

# **WMO RA V Pacific RCC Network**

## **-- Implementation Plan --**

FINAL

17 July 2017

(Prepared following feedback on a skeleton outline prepared at the RA V WG-CLS meeting in Honolulu, Hawaii, USA on 21-23 November 2016)

# WMO RA V Pacific RCC Network

## - Implementation Plan -

### Contents

1. Introduction
2. Background
3. The RA V Pacific RCC Network
  - 3.1 Proposed initial structure
  - 3.2 The RCC Co-ordinator
  - 3.3 Management Committee
  - 3.4 Timeline for Demonstration Phase
  - 3.5 Interface with RCC end users
  - 3.6 Interface with GPCs
4. Future RCC Developments and Research
5. Detailed Description of Proposed RCC Functions
6. Conclusions

### **Annex:**

For each function we provide details on:

- Products, Coverage and Providers

## **1. Introduction**

The document describes the approach to implement a World Meteorological Organisation (WMO) Regional Climate Centre (RCC) Network in the Pacific sub-region of RA V (Pacific RCC-Network). The Pacific sub-region of RA V is defined as all the countries and territories within the WMO RA V region, with the exception of the Southeast Asian sub-region. This implements Resolution 5 of the Sixteenth Session of RA V (2-8 May 2014, Jakarta, Indonesia) to “establish two WMO RCC-Networks in RA V, one network for the Southeast Asian sub-region and one network for the South-West Pacific sub-region.”

RCCs are Centres of Excellence that assist WMO Members in a given region to deliver better climate services and products, including regional long-range forecasts, climate monitoring and climate data services, and to strengthen their capacity to meet national climate information needs. The primary ‘clients’ of an RCC are NMHSs in the region and in neighbouring areas. RCC responsibilities should be regional in nature and not duplicate or replace services provided by NMHSs. RCCs serve the regional level of a three-level (climate-related) infrastructure: Global Producing Centres (GPCs, global level), Regional Climate Centres (RCCs, regional level), National Meteorological and Hydrological Services (NMHSs, national level).

*According to the Manual on the GDPFS, a group of centres performing climate-related activities that collectively fulfil all the required functions of an RCC may be designated by WMO as a “WMO Regional Climate Centre Network”. Each centre in a designated WMO RCC Network will be referred to as a ‘node’. A node will perform, for the region or sub-region defined by the Regional Association, one or several of the mandatory RCC activities’. Each of the nodes should have a lead organisation and the RCC-Network as a whole requires a ‘point of contact’.*

## **2. Background**

### **The development of an RCC Network in the Pacific sub-region of RA V**

The WMO Regional Association V Working Group on Climate Services (WG-CLS) agreed in November 2011 to assess current Regional Climate Centre (RCC)-related functions being performed in RA V in relation to the mandatory and highly-recommended RCC functions, and to perform a subsequent gap analysis.

Coinciding with this work (and working alongside the WG-CLS), the Pacific Islands Climate Services Panel (PICS Panel), which was established in April 2014 at a Special Session of the Pacific Meteorological Council (PMC), in Rarotonga, Cook Islands, was tasked to:

- Send a Regional Climate Centre (RCC) capabilities survey to regional partners;
- Review the combined survey results; and
- Draft a first cut PI RCC node/consortia structure.

A capabilities survey was sent out to potential service providers in November 2014 and responses were collated and analyzed over the following year. A proposed RCC

Network node/consortium structure was presented at the PMC-3 meeting in July 2015 in the Kingdom of Tonga. Following discussions, a revised node/consortium structure was circulated to the PMC for endorsement 'in principle' in April 2016, and was subsequently endorsed.

Alongside the above activities, the PICS Panel in association with the Secretariat for the Pacific Regional Environment Programme (SPREP) and the WMO have held two Regional Pacific Islands Climate Outlook Forums (PICOFs). PICOF-1 was held in October 2015 in Suva, Fiji and included representatives of the water sector. PICOF-2 was held in October 2016 in Nadi, Fiji and included representatives from the Disaster Risk Reduction (DRR) sector. Both forums were very successful, and there has been a commitment to continue to hold PICOFs annually. Progress on RCC activities was reported back at both PICOFs.

The RA V WG-CLS, chaired by Ms Flaviana D. Hilario, met in Singapore from 2-4 February 2016 and discussed in detail the RA V Resolution 5. The WG-CLS agreed on the way forward with concrete steps and actions towards the implementation of the RCC-Networks in these two regions.

A specific outcome of this meeting was for Pacific sub-region members of the WG-CLS, working with the chair of the PICS-Panel, to convene an RCC Implementation Planning meeting in Honolulu, Hawaii, USA in November 2016. Representatives from potential service providers were invited to and attended the meeting, and a draft 'skeleton' RA V Pacific RCC implementation plan (IP) was produced.

This plan builds on the skeleton IP, integrating the additional inputs received from USA, Australia, New Zealand, French Polynesia, Papua New Guinea, The Pacific Community (SPC) and SPREP. Further additional contributions will be encouraged and welcomed at a later stage.

### **3. The RA V Pacific RCC Network**

#### **3.1 List of Probable Node/Consortia Members**

National Institute of Water & Atmospheric Research Ltd (NIWA), New Zealand  
National Oceanographic and Atmospheric Administration (NOAA), United States of America

University of Hawaii (UH), United States of America

Bureau of Meteorology (BoM), Australia

Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Secretariat of the Pacific Regional Environment Programme (SPREP), Samoa

The Pacific Community (SPC), Fiji

French National Meteorological Service (METEO FRANCE), French Polynesia

University of Papua New Guinea (UPNG), Papua New Guinea

### **3.2 Proposed Structure**

The RA V Pacific RCC Network in its initial phase consists of five nodes. Each node is composed of a consortium led by a lead institution or co-leads:

**Node on Long-Range Forecasting:**

NIWA & BoM (co-leads)

METEO FRANCE, NOAA, UH, SPC & SPREP (consortium members)

**Node on Climate Monitoring:**

NOAA & UH (co-leads)

BoM, SPC, SPREP & NIWA (consortium members)

**Node on Operational Data Services:**

BoM (lead)

NOAA, UH, SPC & NIWA (consortium members)

**Training Function:**

SPREP (lead)

NOAA, UPNG, BoM, NIWA, SPC & CSIRO (consortium members)

**Climate Projections Function:**

CSIRO (lead)

USGCRP, BoM & SPREP (consortium members)

### **3.3 Overall RCC Co-ordination**

NIWA New Zealand will co-ordinate the initial implementation and demonstration of the RCC Network. Mr Andrew Tait from NIWA ([Andrew.Tait@niwa.co.nz](mailto:Andrew.Tait@niwa.co.nz)), who is also the chair of the PICS Panel, will be the RCC co-ordinator. This role will be reviewed after 3 years and can be rotated among the Node lead institutions.

### **3.4 Management committee**

A committee consisting of the RCC co-ordinator plus Mr Sunny Seuseu (SPREP), Mr Geoff Gooley (CSIRO), Mr David Jones (BoM), Mr John Marra (NOAA), Mr Jens Kruger (SPC) and Mr Sam Maiha (Vice-Chair PICS Panel, Papua New Guinea Weather Service) will form the management committee for the RCC. This group will be responsible for the overall co-ordination of the RCC and it will be chaired by the RCC co-ordinator. It is anticipated that meetings will mostly be via video-conference.

### **3.5 Timeline**

It is proposed that the demonstration phase of the RCC **will begin in October 2017.**

### **3.6 Interface with the RCC user base**

The main users of RCC products are the NMHSs. Representatives from NMHSs across the Pacific region attend the annual PICOOF discussions. This provides an established forum whereby feedback on RCC products and services can become a regular process. An important function of the RCC is to issue a Climate Watch and this will be a main topic for discussion at the next PICOOF.

### **3.7 The Interface with GPCs**

The Bureau of Meteorology is the only GPC within the RA V Pacific RCC-Network and access to their products and expertise will be critical for this RCC. It is notable, however, that climate forecasting in the region, as demonstrated at the PICOFs held in 2015 and 2016, has been strongly supported by many GPCs and it is intended that strong links be maintained between these GPCs and the RCC. The ongoing availability of forecast outputs to the RCC's lead node and consortium for LRF will ensure that value-added customised forecasts useful for the region can be provided to the RCC's lead node.

Mechanisms will be established to feedback to the GPC the experience of the RCC-Network in using their long-range forecasting and climate monitoring products.

## **4. Future RCC Development and Research**

The RA V Pacific RCC structure outlined above is, in principle, flexible and open and can evolve according to the region's requirements. The region is very large and individual island nations within the region often cover large areas of ocean, hence there will be many challenges to providing an effective and useful RCC. It is envisaged that close collaboration will develop between the Pacific and Southeast Asian RCCs in RA V.

In the demonstration phase of the RCC the focus will be on the establishment of an operational capability to deliver the mandatory requirements in each of the functional areas. Looking to the future there are a number of research and development areas that have already been identified for the region, primarily through the PICOF process. These will be pursued as a second stage, after the mandatory requirements are established operationally. Principally, this will include providing a core suite of standardised regional products from the multiple products currently produced, investigating the accuracy of sub-seasonal forecasts, and developing a region-wide climate database.

## **5. Detailed Description of Proposed Functions**

The table in the following Annex provides a detailed description of the products to be produced in each of the five Pacific RCC functions (the four mandatory functions plus climate change projections), the current extent of the Pacific region that the products cover, and the institution (and branch/division, if appropriate) that will deliver the products.

## **6. Conclusion**

The implementation of this plan will begin to fulfil many of the regional requirements that have been identified through the on-going PICOF process. It will provide the basis for a close collaboration of RCC participants and NMHSs throughout the region. It is intended that participation in the RCC will increase over time.

**Annex**

**See below for list of additional acronyms used in tables.**

**Long Range Forecasting (LRF) function**

<b>Function</b>	<b>Products</b>	<b>Coverage</b>	<b>Provider</b>
Interpret GPC products	Graphs and maps of GPC multi-model ensemble performance in terms of standard skill metrics	Pacific RCC region	BoM
Tailored regional LRF products and services	Online Climate Outlook Forum (OCOF)	Southwest Pacific	BoM, SPREP
	Island Climate Update (ICU)	Pacific RCC region except Hawaii	NIWA
	Pacific Sea Level Anomalies (ensemble forecast)	Pacific RCC region	UHSLC, SPC
	French Polynesia and New Caledonia Climate Outlooks	French Territories in Pacific	METEO FRANCE
	CLIK Pacific multi-model ensemble seasonal forecast maps	Pacific RCC Region	SPREP
Consensus statements	Consensus statement produced at annual PICOF	Pacific RCC region	BoM, NIWA, NOAA, SPREP, SPC
	Quarterly Hawaii and Pacific Islands Climate Impacts and Outlook	Central and Western Pacific	NOAA NESDIS/NCEI
	OCOF, ICU and METEO FRANCE monthly outlooks involve a teleconference-based consensus process	Pacific RCC region	BoM, SPREP, NIWA, METEO FRANCE
Verification	MetPI tool used for ICU	Pacific RCC region except Hawaii	NIWA
	Monthly verification discussion during OCOF	Southwest Pacific	BoM, SPREP

Online access	Outlook products are available on various websites (including websites of NMHSs)	Pacific RCC region	BoM, NIWA, NOAA NWS, METEO FRANCE, SPC
Feedback mechanisms	The annual PICOOF includes extensive discussion of LRF methodologies and models	Pacific RCC region	BoM, NIWA, NOAA, SPREP, SPC

**Node leads: NIWA, BoM**  
**Consortium members: MF, NOAA, UH, SPC, SPREP**



## Climate monitoring function

Function	Products	Coverage	Provider
Climate diagnostics (e.g. maps of current climate anomalies)	Quarterly Hawaii and PIs Climate Impacts and Outlook	Central and Western Pacific	NOAA NESDIS/NCEI
	GHCN Gridded Products (monthly temperature anomaly)	Pacific region (global)	NOAA NESDIS/NCEI
	Teleconnections (e.g., PDO, PNA)	Pacific RCC region	NOAA NESDIS/NCEI
	ESRL current multi-variate ENSO index (MEI)	Pacific RCC region	OAR/ESRL
	Monthly Atmospheric and Ocean Time Series	Pacific RCC region	OAR/ESRL, SPC
	TAO/TRITON ocean and atmospheric observational products	Pacific RCC region	OAR/PMEL
	Hawaii Climate Summaries from the Western Regional Climate Center and Hawaii & Pacific Islands Local Climate Data Summaries from the Western Regional Climate Center	Central and West Pacific	NOAA/WRCC
	Pacific Sea Level Anomalies	Pacific RCC region	UHSLC, SPC
	Monthly Pacific Islands OCOF summary report	Southwest Pacific	BoM, SPREP
	CLIMDEX climate extremes indices, updated annually	Southwest Pacific	BoM
	CliDEsc products	Specific countries, but exportable	NIWA (developer)
Reference climatologies	GHCN Monthly and ISD (rainfall, temp, etc.)	Pacific RCC region (global)	NOAA NESDIS/NCEI

	ENSO Satellite Rainfall Atlas	Pacific RCC region	NOAA NESDIS/NCEI
	Sea Level in Tide Gauges	Pacific RCC region (Mostly US Stations)	NOS/COOPS, SPC
	Pacific Climate Change Data Portal (includes long-term means for a number of reference climate stations)	Pacific RCC region except Hawaii	BoM
Climate Watch  <b>Note:</b> Watches listed here have LRF, monitoring, and data components so will come under the responsibility of all these node leads	Daily 5km Satellite Coral Bleaching Heat Stress Alert Area Product	Central and West Pacific	NOAA NESDIS/STAR
	Pacific Tides	Pacific RCC region	UHSLC, SPC
	ENSO Wrap Up	Pacific RCC region	BoM
	SCOPIC Drought Watch	Southwest Pacific	BoM, SPREP
	Red Cross Alert	Southwest Pacific	BoM, SPREP
	ENSO Watch	Pacific RCC region	NIWA
	Rain Watch	Pacific RCC region	NIWA
	Drought Watch	Pacific RCC region except Hawaii	NIWA
	Tropical Cyclone Outlook	Pacific RCC region	NIWA, BoM, NOAA

**Node leads: NOAA, UHSLC**  
**Consortium members: BoM, SPC, SPREP, NIWA**

## Climate data function

Function	Products	Coverage	Provider
Regional data sets	Pacific Climate Change Data Portal (includes some homogenized data records)	Pacific RCC region except Hawaii	BoM
	GHCN and ISD (temp, precip, winds, etc.)	Pacific RCC region (global)	NOAA NESDIS/NCEI
	Sea Level in Tide Gauges	Pacific RCC region (Mostly US Stations)	NOS/COOPS, SPC
	UHSLC/GLOSS Fast Delivery (FD) and Research Quality Data (RQD)	Pacific RCC region (global)	UHSLC
	Asia Pacific Data Research Center (APDRC) data portal (satellite, model, and station data)	Pacific RCC region/global	UH APDRC
	Pacific Ocean Portal	Pacific RCC region	SPC
Data management services for NMHSs	Regionally distributed climate database CLiDE	Pacific RCC region	BoM
	Tideda – Database used in National Hydrological Services	Southwest Pacific	NIWA

**Node lead: BoM**

**Consortium members: NOAA, UH APDRC, SPC, NIWA**

## Training function

Function	Products	Coverage	Provider
RCC product specifications & methodologies	Methodologies and specifications to be implemented by node leads and consortium members for all RCC products and services <i>(to be evaluated during demonstration phase)</i>	Pacific RCC region	All contributing members
	Socio-economic benefit analysis for climate services	Pacific RCC region	CSIRO
Training co-ordination	Inventories of training opportunities	Pacific RCC region	SPREP, NOAA, UPNG, BoM, NIWA
	UCAR COMET Program	Pacific RCC region	UCAR/NWS
	Training on RCC products (particularly related to sectors) is held at PICOFs	Pacific RCC region	RCC nodes on data, monitoring and LRF
	Ocean and tides training	Pacific RCC region	SPC

**Node lead: SPREP**

**Consortium members: NOAA, SPC, UPNG, BoM, NIWA, CSIRO**

## Highly recommended functions – Climate Projections

Function	Products	Coverage	Provider
Use of CMIP simulations; Downscaling; Guidance materials	Regional and national/sub-national projections	Pacific RCC region (14 countries) except Hawaii	CSIRO
	Pacific Climate Futures tool to analyse raw and downscaled CMIP3 and CMIP5 model data to inform risk and vulnerability assessment	Pacific RCC region (14 countries) except Hawaii	CSIRO, BoM
	Downscaled climate modelling (dynamical and statistical) <ul style="list-style-type: none"> <li>• Hawaii</li> <li>• American Samoa</li> <li>• Guam</li> </ul>	Central and Western Pacific	Pacific RISA, USGS PICSC, UH IPRC
Training	Climate change science training materials (including use of Pacific Climate Futures tool and all PACCSAP climate science publications including technical report, summary report and updated country brochures)	Pacific RCC region (14 countries) except Hawaii	CSIRO, SPREP
Research and Development	Pre-planning strategy to scope out a climate research function for the Pacific Climate Change Centre	Pacific RCC region	CSIRO, SPREP
Data services	Pacific Climate Futures tool for accessing projections data and for applying projections to observed data (for generating application ready data sets)	Pacific RCC region	CSIRO, BoM

**Node lead: CSIRO**

**Consortium members: US GCRP, BoM, USP, SPREP**

**Additional acronyms used in tables (in order of appearance)**

*CPC = Climate Prediction Center, SLC = Sea Level Center, HFO = Hawaiian Forecast Office, JIMAR = Joint Institute for Marine and Atmospheric Research, NESDIS = National Environmental Satellite, Data and Information Service, NCEI = National Centers for Environmental Information, NOS = National Ocean Service, COOPS = Center for Operational Oceanographic Products and Services, OAR = Oceanic and Atmospheric Research, ESRL = Earth System Research Laboratory, PMEL = Pacific Marine Environmental Laboratory, WRCC = Western Regional Climate Center, STAR = Center for Satellite Applications and Research, APDRC = Asia-Pacific Data Research Center, PRH = Pacific Hurricane Center, CSD = Climate Services Division, UCAR = University Corporation for Atmospheric Research, RISA = Regional Integrated Sciences and Assessments, USGS = United States Geological Survey, PICSC = Pacific Islands Climate Science Center, IPRC = International Pacific Research Center*