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Contagion dynamics in time-varying metapopulation networks ANDREA BARONCHELLI, SUYU LIU, NICOLA PERRA, MoBS Lab - Northeastern University — The metapopulation framework is adopted in a wide array of disciplines to describe systems of well separated yet connected subpopulations. The subgroups/patches are often represented as nodes in a network whose links represent the migration routes among them. The connections are usually considered as static, an approximation that is appropriate for the description of many systems, such as cities connected by human mobility, but it is obviously inadequate in those real systems where links evolve in time on a faster timescale. In the case of farmed animals, for example, the connections between each farm/node vary in time according to the different stages of production. Here we address this case by investigating simple contagion processes on temporal metapopulation networks. We focus on the SIR process, and we determine the mobility threshold for the onset of an epidemic spreading in the framework of activity-driven network models. Remarkably, we find profound differences from the case of static networks, determined by the crucial role played by the dynamical parameters defining the average number of instantaneously migrating individuals. Our results confirm the importance of addressing the time-varying properties of complex networks pointed out by the recent literature.

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