1 β and ρ parametrizations

There are two ways which I have tried parametrizing distance decay functions in my models. The first, used in the Pope paper, relies on a multiplicative β term to scale the rate of distance decay. E.g.,

$$ln(\lambda) = -\beta|x_1 - x_2|$$

β in this case is a small positive real. In my simulations is receives values from 0.01 - 0.1 although of course this would vary based on the units of distance (e.g., meters, kilometers, etc.). In my model I assign it a prior,

$$beta \sim \mathcal{N}(0, 0.1)$$

and it is restricted to positive values in the `parameters` block.

An alternative parametrization, following from Mike's chapter on the exponentiated quadratic function, is to use a divisional length scale ρ, such that

$$ln(\lambda) = -\frac{1}{2}\left(\frac{|x_1 - x_2|}{\rho}\right)^2$$

where ρ (at least in my case) is a large positive real. For me, realistic values would be on the range 50-150. I initially gave it a prior,

$$rho \sim \mathcal{N}(100, 50)$$

2 Model convergence

As I mentioned previously, the β parametrization of the model frequently leads to divergent transitions, especially for (1) small sample size and (2) large foraging distance (e.g., small(er) β).

I thought at first that this was a general problem resulting from lack of data, and you suggested that perhaps it was an issue of unidentifiability between two parameters (for example, β and θ (the parameter governing floral attractiveness, which I have ommitted here for simplicity)). However, playing around with these two different paramerizations has led me to believe that the issue is actually with the β parametrization more generally!

I believe that β introduces a complex geometry because as $\beta \to 0$

Because the prior for β is centered on 0 and takes a very small range of valu