### Title:
Modeling malaria transmission in Thailand and Indonesia

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### Abstract:
Malaria Modeling and Surveillance is a project in the NASA Applied Sciences Public Health Applications Program. The main objectives of this project are: 1) identification of the potential breeding sites for major vector species; 2) implementation of a malaria transmission model to identify the key factors that sustain or intensify malaria transmission; and 3) implementation of a risk algorithm to predict the occurrence of malaria and its transmission intensity. Remote sensing and GIS are the essential elements of this project. The NASA Earth science data sets used in this project include AVHRR Pathfinder, TRMM, MODIS, NSIPP and SIESIP.

Textural-contextual classifications are used to identify small larval habitats. Neural network methods are used to model malaria cases as a function of precipitation, temperatures, humidity and vegetation. Hindcastings based on these environmental parameters have shown good agreement to epidemiological records. Examples for spatio-temporal modeling of malaria transmissions in Southeast Asia are given.

Discrete event simulations were used for modeling the detailed interactions among the vector life cycle, sporogonic cycle and human infection cycle, under the explicit influences of selected extrinsic and intrinsic factors. The output of the model includes the individual infection status and the quantities normally observed in field studies, such as mosquito biting rates, sporozoite infection rates, gametocyte prevalence and incidence. Results are in good agreement with mosquito vector and human malaria data acquired by Coleman et al. over 4.5 years in Kong Mong Tha, a remote village in western Thailand.

Application of our models is not restricted to Southeast Asia. The model and techniques are equally applicable to other regions of the world, when appropriate epidemiological and vector ecological parameters are used as input.