EENS sections

RMD

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Contents

Linking null models in evolution and ecology with next generation sequencing data to illuminate non-equilibrium dynamics of biodiversity

As biologists, we are tasked with understanding and predicting how ecological/evolutionary systems change over time, especially in an era of dramatic changes to biodiversity.

Particularly in the current era of dramatic and often unprecedented disturbances to ecological and evolutionary processes, one of the key objectives for biodiversity scientists is to understand and predict how eco-evolutionary systems respond to perturbations.

Enormity-of-the-system/statistical equilibrium argument for focusing on deviations from statistical null models

Efforts to apply this approach in ecology have been intriguing, but constrained by 1) too few comparison/evaluation points 2) the scarcity of historical data

Incorporating population genetics with ecological patterns would 1) provide an additional point for inference and 2) specifically a point of inference that encodes information about past dynamics.

This approach shows promise but has been constrained by 1) a lack of quantitative theoretical work integrating null models of popgen and ecology, 2) a lack of widely-available joint community genetics-and-abundance data to ground theoretical work.

Both of these are addressed by recent advances: 1) the double-neutral line of MESS thinking and 2) wetlab and bioinformatic technologies for NGS.

Here we illustrate how joint neutral modeling of popgen and ecological dynamics can illuminate the past and future trajectories of eco-evolutionary systems as they move away from and towards macroscopic equilibrium.

Present a theoretical framework for interpreting deviations from macroscopic equilibrium

Simulations demonstrating how specific scenarios map on to the expectations of this framework

Demonstration of bioinformatic advances for plugging real-world data into this framework

Call for continued work/signaling of next steps using community genetics data and double-neutral modeling to understand and predict trajectories of eco-evolutionary change.