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Universality and the lack of it in multiscale human mobility networks RAFAEL BRUNE, CHRISTIAN THIEMANN, DIRK BROCKMANN, Northwestern University, Evanston, IL, USA — Although significant research effort is currently devoted to the understanding of complex human mobility and transportation networks, their statistical features are still poorly understood. Specifically, to what extent geographical scales impose structure on these networks is largely unknown. In particular, in light of the use of human mobility models in the development of quantitative theories for spatial disease dynamics, a comprehensive understanding of their structure is of fundamental importance. The large majority of statistical properties (degree distributions, centrality measures, clustering, etc.) of these networks have been obtained either for large scale networks or on small scale systems, indicating significant yet poorly understood deviations. We will present the first investigation of multiscale and multi-national mobility networks, covering length scales of a few to a few thousand kilometers. We will report that certain properties such as mobility flux distribution are universal and independent of length scale, whereas others vary systematically with scale. In particular, controversial properties such as scale-free degree distributions lose their heavy tails in small to intermediate length-scale windows.

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