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The tomography of human mobility – what do shortest-path trees reveal? DANIEL GRADY, CHRISTIAN THIEMANN, DIRK BROCKMANN, Northwestern University — Similar to illustrating the anatomy of organs using pictures of tissue slices taken at various depths, we construct shortest-path trees of different nodes to create a tomogram of large-scale mobility networks. This tomography allows us to measure global properties of the system conditioned on a reference location in the network to gain a fuller characterization of a node. Using this technqiue, we discovered a new symmetry that characterizes a large class of mobility networks. Furthermore, introducing the notion of tree similarity, we devised a new technique for clustering nodes with similar topological footprint, yielding a new, unique and efficient method for community identification in these networks and extracting their topological backbone. We applied these methods to a multi-scale human mobility network obtained from the dollar-bill-tracking site wheresgoerge.com and to the U.S. and world-wide air transportation network.

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