Measuring global and regional influence of cities using geolocated tweets Network of cities

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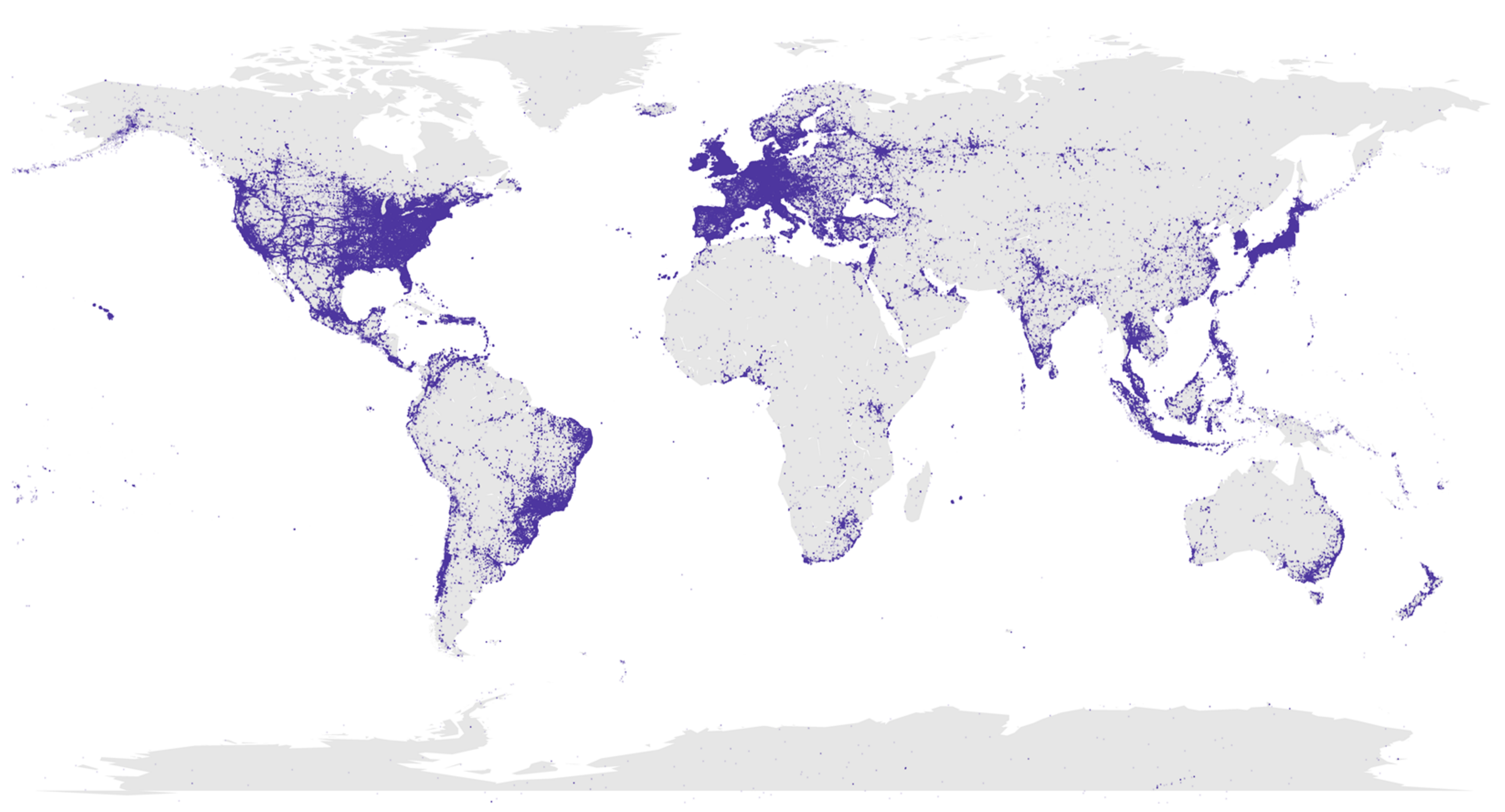
Abstract

Networks are the skeletons behind complex systems, influencing global transport properties and full system dynamics. Finding the most important nodes is fundamental to gain insights in the underlying system organization and identifying weak points. In the case of networks supporting flows, information on node interchanges can provide the basis to establish system-wide hierarchies. An example is transport networks and city-city relations. Cities are characterized by concentrating population, economic activity and services. However, not all cities are equal and a natural hierarchy at local, regional or global scales spontaneously emerges. In this work, we introduce a method to quantify city influence using geolocated tweets to characterize human mobility. Rome and Paris appear consistently as the cities attracting most diverse visitors. The ratio between locals and non-local visitors turns out to be fundamental for a city to truly be global. Focusing only on urban residents mobility flows, a city to city network can be constructed. This network allows us to analyze centrality measures at different scales. New York and London play a predominant role at the global scale, while urban rankings suffer substantial changes if the focus is set at a regional level.

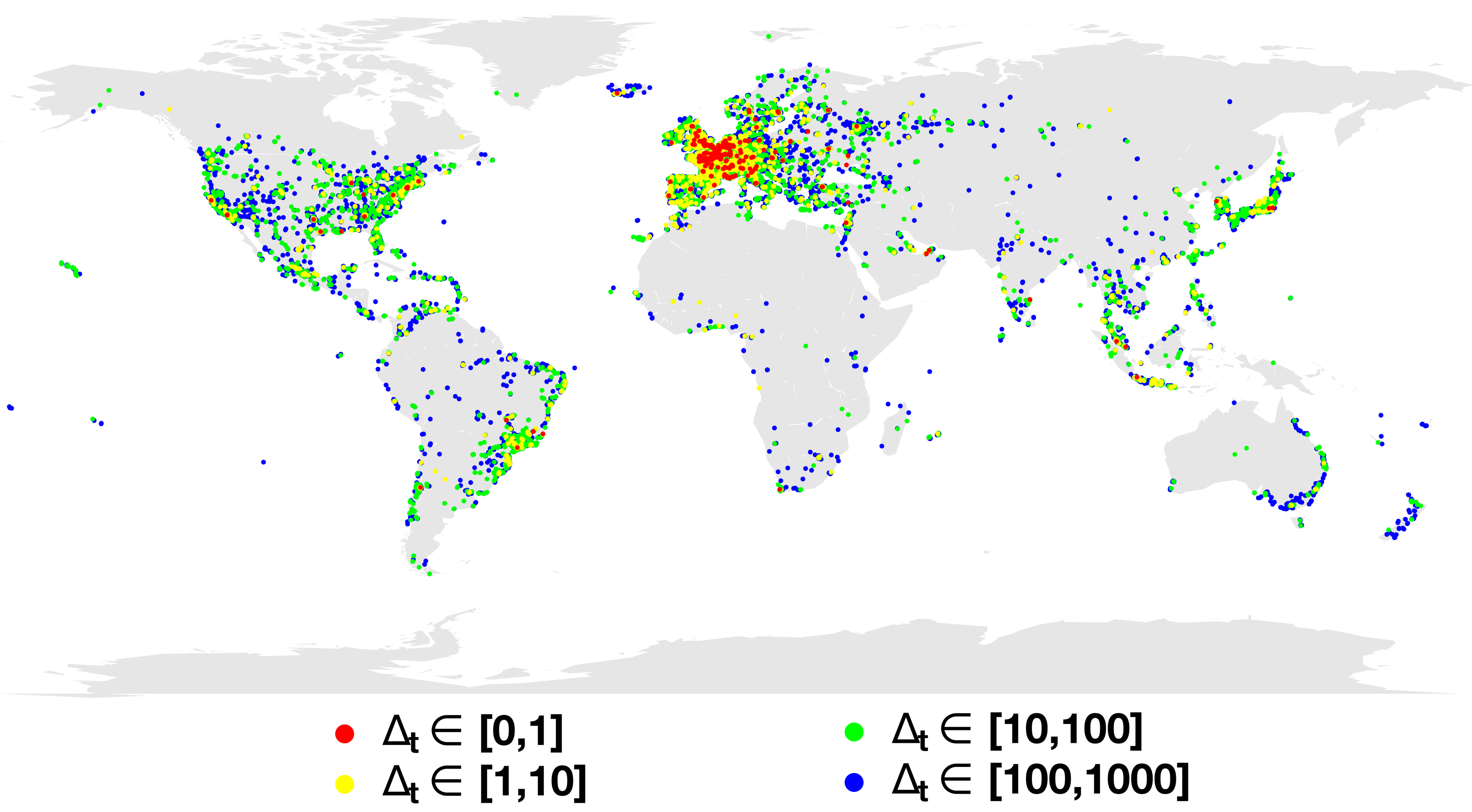
Database



20M of geolocated tweets worlwide

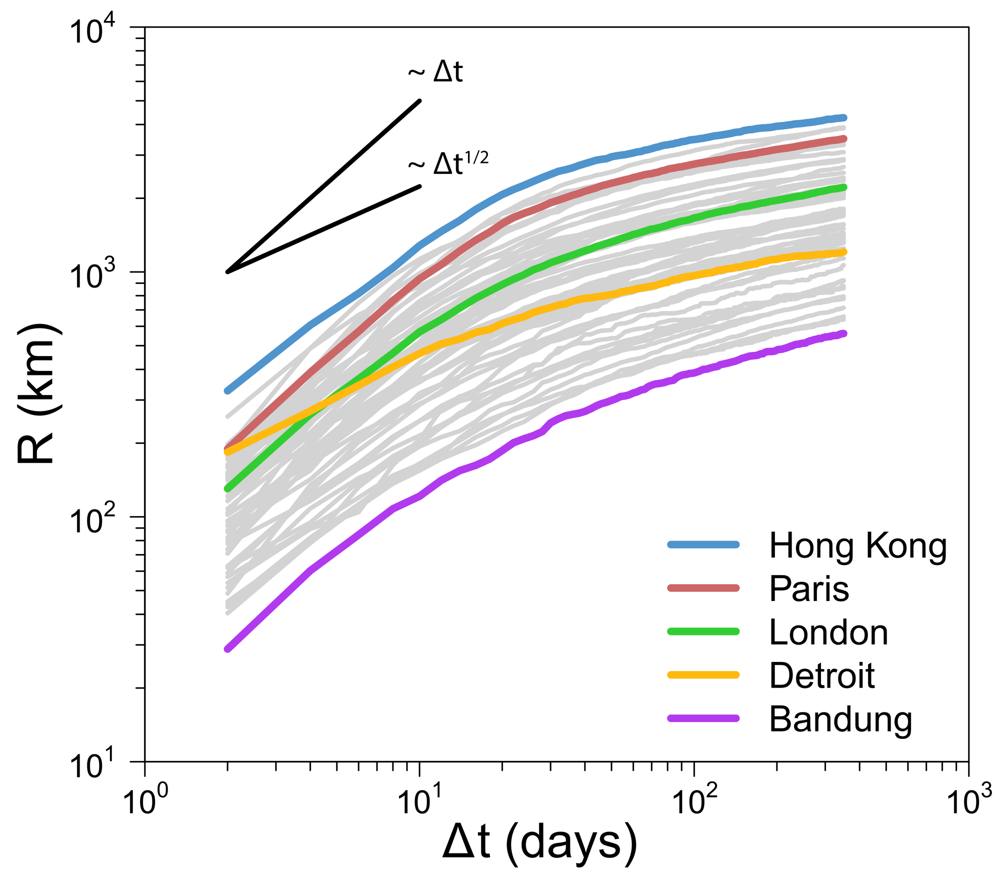
Human Diffusion

Starting from Paris

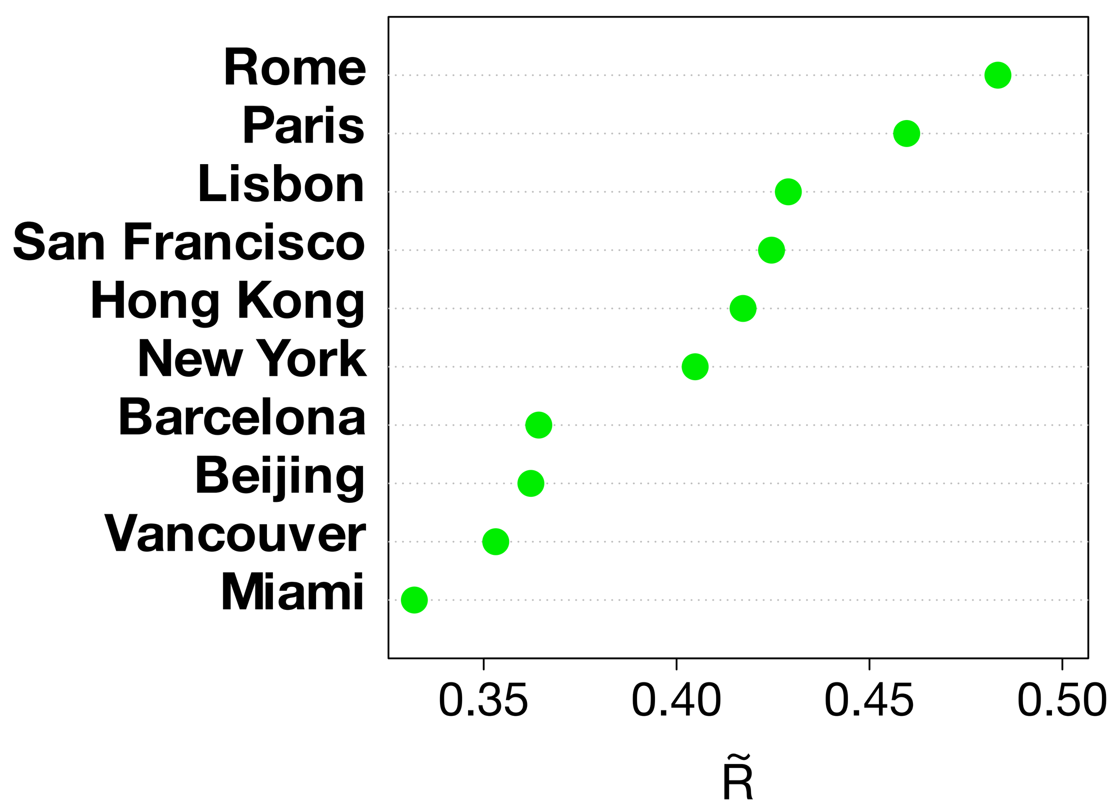


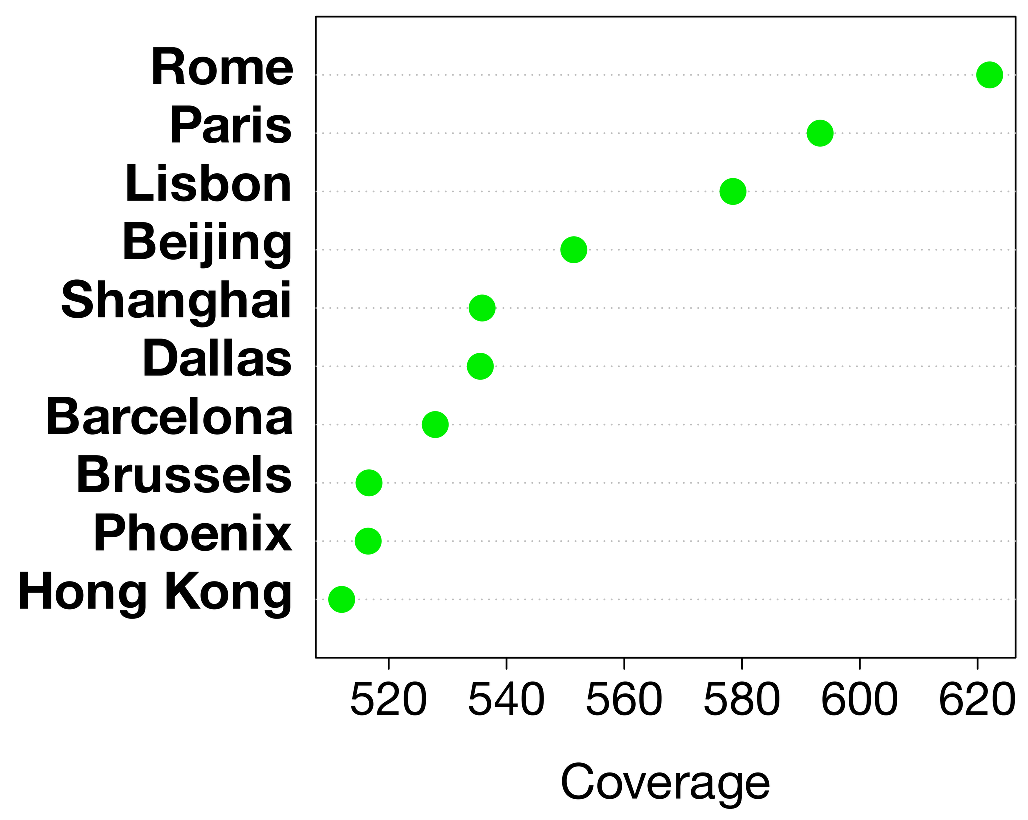
R is the average radius traveled by Twitter users since their first tweet from a city *c*. We tracked for each user the positions from which he or she tweeted after visiting *c*, and compute the average distance from these locations to the center of *c*. The average radius, R, is then defined as the average over all users of their individual radii.

58 cities



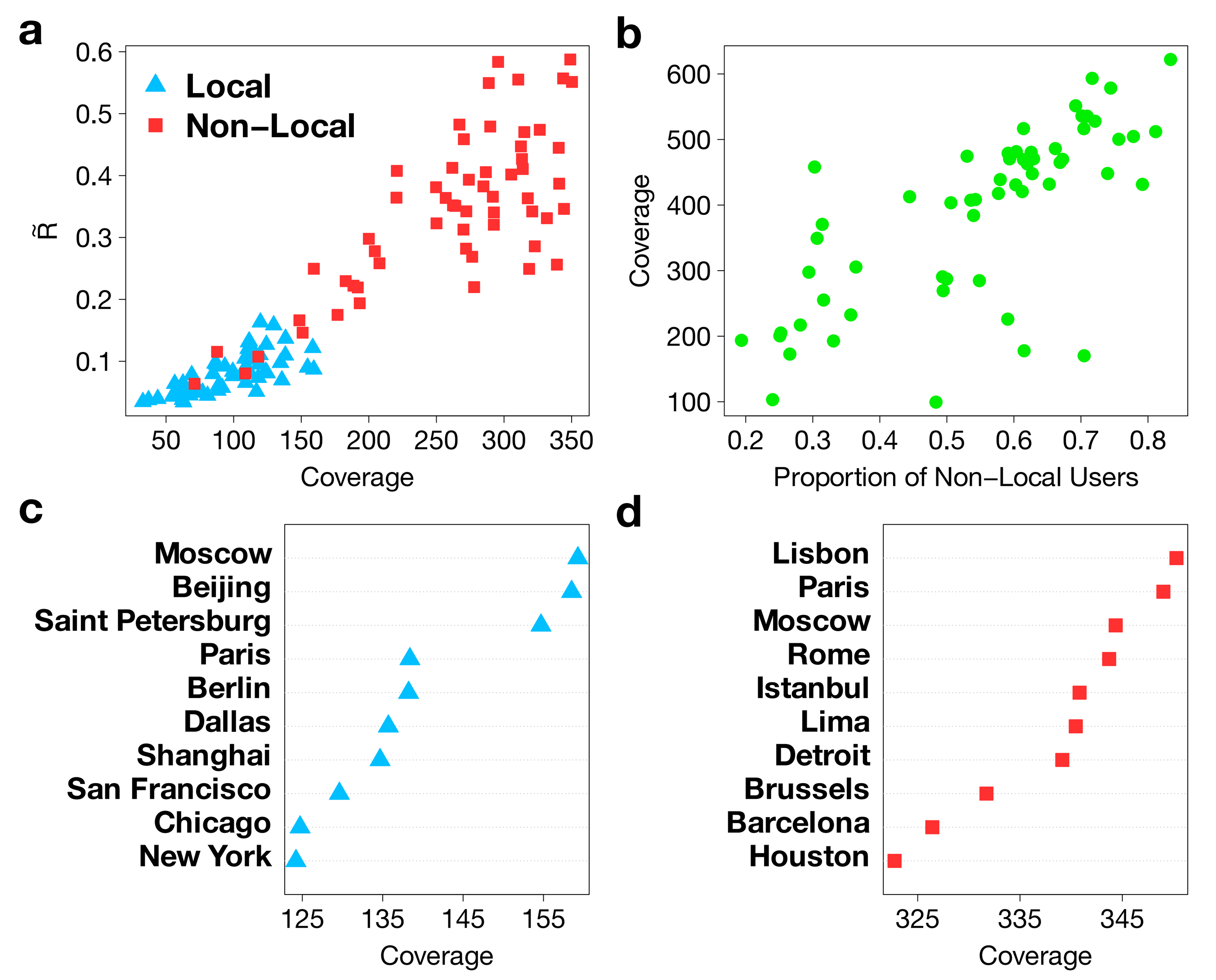
Influence of Cities



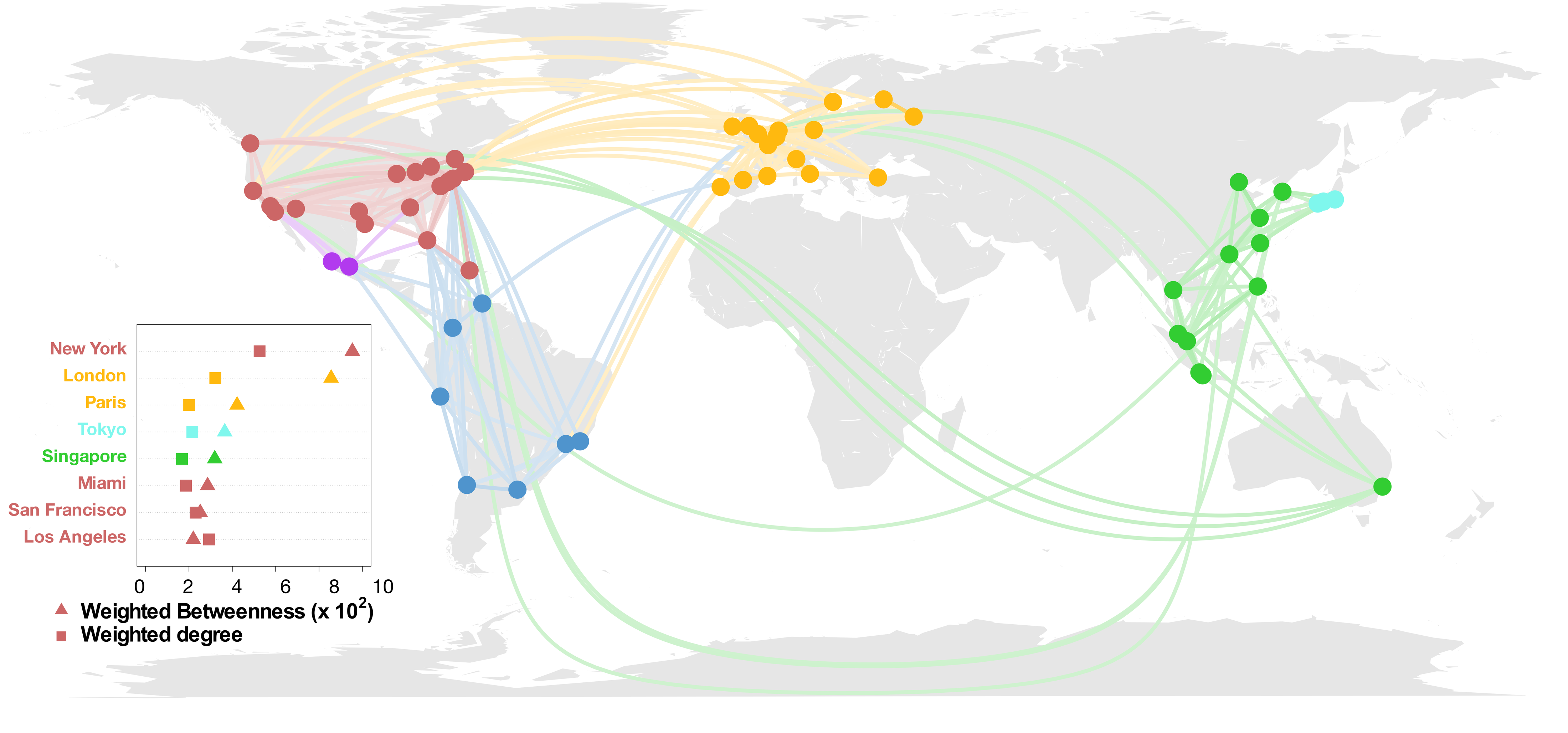


By tracking the movements of the set of users passing through each city, we count the number of cells from which at least a tweet has been posted and define coverage as this number. This metric has the clear advantage of not being sensitive to isolated locations but it still does not consider how specific cells, specially the ones corresponding to other important cities, are visited much more often than others.

Local versus non-local



Network of cities



Lenormand M, Gonçalves B, Tugores A & Ramasco JJ. 2015 Human diffusion and city influence. arXiv:1501.07788