SIO 276L Syllabus
Winter Quarter 2015
Instructor: Dr. George Sugihara
Meeting Time: Thursdays 10-11:00am

Course Goals

For this course, we are continuing to develop a research project idea into a publication-ready paper draft. As a team, we have taken an initial concept developed for SIO 276 and expanded upon it and refined 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 found additional datasets that could be used to test this new application of the CCM technique. Good datasets consist of long-term metrics of species/functional/categorical abundance, spanning multiple trophic levels. Ideal datasets also connect to existing traditional food webs, to provide a good standard of comparison for our method.

Having tested out multiple datasets during the exploratory phase of this project, we have opted to hone in on the applicability of the CCM influence web method in one type of system with particularly long-running and rich datasets at multiple ecological scales, namely ocean planktonic systems in the North Sea. This dataset paired with the original dataset from Port Erin Bay will serve as an in-depth case study for our pilot publication. Having identified our main goal for the first publication, our goal is to write, edit, and provide context for our initial findings, and identify which future directions we will pursue after the first paper is complete.

In the development of this project, we: 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”