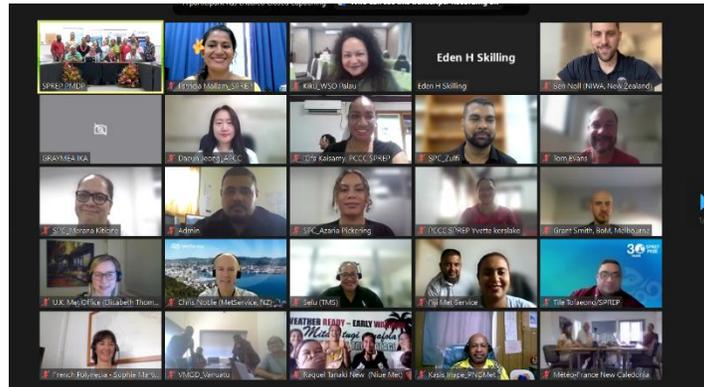


# Eleventh Pacific Islands Climate Outlook Forum (PICOF-12) 20 April, 2023



**HOSTED IN A HYBRID-FORMAT BY THE SECRETARIAT OF  
THE PACIFIC REGIONAL ENVIRONMENT PROGRAMME,  
PACIFIC MET DESK PARTNERSHIP AND WORLD  
METEOROLOGICAL ORGANISATION**

## Introduction

Regional Climate Outlook Forums have been held annually in the Pacific since 2015, and biannually since 2020, allowing dialogue and learning between the providers and users of climate information. Pacific Islands Climate Outlook Forums (PICO) are organized by the Pacific Meteorological Council's (PMC) Pacific Islands Climate Services Panel (PICS Panel), its secretariat SPREP and the WMO and supported by various international and regional organisations.

The April PICO 12, was held virtually attended by 81 (19 in person, 62 online) participants and was organised around the following objective: *To discuss and produce objective, user-relevant regional climate and ocean outlook guidance in real time to support Pacific Island Countries and Territories (PICTs) NMHSs produce national climate and oceans climate information for their national stakeholders, with the ultimate aim to reduce climate-related risks and support sustainable development for the coming season in sectors of critical socioeconomic significance.*

A PICO 12 Regional Statement summarising climate and ocean conditions over the past months, tropical cyclone (TC) and seasonal outlook May 2023 - October 2023 was produced as an output of PICO 12. These products will provide guidance to National Meteorological and Hydrological Services (NMHS) to develop their specific country outlook for this season. It also provides guidance to sectors for preparedness before, during and after climate extreme events.

This report offers a short summary of material presented during the virtual meeting, the key discussion points, and any Meeting recommendations and action points.

The Zoom recording can be accessed by clicking on this link:

[PICO-12 Zoom Recording - 20 April, 2023](#)

Passcode: uHF4=2Q4

All presentations from the PICO-12 can be accessed using this link:

[PICO-12 Presentations](#)

## Agenda Item 1: Opening & setting the scene

### The Meeting: (opening statements/remarks summary)

Director Climate Change Resilience, Tagaloa Cooper:

Applaud the dedication and effort from members of the Pacific Islands Climate Services Panel and Pacific Island Regional Climate Centre to organise the seventh virtual PICOF since the start of April PICOFs in 2020. She emphasis on the need to provide information to keep our people informed and prepared for every season.

To the representatives of the National Meteorological and Hydrological Services present today, it is your duty to ensure that information on climate science shared in this forum reaches the last mile in your country so stakeholders and people can prepare. We need to encourage people to use the climate information we provide to inform their decisions. This is one of the main goals of the regional and national user interface such as Pacific Island Climate Outlook Forum, National Climate Outlook Forum and the monthly Ocean and Climate Outlook Forum.

WMO (Henry Taiki) Representative to the Pacific, provides the following remarks:

- WMO launched a new initial 'Early Warning system for all'.
- There is potential Hydrological Outlook Forum and seek assistance from PICOF members especially weather and water link together.
- PICS panel and RCC to think about how to provide guidance and way forward to upcoming PMC 2023
- WMO encourages Quality Management System in Climate Service and this is an area where Pacific have to move to.
- Link PICOF to NCOF and ensure that more countries in the Pacific join the Regional and National User Interface Platforms to develop their capacity and continue climate services in the region.

### The Meeting: (objectives)

- Ben Noll (NIWA) outlined the overall objectives of the PICOF 12:
- To discuss and produce objective, user-relevant regional climate and ocean outlook guidance in real time.
- Support member NMHSs produce national climate and oceans information for their national stakeholders, with the ultimate aim of reducing climate-related risks and support sustainable development for the coming season in sectors of critical socioeconomic significance.

Specific Objectives of the meeting include:

- build partnerships among NMHSs and Pacific RCC Network members, to facilitate the uptake and use of climate and ocean products and services in Pacific RCC-N member countries.

- compare seasonal and sub-seasonal forecast guidance and discuss how these are produced in terms of accuracy, utility, weaknesses and strengths.
- present, discuss, and summarise the climate and ocean conditions for the last six months and model outlooks for the next six months.
- provide long-term monitoring of and present long-range projections for selected variables, as climate change has had and will continue to have a significant impact in the Pacific region.
- discuss how NMHSs are currently accessing and assessing the available guidance, making them nationally-relevant, tailoring them for specific end users, and disseminating them to users;
- continue capacity building/human resource development activities for the NMHSs, particularly on sectoral application aspects of seasonal and sub-seasonal predictions.

#### Expected Outcomes of PICO 12:

- Better understanding of climate driver (e.g. ENSO) behaviour, climate (e.g. rainfall) and ocean anomalies over November 2022 to April 2023.
- Improved understanding of climate, ocean and tropical cyclone outlooks over May to October 2023, reasons for differences between model outlooks and model confidence for the outlook period.
- Improved understanding long-term trends and climate change projections for selected variables including how climate change may influenced Pacific climate in the last 6 month and outlook for the next 6 months.
- Production of a regional statement summarising the ENSO state, tropical cyclone, climate and ocean patterns.

## Agenda Item 2: ENSO update and outlook

Ben Noll (NIWA) presented a review of the last season's outlook and the outlook for the upcoming season, with contributions from other members.

#### The Meeting:

- ENSO neutral currently, but Pacific RCC node members for LRF all now indicating El Niño Watch.
- IRI odds show over 62% chance of El Niño from May-July and 82% for August-October
- Surface & sub-surface water in the equatorial Pacific is well above average. Westerly wind burst in March; more likely to come – can help to push warm water eastward and toward the surface.
- Strong agreement from global models on a moderate to strong El Niño; \*could\* have similarities with 2015, 1997, and 1982, but need to be mindful of spring predictability barrier.

- Major change in climate patterns compared to last several years with ocean-atmosphere coupling due to El Niño, possibly from June onward.

### **Discussion:**

#### **What are some of the wind burst triggers? MJO, TCs and IOD?**

The MJO/Equatorial Rossby waves, convectively coupled Kelvin waves can trigger the WWBs. Those features can also trigger TCs and may push the IOD positive later this year (uncertainty with the IOD)

### **Agenda Item 3: Looking back - review and evaluation of November-April 2023 -climate outlook.**

#### **i. Atmosphere**

BOM presented the review and evaluation of the November - April 2023 Atmosphere Outlook

#### **The Meeting:**

- La Niña was a dominant driver of atmospheric patterns across the Pacific between November 2022 and April 2023. Rainfall, air temperatures and winds reflected an established event.
- The atmospheric response to La Niña begun showing signs of weakening during March 2023, with atmospheric indicators of ENSO returning to ENSO-neutral levels during April.
- Climate outlooks from October 2022 for Oct – Dec were assessed as being good, especially for near-equatorial regions.
- Climate outlooks for Jan – Mar also assessed verified well with strong model agreement throughout the South Pacific

#### **ii. Ocean**

Presentation on the overview from November to April of the state of the ocean, plus the evaluation of the last PICOF outlook (*Zulfikar Begg, SPC*)

#### **The Meeting:**

- SST well aligned with La Niña patterns, cooler than normal conditions extending from 160E eastwards and surrounded by warmer conditions. Peak negative anomalies close to -1.5°C in Kiribati and peak positive anomaly of more than 2°C in Vanuatu.
- Sea level generally remained higher than normal for most of the countries with countries close to the Coral Sea region experiencing peak anomalies of up to 30cm.
- Countries experiencing highest tides of the year- coastal flooding experienced in Tuvalu.
- Coral bleaching: towards the end of last year, alert levels in the western Pacific and recently the alert levels for countries below 10°S.

## Discussion

Shweta (Fiji Met Service) shared information about the coral bleaching alert 2 issued by FMS in February. This was one of two case studies presented. She spoke about the collaboration with stakeholders and the feedback mechanism which assists the work of FMS in this area.

Simon (BoM) asked with reference to the PICO-11 statement, how did the Sea Level and Sea Surface Temperature perform? Zulfikar responded – there is a correlation and that it outlines well with the Outlook that was produced.

### iii. Tropical cyclones (Southwest Pacific)

NIWA presented the review of the southwest Pacific tropical cyclone

#### The Meeting:

- PICO-11 Statement was generally consistent with what occurred (more activity west, less activity east), predictability likely linked to La Niña
- Good guidance on the number of severe tropical cyclones, despite a lower overall number of tropical cyclones (5 total – fewest since 2016-17)
- Vanuatu especially hard-hit with Judy & Kevin in the same week; 3 total tropical cyclones
- The very unusually warm seas toward the sub-tropics may affected stability profiles across the region, leading to fewer tropical cyclones.

## Discussion

- What are the odds of an off season in TC June/July?

If the MJO is active over the region in May, as I showed it was possible in the ENSO presentation, the region should remain mindful of the potential for TCs, although climatology suggests the likelihood is decreasing this time of year.

## iv. Impacts (Southwest Pacific)

Overview of impacts over November to April was presented by *Philip Malsale, SPREP*

### The Meeting:

Based on the PICO-11 Regional Statement

- Favour La Niña conditions in the tropical Pacific Ocean from November to February. Between February and April, La Niña will most likely transition to ENSO-neutral, with the second most likely outcome being a continuation of La Niña.
- Drier than normal conditions are favoured for islands groups near and west of the Dateline that are located close to the equator. Drier than normal conditions are forecast to extend northeast and southeast from the Date Line towards the sub-tropics, especially in the Southern Hemisphere. Dry conditions in the norther hemisphere seem to zonally span (along the latitude 5° N) in the northeast direction.
- The risk for coral bleaching is enhanced in the tropical west Pacific.
- Sea level is favoured to be notably higher than normal for most of the countries in the region.
- Wetter than normal conditions are favoured for islands located between Palau and the central Marshall Islands in the North Pacific and from southeast Papua New Guinea (PNG) to the southernmost French Polynesia islands.
- There is an enhanced risk for TC activity in the western tropical Pacific. In the central part of the region, TC risks are generally near normal to below normal.

## Presentation Summary

There were several extreme events during the period from November 2022 to April 2023 that have cause impacts across the Pacific outline below. The La Niña event has a lot of influence on

the distribution of Sea Surface Temperature across the Pacific the tropical cyclone, higher sea level to the west and Coral beaching. These environmental conditions have contributed to the following.

- Extreme rainfall
- Tropical cyclones

These climate extreme events caused a lot of

- Strong wind
- Flooding
- Landslides
- Storm surges

These caused a lot of impacts Infrastructures such as Road, bridge, wharf affecting the following.

- Aviation
- Water
- Agriculture
- Health
- Shipping
- Tourism

## **Discussion**

Kotoni (Samoa Meteorological Division) - While this is useful to us, Samoa Met would like to share that they have experienced peculiar conditions in the last two years, especially the rainfall. Although they have seen some of the extreme impacts of flash flooding due to extreme short-term rainfall events. In the long-term, their stations collected below average rainfall.

Some excellent information exchanged in Philip's presentation and brings to bare the scale of impact across the region. Having participated in the last COP, it would be very useful to update Pacific policy makers and the DRR community to see ENSO impacts from a larger regional perspective. While the PICOFF only targets the NMHSs, a suggested webinar ("Webinar on the La Niña and Incoming El Niño under the RCC + PMC") will bring everyone outside our community and invite the Pacific Resilience Partnership community to attend. This can be organised together under the PMC RCC and include some NMHSs directors to do presentations.

Salesa (SPREP) – presentation connects the impacts of La Niña in the Pacific. Benefit discussion around Climate Change and the impacts in the region.

Mele (Environment Division, Tokelau) For the last 3 years dry conditions in Tokelau, a few very dry periods experienced. The government requested for a water scarcity survey, done this 3 times. Experiencing high tides.

#### **Agenda Item 4: Looking back long term: Status of key variables**

BoM/SPC overviewed the status of long-term trends for variables of interest to Pacific communities:

##### **The Meeting:**

- In April 2023, these will be air temperature and ocean acidification. Air temperature is an important indicator of climate change and variability.
- Higher mean temperatures tend to be associated with more frequent and intense heat events. Higher mean and extreme temperatures led to human and animal health issues and affect agricultural production. Higher temperatures are associated with an increase in energy usage required to maintain indoor comfort.
- Land-based annual mean air temperature increased by 1.1°C between 1951-2020. At a regional scale, mean temperature increased over both halves of the 70-year period (1951–1985, 0.5°C [0.9°F] and 1986–2020, 0.6°C [1.1°F]) and in all seasons. On a regional scale, 2020 was the warmest year on record, 0.9°C (1.6°F) above the 1961–1990 average of 24.9°C (76.8°F). Seven of the warmest eight years on record occurred from 2007. Every year since 1983 has been above the 1961–1990 average.
- Annual number of hot days has increased at most of the indicator stations in the Pacific Islands. A hot day is defined as a day when the highest temperature is within the highest 10% of observations (for the respective location) between 1961 and 1990.
- Shift to a warmer climate in the Pacific is accompanied by fewer cold nights. Annual number of cold nights has decreased at most of the indicator stations. A cold night is defined as when the lowest recorded temperature (in a 24-hour period) is within the lowest 10% of observations (for the respective location) between 1961 and 1990.
- Hot days were about three times as common in the 2010s as they were in the 1950s. A record amount (percentage) of hot days occurred in 2016 (32.3%), which is 22.7% greater than the 1961–1990 average (9.5%). Cold nights were about 60% less frequent in the 2010s, compared to the 1950s.
- Temperature important in sugarcane production. Leaf growth constrained with temperatures less than 14-19°C. Photosynthesis is partitioned to sugar accumulation rather than vegetative growth. Unusually cool 'winters' (June-August) associated with

higher sucrose content in Fiji. Statistically significant decline in annual cold nights <17°C. Average of 17 days/year over 1950-70. Eleven days/year since 2000.

## Discussion

No Question

## Agenda Item 5: Looking Forward - Seasonal and Intra-seasonal Pacific guidance for 22/23

NOAA and BoM presented the guidance for the upcoming season for atmosphere, ocean and tropical cyclones respectively.

### i. Atmosphere

#### The Meeting:

Precipitation

- For May – July 2023, wet conditions are expected along the equator and Melanesia. Dry conditions are expected for the off-equatorial region east of the Date Line.
- For August – October 2023, wet conditions are expected to persist along the equator, whereas the chances for dry conditions for the off-equatorial region are likely to be weakened. Dry conditions are expected for Melanesia.

Temperature

- For May – July 2023, warmer than normal conditions are expected for the whole Pacific Islands.
- Warmer than normal conditions are likely to persist for August – October 2023.

### ii. Ocean

#### The Meeting:

- The PICOF outlook and RCC Node for LRF individual model/MME guidance and skill comparison (*Grant Smith, BoM*)
- SSTs likely to be above average across most of western, central, and southwestern Pacific.

- El Niño-like warm tongue emerging across equatorial Pacific, up to 4 °C above average in ACCESS-S2, up to 2 °C in most other models.
- Higher than normal sea levels likely across central to eastern equatorial Pacific, and at PNG, Solomon Is., Vanuatu, and southern Fiji/Tonga/Niue.
- Many Pacific Island countries experience lower tides in June/July but have tides in the top ten between August and October.
- Coral bleaching alerts are forecast to be present along the entire equatorial Pacific between 10 S and 10 N latitudes from July.
- The fisheries convergence zone is forecast to be displaced much further eastward along tropical Pacific in the upcoming seasons.

## Discussion

Salesa (SPREP) asked for more information about marine heatwaves.

Grant (BoM) marine heatwaves form a similar pattern to coral bleaching. How to monitor and track – marine heatwave tracker <http://whalemap.ocean.dal.ca/MHW/>

Simon & APCC – COP meeting global temp at 1.1 target set at 1.5 WMO SG statement – going into El Niño global warming – raise temperatures. How can we monitor our temp in the region to see whether or not the temp will increase or not?

Simon (BoM) said we do need to do a better job of monitoring temperature and temperature trends in the Pacific. We need to have access to data in a timely manner from partners. There is a need to discuss with partner countries and convey to them the importance of monitoring temp and near real time.

Salesa (SPREP) can we provide through the RCC a tracking of how many marine heatwaves we get each year in the Pacific? I think this will be crucial for the El Niño phase.

Grant (BoM) The Pacific Climate Change Monitor has a section on Marine Heatwaves on Page 23, showing the number of marine heatwaves that have occurred over recent decades. This doesn't summarise what is likely during ENSO events however.

Ben (NIWA) said we can also have a look at implementing marine heatwave information as part of the Island Climate update products.

Vanessa (CSIRO) I appreciate you're interested in short-term prediction, but just to add that for marine heatwaves the PCCM does also include climate-scale projections of marine heatwaves. We've also done some recent work for the northern Cook Islands and Vanuatu, looking at historic marine heatwaves with El Niño and La Niña events coincide with strong ENSO events.

Grant (BoM) WMO has a state of the climate report for the southwest Pacific which summarises Marine Heatwave activity for a calendar year. The Bureau contributed to this section - [https://library.wmo.int/doc\\_num.php?explnum\\_id=11387](https://library.wmo.int/doc_num.php?explnum_id=11387)

### **iii. Tropical Cyclones (Northern Hemisphere (West Pacific) and American Samoa**

#### **The Meeting:**

PICOF outlook and RCC Node for LRF individual model/ MME guidance and skill comparison: NIWA, BoM, Meteo-France, NOAA, University of Hawaii, APCC, SPREP, and SPC (NOAA)

- La Niña maintained below-normal TC activity for the U.S. Affiliated Pacific Islands (USAPI) of the western North Pacific in 2020, 2021, 2022.
- A possible shift from La Niña to ENSO-neutral in 2022 did not occur, resulting in little TC activity in the USAPI.
- Tropical Storm Banyan (27W) was a short-lived system which formed over the Republic of Palau in late October 2022
- 2023: La Niña has ended, ENSO-neutral conditions are present with a 62% chance of El Niño by fall; El Niño Watch now in effect
- El Niño conditions support increased TC activity across the USAPI.
- Invest 92W (Tropical Cyclone Formation Alert by the Joint Typhoon Warning Center at 1200 ChST 19 April) could become Tropical Depression 01W, near Pohnpei, Federated States of Micronesia.

#### **Discussion**

- There seems to be increased interest in data on Marine Heatwaves and forecasts. BoM has experimental products which are not externally accessible yet, but could be used for these types of briefings (such as PICOF).
- Grant Smith offered: the Pacific Climate Change Monitor has a section on Marine Heatwaves on Page 23, showing the number of marine heatwaves that have occurred over recent decades. However, this doesn't summarise what is likely during ENSO events.
- Ben Noll suggested that NIWA can also have a look at implementing Marine Heatwave information as part of the Island Climate Update products.
- Vanessa Hernaman shared: The PCCM does also include climate-scale projections of marine heatwaves. We've also done some recent work for the Northern Cook Islands and Vanuatu, looking at historic marine heatwaves with El Niño and La Niña events overlaid to see what extent MHW events coincide with strong ENSO events.

## Agenda Item 6: Looking forward long term

CSIRO presented on the temperature long-term projection for the Pacific.

### The Meeting:

- The current and future generations will experience a hotter and different world depends different choices now and in the near future.
- Warming climate can be thought of Diverging pathways into the future, depending on what the global community do about emissions, or
- 'Global Warming Levels' – what will it look like locally if the world gets to 1.5 or 2 °C above pre-industrial, or even 3 ° C?
- Warmer climate = changing biophysical zones, more heat extremes, more heat impacts
- Most of the warming after 1960
- Can see warming appear like 'steps' rather than smooth change.
- Past and future warming in response to human effects more over land than ocean and highest over the Arctic
- Pre-industrial era benchmark (1850-1900) for Paris Agreement goals. To 2011-2020:
  - The world around +1.1 °C,
  - Land areas +1.6 °C,
  - Oceans +0.9 °C
  - Western Pacific region around +0.8 °C

### Discussion

No question

## Agenda Item 7: Closing

- The PICS Panel Vice Chair summarized the discussions during the meeting and summaries of each session will be shared by the presenters. Confirmation for PICOF 13 will be discuss later and circulated for confirmed of date and venue.

## Annex 1: Agenda

### 12<sup>th</sup> session of the Pacific Islands Climate Outlook Forum (PICOF-12)

Virtual Meeting 20 April 2023 - 11:30-16:30 WST (22:30-03:30 UTC)

11:30-12:00 (Samoa local time)	Registration and communications testing Meeting procedures
12:00-12:30	<b>Session 1: Opening and Setting the scene.</b> <ul style="list-style-type: none"><li>• Opening prayer</li><li>• Opening remarks (Director PMDP, SPREP)</li><li>• Opening remarks (WMO)</li><li>• Meeting objectives (Node for LRF, Co-Lead, NIWA)</li><li>• Group photo</li></ul>
12:30-12:55	<b>Session 2: ENSO Update and Outlook.</b> ENSO status and outlook, and introduction to ENSO tracker: <b>NIWA</b> , BoM, Meteo-France, NOAA, University of Hawaii, APCC, SPREP and SPC (15 minutes)  Including highlights from Global Seasonal Climate Update (GSCU)  Session 2 discussion (10 minutes)
12:55-14:15	<b>Session 3: Looking Back - Review and Evaluation of November to April Climate outlook.</b>  <b>i. Atmosphere</b> Overview of November to April state of the climate, plus evaluation of the last PICOF outlook: NOAA, University of Hawaii, <b>BoM</b> , SPC, SPREP, and NIWA (15 minutes).  <b>ii. Ocean</b> Overview of November to April state of the ocean, plus evaluation of the last PICOF outlook: <b>NOAA</b> , University of Hawaii, BoM, SPC, SPREP, NIWA (15 minutes).  <b>iii. Tropical cyclones</b> Overview of the TCs over November to April: NOAA, University of Hawaii, BoM, SPC, SPREP, and <b>NIWA</b> (15 minutes).  <b>iv. Impacts</b> Overview of impacts over November to April: NOAA, University of Hawaii, BoM, SPC, <b>SPREP</b> , and NIWA (15 minutes).  Session 3 discussion (20 minutes)

14:15-14:45	<p><b>Session 4: Looking Back Long-Term: Status of key variables</b></p> <p>A brief examination of long-term trends for variables of interest to Pacific communities: In April 2023, these will be air temperature and ocean acidification: NOAA, University of Hawaii, <b>BoM</b>, <b>SPC</b>, SPREP, and NIWA (20 minutes).</p> <p>Session 4 discussion (10 minutes)</p>
14:45-14:55	<p><b>10-min break</b></p>
14:55:15:55	<p><b>Session 5: Looking Forward - Seasonal and Intra-seasonal Pacific guidance for May to October 2023.</b></p> <p><b>i. Atmosphere</b>  PICOF outlook and RCC Node for LRF individual model/MME guidance and skill comparison: NIWA, BoM, Meteo-France, <b>NOAA</b>, University of Hawaii, APCC, SPREP, and SPC (15 minutes).</p> <p><b>ii. Ocean</b>  PICOF outlook and RCC Node for LRF individual model/MME guidance and skill comparison: NIWA, <b>BoM</b>, Meteo-France, NOAA, University of Hawaii, APCC, SPREP, and SPC (15 minutes).</p> <p><b>iii. Tropical cyclones</b>  PICOF outlook and RCC Node for LRF individual model/MME guidance and skill comparison: NIWA, BoM, Meteo-France, <b>NOAA</b>, University of Hawaii, APCC, SPREP, and SPC (15 minutes)</p> <p>Session 5 discussion (15 minutes)</p>
15:55-16:25	<p><b>Session 6: Looking Forward Long-Term</b></p> <p>A brief review of long-term climate change projections for variables of interest to Pacific communities: In April 2023, these will be air temperature and ocean acidification: <b>CSIRO</b>, UGCRP, BoM and SPREP (20 minutes).</p> <p>Session 6 discussion (10 minutes)</p>
16:25-16:30	<p><b>Session 7: Closing</b></p> <p>Chair: Summary of proceedings, feedback from participants  Next steps: production of PICOF 12 Report and Statement.</p>

## Annex 2: Participant list

	<b>Title</b>	<b>Given First Name</b>	<b>Family Name/Last Name</b>	<b>Gender</b>	<b>Organisation</b>	<b>Email</b>
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12<sup>th</sup> session of the Pacific Islands Climate Outlook Forum (PICOF-12)

Virtual Meeting 20 April 2023

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# Annex 3: Image Gallery

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