Tuesday – 24.05.2022

08:30 am

D2.11.1 Earth Observation for Health

Chair(s)

Dr. Shubha Sathyendranath (Plymouth Marine Laboratory)
Dr. Milton Kampel (National Institute for Space Research (INPE))
Dr. Rochelle Schneider (ESA)

Room:
H2-02

Topic:
Empower the Green Transition

Form of presentation:
Oral

Duration:
100 Minutes

09:00 am

Spatial modeling of Ebola virus transmission in a changing forest landscape

Dr. Larisa Lee-Cruz | CIRAD, UMR TETIS, F-34398 Montpellier, France | France

Hide details

Authors:

Dr. Larisa Lee-Cruz | CIRAD, UMR TETIS, F-34398 Montpellier, France | France
Dr. Pascal Degenne | CIRAD, UMR TETIS, F-34398 Montpellier, France | France
Dr. Julien Cappelle | CIRAD, UMR ASTRE, F-34398 Montpellier, France | France
Dr. Alexandre Caron | CIRAD, UMR ASTRE, F-34398 Montpellier, France | Mozambique
Dr. Helene De Nys | CIRAD, UMR ASTRE, F-34398 Montpellier, France | Zimbabwe
Elodie Schloesing | CIRAD, UMR ASTRE, F-34398 Montpellier, France | France
Dr. Annelise Tran | CIRAD, UMR TETIS, F-34398 Montpellier, France | France
Thibault Pouliquen | CIRAD, UMR ASTRE, F-34398 Montpellier, France | France
Dr. François Roger | CIRAD, UMR ASTRE, F-34398 Montpellier, France | Viet Nam

The Ebola virus is the causing agent of Ebola virus disease (EVD), an emerging infectious disease that can reach a 90% mortality rate in infected populations. The largest epidemic took place in West Africa in 2014-2016, whereas previously outbreaks had been confined to Central Africa. Multiple ecological and social factors may interact to cause an Ebola virus outbreak. Increased human – wildlife contacts in degraded forests or modified landscapes may lead to a higher risk of outbreaks.
In this study we combine ecological knowledge and Earth observation to model Ebola virus transmission in a bat species (Hypsignathus monstrosus) suspected to be a reservoir for the virus. Land use maps, derived from satellite images, and information on habitat use by bats were integrated to a spatially explicit model to study how land use changes may influence virus transmission in this species. We used land use maps from 2005 and 2015 of an area of approximately 190km2 in Guinea, where bat-human interactions are common, as a starting point for our simulations. During this period in the study area, forest area decreased while the surface of forest-agricultural mosaics and savannahs increased, reflecting a common landscape transformation in the region. Habitat use by bats was modeled based on previous and on on-going ecological studies on the species. Virus transmission among bats is more likely when groups of individuals come together, such as during roosting and foraging. To integrate this information into our model, we assigned indexes of habitat suitability to each land use for these two behaviors.
Results of our simulations show how land use changes affect animal behavior of an Ebola virus host, and the impact this virus can have on transmission within host populations. Deforestation is considered an important risk factor in the emergence of some infectious diseases, notably Ebola. Western Africa has undergone important landscape and human population changes in the last few decades. This study shows a novel way to integrate Earth observation into health ecology research to study the emergence of infectious diseases, with the possibility to test in silico hypotheses on the role of animal reservoirs.