

3.5 Regular Trajectories

Manual of Applied Spatial Ecology

3/11/2022

1. Exercise 3.5 - Download and extract zip folder into your preferred location
2. Set working directory to the extracted folder in R under Session - Set Working Directory...
3. Now open the script “RegTrajScript.Rmd” and run code directly from the script
4. First we need to load the packages needed for the exercise

```
library(adehabitatLT)
library(chron)
library(sp)
```

5. Now read in dataset, extract a single animal and create ltraj as in previous exercise

```
muleys <- read.csv("DCmuleysedited.csv", header=T)
```

```
#CODE FOR AN INDIVIDUAL ANIMAL
```

```
muley15 <- subset(muleys, id=="D15")
muley15$id <- factor(muley15$id)
table(muley15$id)
```

```
##
```

```
## D15
```

```
## 2589
```

```
#Sort data to address error in code and then look at first 10 records of data to confirm
muley15 <- muley15[order(muley15$GPSFixTime),]
```

```
#####
```

```
## Example of a trajectory of type II (time recorded)
```

```
### Conversion of the date to the format POSIX
```

```
#Needs to be done to get proper digits of date into R then POSIXct
```

```
#uses library(chron)
```

```
da <- as.character(muley15$GPSFixTime)
```

```
da <- as.POSIXct(strptime(muley15$GPSFixTime, format="%Y.%m.%d %H:%M:%S"))
```

```
#Attach da to muley15
```

```
muley15$da <- da
```

```
timediff <- diff(muley15$da)
```

```
muley15 <- muley15[-1,]
```

```
muley15$timediff <- as.numeric(abs(timediff))
```

```
#Clean up muley15 for outliers
```

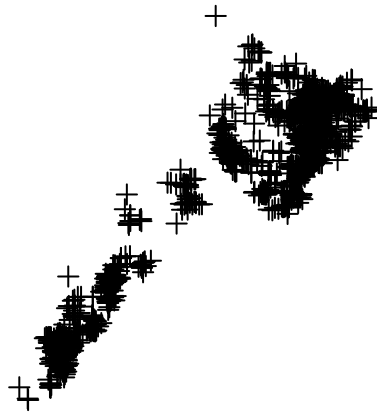
```
newmuleys <- subset(muley15, muley15$X > 599000 & muley15$X < 705000 & muley15$Y > 4167000  
  & muley15$timediff < 14401)
```

```
muley15 <- newmuleys
```

```

data.xy = muley15[c("X","Y")]
#Creates class Spatial Points for all locations
xyssp <- SpatialPoints(data.xy)
#Creates a Spatial Data Frame from
sppt<-data.frame(xyssp)
#Creates a spatial data frame of ID
idsp<-data.frame(muley15[2])
#Creates a spatial data frame of dt
dtsp<-data.frame(muley15[24])
#Creates a spatial data frame of Burst
busp<-data.frame(muley15[23])
#Merges ID and Date into the same spatial data frame
merge<-data.frame(idsp,dtsp,busp)
#Adds ID and Date data frame with locations data frame
coordinates(merge)<-sppt
plot(merge)

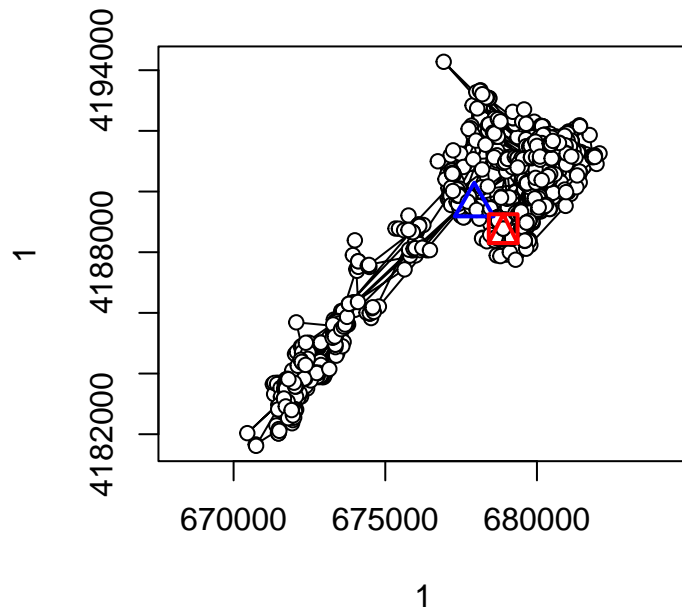
```



```

#Creation of an object of class "ltraj"
ltraj <- as.ltraj(coordinates(merge),merge$da,id=merge$id)
plot(ltraj)

```



6. We want to study the trajectory of the day at the scale of the day. We define one trajectory per day. The trajectory should begin at 2200 hours so the following function returns TRUE if the date is time between 06H00 and 23H00 (i.e. results in 7-8 locations/day bursts)

```
foo <- function(date) {
  da <- as.POSIXlt(date)
  ho <- da$hour + da$min
  return(ho>18.0&ho<23.9)
}
deer <- cutltraj(ltraj, "foo(date)", nextr = TRUE)
```

```
## Warning in cutltraj(ltraj, "foo(date)", nextr = TRUE): At least 3 relocations are needed for a burst
## 27 relocations have been deleted
```

```
head(deer)
```

```
##
## ***** List of class ltraj *****
##
## Type of the traject: Type II (time recorded)
## * Time zone unspecified: dates printed in user time zone *
## Irregular traject. Variable time lag between two locs
##
## Characteristics of the bursts:
```

##	id	burst	nb.reloc	NAs	date.begin	date.end
##	1	D15 D15.001	7	0	2011-10-12 03:00:52	2011-10-12 21:00:40
##	2	D15 D15.002	8	0	2011-10-13 00:00:35	2011-10-13 21:00:39
##	3	D15 D15.003	8	0	2011-10-14 00:00:42	2011-10-14 21:00:39
##	4	D15 D15.004	8	0	2011-10-15 00:00:35	2011-10-15 21:00:51
##	5	D15 D15.005	8	0	2011-10-16 00:00:39	2011-10-16 21:00:37
##	6	D15 D15.006	8	0	2011-10-17 00:01:07	2011-10-17 21:00:49

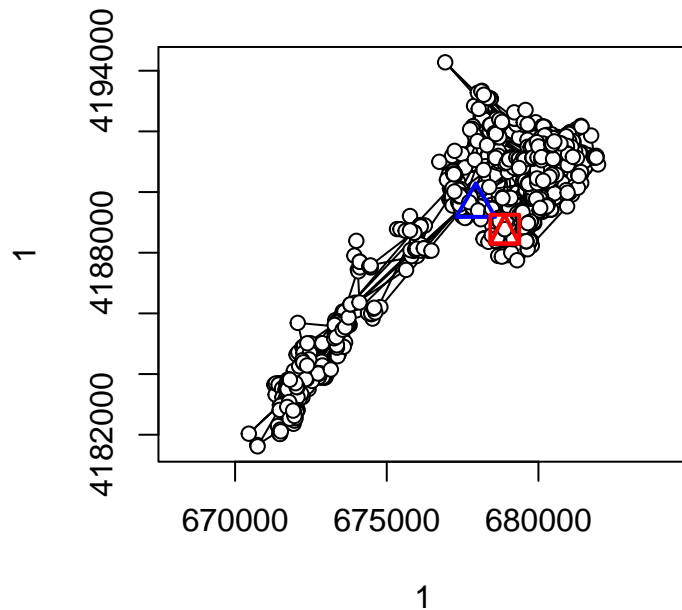
```
##
##
## infolocs provided. The following variables are available:
## [1] "pkey"

## Remove the first and last burst if needed?
#deer2 <- deer[-c(1,length(deer))]

#Bind the trajectories
deer3 <- bindltraj(deer)
deer3

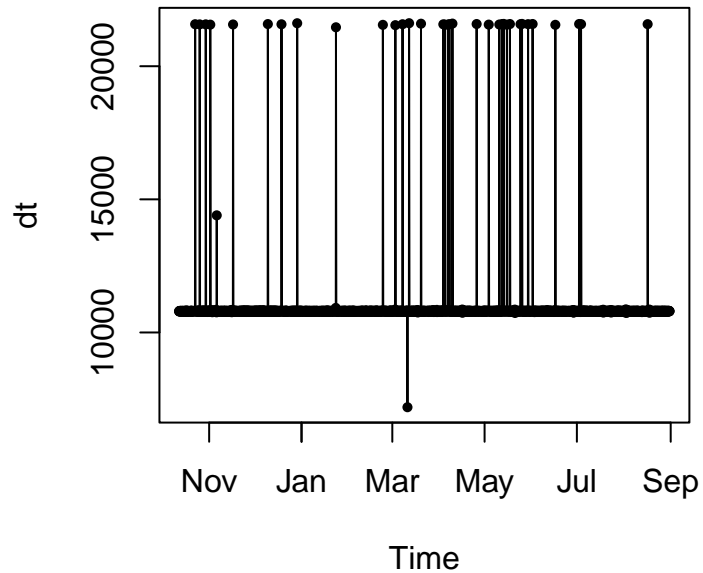
##
## ***** List of class ltraj *****
##
## Type of the traject: Type II (time recorded)
## * Time zone unspecified: dates printed in user time zone *
## Irregular traject. Variable time lag between two locs
##
## Characteristics of the bursts:
##   id burst nb.reloc NAs      date.begin      date.end
## 1 D15   D15      2561   0 2011-10-12 03:00:52 2012-08-31 09:00:51
##
##
## infolocs provided. The following variables are available:
## [1] "pkey"

plot(deer3)
```



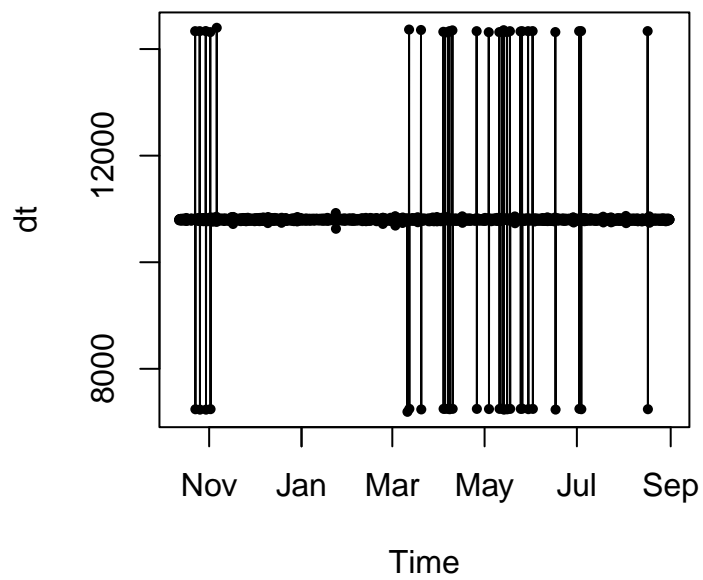
```
is.regular(deer3)
```

```
## [1] FALSE
plotltr(deer3, "dt")
```

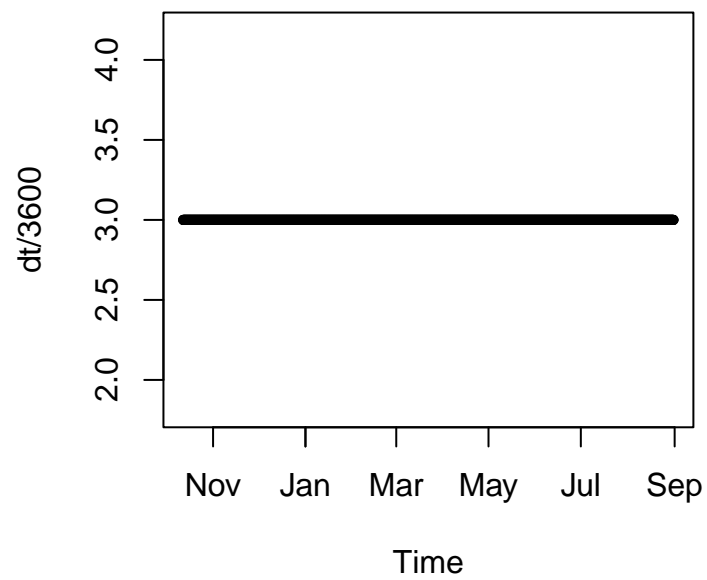


```
## The relocations have been collected every 3 hours, and there are some
## missing data
## The reference date: the hour should be exact (i.e. minutes=0):
refda <- strptime("00:00", "%H:%M")
refda
```

```
## [1] "2022-03-11 EST"
## Set the missing values
deerset <- setNA(deer3, refda, 3, units = "hour")
## now, look at dt for the bursts:
plotltr(deerset, "dt")
```



```
## dt is nearly regular: round the date:
deerset1 <- sett0(deerset, refda, 3, units = "hour")
plotltr(deerset1, "dt/3600")
```



```
is.regular(deerset1)
```

```
## [1] TRUE
```

```
## deerset1 is now regular
```

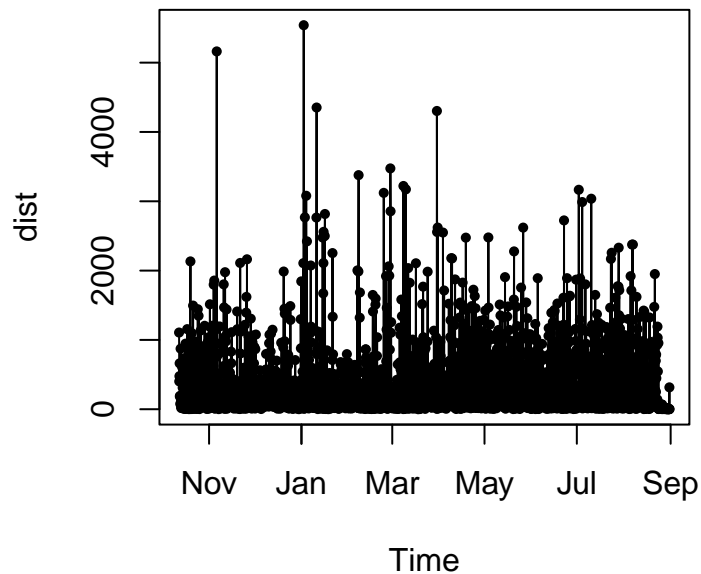
```
## Is the resulting object "sd" ?
```

```
is.sd(deerset1)
```

```
## [1] TRUE
```

```
## Show the changes in the distance between successive relocations with the time
```

```
plotltr(deerset1, "dist")
```



```
deerset1#Is the trajectory regular now?
```

```
##
```

```
## ***** List of class ltraj *****
```

```
##
```

```
## Type of the trajct: Type II (time recorded)
```

```
## * Time zone unspecified: dates printed in user time zone *
```

```
## Regular trajct. Time lag between two locs: 10800 seconds
```

```
##
```

```
## Characteristics of the bursts:
```

```
##   id burst nb.reloc NAs      date.begin      date.end
```

```
## 1 D15   D15      2595  34 2011-10-12 04:00:00 2012-08-31 10:00:00
```

```
##
```

```
##
```

```
## infolocs provided. The following variables are available:
```

```
## [1] "pkey"
```