
How complex is the stability of complex trophic communities?

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Abstract

Measuring the stability of complex ecological networks is a matter of increasing importance, yet it has proven to be a hard task, oftentimes leading to conflicting results. Recently, the fact that the concept of stability itself was not clearly defined has attracted the attention of the scientific community. More precisely, the existence of many different aspects of community responses that can be assessed to evaluate “stability” has been drawn to focus. This, together with the fact that most scientific studies focus only on one of those aspects, holds to the key to understanding the reasons for some of the conflicting results that still remain present, e.g. regarding the stability of complex trophic communities. To study the multidimensionality of the stability of complex ecological communities we propose a unifying approach, measuring at the same time a wide variety of quantities frequently used in scientific literature to assess the stability of ecological networks. Our approach is based on dynamical simulations of realistic trophic networks submitted to different perturbation scenarios (pulse and press). Working with many different metrics simultaneously we shed some light on how these different aspects of stability relate to each other, what they entail for community survival, and provide an estimate of the minimum information that should be taken into account when studying the response of these communities.

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