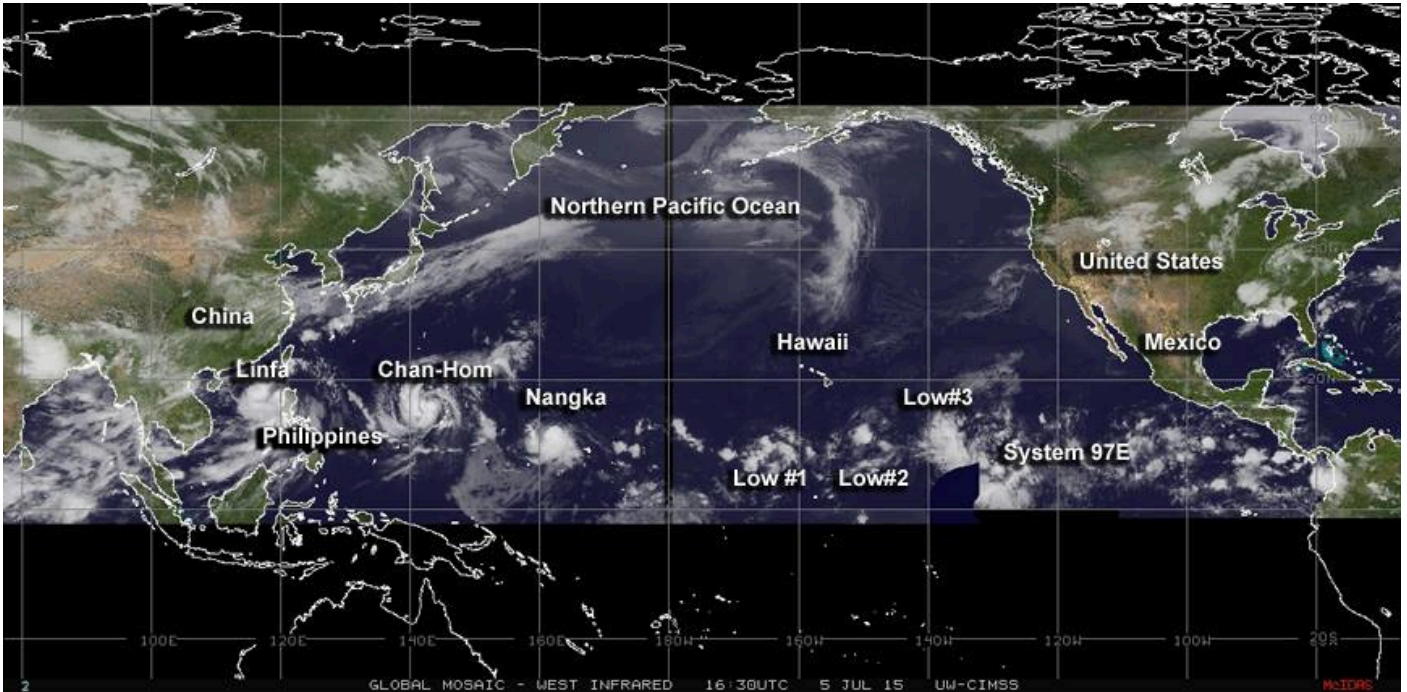


MEMBER REPORT

ESCAP/WMO Typhoon Committee 10th Integrated Workshop



United States of America Pacific Region

Kuala Lumpur, Malaysia
26 – 30 October 2015

Cover caption: This El Nino Year of 2015 has displayed anomalous equatorial westerlies across the entire Pacific Basin resulting in a chain of tropical cyclones that at times stretched from the Bay of Bengal in the west to the west coast of Mexico in the east. This infrared image shows tropical cyclone activity from the US East Pacific GOES-15 and the Japanese Himawari-8 geostationary satellite in early July 2015.

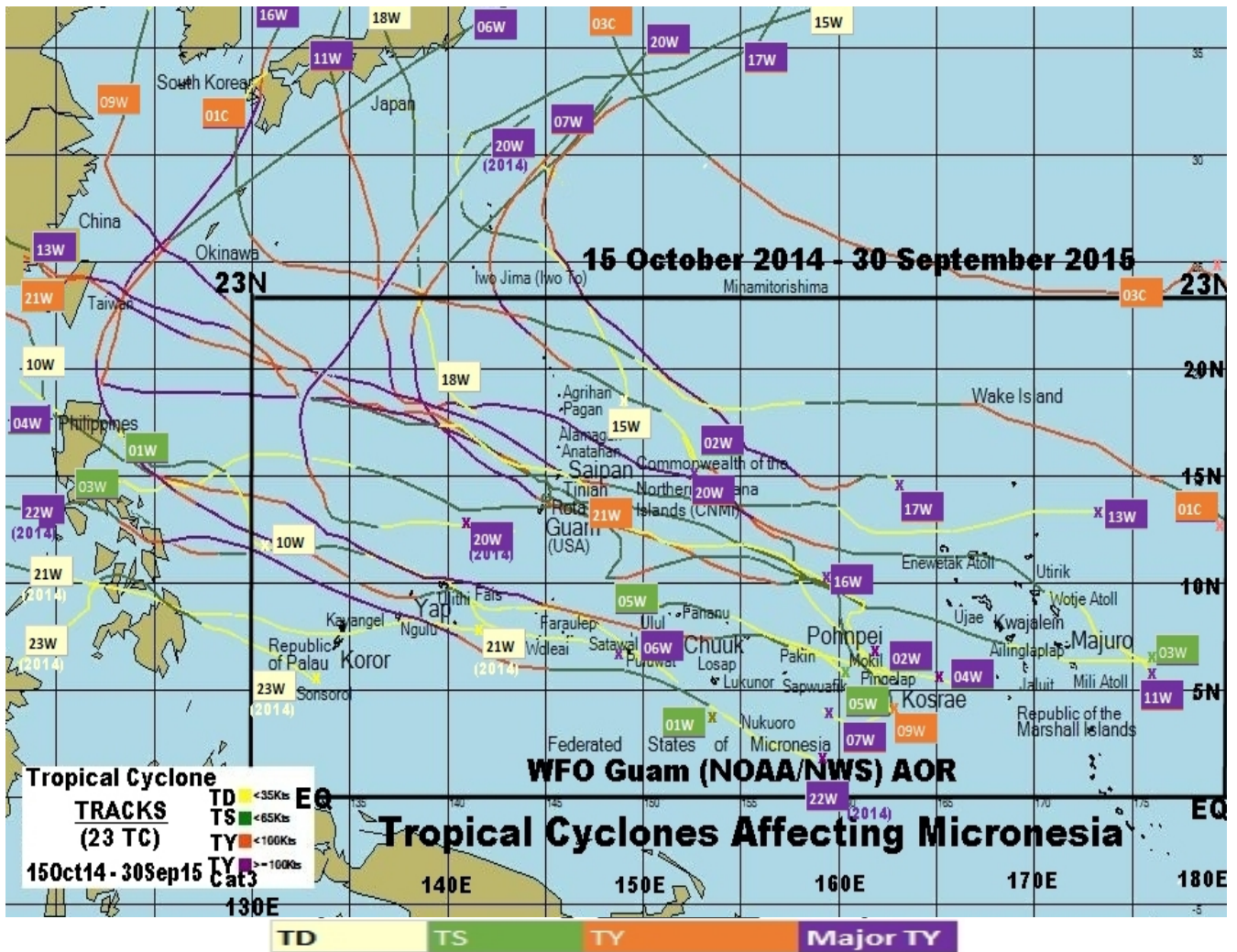
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I. Overview of tropical cyclones which have affected or impacted Member's area in 2015

1. Meteorological Assessment (highlighting forecasting issues/impacts) Western North Pacific (130E to 180, north of the equator) Overview



2014 15Oct-31Dec

20W	STY	NURI	Oct/Nov
21W	TS	SINLAKU	Nov
22W	STY	HAGUPIT	Nov/Dec
23W	TS	JANGMI	Dec/Jan

Tropical cyclone activity in the Micronesian portion (area between the Equator and 23N from 130E to 180, not including Kiribati) of the western North Pacific from 15 October 2014 through 30 September 2015

2015 1Jan-30Sep

11W	STY	NANGKA	Jun/Jul	MEKKAHALA	Jan
01C	TY	HALOLA	Jul	HIGOS	Feb
13W	STY	SOUDELOR	Jul/Aug	BAVI	Mar
15W	TS	MOLAVE	Aug	MAYSAK	Mar
16W	TY	GONI	Aug	HAISHEN	Apr
17W	STY	ATSANI	Aug	NOUL	May
03C	TY	KILO	Aug/Sep	DOLPHIN	May
18W	TS	ETAU	Sep	CHANHOM	Jun
20W	TY	KROVANH	Sep	LINFA	Jun
21W	TY	DUJUAN	Sep		

Figure 1: Tropical Cyclones affecting Micronesia from 15 October 2014 through 30 September 2015. Color scheme is for the highest intensity within the WFO Guam AOR. Starting and ending tracks are indicated.

showed a dramatic increase in activity during this period that had not been seen since the last very strong El Nino year of 1997. Activity increased not only in numbers, but in the intensity of systems within Micronesia and in the location of formations well to the east of previous years. Twenty-three tropical cyclones passed through the WFO Guam AOR during this 11-and-a-half month period. Starting with Tropical Storm Bavi (03W), forming in mid-March with the aid of deep equatorial westerlies, both tropical cyclone and monsoon activity continued in Micronesia, almost unabated, through the end of September. In particular, since 1 January, excluding the two systems that traveled into the AOR from the Central Pacific region, Micronesia has had 17 tropical cyclones originating in the area, including thirteen total typhoons, eight major typhoons (Typhoon Category 3, (96 knots or greater, 1-minute sustained wind)), and five super typhoons (130 knots or greater)...all well over the mean totals for the first nine months of the year.

During this reporting period, WFO Guam issued advisories, watches and warnings on twelve tropical cyclones. This included over 440 Public Advisories for any tropical cyclone anywhere in the entire AOR and 160 Local Statements, which detailed the specific effects and recommendations for each island that fell under a WFO Guam tropical storm or typhoon watch or warning. In addition, numerous special weather advisories were issued for weather events that affected the islands either because of heavy rains and flooding due to the prolonged effects of this year's monsoon or for periods of high seas and surf from the associated surface winds. Inundation was particularly an issue this year for westerly swells affecting the low-lying Marshall Islands. Significant typhoons that affected Micronesia include: Typhoon Maysak that made the first direct eye passage over the Chuuk Lagoon since Typhoon Amy in 1971 and a passage over Ulithi as a Category 5 typhoon; the rapidly intensifying midget Typhoon Soudelor that passed over Saipan as a Category 4 typhoon; and Tropical Storm Bavi and Typhoon Dolphin, which affected eastern Micronesia and later passed directly over Guam.

Central North Pacific (140W to 180, North of the Equator) Overview

Eleven tropical cyclones entered into, or were generated in, the central North Pacific during the period from January 1 through September 30, 2015. Of these eleven tropical cyclones, six became hurricanes, four major hurricanes (Hilda, Kilo, Ignacio, Jimena), while the remaining five attained only tropical storm status. Several records dating back to 1949 were met or exceeded during this hurricane season including, 1) the earliest named storm during hurricane season (June through November) Ela on July 5, previous record Wali, July 17, 2014; 2) three storms formed in three days (Ela, Halola

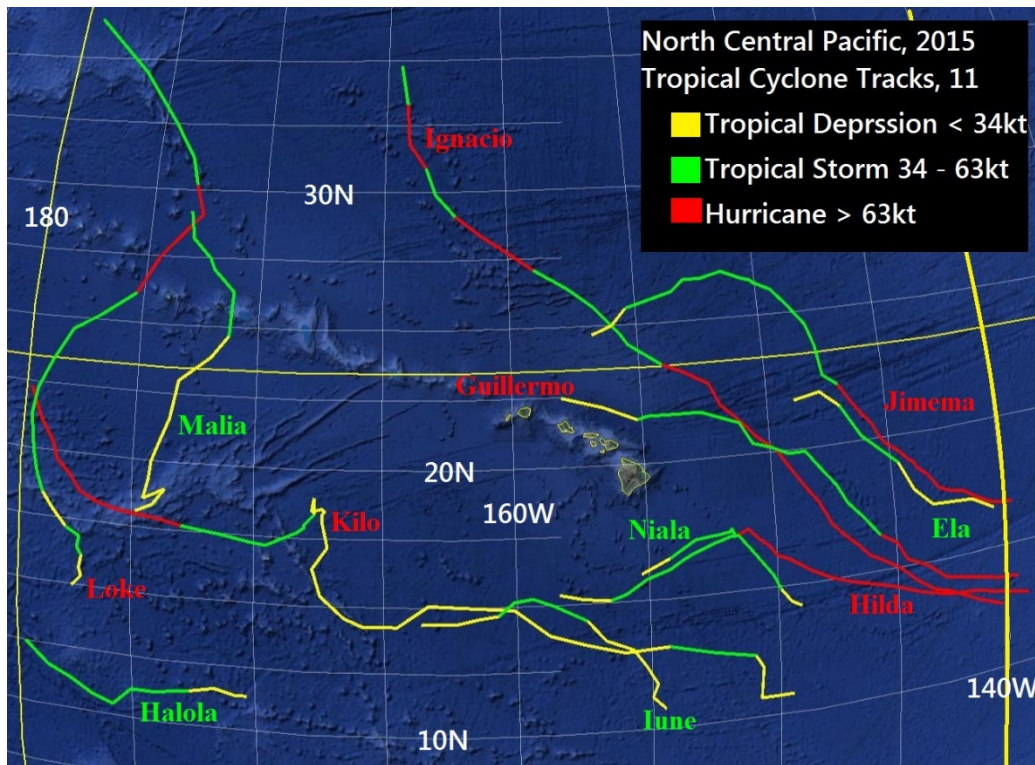


Figure 2: Tropical cyclones affecting the central North Pacific January through September 2015

and June, July 8-10), previous record 18 days in 1982; 3) first time three storms form in the basin in a calendar month; 4) seven tropical cyclones formed in the basin during the season (Ela, Halola, June, Kilo, Loke, Malia, Niala), previous record 4 in 1982; 5) Eleven tropical cyclones formed or entered the basin, ties the record set in 1992 and 1994; and 6) Eleven named tropical cyclones formed or entered the basin, previous record 10 in 1992 and 1994. Although there were no land-falling systems, high surf, coastal flooding, flooding rains and oppressive heat impacted the Hawaiian Islands throughout the season. The largest surf came from Hurricane Ignacio as it passed to the east and northeast of the main Hawaiian Islands. Ignacio produced large waves and a small storm surge resulting in water and debris on roadways along the Big Island's (also known as Hawaii Island) and Oahu's eastern coastline causing road and beach park closures. Also during Hurricane Ignacio, heavy rain fell across the main Hawaiian Islands causing widespread flooding, including portions of Honolulu. Hurricanes Hilda and Kilo forced deep tropical moisture over the main Hawaiian Islands which led to significant flooding rains. Impacts of this flooding included a massive sewage spill when the Honolulu drainage system was overwhelmed, flooding of homes and businesses, and one flash flood fatality. Hurricane Guillermo had the closest approach to the main Hawaiian Islands and produced coastal flooding as large waves closed roads and beach parks. Portions of the northwest Hawaiian Islands, which are not populated but host research teams, were evacuated a few times this season due to large waves associated with Hurricane Kilo and Tropical Storm Malia.

2. Hydrological Assessment (highlighting water-related issues/impact)

Western North Pacific (130E to 180, north of the equator) Overview

Very dry conditions persisted over the Republic of Palau through June. Early establishment of the monsoon trough over Micronesia resulted in above average rainfall for the entire region through mid-October and quickly relieved the dry conditions over Palau. As an example, rainfall for Guam was 128% of average through the end of September.

Central North Pacific (140W to 180, North of the Equator) Overview

The main Hawaiian Islands experienced above normal rainfall relieving drought conditions across the state. The only areas remaining in abnormally dry conditions are the extreme southern portions of Kauai, Maui and the Big Island (also known as Hawaii Island).

3. Socio-Economic Assessment (highlighting socio-economic and DRR issues/impacts)

Western North Pacific (130E to 180, north of the equator) Overview

WFO Guam conducted 52 formal presentations for emergency managers and military decision makers that often included representatives from the Federal Emergency Management Agency or the United States (US) Agency for International Development, the two key US agencies for emergency recovery and relief. The WFO also conducted more than two hundred radio and television interviews and more than 100 outreach educational events that in-part addressed tropical cyclones. WFO Guam also introduced a Facebook page that rapidly became extremely popular and effective. During Typhoon Dolphin, the Facebook page got over 425,000 hits as the storm approached and passed Guam and the other Mariana Islands. Despite the activity in the Mariana Islands, there were no deaths or serious injuries. Unfortunately, the passage of Typhoon Maysak over Chuuk Lagoon resulted in four deaths, three from falling tree limbs and one from a mudslide.

Central North Pacific (140W to 180, North of the Equator) Overview

Regional Specialized Meteorological Center (RSMC) Honolulu conducted over 50 tropical cyclone related outreach events, several hundred broadcast and print media interviews, and over 50 formal Emergency Manager briefings. Also in 2015, RSMC Honolulu conducted a formal Federal Emergency Management Agency (FEMA) course entitled "Hurricane Preparedness for Decision Makers." This course was attended by emergency managers, police, fire, homeland security, and other decision makers. Following the course, RSMC Honolulu participated in a week-long hurricane exercise by providing advisories and briefings. For all events, RSMC Honolulu emphasized that a direct land-fall is not necessary to produce major damage and impacts.

4. Regional Cooperation Assessment (highlighting regional cooperation successes and challenges)

None.

II. Summary of progress in Key Result Areas

Title of item:

NOAA Weather-Ready Nation Ambassador Initiative



In 2013, NOAA embarked on a program called the Weather-Ready Nation. This program had the objective to build community resilience to reduce vulnerability to extreme weather and water events.

In 2014, another program designed to bring attention to and prepare for weather hazards was the Weather Ready Nation Ambassador™. The Weather-Ready Nation Ambassador™ initiative is the National Oceanic and Atmospheric Administration's (NOAA) effort to formally recognize NOAA partners who are improving the nation's readiness, responsiveness, and overall resilience against extreme weather, water, and climate events. As a WRN Ambassador, partners commit to working with NOAA and other Ambassadors to strengthen national resilience against extreme weather. Throughout 2015, the WRN Ambassador initiative helped and continues to help unify the efforts across government, non-profits, academia, and private industry toward making the nation more ready, responsive, and resilient against extreme environmental hazards.

Identified opportunities/challenges, if any, for further development or collaboration:

NWS will use the opportunity to engage in multi-lateral forums and engage with partners in international agreements to help infuse the global weather enterprise with our new weather and climate information, new science, and innovative technology and seek opportunities to learn best practices from other countries to improve our technology and service delivery. We will expand our partnerships to help improve and sustain observing and communications networks essential for early warnings

KRA =	1	2	3	4	5	6	7
Meteorology		X		X	X		
Hydrology		X		X	X		
DRR		X		X	X		
Training and research							
Resource mobilization or regional collaboration							

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Title of item:

China Meteorological Administration (CMA) and U.S. National Oceanic and Atmospheric Administration (NOAA) sign agreement.

On September 1, CMA and the NOAA signed an Agreement to extend the Protocol on Cooperation in the Field of Atmospheric Science and Technology. The signing of the Agreement was represented by Administrator Dr. Zheng Guoguang from the CMA, Assistant Administrator Dr. Holly Bamford from National Ocean Service and Assistant Administrator Dr. Louis Uccellini from NWS.

Both CMA and NOAA will carry out science and technology cooperation in six fields including: climate and monsoon development research, numerical forecasting, meteorological modernization, satellite meteorology, and training.

For two days, members of the CMA participated in the Summary of the 19th Joint Working Group meeting with NOAA leadership at the NOAA Center for Weather and Climate Prediction (NCWCP) in College Park, Maryland.

Since the signing of the Protocol on Cooperation in the Field of Atmospheric Science and Technology in 1979, China and the US have developed extensive cooperation that has provided high visibility from both government agencies.

In June 2015, the seventh China-US Strategic and Economic Dialogue developed four cooperative proposals: joint research of disastrous weather monitoring; joint research and greenhouse gases monitoring; climate science and climate service; and space weather forecasting and service.

Identified opportunities/challenges, if any, for further development or collaboration:
None.

KRA =	1	2	3	4	5	6	7
Meteorology							X
Hydrology							X
DRR							X
Training and research							
Resource mobilization or regional collaboration							

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Title of item:

National Weather Service Deputy Director addresses the 17th WMO Congress.

NWS Deputy Director Laura Furgione was in Geneva, Switzerland, for the 17th World Meteorological Organization (WMO) Congress, in her capacity as United States permanent representative with the WMO. Ms. Furgione co-hosted the U.S. reception with Ambassador Pamela Hamamoto, where they welcomed over three hundred delegates to the congress.

The ambassador reaffirmed the U.S. commitment to support the international community through the WMO, where NWS has the lead for the U.S. government.

Ms. Furgione stressed the importance of the WMO to the U.S. by emphasizing how the scientific community has a long-standing tradition of international engagement and data sharing. She also stated that we can no longer merely produce an accurate forecast, but like our Weather-Ready Nation strategic outcome, we must produce forecasts and warnings that are more action-oriented to reduce the number of weather related fatalities.

Ms. Furgione ended her remarks by stating that the global weather enterprise is increasingly eager to develop techniques to better anticipate social and economic impacts of hazardous weather. She also mentioned that NOAA would soon be partnering with the WMO and others on sharing best practices and supporting demonstration projects in developing countries through the new Weather-Ready Nations initiative.

Identified opportunities/challenges, if any, for further development or collaboration:
None.

KRA =	1	2	3	4	5	6	7
Meteorology							X
Hydrology							X
DRR							X
Training and research							
Resource mobilization or regional collaboration							

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Title of item:

Annual Tropical Cyclone, Disaster Preparedness and Climate Workshops

A primary WFO Guam outreach event each year for the major Micronesia islands is the Annual Tropical Cyclone, Disaster Preparedness and Climate Workshop. These two-day, 18-module Workshops are tailored for each island and designed for decision makers in the local, state, and national governments and agencies.

The Workshops cover a plethora of topics such as:

- tropical cyclone behavior, structure, and hazards;
- the WFO Guam tropical cyclone program, products, and timing of products;
- tropical cyclone plotting and speed-distance-time computations;
- a scale that relates tropical cyclone wind speed to damage and storm surge;
- applications tutorial for applying the scale; typhoon risk and vulnerability;
- tropical cyclone decision making for individual islands and states; and
- WFO Guam website products.
- general climate familiarity, climate variability, and climate change;
- El Niño /La Niña and their effects, impacts and status;
- Other subjects addressed are tsunamis and volcanoes; rip currents, currents, and tides; earthquakes, and local communications capabilities.

In 2015, WFO Guam conducted workshops at: Chuuk and Kosrae in the Federated States of Micronesia; Majuro, Ebeye and Kwajalein in the Republic of the Marshall Islands; Saipan, Rota and Tinian in the Commonwealth of the Northern Marianas Islands, and on Guam.

Identified opportunities/challenges, if any, for further development or collaboration:

In addition to conducting the workshops, WFO Guam also provides seminars at the local colleges, training at the meteorological service offices and to disaster managers, and weather spotter and surf observer training. They also interface with local Non-Government Organizations and US Embassies. PowerPoint presentations are being expanded to include comprehensive notes to allow a broader number of lecturers.

KRA =	1	2	3	4	5	6	7
Meteorology				X	X		
Hydrology				X	X		
DRR				X	X		
Training and research				X	X		
Resource mobilization or regional collaboration							

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Title of item:

Annual Tropical Cyclone Exercises

It is always important to have procedures in place for dealing with tropical cyclones. Even more important is testing and evaluating these programs. In 2015, RSMC Honolulu participated in annual tropical cyclone exercises.

RSMC Honolulu participated in a statewide annual tropical cyclone exercise in Hawaii. The annual hurricane exercise, coordinated by Hawaii State Civil Defense (SCD) in partnership with the NWS Forecast Office in Honolulu was held in June.

On Guam, the annual Typhoon Preparedness exercise did not take place due to the early occurrences of Typhoon Bavi in March and Typhoon Dolphin in May. Disaster managers and WFO Guam jointly decided to use the two opportunities to conduct comprehensive reviews of appropriate response plans.

Identified opportunities/challenges, if any, for further development or collaboration:

None.

KRA =	1	2	3	4	5	6	7
Meteorology							
Hydrology							
DRR				X	X		
Training and research							
Resource mobilization or regional collaboration							

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Title of item:

National Weather Service StormReady/TsunamiReady Programs



StormReady is a program designed by the National Weather Service to help communities and counties implement procedures and supplemental programs to reduce the potential for disastrous, weather-related consequences. StormReady helps communities evaluate their current levels of preparedness for and response to extreme weather-related events. These communities demonstrate a strong commitment to saving lives and protecting property when hazardous weather strikes. By participating in StormReady, local agencies can earn recognition for their jurisdiction by meeting guidelines established by the NWS in partnership with federal, state and local emergency management professionals. TsunamiReady is a similar program that expands preparedness and response of coastal communities to tsunami threats.

In October 2014, the island of Tinian, CNMI was recognized for another three years as a StormReady/TsunamiReady location. This designation was tested when Typhoons Bavi, Dolphin, Chanhom, Soudelor, and Goni tracked toward the CNMI. Tinian Emergency Management office went into action and adequately warned their populace, preventing injury and unnecessary destruction of property.

In April 2015, the US Naval Base on Guam was officially recognized as StormReady and TsunamiReady. Because the military base functions as its own community, it was an important recognition for the Department of Defense. This is the second military base on island to receive this recognition. Last year in March 2014, Andersen Air Force Base became StormReady/TsunamiReady. This distinction among other military bases emphasizes the readiness and preparedness of the installation.

RSMC Honolulu assisted the community of Waimanalo, on the island of Oahu, in becoming StormReady and TsunamiReady; and Hawaii Volcanoes National Park in renewing their designations as StormReady and TsunamiReady. RSMC Honolulu ensured the community had disaster action plans in place and held outreach events to convey a preparedness message. Six entities were assisted in achieving this designation.

As of October 2015, there were 2245 StormReady Communities in the United States, of which, 17 are in the Pacific Region. There were also 177 TsunamiReady communities, of which 17 were in the Pacific Region. All of the locations under the WFO Guam AOR are both StormReady and TsunamiReady.

Identified opportunities/challenges, if any, for further development or collaboration:
None

KRA =	1	2	3	4	5	6	7
Meteorology					X		
Hydrology							
DRR	X						
Training and research							
Resource mobilization or regional collaboration							

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Title of item:

Advanced Weather Interactive Processing System (AWIPS) II

AWIPS is the engine running NWS Weather Forecast Office operations. It is an interactive computer system that integrates all meteorological, hydrological, satellite, and radar data into a single computer workstation. First implemented in 2001, AWIPS provides an efficient and effective means for forecasters to prepare and issue timely, accurate forecasts and warnings. It allows forecasters the interactive capability to view, analyze, combine, and manipulate large amounts of graphical and alphanumeric weather data.

In 2015, NWS embarked on implementing the newest and most ambitious upgrade to the program—AWIPS II. AWIPS-II is a more robust system and implements a modern Services-Oriented Architecture (SOA) infrastructure.

This modernized platform utilizes a new object-oriented architecture and scalable design to implement new display technology and data interrogation techniques. The enhanced capability is important for meteorologists as they face an unprecedented volume of decision-influencing observations and model output fields, while striving to increase lead times and accuracy for dangerous weather events. One of the contributors to the influx of new, useful observations will be the Geostationary Operational Environmental Satellite (GOES) R-Series. The challenge is to allow for gainful information to be ascertained by the forecaster without requiring a significant amount of time for assessment or compromising the details in the data.

The increased functionality of AWIPS II is in part due to a re-engineered, service-oriented architecture and multi-platform Java codebase, which improves system performance and streamlines the enhancement process for new features while limiting the need for significant incremental upgrades and maintenance releases.

Identified opportunities/challenges, if any, for further development or collaboration:

In the future, AWIPS II will likely contain intuitive user controls, which communicate directly with the graphical processing unit to quickly render displays.

KRA =	1	2	3	4	5	6	7
Meteorology							
Hydrology							
DRR							
Training and research							
Resource mobilization or regional collaboration							

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Title of item:

Outreach/Education Activities

- *Expanded Pacific Hydrology Discussions.* Both WFO Guam and RSMC Honolulu provide input into the quarterly *Pacific ENSO Update* newsletter produced by the Pacific ENSO Applications Climate Center, which issues Special Updates, if warranted. WFO Guam also provides input to the Climate Prediction Center's Monthly *ENSO Diagnostics Discussion* and employs the use of more comprehensive and targeted products--the *Hydrologic Outlook* product for extreme rainfall events and the *Drought Information Statement* for drought events. Finally, WFO Guam and RSMC Honolulu assist in preparing a popular quarterly two-page color product called the *Hawaii and U.S. Pacific Islands Climate Impacts and Outlook*.
- *RSMC Press Conference.* RSMC Honolulu hosted a press conference to announce the 2015 Central Pacific Hurricane Season Outlook on 26 May.
- *RSMC Honolulu media interfaces.* RSMC Honolulu conducted in the neighborhood of a thousand media interviews, teleconferences and press briefings throughout the season as several of the tropical cyclones had impacts to the Hawaiian Islands in order to provide decision makers with useful and timely information about developing hazards.
- *National Disaster Preparedness Month.* September was National Disaster Preparedness Month for 2015. The Emergency Management Offices on Guam and in the CNMI took the leads and arranged the events. On Guam, several events and numerous activities such as school presentations and a Grand Finale event at a major shopping center showcased the Preparedness Month. WFO Guam participated in the proclamation signing by the Governor of Guam, several awareness activities, and the Grand Finale Display at a local Shopping Center. During the month, the WFO Guam conducted associated outreach activities on Chuuk in the Federated States of Micronesia and on Tinian in the Commonwealth of the Northern Mariana Islands (CNMI) and radio and television interviews on Saipan (CNMI), despite the island's continued recovery from Typhoon Soudelor.
- *University Course Enhancement.* Nine times during the period, WFO Guam hosted the University of Guam Environmental Biology and Physical Geography classes providing facility tours and seminars on tropical cyclones, ENSO, and Climate Change. This provided education to nearly 300 students majoring in such topics as nursing, education, criminal justice, and biological sciences.
- *El Nino briefings.* WFO Guam played a major role in producing products that explain El Nino influences on western North Pacific tropical cyclone activity, rainfall, and sea level through the Pacific ENSO Applications Climate (PEAC) Center's *Pacific ENSO Update* newsletter and through specifically prepared

updates provided to senior leadership during WFO Guam visits to Micronesia.

- *Tailored outreach materials.* Despite a temporary reduction in tropical cyclone training, WFO Guam developed new products for the islands. These include specifically tailored rip current, flash flood/flood, mud slide, and tropical cyclone brochures.
- *Research.* WFO Guam and the University of Guam jointly prepared typhoon wind assessments for Typhoon Dolphin, Typhoon Soudelor, and Super Typhoon Maysak. WFO Guam people also participated in research that resulted in several refereed journal articles and also refereed/reviewed several articles for major meteorological and climate journals.

Identified opportunities/challenges, if any, for further development or collaboration:

Research the impact of Social Media as a means of outreach before and during events.

KRA =	1	2	3	4	5	6	7
Meteorology				X	X		
Hydrology					X		
DRR				X	X		
Training and research				X			
Resource mobilization or regional collaboration							

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Title of item:

Pacific International Training Desk

The Pacific International Training Desk (PITD), funded by the USA National Weather Service as part of the US contribution to the WMO Voluntary Cooperation Program (VCP), had four cohorts trained this year for a total of 13 students. The PITD is managed by the University of Hawaii, Telecommunications and Social Informatics (TASI) Research Program. The new Desk has four components: 1) basic forecaster training, to be implemented through use of e-learning modules that will be readily available to anyone; 2) a month long, instructor led on-site training program carried out at RSMC Honolulu; 3) training on use of communications equipment, also to be funded by the VCP: and 4) in-Island workshops on severe weather event topics.

Identified opportunities/challenges, if any, for further development or collaboration:

Nil.

KRA =	1	2	3	4	5	6	7
Meteorology						X	X
Hydrology						X	X
DRR						X	X
Training and research						X	X
Resource mobilization or regional collaboration							

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Title of item:

International Cooperation Efforts

- *Annual WGDRR meeting.* The 10th annual WGDRR Meeting was held in Seoul, Republic of Korea in May 2015 at the kind generosity of the National Disaster Management Institute. This year's theme, "Learning from Past Disasters", was prominently featured in members' presentations. Members discussed completion of current work plans and approved the 2016 work plan along with connections to the Sendai Framework. Ray Tanabe represented the US and presented an update on the National Weather Service Weather Ready Nation initiative.
- *SSOP Expert Mission.* SSOP Tropical Cyclone mission to Cambodia, Lao People's Democratic Republic, and the Republic of the Philippines: The mission was successful in assisting the visited countries in developing SSOPs for their respective requirements. All visited countries expressed the need for additional assistance in further developing SSOPs, and were very accommodating to the Mission and grateful for the assistance.. The Mission achieved its objectives by assisting in the development of draft SSOPs. A list of 31 accomplishments was developed under the following topic headings: Manual, Missions, Miscellaneous, Follow-on, and Outside the Scope of the Project Issues.

Identified opportunities/challenges, if any, for further development or collaboration:

None.

KRA =	1	2	3	4	5	6	7
Meteorology						X	X
Hydrology						X	X
DRR							X
Training and research						X	X
Resource mobilization or regional collaboration							

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Title of item:

Technological Improvements

- *GOES-R project and Initial Views from the Himawari Satellite.* RMSC Honolulu and WFO Guam have been participating in both the examination of the new high resolution data now available from the new Japanese Himawari geostationary satellite as well as through the on-going GOES-R project. In addition, data continues to be received, analyzed, and evaluated from the multiple sensors and displays coming from a large number of polar orbiting satellite instruments. One of those sensors is onboard the Suomi NPP satellite and it continues to play a critical role in locating positions of tropical cyclones. The Visible Infrared Imaging Radiometer Suite (VIIRS) is able to produce a day-night band allowing forecasters to receive visible images at night. Plans are already underway within the U.S. National Weather Service to restructure its satellite training and forecasting programs in order to take advantage of the new suite of sensors that are now becoming available.
- *Continued evaluation and application of ocean surface wind vector scatterometer instruments (ASCAT, RSCAT and Windsat).* The addition of the RSCAT instrument on board the International Space Station (ISS) has been a welcome addition to ocean surface wind vector coverage over the tropical oceans. These data plus the two ASCAT instruments and the Windsat sensor are made available in near real-time to the operational forecasters by the European Space Agency (ESA), NOAA/NESDIS and the US Naval Research Laboratory (NRL). Coriolis satellite also provides surface wind data through its Windsat via its 37GHz microwave instrument. While these instruments are subject to the attenuation effects of heavy rainfall and are somewhat limited under very light and very strong wind conditions, they continue to greatly improve our capability to monitor tropical cyclone development and to observe the structure and intensity of tropical cyclones in the AOR.

Identified opportunities/challenges, if any, for further development or collaboration:
None

KRA =	1	2	3	4	5	6	7
Meteorology	X					X	
Hydrology							
DRR		X				X	

Training and research							
Resource mobilization or regional collaboration							

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Title of item:

Improved Typhoon-related Disaster Risk Management in Various Sectors

- *Tropical Weather Outlook graphic.* During the tropical cyclone season, RSMC Honolulu prepares and transmits a text and graphical *Tropical Weather Outlook* that illustrates the probability of tropical cyclone development in the next 48 hours.
- *Hawaii State Hazard Mitigation Forum.* The Hawaii State Hazard Mitigation Forum, of which RSMC Honolulu is a member, is tasked with maintaining and updating the Hawaii State Hazard Mitigation Plan. Forum members met regularly to discuss hazard threat, risk assessment, and actions which can be taken to mitigate the hazard risk to protect lives and property from loss and destruction during a natural hazard.
- *Hawaii Emergency Preparedness Executive Consortium (HEPEC).* RSMC Honolulu is a member of the Hawaii Emergency Preparedness Executive Consortium (HEPEC). HEPEC is comprised of emergency managers and disaster mitigation personnel from local, state, and federal agencies. HEPEC meets quarterly to provide updates on current and outstanding threats, both natural and manmade, to the State of Hawaii. RSMC Honolulu Personnel provided a hurricane presentation to the group during the July 2015 meeting.
- *RSMC Coordination.* RSMC Honolulu and RSMC Tokyo coordinated seamless transitions of two tropical cyclones as they crossed the International Date Line into RSMC Tokyo's area of responsibility.
- *Improvements in the Hurrevac 2015 program for the western North Pacific view.* HURREVAC is the primary decision support tool of the National Hurricane Program, administered by FEMA, the USACE, and the NOAA National Hurricane Center. WFO Guam has worked with the developers/maintainers of the HURREVAC program over the past several years to improve the display capabilities for the Pacific Region. This software program is designed to aid both Emergency Managers and forecasters with graphical past and present tracks, forecast tracks, error distributions, and the intensity and wind fields tropical storms, hurricanes and typhoons. This year's changes have added to the depiction of selective location start and end times of criteria winds for emergency manager decision times and have further improved on the internet graphics, which are heavily used by the threatened Micronesian populations and the multitude of US Government agencies that support them and the National leadership.

Identified opportunities/challenges, if any, for further development or collaboration:

None.

KRA =	1	2	3	4	5	6	7
Meteorology				X		X	
Hydrology							
DRR				X		X	
Training and research							
Resource mobilization or regional collaboration							

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Title of item:

Resource Mobilization During Extreme Events

RSMC Honolulu conducted dozens of Emergency Management Briefings through the season through video teleconferencing. These briefings included personnel at Emergency Operations Centers from the State level to the local level with the State Governor and County Mayors participating at times.

WFO Guam Warning Coordination Meteorologist (WCM) was detailed to the Guam Emergency Operations Center during Typhoons Bavi, Dolphin, Soudelor, Chanhom, and Goni in order to provide direct input and options to the Governor and his staff during these events. While there, the WCM conducted several briefings for Emergency Operations Staff and Mayors, and provided numerous on-camera updates to the media. He also provided numerous telephonic discussions and tailored PowerPoint presentations to the Government of the Commonwealth of the Northern Mariana Islands for the tropical cyclones.

Identified opportunities/challenges, if any, for further development or collaboration:

None.

KRA =	1	2	3	4	5	6	7
Meteorology							
Hydrology							
DRR							
Training and research							
Resource mobilization or regional collaboration		X		X	X		

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