Barro Colorado Island

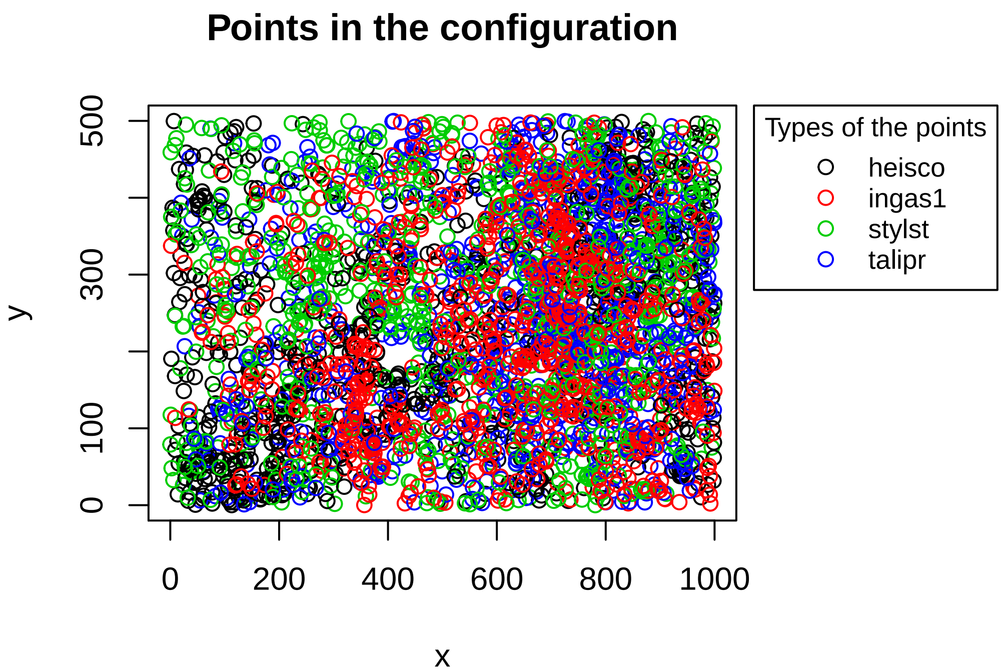
```r
library(ppjsdm)
#> Registered S3 method overwritten by 'spatstat':
#>   method     from
#>   print.boxx cli
library(spatstat)
#> Loading required package: spatstat.data
#> Loading required package: nlme
#> Loading required package: rpart
#>
#> spatstat 1.64-0       (nickname: 'Susana Distancia')
#> For an introduction to spatstat, type 'beginner'
#>
#> Attaching package: 'spatstat'
#> The following object is masked from 'package:ppjsdm':
#>
#>     marks
library(plot.matrix)
remove(list = ls())

source("../R/get_bci.R")

set.seed(1)
```

This vignette explains how to use the `ppjsdm` package with the Barro Colorado Island (BCI) dataset. We begin by loading the data with only the most prevalent species.

```r
number_of_species <- 4
bci <- get_bci(least_prevalent = 50, most_prevalent = 50 + number_of_species - 1)
configuration <- bci$configuration
window <- bci$window
```

The point configuration is plotted below.

```r
par(mar = c(5, 4, 4, 13) + 0.1)
plot(configuration, window = window)
```

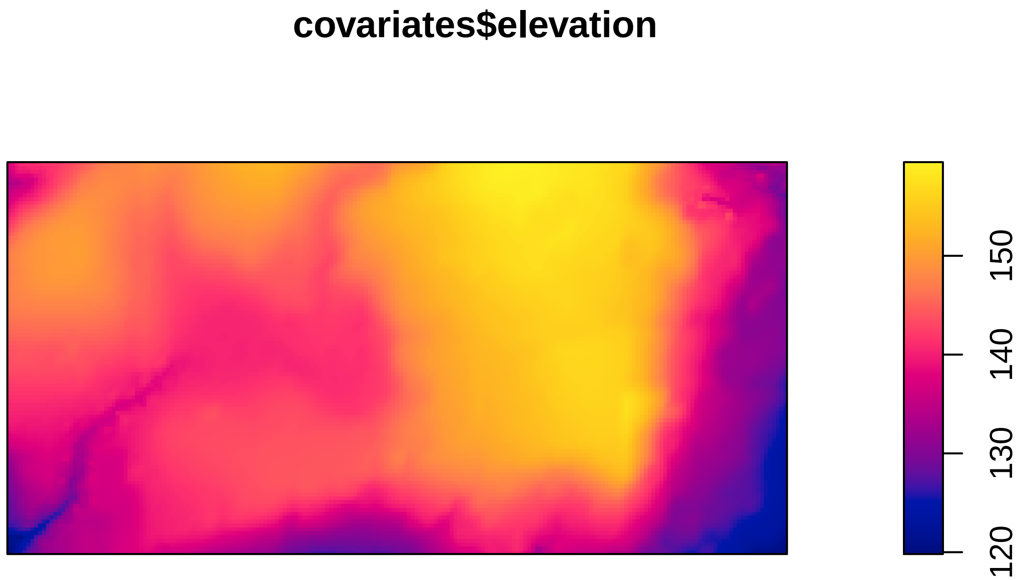


The BCI dataset also contains a series of environmental covariates. The easiest to obtain are the elevation level and the elevation gradient, since they are included in `spatstat`.

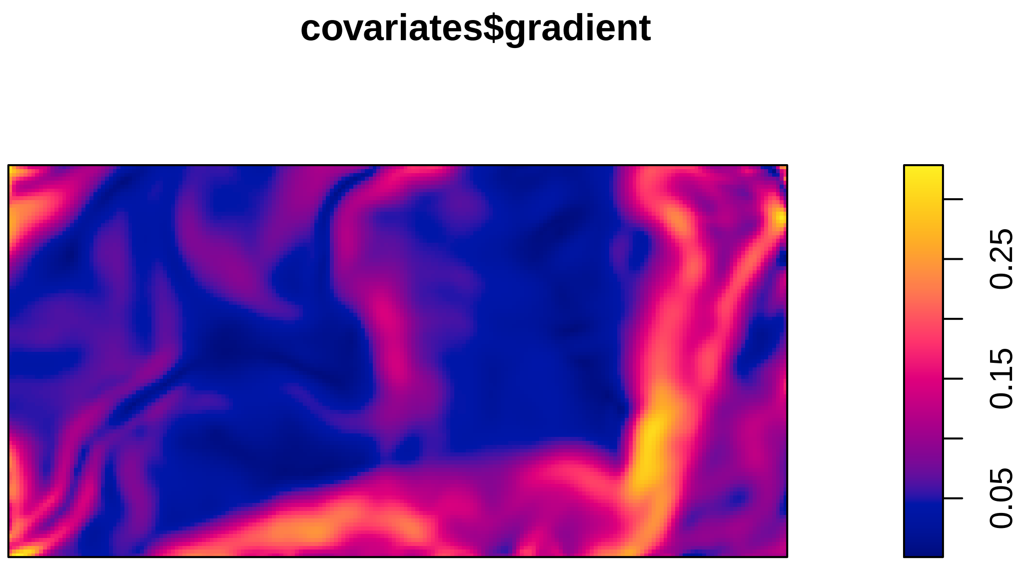
```
covariates <- list(elevation = spatstat.data::bei.extra$elev,
                   gradient = spatstat.data::bei.extra$grad)
```

Plotting covariates maps is easy in `spatstat`.

```
plot(covariates$elevation)
```




```r
plot(covariates$gradient)
```



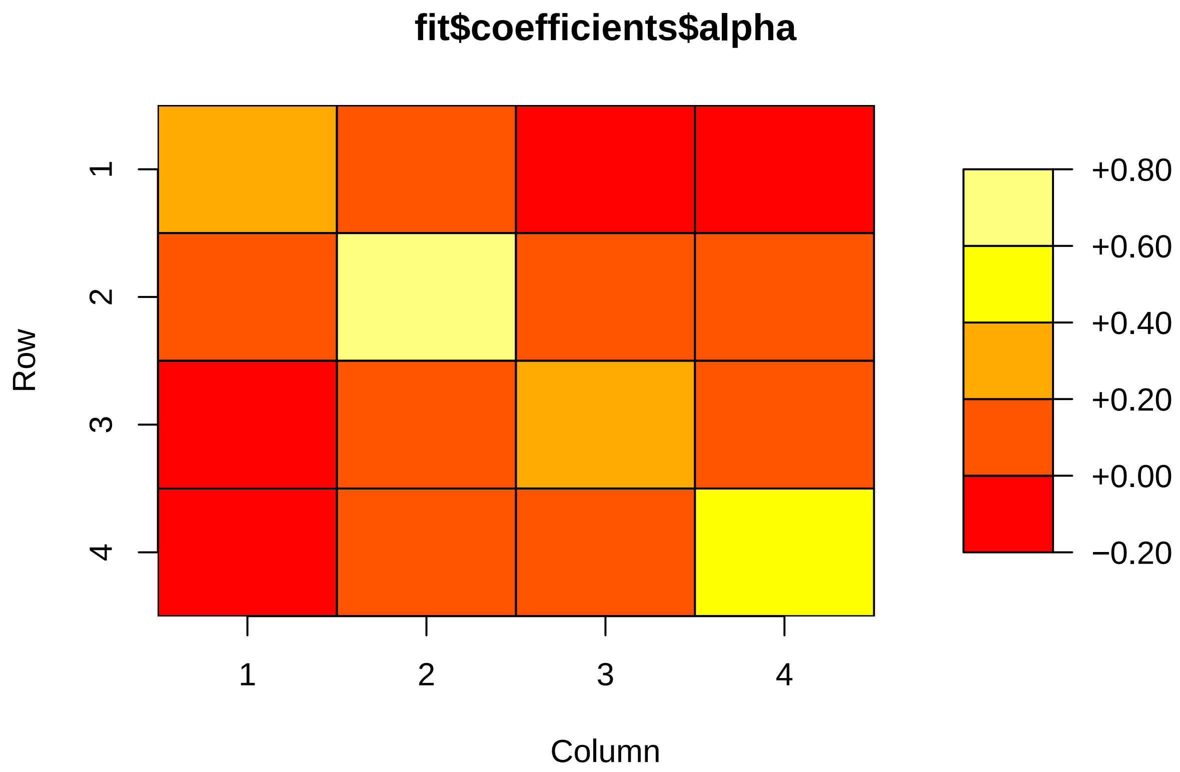
The matrix `short_range` defined below models short range interaction radii within a species (on the diagonal), and between species (outside the diagonal). One could play around with different interaction radii, but any homogeneous interaction radius of less than 10 m tends to work well.

```
short_range <- matrix(10, number_of_species, number_of_species)
medium_range <- matrix(20, number_of_species, number_of_species)
long_range <- matrix(40, number_of_species, number_of_species)
```

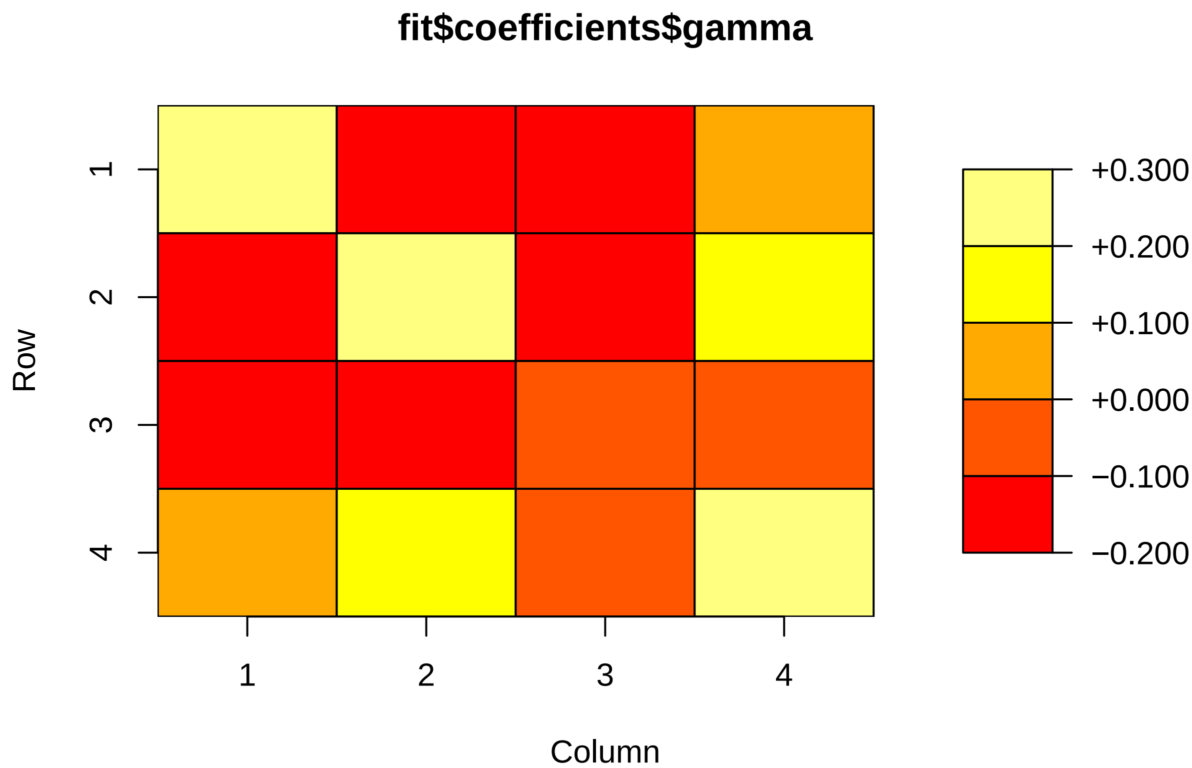
Fitting the model to the dataset is then quite easy.

```
tm <- Sys.time()
fit <- ppjsdm::gibbsm(configuration,
                      window = window,
                      covariates = covariates,
                      model = "square_exponential",
                      medium_range_model = "square_exponential",
                      short_range = short_range,
                      medium_range = medium_range,
                      long_range = long_range,
                      use_glmnet = FALSE)
print(Sys.time() - tm)
#> Time difference of 4.221825 mins
print(fit$coefficients)
#> $beta0
#> [1]  -5.702813 -10.186507  -4.986499 -10.727998
#>
#> $alpha
```

```
#>             [,1]       [,2]        [,3]        [,4]
#> [1,]  0.33131696 0.08664114 -0.03860860 -0.01466829
#> [2,]  0.08664114 0.73664460  0.03386179  0.10122725
#> [3,] -0.03860860 0.03386179  0.28899282  0.15913165
#> [4,] -0.01466829 0.10122725  0.15913165  0.41523899
#>
#> $gamma
#>             [,1]       [,2]        [,3]        [,4]
#> [1,]  0.29765179 -0.1066259 -0.10993179  0.02123073
#> [2,] -0.10662590  0.2664075 -0.13612367  0.11918027
#> [3,] -0.10993179 -0.1361237 -0.09477362 -0.02017127
#> [4,]  0.02123073  0.1191803 -0.02017127  0.25231364
#>
#> $beta
#>              [,1]         [,2]
#> [1,] -0.008904305  0.442801492
#> [2,]  0.018250708 -0.878159790
#> [3,] -0.007623592 -0.009519699
#> [4,]  0.020026593 -0.100391594
#>
#> $short_range
#>      [,1] [,2] [,3] [,4]
#> [1,]   10   10   10   10
#> [2,]   10   10   10   10
#> [3,]   10   10   10   10
#> [4,]   10   10   10   10
#>
#> $medium_range
#>      [,1] [,2] [,3] [,4]
#> [1,]   20   20   20   20
#> [2,]   20   20   20   20
#> [3,]   20   20   20   20
#> [4,]   20   20   20   20
#>
#> $long_range
#>      [,1] [,2] [,3] [,4]
#> [1,]   40   40   40   40
#> [2,]   40   40   40   40
#> [3,]   40   40   40   40
#> [4,]   40   40   40   40
par(mar = c(5.1, 5.1, 4.1, 4.1))
plot(fit$coefficients$alpha)
```




```r
plot(fit$coefficients$gamma)
```




```
print(fit$aic)
#> [1] 6946.821
print(fit$bic)
#> [1] 7158.711
```