**Spatiotemporal Models for Ecologists**

**Ordination for community spatial description**

Goal: Explore ordination as way to describe community spatial distribution using simulate data

**Data generating process**

Envision a square spatial domain with two spatial dimensions where and . Envision that four species reside in this domain with densities:

Where is a spatial correlation matrix of your choice and is a spatial factor for each of factors, where:

And . Then simulate point-counts using 100 samples, where each sample counts abundance for each species:

Given this matrix of counts , calculate the Bray-Curtis dissimilarity (e.g., using `ecodist::bcdist`) and then apply hierarchical clustering using a Ward2-dissimilarity (e.g., using `hclust(., method="ward.D2" )` or `fastcluster::hclust.vector`). Finally, cut the resulting tree into 2 clusters (e.g., using `cutree(, k = 2 )`) and plot the resulting cluster labels as well as the first two of the original factors .

Questions:

* How do the clusters identified using Bray-Curtis dissimilarity compare with the original factors?
* If you re-do the cluster analysis using Ward distances applied to the latent (but unobserved) densities , how does that apply with either the Bray-Curtis clusters?