

Online Presentation

Name of the Presenter: Dr. Juste Raimbault

Affiliation of the Presenter: University College London, United Kingdom

Empowering Urban Governance through Urban Science: Multi-scale Dynamics of Urban Systems Worldwide

Juste Raimbault^{1,2,3*}, Eric Denis³, Denise Pumain³

¹Center for Advanced Spatial Analysis, University College London, UK

²UPS CNRS 3611 ISC-PIF, France

³UMR CNRS 8504 Géographie-cités, France

**Corresponding author: E-mail: juste.raimbault@polytechnique.edu*

Abstract. Cities are facing many sustainability issues in the context of the current global interdependency characterized by an economic uncertainty coupled to climate changes, which challenge their local policies aiming to better conciliate reasonable growth with livable urban environment. The urban dynamic models developed by the so-called “urban science” can provide a useful foundation for more sustainable urban policies. It implies that their proposals have been validated by correct observations of the diversity of situations in the world. However, international comparisons of the evolution of cities often produce unclear results because national territorial frameworks are not always in strict correspondence with the dynamics of urban systems. We propose to provide various compositions of systems of cities in order to better take into account the dynamic networking of cities that go beyond regional and national territorial boundaries. Different models conceived for explaining city size and urban growth distributions enable the establishing of a correspondence between urban trajectories when observed at the level of cities and systems of cities. We test the validity and representativeness of several dynamic models of complex urban systems and their variations across regions of the world, at the macroscopic scale of systems of cities. The originality of the approach resides in the way it considers spatial interaction and evolutionary path dependence as major features in the general behavior of urban entities. The models studied include diverse and complementary processes, such as economic exchanges, diffusion of innovations, and physical network flows. Complex systems dynamics is in principle unpredictable, but contextualizing it regarding demographic, income, and resource components may help in minimizing the forecasting errors. We use, among others, a new unique source correlating population and built-up footprint at world scale: the Global Human Settlement built-up areas (GHS-BU). Following the methodology and results already obtained in the European GeoDiverCity project, including USA, Europe, and BRICS countries, we complete them with this new dataset at world scale and different models. This research helps in further empirical testing of the hypotheses of the evolutionary theory of urban systems and partially revising them. We also suggest research directions towards the coupling of these models into a multi-scale model of urban growth.

Keywords: *system of cities; urban dynamics; co-evolution regimes; geodiversity; model calibration*