Globally Regulated Multi-population Dynamics: An Explanation for Vicissitudinary Growths

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Empirical evidence suggests that the evolution of many multi-population systems are not only determined by local conditions, but also are constrained by global status. Within an urban context, the impact on development by local topography, industrial base, and group constitutions of nearby cities are usually regulated by their shared regional status, including railway conveniences, regional industrial roles, and urban niches. These facts can be attributed to the competition for space and resource. Thus, modeling the emergence of cities needs to be conducted from a regional restrictive perspective. To account for this, we propose an out-of-equilibrium model of emerging communities in a given region with a fixed bound on systematic growth rates representing competitions. The model processes through freely growth phase and restricted growth phase. We confirm that the empirical Clark's and Zipf's laws for singular and multi-population are consistent in freely growth phase. And instead, given finite regional resource, restricted growth phase captures the inevitability of various eco-illnesses such as habitat shrinkage in developed communities and the spatial transitions of developmental focuses.

INTRODUCTION

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