CPC-PaCIS (Pacific Climate Information System) Meeting and 2009 Hawaii Conservation Conference

Honolulu, Hawaii, July 27 – August, 2009

Meeting Summary Report

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(I) Background

Ed O'Lenic and Luke He traveled to Honolulu, Hawaii from July 27 to July 31 to attend the 2009 Hawai'i Conservation Conference and had a meeting with PaCIS leadership and Team Pacific. This travel was supported by NOAA Climate Test Bed (CTB) program.

Our primary objective of this travel was:

(1) Meet with PaCIS leadership and Team Pacific to identify tasks for PaCIS implementation plan. PaCIS has been developed and implemented to provide regional climate services information support to decision makers using an end to end approach. PaCIS provides a programmatic framework to integrate ongoing and future climate observations, operational forecasting services and climate projections, research, assessment, data management, outreach, and education to address the needs of American Flag and U.S.-Affiliated Pacific Islands (USAPI) user communities in a regional context. It involves the integration of activities from various agencies and organizations such as PEAC Center, NOAA IDEA (Integrated Data and Environmental Application) Center, NOAA Climate Prediction Center, NWS Climate Services Division, Pacific RISA (Pacific Islands Regional Integrated Science and Assessment), IPRC (International Pacific Research Center) at the University of Hawaii and other partners and institutes. We believe the dialog between CPC and PaCIS will enhance the collective efforts of scientific and outreach activities to meet the demand for climate information and climate services (e.g., seasonal climate outlook, climate monitoring, ENSO impacts on precipitation and sea level, etc.) from the Pacific region.

(2) Attend the Hawaii Conservation Conference (HCC) and engage partners and users to identify areas for potential collaboration and/or outreach to increase usage of CPC products and services. The annual Hawai'i Conservation Conference, presented by the Hawai'i Conservation Alliance, is the largest gathering of people actively involved in the protection and management of the natural environment in Hawai'i and the Pacific Region. The conference facilitates interaction among resource managers, the scientific community, and other stakeholders.

(II) CPC-PaCIS Meetings

On July 28, CPC and PaCIS members had a meeting in the East-West Centre, University of Hawaii. The following is the agenda:

(1) Eileen Shea & Jim Weyman (PaCIS): PaCIS History, Current state and Priorities
(2) Melissa Finucane (Pacific RISA): Pacific-RISA Plan
(3) Ed O'Lenic (CPC): Climate Prediction Center: Prediction, Monitoring and Outreach
(4) Luke He (CPC): Climate Monitor, Rainfall & Drought Prediction, Sea Level Analysis & Prediction, and Users Training – Four proposed cooperative projects between CPC and PaCIS
(5) Sarah Duncan & Julie Earp (PEAC): PEAC's Products and History
(6) Chase Norton (Hawaii State Climate Office): HSCO's Activities and Products
(7) Alice Ruan (HSCO): Climate change in precipitation extremes in Hawaii
(8**)** Joshua Fu (IPRC): Implementation of a consolidated subseasonal-to-seasonal rainfall forecast for the Pacific Islands
(9) Discussion

Eileen Shea (PaCIS Chair) and Jim Weyman (PaCIS Executive Director) reviewed the PaCIS's history, vision, mission objectives and program elements. The evolution of PaCIS is being guided by principles developed over a decade of climate experience in the Pacific region. The PaCIS has moved from Action Plan to Implementation Plan stage. The PaCIS has also been identified as an early regional climate services core program for NOAA. There are lots of opportunities in terms of all three PaCIS working groups as well as direct support in the context of Pacific RISA. CPC and PaCIS further collaboration, which includes but isn't limited to Pacific RISA will greatly improve the climate service and climate forecast over the Pacific region.

Ed O'Lenic (CPC) introduced CPC's products for Hawaii, which include ENSO monitoring and forecasting, 8-14-day temperature & precipitation forecasts for Hawaii, and local impacts of the forecasts. He also showed CPC's typical forecast process, forecast tools, forecast verification and forecast evaluation tool, drought monitoring and CPC's outreach and user interaction activities.

Luke He (CPC) proposed 4 possible areas that CPC may work with PaCIS for improving the climate service and climate forecast for the Pacific: (1) Climate Data Analysis: e.g., expansion of Pacific Rainfall Atlas by including precipitation extremes and tropical cyclone (2) Rainfall Prediction and Drought Monitoring: e.g., improving PRIDE rainfall model, forecast downscaling, a drought monitoring an early warning system for Hawaii and US-affiliated islands (3) Sea Level Prediction: Since predicting sea level change is a complex, challenging, and long-term problem, we need an improved model and high quality sea level observation (4) Users training.

Melissa Finucane (Pacific-RISA) reviewed the background of Pacific RISA, past and current projects. The Pacific RISA program supports Pacific island and coastal communities to mitigate and adapt to the impacts of climate variability and change. The Pacific-RISA strives to enhance Pacific communities' abilities to understand, plan for, and respond to changing climate conditions. The Pacific RISA emphasizes the engagement of communities, governments, and businesses in developing effective policies to build resilience in key sectors such as water resource management, coastal and marine resources, fisheries, agriculture, tourism, disaster management and public health. The Pacific RISA also adapts and applies existing model-based decision support tools with an initial focus on climate-related extreme events.

Sarah Duncan and Julie Earp (PEAC) gave an overview of the PEAC's history, products & services, and future products. PEAC was initiated as a small pilot project in 1994, and became a NWS climate operational center in 2000. PEAC is an example of a pilot program that has been successful in improving a forecast process by applying research, developing products and dissemination methods, and establishing user outreach. The goal of PEAC is to provide routine production and delivery tailored forecasts; as institutional focus for translation, interpretation, communication, education and outreach; and enhanced partnership among the scientific community, government agencies, and local decision makers. Some of PEAC's intended future products and services include:

1. supporting development of a PaCIS portal and a regional climate testbed;
2. preparing and disseminating education material;
3. writing a journal article to document PEAC's rainfall forecasting methodology;
4. standardizing and migrating PEAC's website to the NWS server;
5. developing additional research capacity with PEAC Graduate student.

Chase Norton (Hawaii State Climate Office) presented a review of Dr. Pao Shin Chu's entire list of journal publications. This work was at least partly related to the Hawaii State Climate Office's activities. Among the long list were: (a) Climate variability and tropical cyclones (b) Climate prediction (c) Climate Variability and Hawaii Rainfall (Drought) (d) Statistical Analysis of Extreme Events (e) Climate Change. (e) Climate Variability and Wild land Fire. Some current HSCO projects include monitoring climate for the Pacific Island Network (with National Park Service), operational probabilistic forecasting of seasonal typhoon tracks for the western North Pacific (with Pacific Disaster Center).

Alice Ruan (Hawaii State Climate Office) presented her recent research work with Prof Pao-Shin Chu for climate change in precipitation extremes in Hawaii using non-parametric method (Mann-Kendall test and Sen's method). They used Stationary Generalized extreme value diagrams (GEV) to show that there is a relative maximum at a lower elevation on the eastern slopes, which is similar to climate average pattern. Non-stationary GEV was portrayed as being capable of determining the variability of the return period of various extreme events. For example, they showed the 2-yr and 20-yr return period of extreme events decreased with time. They also discussed its relationship to the SOI.

Joshua Fu (IPRC) talked about a NOAA PRIDE supported project – "Implementation of a Consolidated Subseasonal-to-Seasonal Rainfall Forecast System for the Pacific Islands".
The PRIDE rainfall model consolidates 3 models (two dynamical models: NCEP CFS and IRPC_HcGCM, one statistical model: NCEP Constructed Analogy) by using Multi-model superensemble (MME) based on the Krishnamurti et al. (1999) technique. A downscaling scheme is applied to obtain rainfall for individual islands. The PRIDE rainfall model has been used in the monthly PEAC Climate Teleconference as an experimental tool.

There were also some discussions about the chance for collaboration and how to improve CPC's products and service:

1. Ray Tanabe requested that CPC make-available the high resolution version of the SST image routinely available in CPC's Pacific Islands webpage, for use in the Honolulu WFO media briefing,
2. A one pager, summarizing ENSO impacts for Hawaii and USAPI communities,
3. Kevin Kodama expressed some frustration with CPC's EC forecast. In particular, he wanted us to find a way to say something besides "EC". Ed explained that, sometimes that the uncertainty indicated by "EC" was a necessary part of putting out an accurate portrayal of the confidence of the forecaster. Ed said that CPC would examine the feasibility of using Dave Unger's objective ensemble regression technique (Consolidation) for the Hawaii long-lead 3-month outlooks,
4. Ed also requested that the Honolulu WFO evaluate CPC's week-2 Hawaii forecast, and provide any feedback they might have, including: i) the possible availability of more stations for the forecast and verification, ii) applying ensemble regression to consolidate forecast tools.

On July 31, 2009, Sarah Duncan, Julie Earp, Duncan Gifford and Luke He had a meeting with Annette Hollingshead of NWS CSD in Honolulu WFO conference room. Annette demonstrated some her initial work for the composite based local ENSO impacts for the Pacific: She suggested to use this products because (a)User Needs: Local office capability to analyze ENSO impacts with variables unique to location & socio-economic environment; Additional ENSO impact guidance & support; Enhance ENSO impact communication (b)Benefits: Provide ENSO awareness outreach material; Provide consistency via a standardized tool; Utilize local expertise with standardized CPC expertise and 'best practices'; Extension of NOAA Pacific Climate Atlas. This is a very good project to delivery related ENSO information to the users and decision makers over the Pacific region.
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On July 31, Luke He also visited Sea Level Center (SLC) at University of Hawaii to discuss with the scientist in SLC about the challenge of the sea level rise (observed sea level trends, systematic error of sea level in the forecast and observation). SLC also introduced their networks, tools, and quality control of sea level data, which is used by PEAC for the operational sea level prediction.

(III) 2009 annual Hawai'i Conservation Conference

Hawaii faces a host of environmental issues. Foremost among these are: 1) A steady decline in precipitation over the last century, and especially since the mid-1970s, 2) numerous invasive plant and animal species, which are pushing native species toward extinction, 3) Rapidly rising incidence of coral bleaching, due to warmer water, enhanced solar radiation, and rising ocean water pH, and 4) A rising sea level, which endangers low-lying coastal areas, and which also reduces the capacity of the salt water lenses under the islands, which are the source of much of Hawaii's drinking water.

Many of island neighbors in the Pacific already have been measurably affected by climate change. Climate change is a profoundly important topic for Hawaii and the Pacific region. It's important and challenger to understand the magnitude of changes that will impact our lands and seas, water resources, cultural heritage, residents, agricultural areas, and infrastructure. This is an annual opportunity to share experiences and ideas on a wide range of conservation issues affecting Hawai'i and the Pacific. The conference highlighted the current state of knowledge on climate change impacts and fostered a dialogue on adaptation and mitigation strategies for Hawaii's natural and human communities. There are 1200 people attending the 2009 HCC. **NOAA Climate Test Bed is one of the major sponsors of the 2009 HCS.**

CPC had an exhibitor table at 2009's Hawaii Conservation Conference to show 2 poster (one is for CPC's products for Hawaii including the ENSO forecast, 8-14-day temperature forecast for Hawaii, and local impacts of the forecasts, and another showing CPC's mission, vision and main products) and 3 CPC Brochures (CPC Prediction, CPC Monitoring, and CPC Outreach) to highlight CPC's activities for climate prediction and climate service.

This is a great meeting with lots of challenging climate change information. There are many good sessions, Symposiums and Forums, e.g.

(1) SYMPOSIUM: Climate Change Impacts in Hawaii and Island Communities

This panel presentation moderated by the lead author of the Islands Chapter of the USCCSP Unified Synthesis Product (Eileen Shea) who introduced the session with an overview of the key findings and recommendations in that chapter. Following this overview, panelists comprising state and regional experts from NOAA, other Federal agencies (most notably USGS), academia, and regional organizations discussed climate change impacts in Hawaii and Pacific Islands in the context of the three key issues addressed in the USP Islands Chapter:

• Anticipated reductions in the availability of freshwater resources will have significant implications for island communities, economies and resources;
• Island communities, infrastructure and ecosystems are vulnerable to coastal inundation due to sea level rise and coastal storms; and
• Climate changes affecting coastal and marine ecosystems will have major implications for

(2) FORUM: Global Climate Change Impacts in the United States

This formal, moderated panel presentation provided participants with an overview of the key findings and recommendations from the U.S. Global Climate Change Impacts in the United States Report released in June 2009. The U.S. Impacts report was commissioned in 2007 under the auspices of the U.S. Global Change Research Program, a consortium of 13 Federal Government agencies. Authored by a Committee of 31 leading climate scientists this nonpartisan Report is an authoritative assessment of the

most up-to-date climate change science available. The Report provides a highly-readable summary of the current state of understanding of changing climate conditions and their impacts for the United States. Panelists included three members of the Author Committee including: Thomas C. Peterson, one of the Committee's three co-chairs; Lynne Carter who brought insights into climate vulnerability and adaptation; and Eileen Shea who served as a lead author for the Islands Chapter of the Report. The panelists highlighted elements of key report chapters including state of the science summaries of climate change at the global and national level as well as selected sections most relevant to the 2009 Hawaii Conservation Conference (e.g., water resources, ecosystems coasts and adaptation).

(3) FORUM: Conservation Information Needs in a Changing Climate

Following the Symposium on Climate Change Impacts in Hawaii and Island Communities, Conference participants invited to join representatives of the National Oceanic and Atmospheric Administration (NOAA) in a less formal roundtable discussion to help identify critical climate data and information needs and help guide the development of new climate data products and information services. This session provided a Hawaii-focused conservation and resource management contribution to an ongoing series of climate data users conferences that began in November 2007 with a national-level discussion of climate information needs for the energy, transportation and insurance sectors. Participants engaged in a facilitated discussion of the following key issues:

• What are the most critical current and anticipated climate-related challenges and opportunities facing natural resource managers and conservation organizations in Hawaii;
• What information gaps currently limit the ability of resource managers and conservation organizations to respond to those challenges and capitalize or capitalize on those opportunities;
• What data products and information services would be most helpful in the near-term; and
• What steps should NOAA take to provide meaningful climate information services to support climate adaptation.

The findings and recommendations from this dialogue summarized for use in the state and provided to local and national NOAA program officials engaged in the development of a NOAA climate information service. In addition, this forum served as an important opportunity for stakeholder engagement in the context of NOAA's emerging regional science and services program.

(IV) Conclusions and Recommendations

In summary, the Pacific region is one of the most vulnerable areas around the world with respect to the impacts of climate-related natural disasters. Hawaii and the Pacific islands are facing unique challenges of climate change (e.g., sea level and air temperature rise, declining rainfall, increasing coastal erosion, extreme weather events and ocean

acidification, invasive species, and coral reef bleaching). However, there are many opportunities and areas that CPC and PaCIS can work together and collaborate to improve the climate forecast and climate service for the Pacific region. Some recommendations are:

(1) **CPC will work closely with PaCIS and participate PaCIS core activities: Monthly PEAC Teleconference, PaCIS Working Group Teleconference and PaCIS Steering Committee and Work Group meetings. PaCIS has three Working Groups (Working group on Education, Outreach and User Information Needs; Working Group on Operational Climate Observations, Products and Services, Work Group on Research and Assessment) to effectively and efficiently develop and design work plans to support the PaCIS mission objective. Currently, the three Working Groups are working on the selecting of priorities and pilot projects. CPC will work with PaCIS's to help the success of the PaCIS's priorities and pilot projects**
(2) **CPC will work with PaCIS (e.g., PEAC, Pacific-RISA) to find funding opportunities to enhance PaCIS research activities and abilities for improving climate forecast (e.g., consolidate rainfall and sea level forecast)**
(3) **User training. Users and customs over the Pacific need training: education materials (e.g., one-page on ENSO impacts for Hawaii and USAPI communities), and workshop. Users training are very important for delivering related climate information for decision makers across many economic sectors (e.g., water resource management, fisheries and coastal zone management) over the Pacific region.**
(4) **Ed O'Lenic and Melissa Finucane discussed possible collaboration on developing decision-support tools for users. In particular, Ed suggested that CPC's users need a method to allow them to assess the cost of failure and the value of success, since those are key ingredients in assessing risk, along with an appropriate probabilistic forecast of events corresponding to failure or success.**

Appendix I – PaCIS MiniProposal (Luke He)

Program: Improving NWS Products and Services in Partnership with the External Community

Category: Partnerships between CPC and RISAs

CPC POC: Luke He

Partners: PaCIS Steering Committee and Leadership (Eileen Shea, Jim Weyman); Pacific RISA (Melissa Finucane)

Title of Project: Building CPC's Contribution to PaCIS Vision

Outcomes: Identify tasks, near-term opportunities, and deliverables for CPC to contribute to PaCIS Implementation Plan

Benefits to partnership/CPC: This activity will enhance the relationship between CPC and the PaCIS community.

Activities to accomplish outcomes (workplan):

- Attend the Hawaii Conservation Conference and engage partners and users to identify areas for potential collaboration and/or outreach to increase usage of CPC products and services (http://hawaiiconservation.org/2009_hcc.asp)
- Meet with PaCIS leadership and the steering committee to identify tasks for implementation plan

How will outcomes be sustained and who will sustain them:

Budget request: $6000

Spend Plan (include everything that requires $$$):

- Travel for two people to meeting (airfare, lodging, etc.) - $5000
- Sponsorship for meeting - $1000