The effect of topography and land cover on the accuracy of gridded precipitation data over the Philippines

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ABSTRACT

This study aims to improve gridded precipitation data by including the first order effects of topography and land cover on its accuracy. We consider a gridded precipitation dataset over the Philippines obtained from synoptic and satellite-derived measurements combined via information theoretical and time series analysis methods. First and higher order corrections due to surface topography and land cover corrections will be calculated from historical data. This study is relevant to micro-scale and synoptic scale weather forecasting and environmental monitoring.

Currently, there are only 56 active synoptic weather stations distributed over the Philippines establishing ground-based rainfall measurements. With such number, many areas in the Philippines still have no ground stations. This inhibits good representation of rainfall distribution in the country making forecasts utilizing these sparse rainfall measurements prone to error.

As a substitute to the sparse synoptic measurements, satellite-derived and gridded re-analysis rainfall datasets have become recently and openly available worldwide. However, studies show that satellite-derived products are prone to over- and underestimation depending on the season. Moreover, gridded re-analysis datasets worldwide do not consider local parameters affecting rainfall distribution. Thus, we can't depend primarily on available worldwide gridded datasets especially in creating localized weather and environmental forecasts.

Keywords: Rainfall, Time series analysis, Information Theory, Topography, Land Cover