Thomas Muamar

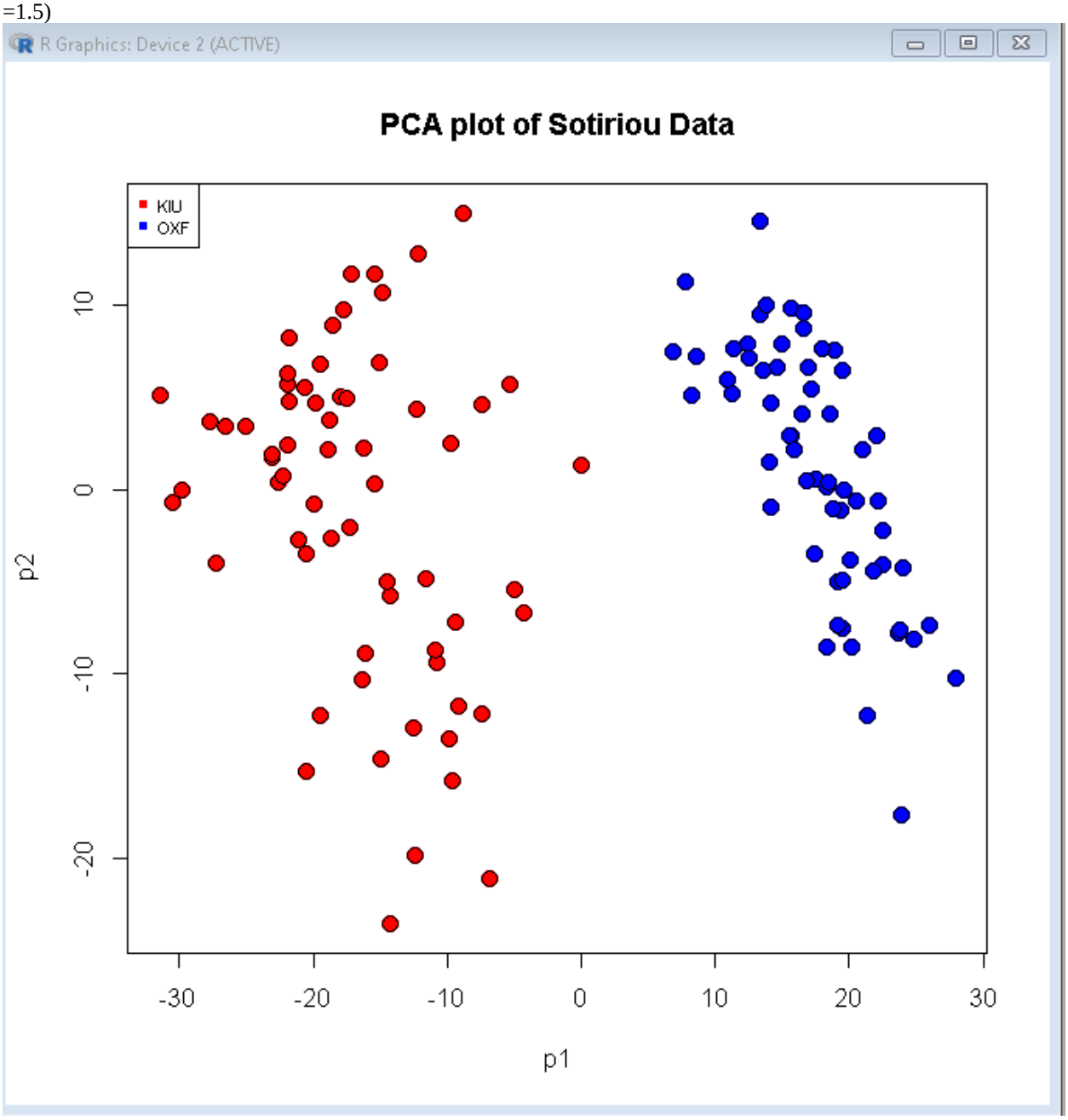
Lab 7

1.

```
dat<-read.table("Sotiriou.txt",header=T,row.names=1)
ann <-read.table("Sotiriou_annotations.txt",header=T, row.names=1)
```

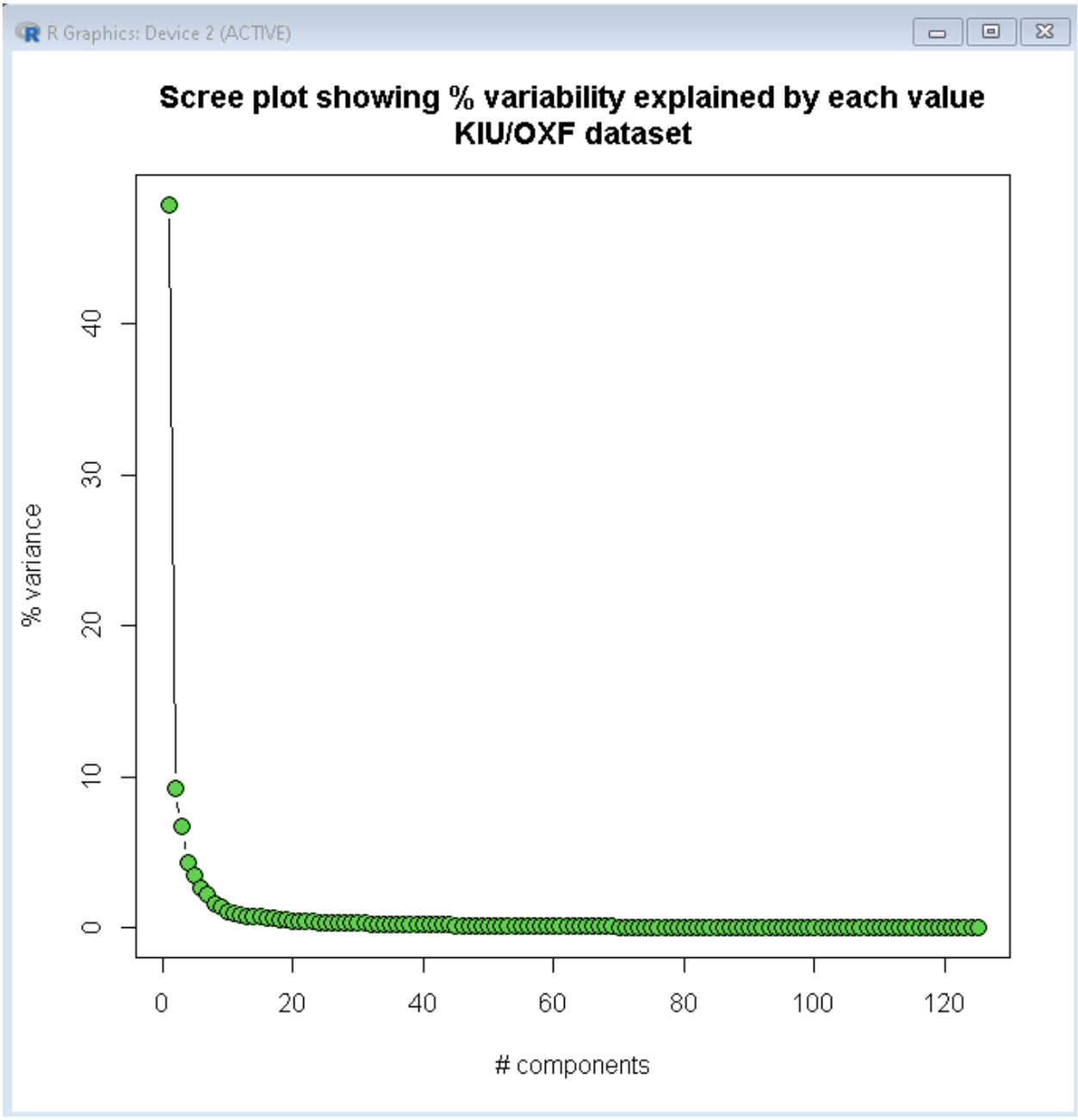
2.

```
plot(range(dat.loadings[,1]),range(dat.loadings[,2]),type="n",xlab='p1',ylab='p2',main='PCA plot of Sotiriou Data')
points(dat.loadings[,1][ann$site=="KIU"],dat.loadings[,2][ann$site=="KIU"],col=1,bg='red',pch=21,cex=1.5)
points(dat.loadings[,1][ann$site=="OXF"],dat.loadings[,2][ann$site=="OXF"],col=1,bg='blue',pch=21,cex=1.5)
```



3.

```
dat.pca.var <- round(dat.pca$sdev^2 / sum(dat.pca$sdev^2)*100,2)
plot(c(1:length(dat.pca.var)),dat.pca.var,type="b",xlab="# components",ylab="%
variance",pch=21,col=1,bg=3,cex=1.5)
title("Scree plot showing % variability explained by each value\nKIU/OXF dataset")
```

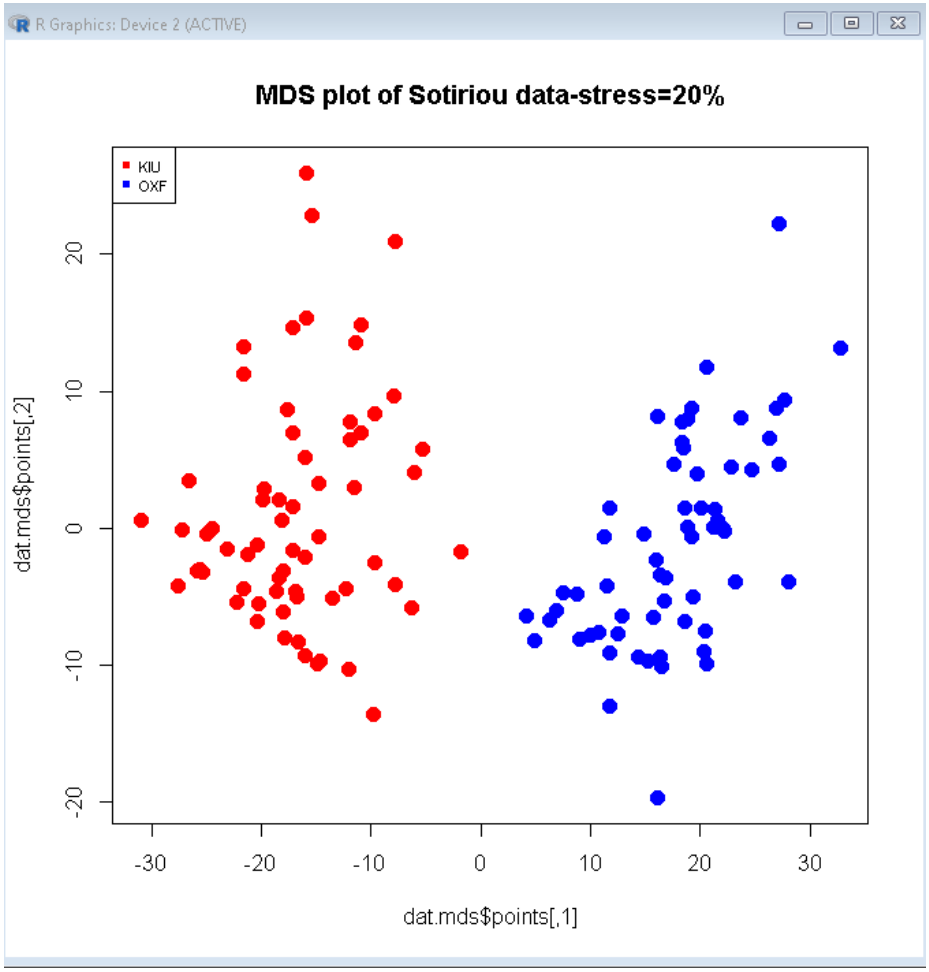


About 10 % variability in the data is explained.

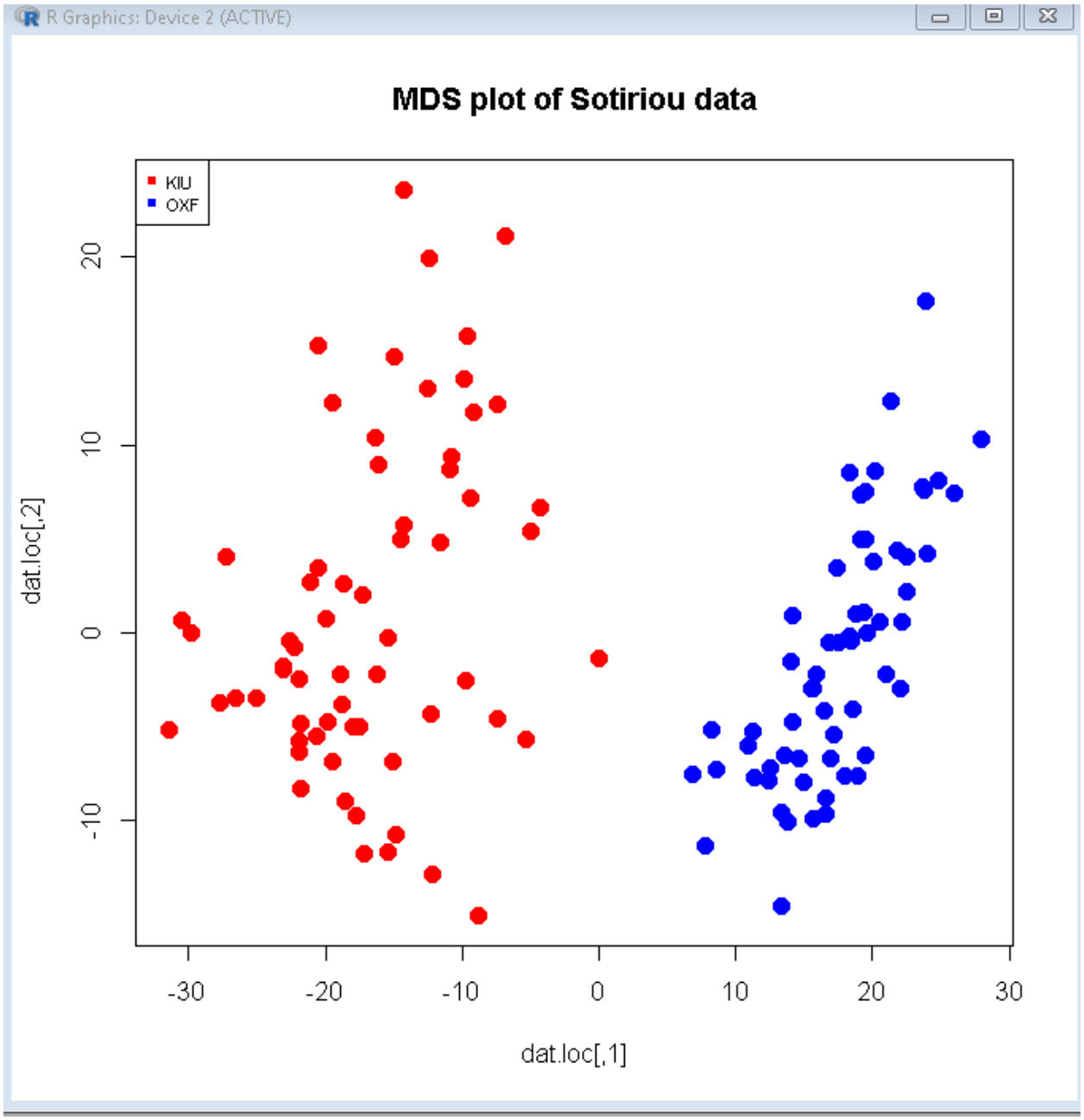
4.

```
at.dist <- dist(t(dat))
```

```
dat.mds <- isoMDS(dat.dist)
    plot(dat.mds$points, type = "n")
    points(dat.mds$points[,1][ann$site=="KIU"],dat.mds$points[,2][ann$site=="KIU"],col="red",pch=16,
    cex=1.5)
    points(dat.mds$points[,1][ann$site=="OXF"],dat.mds$points[,2][ann$site=="OXF"],col="blue",pch=1
    6,cex=1.5)
    title(main="MDS plot of Sotiriou data-stress=20%")
    legend("topleft", c("KIU","OXF"),col=c("red","blue"),pch=15,cex=.7,horiz=F)
```




```
    dat.loc <- cmdscale(dat.dist)
    plot(dat.loc, type = "n")
    points(dat.loc[,1][ann$site=="KIU"],dat.loc[,2][ann$site=="KIU"],col="red",pch=16,cex=1.5)
    points(dat.loc[,1][ann$site=="OXF"],dat.loc[,2][ann$site=="OXF"],col="blue",pch=16,cex=1.5)
    title(main="MDS plot of Sotiriou data")
    legend("topleft", c("KIU","OXF"),col=c("red","blue"),pch=15,cex=.7,horiz=F)
```



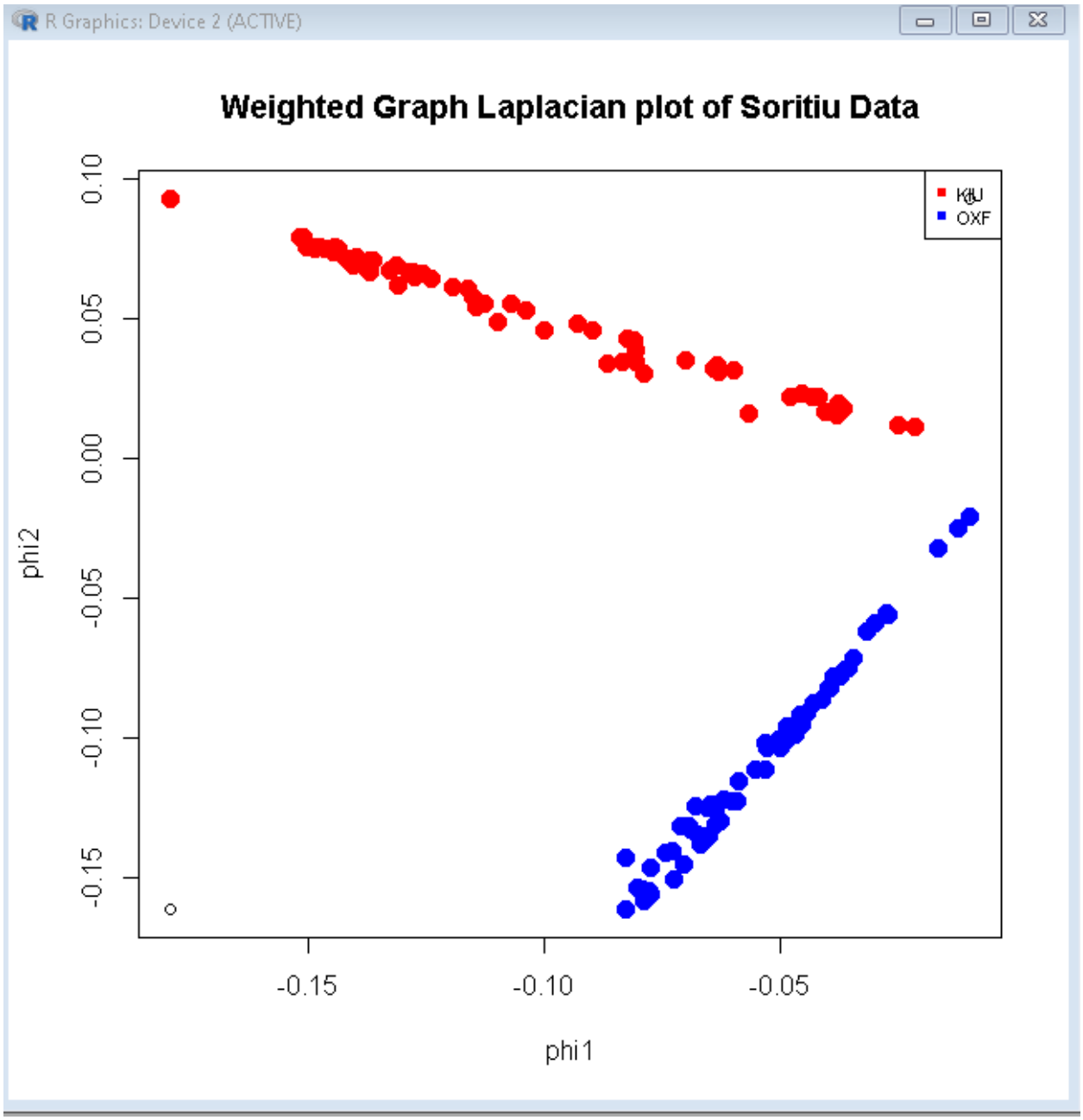
5.

```
dat2<- data.matrix(dat)
temp <- t(dat2)
temp <- scale(temp,center=T,scale=T)
k.speClust2 <- function (X, qnt=NULL) {
dist2full <- function(dis) {
n <- attr(dis, "Size")
        full <- matrix(0, n, n)
        full[lower.tri(full)] <- dis
        full + t(full)
}
```

```
dat.dis <- dist(t(X),"euc")^2
if(!is.null(qnt)) {eps <- as.numeric(quantile(dat.dis,qnt))}
if(is.null(qnt)) {eps <- min(dat.dis[dat.dis!=0])}
kernal <- exp(-1 * dat.dis/(eps))
K1 <- dist2full(kernal)
diag(K1) <- 0
D = matrix(0,ncol=ncol(K1),nrow=ncol(K1))
tmpe <- apply(K1,1,sum)
tmpe[tmpe>0] <- 1/sqrt(tmpe[tmpe>0])
tmpe[tmpe<0] <- 0
diag(D) <- tmpe
L <- D%*% K1 %*% D
X <- svd(L)$u
Y <- X / sqrt(apply(X^2,1,sum))
}
phi <- k.speClust2(temp,qnt=NULL)

plot(range(phi[,1]),range(phi[,2]),xlab="phi1",ylab="phi2",main="Weighted Graph Laplacian plot of
Soritiu Data")

points(phi[,1][ann$site=="KIU"],phi[,2][ann$site=="KIU"],col="red",pch=16,cex=1.5)
points(phi[,1][ann$site=="OXF"],phi[,2][ann$site=="OXF"],col="blue",pch=16,cex=1.5)
legend("topright",c("KIU", "OXF"),col=c("red", "blue"),pch=15,cex=.7,horiz=F)
```


R Graphics: Device 2 (ACTIVE)
Weighted Graph Laplacian plot of Soritiu Data
K@U
OXF
phi2
0.10
0.05
0.00
-0.05
-0.10
-0.15
-0.15
-0.10
-0.05
phi1