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Modeling and forecasting of West Nile virus

West Nile virus is a mosquito-borne flavivirus typically transmitted between birds and mosquitoes, and can infect humans and other domestic mammals. It has become a threat for public health since 1999 in North America. Like other mosquito-borne or vector-borne diseases, the transmission and dynamics of the West Nile virus can be very complicated due to climate and environmental impact on vector mosquitoes density, seasonal impact on amplification host birds and biting incidences of the vectors. In this talk, I will talk about the modeling and dynamics of the virus, including bifurcation analysis of some compartmental models. I will briefly introduce our effort on using surveillance data, weather and landscape data to model and weekly real-time forecast of culex mosquito abundance, minimum infection rate (MIR) for risk assessment and human infection of West Nile virus in Ontario, an effort towards toolkit development for public health, and the establishment of Early Warning and Response System (EWARS) for vector-borne diseases in Ontario, Canada.