Liseron

Eric Imbet

24/05/2022

Import data

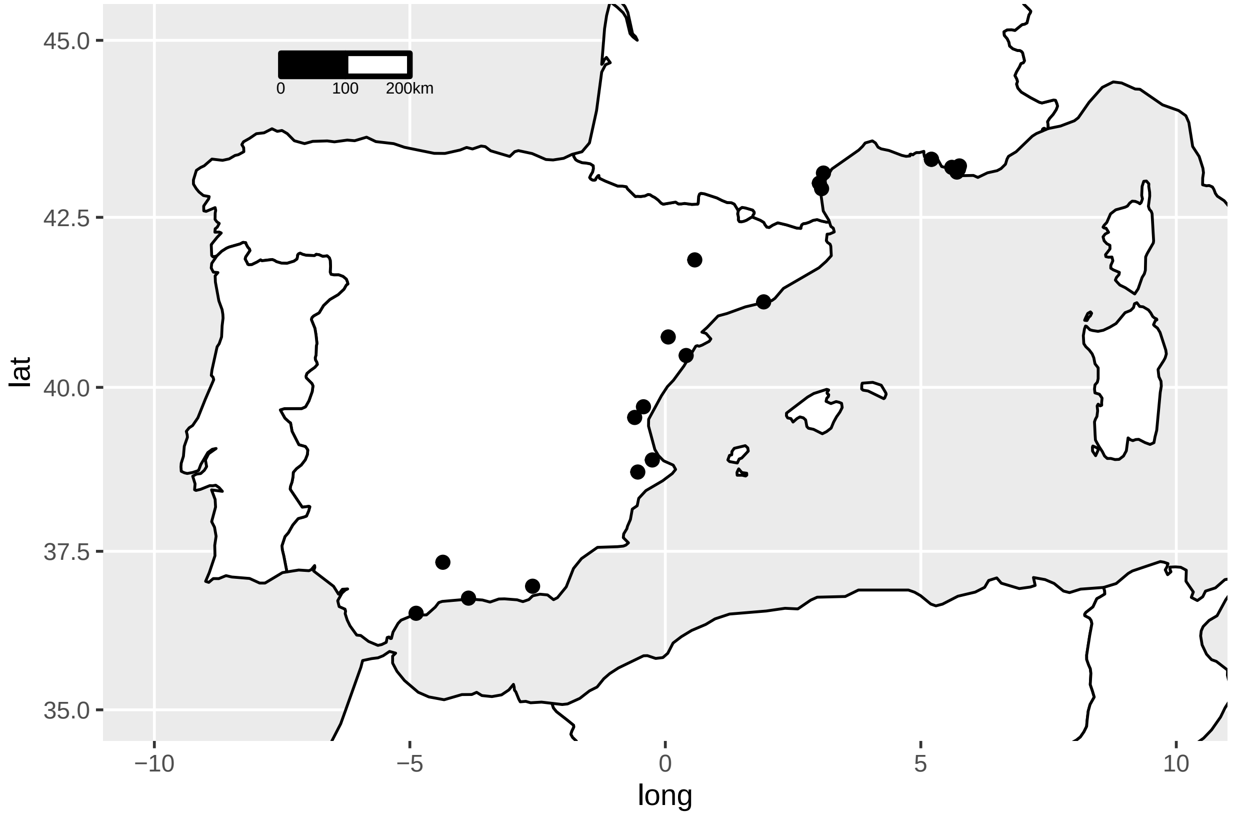
```
gps=read.table("location.csv", header=T, dec=",")
PACA=gps[gps$Longitude>0 & gps$Latitude>42.5,]
fst=read.table("fst.csv", header=F) #fst/1-fst from GenepopV4
```

Map

```
#postscript("Figure1.eps", horizontal = F, height=10, width=10)
mappy=map_data("world",xlim=c(-10,10), ylim=c(35,45))

p=ggplot()
p=p + geom_map(data=mappy, map=mappy, aes(long, lat, map_id=region), fill="white", colour="black") +
    coord_map(xlim=c(-10,10), ylim=c(35,45))
```

```
## Warning: Ignoring unknown aesthetics: x, y
```

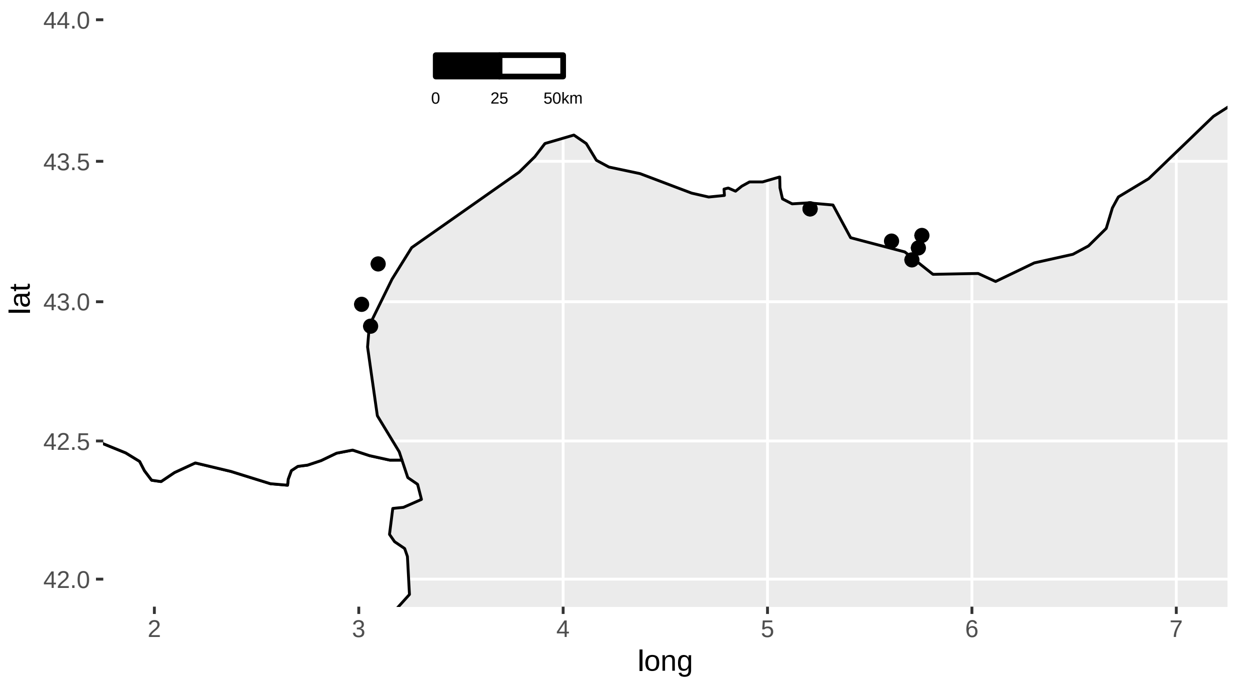
```
p = p + geom_point(data=data.frame(longitude=gps$Longitude, latitude= gps$Latitude), aes(longitude, lati

p  = p + scalebar(data=mappy, dist=100, dist_unit="km", height=0.010,
                  transform=TRUE, model= "WGS84", st.dist=0.005,
                  st.size=2, anchor=c(x=-5,y=44.5))

p
```



```
#dev.off()


#focus on South of France
#postscript("Figure1a.eps", horizontal = F, height=10, width=10)
mappy=map_data("world",xlim=c(2,7), ylim=c(42,44))

p=ggplot()
p=p + geom_map(data=mappy, map=mappy, aes(long, lat, map_id=region), fill="white", colour="black") +
    coord_map(xlim=c(2,7), ylim=c(42,44))
```

```
## Warning: Ignoring unknown aesthetics: x, y
```

```
p = p + geom_point(data=data.frame(longitude=PACA$Longitude, latitude=PACA$Latitude), aes(longitude, la

p  = p + scalebar(data=mappy, dist=25, dist_unit="km", height=0.005,
                  transform=TRUE, model= "WGS84", st.dist=0.005,
                  st.size=2, anchor=c(x=4,y=43.8))

p
```



```
#dev.off()
```

Compute distances and test for correlation

```
distance=spDists(cbind(gps$Longitude, gps$Latitude), longlat=T, diagonal=FALSE)
distance=as.dist(distance, diag=F, upper=F)

fst=as.dist(fst, diag=F, upper=F)


mantel.rtest(distance,fst, nrepet=9999)
```

```
## Monte-Carlo test
## Call: mantelnoneuclid(m1 = m1, m2 = m2, nrepet = nrepet)
##
## Observation: 0.4274085
##
## Based on 9999 replicates
## Simulated p-value: 1e-04
## Alternative hypothesis: greater
##
##      Std.Obs  Expectation     Variance
## 4.4512412692 0.0001317022 0.0092141718
```

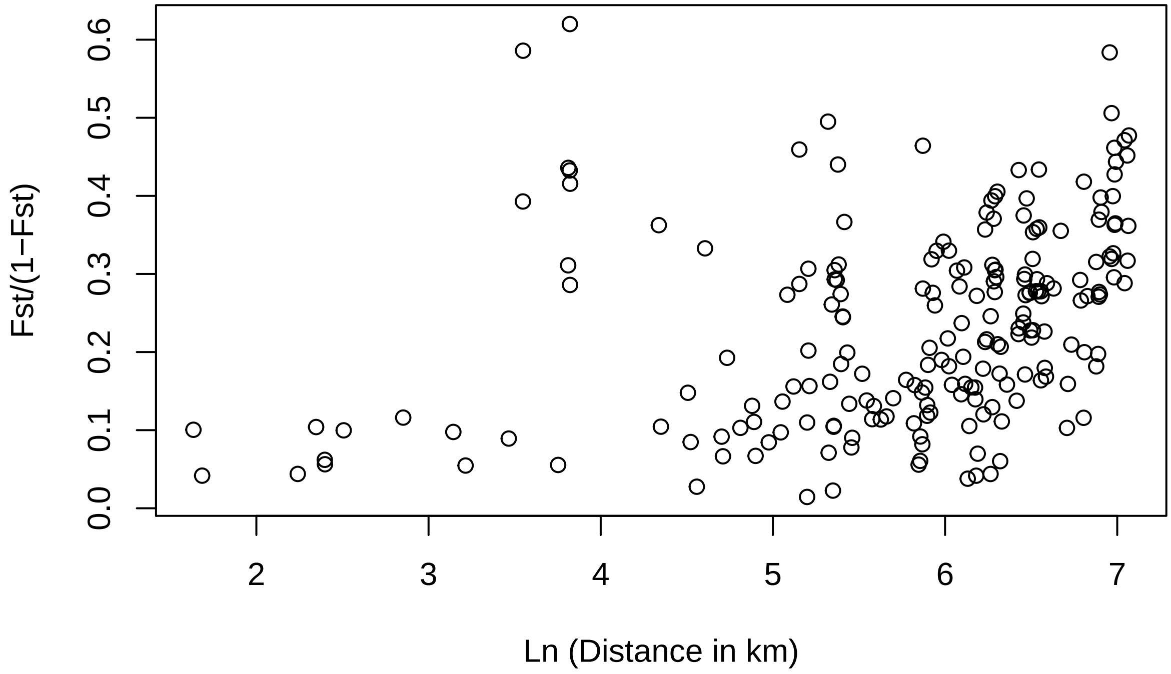
IBD remove distances < 1 km see Rousset 1997

```
to_remove=which(distance<1)
```

```
lm(as.vector(fst[-to_remove]) ~ log(as.vector(distance[-to_remove])))
```

```
##
## Call:
## lm(formula = as.vector(fst[-to_remove]) ~ log(as.vector(distance[-to_remove])))
##
## Coefficients:
##                          (Intercept)  log(as.vector(distance[-to_remove]))
##                              0.02111                               0.03714
```

```
plot( fst[-to_remove] ~ log(distance[-to_remove]), xlab="Ln (Distance in km)", ylab="Fst/(1-Fst)")
```


Fst/(1−Fst)
Ln (Distance in km)