

# Pacific Islands - Ocean and Climate Outlook Forum (OCOF) No. 185

Country: Tonga

## Part 1: Recent climate

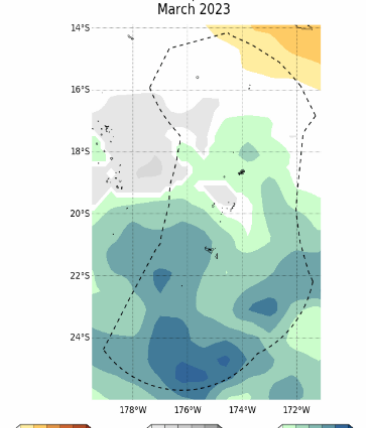
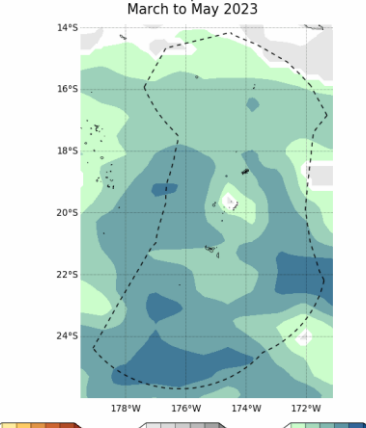
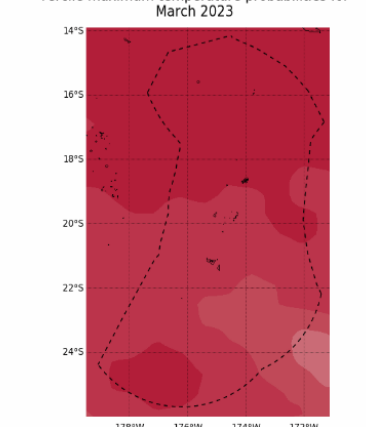
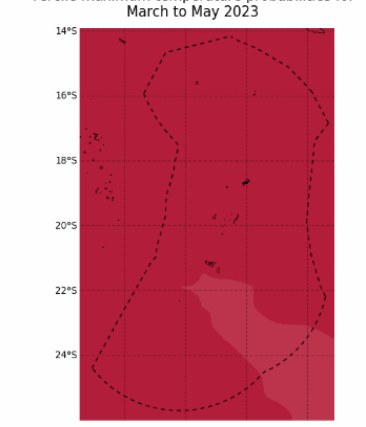
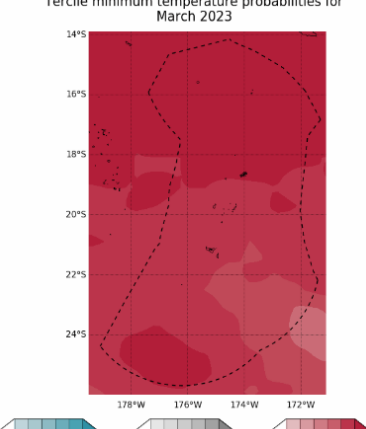
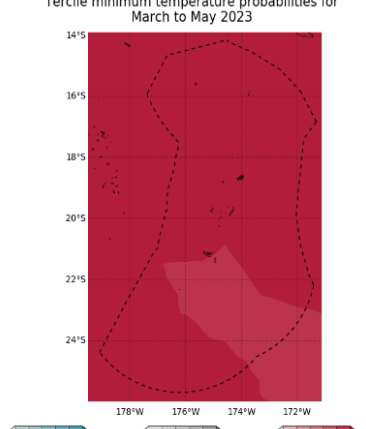
**TABLE 1: Monthly Rainfall**

Station (include data period)	Nov-2022	Dec-2022	Jan-2023				
			Total (mm)	33%tile	67%tile	Median	Rank
	Total (mm)	Total (mm)	Rainfall (mm)				
Northern Division							
Niuafo'ou (1971-2023)	85.5	71.2	243.4	209.7	362.2	253.5	24/49
Niuaatoputapu (1947-2023)	205.4	128.5	219.3	211.5	296.3	245.6	29/76
Central Division							
Vava'u (1947-2023)	194.2	389.2	207.2	173.0	316.4	244.0	32/77
Ha'apai (1947-2023)	175.0	282.0	245.7	123.0	261.0	191.9	50/77
Southern Division							
Fua'amotu (1979-2023)	224.3	279.4	215.7	132.0	303.6	198.4	24/44
Nuku'alofa (1944-2023)	77.4	386.5	282.5	127.0	256.0	197.0	58/79

**TABLE 2: Three-month Total Rainfall for November 2022 to January 2023**

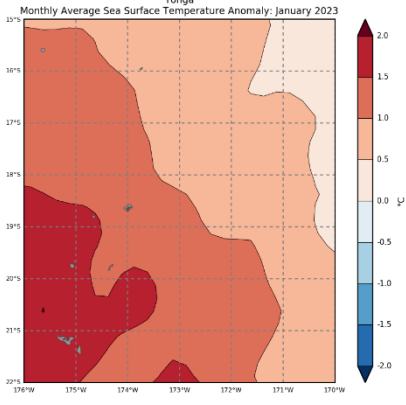
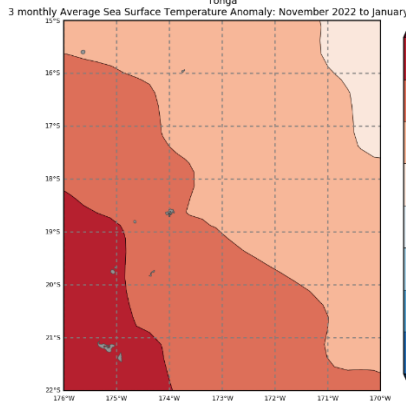
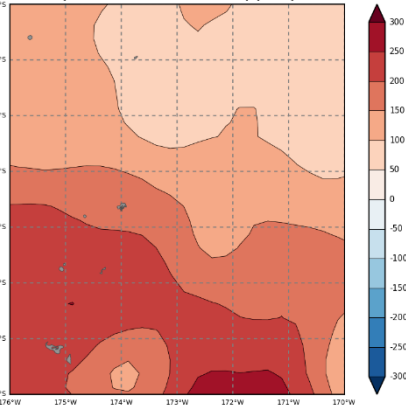
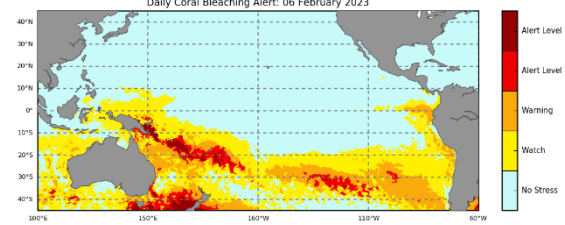
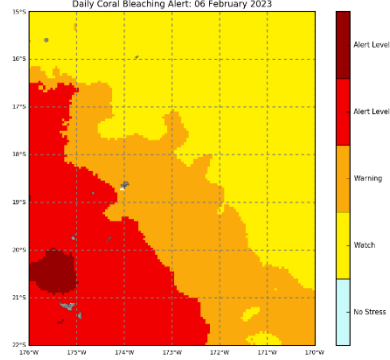
Station	Three-month Total		33%tile	67%tile	Median	Rank
	Rainfall (mm)					
Northern Division						
Niuafo'ou (1971-2023)	400.1	Below normal	700.7	980.7	803.6	5/45
Niuaatoputapu (1947-2023)	553.2	Below normal	613.0	861.0	751.0	21/71
Central Division						
Vava'u (1947-2023)	790.6	Normal	465.5	817.7	638.5	48/76
Ha'apai (1947-2023)	702.7	Above normal	317.8	570.6	457.5	61/76
Southern Division						
Fua'amotu (1979-2023)	719.4	Above normal	383.3	618.3	479.0	34/43
Nuku'alofa (1944-2023)	746.4	Above normal	316.1	569.3	433.4	66/79

## Part 1i. Monthly and Seasonal Outlooks for March and March to May 2023

Monthly: March	Seasonal: March to May
Rainfall (Image 1)	Rainfall (Image 2)
<p>Tercile rainfall probabilities for March 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 1.1. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p> <p>Model run: 06/02/2023 Issued: 09/02/2023</p>	<p>Tercile rainfall probabilities for March to May 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 1.1. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p> <p>Model run: 06/02/2023 Issued: 09/02/2023</p>
Monthly Maximum temperature (Image 3):	Seasonal maximum temperature (Image 4):
<p>Tercile maximum temperature probabilities for March 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 1.1. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p> <p>Model run: 06/02/2023 Issued: 09/02/2023</p>	<p>Tercile maximum temperature probabilities for March to May 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 1.1. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p> <p>Model run: 06/02/2023 Issued: 09/02/2023</p>
Monthly minimum temperature (Image 5):	Seasonal minimum temperature (Image 6):
<p>Tercile minimum temperature probabilities for March 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 1.1. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p> <p>Model run: 06/02/2023 Issued: 09/02/2023</p>	<p>Tercile minimum temperature probabilities for March to May 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 1.1. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p> <p>Model run: 06/02/2023 Issued: 09/02/2023</p>

Part 2: Recent Ocean Observation

Monthly/Three months: January 2023 and November 2022 to January 2023

Monthly: January	Last three months: November 2022 to January 2023:
Sea Surface Temperature (Image 1):	Sea Surface Temperature (Image 4):
<div><p>Tonga</p><p>Monthly Average Sea Surface Temperature Anomaly: January 2023</p><p>©Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p><p>Reynolds SST</p></div>	<div><p>Tonga</p><p>3 monthly Average Sea Surface Temperature Anomaly: November 2022 to January 2023</p><p>©Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p><p>Reynolds SST</p></div>
Sea level (Image 2):	
<div><p>Tonga</p><p>Monthly Near Real Time Sea Level Anomaly: January 2023</p><p>©Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p><p>AVISO SeaWiFS/Quicks SLA</p></div>	
Daily coral bleaching alert (Image 3):	
<div><p>Pacific Ocean</p><p>Daily Coral Bleaching Alert: 06 February 2023</p><p>©Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p><p>NOAA Coral Reef Watch</p></div>	<div><p>Tonga</p><p>Daily Coral Bleaching Alert: 06 February 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 March and March to May 2023

Monthly: March	Seasonal: March to May
Monthly sea surface temperature (Image 5):	Seasonal sea surface temperature (Image 6):
<p>Difference from average sea surface temperature forecast for March 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.maritimergms.org/">http://www.maritimergms.org/</a></p> <p>Model run: 11/02/2023 Issued: 13/02/2023</p>	<p>Difference from average sea surface temperature forecast for March to May 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.maritimergms.org/">http://www.maritimergms.org/</a></p> <p>Model run: 11/02/2023 Issued: 13/02/2023</p>
Monthly sea level (Image 7):	Seasonal sea level (Image 8):
<p>Difference from average sea surface height forecast for March 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.maritimergms.org/">http://www.maritimergms.org/</a></p> <p>Model run: 11/02/2023 Issued: 13/02/2023</p>	<p>Difference from average sea surface height forecast for March to May 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.maritimergms.org/">http://www.maritimergms.org/</a></p> <p>Model run: 11/02/2023 Issued: 13/02/2023</p>
4-week Coral Bleaching (Image 9):	
<p>Pacific Ocean 4 Weeks Coral Bleaching Outlook: 05 March 2023</p> <p>©Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p> <p>NOAA Coral Reef Watch</p>	<p>Tonga 4 Weeks Coral Bleaching Outlook: 05 March 2023</p> <p>©Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPPac</p> <p>NOAA Coral Reef Watch</p>

## **Summary Statement**

### **Monthly and last three months: January 2023/November 2022 to January 2023 statement**

For January, above normal rainfall was recorded in Nuku'alofa, while near-normal rainfall was recorded for the rest of the country.

For November to January, above normal rainfall was recorded in Ha'apai, Fua'amotu and Nuku'alofa, near-normal at Vava'u, while below normal rainfall was recorded at Niuafo'ou and Niuatoputapu.

## **Part 1i. Monthly and Seasonal Outlooks for March and March to May 2023**

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

March rainfall is likely or very likely to be above normal for the Southern Division (Fua'amotu and Nuku'alofa) and Central Division (Vava'u and Ha'apai), but for the Northern Division (Niuafo'ou and Niuatoputapu) the outlook offers little guidance. Rainfall over March to May 2023 is likely to be above normal throughout Tonga.

Maximum and minimum temperatures during March and averaged over March to May, are very likely to be above normal across the country.

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

### **Monthly and last three months: January 2023/November 2022 to January 2023**

January and average November to January ocean temperatures around Tonga were 0.5 to 2.0°C above normal.

January sea levels around Tonga were 50 mm to 250 mm above normal.

Coral bleaching alert is at 'Alert Level 1 and 2' for southwestern Tonga Waters

## **Part 2i. Monthly and Seasonal Outlooks for March and March to May 2023**

### **Ocean Variable statement**

The monthly (March) and seasonal (averaged over March to May) ocean temperatures around Tonga are predicted to be 0.4 to 1.2°C above normal. The monthly and seasonal sea surface height forecast near-normal sea surface heights in northern Tonga, and sea surface heights of up to 100 mm above normal east of Tongatapu for March monthly outlook, and up to 100mm above normal south of Tongatapu from March to May 2023 seasonal outlook.

Coral bleaching outlook for the next four weeks is at 'Warning' for Niuafo'ou and Niuatoputapu, while Alert Level 1 for Vava'u, southern division and central are at 'Alert Level 2'

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

Product	Date: January 2023	Stakeholder	Total Number of Participants	Number of male	Number of female
Climate Bulletin	3 Feb	Government ministries, NGOs, Media, Private sector	155	118	37
EAR Watch					
Monthly Climate Briefing					
Ocean Outlook	3 Feb	Government ministries, NGOs, Media, Private sector	155	118	37
Climate data request					
<b>Total</b>			<b>310</b>	<b>236</b>	<b>74</b>