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Spatiotemporal analysis of the climate impact on the dengue fever risk in Southern Taiwan

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Dengue fever has been identified by WHO as one of the most serious vector-borne infectious disease in the tropical and sub-tropical areas. In 2007, there were over 2000 dengue fever incidences which is the highest ever in the record history in Taiwan. Studies have shown that the changes of hydrological parameters, e.g. precipitation, temperature, El Nino index, etc, is essential to the occurrence of dengue fever. However, most dengue fever modeling studies have been mainly focus on the temporal pattern of the dengue fever and its associations with other hydrological covariates yet understate its spatial patterns, e.g. spatial dependence and clustering. In this study, the spatiotemporal analysis is applied to assess the dengue fever incidences from 1997 to 2007 over Southern Taiwan, i.e. counties of Tainan and Kaohsiung, across space and time and its association with the climate covariates, such as temperature, south oscillation index (SOI), precipitation. The stochastic model by Bayesian maximum entropy method (BME) is proposed. It can account for the uncertainty of data of dengue fever and estimated climate variables and generate the spatiotemporal disease mapping of dengue fever risk based upon the given climate conditions.