

## ABSTRACT

### FACTORS AFFECTING AIR SURFACE TEMPERATURE VARIATIONS IN THE PHILIPPINES

John Christian B. Lequiron  
University of the Philippines, 2016

Adviser: Gerry Bagtasa, PhD.  
Reader: Olivia C. Cabrera, PhD.

Changes in air surface temperature plays an important role in the Philippine's economy, industry, health, and food production. While increasing mean global temperature in the recent several decades has prompted a number of climate change and variability studies in the Philippines, most of the studies focus on rainfall and tropical cyclones. This study aims to investigate the trend and variability of observed air surface temperature and determine its major influencing factor's in the Philippines. A non-parametric Mann-Kendall trend test was applied to monthly mean temperature of 17 synoptic stations covering 56 years from 1960 to 2015 and a mean change of 0.58°C or a positive trend of 0.0105 °C/year was found. In addition, wavelet decomposition was used to determine the frequency of temperature variability show a 12 month, 30-80-month and more than 120-month cycles. This indicates a strong annual cycle, an interannual cycle that coincides with ENSO events, and an interdecadal trend that may be attributed to CO<sub>2</sub> concentrations. Air surface temperature was also correlated with solar activity (smoothed sunspot number) and galactic cosmic rays, the effects of which are shown to be minimal to none. The influence of ENSO teleconnection on temperature, wind pattern, cloud cover, and outgoing longwave radiation on different seasons had significant effects on regional temperature variability. Particularly, an anomalous anticyclonic (cyclonic) flow east of the Philippines during the peak and decay stage of El Niño (La Niña) events leads to the advection of warm southeasterly (cold northeasterly) air mass over the country. Furthermore, an apparent increasing cloud cover trend is observed over the West Philippine Sea including portions of the Philippines, and this is believed to lessen the effect of the increasing air surface temperature. However, relative humidity was also found to be increasing especially on the central part of the country, which results in a high positive trend of heat index, exacerbating the effects on human discomfort. Finally, an assessment of gridded temperature data were done to look at the viability of using three high-resolution datasets in future climate analysis and model calibration and verification. Several error statistics (i.e. Pearson correlation, Bias, MAE, and RMSE) were used for this validation. Results show that gridded temperatures generally follows observed values.

Keywords: Air surface temperature, smoothed sunspot number, galactic cosmic rays, CO<sub>2</sub>, and ENSO