

sDiv working group meeting summary

“sNiche II - Expanding Neo-Chessonian coexistence theory towards a stochastic theory for species rich communities”

The general objective of the two sNiche workshops is to synthesize recent coexistence theories by focusing on the role of stochasticity in promoting biodiversity. We aim to approach a new stochastic coexistence theory that should allow for deterministic fitness differences and stabilizing mechanisms, but include also stochasticity as a key mechanism that further promotes coexistence and that can lead to biodiversity patterns similar to those predicted by neutral models.

The participants contributed expertise on spatial pattern analysis, stochastic modeling, “Neo Chessonian” coexistence theory, and spatially explicit simulation modeling. Diverse career stages were represented, including PhD students, post docs, early career researcher, senior scientists and faculty. The group was also diverse in terms of gender and geographic origins, with participants from Germany, the US, Australia, and China.

sNiche I was very successful in brainstorming, idea development and project planning. The second sNiche workshop then focused on advancing the main products identified during sNiche I. We accomplished this by a few plenary presentations providing progress reports with subsequent group discussions and by break-out time for smaller sub-groups to work together on the products.

We were working on four main issues,

1. a forum paper on biodiversity theories and coexistence mechanisms (draft manuscript)
2. a synthesis paper on stochasticity in ecological communities (draft manuscript)
3. using simulation models and field data to find out if stochastic neighborhood patterns change with species richness in a fundamental way (draft manuscript)
4. test classical and Neo Chessonian coexistence theory to data generated with individual-based and spatially explicit community models (preliminary analyses)

Discussion and key questions for the forum paper included how to go from two (or low) species cases to species rich cases, how to put multiple coexistence mechanisms conceptually together, if they are able to jointly

produce high biodiversity, and how occurrence of multiple coexistence mechanisms can be tested with data. Beside the work in small groups to complete sections of the paper we identified and tested in the plenary group suitable keywords and questions for a literature review on tests of coexistence mechanism in field studies. Each participant conducted a few test reviews to improve our scheme.

Prior to the workshop the participants had already provided drafts on different sections of the stochasticity synthesis paper. During the workshop, we had a lot of great discussions in the plenary and smaller groups. Our discussions summarized definitions of different types of stochasticity, lessons learned about stochasticity at the population level and how these lessons extend to communities.

We had fruitful discussions on the response of the stochastic geometry of neighborhood patterns to changes in species richness and how summary functions of spatial pattern analysis can capture them. Using data generated by the CONFETTI simulation model showed that mechanisms such as habitat association or competition can indeed generate the expected neighborhood patterns.

Finally we discussed various approaches to use spatially-explicit simulation models to find out to what extent high species richness and the stochastic geometry of biodiversity changes predictions of classical and Neo-Chessonian coexistence theory.

The research ideas developed during the workshop were beyond what we had hoped and were fruit of bringing together the diverse expertise and perspectives inherent in the group. The work on the concrete products initiated during the workshop is ongoing and several ideas of continuing in subgroups were developed. They include e.g., applying for DAAD funding promoting international mobility of researchers or sharing supervision of students or PostDocs.

To maximize time to work on products we scheduled only few background presentations of participants, and the balance between work on outputs/ general brainstorming - information exchange / participants presentations was roughly 45%/40%/15%. sNiche was very inspiring for all participants. The general working atmosphere was exceptionally positive and constructive, and concentrated. Despite a rather large group there was a sense of full dedication throughout the workshop. Besides the good composition of the workshop group the support of sDiv was absolutely key for the success of the workshop.

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Second sNiche workshop, 6.-8. 06. 2016 at iDiv, Leipzig. Participants from left to right: Jonathan Chase, Thorsten Wiegand, Lauren Shoemaker, Karen Abbott, Margie Mayfield, Nathan Kraft, Felix May, Franziska Taubert, Janneke Hille-Ris Lambers, Karin Frank, Sebastian Lehmann, Andreas Huth, Grigoris Kylafis, Lauren Sullivan, Ranjan Muthukrishnan, Stefan Kupers, I-Fang Sun, Stan Harpole, Sean Satterlee, Xugao Wang and Juliano Sarmento Cabral.