



The cross wavelet analysis of dengue fever variability influenced by meteorological conditions

Yuan-Chien Lin, Hwa-Lung Yu, and Chieh-Han Lee

National Taiwan University, Bioenvironmental Systems Engineering, Taipei City, Taiwan (chitin90544@gmail.com)

The multiyear variation of meteorological conditions induced by climate change causes the changing diffusion pattern of infectious disease and serious epidemic situation. Among them, dengue fever is one of the most serious vector-borne diseases distributed in tropical and sub-tropical regions. Dengue virus is transmitted by several species of mosquito and causing lots amount of human deaths every year around the world. The objective of this study is to investigate the impact of meteorological variables to the temporal variation of dengue fever epidemic in southern Taiwan. Several extreme and average indices of meteorological variables, i.e. temperature and humidity, were used for this analysis, including averaged, maximum and minimum temperature, and average rainfall, maximum 1-hr rainfall, and maximum 24-hr rainfall. This study plans to identify and quantify the nonlinear relationship of meteorological variables and dengue fever epidemic, finding the non-stationary time-frequency relationship and phase lag effects of those time series from 1998-2011 by using cross wavelet method. Results show that meteorological variables all have a significant time-frequency correlation region to dengue fever epidemic in frequency about one year (52 weeks). The associated phases can range from 0 to 90 degrees (0-13 weeks lag from meteorological factors to dengue incidences).

Keywords: dengue fever, cross wavelet analysis, meteorological factor