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Association of temperature and total precipitation anomalies with West Nile Virus human cases in Central Macedonia, Greece

Anastasia Angelou and Ioannis Kioutsioukis
Department of Physics, University of Patras, 26504, Patras, Greece

West Nile Virus (WNV) belongs to the flavivirus genus, and it is a neurotropic mosquito-borne virus. The virus transmitted among amplifying hosts, such as birds, transferred through the bites of mosquitoes and incidentally humans and other mammals may become infected. In elderly and immunocompromised people, symptomatic infections can result in neurologic diseases. There is currently no specific treatment or vaccine available for WNV. The transmission dynamics of WNV are complex and affected by various environmental factors, including temperature and total precipitation. Understanding the relationship between the environmental factors and WNV transmission is crucial for predicting and preventing outbreaks of the disease., while the prediction of an infectious disease outbreak is critical for reducing the potential impact on human health. A large proportion of WNV infections in humans present either asymptomatically or with some non-specific clinical symptoms and are unrecorded.

The aim of this study is to explore the association between climatic factors and the occurrence of West Nile fever (WNF) in humans at a finer than NUTS-3 spatial scale (LAU). The investigation area is the region of Central Macedonia in Northern Greece, analyzing a unique dataset that includes meteorological data from ERA5 (European Centre for Medium-Range Weather Forecasts) and epidemiological data from the Hellenic National Public Health Organization for the period 2010-2022. The research focuses on this region because it is an area of great epidemiological interest. Specifically, at least one WNV human case has been recorded at all LAUs, while in 26% of the LAUs an extremely high number of cases have been recorded during the period of research. The analysis shows a strong correlation between the number of annual human cases of WNV and temperature and precipitation patterns in the months leading up to the outbreak. The results reveal the augmented forecast potential from temperature and precipitation anomalies in virus spread prediction models.

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