

SIO 276L Syllabus 2015
Instructor: Dr. George Sugihara
Meeting Time: Thursdays 10-12:30am

Course Goals

For this course, the main focus will be to develop a research project idea from the early stages through to publication. As a team, we will be taking an initial concept developed for SIO 276 and expanding upon it and refining it. The approach of the initial concept was to apply convergent cross-mapping (CCM) statistical techniques to a large, long-term dataset of abundances within a species assemblage, in order to quantitatively model interspecies interactions, produce an influence web, and compare the observed patterns with traditionally produced food webs. The initial project utilized a 13 year historic dataset of plankton species, collected at Port Erin Bay on the Isle of Man, UK.

In order to expand on the original project, we will first conduct an exploratory phase, during which we will search for any available additional datasets that could be good candidates for attempting this new application of the CCM technique. Good potential datasets will consist of long-term metrics of species/functional/categorical abundance, spanning multiple trophic levels. Ideal datasets will also connect to existing traditional food webs, to provide a good standard of comparison for our method.

Depending on the outcome of the exploratory phase, we will either take a broad-based investigative approach to test the efficacy and applicability of the CCM influence web method across multiple systems, or we will select a particularly promising dataset with which to conduct an in-depth case study.

In the development of this project, we will: decide as a group what specific directions to take in our research; refine our statistical techniques; look for evidence of traditional trophic and ecological patterns in our results (i.e. trophic cascades, interspecific competition, top-down and bottom-up control, etc); examine the efficacy of the application of this approach for different kinds of datasets; produce a submission-ready paper summarizing our investigations and findings.

Preliminary Reading List

- Bascompte, Jordi (2009) "Disentangling the Web of Life"
- Berlow, Eric (2004) "Interaction strengths in food webs: issues and opportunities"
- Cohen, Joel (1978) "Food Webs and Niche Space"
- Faust, Katherine (2002) "Comparing Networks Across Space and Time, Size and Species"
- Link, Jason (2002) "Does food web theory work for marine ecosystems?"

- Moniz, L.J. (2007) "Application of information theory methods to food web reconstruction"
- Polis, Gary (1991) "Complex Trophic Interactions in Deserts: An Empirical Critique of Food-Web Theory"
- Sala, Enric (2002) "Community-wide distribution of predator–prey interaction strength in kelp forests"
- Schoenly, Kenneth (1991) "Temporal Variation in Food Web Structure"
- Sugihara, George (1984) "Graph theory, homology and food webs"