Titre

To quantify the impact of extreme weather events on the circulation of respiratory pathogens through their disruption of human mobility and mixing

Encadrant

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Description

Background

Climate change is increasing the frequency, intensity and range of extreme weather events, causing a manifold threat to public health. In addition to direct injury and death, extreme weather events may facilitate the emergence and circulation of epidemic of infectious diseases[1]. On one side, they may directly facilitate the circulation of certain pathogens, namely water-borne (like cholera) and vector-borne pathogens (like Dengue). On the other side, extreme weather disrupts patterns of human mobility and population mixing. This in turn can drive the circulation of directly transmitted pathogens (like SARS-CoV-2, influenza).

Project

This project will quantify the impact of localized extreme weather events on the large-scale spread of an ongoing infectious disease epidemic. We will use human mobility networks from various data sources to understand how mobility changes during extreme weather. Then, we will inform an epidemic model to study how local perturbations in mobility and mixing, compatible with those observed during extreme weather events, change the overall epidemic evolution. We will use both analytical and computational methods inherited from complex networks science[2]. The expected outcome of this project will help prepare public health response in the context of climate change adaptation.

References

1. de Oliveira, T. & Tegally, H. Will climate change amplify epidemics and give rise to pandemics? *Science* **381**, eadk4500 (2023).
2. Pastor-Satorras, R., Castellano, C., Van Mieghem, P. & Vespignani, A. Epidemic processes in complex networks. *Rev. Mod. Phys.* **87**, 925–979 (2015).