Abstract 17:

Data-driven modelling to improve our understanding of vector-borne disease risk: a One Health approach

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Severe vector-borne diseases have not yet formed a major threat for Dutch public health. Sporadic cases have occurred from imported infections, but the ecosystem has been sufficiently resilient to prevent diseases from getting established. However, this resilience is decreasing under the influence of ecological changes, urbanisation, international travel, and changes in land use and water management. To be better prepared for this increasing risk, it is important to understand how these changes interact and together affect transmission risk. This project is part of 'One Health PACT' (Predicting Arbovirus Tipping Points), an interdisciplinary consortium that aims to improve understanding of and preparedness for vector-borne diseases in the Netherlands. My role as a modeller is to connect the various types of data collected in the consortium using advanced Bayesian methods to better understand what drives an outbreak, assess the probability of future outbreaks and inform surveillance and control strategies.
I will develop a transmission model to simulate potential emergence and spread of (new) arboviruses in the Netherlands. The metapopulation simulation model brings together spatiotemporal dynamics of human, animal and environmental factors required for emergence to assess the probability of outbreaks, using Usutu virus as a case study initially. Subsequently, we can use these empirically grounded models to apply them to different arboviruses, compare various control strategies and improve the current surveillance system. These models can also be adapted to study the possible consequences of future change scenarios for disease risk.