



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2002GU3B

Title: A rainfall climatology for Saipan: distribution, return periods, and inter-annual variations.

Project Type: Research

Focus Categories: Water Quantity, Climatological Processes, Drought

Keywords: Rainfall climate, return periods, interannual variation, ENSO, drought, extreme events

Start Date: 03/01/2002

End Date: 02/28/2003

Federal Funds: \$17,181

Non-Federal Matching Funds: \$0

Congressional District:

Principal Investigator:

Mark Lander

WERI, University of Guam

Abstract

Improved information on rainfall depth-intensity-duration-frequency and their areal distribution is needed for use in designing storm water control systems. Previous estimations (based on rainfall records of limited duration) of Saipan's mean monthly and mean annual rainfall, and the distribution of rainfall throughout the island will be re-examined. Prior calculations of return periods of heavy rainfall events on Saipan can be shown to be erroneous and are in need of a complete overhaul. This proposal seeks to develop a climatology of Saipan's rainfall to include: (1) an estimation of the distribution of rainfall at mean monthly to mean annual time periods, (2) calculations of return periods of heavy rainfall events, and (3) an examination of interannual variations in mean annual rainfall. Previous estimations of Saipan's mean monthly and mean annual rainfall, and the distribution of rainfall throughout the island will be re-examined. Prior calculations of return periods of heavy rainfall events on Saipan can be shown to be erroneous and are in need of a complete overhaul. Interannual variations of Saipan's rainfall are closely linked to the El Niño/Southern Oscillation (ENSO) phenomenon. The CNMI and Guam are in an ENSO core region that features very dry conditions in the year following El Niño and an increase in the level of threat from typhoons during an El Niño year. The long-term variations of rainfall on Saipan are very similar to those on Guam. As on Guam, the mean annual rainfall on Saipan varies substantially (15%) at different locations on the island. As a first approximation, the heaviest rain tends to be at the higher elevations -- at Guam it occurs on the eastern slopes of the southern mountains and, at Saipan, it appears as if the mean annual rainfall is heaviest at stations in the central high ground (e.g., Capitol Hill and Mount Topachau). The recurrence interval of heavy rain events, however, can not be considered to have a similar distribution as the annual mean since the causes of extreme daily rainfall events are typhoons, monsoon squall lines, and other so-called meso-scale weather systems that produce rain amounts that are independent of the island topography. The proposed project directly supports three of the CNMI's stated needs in Water Quality and Water Quantity, and Education and Professional Training:

* Improved information on rainfall depth-intensity-duration-frequency and their areal distribution for use in designing storm water control systems.

* Develop regional (Guam/CNMI) manual of best management practices for control of storm-water runoff.

* Task force organization to address special water resource issues.