**Spatiotemporal Models for Ecologists**

**Comparing spatial GLMM and Generalized Additive Models**

Goal: Compare a spatial delta-GLMM with a Generalized Additive Model

**Data generating process**

Envision a model for gridded densities using square grid cells in two dimensions:

Where is a spatially correlated variable. We will specify Using the SPDE method, where:

Where:

And using package:fmesher to construct the matrices involved.

We will compare this model with a generalized additive model using an isotropic two-dimensional smoother. In R-package mgcv, this is specified using the formula:

Please load the point-count data from Barro Colorado data for Vismia baccifera (vismba.rds), and convert it to counts within 32 square grid cells (see Discretize\_samples.R). Fit the SPDE model, calculate the percent-deviance-explained for the SPDE method, and compare it with the value calculated by mgcv. Then refit both models at different scales, by progressively decreasing the cell sizes used for discretization.

How does PDE change for each method as you increase the resolution (number of discrete spatial cells)? And how does the estimated intercept (and its standard error) change as you increase the resolution?