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Spatial Renormalization of Human Mobility Networks VINCENT J. DAVID, ESAM & NICO, Northwestern University, Evanston, IL; Faculty of Physics, Georg-August-Universitaet, Goettingen, Germany, DIRK BROCKMANN, ESAM & NICO, Northwestern University, Evanston, IL, ROCS TEAM — Research on human mobility networks relies on the definition of vertices (locations) and weighted links that reflect the traffic between them. Typically, the appropriate choice of spatial scale for vertices (e.g. cities, counties, regions, etc.) is arbitrary and not given by the problem at hand. It is a priori unclear how statistical and topological features depend on these choices. We investigate multi-scale human mobility networks in response to spatial renormalization, in which the spatial scale is systematically varied as vertices are locally merged to form larger meta-nodes. As a proxy for human mobility we employ the network of flux of geo-trackable items between a set of registered geographic locations (geocaches) for the US and Europe. On the finest scale these networks are sparsely connected and homogeneous, while they converge by spatial renormalization to networks with broad, invariant weight and flux distributions, potentially revealing the origin of these universal features of real human mobility networks.

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