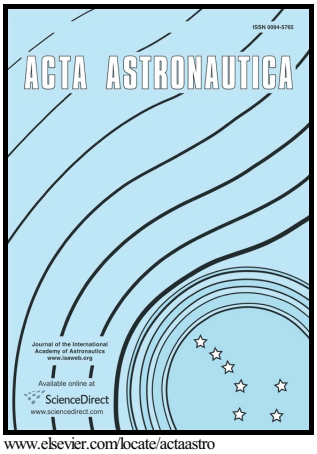

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THE CURRENT AND POTENTIAL ROLE OF SATELLITE REMOTE SENSING IN THE CAMPAIGN AGAINST MALARIA

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Abstract:

Malaria and other vector borne diseases claim lives and cause illness, especially in less developed countries. Although well understood methods, such as spraying and insecticidal nets, are identified as effective deterrents to malaria transmission by mosquitos, the nations that have the greatest burden from the disease also struggle to deploy such measures sufficiently. More targeted and up to date information is needed to identify which regions of malaria-endemic countries are most likely to be at risk of malaria in the near future. This will allow national governments, local officials and public health workers to deploy protective equipment and personnel where they are most needed. This paper explores the role of environmental data generated via satellite remote sensing as an ingredient to a Malaria Early Warning System. Data from remote sensing satellites can cover broad geographical areas frequently and consistently. Much of the relevant data may be accessed by malaria-endemic countries at minimal cost via international data sharing polices. While previous research studies have demonstrated the potential to assign malaria risk to a geographic region based on indicators from satellites and other sources, there is still a need to deploy such tools in a broader and more operational manner to inform decision making on malaria management. This paper describes current research on the use of satellite-based environmental data to predict malaria risk and examines the barriers and opportunities for implementing Malaria Early Warning Systems enabled by satellite remote sensing. A Systems Architecture framework analyses the components of a Malaria Early Warning System and highlights the need for effective coordination across public and private sector organizations.

I. INTRODUCTION

The World Health Organization (WHO) estimates that in 2013, there were 198 million malaria cases worldwide and 584,000 deaths (WHO 2014a). While recent efforts to diminish this threat have resulted in decreasing mortality rates, more work is needed to reduce transmission rates and the overall footprint of malaria. Malaria cases are predominately concentrated in sub-Saharan Africa, but there are still pockets of malaria on almost every continent (IAMAT 2014). Malaria disproportionately affects less developed countries (WHO 2014b); resources from multinational, national and non-governmental organizations have been employed to fight malaria in these countries, yet a child dies every minute from malaria in Africa (WHO 2014a). Public health officials and international agencies are constantly reacting to malaria events around the world. With limited resources, countries have to make tough choices based on partial information about where to deploy malaria prevention efforts and which types of interventions to employee. Increasing the use of satellite-based remote sensing data as one source of information can help reduce the uncertainty by providing key indicators to decision makers about malaria risk factors. The data from satellites contributes to risk models that help identify the geographic regions that are most likely to be impacted by vector borne disease in the near future. This paper explores the information that satellite remote sensing can provide and identifies a framework for the operation of a Malaria Early Warning System that is enabled by earth observation data coupled with other types of data.