INTERNATIONAL PACIFIC RESEARCH CENTER
IN THE SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY AT THE UNIVERSITY OF HAWAI'I AT MĀNOA

September 5, 2018

UH scientist identifying climate model errors to improve forecasts for the U.S. Affiliated Pacific Islands

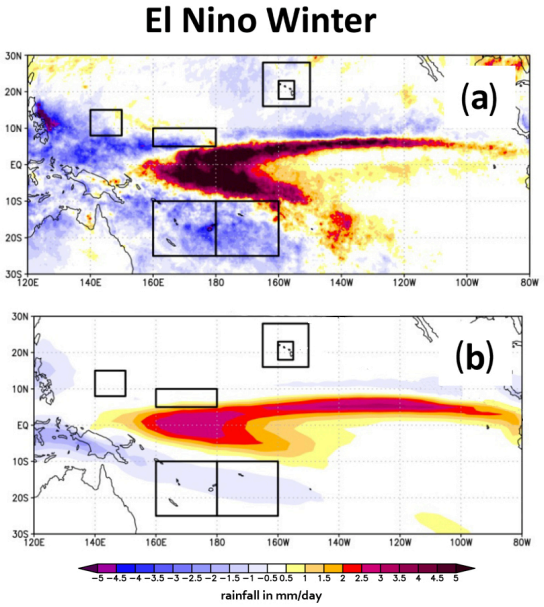
The U.S. Affiliated Pacific Islands (USAPI) are no stranger to variable weather and climate. One dominant weather influencer in the region called the El Nino-Southern Oscillation (ENSO) — an alternating pattern of abnormally warm and cool ocean temperatures in the tropical Pacific — can cause drought-like conditions in the southwest Pacific that persist for 3-4 seasons. In addition, ENSO can cause frequent cyclones and storms to hit the USAPI.

Given the region's regular bombardment of extreme events during ENSO, USAPI decision makers need accurate predictions from climate models. However, modeling errors limit the reliability of forecasts.

Now, a researcher from the International Pacific Research Center (IPRC) at the University of Hawai'i at Manoa is leading a project to identify those errors. Supported by a $508k grant from the NOAA Research Modeling, Analysis, Predictions, and Projections (MAPP) Program, H. Annamalai and his research team will develop tools, known as diagnostics, to pinpoint where and how exactly errors begin, to help scientists determine how to improve their models. Just like a doctor diagnosing why a patient is feeling unwell, these tools will help climate modelers determine why their models are not performing well.

"Our diagnostics will be user accessible, flexible and adaptable such that they can be transitioned to any group of evaluations during model development," said Annamalai.

Annamalai's research will build on results from his MAPP-funded project that is ending this year. That project focused on understanding processes that shape unusual ENSO-related precipitation during the winter season, using diagnostics. He and his team found that model errors in predicting abnormal precipitation are strongly tied to the models' ability to represent how



Example figure illustrating the degree of match between observed (a) and modeled (b) rainfall patterns during a El Niño winter (Dec-Feb). Boxes enclose US Affiliated Pacific Island groups.

moisture is distributed in a certain part of the atmosphere and how the interaction between radiation and clouds are represented. This new project's diagnostics will address those model errors in representing moisture, clouds, and their interaction with radiation in the atmosphere.

Specific project outcomes will include a set of metrics that will help scientists quantify how accurately their models represent ENSO-related impacts and identify sources of model errors that reveal deficiencies to help inform model improvement decisions.

"Identifying and improving processes in climate models that lead to reliable forecasts of droughts and tropical storms well in advance will allow policy makers ample time to plan and mitigate situations during extreme events," said Annamalai. "These events have significant impacts on water resources and agriculture, defense-related operations, forest fires, air traffic, and more."

Project collaborators include Yi Ming, head of the Atmospheric Physics and Climate Group at NOAA's Geophysical Fluid Dynamics Laboratory; Richard Neale, Project Scientist at the National Center for Atmospheric Research; and Gill Martin, Science Manager at the UK Met Office, Hadley Center.

##

PI Contact:
Hariharasubramanian Annamalai, hanna@hawaii.edu, (808) 956-5646

IPRC Media Contact: Rachel Lentz, rlentz@hawaii.edu, +1-808-561-5539

The International Pacific Research Center (IPRC) of the School of Ocean and Earth Science and Technology (SOEST) at the University of Hawai'i at Mānoa, is a climate research center founded to gain greater understanding of the climate system and the nature and causes of climate variation in the Asia-Pacific region and how global climate changes may affect the region. Established under the "U.S.-Japan Common Agenda for Cooperation in Global Perspective" in October 1997, the IPRC is a collaborative effort between agencies in Japan and the United States.