

paleofire R package

Olivier Blarquez, Université de Montréal

28 September 2015

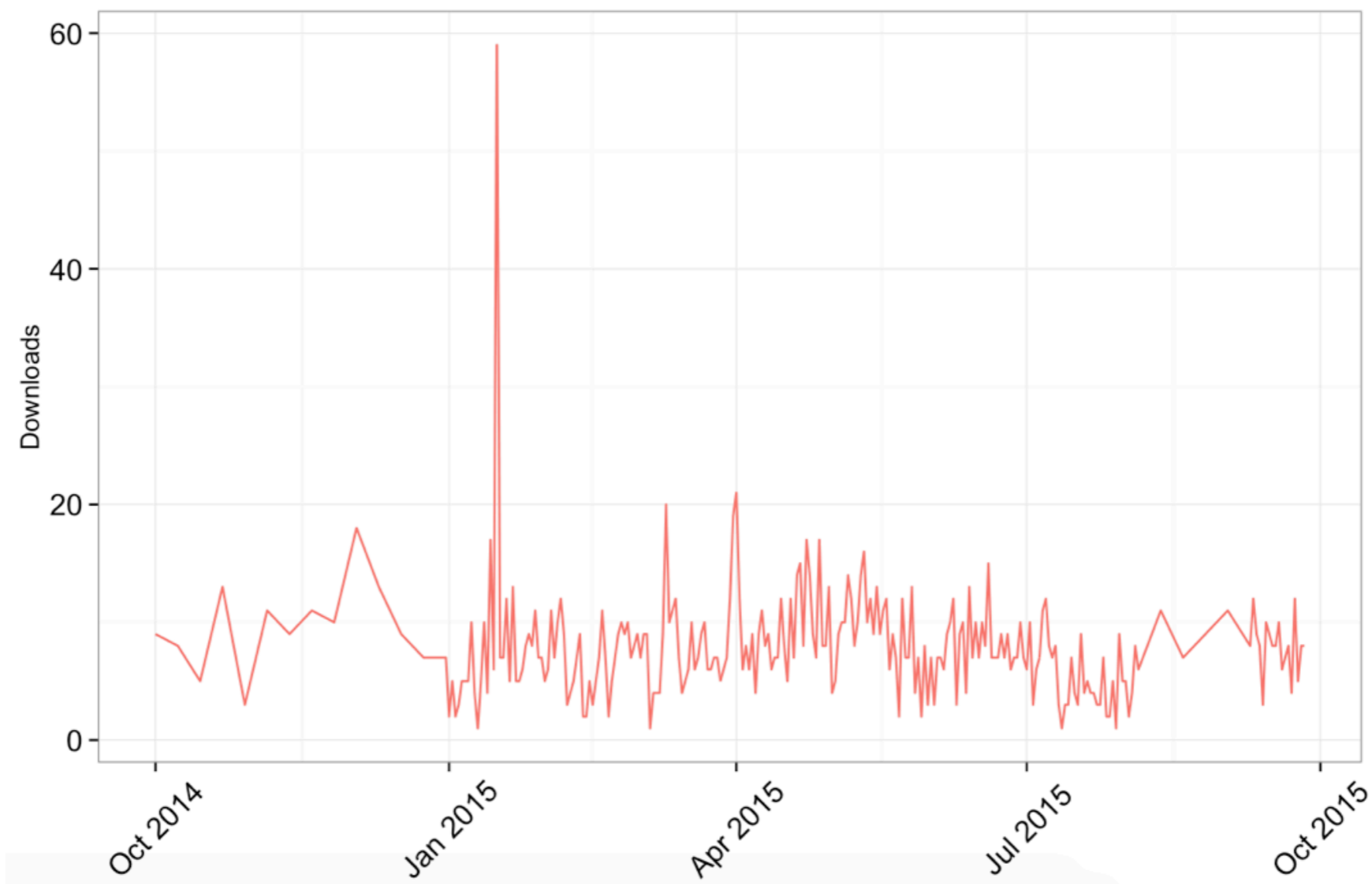
Motivations

- Regroup all analytical methods within a single environment
- Ease analysis steps
- Share analytical methods within the paleofire community
- Promote GCD usage and associated analyses for ecologists, modellers, etc.
- R is free, the paleofire package is under GNU GPL3

Some stats and dates

- Proof of concept elaborated during the GCD meeting in Salt Lake city in May 2013
- 7 versions: currently 1.1.6 (since 8 Jan. 2014)
- 21 functions
- 736 charcoal series in the GCD package (v3)
- 48 pages of help
- 1 tutorial and manuscript in Computers and Geosciences (Nov. 2014)

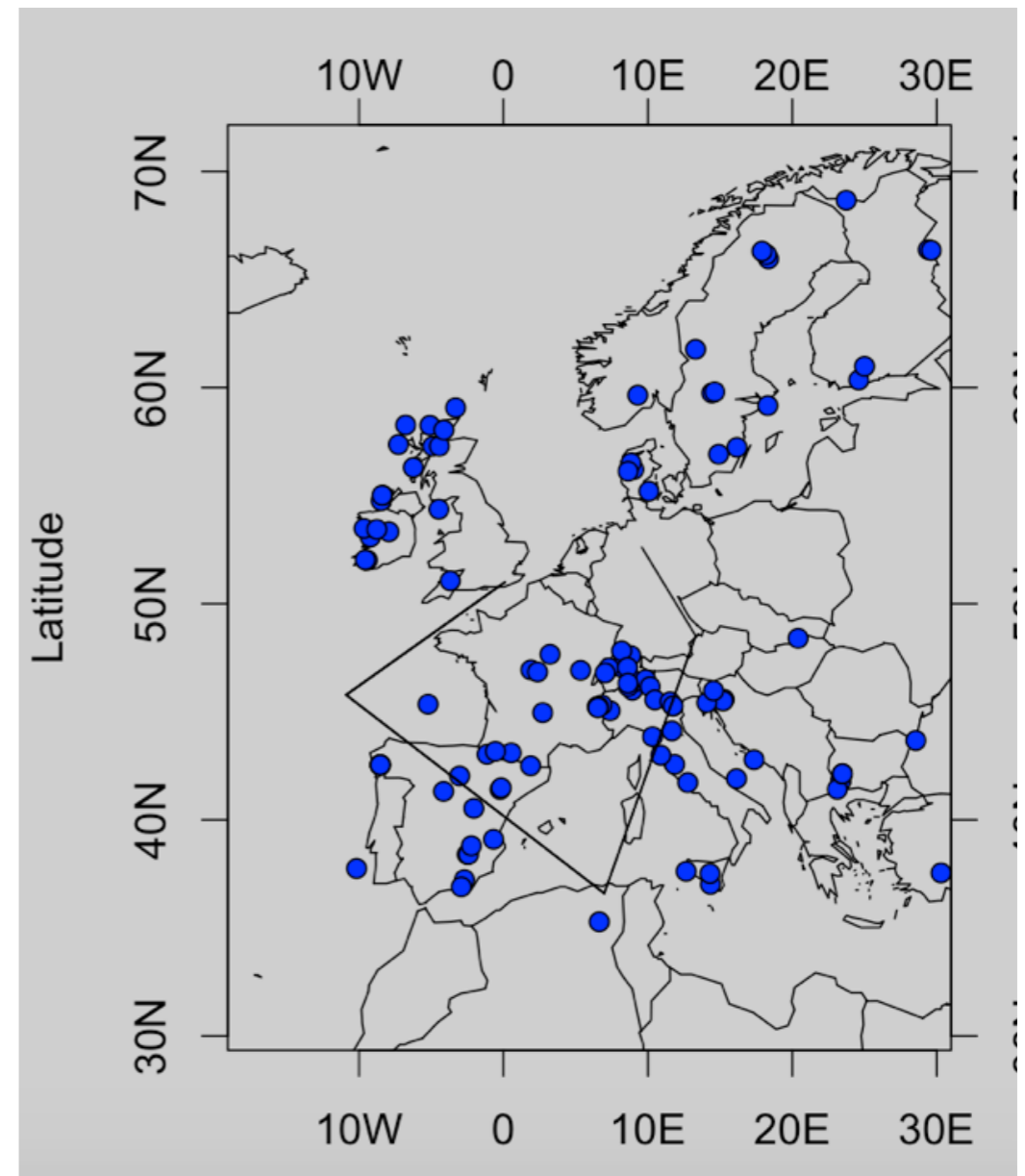
Number of downloads from 10/2014 to 09/2015



Number of downloads per day from the Rstudio mirror
Total: 5138

paleofire main functionalities

- Charcoal series selection
 - `pfInteractive`
 - `pfSiteSel`
 - `pfAddData` (custom data)



paleofire main functionalities

- Charcoal series (or sites) selection
- Transformation of charcoal data
 - `pfTransform` (e.g. Power et al. 2008)
- Compositing i.e. construction of temporal trends
 - `pfCompositeLF` (e.g. Daniau et al. 2012)
- Mapping: gridding and spatio temporal interpolation
 - `pfDotMap`, `pfGridding`, `pfSimpleGrid`

paleofire main functionalities

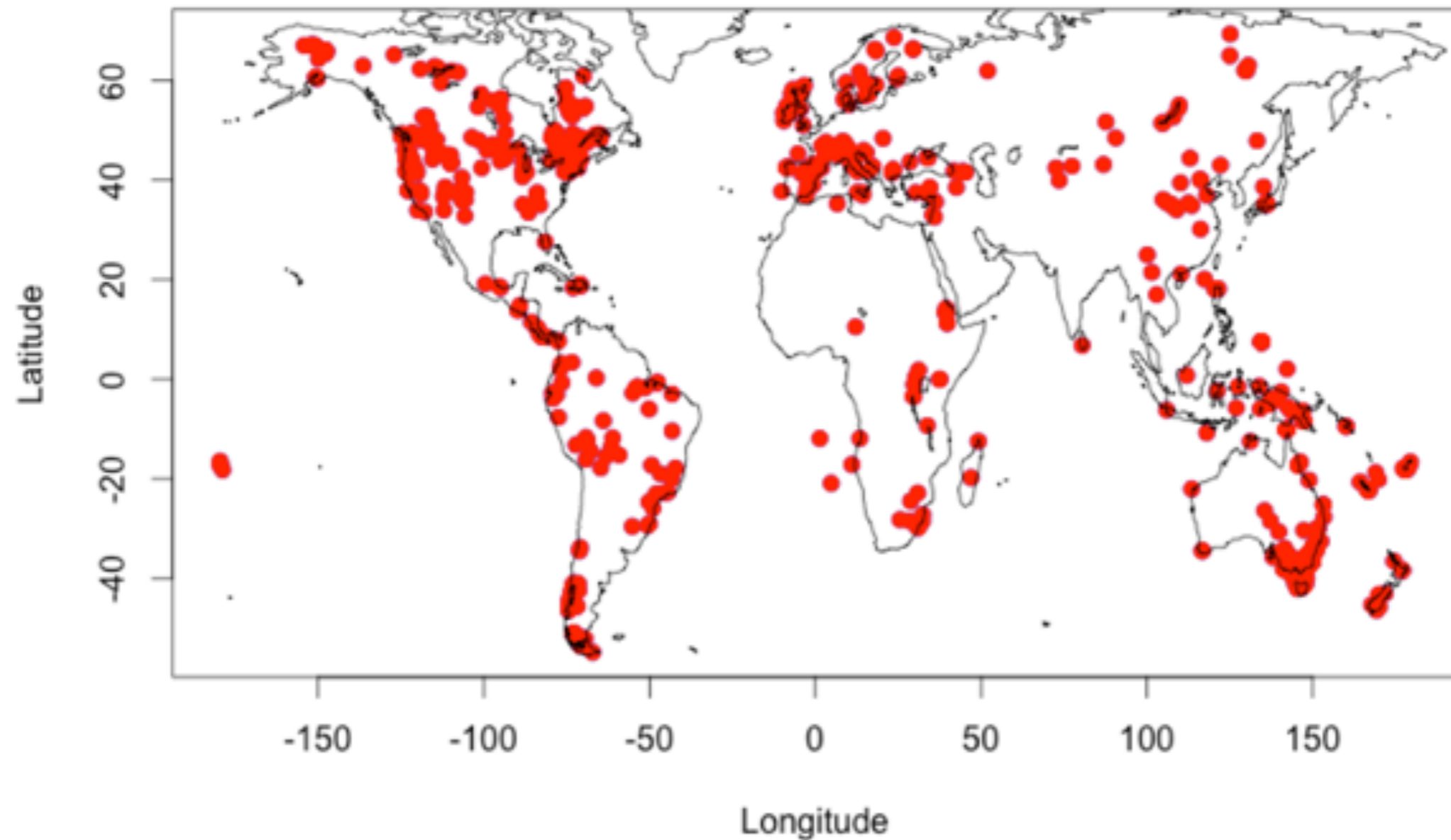
- Tests
 - `pfKruskal1`
- Miscellaneous
 - `pfToKml` (export sites to Google Earth)
 - `pfPublication` (extract publication data)
 - `potveg` (extract biome information)
 - etc..



Better than words: some examples

```
# Install and load paleofire  
  
install.packages("paleofire")  
library(paleofire) # Load the package  
  
# Select all sites and plot them:  
  
all_sites <- pfSiteSel()  
plot(all_sites)
```


Ex: Plot all sites on a map



Ex: Select sites in eastern North America

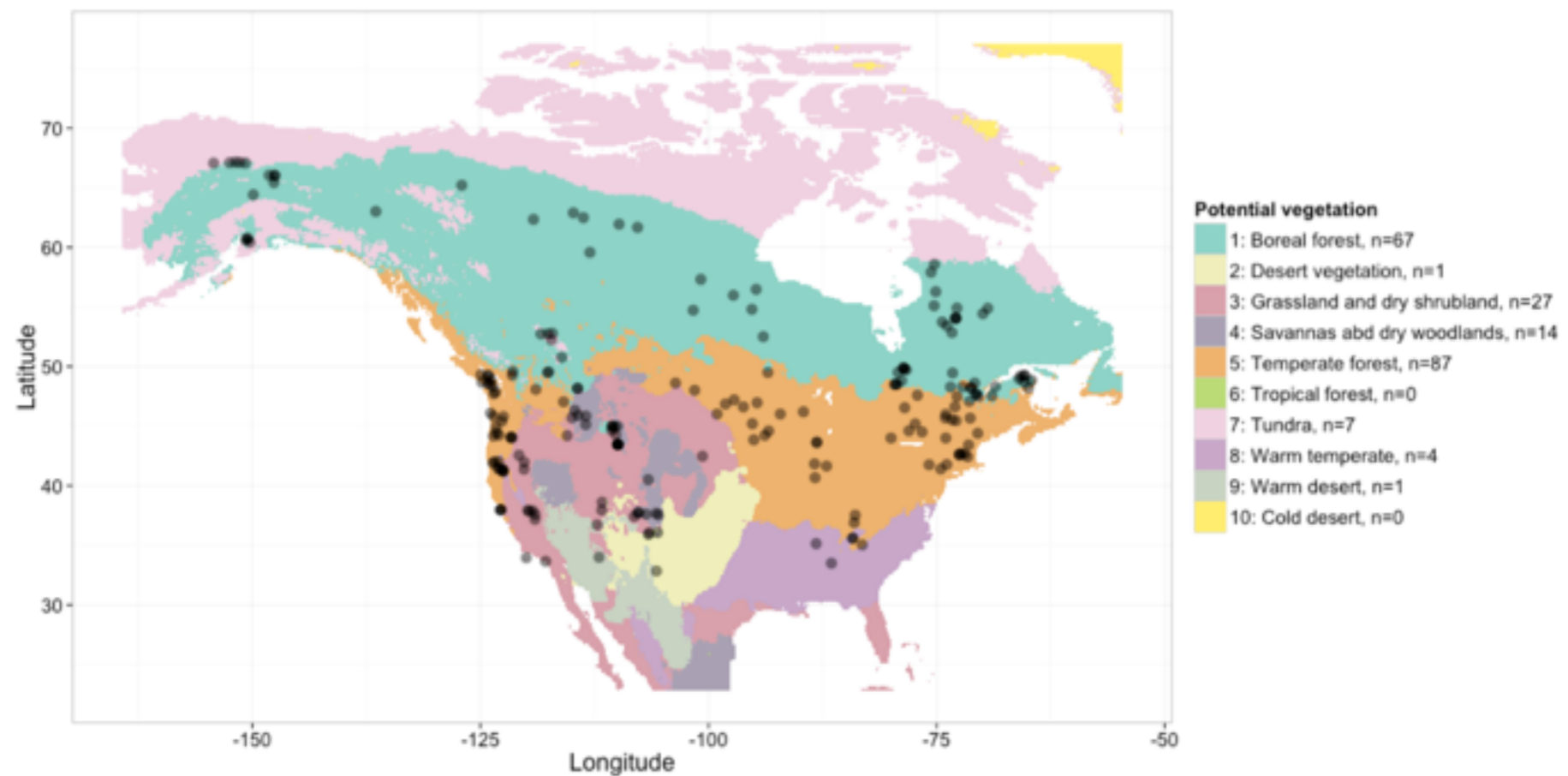
```
# Sites in Eastern North America

NA <- pfSiteSel(lat>30,long<(-50),long>-170)

# Retrieve the potential vegetations of those sites using
the classification of Levavasseur et al. (2012)

NA_veg <- potveg(NA,classif="l12")
plot(NA_veg)
```

Ex: Select sites in eastern North America
+ and in the boreal forest



```
BNA <- pfSiteSel(lat>30,long<(-50),long>-170,l12==1)
```

Ex: Select sites in eastern North
America

+ and in the boreal forest

+ and add one unpublished site

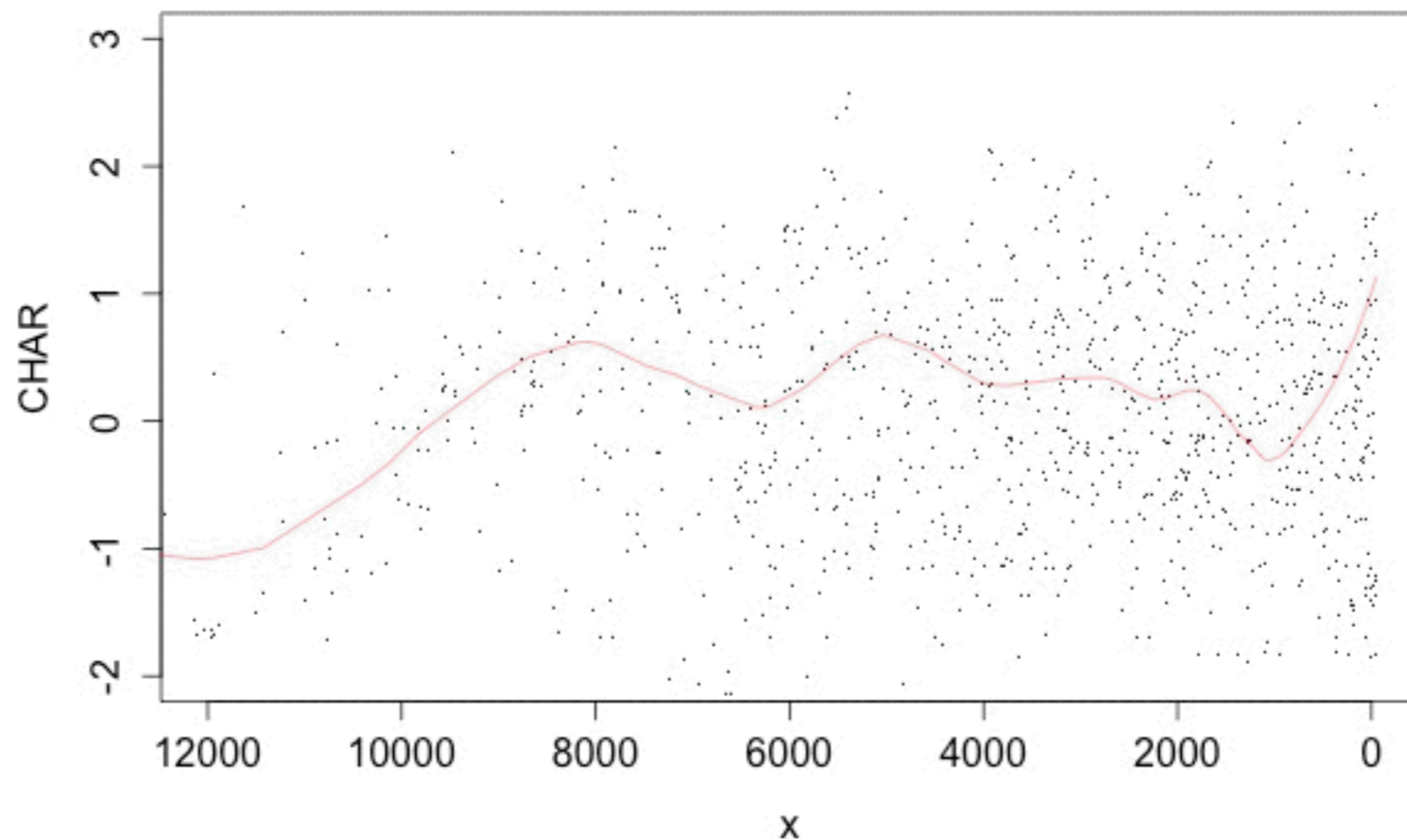
```
# Create a vector with location of files
loc=c("path/site1.csv","path/site2.csv")
# Create an object
mysites=pfAddData(files=loc, type="CharAnalysis")
```

| H10 | | | | | | | |
|-----|------------|------------|----------------|----------------|---------------|-----------------|---|
| | A | B | C | D | E | F | G |
| 1 | cmTop (cm) | cmBot (cm) | ageTop (yr BP) | ageBot (yr BP) | charVol (cm3) | charCount (mm2) | |
| 2 | 0 | 1 | -59 | -58 | 1 | 0.0176 | |
| 3 | 1 | 2 | -58 | -45.88 | 1 | 0 | |
| 4 | 2 | 3 | -45.88 | -33.8 | 1 | 0 | |
| 5 | 3 | 4 | -33.8 | -21.72 | 1 | 0.0709 | |
| 6 | 4 | 5 | -21.72 | -9.64 | 1 | 0 | |
| 7 | 5 | 6 | -9.64 | 2.44 | 1 | 0 | |
| 8 | 6 | 7 | 2.44 | 14.52 | 1 | 0 | |
| 9 | 7 | 8 | 14.52 | 26.6 | 1 | 0 | |

Transform charcoal series and produce a composite curve

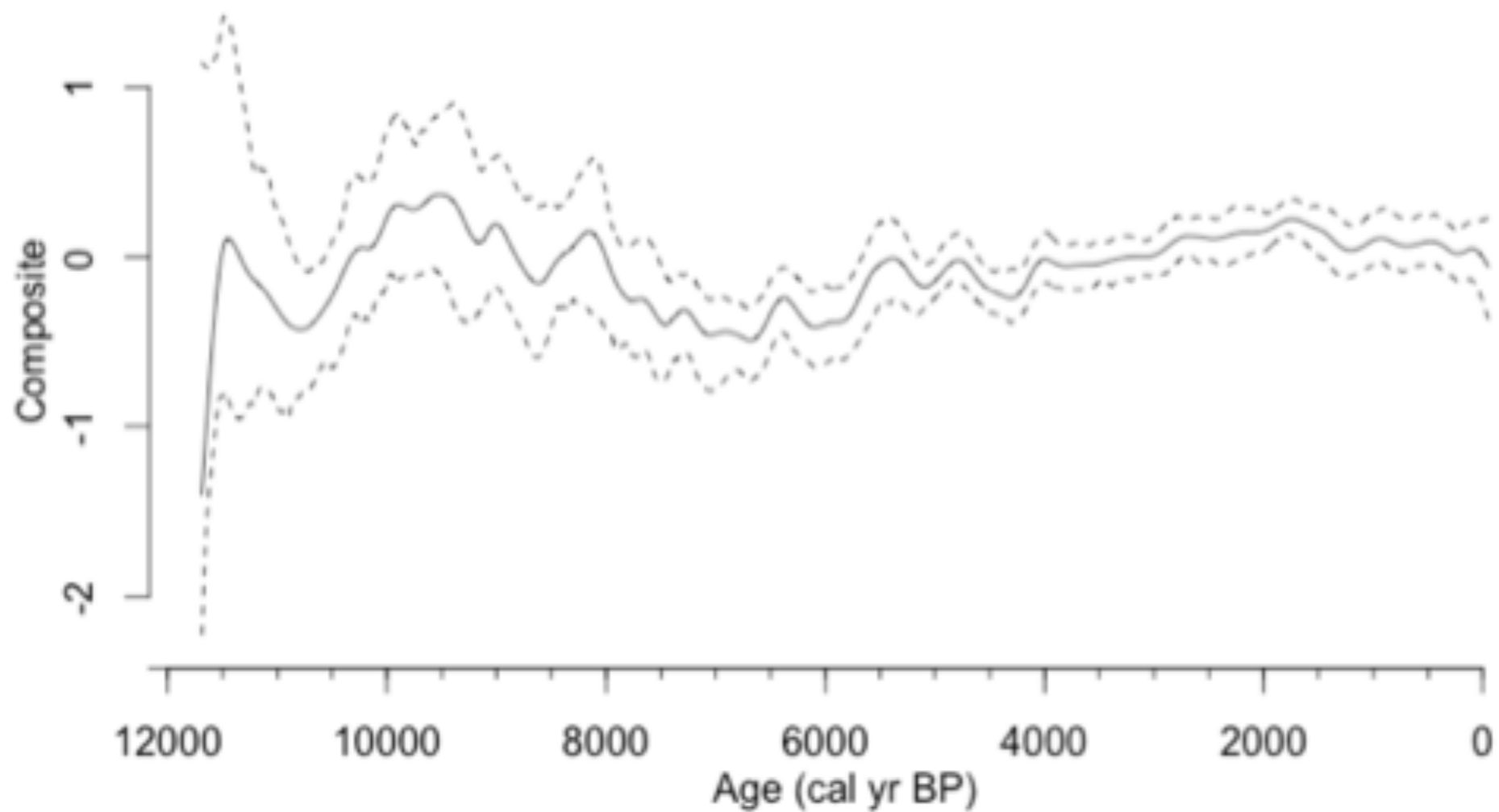
```
# Because of taphonomy, units, methods, etc.  
# series needs to be homogenized:  
  
BNA_trans <- pfTransform(BNA, add=mysites,  
                        method=c("MinMax", "Box-Cox", "Z-Score"))  
  
# Look at Power et al. (2008) for details  
# Compositing:  
BNA_comp <- pfCompositeLF(BNA_trans,  
                          tarAge=seq(-50, 11700, 20),  
                          hw=250, nboot=1000)  
  
plot(BNA_comp)
```

Transform charcoal series and produce a composite curve



```
# Compositing:  
BNA_comp <- pfCompositeLF(BNA_trans,  
                           tarAge=seq(-50,11700,20),  
                           hw=250,nboot=1000)
```

Transform charcoal series
and produce a composite curve

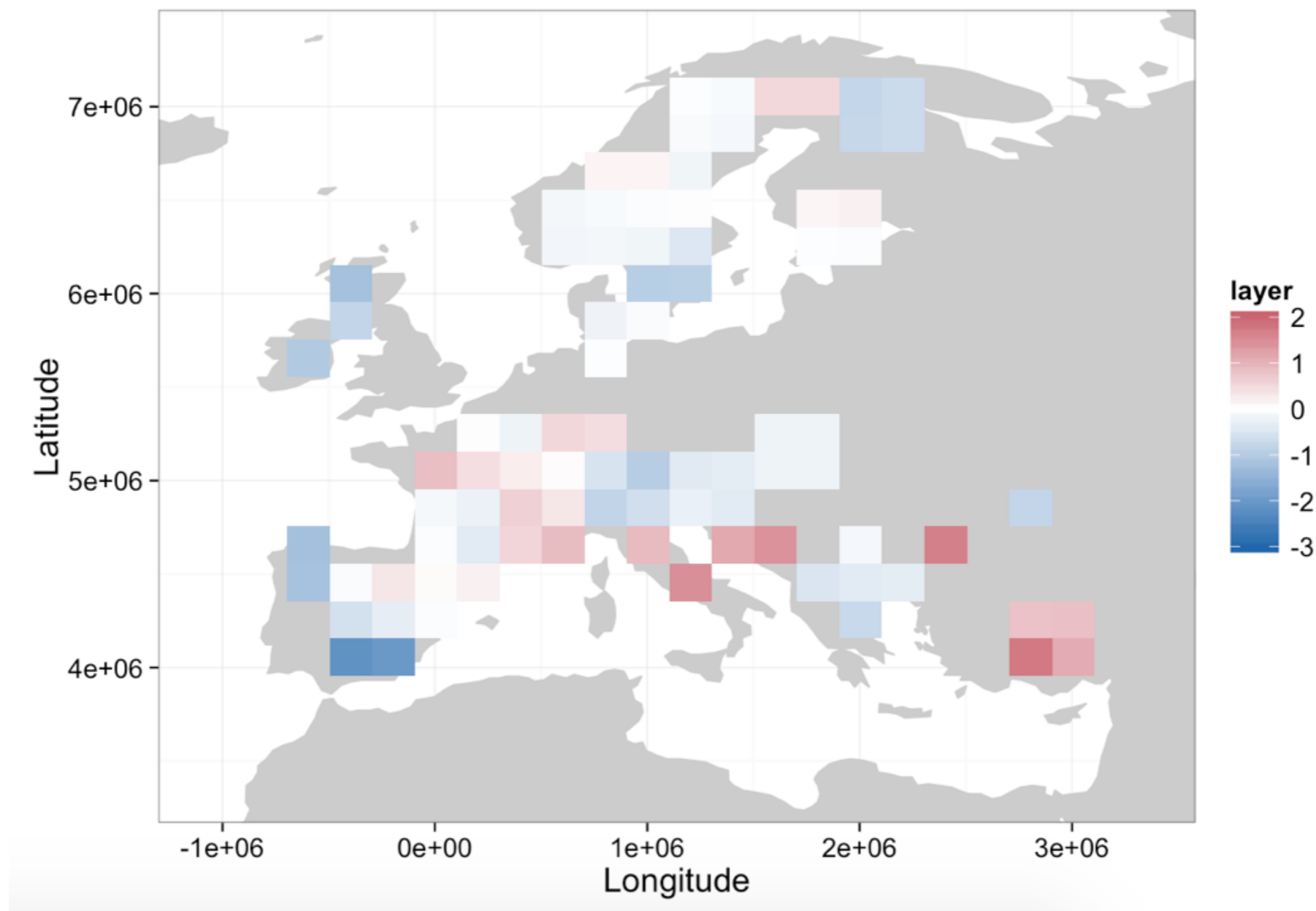


Ex: Map charcoal anomalies at 6 ka BP in Europe

```
ID <- pfSiteSel(id_region=='EURO')
TR <- pfTransform(ID,method=c("MinMax", "Box-Cox", "Z-
Score"))

# Spatio temporal interpolation using a tricube weight
function
Grd1<-pfGridding(TR, age=6000,
cell_size=200000,time_buffer=500, distance_buffer=300000)
plot(grd1)
```


Ex: Map charcoal anomalies at 6 ka BP in Europe



Go further...

- Next version will link to the `http://paleofire.org` website and online GCD
- Github: `http://github.com/paleofire`
- CRAN `http://cran.r-project.org/web/packages/paleofire/`