i=point

s=species

j=replicate

Let be the occupancy status of point i for species s.

The vector is modeled as a standard random effect and includes the intercept term. More specifically, we assume that:

where is a diagonal matrix with elements .

We assume a standard random effect prior for :

where is a diagonal matrix comprised of elements

Finally, we specify the following priors:

#------------------------------------------------

Calculating likelihood

If , then:

If at least one , then:

#-------------------------------------------

Full conditional distributions for latent variables

* For and

We will sample this joint distribution using compositional sampling. More specifically, we rely on

1. For

Notice that we only sample whenever for all j. As a result, this expression becomes:

We sample this from a Bernoulli distribution

1. For

If , then

If , then

* For

If , then:

If , then:

#--------------------------------------------------

Full conditional distributions for gammas and its priors

* For

where represents all the observations (across all I and j) for species s for which . Similarly, represents the design matrix for which

This implies that

* For

where is the number of species. This implies that

* For

Where is the number of species

This implies that

#------------------------------------------------

Full conditional distributions for betas

* For

This implies that

#-----------------------------

Full conditional distributions for the prior of

* For

Where is the number of species

* For