SILand
R package for estimating the spatial influence of landscape

F. Carpentier, O. Martin
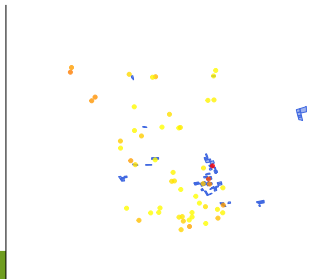
MaIAGe, BIOGER, BioSP

Aim : Estimating the influence of the landscape

Problem :

- ▶ Observations :
    - ▶ geolocated
    - ▶ measurements (eg. abundance of a specie)
- ▶ Landscape
    - ▶ geolocated variable (eg. presence of field)
    - ▶ one or several
- ▶ Local variables (eg. local treatment)

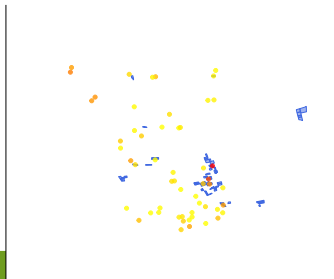SILand, a user-friendly tool from import to results map.

data from Ricci et al. 2009

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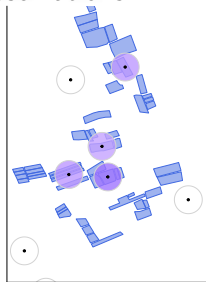
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Model 1 : Buffer model
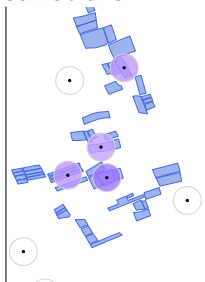
Point observations

Landscape effects estimate :

- ▶ effect intensity
- ▶ buffer radius

Model 1 : Buffer model

Point observations

Polygonal observation

Landscape effects estimate :

- ▶ effect intensity
- ▶ buffer radius

Siland : Data Import

Data imported directly from shapefiles

```
library(siland)

dataCmoth=data.gis(dsn="./GIS",layer="dataCarpo", varname=c("Cmoth","trait"))

landCmoth=land.gis(dsn="./GIS",layer="landCarpo", varname="OrgConv",landname = c("conv","org"),wd=40)
```

Buffer model : Writing and Estimation

Model in a lm-like syntax

Point data

```
resPoint=Bsiland(Cmoth~trait+Conv+Org,
                 data=dataCmoth,land = landCmoth,
                 border=F)
summary(resPoint)
```

```
## Dist.Conv  Dist.Org
## 354.78245  57.75109
```

```
##              Estimates  Std  tval Pval signif
## (Intercept)       4.29 2.53  1.69 0.10      .
## trait             0.11 0.20  0.54 0.59
## Conv            -11.30 4.27 -2.65 0.01      *
## Org              19.27 4.54  4.24 0.00    ***
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```

Polygon data

```
resPol=Bsiland(Cmoth~trait+Conv+Org,
               data=dataCmoth,land=landCmoth,
               border=T)
summary(resPol)
```

```
## Dist.Conv   Dist.Org
##  20.10367  127.44589
```

```
##              Estimates   Std   tval  Pval  signif
## (Intercept)       2.00  2.13   0.94  0.35
## trait             0.10  0.17   0.57  0.57
## Conv             -4.63  3.44  -1.35  0.18
## Org              71.90 12.08   5.95  0.00     ***
```
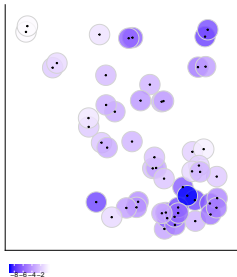
Graphical output : First landscape variable effect

Point data

```
graphPoint=plotBsiland.land(res=resPoint,var=1,
                            land=landCmoth,border=F)
graphPoint
```


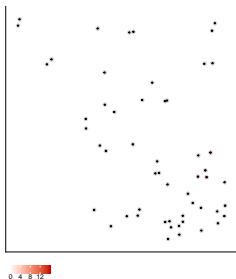## Polygon data

```
graphPol=plotBsiland.land(res=resPol,var=1,
                          land=landCmoth,border=T)
graphPol
```

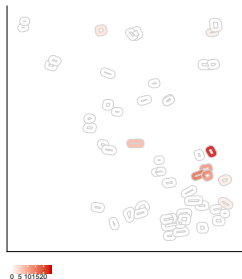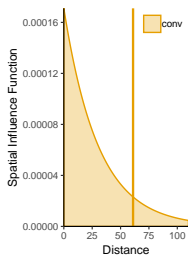# Graphical output : Second landscape variable effect

Point data

```
graphPoint=plotBsiland.land(res=resPoint,var=2,
                            land=landCmoth,border=F)
graphPoint
```


Polygon data
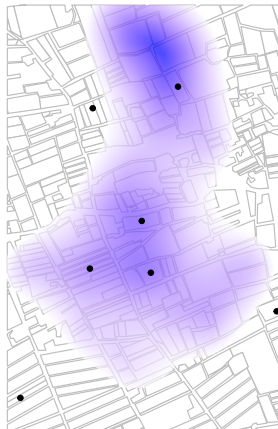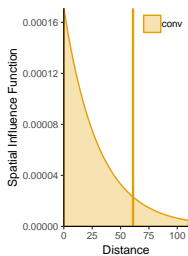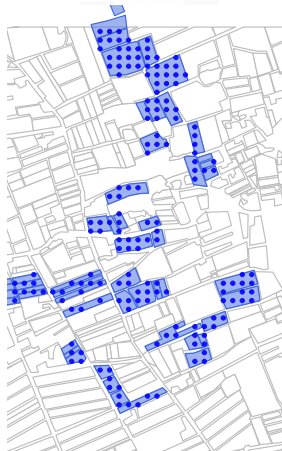
```
graphPol=plotBsiland.land(res=resPol,var=2,
                          land=landCmoth,border=T)
graphPol
```

Model 2 : Spatial Influence Function (SIF) based model

# Model 2 : Spatial Influence Function (SIF) based model

Estimation

```
resSIF=siland(loc.model= Cmoth~trait,
              land=landCmoth,data=dataCmoth,test=T)
summary(resSIF)


## Coefficients:
## (Intercept)      trait       conv        org
##     11.0818    -0.1145   -50.7619    86.9974
##
## pvalue (L.R. Test):
##    trait      conv       org
## 5.048e-01 1.818e-03 2.079e-07
##
## AIC: 331.28  AIC (no landscape): 364.79
## (No landscape effect) p-value: 2.113485e-08
```

```
plotsiland(resSIF,landCmoth,dataCmoth)
```
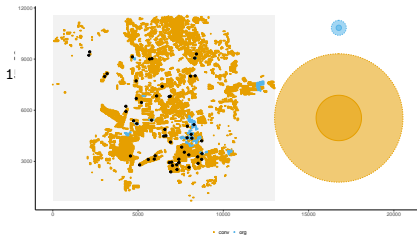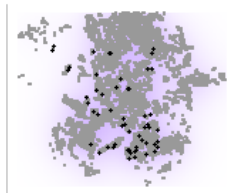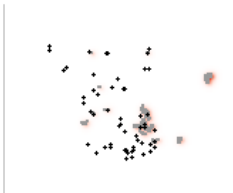
Graphical outputs :
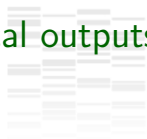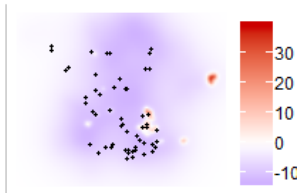
Maps of landscape variable effects

Landscape Var 1   Landscape Var 2   Global effect

SILand Package

Available on

- CRAN
- https://github.com/silandpackage/siland

SILand project is still in progress.

You may contact me at **Florence.carpentier@inra.fr**

Thank you for your attention