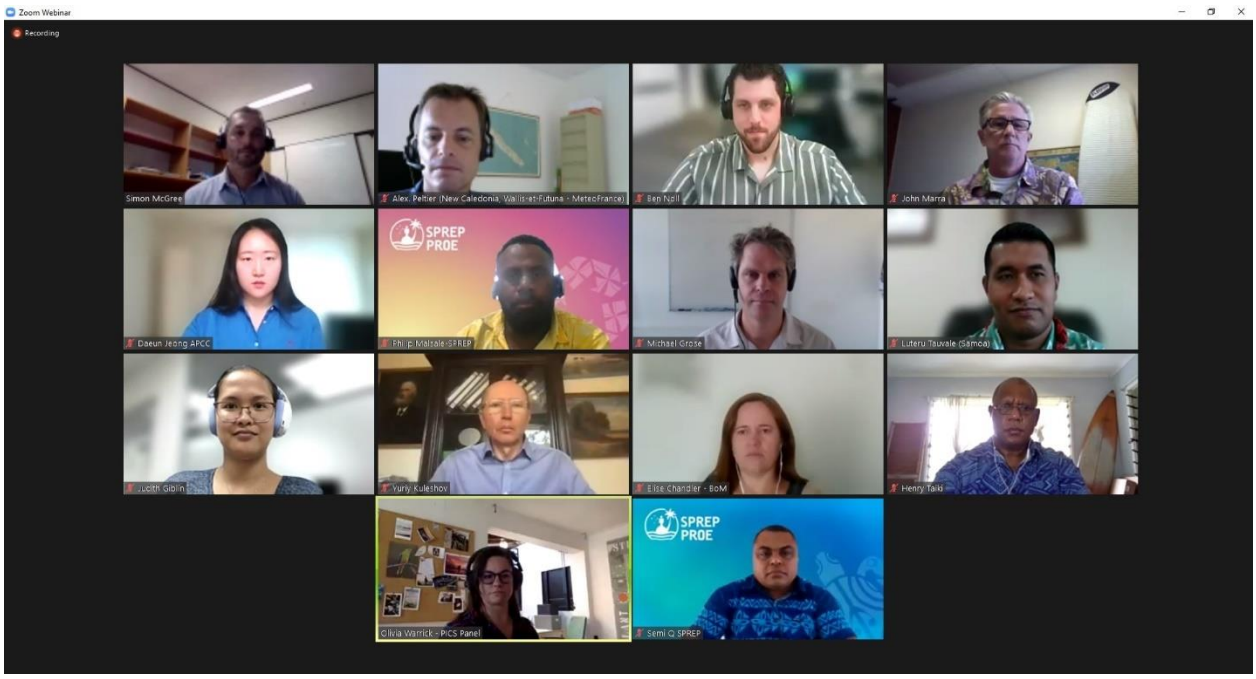
Tenth Pacific Islands Climate Outlook Forum (PICOF-10)

April 2022



Hosted virtually by Pacific Island Development Program (PIDP) of the East-West Centre, 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 (PICOFs) 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 PICOF-10, was held virtually 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 PICOF-10 Regional Statement summarising climate and ocean conditions over the past months, tropical cyclone (TC) and seasonal outlook May-October 2022 was produced as an output of PICOF-10. These products will provide guidance to National Meteorological and Hydrological Services (NMHSs) to develop their specific country outlook for this season.

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

Agenda Item 1: Opening & setting the scene

Simon McGree, PICS Panel Co-Chair welcomed participants to the 10th Pacific Islands Climate Outlook Forum (PICOF-10) held virtually on 26 April 2022. Semi Qamese, SPREP, blessed the meeting with an opening prayer. Opening remarks were given by the PMC Chair representative Afaese Luteru Tauvale, Director of the Samoa Meteorological Division and Henry Taiki, the WMO representative. Simon McGree of the Australian Bureau of Meteorology, Co-Chair of the PICS Panel and RCC Node Lead for Long Range Forecasting outlined the Meeting objectives.

The Meeting: (opening statements/remarks summary)

- Acknowledged and welcomed the NMHSs and partner organisations to PICOF-10
- Noted the importance of the PICOFs to keeping communities informed, especially during the COVID pandemic.
- Noted the La Niña event, leading to drought in the central equatorial Pacific, landslides and floods in other countries, and an active tropical cyclone season in parts of the Pacific.
- Acknowledged the inclusion of climate change in the PICOF for the first time and commended the Pacific RCC for developing the inaugural Pacific Climate Change Monitor and for holding the Pacific Climate Change Forum which will take place over the coming days.
- Thanked the multiple projects and support partners in the region enabling NMHSs to deliver effective climate services and in particular commended the progress made by the PICS Panel, WMO and SPREP in moving the Pacific RCC towards operational mode.
- Recognised the aspects of WMO reform that are benefitting Pacific NMHSs provision of climate services.
- Noted the likely formation of sub-group on climate services under the WMO RA-V Working Group on Services, the WMO 2020 State of the Climate Report (SoCR) released last year and noted the upcoming development of the 2021 SoCR of which authorship and contributors are being identified.
- Noted the improvement in capacity, provision, and uptake of seasonal forecasts as an outcome of the PICOFs and recognized the transition globally towards the WMO objective seasonal forecast method in RCOFs.
- Highlighted the various significant achievements in the Pacific spearheaded by WMO.

The Meeting: (objectives)

- Highlighted the most relevant objectives to PICOF-10, to produce objective, user-relevant climate and ocean outlook guidance in real time.
- Continue to build partnership among NMHSs and Pacific RCC network members.
- Noted the new objective for PICOFs going forward, to provide long term monitoring of and present long-range projections for selected variables noting climate change impacts has had and will continue to have significant consequences in the Pacific Island countries and territories and the region.
- Noted the new expected outcomes for improved understanding of long-term trends and climate change projections for selected variables including how climate change might have influenced the monitoring and outlook period for PICOF-10

- Reminded participants that the Pacific RCC Node for LRF is responsible for delivering presentations and that a Node member will be responsible for each agenda item.

Agenda Item 2: ENSO update and outlook

Elise Chandler from the Australian Bureau of Meteorology presented a review of the last season's outlook and the outlook for the upcoming May-October 2022 season, with contributions from other RCC node for LRF members.

The Meeting:

- Summarized the ENSO advisories issued by various agencies through 2021 until March 2022, noting that advisories were generally consistent despite differences in methods of classifying events and how they progress.
- Noted that all agencies had declared a La Nina event by Nov 2021 although some differences were observed in timing of issuing La Niña watch, as can be seen on the ENSO tracker developed by NIWA.
- A double dip La Niña was forecast and did eventuate.
- Overviewed oceanic indicators, noting in particular the downwelling Kelvin wave about 9 months associated with a weakening of the tradewinds sloshing warm near surface water eastwards during January/February, followed by an upwelling of cooler water during March/April as trade winds strengthened near the dateline.
- Overviewed atmospheric indicators, noting in particular that the SOI has been at La Niña levels since July 2021, and due to strong westerly winds, MJO events have not progressed far into the Pacific.
- Noted that the 2021-22 event is comparable to previous moderate-strong La Niña, particularly with regard to atmospheric indicators, although some indicators peak later than usual.
- Noted that historically, few La Niña events transition directly to El Niño and an extended La Niña period is unusual although not unprecedented (1998-200, 1973-1976, 1954-1957) and thus, it is most likely that ENSO neutral period will follow the La Niña.
- Emphasized that May-June is the predictability barrier and thus, long lead time prediction forecasts as far out as the September to October period are reasonably uncertain.

Discussion:

- No questions

Agenda Item 3: Looking back - review and evaluation of November 2021 - April 2022 climate outlook.

Ben Noll from the NIWA presented the review of the previous season's atmospheric outlook, Judith Giblin of SPC presented a review of the previous season's ocean outlook, and Philip Malsale of SPREP presented a review of the previous season's tropical cyclone outlook

i. Atmosphere

The Meeting:

- Noted that rainfall and temperature forecasts for the previous season performed well, for example, forecast drier than normal conditions for island groups near and west of the dateline and near the equator generally eventuated and warmer than normal air temperature for many island groups except near the equator and east of the dateline.
- Recognised that rainfall forecasts for the first and second season had good skill, likely enhanced by La Niña, although forecasts in some specific locations predicted conditions that were wetter than eventuated.
- Emphasized island group hotspots that have experienced severely dry conditions over the past 90 days including parts of PNG, Nauru, Tokelau, Wallis and Futuna, Samoa, American Samoa, Cook Islands, Kiribati (Phoenix Islands) and French Polynesia.
- Noted that more easterlies than normal were experienced consistent with La Niña and lower air pressure in the west consistent with higher tropical cyclone activity .
- Noted that the SPCZ was displaced south of it's climatological position for the last two seasons, consistent with La Niña signals.
- Noted increased thunderstorm activity north of Australia and sinking air in the eastern Pacific consistent with La Niña, and 'reluctance' for the MJO crossing into the Pacific which likely contributed to lower tropical cyclone activity than the average.

ii. Ocean

The Meeting:

- Recalled the ocean related statements made in the regional statement from the PICOF 9
- Noted that sea surface temperatures from August to January 2021 remained warmer than normal in the western Pacific and negative subsurface temperature anomalies persisted in the eastern half of the Pacific.
- Noted that since mid-December 2021 to February 2022 a downwelling Kelvin wave shifted eastwards and below-average subsurface temperatures have persisted in the east-central Pacific.

- Emphasised that the highest observed tides were in late 2021 which confirms the statement made in the PICOF-9 statement predicting higher than normal sea levels.
- Overviewed the coral bleaching outlook noting that intensity is currently decreasing.
- Noted that higher chlorophyl concentration in January and February 2022.
- Recognised the coastal flooding experienced in PNG, noting that the highest tides occurred in late 2021, and this coupled with the higher sea levels exacerbated coastal flooding.
- Recognised the coral bleaching experienced in Fiji, related to warmer than normal sea surface temperatures and prolonged exposure to heat stress noting in particular the excellent public outreach done by FMS during this period and consistency with the PICOF-9 statement.

iii. Tropical cyclones (Southwest Pacific)

The Meeting:

- Acknowledged the different regions of responsibility for seasonal Tropical Cyclone Outlooks by NIWA and BoM
- Recalled the PICOF-9 statement predicted near normal cyclone risk with reduced risk further east and enhanced risk in the western part of the basin over November to April, near normal in central part of the region and reduced chances further east.
- Noted that activity experienced was consistent with predictions given by BoM and NIWA and FMS/RSMC Nadi.
- Noted that the reluctance of the MJO to cross into the Pacific contributed to lower than normal activity although noting that Tropical Cyclones Dovi and Cody were significant events causing flooding damages in Fiji, Vanuatu, and New Caledonia.
- Noted flooding, inundation, landslides and strong winds experienced in Palau, related to La Niña and a number of tropical lows.

Discussion

- Samoa asked for clarification on wetter than normal conditions predicted for Samoa by the WMO MME given that meteorological drought conditions have been experienced. NIWA responded that the WMO MME was bias towards wetter than normal conditions, although some individual models within did predict drier than normal conditions. 5 of 13 models accurately predicted below normal rainfall for Samoa: Tokyo (JMA), Seoul (KMA), Germany (DWD), Moscow, Canada (CanSIPS). Several models, including ECMWF and UKMO, were notably wetter, which skewed the mean forecast. This highlights the value at looking at the model spread or range of scenarios possible.

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

John Marra of NOAA and Yuri Kuleshov of BoM presented long term trends for sea level and tropical cyclones respectively.

The Meeting:

- Noted that thermal expansion and ice melt associated with global warming has contributed to sea level rise in the Pacific which is equivalent to the global mean in the central Pacific and higher than the global mean in the eastern tropical Pacific.
- Noted that local rates of change from tide gauges are generally in agreement with those derived from satellites, although there are some exceptions such as Pago Pago
- Emphasized that natural patterns of variability play an important role in sea level variations locally and regionally.
- Noted that total counts of minor flooding have increased steadily in frequency across the Pacific since 1980, about a threefold increase.
- Recognized that trends are presented in subregions of the greater southwest Pacific region and the northwest Pacific Ocean as numbers of tropical cyclones that have occurred within Pacific Island EEZs are insufficient for reliable long term trend analysis
- Noted that there is a negative trend in numbers of severe tropical cyclones over the last 40 years in the southwest.
- Noted little change in the numbers of total tropical cyclones and in severe tropical cyclones in the northwest Pacific Ocean.

Discussion

- CSIRO asked whether the sea level trend over the next 5-10 years be dependent on the IPO phase? Could it be more spatially uniform (less enhanced in the west) than the trend since 1993? NOAA responded that natural variability is going to have a significant influence on what the trend looks like over the next 20 or 30 years until the long-term signal begins to override the variability

- The PICS Panel Co-chairs asked for clarification on the differences between observed trends (a general decrease in observed numbers of severe tropical cyclones in some basins) and projected trends (increase in proportion of severe tropical cyclones). CSIRO and BoM responded that trends in total numbers of tropical cyclones (<995hPa) and severe tropical cyclones (<970hPa) were examined for the period 1981 to 2021 for the greater Southwest Pacific region (135°E ─ 120°W; 0° ─ 50°S) and for a sub-region of the North-west Pacific Ocean (125°E ─ 180°W; 0° ─ 20°N). Data used for the following analyses was obtained from the Southern Hemisphere Tropical Cyclone Dataset (for the Southwest Pacific) and Regional Specialized Meteorological Center (RSMC) Tokyo - Typhoon Center for the Northwest Pacific. Specifically, for the greater southwest Pacific region, a marginal downward trend in the total numbers of tropical cyclones and a downward trend in the numbers of severe tropical cyclones has been observed. The

proportion of tropical cyclones that became severe tropical cyclones also declined. For the examined sub-region of the north-west Pacific Ocean, little change in the total numbers of tropical cyclones and severe tropical cyclones has been observed. There has also been little change in the proportion of tropical cyclones that became severe tropical cyclones. The marginal decline in the total numbers of tropical cyclones is consistent with projected trends.

- CSIRO -the main messages are fairly consistent – a decrease or little change in total number in the past and future, but with a higher proportion of storms being in in the higher categories in future, and the overall effect of TCs is likely to be greater (higher rain rates, higher sea level, as well as higher intensity) – and clearer trends at the global scale than in any one region. And some things remain unclear – change to speed, size and so on.

- SPREP asked whether there is an observed trend in the size of tropical cyclones over time? BoM responded that it is difficult to comment on the question because that would require significant statistical analysis as in the Pacific, there are relatively small numbers on the record.
- WSO Pago Pago asked what is causing tropical cyclone trends to decline? BoM responded that increased ocean temperatures can cause increase in severity of tropical cyclone but also vertical windshear can reduce the numbers.

- Carter Guri asked how do you quantify the risk magnitude of tropical cyclones for DRR (early action preparedness) purposes using past Tropical Cyclone Consolidated Tracks? BoM responded that Tropical Cyclones have multiple hazards including wind, storm surge, rainfall, and also risk is dependent on exposure and vulnerability, so many factors contribute to risk, although this is a significant area of research. Global warming also affects the rain rates of Tropical Cyclones so that is likely to affect the impacts and also the translation rate

Agenda Item 5: Looking Forward - Seasonal and Intra-seasonal Pacific guidance for May-October 2022.

Daeun Jeong of APCC, Alex Peltier of Meteo France, and Marcus Aydlett of NOAA presented the guidance for the upcoming season for atmosphere, ocean and tropical cyclones respectively

i. Atmosphere

The Meeting:

- Noted that dry conditions are likely along western and central equatorial Pacific with wet conditions for the off equatorial region through until July with weakening chances for both wet and dry through August/September/October.
- Acknowledging that the patterns are similar for outlooks provided by most agencies with some variation in skill although PICASO is showing drier than normal conditions likely in the northern Pacific through May/June/July which is at odds with most other dynamical models. SCOPIC, a statistical model is showing a generally consistent pattern with highest skill in the central equatorial region.
- Noted that cooler than normal temperatures are likely along the equator and near and east of the dateline for May/June/July, and warmer than normal or normal temperatures for other regions with similar patterns across most models with a few isolated differences. During August/September/October, the probability for below normal temperature is expected to decrease whereas the probability for above normal conditions are expected to persist.

ii. Ocean

The Meeting:

- Noted that below average SSTs are expected for May/June/July across the central equatorial Pacific while they remain above average for most PI countries in the west including Palau, East Timor, FSM, PNG, Solomon Islands, Vanuatu, New Caledonia, Fiji, Tonga, Niue, Southern Cook Islands and (Austral Islands) French Polynesia.
- Acknowledged general agreement between the models and high confidence in the “giant horseshoe” of warmer water dominating the western and mid-latitude Pacific and no consensus for Tuvalu, Tokelau, Samoa, Wallis and Futuna, Northern Cook Islands and the remainder of French Polynesia.
- Noted that warm and cool anomalies are expected to decline in intensity for August/September/October except around the coasts of PNG where waters are getting warmer. Near normal or slightly below average temperatures are expected for Nauru and Kiribati.
- Noted that the spatial distribution of skipjack tuna catches is predicted to contract westward, and in the south Pacific good fishing locations are likely to extend further south, although predictions of catch amounts vary from one EEZ to another and between tuna species.
- Emphasised that although heat stress on coral has dissipated from much of the southern Pacific Ocean, heat stress remains in PNG and is expected to continue for 8-12 weeks.
- Noted that sea level is favored to be significantly higher for the western Pacific and northern Fiji and northern Tuvalu - people should be aware of higher tides.

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

The Meeting:

- Acknowledged the different regions in the north Pacific that different institutions are responsible for monitoring cyclones
- Noted that the American Samoa outlook released in October 2021 predicted a normal to below normal tropical cyclone season and that this is consistent with La Niña and until now has experienced no tropical cyclone activity. The next outlook will be released in October 2022.
- Noted that current ENSO state influences the outlook; the 2020 La Niña tropical cyclone season saw little activity in the Guam area of responsibility but in the 2015 El Niño season saw a lot of activity.
- Noted that the West Pacific USAPI outlook is developed by sub region, not a basin wide outlook and that the outlook will be completed and released by May 2022. However, a tentative outlook based upon the current climate pattern indicates average activity is expected.
- Noted that so far in 2022 impacts have been experienced on the periphery of a tropical storms, tropical depression and a typhoon.
- Recognized that the Regional Climate Conference for the western north Pacific will feature the release of the seasonal Tropical cyclone outlook

Discussion

- A question was asked when will the base period be updated to 1991-2020? APCC responded that in the case of WMO, the base period is a common hindcast period of MME participating models, which is 1993-2009 currently. If individual models are providing hindcast data up to 2020, the new period 1991-2020 would be possible.
- A question was asked: in terms of verification, how is the 3 month outlook for skipjack tuna fishing or fisheries convergence zone verified? Any data collected from fishers (commercial or local) on the catch. Meteo France responded that many papers exist on the relationship between the warm pool and catch and the SST is used is a proxy. It is very difficult to predict deeper ocean temperatures, and this makes it difficult to predict catch of species that live below the surface.

Agenda Item 6: Looking forward long term

Michael Grose of CSIRO presented an overview of long-term projections in tropical cyclones and sea level.

The Meeting:

- Recognised the importance of the IPCC WG1 AR6 report on projections of sea level
- Acknowledged that emissions pathways are crucial to the budget of sea level change.
- Emphasised the new assessment of 'low likelihood high impact' outcome of a possible rapid rise in sea level due to Antarctic ice melt. It can't be quantified but it can't be ruled out especially for higher pathways.
- Noted that overall the Pacific is showing slightly more sea level rise than the global average but less than in some other regions. Natural variability on annual and decadal timescales come along with the long-term trend.
- Noted that despite the level of change, impacts are also a function of exposure and vulnerability.
- Emphasised the severe impacts in the Pacific leading from tropical cyclones and that in the future, tropical cyclones are likely to have greater impacts on the ground, because for a world that is 2ºC warmer or more there will be increase in the average peak intensity, higher rain rates, and tropical cyclones making landfall on a higher sea level.
- Noted that it is likely there has been an increase in extreme sea level events associated with tropical cyclones passage/occurrence in many places.
- Noted that there is currently limited evidence for decrease in average translation speed in the Pacific region.
- Noted that some changes are not yet clear: decrease or unchanged average frequency has low confidence in some basins, any projected speed decrease has low confidence, any change on location of tracks except for the north Pacific.

Discussion

- BoM asked for any information on the size of tropical cyclones. BoM confirmed that there is currently no evidence on increase or decrease in size of tropical cyclones.

- Meteo France asked how much confidence we can have on data collected before 1990? CSIRO responded that as with all meteorological data, the further back we go the less reliable is the data.

Agenda Item 7: Closing

- The PICS Panel Co-Chair thanked the NMHSs and partners for participating in the discussions and closed the PICOF-10

Annex 1: Agenda

12:30-13:00 (Samoa local time)	Registration and communications testing Meeting procedures
13:00-13:30	**Agenda 1: Opening and Setting the scene.** • Opening prayer (Semi Qamese) • Opening remarks (Luteru Tauvale, Director Samoa Met Division on behalf of PMC Chair) • Opening remarks (Henry Taiki, WMO) • Meeting objectives (Simon McGree-BOM) • Group photo
13:30-13:50	**Agenda 2: ENSO Update and Outlook.** ENSO status and outlook, and introduction to ENSO tracker: NIWA, **BoM**, Meteo-France, NOAA, University of Hawaii, APCC**,** SPREP and SPC (15 minutes) Including highlights from Global Seasonal Climate Update (GSCU) • Agenda 2 discussion (5 minutes)
13:50-14:35	**Agenda 3: Looking Back - Review and Evaluation of May-October 2021 Climate outlook.** **i. Atmosphere** Overview of May to October 2021 state of the climate, plus evaluation of the last PICOF outlook: NOAA, University of Hawaii, BoM, SPC, SPREP, and **NIWA** (12 minutes). **ii. Ocean** Overview of May to October 2021 state of the ocean, plus evaluation of the last PICOF outlook: NOAA, University of Hawaii, BoM, **SPC**, SPREP, NIWA (12 minutes). **iii. Tropical cyclones** Overview of the TCs over last six months: NOAA, University of Hawaii, BoM, SPC, **SPREP**, and NIWA (12 minutes). Agenda 3 discussion (9 minutes)
14:35-14:55	**Agenda 4: Looking Back Long-Term: Status of key variables** A brief examination of long-term trends for variables of interest to Pacific communities: In April 2022, these will

	be tropical cyclones and sea level: **NOAA**, University of Hawaii, **BoM**, SPC, SPREP, and NIWA (10 minutes). Agenda 4 discussion (10 minutes)
14:55-15:05	**10-min break**
15:05:16:05	**Agenda 5: Looking Forward - Seasonal and Intra-seasonal Pacific guidance for 2021/22.** **i. Atmosphere** 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 (15 minutes). **ii. Ocean** 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 (15 minutes). **iii. Tropical cyclones** 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 (15 minutes) Agenda 5 discussion (15 minutes)
16:05-16:25	**Agenda 6: Looking Forward Long-Term** A brief review of long-term climate change projections for variables of interest to Pacific communities: In April 2022, these will be tropical cyclones and sea level: **CSIRO**, UGCRP, BoM and SPREP (10 minutes). Agenda 6 discussion (10 minutes)
16:25-16:30	**Agenda 7: Closing** Chair: Summary of proceedings, feedback from participants Next steps: production of PICOF-10 Report, PICOF Statement, reminder of production deadlines. Proposed date for PICOF 11: Friday 21 October and Tuesday 25 October 2020. Theme: tbd

Annex 2: Participant list

	Name (Original Name)	User Email
1	Jay Gataua	thaileigh@gmail.com
2	Gander Wainiqolo	gander.wainiqolo@cookislands.gov.ck
3	Beretekira Beero	b.beero@melad.gov.ki
4	Seluvaia Vea (TMS) (Seluvaia Vea (TMS))	seluf@met.gov.to
5	Luteru Tauvale	luteru.tauvale@mnre.gov.ws
6	david hiriasia	david.hiba@met.gov.sb
7	PIDP Tech 1 (pidp@eastwestcenter.org)	pidp@eastwestcenter.org
8	PIDP Tech 3 (Lori Concepion)	concepcl@eastwestcenter.org
9	PIDP Tech 2 (Tolua Samifua)	samifuat@eastwestcenter.org
10	Posevima Havea	vimahavea123@gmail.com
11	Sanjeshni Kissun	sanjeshni.kissun@giz.de
12	Sangwon Moon (Sangwon Moon)	swmoon.apcc@gmail.com
13	Rossy Mitiepo	rossy.mitiepo@mail.gov.nu
14	Peni Hausia Havea	ilaisiaimoana@yahoo.com
15	PIDP Tech 4 (Alyssa Chau)	amchau@hawaii.edu
16	Nihmei Salesa/SPREP (Nihmei Salesa)	salesan@sprep.org
17	Azarel SPREP (Azarep Maiai)	azarelm@sprep.org
18	Haden Talagi	haden.talagi@mail.gov.nu
19	Andre Miralles-Barboza	andrea.miralles-barboza@noaa.gov
20	Simon McGree	simon.mcgree@bom.gov.au
21	Hiroya Abe	abe.hiroya@nies.go.jp
22	Everett Sioa	everetts@sprep.org

23	John Marra	john.marra@noaa.gov
24	WSO Pago Pago Operations	nws.pr.pago.operations@noaa.gov
25	Rakeshni Lata /ACE (Rakeshni Lata)	rakeshni.lata@giz.de
26	SPREP_Leanne Moananu (Leanne Moananu)	leannem@sprep.org
27	Masako Ogawa	mogawa.pccc2020@gmail.com
28	Olivia Warrick (Kehaupuaokalani Kamaka)	pua.kamaka@noaa.gov
29	Rochelle Campbell	rcampbell@hrcwater.org
30	Blair Trewin	blair.trewin@bom.gov.au
31	Dave Helweg (Dave Helweg)	dhelweg@usgs.gov
32	Michelle Rub	michelle.rub@noaa.gov
33	SAMOA_Silipa Mulitalo (Silipa Mulitalo)	silipa.mulitalo@mnre.gov.ws
34	Zulfikar Begg	zulfikarb@spc.int
35	Doug Ramsay	doug.ramsay@niwa.co.nz
36	IFRC Pacific Jen Stewart Manu	jennifer.stewart@ifrc.org
37	Finbar Kiddle	finbar.kiddle@mfat.govt.nz
38	Azaria Pickering	azariapickering@gmail.com
39	Kate Taylor	kate.taylor@noaa.gov
40	Angélique RENAUD	angelique.renaud@environnement.gov.pf
41	Sarah Kwon	sarah.kwon@environment.gov.au
42	Leanne Webb	leanne.webb@csiro.au
43	Thomas Giambelluca	thomas@hawaii.edu
44	Karlos Lee - PIFS (Karlos Lee Moresi)	karlosm@forumsec.org
45	Mavis Yuen	mavis_yuen@yahoo.com
46	SPC_Merana Kitione (Merana Kitione)	meranak@spc.int

47	Steven Mana'oakamai Johnson (Steven Johnson)	stevenjohnson@asu.edu
48	Ludwig Kumoru	ludwigk@spc.int
49	Lisa Vaughan	lisa.vaughan@noaa.gov
50	Audrey Brown-Pereira	audreyp@sprep.org
51	Teuila Fruean	teuilajanef@sprep.org
52	Yvette Kerslake	yvettek@sprep.org
53	PIDP Tech 5 (Perry Arrasmith)	perryarr@hawaii.edu
54	FRENCH POLYNESIA - Engel Raygadas (Engel Raygadas)	engel.raygadas@presidence.pf
55	Michael Kruk	michael.kruk@noaa.gov
56	Tagaloa Cooper (Siosinamele Lui)	siosinamelel@sprep.org
57	Kili Ling	lingk@eastwestcenter.org
58	Judith Giblin	judithg@spc.int
59	Emily Sesno	esesno@contractor.usgs.gov
60	Anama Solofa	anama.solofa@ffa.int
61	anne claire goarant	anneclaireg@spc.int
62	Kalani Quiocho	kalani.quiocho@noaa.gov
63	Chris Teva	pitapile@gmail.com
64	Moirah Matou Van MATOU	dianamoirah@gmail.com
65	Alan Porteous - NIWA (Alan Porteous)	alan.porteous@niwa.co.nz
66	Arabella Comyn	arabella.comyn@pmc.gov.au
67	Nicholas Hamp-Adams	nhamp-adams@unfccc.int
68	Sophie Martinoni-Lapierre	sophie.martinoni@meteo.fr
69	Sandy Chen	schen3@hawaii.edu
70	Ayesha Genz	ayesha.genz@noaa.gov

71	Yuji Ueno	yuji.ueno.2@gmail.com
72	Elinor Lutu-Mcmoore	elinor.lutu-mcmoore@noaa.gov
73	Arona Ngari	arona.ngari@cookislands.gov.ck
74	Tupou_CC (Loiloi Latu)	leroy.latu@gmail.com
75	Mika Perez	mika.perez@tokelau.org.nz
76	Lee Jacklick	lee.jacklick@noaa.gov
77	Jedaiah Tukuitonga	jedaiah.tukuitonga@gov.nu
78	Tile Tofaeono	tilet@sprep.org
79	Celine Becker	celine.becker@bom.gov.au
80	Fred Patison	fredp@sprep.org
81	Zena Grecni	grecniz@eastwestcenter.org
82	Noa Maile ('Elenoa Maile)	elenoamaile05@gmail.com
83	Emily Smith	emily.a.smith@noaa.gov
84	Nicolas Rocle	nicolasr.ext@sprep.org
85	Olivia Warrick	ocwconsulting@gmail.com
86	Glenda Pakoa	gpakoa@meteo.gov.vu
87	Mari-Vaughn Johnson	mvjohnson@usgs.gov
88	Arieta Baleisolomone	arieta.daphne@met.gov.fj
89	Tyson Jella	jellamickey@gmail.com
90	Heather Kerkering	hkerkering@usgs.gov
91	'Alilia Fine	alya4ine@gmail.com
92	Tauala Katea	tauala.k@gmail.com
93	Henry Taiki	htaiki@wmo.int
94	Sefanaia Nawadra	sefanaian@sprep.org

95	Matthew Widlansky	mwidlans@hawaii.edu
96	John Ruben	jruben@meteo.gov.vu
97	Call-In User_1	
98	Sunny Seuseu/SPREP (Sunny Seuseu)	sunnys@sprep.org
99	Nelson Kalo	kalonel77@gmail.com
100	Laura Brewington	brewingl@eastwestcenter.org
101	PIDP Tech 7 (Kalen Eyre)	eyrek@hawaii.edu
102	Selotia Tausi	sltausigeorge@gmail.com
103	Victoria Keener	keenerv@eastwestcenter.org
104	Geoff Gooley CSIRO (Geoff Gooley)	geoff.gooley@csiro.au
105	Paula Moehlenkamp	moehlenp@eastwestcenter.org
106	Chelsey Bryson	cajbryson@gmail.com
107	Ryan Longman (PIDP) (Ryan Longman)	longmanr@eastwestcenter.org
108	Grant Smith	grant.smith@bom.gov.au
109	Robert Ireland	robert.ireland@vaisala.com
110	Patricia Sachs-Cornish (Patricia Cornish)	patricia.sachs-cornish@ffa.int
111	James Potemra	jimp@hawaii.edu
112	Elise Chandler	elise.chandler@bom.gov.au
113	Bo Ra Kim	bora.kim@un.org
114	Nazgul Borkosheva	nazgul.borkosheva@un.org
115	Allan Rarai	ararai@meteo.gov.vu
116	Tessa Tafua	ttafua@wmo.int
117	PCCC SPREP / Rachel Nunn-Crichton (Rachel Nunn-Crichton)	racheln@sprep.org
118	Samasoni Sauni	samasonis@spc.int

119	Alexandre Peltier	alexandre.peltier@meteo.fr
120	Chloe Norman	normankloe@gmail.com
121	Meapelo Maiai	mmaiai@theprif.org
122	Leon Geschwind	leon.geschwind@noaa.gov
123	Floyd Viliamu	floyd.viliamu@mail.gov.nu
124	Savin Chand	s.chand@federation.edu.au
125	Nikotemo Iona	niona@gov.tv
126	Sean Tukutama (Niue Met) (Sean Tukutama)	sean.tukutama@mail.gov.nu
127	Philip Malsale	philipm@sprep.org
128	Kasis Inape_PNGMet (Kasis Inape)	kinape70@gmail.com
129	Emarosa Romeo	emarosa.romeo@mnre.gov.ws
130	'Ofa Ma'asi-Kaisamy (Ofa Kaisamy-Maasi)	ofak@sprep.org
131	Evangeline Lujan	vangie@guamwaterworks.org
132	Casuallen Atuatasi	casuallen.atuatasi@epa.as.gov
133	uatea vave	uateavave@gmail.com
134	KIKUKO MOCHIMARU	kiku.mochimaru@noaa.gov
135	Kaitlyn Lowder	klowder@oceanfdn.org
136	Emilia Belo	emiliacristiana96@gmail.com
137	Mwata Keariki	aco@met.gov.ki
138	Barnabas Zeron Bago	bbago@mecdm.gov.sb
139	Brandon Bukunt	brandon.bukunt@noaa.gov
140	Taumeasina Fomai (Taumeasina Fomai)	taumeasina.fomai@mnre.gov.ws
141	Yuki Yoshida	yoshida.yuki@nies.go.jp
142	Chanel Iroi	c.iroi@met.gov.sb

143	Teopola Kulavati	teopola.kulavati@govnet.gov.fj
144	Maccarios Auvae	maccarios060087@gmail.com
145	Victoire Laurent	victoire.laurent@meteo.fr
146	Kotoni Faasau	kotoni.faasau@mnre.gov.ws
147	Jasneel (Jasneel Chandra)	jasneel.chandra@met.gov.fj
148	Michael Grose	michael.grose@csiro.au
149	Shweta Shiwangni	shweta.shiwangni@met.gov.fj
150	Sugata Narsey	sugata.narsey@bom.gov.au
151	Gabriel Tuno	aizotuno@gmail.com
152	Bapon Fakhruddin	bfakhruddin@tonkintaylor.co.nz
153	Nenenteiti Ruatu	decd@melad.gov.ki
154	Vanessa Hernaman	vanessa.hernaman@csiro.au
155	Eden Skilling	eden.skilling@noaa.gov
156	Ueneta Toorua	dmet@met.gov.ki
157	Neemia Evii	neemiaevii@gmail.com
158	Tsatsa Seimarlie	lelasei@gmail.com
159	Carter Guri PNG Weather Service (Carter Guri)	carterguri19@gmail.com
160	Raeterenga Kiaitoka	r.kiaitoka@melad.gov.ki
161	Natasha Nakasone	natasha.nakasone@decem.gov.fm
162	Tom Burkitt	tbu@dhigroup.com
163	Vanessa Fread	freadv@yahoo.com