The global homogenization of urban form. An assessment of 194 cities across time

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Abstract
The spatial structure of cities, i.e. their composition, shape and degree of fragmentation or compactness, is a physical expression reflecting development efficiency. Identifying the evolution of urban systems in time and space is crucial towards sustainable urban development. In this paper, we assess the spatial structure of 194 cities from 1990 and 2015, in order to identify patterns, clusters of similar cities, trajectories, and the global distribution of urban form. We delineated the contiguous urban fabric, employed landscape metrics to quantitatively describe urban patterns, applied a Principal Component Analysis (PCA) to reduce the dimension of data to an uncorrelated set of variables and identified groups of cities with similar urban forms by means of hierarchical clustering. We found four types of urban form: compact-grey, transitional, ragged-small and fragmented-complex cities. Globally, continentally and regionally, cities have followed a trend towards more homogeneous urban forms, most of them becoming transitional as a consequence of both, processes of fragmentation and compactness. The only exception of this trend is a group of large cities in Australia, New Zealand and the United States, which are still predominantly fragmented-complex. Under the persisting process of urban expansion, small to medium-sized cities showed to be the most dynamic in terms of expansion and change in urban form, which makes them key towards sustainable urban development. This analysis contributes to the understanding of the transformations induced by the process of urban expansion that shapes urban form. Such information is crucial for achieving urban sustainability.

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