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D-MOSS: Dengue Fever Forecasting for Vietnam – Assessment of an Operational System.

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Dengue fever is now present in over 150 countries world-wide, affecting 390 million people per year. In Vietnam the number of cases has increased by 100% since 2000, and 2019 exhibited exceptional high numbers of reported dengue fever cases. Transmission of this mosquito-borne disease is dependent on a variety of climate and socio-economic factors. Among those water availability plays a crucial role in creating or destroying suitable mosquito breeding grounds.

At present mitigating actions are taken based on reported dengue fever cases and local knowledge, leading to a reactive rather than proactive approach of disease control. By combining Earth Observation and vector-borne disease modelling expertise we have developed D-MOSS (Dengue Model Forecasting Satellite based System). The D-MOSS system is funded by the UK Space Agency's International Partnership Programme and aims to predict the likelihood of future dengue epidemics for Vietnam on a province scale with a lead time of up to six months.

D-MOSS integrates multiple stressors such as water availability, land-cover, precipitation and temperature with data of past dengue fever incidents. This information is used to develop statistical models of disease incidence, that can then be used to forecast dengue outbreaks based on seasonal weather and hydrological forecasts. It is the first fully integrated dengue fever forecasting system incorporating Earth Observation data and seasonal climate forecasts to routinely issue warnings.

D-MOSS takes the form of a web-based platform. The system's architecture is based on open and non-proprietary software, where possible, and on flexible deployment into platforms including cloud-based virtual storage and application processing. Working closely with public health authorities in Vietnam enabled us to develop a system tailored to the local needs and decision making procedures.