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Analysis of Monthly, Seasonal, and Yearly Wind Flow Over the Ometepe Island in Lake Nicaragua

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The health issues on the Ometepe Island in Lake Nicaragua are directly influenced by the open-pit fires inside of homes on the island and the particulates they produce. Understanding the prevailing wind patterns of the area would result in better advice for local homeowners on how to foster natural air flow through their homes and minimize the concentrations of trapped particulates. The purpose of this study is to identify prevailing wind patterns over the island in the monthly, seasonal, and yearly time frames. Due to the limited observations in the island area, the Weather Research and Forecasting model (WRF) was run at 1.33 km grid spacing, focusing on the area around the island to verify the small existing data set. Because of the verification, WRF simulations were used for an analysis of average wind direction and speed in the hopes of finding common, predictable wind patterns in the simulated data set. It is hypothesized that the most variation will occur between wind speed and direction in the wet and dry seasons, as the Intertropical Convergence Zone (ITCZ) will migrate southward into the area. With these useful climatologies, individuals in the local area should be able to create a mechanism to maximize awareness of how to properly foster natural cross-breeze ventilation.

Information about the Authors:

This inter-disciplinary project proposed in Prof. Kevin Goebbert's spring 2014 research class has been researched by junior and senior meteorology majors. For the last 20 years, the VU College of Nursing has been visiting Ometepe Island in order to further their nursing proficiency. In recent years, the Chemistry and Meteorology Departments have been working with the traveling nursing students in the hopes of determining the causes of the respiratory problems that the islanders face. By utilizing the technological resources of VU's weather center and Geographic Information System (GIS) lab, applicable results are ensuring that islanders will be able to better understand their immediate environment through informational literature. The Meteorology Department hopes to continue their presence in the island area to ensure the longevity of their partnership with the Nursing and Chemistry Departments and to foster new partnerships with engineering students in developing cleaner indoor technologies.

Faculty Sponsor: Dr. Kevin Goebbert

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