Paper ID: 46483
student

IAF EARTH OBSERVATION SYMPOSIUM (B1)
Earth Observation Applications, Societal Challenges and Economic Benefits (5)

Author: Mr. Samuel Malloy
The Ohio State University, United States, malloy.65@osu.edu

Dr. John M. Horack
The Ohio State University College of Engineering, United States, horack.1@osu.edu
Dr. Elizabeth Newton
The Ohio State University, United States, newton.387@osu.edu
Ms. Divya Batchu
The Ohio State University College of Engineering, United States, batchu.6@osu.edu
Mr. David Abernathy
The Ohio State University College of Engineering, United States, abernathy.49@osu.edu

SPACE-BASED WATERBORNE DISEASE SURVEILLANCE IN COASTAL COMMUNITIES: ACTIONABLE RISK ASSESSMENT OF ENTERIC PATHOGENS IN A CHANGING CLIMATE

Abstract

Coastal communities are increasingly vulnerable to waterborne disease, particularly to pathogens whose range and abundance are sensitive to the effects of a changing climate. In particular, increased precipitation and coastal flooding events are associated with a greater risk of drinking water contamination by enteric pathogens such as hepatitis A and E, as well as multiple *Vibrio* bacterial species, including the causative agent of cholera, *Vibrio cholerae*. The greatest incidence of these emerging and re-emerging waterborne threats is in the developing world, primarily among highly populated coastal cities in Southeast Asia and East Africa. Risk of enteric disease outbreaks can be characterized by space-based remote sensing measurements of indicators such as turbidity, biochemical oxygen demand, colored dissolved organic matter (CDOM), total suspended solids (TSS) and water temperature. Recent work has characterized individual waterborne diseases based on these criteria, although most efforts have focused on pathogen abundance at a static point in time. Here, we describe efforts to integrate multiple remotely sensed indicators of enteric pathogens with climate models to characterize short to medium-term risk of waterborne disease outbreaks in highly populated urban environments in the developing world. We present detailed case studies of cholera epidemics in Dar es Salaam, Tanzania and Mombasa, Kenya, and present a forecasting method that can be utilized by local ministries of health. We consider the spatial and temporal accuracy needs of public health surveillance systems, and describe methods to integrate multiple space-based indicators into alert-based forecasting systems. We conclude by describing the iterative, community-based design methods space agencies can utilize when working with communities to combat waterborne disease.