`paleofire` `R` package

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Motivations

- Regroup all analytical methods within a single environment

- Ease analysis steps

- Share analytical methods within the paleofire community

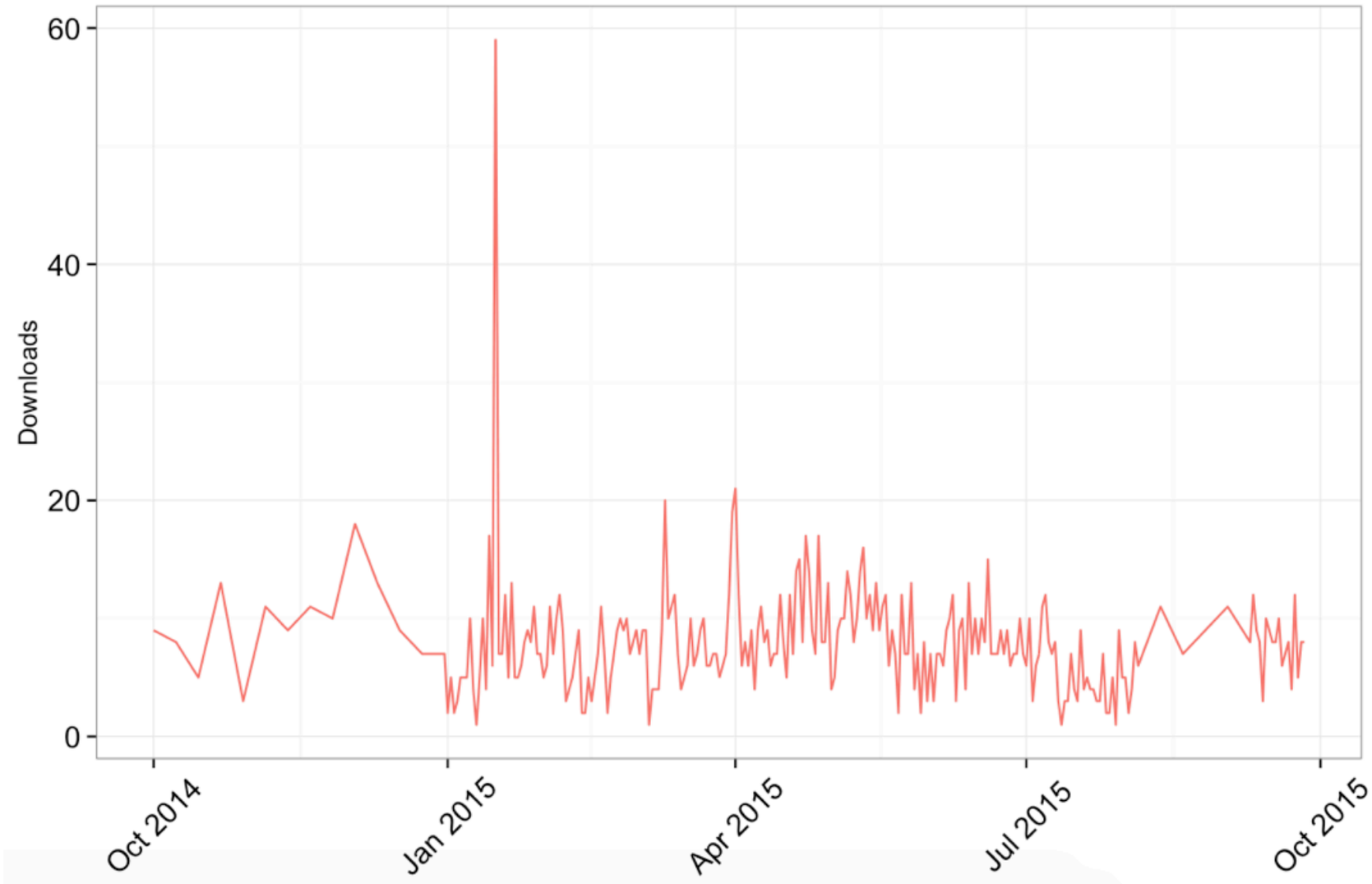
- Promote GCD usage and associated analyses for ecologists, modellers, etc.

- 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

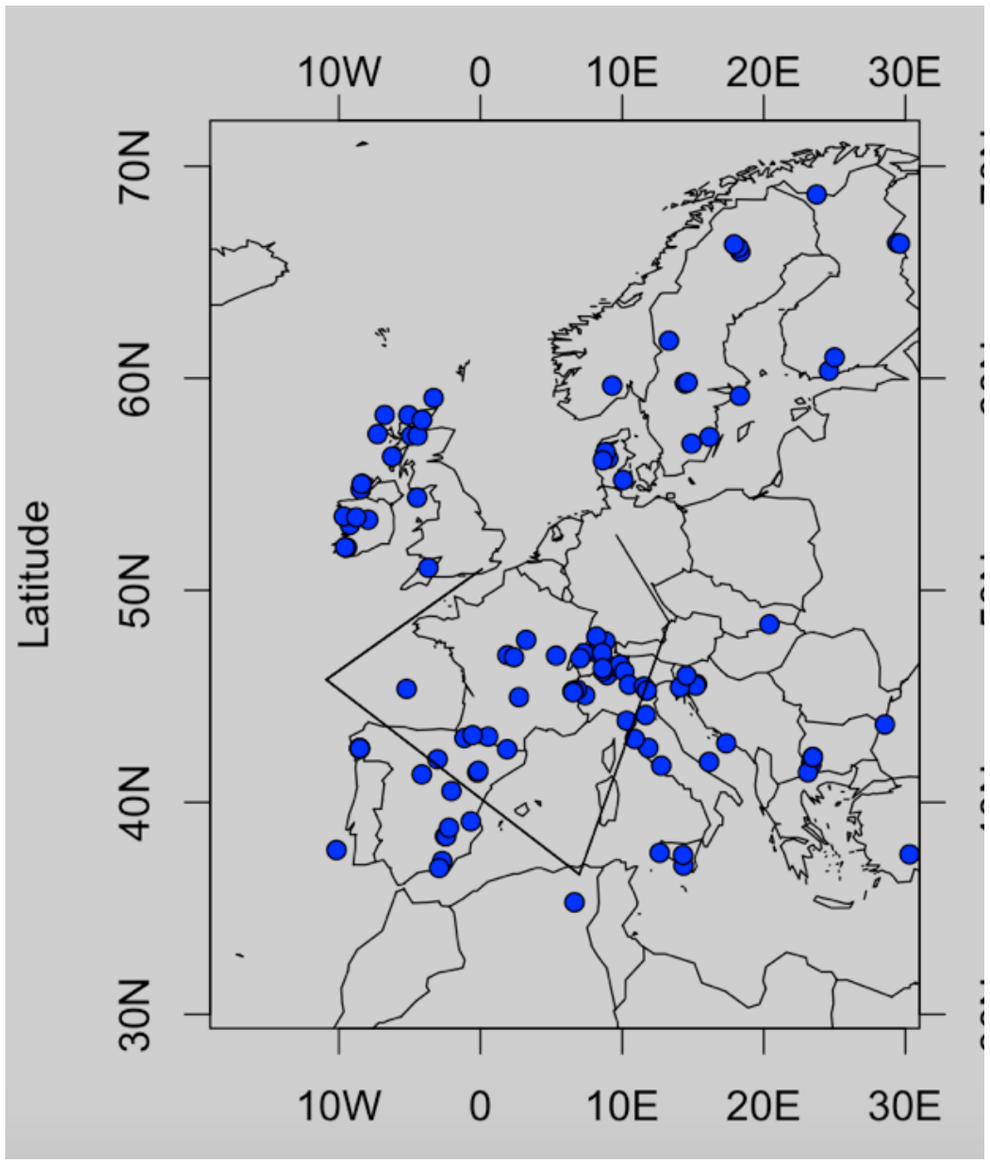


Number of downloads per day from the Rstudio mirror

Total: 5138

`paleofire` main functionalities

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

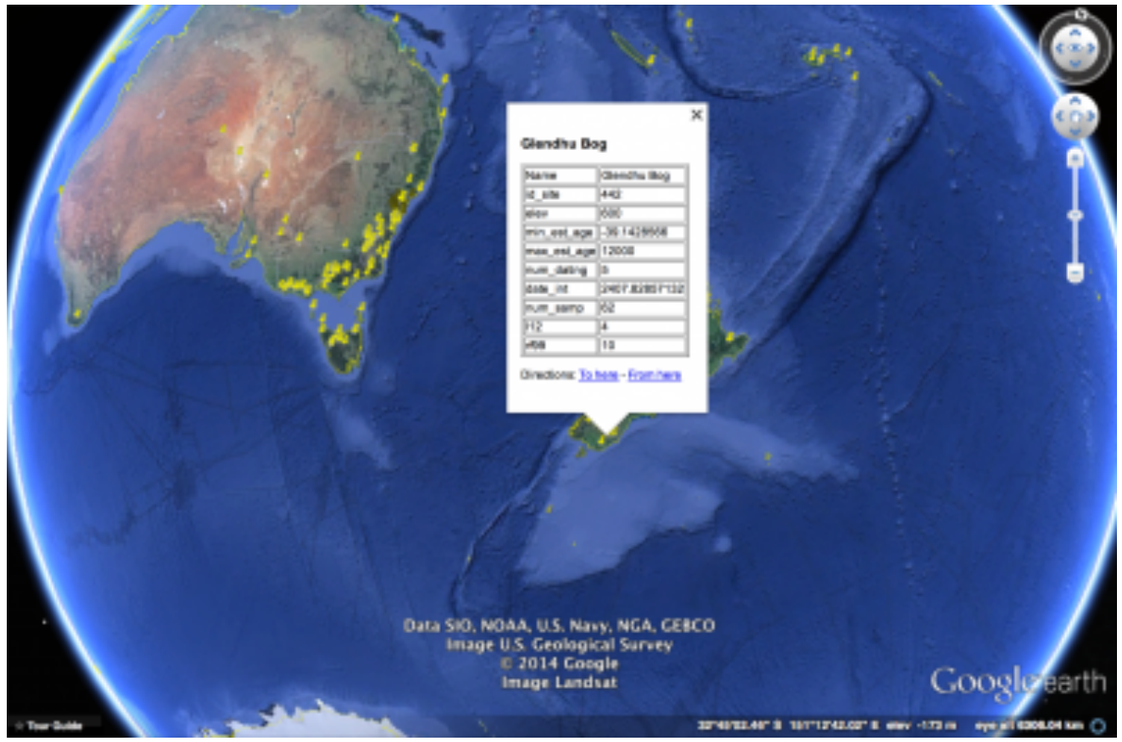


`paleofire` main functionalities

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



Better than words: some examples

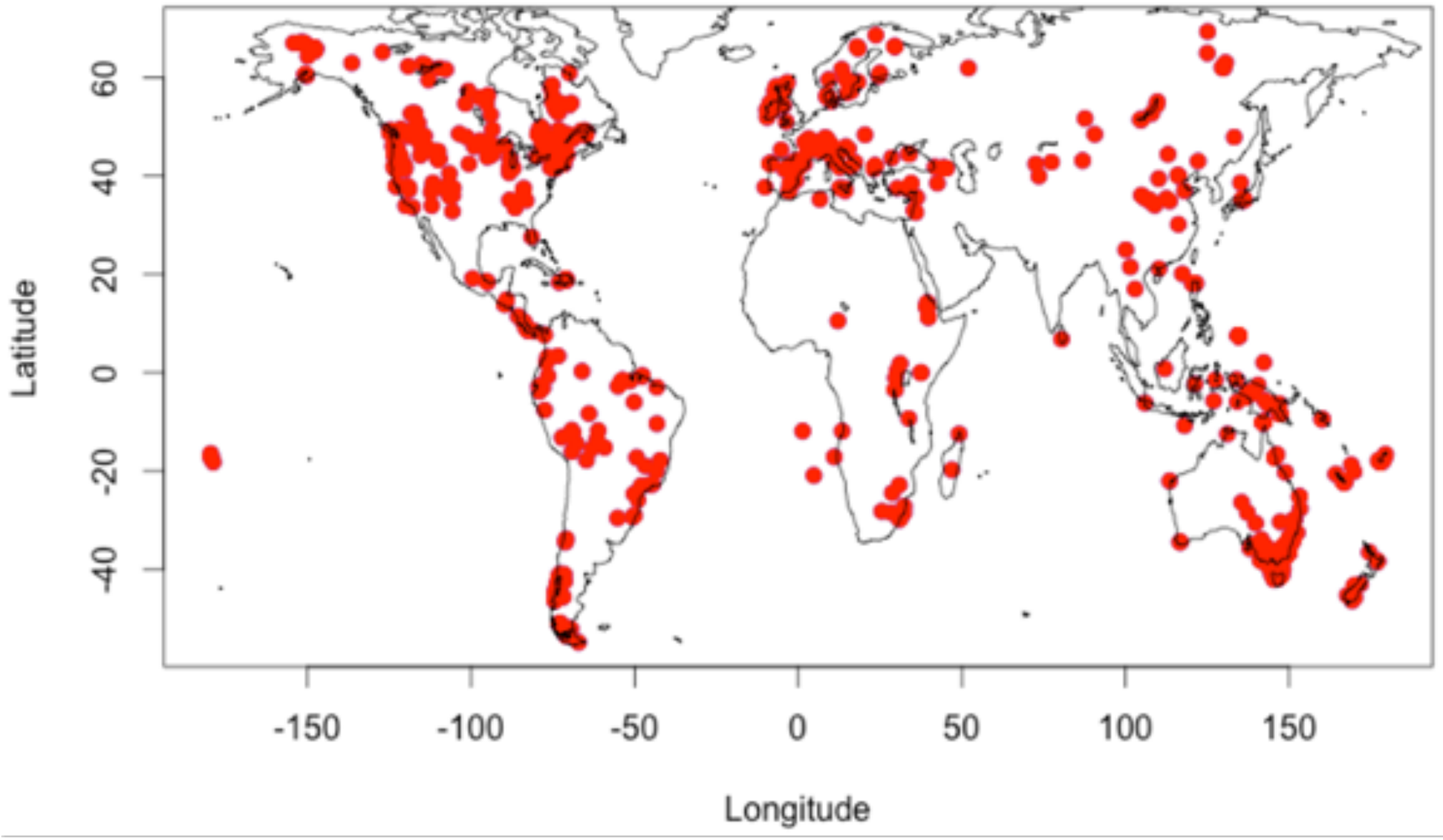
```
# Install and load paleofire

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

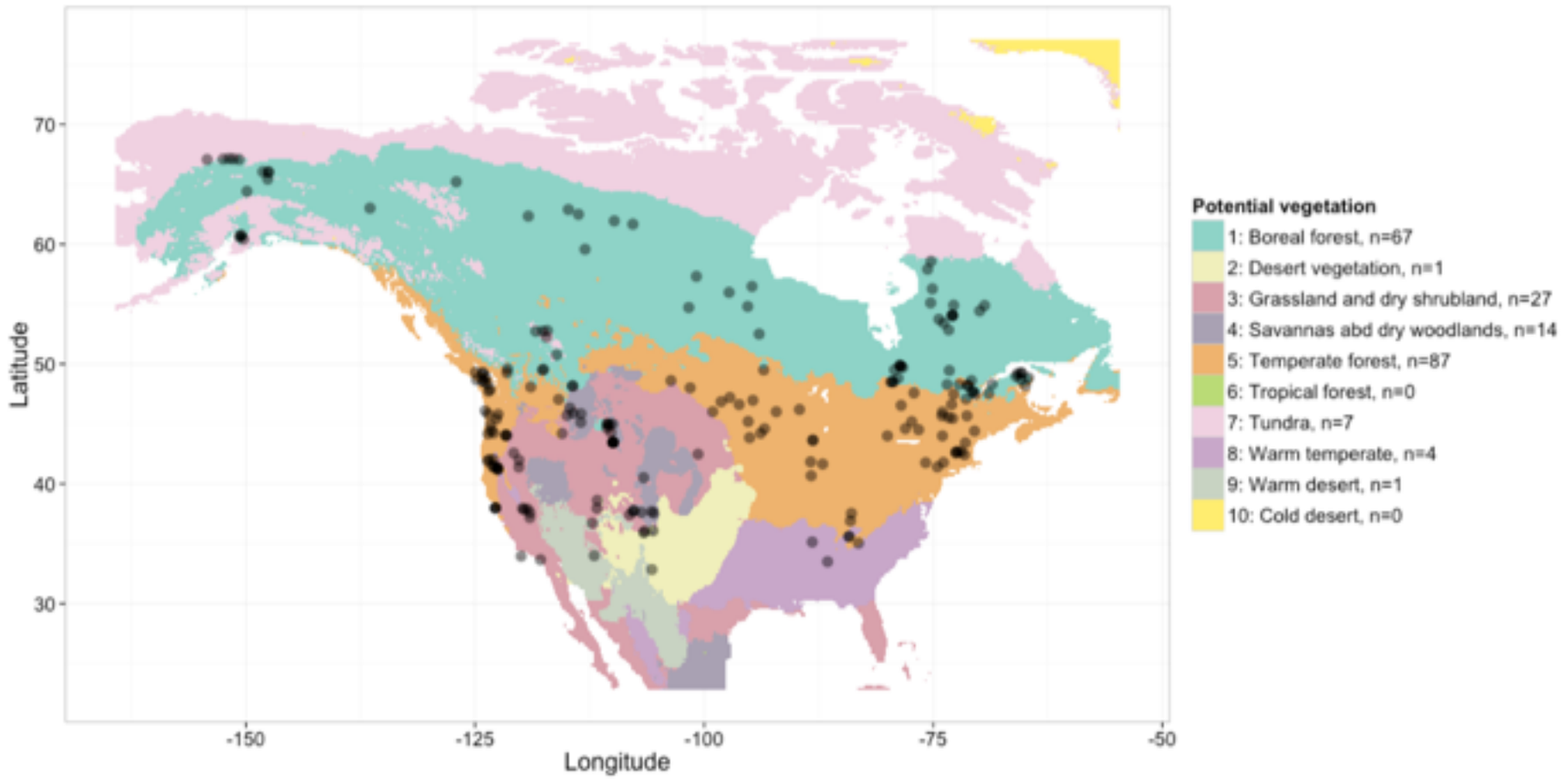
```
# Sites in Eastern North America

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	

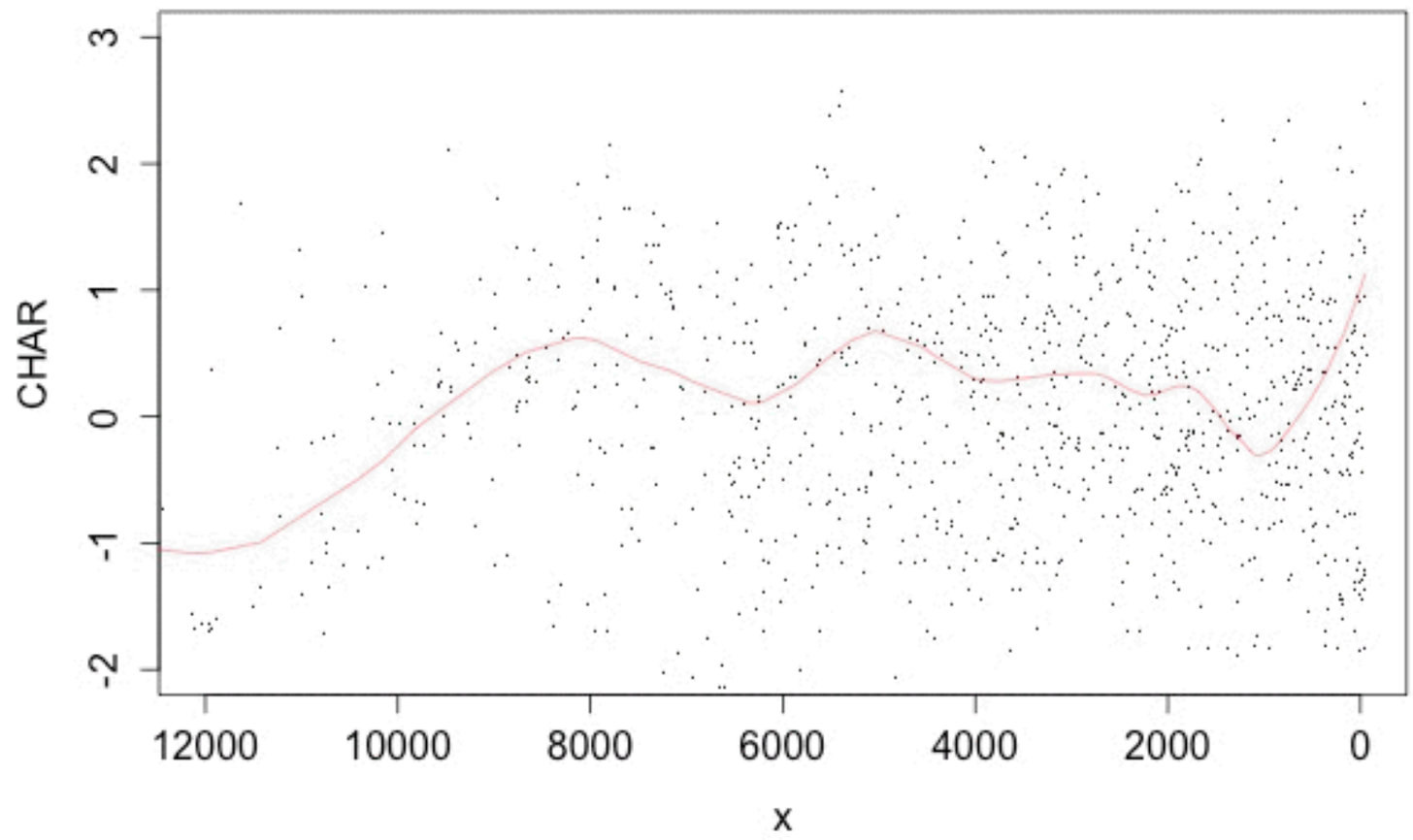
Transform charcoal series and produce a composite curve

```
# 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

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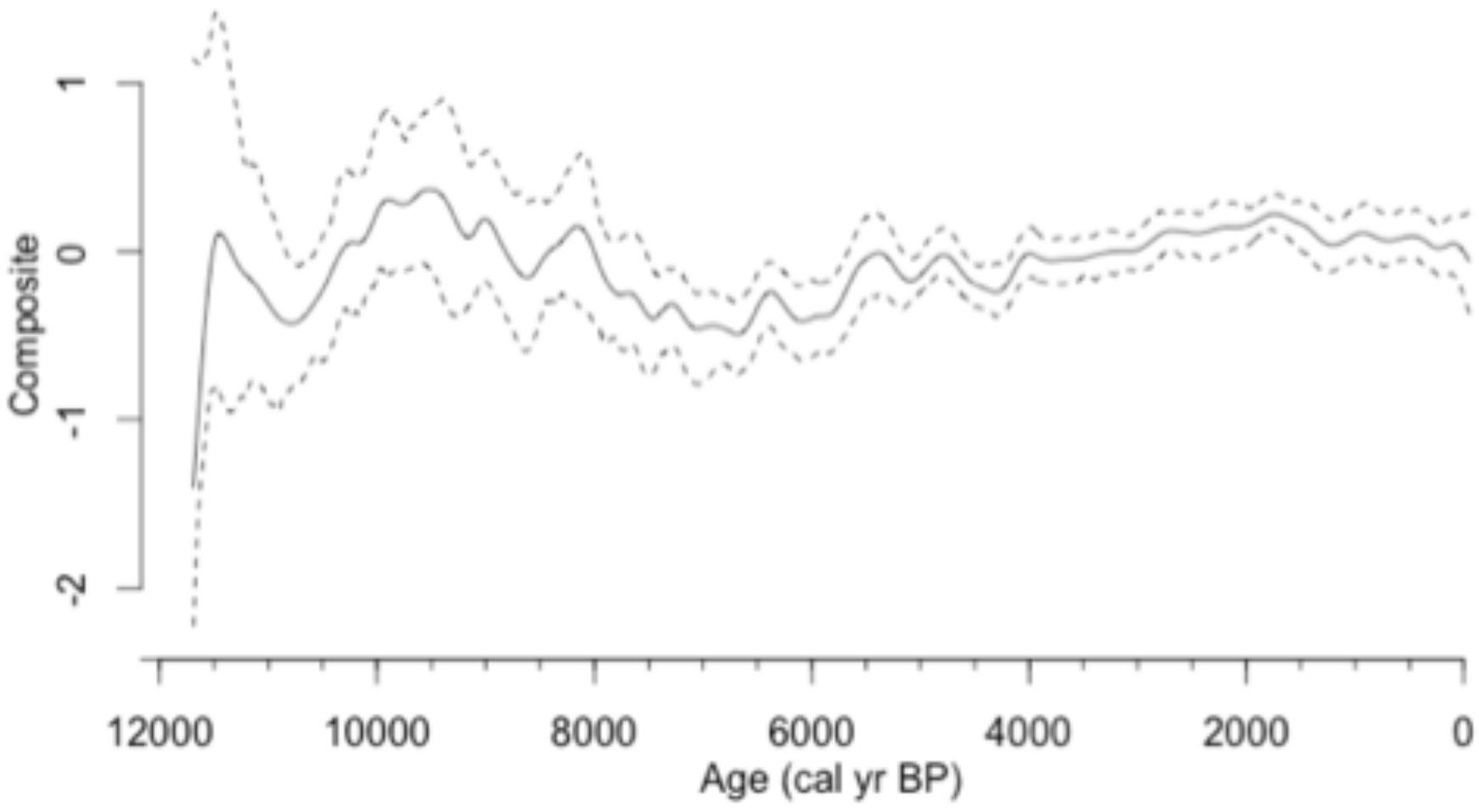
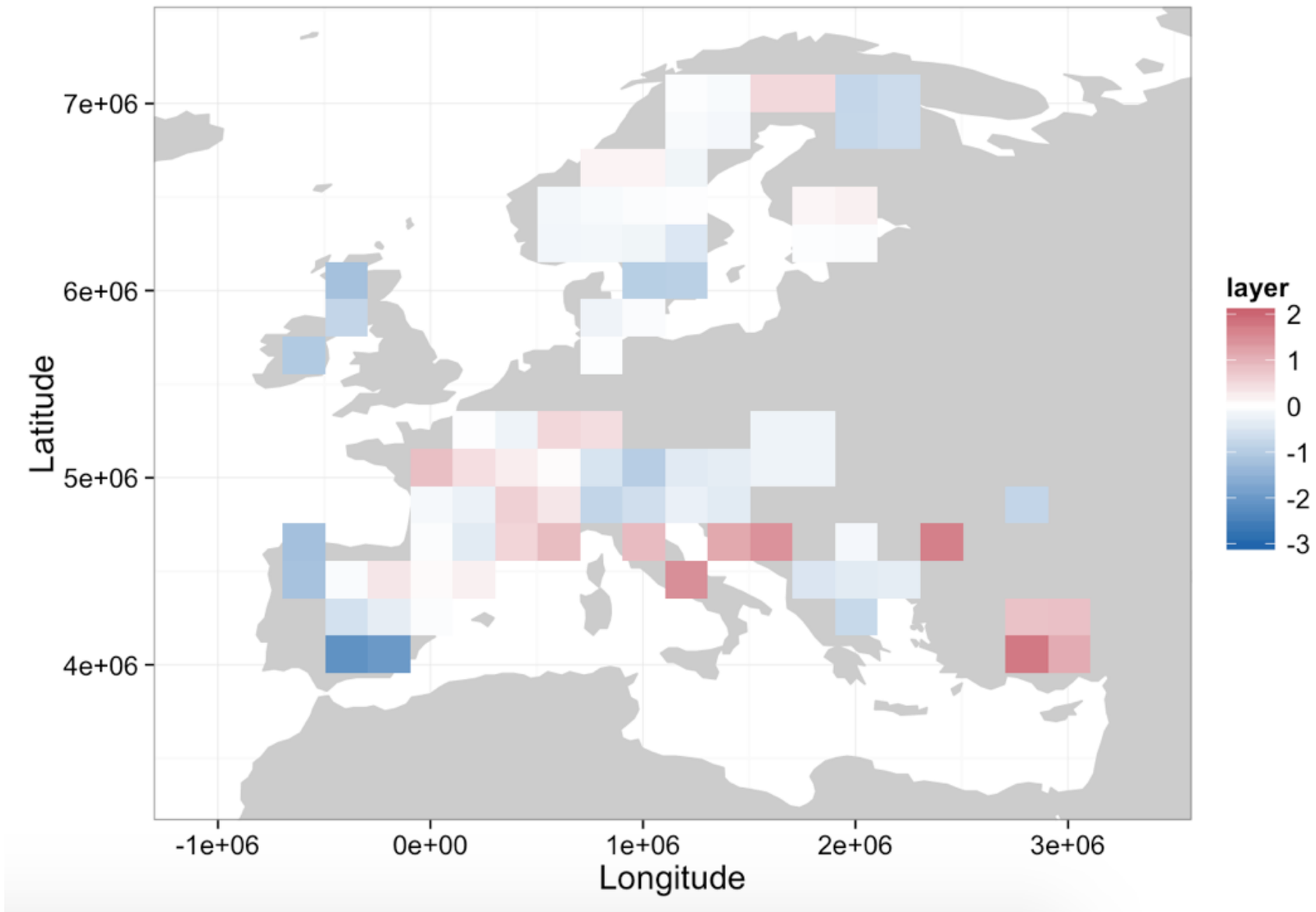


Ex: Map charcoal anomalies at 6 ka BP in Europe

```
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



Ex: Map charcoal anomalies at 6 ka BP in Europe

```
# Same procedure but using lat-long WGS84 coordinates (5° grid
here); to do this first update paleofire using the GitHub
repos:

install.packages('devtools')
library(devtools)
install_github('paleofire/paleofire')

p=pfGridding(TR,cell_size=5,time_buffer =50,distance_buffer =
300000, age=6000,proj4='+proj=longlat +ellps=WGS84
   +datum=WGS84 +no_defs')
plot(p)

# Save the result as a netcdf file
writeRaster(p$raster,file="path/filename.nc",format='CDF')
```

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/`