stackoverflow - sujet 4 module 3 du MOOC RR

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Ayant galéré à rendre les données de base dans un format manipulable, j'ai simplifié le jeu de données dans Excel en transformant les données de date en prenant t=0 pour la première mesure, retirant toutes les colonnes inutiles et ne laissant que les deux colonnes utiles et crée un csv avec 3 colonnes : time, size, duration (of the transfer).

```
data_path = "C:/Users/muller/Desktop/mooc/rr/mooc-rr/module3/stackoverflow.csv"
```

Téléchargement

```
data = read.csv2(data_path, sep=(';'), dec = ",", header = TRUE)
head(data)
```

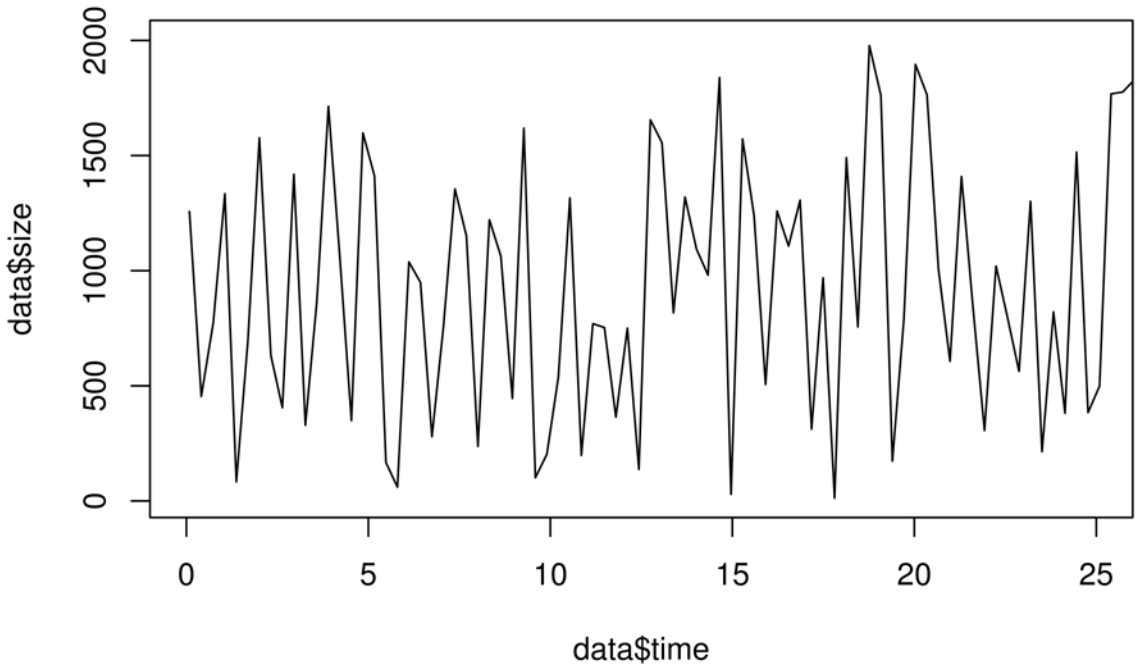
```
##         time size duration
## 1 0.08270001 1257      120
## 2 0.40825009  454      120
## 3 0.73972988  775      126
## 4 1.05662990 1334      112
## 5 1.37222004   83      111
## 6 1.68835998  694      111
```

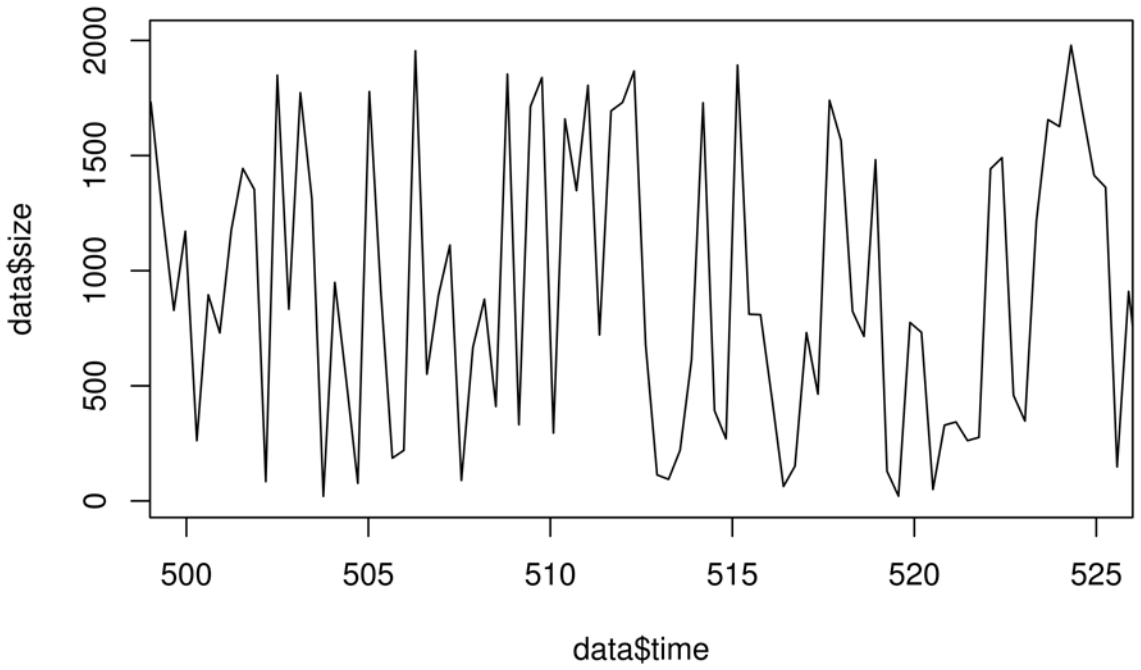
exploration des données sur un échantillon de graphes (4) représentant 1% du jeu de données et à peu près lisibles :

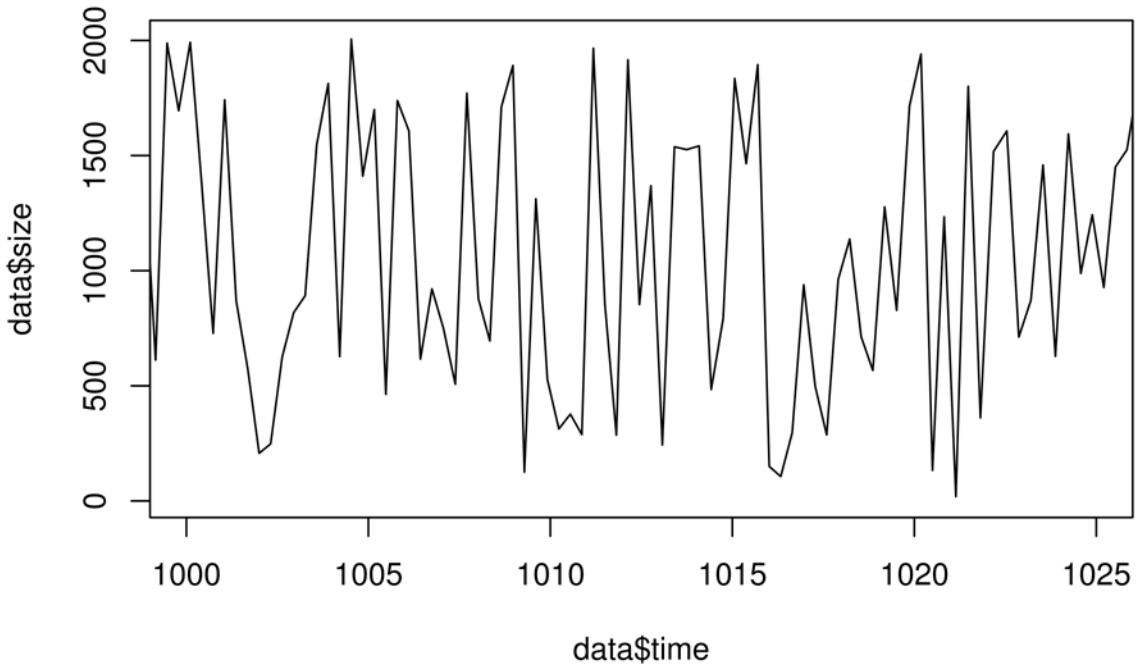
```
max(data$time)
```

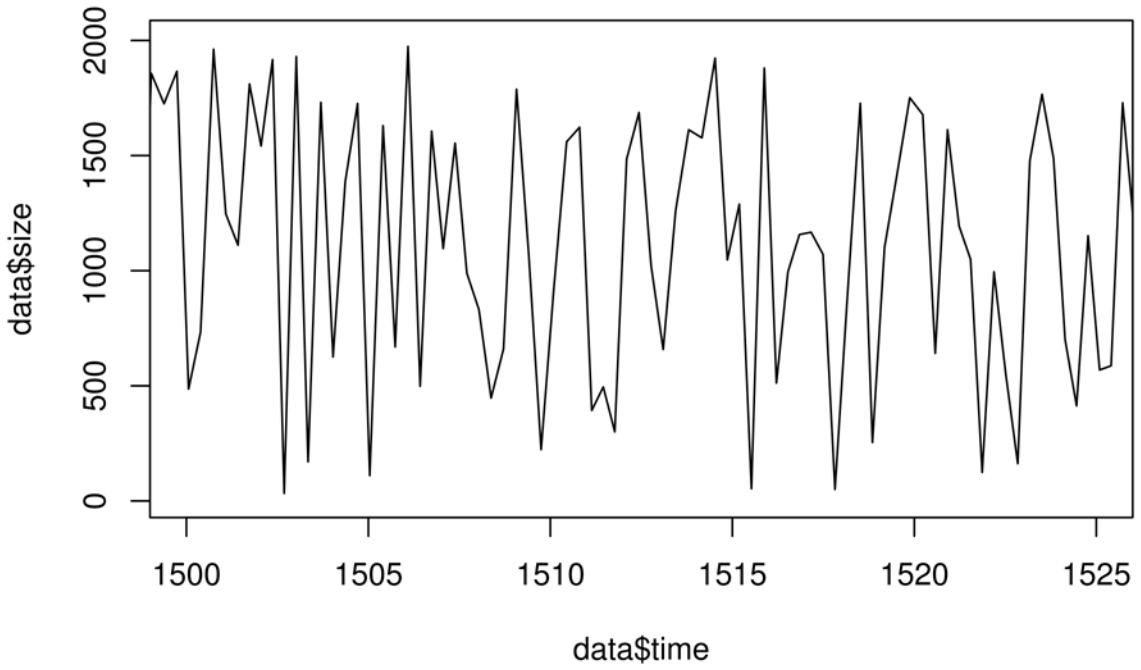
```
## [1] 2257.704
```

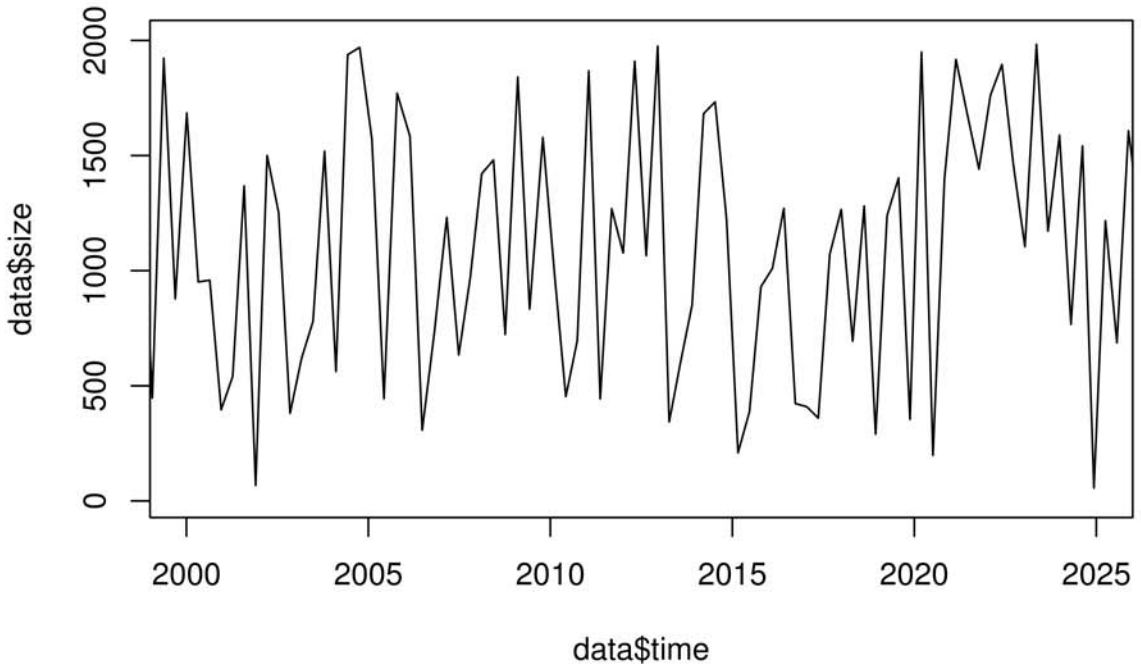
```
interval_size <- 25
number_plot <- round(max(data$time)/interval_size, digit=0)/20
for (i in 0:number_plot) {
plot(data$time, data$size, type="l", xlim = c(interval_size*i*20,interval_size*(i*20+1)))
}
```


data$size
0
500
1000
1500
2000
0
5
10
15
20
25
data$time


data$size
0
500
1000
1500
2000
500
505
510
515
520
525
data$time

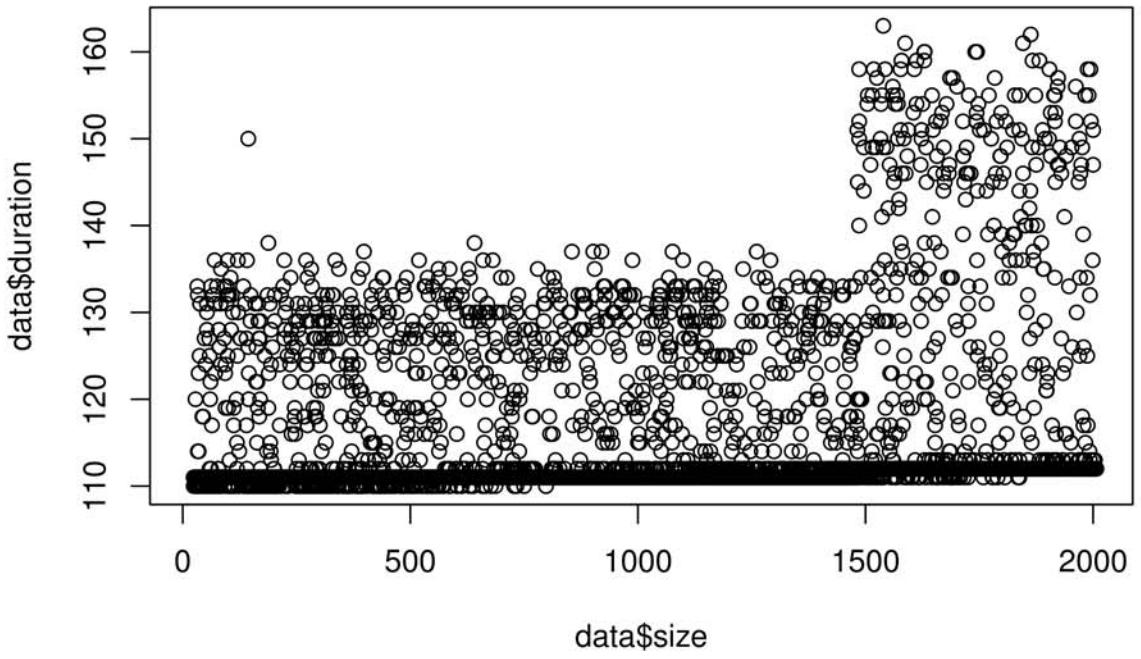

data$size
0
500
1000
1500
2000
1000
1005
1010
1015
1020
1025
data$time


data$size
0
500
1000
1500
2000
1500
1505
1510
1515
1520
1525
data$time



relation entre taille et durée du transfert..

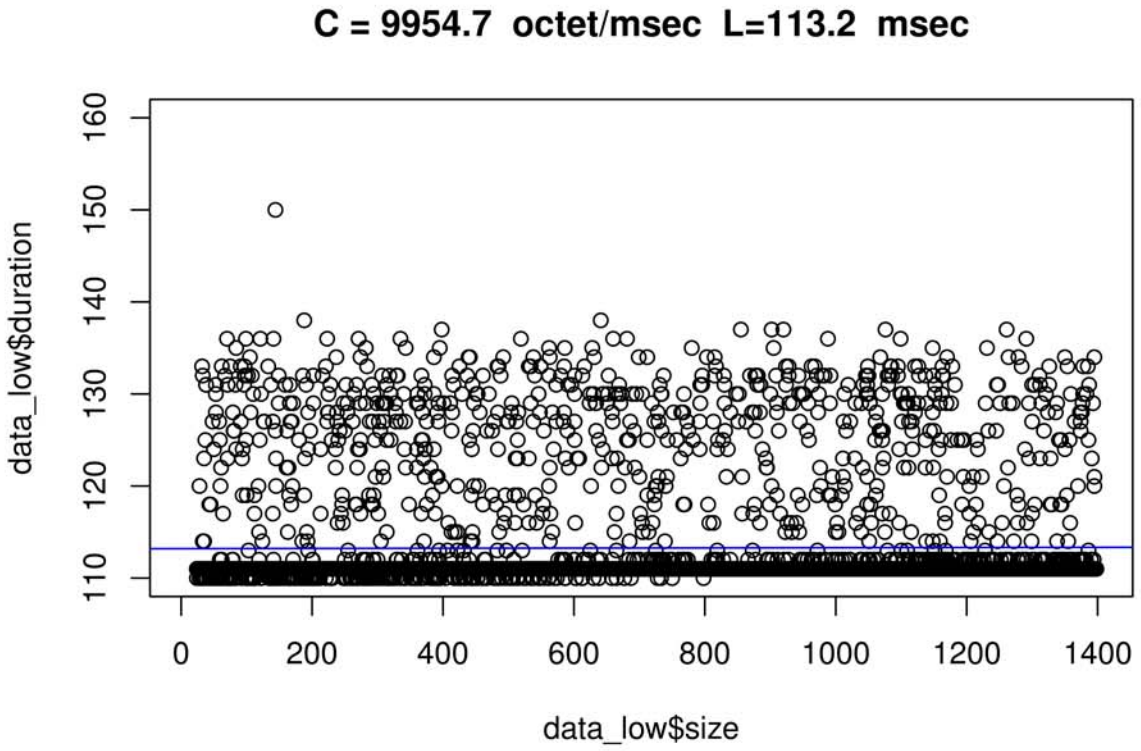
```
plot (data$size, data$duration, type = "p")
```



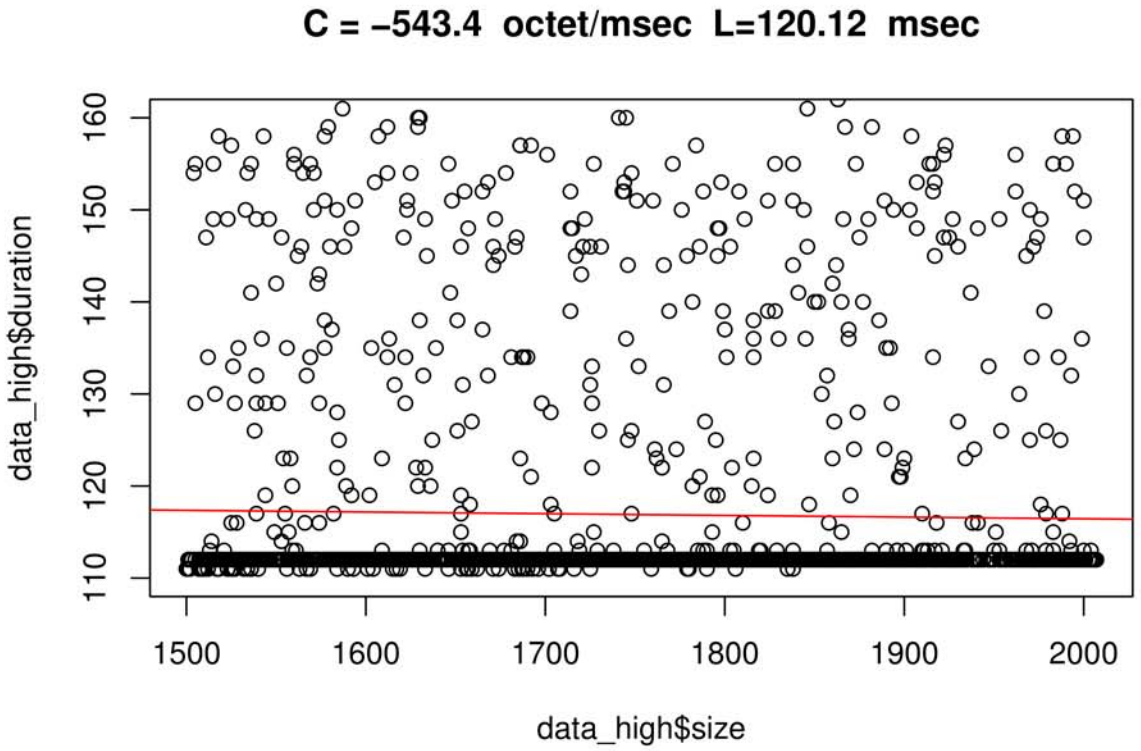
Une rupture apparait un peu en dessous de 1500 octet. On coupe les données en deux.On laisse volontairement un vide entre 1400 et 1500 pour ne pas empiéter sur l'intervalle voisin

```
data_low <- subset(data, data$size<1400)
data_high <- subset(data, data$size>=1500)


reg <- lm(duration ~ size, data = data_low)
coeff=coefficients(reg)
# Equation de la droite de regression :
eq = paste0("C = ", round(1/coeff[2],1), "  octet/msec  ", "L=", round(coeff[1],2), "  msec")
# Graph
plot(data_low$size, data_low$duration, type = "p", main = eq, ylim=c(110,160))
abline(reg=reg, col="blue")
```




```
reg <- lm(duration ~ size, data = data_high)
coeff=coefficients(reg)
# Equation de la droite de regression :
eq = paste0("C = ", round(1/coeff[2],1), "  octet/msec  ", "L=", round(coeff[1],2), "  msec")
plot(data_high$size, data_high$duration, type = "p", main = eq, ylim=c(110,160))
abline(reg=reg, col="red")
```



On utilise la régression quantile pour donner moins de poids aux outlier. Le principal effet concerne l'abscisse à l'origine (et pas la pente)

```
library(quantreg)
```

```
## Warning: package 'quantreg' was built under R version 3.5.3
```

```
## Loading required package: SparseM
```

```
## Warning: package 'SparseM' was built under R version 3.5.2
```

```
##
## Attaching package: 'SparseM'
```

```
## The following object is masked from 'package:base':
##
##     backsolve
```

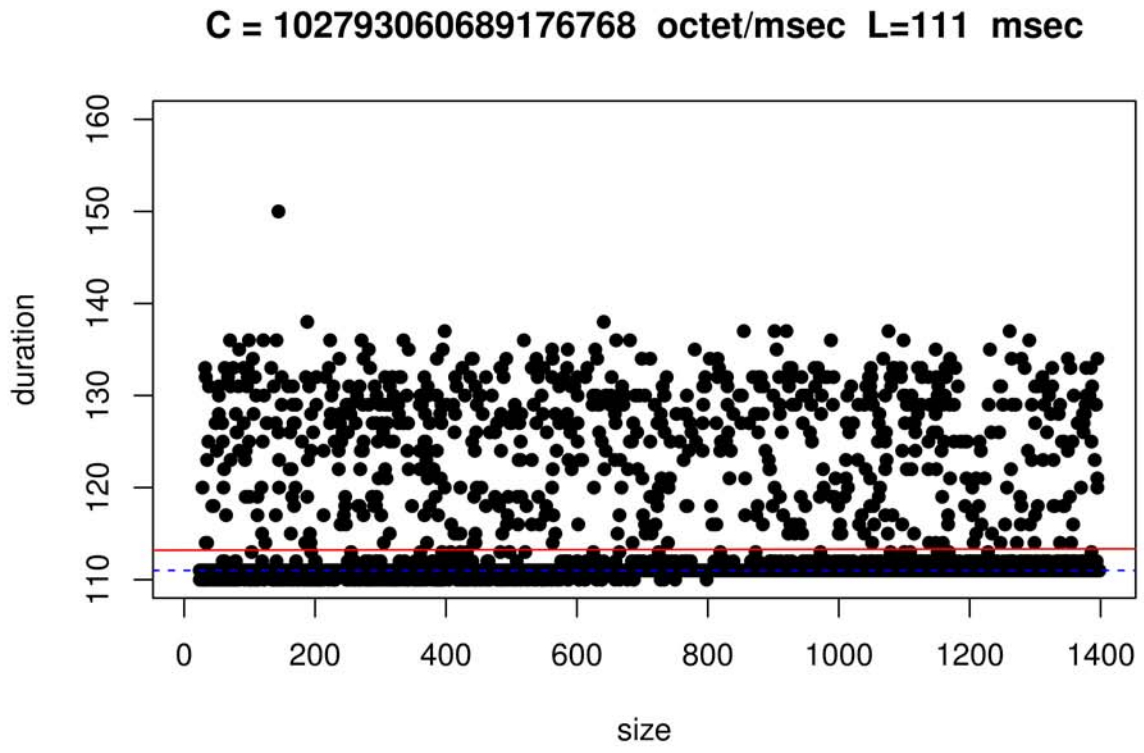
```
# regression against 50% quantile in the lower part
################
rqfit <- rq(duration ~ size, data = data_low, tau = 0.5)
coeff=coefficients(rqfit)

# Equation de la droite de regression quantile :
```

```r
eq = paste0("C = ", round(1/coeff[2],1), "  octet/msec  ", "L=", round(coeff[1],2), "  msec")

plot(duration ~ size, data = data_low, pch = 16, main = eq, ylim=c(110,160))
abline(rq(duration ~ size, data = data_low), col = "blue", lty = 2, ylim=c(110,160))

#plotting again the regression on the same graph
reg <- lm(duration ~ size, data = data_low)
abline(reg, col="red", lty = 1, ylim=c(110,160))
```

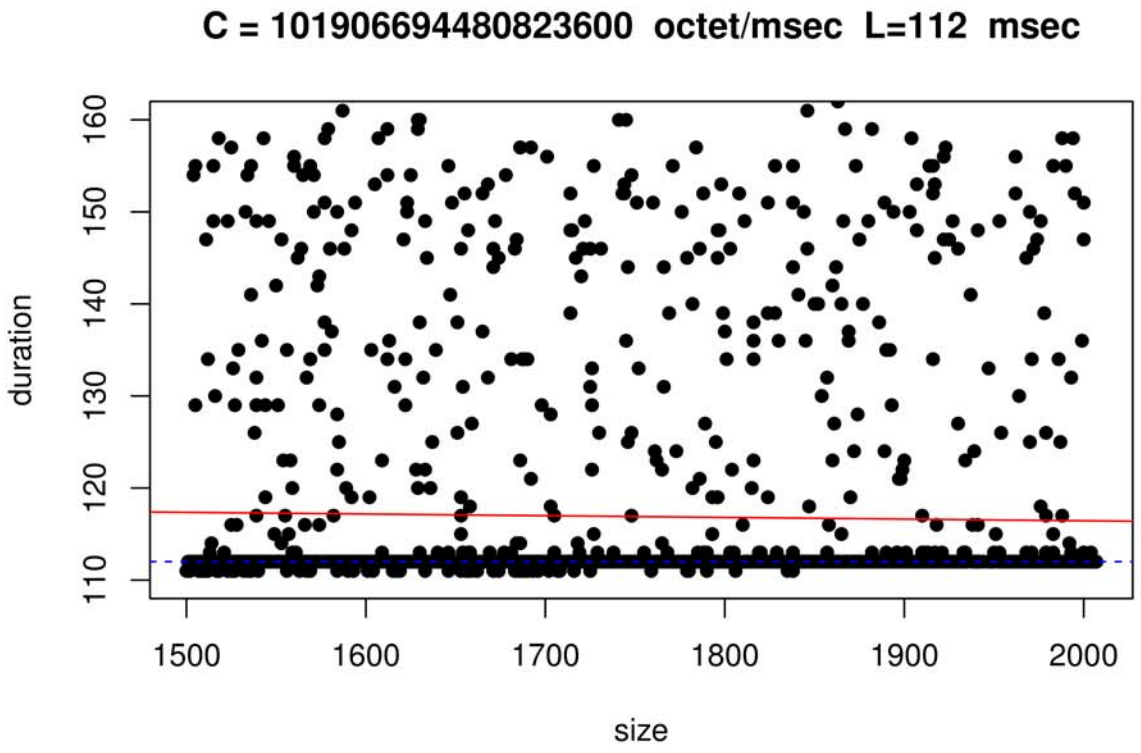



```r
## regression against 50% quantile in the higher part
################
rqfit <- rq(duration ~ size, data = data_high, tau = 0.5)
coeff=coefficients(rqfit)

# Equation de la droite de regression quantile :
eq = paste0("C = ", round(1/coeff[2],1), "  octet/msec  ", "L=", round(coeff[1],2), "  msec")

plot(duration ~ size, data = data_high, pch = 16, main = eq, ylim=c(110,160))
abline(rq(duration ~ size, data = data_high), col = "blue", lty = 2, ylim=c(110,160))

#plotting again the regression on the same graph
reg <- lm(duration ~ size, data = data_high)
abline(reg, col="red", lty = 1, ylim=c(110,160))
```

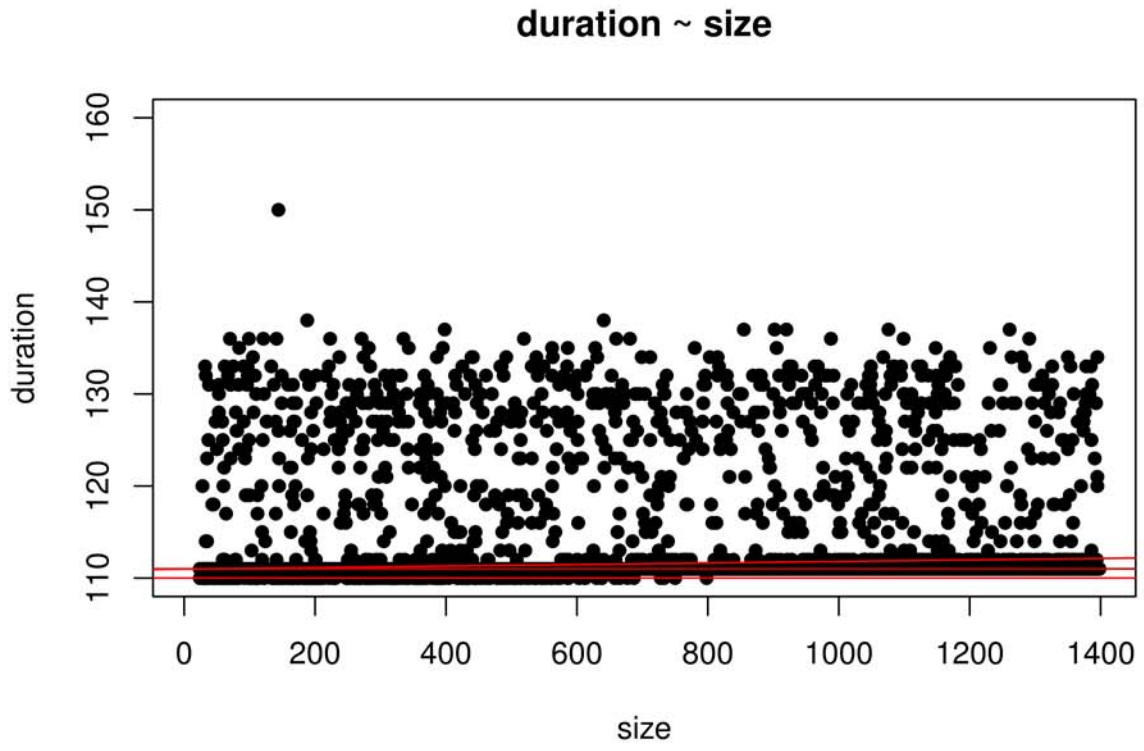


On voit que les vitesses ainsi calculées n'ont pas de sens car le temps dépend très peu de la taille

Par curiosité, on peut observer les régressions sur les différents quantiles.

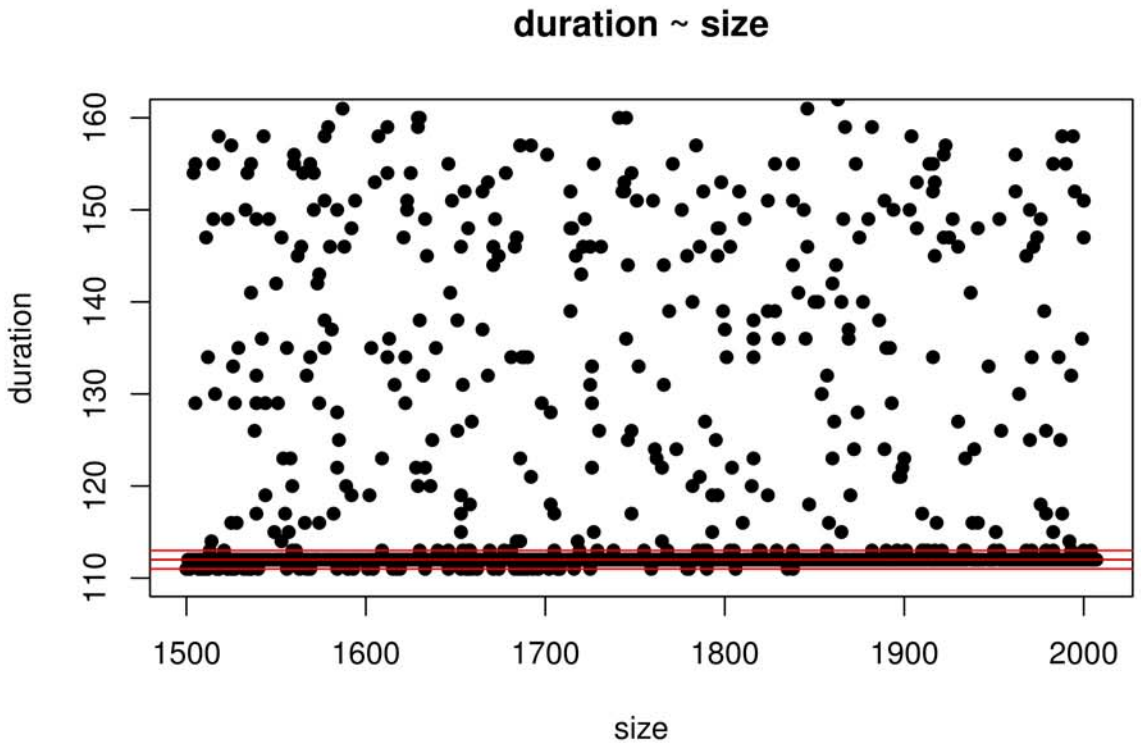
```
multi_rqfit <- rq(duration ~ size, data = data_low, tau = seq(0, 1, by = 0.2))

# plotting different quantiles
colors <- c("red", "red","#ff3333", "#cc0000", "red")
plot(duration ~ size, data = data_low, pch = 16, main = "duration ~ size", ylim=c(110,160))
for (j in 1:ncol(multi_rqfit$coefficients)) {
    abline(coef(multi_rqfit)[, j], col = colors[j])
}
```




```
multi_rqfit <- rq(duration ~ size, data = data_high, tau = seq(0, 1, by = 0.2))

# plotting different quantiles
colors <- c("red", "red","#ff3333", "#cc0000", "red")
plot(duration ~ size, data = data_high, pch = 16, main = "duration ~ size", ylim=c(110,160))
for (j in 1:ncol(multi_rqfit$coefficients)) {
    abline(coef(multi_rqfit)[, j], col = colors[j])
}
```



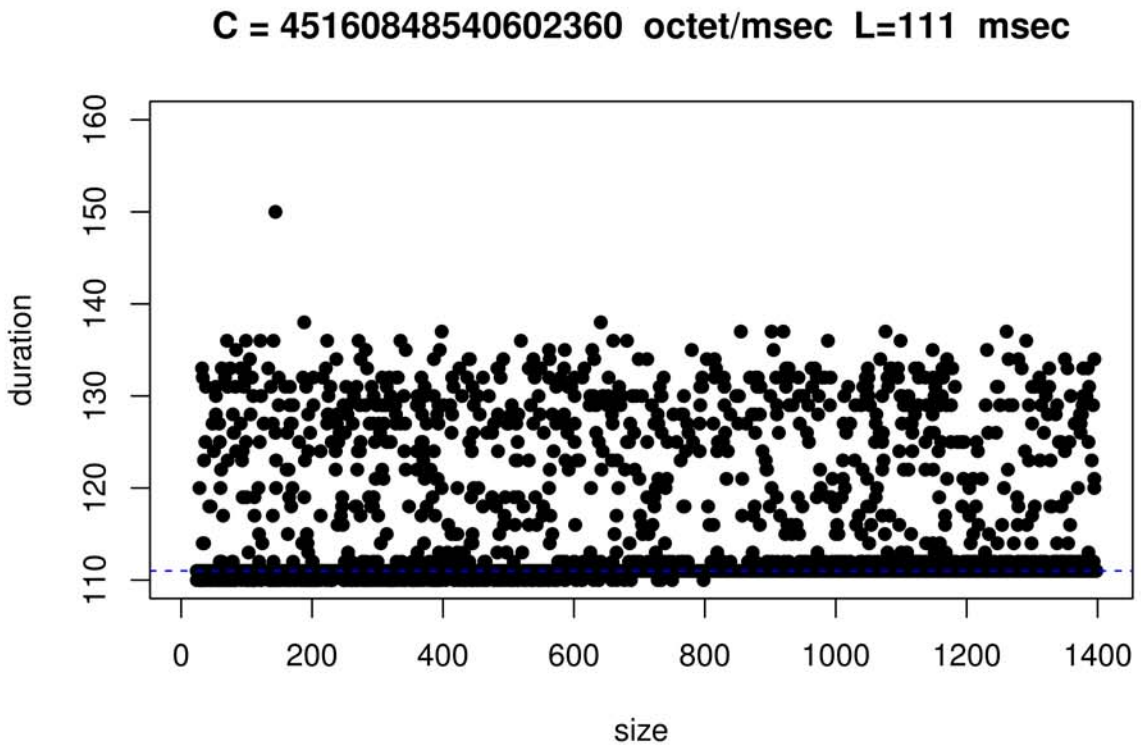
Pour finir, on peut s'intéresser à la régression sur les 10% de messages les plus rapides pour une taille données (10ème centile)

```
library(quantreg)
# regression against 10% quantile in the lower part
################
rqfit <- rq(duration ~ size, data = data_low, tau = 0.1)
coeff=coefficients(rqfit)

#summary(rqfit)


# Equation de la droite de regression quantile :
eq = paste0("C = ", round(1/coeff[2],1), "  octet/msec  ", "L=", round(coeff[1],2), "  msec")

plot(duration ~ size, data = data_low, pch = 16, main = eq, ylim=c(110,160))
abline(rq(duration ~ size, data = data_low), col = "blue", lty = 2, ylim=c(110,160))
```

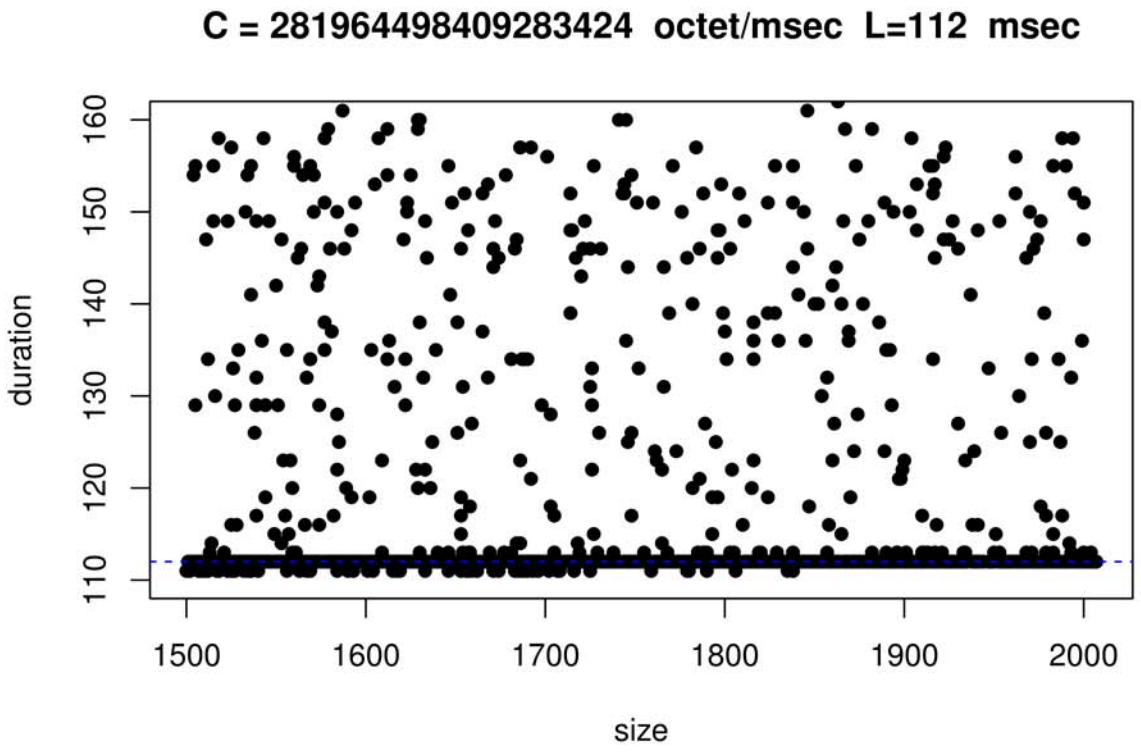


Les résultats sont pour la partie basse de la taille (<1400 octet) L = 111 msec et il n'y a aucun lien entre taille et durée

```
## regression against 10% quantile in the higher part
################
rqfit <- rq(duration ~ size, data = data_high, tau = 0.1)
coeff=coefficients(rqfit)

# Equation de la droite de regression quantile :
eq = paste0("C = ", round(1/coeff[2],1), "  octet/msec  ", "L=", round(coeff[1],2), "  msec")

plot(duration ~ size, data = data_high, pch = 16, main = eq, ylim=c(110,160))
abline(rq(duration ~ size, data = data_high), col = "blue", lty = 2, ylim=c(110,160))
```



Les résultats sont pour la partie haute de la taille (>1500 octet) L = 112 msec et il n'y a aucun lien entre taille et durée