

Third Meeting of the Pacific Meteorological Council (PMC-3)

20-24 July 2015
Nuku'alofa
The Kingdom of Tonga

Agenda Item 4.22: United States Country Report

Purpose

1. To report on activities conducted by NOAA in support of the Pacific Meteorological Council and the SPREP Pacific Meteorological Desk Partnership since the 2nd PMC Meeting in 2013.

Background

2. The US has a well-developed weather enterprise with 122 weather forecast offices, 8 specialized weather centers, and over 4,500 staff. The importance of hydrometeorological and climate observations, forecasts, and warnings contributes to every aspect of the US domestic economy – from agriculture, construction, fishing, transportation, to tourism, the US public relies upon the U.S. National Oceanographic & Atmospheric Administration (NOAA) National Weather Service (NWS). Our investment in weather also extends to our development of strong global partnerships under the World Meteorological Organization, the Intergovernmental Oceanographic Commission, and others, which helps us to coordinate these programs and services with other nations, sharing best practices, exchange data, and improve our capacity and capabilities to expand our understanding and prediction of short, medium, and long term global trends, meanwhile contributing to improved Decision Support Services (DSS) for extreme weather, tsunamis, and other hazard events. It is in this context that we work closely with our partners in the Pacific to enhance their abilities to contribute to this global enterprise and benefit from the products and services generated by NOAA. This report will focus on the partnership between the National Meteorological and Hydrological Services (NMHS) in the Pacific and the US Government, particularly NOAA National Weather Service to improve weather, water, and climate services across the Pacific Region.
3. **Pacific Region Weather Service Offices** - NWS maintains its long standing commitment with the Federated States of Micronesia (FSM), the Republic of the Marshall Islands (RMI), and the Republic of Palau (ROP), under the Compact of Free Association, in the provision of weather services, through our support for Weather Services Offices in Majuro, RMI, Pohnpei, Chuuk, and Yap (FSM), and Koror (ROP). Staff of these offices are

citizens of their respective nations. NOAA is responsible for the facilities, infrastructure, operational forecasts and warnings supported by the Weather Forecast Office on Guam and the Pacific Tsunami Warning Center (PTWC). Annual inspections, on-site training, and maintenance support are provided from Guam and Honolulu. Continuous improvements are being planned, including upgrading the Chuuk WSO, and construction and relocation of the new WSO in Palau to the Palau International Airport should be underway by the end of 2015. Procurement began for new automatic weather stations to be installed at the Majuro, Kosrae, Pohnpei, Chuuk, Yap, and Palau international airports, thus finally achieving the long term goal of transitioning away from manual collection of aviation weather observations. About 8 years remain on the 2nd Compact of Free Association Agreement, and NOAA National Weather Service is committed to assisting the RMI, FSM and Palau to further developing the capacities to evolve their respective national meteorological services with assistance from the World Meteorological Organization and SPREP.

4. **Weather Ready Nations (WRN) – a Global Initiative** -Early in 2015, the US Permanent Representative launched the Weather Ready Nations Initiative with the WMO. This USNWS initiative is founded on the principle of preparedness of communities and developing citizen understanding of weather risks and proper responses to severe weather and climate events that could impact their lives. This initiative focuses on building partnerships with other government agencies – such as emergency managers, businesses, and public service providers like schools and hospitals that are all uniquely vulnerable in severe weather events, and focus on improving decision support services (DSS). At the heart of the initiative is enhanced planning and coordination efforts before weather events impact a community to help mitigate loss of property and life. This preparedness initiative builds on US community readiness programs like Storm Ready and Tsunami Ready, and the US Federal Emergency Management Agency’s Whole Community Approach to Emergency Management. These projects serve as models for other nations to work closely with their local communities to strengthen their resilience to potential weather and climate hazards.

The US and WMO are currently engaged in piloting global extensions of the WRN and looks forward to future collaboration with the Pacific Met Services in this initiative. Next steps include offering to collaborate with other WMO Members in the promotion of the uptake of WRN Principles as a key national resilience-building strategy, inviting participation to a WRN collaborative network, and convening a workshop that brings together best WRN-related practices from countries that already have a developed program. There will also be an initiation of a series of demonstration projects with selected (and interested) developing countries to highlight key elements of WRN, as well as a scaling up or adoption of principles through current WMO projects (SWFDP/FFG/MHEWS) and networks (VCP-IPM).

5. **Pacific Training Desk in Honolulu, Hawaii and soon Guam** - For over a decade the US has provided a hands-on forecaster training opportunity at the Honolulu Weather Forecast Office and Central Pacific Hurricane Center to build the technical capabilities of individual forecasters across the Pacific. Representatives of the NMHSs for the first 12 years of the Program came for a 6 week training course, and since the middle of 2014, have attended

the 4 week training with some prerequisites complete before arriving in Honolulu. The resumption of the Pacific International Training Desk has focused on providing tropical forecasting training to Met Office staff with little to no forecasting experience, so that they can become assistant forecasters upon returning to their home nations. There have been 18 students in 2014-15 from 10 countries. Recently added to the on-site program is a three day communications training module to help the Met Office personnel to advance their proficiency in operating RANET communications equipment for receiving and transmitting weather data and information. A recent success should be noted with the activation and use of a RANET Chatty Beetle to transmit an e-mail message to the Pacific International Training Desk. The Pacific Desk has hired an instructor to provide a training course for the FSM, RMI, and Palau Met Offices, to be taught at the Weather Forecast Office on Guam, to start up in 2015.

6. **Communications and Dissemination - RANET** - Nothing is more critical to weather forecasting than the collection and exchange of observational data from remote synoptic observers in near real time, as well as and the dissemination of warnings to remote communities and villages. Over the past decade, the Pacific islands region has seen an expansion of modern telecommunications capabilities into the capital cities and main islands in many areas. This has allowed for local telecommunications providers to offer broadband wired and wireless Internet connectivity previously unavailable. Many National Meteorological Services are now able receive meteorological data, models, and products via the Internet. However, the reach to remote provinces and villages still remains challenging, relying upon HF, VHF, and satellite communications systems.

NOAA has worked closely with Pacific Island Nations over the past decade with generous funding support from USAID Office of Foreign Disaster Assistance and the US contribution to the WMO Voluntary Cooperation Program to build a diverse network of backup and secondary communications technologies to support the dissemination of warnings and critical information during severe weather events and natural disasters. NOAA's contributions to building such systems as the Chatty Beetle, the Emergency Managers Warning Information Network (EMWIN), HF networks, LRIT, and RapidCast, have helped to improve the mechanisms for transmission of warning information to outer islands and even between capitals in extreme events. The US is committed to continuing to work with Pacific partners to sustain and improve these networks and looks for more dialogue on how to more efficiently train and maintain these systems over the coming years, and establishing a trust fund for ongoing support.

NOAA staff will be conducting interviews during this event to better understand current capabilities and the challenges, to insure advances in communications technologies will reach the broader expanse of remote islands and villages, as well as addressing interoperability among different nationally, regionally, and local emergency communications networks. Please see the RANET Report for additional specific information on each RANET system.

In the north Pacific, due to the need to upgrade communications systems and technologies to bandwidths necessary to transmit high volume next generation geostationary satellite data (such as from the Himiwari 8 and future GOES-R satellites) to

NOAA NWS Offices in Alaska and the Pacific Region, an unusual opportunity presented itself in which 100 Mbps cloud to cloud infrastructure has been established. By the end of 2015, both Weather Forecast Offices in Guam and Honolulu, and to a lesser extent in American Samoa (being upgrade to 10 Mbps) will be completed. This includes both the Pacific Tsunami Warning Center (now relocated from Ewa Beach, Hawaii to the new Inouye Regional Center on Ford Island) and will include the National Tsunami Warning Center in Palmer, Alaska. Upgrades to communications infrastructure for WSOs in Micronesia will be dependent on the progress in the advancement of communications infrastructures by their telecomm providers.

7. **Observations and Satellite Services – GOES R Transition** - The US relies on a robust network of observing capabilities to better understand the planet. There are NOAA satellites, ocean buoys for climate and tsunami, tide gauges, upper air networks, AMDAR, radar, automatic weather stations, and all manner of instruments like river gauges that depend upon the satellites to bring their data in real time to our global processing centers. All our products and services rely on data points synthesized in our Global Forecasting Ensembles and higher resolution regional models for weather and climate prediction products to be produced by our centers and the weather forecasting offices. In 2014 NWS began installing a super computer to advance these capabilities in numerical weather prediction and great improvements in the accuracy and timeliness of our forecast products are expected from this investment.

The National Environmental Satellite, Data, and Information Service (NESDIS) is rolling out a new series of GOES satellites that will provide far greater volumes of information to improve forecasting. This transition will require Pacific Meteorological Services who now receive high resolution GOES imagery to upgrade their GOES Direct Readout to accommodate the greatly increased data from the GOES-R satellites. In the GOES-R era, the EMWIN and LRIT separate broadcasts will be merged into one 400 Kbps broadcast, and will require an upgraded antenna and receiver Presentations from the 2015 NOAA Satellite Conference can be downloaded from the following web site: <http://satelliteconferences.noaa.gov/2015/NSC20150Agenda-final.htm>.

NOAA is linked with other nations through the WMO Information System (WIS) and was recently confirmed as a Global Information Systems Center (GISC). NOAA values the need to continue to support the efforts of Pacific Island SIDS and LDCs who have yet to be able to upgrade to broadband connectivity to WIS and GISC products, thus the need to maintain support for remote satellite systems such as EMWIN/LRIT, etc. NOAA will continue to make all of our data and information freely available through as many means as possible.

8. **Climate Services** - PaCIS (Pacific Climate Information System) has provided a programmatic framework for the U.S. National Oceanic and Atmospheric Administration (NOAA) to bring together ongoing and future climate observations, operational forecasting services and climate projections, research, assessment, data management, outreach, and education – an integrated system of climate services – to address the needs of the Pacific Islands. It has served as a forum for sharing the expertise, experience, and perspective needed to guide integrated program planning and product

development. PaCIS is composed of representatives of regional, national and local institutions and programs in the Pacific, as well as selected individuals from other regions, with experience and expertise in climate observations, science, assessment, education, outreach, users, and services.

With the PICS Panel established PaCIS and the administrative structure that is associated with it is evolving into a structure where the region-wide coordination that PaCIS had done can now be done via the PICS Panel. This will allow the NOAA Pacific Region climate services program to better direct limited resources by focusing on teaming amongst NOAA colleagues to see how NOAA can contribute towards priority activities identified in the PICS Panel's "Action Plan for Strengthening Climate Services in the Pacific" which includes support for the distributed RCC concept and proposal that is now evolving in the region.

- 9. Tsunami** - The US hosted the 50th Anniversary events commemorating the founding of the Pacific Tsunami Warning & Mitigation System from April 20-24, 2015 under the Intergovernmental Oceanographic Commission (IOC). Tsunami scientists and practitioners from National Meteorological Services, Geosciences, Ocean Services, National Disaster Management Offices, and key decision makers participated in an International Tsunami Symposium April 20-21st titled "Making the Pacific Ready for the Tsunami Threat". The International Tsunami Symposium provided the opportunity for these experts to discuss the state of the science and the developments necessary to sustain and advance the Pacific tsunami early warning system.

NOAA's Pacific Tsunami Warning Center transitioned to new products on October 1, 2014. Prior, the IOC and NOAA's International Tsunami Information Center provided regional training sessions across the Pacific to help prepare Pacific Island Countries and the other Pacific nations that rely on the tsunami forecasting guidance provided by the US. Pacific Island Country participation in the IOC PTWS Intergovernmental Coordination Group Meeting held in Honolulu was the largest ever and Samoa's Filomena Nelson was elected to serve as the Chair of the ICG for the next inter-sessional period. Ofa Fa'anunu was elected to serve as the Chair of the Southwest Pacific Regional Working Group. PTWC also relocated from its former site in Ewa Beach, Hawaii to the new NOAA Inouye Regional Center in March, 2015. The International Tsunami Information Center is co-located with the NWS Pacific Region Headquarters and the PTWC.

NOAA is dedicated to maintaining a network of robust remote sensing systems, such as – DARTs, seismic sensors, and sea level gauges and will continue to provide reliable and timely tsunami forecast advisory services to the PTWS. The ITIC will seek to fulfill requests for additional training courses in the upcoming year. The provision of tsunami warnings is a sovereign responsibility of each PTWS member and NOAA will continue providing training and awareness materials to help responsible entities develop SOPs and capabilities to warn their citizens of impending tsunami events. It is likely that these trainings will need to be supported by nations requesting assistance in the future. Therefore as each nation builds their disaster resiliency plans and development agendas, they are encouraged to seek funding support to advance their preparations for the ever-present threat of tsunamis in their region.

The ITIC, in cooperation with the IOC and endorsed by the ICG/PTWS, is currently developing a new international tsunami training course titled “Essential Tsunami Preparedness: Developing Tsunami Evacuation Plans, Maps, And Procedures.” The course trains countries on how to produce reliable and practical tsunami evacuation maps using sound science and a community-driven process. When completed in 2016, the course will be globally applicable, employ standardized tools and methodologies, and take advantage of country best practices. The course consists of series of linked training workshops covering inundation mapping, evacuation mapping, plans and operating procedures, and exercises. A PTWS Task Team on Evacuation Planning and Mapping is providing input to the ITIC; the Task Team is comprised of experts and representatives from Pacific sub-regions, including the Southwest Pacific Chair. A 1.5-year Pilot is currently being conducted, in Spanish, in Honduras, Central America. Other pilots, in English, could be undertaken subject to funding.

Marine Services -NOAA is a leader in ocean observations in the Pacific Region and supports critical buoy networks needed for tsunami detection, weather forecasting, and climate prediction. DARTs, TAO, Drifters, and Argo profiling floats are among our signature systems helping to describe our ocean in real time and over time. The US collaborates with 54 other global partners plus the European Union to maintain an array of over 3,800 active Argo profiling floats throughout the global ocean. In the Pacific there are 2,140 active profiling floats as of 19 July 2015. The Argo Home Page (<http://www.argo.ucsd.edu/>) [provides links to all aspects of the Argo program including links to operational forecast centers that produce forecasts and products using Argo data.](#) Links directly accessing gridded fields and data viewers are available at http://www.argo.ucsd.edu/Argo_data_and.html. [All Argo data are freely and openly available through two global Argo Data Assembly Centers: <http://www.usgoda.gov/argo/argo.html>; and \[www.coriolis.eu.org/cdc/DataSelection/cdcDataSelections.asp\]\(http://www.coriolis.eu.org/cdc/DataSelection/cdcDataSelections.asp\).](#) The TAO/TRITON network has 77 moorings and these data and information can be found on the National Data Buoy (NDBC) website: <http://www.ndbc.noaa.gov/>.

JCOMM Regional Marine Met Instrumentation Center - The US qualified as the first JCOMM certified Regional Marine Met Instrumentation Center for WMO Region IV that demonstrates best practices in ocean observing systems calibration and development, as well as data management. The US will hold its second workshop in February of 2016 funded in part by the JCOMM Data Buoy Cooperation Panel and RAV members may seek resources through WMO to attend the training event focused on wave forecasting.

Voluntary Observing Ship Program (VOS) – Port Meteorological Officers - The US is actively working to improve its contributions to the global VOS program by shifting observations taken to CLIMDEV software in all of the recruit vessels for better data management in real time and for climate forecasts. US is also working actively to develop an international mentoring program to encourage other countries to participate in the VOS Program. Pacific Island Met Services benefit from the data collected in this program by ships transiting the Pacific reporting on key data. PMC members may want to work with national vessels or shipping companies to become involved in VOS to increase the numbers of observing ships in the region.

NWS Weather Forecast Offices in the Pacific develop many of its products and services by relying heavily on remote sensed data from satellite and model generated data without the benefit of an extensive network marine observational data in the offshore and high seas areas to verify and enhance these products. Programs like the WMO VOS (Voluntary Observational Ship) Programme, provide the basis to collect and distribute invaluable in situ data to models run by regional and global centers which PMC members could benefit from to produce enhanced marine (tropical and non-tropical) forecasts and warnings to support the domestic and international marine community.

But ocean observing networks are costly and require annual investments to be sustained. Many networks suffer from vandalism at the hands of fishers who do not understand their importance. NOAA is working hard to build buoys that are more resilient to vandalism and also appeals to the global community to share the importance of these systems for understanding our weather and climate and predicting tsunamis with marine industries. Regional Fishing Organizations have recently developed regulations preventing fishers from coming to near buoys or using buoys to aggregate fish. NOAA hope our partners in the Pacific will share the importance of these buoy networks with their communities.

NOAA is also serving as a lead in the development of a global initiative called TPOS – Tropical Pacific Observing System 2020, which is a project to assess and document the requirements for future ocean observing networks and develop a set of recommendations and a plan for its resource working group describing the elements of an evolved ocean observing network that can be supported by global partners. The aim is to transition the TPOS to a more robust, integrated and sustainable design and plan beyond 2020. TPOS 2020 has successfully established partnerships, governing elements and Task Teams (TT) and is now looking to confirm TT, sub-project, and working group membership and plans along with development of concerted efforts to work with the TPOS Resource Forum members to understand and provide support for their activities and needs. More information about this JCOMM – IOC/WMO endorsed effort can be found at: <http://tpos2020.org/>

10. **COMET Training – Aviation QMS-** The MetEd website, one of COMET's primary undertakings, hosts hundreds of hours of education and training material for the geosciences – particularly useful for the Met Services and Disaster Management communities. NWS has long supported COMET's online training module development as a key part of its training program to update forecaster skills. NWS also has supported making COMET more relevant for international partners using funds from its contribution to the WMO VCP to translate and make more training modules. There are excellent resources on MetEd for forecasters to achieve the Aviation competencies required by WMO/International Civil Aviation Organization (ICAO). COMET has produced a suite of training resources that explain the characteristics of the weather patterns that give pilots and controllers the most difficulty and teach the best procedures and tools to predict them.

They also have a website to support international efforts to develop the technical and human infrastructures for successful natural hazards early warning systems.

<https://www.meted.ucar.edu/communities/hazwarnsys/> \Sponsored by NOAA/NWS, and in accordance with the disaster risk reduction efforts of the WMO and GEO, this site offers materials that share expertise in assessing risks, developing functional and sustainable monitoring and warning services, creating proper dissemination and communication systems, and coordinating with communities to increase their response capabilities.

The Environmental Satellite Resource Center provides easy access to a wide range of useful information, education, and training about low-earth orbit and geostationary satellites from trusted sources. <http://www.meted.ucar.edu/esrc/>.

NOAA encourages PMC members to utilize these resources for training staff and better understanding of key meteorological principles.

11. RECOMMENDATIONS:

The Meeting is invited to:

Note the US Country Report contents and the consider supporting the recommendations contained in the US reports on the Pacific Training Desk, RANET, and PaCIS.

Provide guidance and recommendations on how to improve and enhance the value of US support in the development of PICTs NMHSs.

Provide guidance and recommendations on how US support could be harmonized with other international efforts in the Pacific, to provide greater positive impact and value.

Recommend specific priorities for the US to consider with respect to its on-going support for the four PIMS priority areas:

- o Improved weather services, in particular aviation, marine and public weather services- including Weather Ready Nations;
- o Improved end-to-end Multi-Hazard Early Warning Systems (MHEWS)- especially tsunami and tropical cyclone;
- o Enhanced infrastructure (observational networks, data and information services) for weather, climate, water and related program and activities; and
- o Improved climate services.

Attachments none

18 July 2015