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THE CURRENT AND POTENTIAL ROLES OF SATELLITE REMOTE SENSING IN THE CAMPAIGN AGAINST MALARIA

Abstract

This project addresses how remote sensing satellites have, and can be used as part of systems that fight malaria. Malaria is one of the foremost health problems in the world, yet its prevention often requires very simple precautions. The primary malaria vector is the Anopheline mosquito, and most prevention efforts focus on the control of this vector, that is, minimizing human-mosquito contact. Measures such as sleeping under Long-Lasting Insecticide Nets (LLINs) and Indoor Residual Spraying (IRS) are common and effective, but health agencies in malaria-endemic nations do not have the resources to field these measures on a national scale. Therefore, a method is needed to accurately forecast the most likely areas of malaria outbreaks, so that local governments can effectively distribute these measures to the areas that need them the most.The method analyzed here, building on past studies and analyses, is the use of remote sensing satellites, which can provide a wealth of data with adequate spatial and temporal resolution. This method is based on the principle that environmental parameters have a strong relationship with malaria transmission. This paper summarizes the full range of topics needed for the use of satellites as part of systems addressing malaria. We consider both benefits, limitations and disadvantages of using satellites to fight malaria. There are existing efforts to utilize this tool to fight the disease; we discuss several small-scale studies and describe the satellites used. The growing participation of commercial and emerging space nations as satellite operators is increasing the potential sources of remotely sensed data that is relevant to malaria response. Several models to forecast disease outbreaks combine remotely sensed data with other information, such as temperature, rainfall, epidemiology, poverty levels and sanitation. A model system for this has been created by the Armed Forces Health Surveillance Center, which has successfully predicted Rift Valley Fever outbreaks in multiple years. This system is now being applied to predict other vector-borne diseases. The conclusion discusses how satellite data can be processed and utilized to ultimately fit into the World Health Organization's framework for a Malaria Early Warning System (MEWS).