ICTP/PROMISE conference on:
Monsoon Environments: Agricultural and Hydrological Impacts of Seasonal Variability and Climate Change

Gauging Philippine climate conditions for the 21st Century: An analysis of general circulation models based on the special report on emissions scenarios

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Visualization of the extent of possible climate change is important for a number of reasons. For a developing country like the Philippines, determining the most probable range of temperature and precipitation changes are of utmost importance as this spells the balance between environmental preparedness and economic feasibility. However, the country still lacks the capability and manpower to develop Regional Climate Models which are of sufficient spatial and temporal resolution. For this reason, results of General Circulation Models may be used for the necessary vulnerability and adaptation studies.

Three different models were studied. These are models developed by the Hadley Centre for Climate Prediction and Research (HadCM3), Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO), and Canadian Center for Climate Modelling and Analysis (CGCM2ma). These models are based on the Special Report on Emissions Scenarios (SRES), a set of possible future scenarios based on projected changes in non-climatic factors, such as demography, economic development, and technology. These are developed by the Intergovernmental Panel on Climate Change (IPCC), to incorporate recent findings and development on the understanding of the driving forces of emissions and methodologies.

The study aims to determine the most suitable model for application in the Philippines. As with any model, General Circulation Models have limitations on certain parameters which affect the climate. To determine which model is suited for Philippine climate change studies, a comparison of each model's baseline, 1961-90 climate conditions is compared with the country's observed climate trend at the same time period. This is especially important in a study of an area as small as the Philippines. The size of the grid points, together with certain assumptions about certain parameters such as topography and land use, may render some models' results as not applicable to the Philippine scenario. Correlation between the SRES-based models and the baseline is important in understanding the above-mentioned limitations of the models when downscaled to a regional level. However, the choice of the best model to use for the Philippines does not disregard the result of the other models. One of the advantages of the multi-model approach is that results of all the models provide a range of climatic changes. Results of this study may then be used as input in the different sectors, such as Agriculture, Forestry, Coastal Zone System, Freshwater Resources, and Public Health.

A comparison of all the models' 1961-90 climatological data with the observed and established baseline shows that the HadCM model seems to be most closely suited for application to Philippine conditions in terms of precipitation, while the CSIRO model seems to be best suited for temperature studies. These models show the most consistent correlation with the baseline. Also, for temperature, the HadCM model was the only model which indicated that topography was one of the prime factors in its projections, as shown by its vertical orientation.

Based on all the models, temperature will continuously increase by 0.5 to 2.4 degrees Celsius for the 21st century. This rate of temperature change will not be uniform throughout the country, and the area with the greatest projected increase is the Southern part of the Philippines, which is nearest the equator. Changes in precipitation, on the other hand, is projected to vary across the year. A decrease of up to 42 percent is projected during the country's dry season (December to February) while rainfall is projected to increase by 30 percent during the rainy season (June to August).

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