**Generative model**

Our generative model assumes that the group membership of “virtual” individual i in location l for band b is given by:

Let the reflectance contribution of “virtual” individual i for band b and location l be given by a binary variable . We will assume that is drawn from:

where describes the spectral signature in band b of community j.

Our data consists of reflectance for each band b and location l. We will assume that this variable is binomially distributed with size n and, as a result, it can be represented as

where are binary variables representing the reflectance (0 or 1) of each “virtual individual” i.

After marginalizing the latent , this model is equivalent to assuming that:

**Priors**

In relation to our priors, we assume that

As for , we use a truncated stick-breaking (TSB) prior:

where

This TSB prior imposes an exponential reduction in the parameters as j increases, thus helping us to enforce sparseness.

**Gibbs sampler**

Explicitly representing each is computationally expensive. Instead, we will estimate the parameters of our model using directly the marginal likelihood. More specifically, the full model (likelihood and prior) is given by:

Our algorithm will rely on univariate random-walk Metropolis-Hastings steps to sample these parameters one at a time.