthly/Three months: May and March to May 2023

<div>Monthly: May</div> <div>Sea Surface Temperature (Image 1):</div> <div><p>Tonga Monthly Average Sea Surface Temperature Anomaly: May 2023</p><p>© Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p><p>Reynolds SST</p></div>	<div>Last three months: March to May 2023:</div> <div>Sea Surface Temperature (Image 4):</div> <div><p>Tonga 3 monthly Average Sea Surface Temperature Anomaly: March to May 2023</p><p>© Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p><p>Reynolds SST</p></div>
<div>Sea level (Image 2):</div> <div><p>Tonga Monthly Near-Real Time Sea Level Anomaly: May 2023</p><p>© Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p><p>ARSO SeaLevel SLA</p></div>	
<div>Daily coral bleaching alert (Image 3):</div> <div><p>Tonga Daily Coral Bleaching Alert: 06 June 2023</p><p>© Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p><p>NOAA Coral Reef Watch</p></div>	<div><p>Pacific Ocean Daily Coral Bleaching Alert: 06 June 2023</p><p>© Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p><p>NOAA Coral Reef Watch</p></div>

Part 2i. Monthly and Seasonal Outlooks for July and July to September 2023

Monthly: July	Seasonal: July to September
Monthly sea surface temperature (Image 5):	Seasonal sea surface temperature (Image 6):
<p>Difference from average sea surface temperature forecast for July 2023</p>  <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2023, Australian Bureau of Meteorology Shapefile data extracted from Flinders Marine Institute (2023), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (2004M), version 11. Available online at <a href="http://www.maritime.gov.au">http://www.maritime.gov.au</a></p> <p>Model run: 05/06/2023 Issued: 07/06/2023</p>	<p>Difference from average sea surface temperature forecast for July to September 2023</p>  <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2023, Australian Bureau of Meteorology Shapefile data extracted from Flinders Marine Institute (2023), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (2004M), version 11. Available online at <a href="http://www.maritime.gov.au">http://www.maritime.gov.au</a></p> <p>Model run: 05/06/2023 Issued: 07/06/2023</p>
Monthly sea level (Image 7):	Seasonal sea level (Image 8):
<p>Difference from average sea surface height forecast for July 2023</p>  <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2023, Australian Bureau of Meteorology Shapefile data extracted from Flinders Marine Institute (2023), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (2004M), version 11. Available online at <a href="http://www.maritime.gov.au">http://www.maritime.gov.au</a></p> <p>Model run: 05/06/2023 Issued: 07/06/2023</p>	<p>Difference from average sea surface height forecast for July to September 2023</p>  <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2023, Australian Bureau of Meteorology Shapefile data extracted from Flinders Marine Institute (2023), Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (2004M), version 11. Available online at <a href="http://www.maritime.gov.au">http://www.maritime.gov.au</a></p> <p>Model run: 05/06/2023 Issued: 07/06/2023</p>
4-week Coral Bleaching (Image 9):	
<p>Tonga 4 Weeks Coral Bleaching Outlook: 25 June 2023</p>  <p>© Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPac</p> <p>NOAA Coral Reef Watch</p>	<p>Pacific Ocean 4 Weeks Coral Bleaching Outlook: 25 June 2023</p>  <p>© Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPac</p> <p>NOAA Coral Reef Watch</p>

## Summary Statement

### Monthly and last three months: May 2023/March to May 2023 statement

May rainfall was normal at Fua'amotu and Nuku'alofa, and above normal for the rest of the Country. Niuatoputapu recorded its highest May rainfall. Ha'apai had its fourth, and Vava'u and Niuafu'ou had their fifth highest May rainfall on record, respectively.

March to May rainfall was normal for Vava'u, and above normal for the rest of Tonga. Niuatoputapu had its second highest March to May rainfall on record.

## Part 1i. Monthly and Seasonal Outlooks for July and July to September 2023

### Monthly /Seasonal rainfall and temperature Outlook statements

The outlook offers little guidance for July rainfall.

The rainfall for July to September is likely to be below normal for Niuatoputapu and far southern Tonga, while little guidance is available for central Tonga and Niuafu'ou in the north.

Maximum and minimum temperatures during July and averaged over July to September, are likely to be above normal across the country, except for a small part of central Tonga where July's outlook offers little guidance.

## Part 2: Recent Ocean summary statement

### Monthly and last three months: May 2023/March to May 2023

May ocean temperature around Tonga were utmost 1.0°C above normal.

Averaged over March to May 2023, ocean temperatures were utmost 1.0°C above normal.

May sea levels around Tonga were 50mm to 200mm above normal.

Coral bleaching alert at 'Watch' for northern Tonga waters.

## Part 2i. Monthly and Seasonal Outlooks for July and July to September 2023

### Ocean Variable statement

May and averaged May to July ocean temperatures around Tonga are predicted to be 0.4 to 0.8°C above normal.

May and average May to July sea levels around Tonga are predicted to be near normal in northern Tonga, with sea surface heights of up to 200mm for southern Tonga.

The 4 weeks coral bleaching outlook to 25 June 2023 forecasts no thermal stress for Tonga.

**TABLE 3: Stakeholder Engagement- Evaluations of how effective NMS engage with stakeholders**

Product	Date: May 2023	Stakeholder	Total Number of Participants	Number of Male	Number of Female	Comments (If there are comments from you Stakeholders)
Climate Bulletin	3 May	Government ministries. NGOs, Media, Private Sector	155	118	37	
EAR Watch						
Monthly Climate Briefing						
Ocean Outlook	3 May	Government ministries. NGOs, Media, Private Sector	155	118	37	
Climate data request						
<b>Total</b>			<b>310</b>	<b>236</b>	<b>74</b>	