

# Pacific Islands - Ocean and Climate Outlook Forum (OCOF) No. 190

Country: Tonga

## Part 1: Recent climate

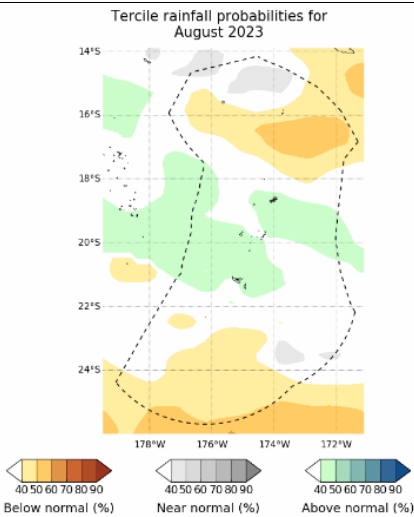
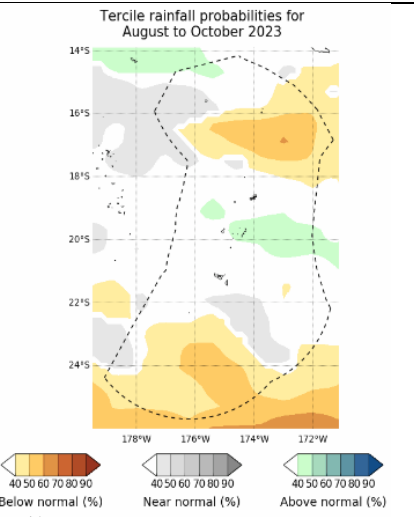
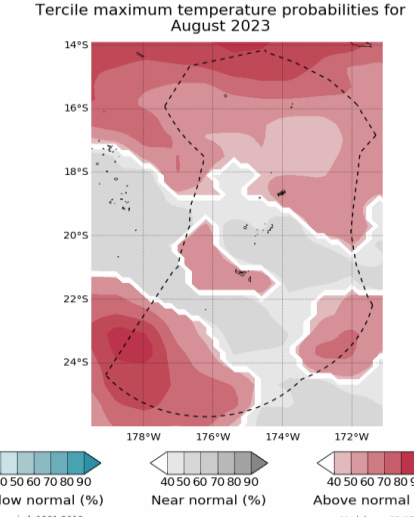
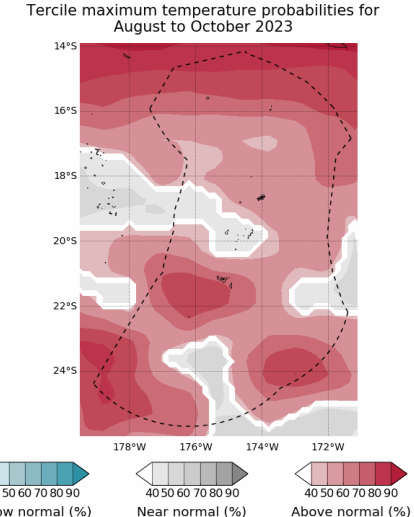
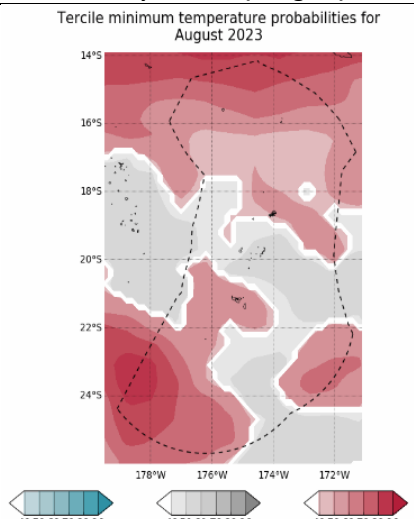
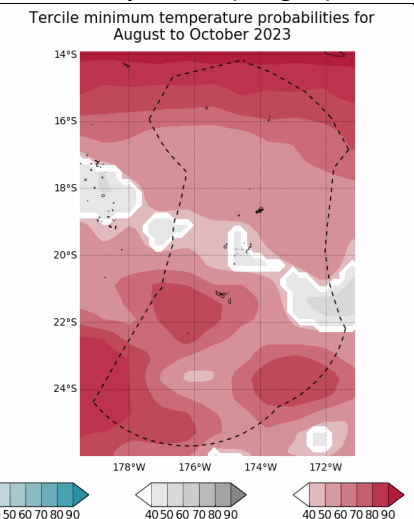
**TABLE 1: Monthly Rainfall**

Station (include data period)	Apr-2023	May-2023	Jun-2023				
			Total (mm)	33%tile	67%tile	Median	Rank
	Total (mm)	Total (mm)	Rainfall (mm)				
Northern Division							
Niuafu'ou (1971-2023)		362.0	153.8	72.8	151.6	112.0	34/50
Niutoputapu (1947-2023)	102.5	644.4	167.5	66.4	168.0	91.0	51/77
Central Division							
Vava'u (1947-2023)	101.0	357.6	120.1	57.0	132.0	89.0	50/77
Ha'apai (1947-2023)	110.6	338.8	145.3	46.0	108.0	74.0	66/77
Southern Division							
Fua'amotu (1979-2023)	296.7	75.1	86.8	69.0	135.4	100.2	20/44
Nuku'alofa (1944-2023)	198.5	119.5	120.8	58.0	114.0	84.0	56/79

**TABLE 2: Three-month Total Rainfall for April to June 2023**

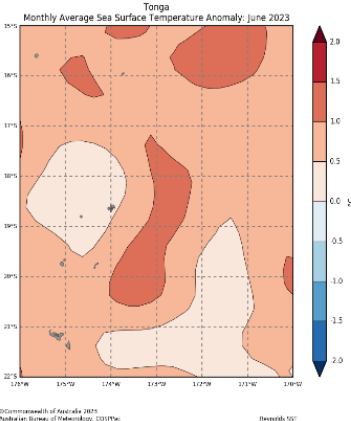
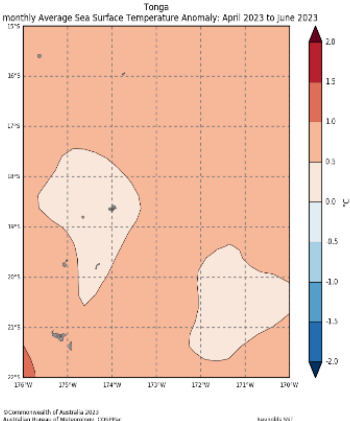
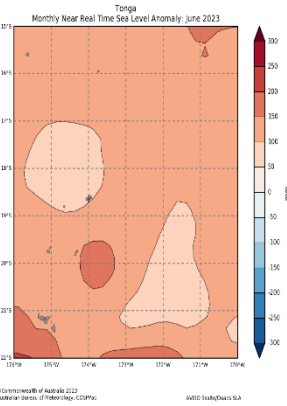
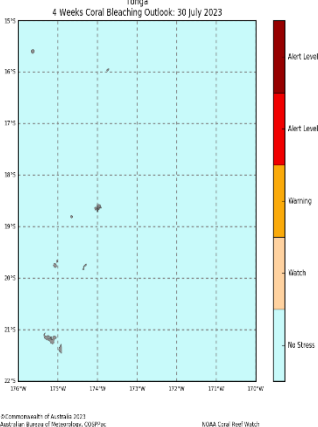
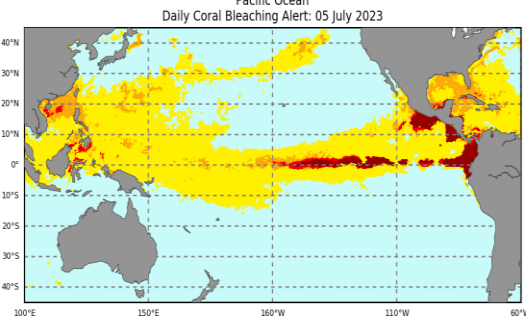
Station	Three-month Total		33%tile	67%tile	Median	Rank
	Rainfall (mm)					
Northern Division						
Niufo'ou (1971-2023)			493.7	648.0	582.0	
Niutoputapu (1947-2023)	914.4	Above normal	431.3	609.0	534.0	67/70
Central Division						
Vava'u (1947-2023)	578.7	Normal	412.0	583.2	493.0	52/77
Ha'apai (1947-2023)	594.7	Above normal	294.8	433.9	355.0	66/76
Southern Division						
Fua'amotu (1979-2023)	458.6	Normal	341.1	526.1	466.0	22/43
Nuku'alofa (1944-2023)	438.8	Normal	292.3	439.0	362.5	53/78

Part 1i. Monthly and Seasonal Outlooks for August and August to October 2023

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

## Part 2: Recent Ocean Observation

### Monthly/Three months: April and April to June 2023

<b>Monthly: June</b>	<b>Last three months: April to June 2023:</b>
<b>Sea Surface Temperature (Image 1):</b>	<b>Sea Surface Temperature (Image 4):</b>
 <p>Tonga Monthly Average Sea Surface Temperature Anomaly: June 2023</p> <p>©Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p> <p>Reproduced by 101</p>	 <p>Tonga 3 monthly Average Sea Surface Temperature Anomaly: April 2023 to June 2023</p> <p>©Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p> <p>Reproduced by 101</p>
<b>Sea level (Image 2):</b>	
 <p>Tonga Monthly Near Real Time Sea Level Anomaly: June 2023</p> <p>©Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p> <p>NOAA SeaWiFS SIA</p>	
<b>Daily coral bleaching alert (Image 3):</b>	
 <p>Tonga 4 Weeks Coral Bleaching Outlook: 30 July 2023</p> <p>©Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p> <p>NOAA Coral Reef Watch</p>	 <p>Pacific Ocean Daily Coral Bleaching Alert: 05 July 2023</p> <p>©Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p> <p>NOAA Coral Reef Watch</p>

Part 2i. Monthly and Seasonal Outlooks for August and August to October 2023

Monthly: August	Seasonal: August to October
Monthly sea surface temperature (Image 5):	Seasonal sea surface temperature (Image 6):
<div><p>Difference from average sea surface temperature forecast for August 2023</p><p>Difference from average (°C)</p><p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2023, Australian Bureau of Meteorology Shapefile data extracted from Flinders Marine Institute (2015), Maritime Boundaries Database: Maritime Boundaries and Exclusive Economic Zones (2004B), version 1.1. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p><p>Model run: 03/07/2023 Issued: 05/07/2023</p></div>	<div><p>Difference from average sea surface temperature forecast for August to October 2023</p><p>Difference from average (°C)</p><p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2023, Australian Bureau of Meteorology Shapefile data extracted from Flinders Marine Institute (2015), Maritime Boundaries Database: Maritime Boundaries and Exclusive Economic Zones (2004B), version 1.1. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p><p>Model run: 03/07/2023 Issued: 05/07/2023</p></div>
Monthly sea level (Image 7):	Seasonal sea level (Image 8):
<div><p>Difference from average sea surface height forecast for August 2023</p><p>Difference from average (mm)</p><p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2023, Australian Bureau of Meteorology Shapefile data extracted from Flinders Marine Institute (2015), Maritime Boundaries Database: Maritime Boundaries and Exclusive Economic Zones (2004B), version 1.1. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p><p>Model run: 03/07/2023 Issued: 05/07/2023</p></div>	<div><p>Difference from average sea surface height forecast for August to October 2023</p><p>Difference from average (mm)</p><p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2023, Australian Bureau of Meteorology Shapefile data extracted from Flinders Marine Institute (2015), Maritime Boundaries Database: Maritime Boundaries and Exclusive Economic Zones (2004B), version 1.1. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p><p>Model run: 03/07/2023 Issued: 05/07/2023</p></div>
4-week Coral Bleaching (Image 9):	
<div><p>Tonga 4 Weeks Coral Bleaching Outlook: 30 July 2023</p><p>Alert Level 2 Alert Level 1 Warning Watch No Stress</p><p>© Commonwealth of Australia 2023 Australian Bureau of Meteorology, CSIRO</p><p>NZAA Coral Reef Watch</p></div>	<div><p>Pacific Ocean 4 Weeks Coral Bleaching Outlook: 30 July 2023</p><p>Alert Level 2 Alert Level 1 Warning Watch No Stress</p><p>© Commonwealth of Australia 2023 Australian Bureau of Meteorology, CSIRO</p><p>NZAA Coral Reef Watch</p></div>

## **Summary Statement**

### **Monthly and last three months: June 2023/April to June 2023 statement**

June rainfall was normal at Niuatoputapu, Vava'u and Fua'amotu, while above normal rainfall was recorded in Niuafo'ou, Ha'apai and Nuku'alofa.

April to June rainfall was normal for Vava'u, Fua'amotu and Nuku'alofa, while above normal rainfall was recorded for Niuatoputapu and Ha'apai. Niuatoputapu had its fourth highest April to June rainfall on record.

## **Part 1i. Monthly and Seasonal Outlooks for August and August to October 2023**

### **Monthly /Seasonal rainfall and temperature Outlook statements**

The outlook for northern and southern region for August is likely to be below normal and above normal for central region.

The rainfall for August to October 2023 is likely to be below normal for Niuatoputapu and far southern Tonga, while little guidance is available for central Tonga and Niuafo'ou in the north.

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

## **Part 2: Recent Ocean summary statement**

### **Monthly and last three months: June 2023/April to June 2023**

June ocean temperatures around Tonga were utmost 1.0°C above normal.

Averaged over April to June 2023, ocean temperatures were utmost 1.0°C above normal.

June sea levels around Tonga were 50mm to 150mm above normal.

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

## **Part 2i. Monthly and Seasonal Outlooks for August and August to October 2023**

### **Ocean Variable statement**

June and Averaged June to August ocean temperatures around Tonga are predicted to be 0.4 to 0.8°C above normal.

June and average June to August sea levels around Tonga are predicted to be near normal in northern Tonga, with sea surface heights of up to 100mm for southern Tonga.

The 4 weeks coral bleaching outlook to 30 July 2023 forecasts no thermal stress for Tonga.

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

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