

Pacific Islands - Ocean and Climate Outlook Forum (OCOF) No. 182

Country: Tonga

Part 1: Recent climate

TABLE 1: Monthly Rainfall

Station (include data period)	Aug-2022	Sep-2022	Oct-2022				
			Total (mm)	33%tile	67%tile	Median	Rank
	Total (mm)	Total (mm)	Rainfall (mm)				
Northern Division							
Niuafo'ou (1971-2022)	93.0	43.3	88.0	137.0	199.5	172.9	10/50
Niuaatoputapu (1947-2022)	104.0	178.0	224.0	116.7	219.5	167.0	51/73
Central Division							
Vava'u (1947-2022)	105.9	57.5	164.3	101.7	181.7	143.7	46/76
Ha'apai (1947-2022)	32.0	94.0	406.0	55.5	124.0	94.8	76/76
Southern Division							
Fua'amotu (1979-2022)	91.6	96.1	194.0	56.7	118.0	88.9	39/43
Nuku'alofa (1944-2022)	37.9	50.5	281.8	59.0	129.3	96.5	72/78

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

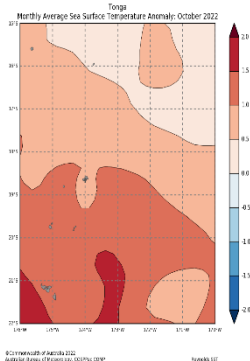
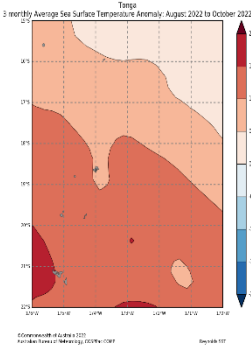
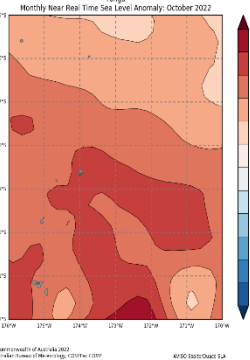
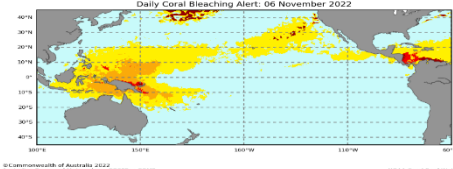
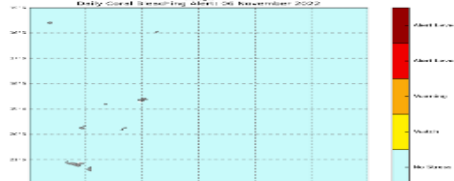
Station	Three-month Total		33%tile	67%tile	Median	Rank
	Rainfall (mm)					
Northern Division						
Niuafo'ou (1971-2022)	224.3	Below normal	331.0	479.7	417.0	7/49
Niuaatoputapu (1947-2022)	506.0	Normal	276.0	514.4	340.0	48/73
Central Division						
Vava'u (1947-2022)	327.7	Below normal	335.3	475.0	402.8	25/76
Ha'apai (1947-2022)	532.0	Above normal	241.3	355.0	294.8	69/76
Southern Division						
Fua'amotu (1979-2022)	381.7	Normal	280.0	405.1	353.0	26/43
Nuku'alofa (1944-2022)	370.2	Normal	265.6	397.8	338.5	44/78

Part 1i. Monthly and Seasonal Outlooks for December 2022 and December 2022 to February 2023

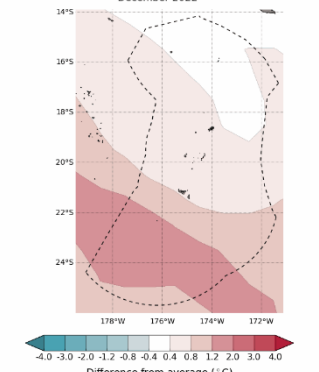
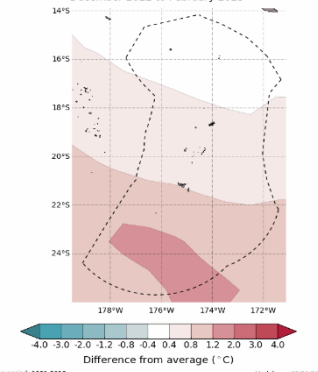
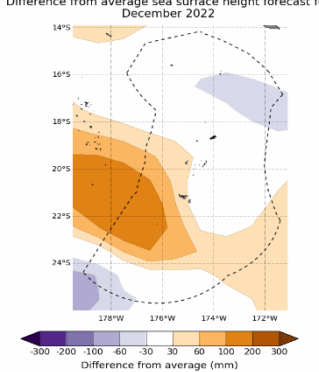
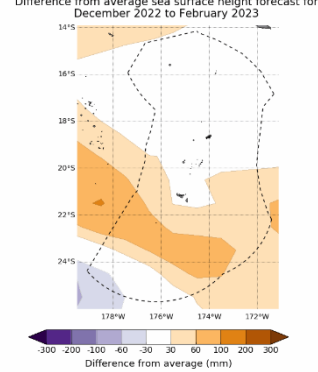
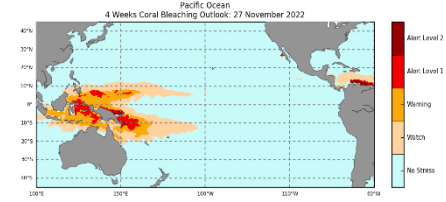
Monthly: December	Seasonal: December to January
Rainfall (Image 1)	Rainfall (Image 2)
<p>Tercile rainfall probabilities for December 2022</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2022, Australian Bureau of Meteorology Shapefile data extracted from: Standard Marine Vectors (2019), Maritime Boundaries Geodatabase, Maritime Boundaries and Exclusive Economic Zones (2009), version 11. Available online at http://www.maritime.gov.au</p> <p>Model run: 05/11/2022 Issued: 07/11/2022</p>	<p>Tercile rainfall probabilities for December 2022 to February 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2022, Australian Bureau of Meteorology Shapefile data extracted from: Standard Marine Vectors (2019), Maritime Boundaries Geodatabase, Maritime Boundaries and Exclusive Economic Zones (2009), version 11. Available online at http://www.maritime.gov.au</p> <p>Model run: 05/11/2022 Issued: 07/11/2022</p>
Monthly Maximum temperature (Image 3):	Seasonal maximum temperature (Image 4):
<p>Tercile maximum temperature probabilities for December 2022</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2022, Australian Bureau of Meteorology Shapefile data extracted from: Standard Marine Vectors (2019), Maritime Boundaries Geodatabase, Maritime Boundaries and Exclusive Economic Zones (2009), version 11. Available online at http://www.maritime.gov.au</p> <p>Model run: 05/11/2022 Issued: 07/11/2022</p>	<p>Tercile maximum temperature probabilities for December 2022 to February 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2022, Australian Bureau of Meteorology Shapefile data extracted from: Standard Marine Vectors (2019), Maritime Boundaries Geodatabase, Maritime Boundaries and Exclusive Economic Zones (2009), version 11. Available online at http://www.maritime.gov.au</p> <p>Model run: 05/11/2022 Issued: 07/11/2022</p>
Monthly minimum temperature (Image 5):	Seasonal minimum temperature (Image 6):
<p>Tercile minimum temperature probabilities for December 2022</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2022, Australian Bureau of Meteorology Shapefile data extracted from: Standard Marine Vectors (2019), Maritime Boundaries Geodatabase, Maritime Boundaries and Exclusive Economic Zones (2009), version 11. Available online at http://www.maritime.gov.au</p> <p>Model run: 05/11/2022 Issued: 07/11/2022</p>	<p>Tercile minimum temperature probabilities for December 2022 to February 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2022, Australian Bureau of Meteorology Shapefile data extracted from: Standard Marine Vectors (2019), Maritime Boundaries Geodatabase, Maritime Boundaries and Exclusive Economic Zones (2009), version 11. Available online at http://www.maritime.gov.au</p> <p>Model run: 05/11/2022 Issued: 07/11/2022</p>

Part 2: Recent Ocean Observation

Monthly/Three months: October 2022 and August to October 2022

<u>Monthly: October</u>	<u>Last three months: August to October 2022:</u>
<p>Sea Surface Temperature (Image 1):</p>  <p>Tonga Monthly Average Sea Surface Temperature Anomaly: October 2022</p> <p>Commonwealth of Australia 2022 Australian Bureau of Meteorology, CSIRO/CSIRO</p> <p>NOAA/NOAA</p>	<p>Sea Surface Temperature (Image 4):</p>  <p>Tonga 3 monthly Average Sea Surface Temperature Anomaly: August 2022 to October 2022</p> <p>Commonwealth of Australia 2022 Australian Bureau of Meteorology, CSIRO/CSIRO</p> <p>NOAA/NOAA</p>
<p>Sea level (Image 2):</p>  <p>Tonga Monthly Near Real Time Sea Level Anomaly: October 2022</p> <p>Commonwealth of Australia 2022 Australian Bureau of Meteorology, CSIRO/CSIRO</p> <p>NOAA/NOAA</p>	
<p>Daily coral bleaching alert (Image 3):</p>  <p>Pacific Ocean Daily Coral Bleaching Alert: 06 November 2022</p> <p>Commonwealth of Australia 2022 Australian Bureau of Meteorology, CSIRO/CSIRO</p> <p>NOAA Coral Reef Watch</p>	 <p>Pacific Ocean Daily Coral Bleaching Alert: 06 November 2022</p> <p>Commonwealth of Australia 2022 Australian Bureau of Meteorology, CSIRO/CSIRO</p> <p>NOAA Coral Reef Watch</p>

Part 2i. Monthly and Seasonal Outlooks for December 2022 and December 2022 to February 2023

Monthly: December	Seasonal: December to February
Monthly sea surface temperature (Image 5):	Seasonal sea surface temperature (Image 6):
 <p>Difference from average sea surface temperature forecast for December 2022</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2022, Australian Bureau of Meteorology Differences are extracted from the Pacific Marine Climate System (PMCS) Marine Boundary and Ecosystem Science (PMCS) version 11. Available online at https://www.bom.gov.au/pmc/</p> <p>Model run: 05/11/2022 Issued: 07/11/2022</p>	 <p>Difference from average sea surface temperature forecast for December 2022 to February 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2022, Australian Bureau of Meteorology Differences are extracted from the Pacific Marine Climate System (PMCS) Marine Boundary and Ecosystem Science (PMCS) version 11. Available online at https://www.bom.gov.au/pmc/</p> <p>Model run: 05/11/2022 Issued: 07/11/2022</p>
Monthly sea level (Image 7):	Seasonal sea level (Image 8):
 <p>Difference from average sea surface height forecast for December 2022</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2022, Australian Bureau of Meteorology Differences are extracted from the Pacific Marine Climate System (PMCS) Marine Boundary and Ecosystem Science (PMCS) version 11. Available online at https://www.bom.gov.au/pmc/</p> <p>Model run: 05/11/2022 Issued: 07/11/2022</p>	 <p>Difference from average sea surface height forecast for December 2022 to February 2023</p> <p>Base period: 1981-2018 Model: ACCESS-S2 © Commonwealth of Australia 2022, Australian Bureau of Meteorology Differences are extracted from the Pacific Marine Climate System (PMCS) Marine Boundary and Ecosystem Science (PMCS) version 11. Available online at https://www.bom.gov.au/pmc/</p> <p>Model run: 05/11/2022 Issued: 07/11/2022</p>
4-week Coral Bleaching (Image 9):	
 <p>Pacific Ocean 4 Weeks Coral Bleaching Outlook: 27 November 2022</p> <p>© Commonwealth of Australia 2022 Australian Bureau of Meteorology NOAA Coral Reef Watch</p>	

Summary Statement

Monthly and last three months: October 2022/August to October 2022 statement

October rainfall was below normal in Niuafo'ou, normal at Vava'u, and above normal for the rest of the country. Ha'apai had its highest October rainfall on record.

August to October rainfall was below normal at Niuafo'ou and Vava'u, near-normal at Niuatoputapu, Fua'amotu and Nuku'alofa, and above normal in Ha'apai. Niuafo'ou recorded its seventh lowest August-October rainfall, while Ha'apai recorded its eighth wettest.

Part 1i. Monthly and Seasonal Outlooks for December 2022 and December 2022 to February 2023

Monthly /Seasonal rainfall and temperature Outlook statements

Rainfall in December and over December 2022 to February 2023 is likely to be above normal over central and southern Tonga. Rainfall at Niuatoputapu is likely to be near-normal for both periods, while the outlook for Niuafo'ou offers little guidance as the chances of above, normal and above normal rainfall are similar.

Maximum and minimum temperatures in December and averaged over December 2022 to February 2023 are very likely to be above normal throughout Tonga.

Part 2: Recent Ocean summary statement

Monthly and last three months: October/August to October 2022

Most of Tonga experienced above average SST in the month of October and August to October 2022.

Highest SSTs were 1.0 to 1.5 degrees above average spanning from the south to central division. Sea level was also above normal reaching a maximum of 250mm above average.

Part 2i. Monthly and Seasonal Outlooks for December 2022 and December 2022 to February 2023

The monthly and seasonal SST outlooks for Tonga forecast SSTs to be average in the north and up to 2.0 degrees Celsius above average in the south for December and December to February 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 December, and up to 100 mm above average to the south in December to February., Ha'apai and Vava'u.

Coral bleaching outlook for Tonga reveals no thermal stress.

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

Product	Date: October 2022	Stakeholder	Total Number of Participants	Number of male	Number of female
Climate Bulletin	3 October	Government ministries, NGOs, Media, Private sector	155	118	37
EAR Watch					
Monthly Climate Briefing					
Ocean Outlook	3 October	Government ministries, NGOs, Media, Private sector	155	118	37
Climate data request					
Total			310	236	74