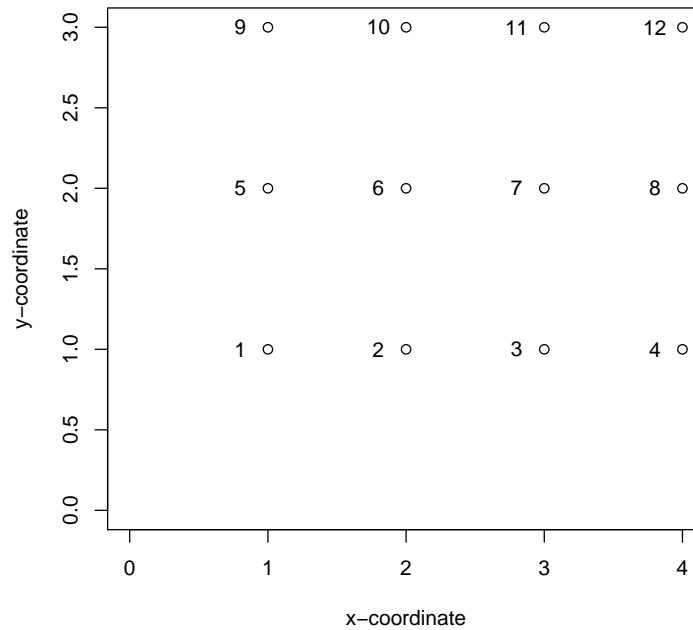
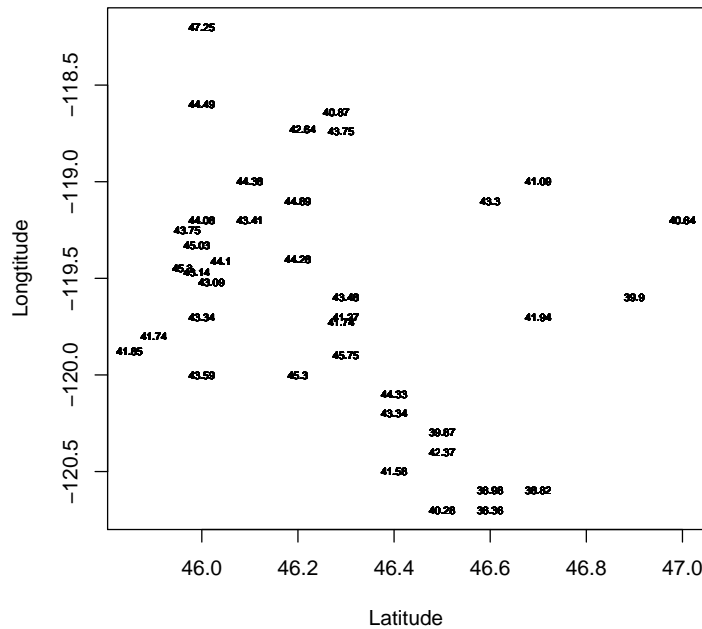


The results below are generated from an R script.

```
## Display of spatial data
loc = cbind(rep(1:4, 3), rep(1:3, each = 4))
plot(loc[, 1], loc[, 2], xlim = c(0, 4), ylim = c(0, 3), xlab = "x-coordinate", ylab = "y-coordinate")
for (i in 1:nrow(loc)) {
  text(loc[i, 1] - 0.2, loc[i, 2], i)
}
```



```
# postscript(file='AirText.eps', horizontal=FALSE, onefile=FALSE, height=4, width=5,
# pointsize=10)
plot(paws$Lat, paws$Long, xlab = "Latitude", ylab = "Longitude", type = "n")
for (i in 1:nrow(paws)) {
  text(paws$Lat, paws$Long, paws$Air, cex = 0.5)
}
```



```

# dev.off()
#### Generate spatial normal data
## Define the Matern covariance function
cov.matern = function(x, nu = 2, alpha = 1, vars = 1) {
  if (nu == 0.5)
    return(vars * exp(-x * alpha))
  ismatrix <- is.matrix(x)
  if (ismatrix) {
    nr = nrow(x)
    nl = ncol(x)
  }
  x <- c(alpha * x)
  output <- rep(1, length(x))
  n <- sum(x > 0)
  if (n > 0) {
    x1 <- x[x > 0]
    output[x > 0] <- (1/((2^(nu - 1)) * gamma(nu))) * (x1^nu) * besselK(x1, nu)
  }
  if (ismatrix) {
    output <- matrix(output, nr, nl)
  }
  vars * output
}
for (nu in seq(0.5, 4, by = 0.25)) {
  temp = cov.matern(2.8 * sqrt(nu), nu)
  cat(temp, " ", nu, "\n")
}

## 0.1381  0.5
## 0.1418  0.75

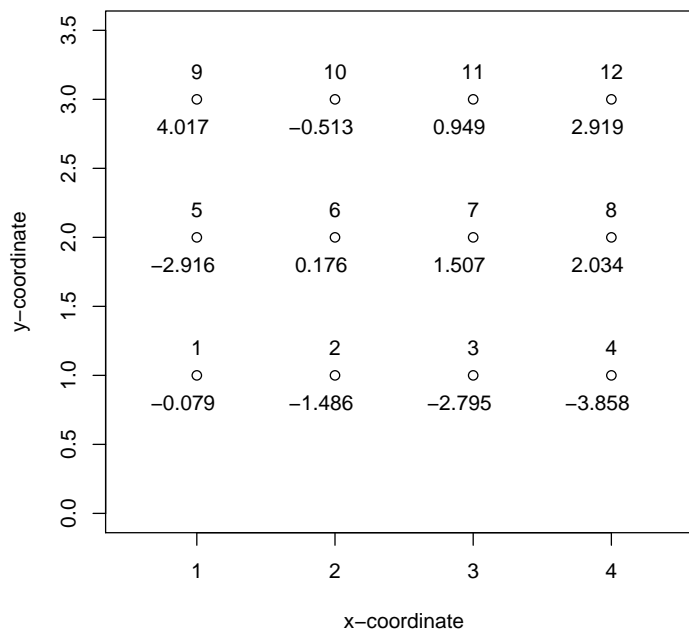
```

```

## 0.1431  1
## 0.1435  1.25
## 0.1436  1.5
## 0.1434  1.75
## 0.1433  2
## 0.1431  2.25
## 0.1429  2.5
## 0.1427  2.75
## 0.1426  3
## 0.1424  3.25
## 0.1423  3.5
## 0.1421  3.75
## 0.142   4

## This function defines the distance matrix
distmat = function(x) {
  as.matrix(dist(x))
}
d = distmat(loc)
set.seed(10)
library(MASS)
y = mvrnorm(mu = rep(0, 12), Sigma = 10 * exp(-d))
plot(loc[, 1], loc[, 2], xlim = c(0.5, 4.5), ylim = c(0, 3.5), xlab = "x-coordinate", ylab = "y-coordinate")
for (i in 1:nrow(loc)) {
  text(loc[i, 1], loc[i, 2] + 0.2, i)
  text(loc[i, 1] - 0.1, loc[i, 2] - 0.2, round(y[i], 3))
}

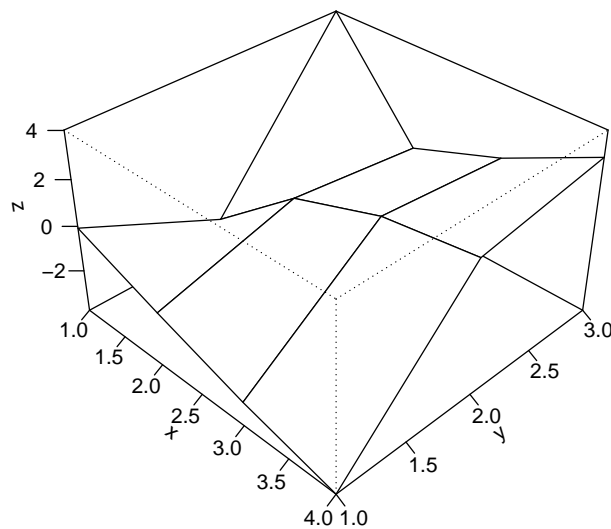
```



```

yma = matrix(y, ncol = 3)
persp(x = 1:4, y = 1:3, z = yma, xlab = "x", ylab = "y", zlab = " z", theta = 45, phi = 35,
      r = 5, expand = 0.6, axes = T, ticktype = "detailed")
V = cov.matern(distmat(cbind(rep(0:20, 21)/20, rep(0:20, each = 21)/20)), nu = 3, alpha = 7 *
  sqrt(3))
set.seed(20)
z = mvrnorm(mu = rep(0, 21^2), Sigma = V)
z = matrix(z, ncol = 21)
postscript(file = "SimuProc4.eps", horizontal = FALSE, onefile = FALSE, height = 5, width = 5,
  pointsize = 10)
persp(x = (0:20)/21, y = (0:20)/21, z, theta = 45, phi = 35, r = 5, expand = 0.6, axes = T,
  ticktype = "detailed", xlab = "x", ylab = "y", zlab = "z")
dev.off()

```



```

## windows
##      2

postscript(file = "SimuProc5.eps", horizontal = FALSE, onefile = FALSE, height = 5, width = 5,
  pointsize = 10)
filled.contour(x = 0:20, y = 0:20, z, color.palette = gray.colors)
dev.off()

## windows
##      2

```

The R session information (including the OS info, R version and all packages used):

```

sessionInfo()

## R version 3.0.1 (2013-05-16)

```

```
## Platform: x86_64-w64-mingw32/x64 (64-bit)
##
## locale:
## [1] LC_COLLATE=English_United States.1252 LC_CTYPE=English_United States.1252
## [3] LC_MONETARY=English_United States.1252 LC_NUMERIC=C
## [5] LC_TIME=English_United States.1252
##
## attached base packages:
## [1] stats      graphics  grDevices  utils      datasets  methods   base
##
## other attached packages:
## [1] knitr_1.5  MASS_7.3-26
##
## loaded via a namespace (and not attached):
## [1] evaluate_0.5.1 formatR_0.9  highr_0.2.1  stringr_0.6.2 tools_3.0.1

Sys.time()

## [1] "2014-01-23 11:57:17 EST"
```