ANALYSING THE TEMPERATURE VARIATION IN URBAN COLOMBO: A WAVELET APPROACH

W.P.T.M. Wickramaarachchi, S.S.N. Perera, S.L. Sumanasekara and N.O. Dematagoda

Research and Development Centre for Mathematical Modelling, Department of Mathematics, University of Colombo, Sri Lanka
Corresponding author: wptharindu86uoc@gmail.com

The majority of the real world phenomena such as epidemics, global warming and population dynamics of species depend on climate variations and temperature plays a vital role. Therefore it is important to address the temperature variation in the process of modelling life sciences. Colombo is one of the cities in the tropical world that face natural problems such as increased temperature, air pollution and public health problems such as dengue epidemics. In this study we analysed the temperature variation in Colombo with respect to other climate parameters as a starting point to the future research work in advanced mathematical modelling. We used climate data from year 2006 - 2011 from Department of Meteorology in Colombo and analysed them using wavelet theory. Wavelet power spectrum is a powerful tool in Mathematics used to analyse noisy and non-stationary time series data. Wavelet transformation produces good time-frequency localization compared to classical techniques such as Fourier transformation. It was identified from the cross wavelet power spectrum, in the cycle of September to February, the increase in temperature is caused by lack of rain, low wind speed, low humidity and high pressure. But in the June to August cycle; the increase in temperature was only caused by low wind speed, low humidity and high pressure. In this analysis the factors such as rain fall, wind speed, relative humidity and air pressure were considered as factors that affect the variation in the temperature. Further research work can be carried out to examine the influence of sea level, sea temperature, sea current and global warming to the temperature variation in urban Colombo. The information gathered from this study can be applied in sophisticated mathematical modelling in environment, geography and epidemiology.

Keywords: Climate parameters, Colombo, Temperature variation, Wavelet power spectrum