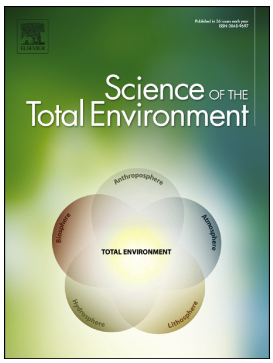

Effects of human mobility, temperature and mosquito control on the spatiotemporal transmission of dengue

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Effects of human mobility, temperature and mosquito control on the spatiotemporal transmission of dengue

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Abstract

Dengue transmission exhibits evident geographic variations and seasonal differences. Such heterogeneity is caused by various impact factors, in which temperature and host/vector behaviors could drive its spatiotemporal transmission, but mosquito control could stop its progression. These factors together contribute to the observed distributions of dengue incidence from surveillance systems. To effectively and efficiently monitor and response to dengue outbreak, it would be necessary to systematically model these factors and their impacts on dengue transmission. This paper introduces a new modeling framework with consideration of multi-scale factors and surveillance data to clarify the hidden dynamics accounting for dengue spatiotemporal transmission. The model is based on compartmental system which takes into account the biting-based interactions among humans, viruses and mosquitoes, as well as the essential impacts of human mobility, temperature and mosquito control. This framework was validated with real epidemic data by applying retrospectively to the 2014 dengue epidemic in

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