./scripts/06.R

```r
1   generatePatchySpecies <-
2   function(nb.sim = 1, nb.sp = 20)
3   {
4     richness <- stack()
5     richness.patch <- stack()
6     for (j in 1:nb.sim)
7     {
8       sp.traits <- data.frame(T.optimum = sample(temperature.gradient,
9                                 nb.sp, replace = T),
10                      T.tolerance = sample(seq(50, 100,
11                             length = 1000),
12                             nb.sp, replace = T))
13      species <- list() # All the species will be stored in this list
14      range.stack <- stack() # Species ranges will be stored in this stack
15      range.patch.stack <- stack() # Species ranges with patched distributions will be stored in this stack
16
17      for (i in 1:nb.sp)
18      {
19        # Step 1: generating the species environmental suitability
20        # (i.e., transforming from E-space to G-space)
21        species[[i]] <- generateSpFromFun(bio1,
22                      list(bio1 = list(fun = "gauss.resp",
23                            args = list(mean. = sp.traits[i, "T.optimum"],
24                                 diff. = sp.traits[i, "T.tolerance"],
25                                 prob. = 0.99))),
26                      rescale.each.response = FALSE,
27                      rescale = FALSE)
28        # Step 2: converting environmental suitability to presence-absence,
29        # using the probabilistic conversion
30        species[[i]] <- convertToPA(species[[i]], # PA.method = "threshold",
31                      beta = 0.7, alpha = -0.05,
32                      plot = FALSE)
33
34        # Step 2.5: generate habitat patches
35        patches <- generate.patches(bio1, n.patches = 50, patch.size = 10)
36        species[[i]]$patched.pa.raster <- overlay(species[[i]]$pa.raster,
37                            patches,
38                            fun = function(x, y) x * y)
39
40
41        # Step 3: we store ranges to calculate richness par cell
42        range.stack <- addLayer(range.stack,
43                      species[[i]]$pa.raster)
44        range.patch.stack <- addLayer(range.patch.stack,
45                      species[[i]]$patched.pa.raster)
46      }
47
48
49      # Richness calculation
50      richness <- addLayer(richness,
51                      sum(range.stack))
52      richness.patch <- addLayer(richness.patch,
53                      sum(range.patch.stack))
54
55      # Saving the files
56      save(species, file = paste0("./data/S1_sim", j, "_species"))
57      save(sp.traits, file = paste0("./data/S1_sim", j, "_traits"))
58      writeRaster(range.stack, paste0("./data/S1_sim", j, "_rangestacks"),
59            overwrite = T)
60      writeRaster(richness, paste0("./data/S1_sim", j, "_richness"),
61            overwrite = T)
62      writeRaster(range.patch.stack, paste0("./data/S1_sim", j, "_rangestacks_patch"),
63            overwrite = T)
64      writeRaster(richness.patch, paste0("./data/S1_sim", j, "_richness_patch"),
65            overwrite = T)
66    }
67  }
```