

# Pacific Islands - Ocean and Climate Outlook Forum (OCOF) No. 184

Country: Tonga

Part 1: Recent climate

**TABLE 1: Monthly Rainfall**

Station (include data period)	Oct-2022	Nov-2022	Dec-2022				Rank
			Total (mm)	33%tile	67%tile	Median	
	Total (mm)	Total (mm)	Rainfall (mm)				
<b>Northern Division</b>							
Niufo'ou (1971-2022)	88.0	85.5	71.2	224.0	363.0	283.0	2/50
Niutoputapu (1947-2022)	224.0	205.4	128.5	166.0	283.0	245.5	15/71
<b>Central Division</b>							
Vava'u (1947-2022)	164.3	194.2	389.2	125.5	250.0	165.5	63/76
Ha'apai (1947-2022)	406.0	175.0	282.0	66.0	156.9	122.2	63/76
<b>Southern Division</b>							
Fua'amotu (1979-2022)	194.0	224.3	279.4	130.7	191.5	153.8	39/43
Nuku'alofa (1944-2022)	281.8	77.4	386.5	75.3	165.7	126.0	74/78

**TABLE 2: Three-month Total Rainfall for October to December 2022**

Station	Three-month Total		33%tile	67%tile	Median	Rank
	Rainfall (mm)					
<b>Northern Division</b>						
Niufo'ou (1971-2022)	244.7	Below normal	632.3	855.9	711.0	2/48
Niutoputapu (1947-2022)	557.9	Normal	521.3	746.0	631.2	29/70
<b>Central Division</b>						
Vava'u (1947-2022)	747.7	Above normal	381.3	614.8	530.0	59/76
Ha'apai (1947-2022)	863.0	Above normal	251.0	423.0	341.2	74/76
<b>Southern Division</b>						
Fua'amotu (1979-2022)	697.7	Above normal	298.5	439.4	371.5	40/43
Nuku'alofa (1944-2022)	745.7	Above normal	251.7	417.3	346.0	72/77

# Part 1i. Monthly and Seasonal Outlooks for February and February to April 2023

Monthly: February	Seasonal: February to April
<p><b>Rainfall (Image 1)</b></p> <p>Tercile rainfall probabilities for February 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 Model run: 02/01/2023 Issued: 05/01/2023</p> <p>© Commonwealth of Australia 2023. Australian Bureau of Meteorology Datafile data extracted from Forecast Marine Weather (2023). Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (2004), version 11. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p>	<p><b>Rainfall (Image 2)</b></p> <p>Tercile rainfall probabilities for February to April 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 Model run: 02/01/2023 Issued: 05/01/2023</p> <p>© Commonwealth of Australia 2023. Australian Bureau of Meteorology Datafile data extracted from Forecast Marine Weather (2023). Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (2004), version 11. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p>
<p><b>Monthly Maximum temperature (Image 3):</b></p> <p>Tercile maximum temperature probabilities for February 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 Model run: 02/01/2023 Issued: 05/01/2023</p> <p>© Commonwealth of Australia 2023. Australian Bureau of Meteorology Datafile data extracted from Forecast Marine Weather (2023). Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (2004), version 11. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p>	<p><b>Seasonal maximum temperature (Image 4):</b></p> <p>Tercile maximum temperature probabilities for February to April 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 Model run: 02/01/2023 Issued: 05/01/2023</p> <p>© Commonwealth of Australia 2023. Australian Bureau of Meteorology Datafile data extracted from Forecast Marine Weather (2023). Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (2004), version 11. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p>
<p><b>Monthly minimum temperature (Image 5):</b></p> <p>Tercile minimum temperature probabilities for February 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 Model run: 02/01/2023 Issued: 05/01/2023</p> <p>© Commonwealth of Australia 2023. Australian Bureau of Meteorology Datafile data extracted from Forecast Marine Weather (2023). Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (2004), version 11. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p>	<p><b>Seasonal minimum temperature (Image 6):</b></p> <p>Tercile minimum temperature probabilities for February to April 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 Model run: 02/01/2023 Issued: 05/01/2023</p> <p>© Commonwealth of Australia 2023. Australian Bureau of Meteorology Datafile data extracted from Forecast Marine Weather (2023). Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (2004), version 11. Available online at <a href="http://www.marine.gov.au">http://www.marine.gov.au</a></p>

# Part 2: Recent Ocean Observation

## Monthly/Three months: December 2022 and October to December 2022

Monthly: December	Last three months: October to December 2022:
<p><b>Sea Surface Temperature (Image 1):</b></p> <p>Tonga Monthly Near Real Time Sea Level Anomaly: December 2022</p> <p>© Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPac, CSIRO</p> <p>NOAA Hydrographic S&amp;A</p>	<p><b>Sea Surface Temperature (Image 4):</b></p> <p>Tonga 3 monthly Average Sea Surface Temperature Anomaly: September 2022 to November 2022</p> <p>© Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPac, CSIRO</p> <p>NOAA SST</p>
<p><b>Sea level (Image 2):</b></p> <p>Tonga Monthly Near Real Time Sea Level Anomaly: December 2022</p> <p>© Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPac, CSIRO</p> <p>NOAA Hydrographic S&amp;A</p>	
<p><b>Daily coral bleaching alert (Image 3):</b></p>	
<p>Pacific Ocean Daily Coral Bleaching Alert: 04 January 2023</p> <p>© Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPac, CSIRO</p> <p>NOAA Coral Reef Watch</p>	<p>Pacific Ocean 4 Weeks Coral Bleaching Outlook: 29 January 2023</p> <p>© Commonwealth of Australia 2023 Australian Bureau of Meteorology, COSPac, CSIRO</p> <p>NOAA Coral Reef Watch</p>

## Part 2i. Monthly and Seasonal Outlooks for February and February to April 2023

Monthly: February	Seasonal: February to April
<p><b>Monthly sea surface temperature (Image 5):</b></p> <p>Difference from average sea surface temperature forecast for February 2023</p> <p>Base period: 1981-2018 Model: ACCESS2 © Commonwealth of Australia 2022, Australian Bureau of Meteorology Data: Sea Surface Temperature (SST) from the Australian Bureau of Meteorology Model Run: 28/01/2023 Issued: 04/02/2023</p>	<p><b>Seasonal sea surface temperature (Image 6):</b></p> <p>Difference from average sea surface temperature forecast for February to April 2023</p> <p>Base period: 1981-2018 Model: ACCESS2 © Commonwealth of Australia 2022, Australian Bureau of Meteorology Data: Sea Surface Temperature (SST) from the Australian Bureau of Meteorology Model Run: 28/01/2023 Issued: 04/02/2023</p>
<p><b>Monthly sea level (Image 7):</b></p> <p>Difference from average sea surface height forecast for February 2023</p> <p>Base period: 1981-2018 Model: ACCESS2 © Commonwealth of Australia 2022, Australian Bureau of Meteorology Data: Sea Level Pressure (SLP) from the Australian Bureau of Meteorology Model Run: 28/01/2023 Issued: 04/02/2023</p>	<p><b>Seasonal sea level (Image 8):</b></p> <p>Difference from average sea surface height forecast for November 2022 to January 2023</p> <p>© Commonwealth of Australia 2022 Bureau of Meteorology Model: ACCESS2 Base Period: 1981-2018 Model Run: 28/01/2023 Issued: 05/02/2023</p>
<p><b>4-week Coral Bleaching (Image 9):</b></p> <p>Pacific Ocean 4 Weeks Coral Bleaching Outlook: 29 January 2023</p> <p>© Commonwealth of Australia 2022 Australian Bureau of Meteorology, CO2Pac COMP NOAA Coral Reef Watch</p>	<p><b>Tonga</b></p> <p>4 Weeks Coral Bleaching Outlook: 29 January 2023</p> <p>© Commonwealth of Australia 2022 Australian Bureau of Meteorology, CO2Pac COMP NOAA Coral Reef Watch</p>

## Summary Statement

### Monthly and last three months: December 2022/October to December 2022 statement

December rainfall was below normal at Niuafu'ou and Niuatoputapu, and above normal for the rest of the country. Niuafu'ou had its second lowest December rainfall on record, while Fua'amotu had its sixth highest and Nuku'alofa its fifth highest December rainfall on record.

October to December rainfall was below normal at Niuafu'ou, normal at Niuatoputapu, and above normal for the rest of Tonga. Niuafu'ou had its second lowest October to December rainfall, while Ha'apai had its third highest, Fua'amotu its fourth highest, and Nuku'alofa its sixth highest October to December rainfall on record.

## Part 1i. Monthly and Seasonal Outlooks for February and February to April 2023

### Monthly /Seasonal rainfall and temperature Outlook statements

Rainfall in February and over February to April is likely or very likely to be above normal over central and southern Tonga. In the Northern Division, however, February rainfall is likely to be below normal, while the three-month total is likely to be near-normal.

Maximum and minimum temperatures in February and averaged over February to April are very likely to be above normal throughout Tonga.

## Part 2: Recent Ocean summary statement

### Monthly and last three months: December/October to December 2022

Most of Tonga experienced above average SST in the month of December and for the last three months, October to December 2022.

Highest SSTs were over 2 degrees above average spanning from the southwest to central division. Similarly, sea level was also above normal for December, reaching a maximum of over 250mm above average.

## Part 2i. Monthly and Seasonal Outlooks for February and February to April 2023

### Ocean Variable statement

The monthly and seasonal SST outlooks for Tonga forecast SSTs to be average in the north and up to 1.2degrees Celsius above average in the south for February and February to April 2023.

The monthly and seasonal sea surface height outlooks forecast near-normal sea surface heights in northern Tonga, and sea surface heights of up to 200 mm above normal just to the east of Tongatapu for February, and up to 200mm above to the south in February to April 2023.

The 4 weeks coral bleaching outlook to 29<sup>th</sup> January shows watch and warning for Tonga

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

Product	Date: December 2022	Stakeholder	Total Number of Participants	Number of male	Number of female
Climate Bulletin	3 Jan	Government ministries, NGOs,Media, Private sector	155	118	37
EAR Watch					

Monthly Climate Briefing					
Ocean Outlook	3 Jan	Government ministries, NGOs, Media, Private sector	155	118	37
Climate data request					
<b>Total</b>			<b>310</b>	<b>236</b>	<b>74</b>