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Dengue Epidemics : *Urbi et Orbi*

Dengue is a viral disease which plagues most of the tropical regions of the world, mainly those with high humidity and dense population. Although the disease is not permanent (since it is through in about 3 weeks) and in most cases not fatal, nevertheless it has an enormous impact in the public health system and in the economic activity of the affected regions. The viral infection is only transmitted by infected mosquito *Aedes egypti* which only get the virus by biting infected humans. So, the dynamics of the dengue epidemics depends strongly on the human movement (the infected individuals) and on the existence of a large population of mosquitoes vectors. The coupling of both populations plus the movement of the human population is the basis for the the mathematical model that we present, where the vector population evolves locally (in urban areas) while the infected humans are responsible for the large distance phenomena (orbi). We have tested the model in the State of Sao Paulo-Brazil by devising a network consisting of its largest 60 cities linked by the highway traffic between them as a measure of their inter connections. At each city we have used a simple and homogeneous model of vector-epidemic dynamics. The simulation were made by starting a focus of infection in a far west city of the state (which is commonly observed) and the geographical and time evolution of the results are quite close to the data obtained from the State Health Department in the last decade. The main goal of this work is to have a reliable software to predict the evolution of an epidemic burst , detect its main spreading nodes so that the responsible public system can act sparsely (which is the only way it can afford to do) but quickly in order to block the further propagation of the infection.