Preprocesamiento

Paquetes

In [1]:

```
install.packages('stepR')
```

```
Installing package into ‘/home/max/R/x86_64-pc-linux-gnu-library/4.2’
(as ‘lib’ is unspecified)
```

In [2]:

```
require(stepR)
```

```
Loading required package: stepR

Successfully loaded stepR package version 2.1-3.
Several new functions are added in version 2.0-0. Some older functions are deprecated (sti
ll working) and may be defunct in a later version. Please read the documentation for more
details.
```

Cargando los datos

In [3]:

```
datos = read.csv("datos.csv")
head(datos)
```

A data.frame: 6 × 2

	timestamp	value
	<chr>	<dbl>
1	2014-04-01 00:00:00	19.76125
2	2014-04-01 00:05:00	20.50083
3	2014-04-01 00:10:00	19.96164
4	2014-04-01 00:15:00	21.49027
5	2014-04-01 00:20:00	20.18774
6	2014-04-01 00:25:00	19.92313

Objetivo: Definir intervalos que contengan el patrón regular.

In [4]:

```
#Número de escalones
nc = 35
```

In [5]:

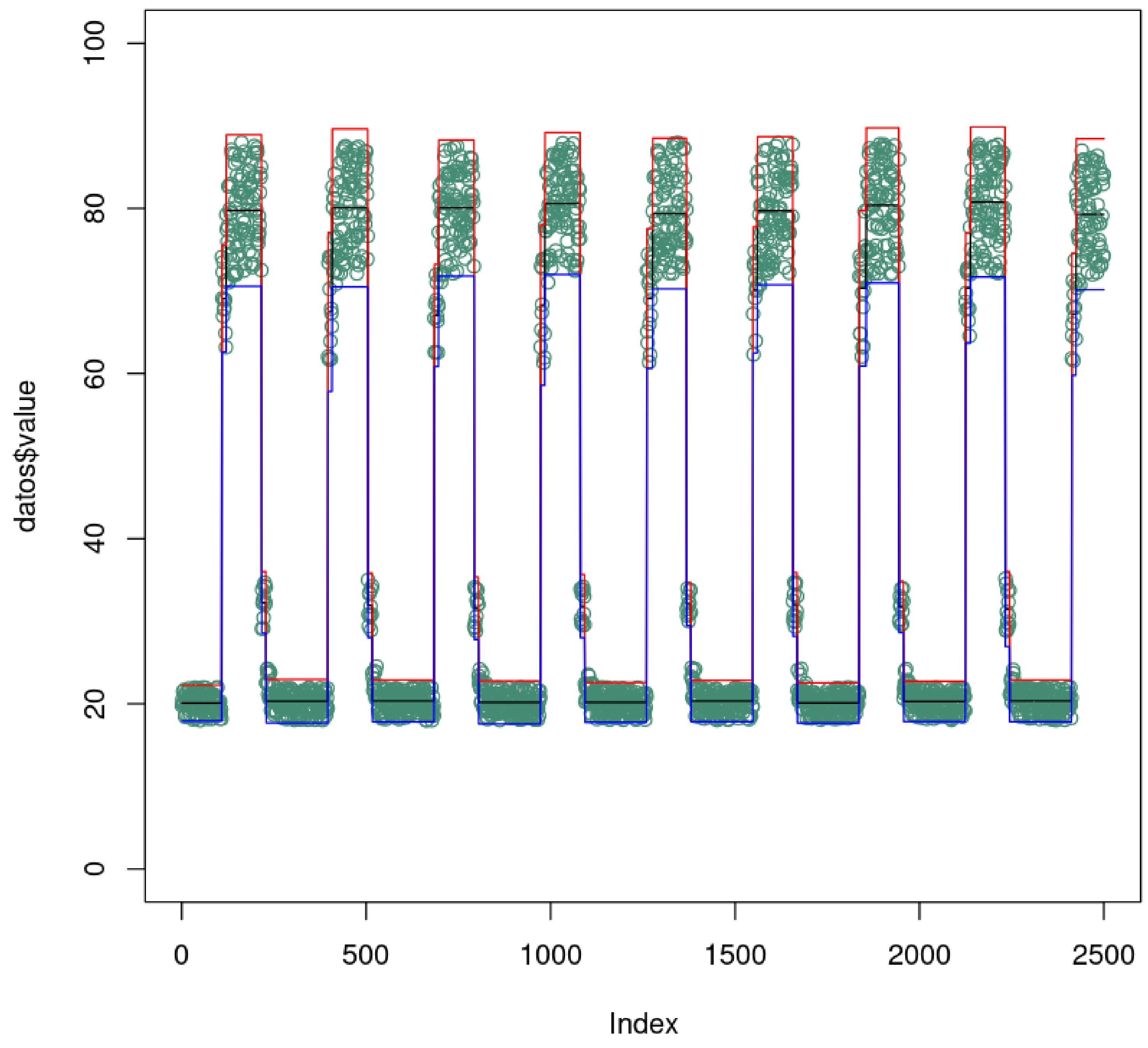
```
#Calculando el modelo
modelo = steppath(datos$value)

#Niveles ajustados
fitg <- modelo[[nc]]

#Calculo de la volatilidad
r = diff(c(0,fitg$rightEnd))
media = unlist(sapply(1:nc, function(i){rep(fitg$value[i],r[i])}))
desv = unlist(sapply(1:nc, function(i){
                  ind = fitg$leftEnd[i]:fitg$rightEnd[i]
                  rep(sqrt(var(datos$value[ind])),r[i])
            }))
liminf = media - 1.96*desv
limsup = media + 1.96*desv

#Gráfica
plot(datos$value, type = "p", col = "aquamarine4", ylim = c(0,100))
lines(media, type = "l", col = "black")
```

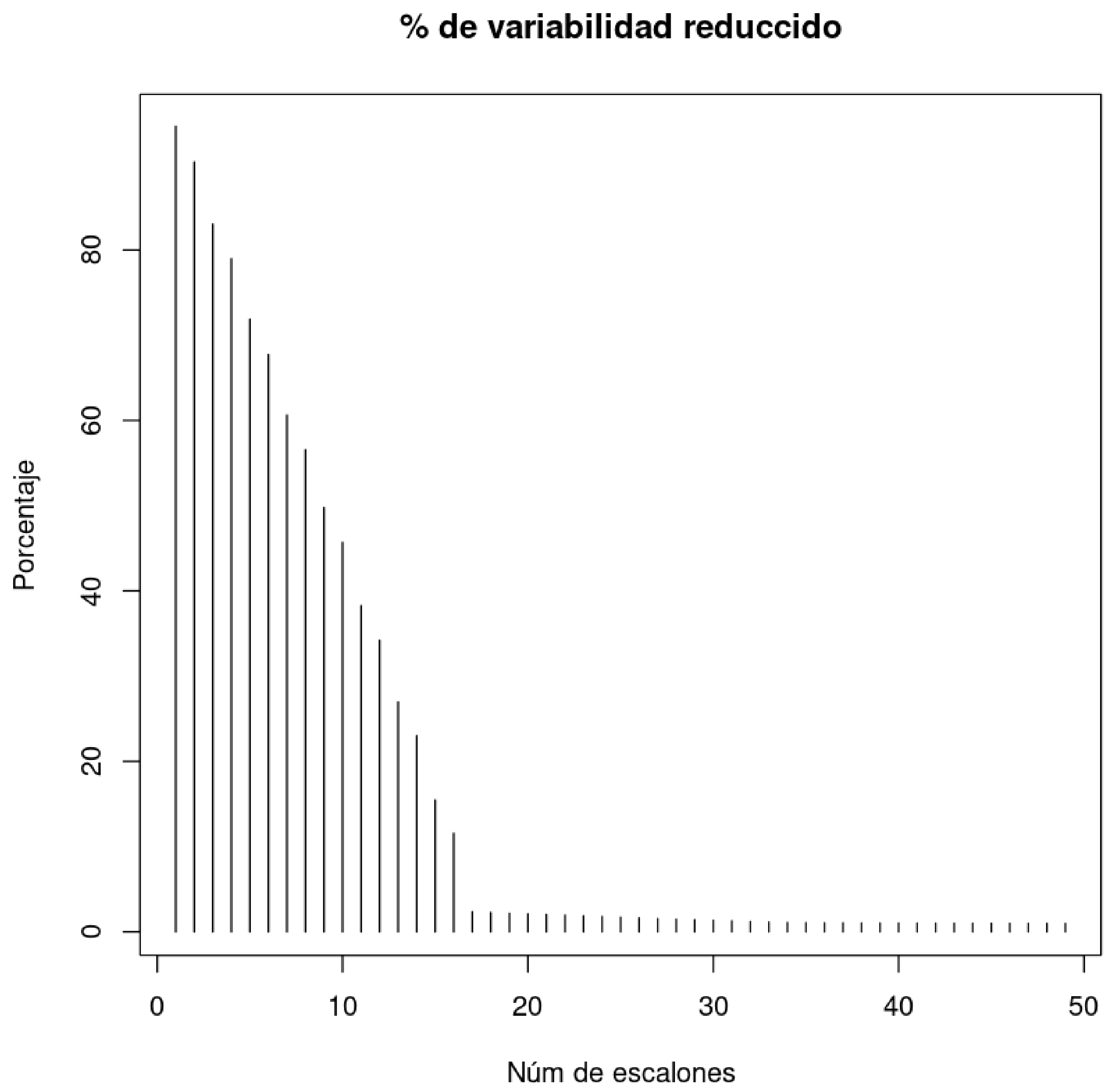
```
lines(limsup, type = "l", col = "red")
lines(liminf, type = "l", col = "blue")
```



¿Cuántos escalones son necesarios?

Con **18** segmentos se explica suficiente variabilidad.

In [6]:
```
varianzas = sapply(2:50, function(i){
  fitg <- modelo[[i]]
  var(resid(fitg, datos$value))
})
varianza = var(datos$value)
plot(100*(varianzas/varianza), type =  "h",
 main = "% de variabilidad reduccido",
 ylab = "Porcentaje",
 xlab = "Núm de escalones")
```



Con **18** segmentos se obtiene poca ***cobertura***.

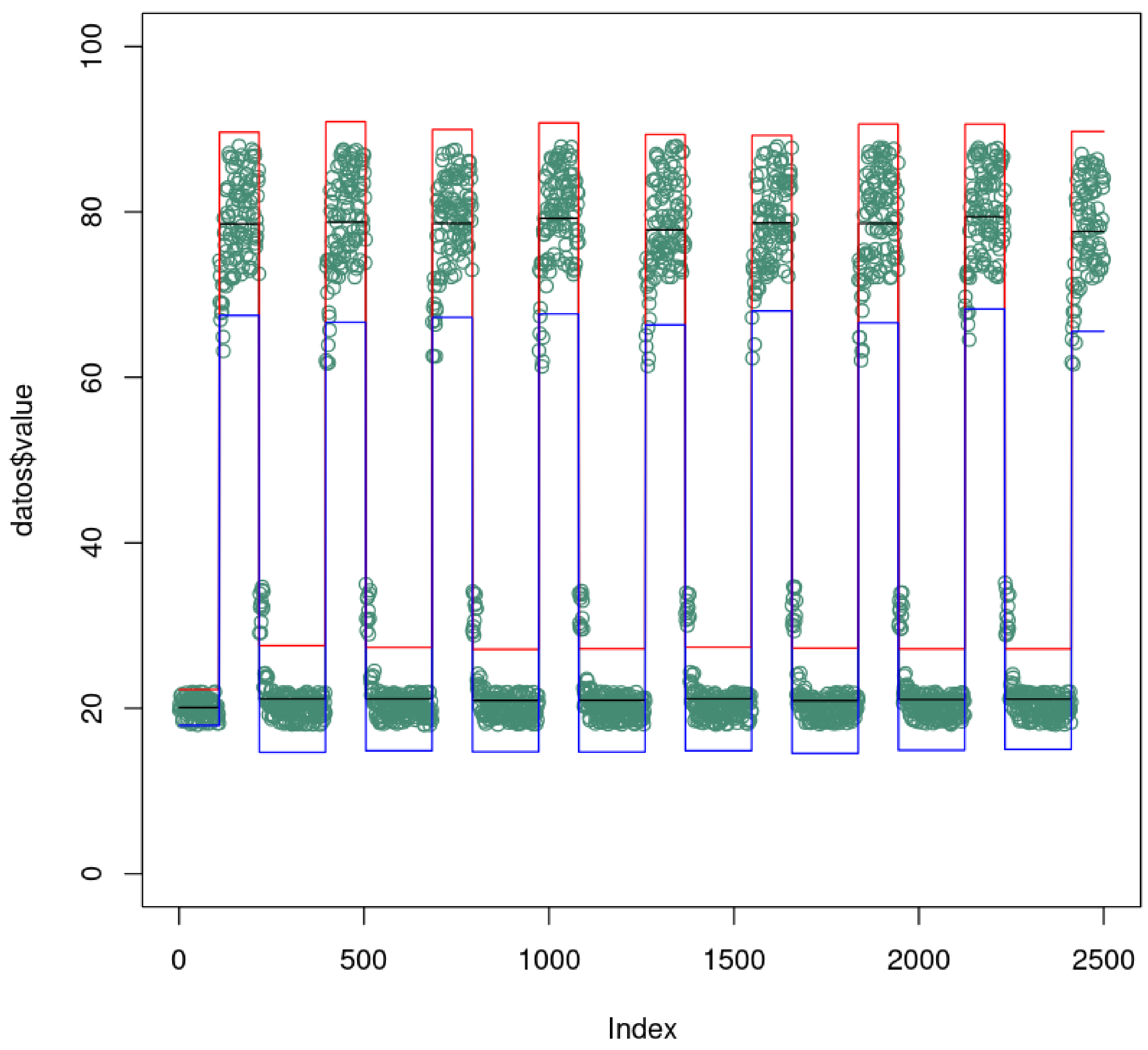
In [7]:

```
#Número de escalones
nc = 18

#Niveles ajustados
fitg <- modelo[[nc]]

#Calculo de la volatilidad
r = diff(c(0,fitg$rightEnd))
media = unlist(sapply(1:nc, function(i){rep(fitg$value[i],r[i])}))
desv = unlist(sapply(1:nc, function(i){
                  ind = fitg$leftEnd[i]:fitg$rightEnd[i]
                  rep(sqrt(var(datos$value[ind])),r[i])
            }))
liminf = media - 1.96*desv
limsup = media + 1.96*desv

#Gráfica
plot(datos$value, type = "p", col = "aquamarine4", ylim = c(0,100))
lines(media, type = "l", col = "black")
lines(limsup, type = "l", col = "red")
lines(liminf, type = "l", col = "blue")
```



Con **35** segmentos se obtiene buena ***cobertura***.

In [8]:

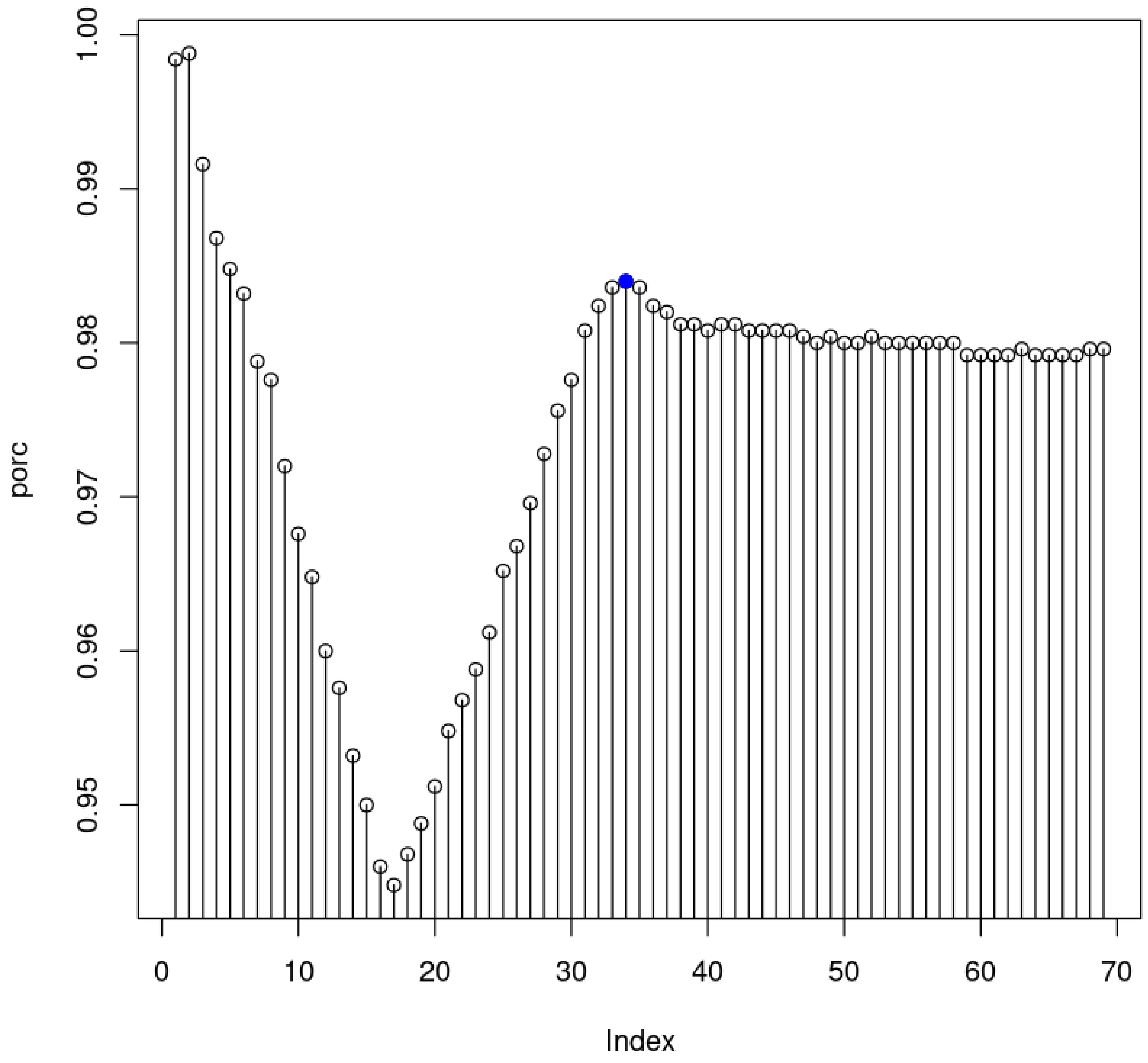
```
porc = sapply(2:70,function(nc){
        fitg <- modelo[[nc]]
        r = diff(c(0,fitg$rightEnd))
        media = unlist(sapply(1:nc, function(i){rep(fitg$value[i],r[i])}))
        desv = unlist(sapply(1:nc, function(i){
                  ind = fitg$leftEnd[i]:fitg$rightEnd[i]
                  rep(sqrt(var(datos$value[ind])),r[i])
            }))
        liminf = media - 1.96*desv
        limsup = media + 1.96*desv
        mean((liminf <= datos$value)*(datos$value<=limsup))
          })

plot(porc, type = "h")
points(porc)
points(x = 34, y = porc[34], col = "blue", pch = 19)
```

```
porc[30:40]
which.max(porc[30:40])
```

0.9776 · 0.9808 · 0.9824 · 0.9836 · 0.984 · 0.9836 · 0.9824 · 0.982 · 0.9812 · 0.9812 · 0.9808

5



¿Como cubrir el 100%?

Se redefine el intervalo al error máximo observado.

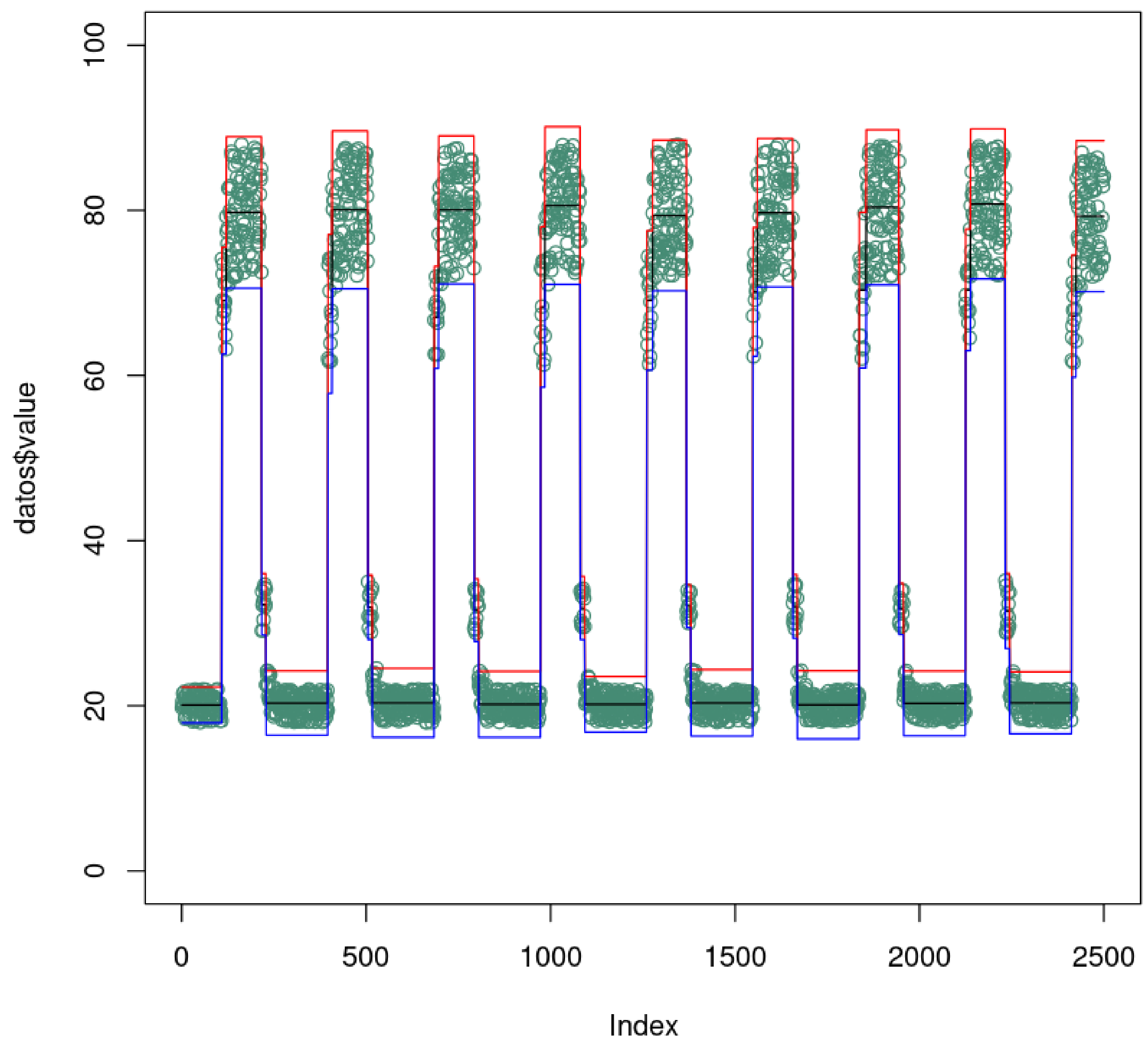
In [9]:
```
#Número de escalones
nc = 35

#Ajustando el intervalo
fitg <- modelo[[nc]]
r = diff(c(0,fitg$rightEnd))
media = unlist(sapply(1:nc, function(i){rep(fitg$value[i],r[i])}))
desv = unlist(sapply(1:nc, function(i){
                  ind = fitg$leftEnd[i]:fitg$rightEnd[i]
                  rep(max(abs(datos$value[ind] - media[ind])/1.96,
                          sqrt(var(datos$value[ind]))),r[i])
            }))
liminf = media - 1.96*desv
limsup = media + 1.96*desv
```

In [10]:
```
mean((liminf <= datos$value)*(datos$value<=limsup))
```

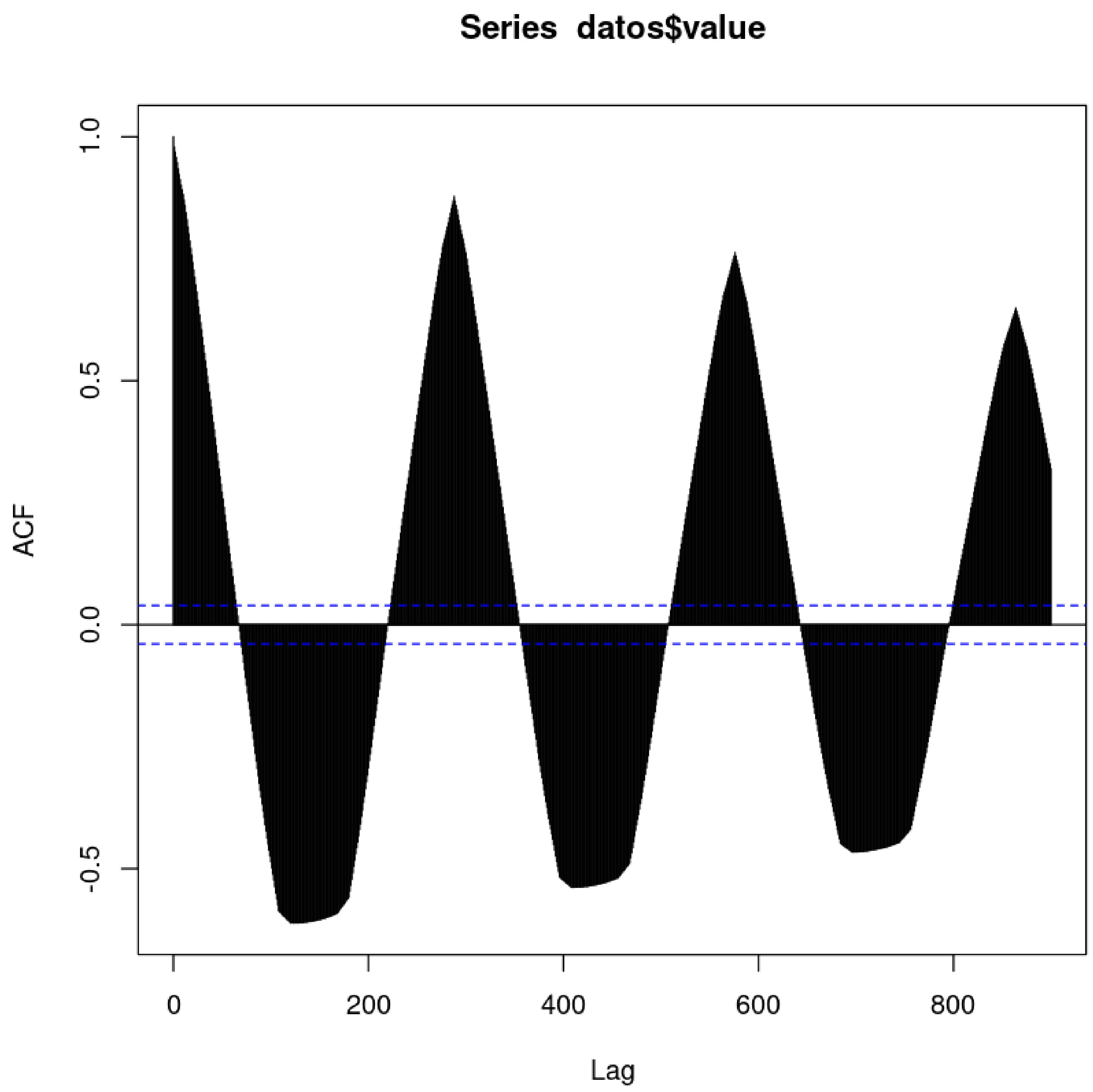
1

In [11]:
```
#Gráfica
plot(datos$value, type = "p", col = "aquamarine4", ylim = c(0,100))
lines(media, type = "l", col = "black")
lines(limsup, type = "l", col = "red")
lines(liminf, type = "l", col = "blue")
```



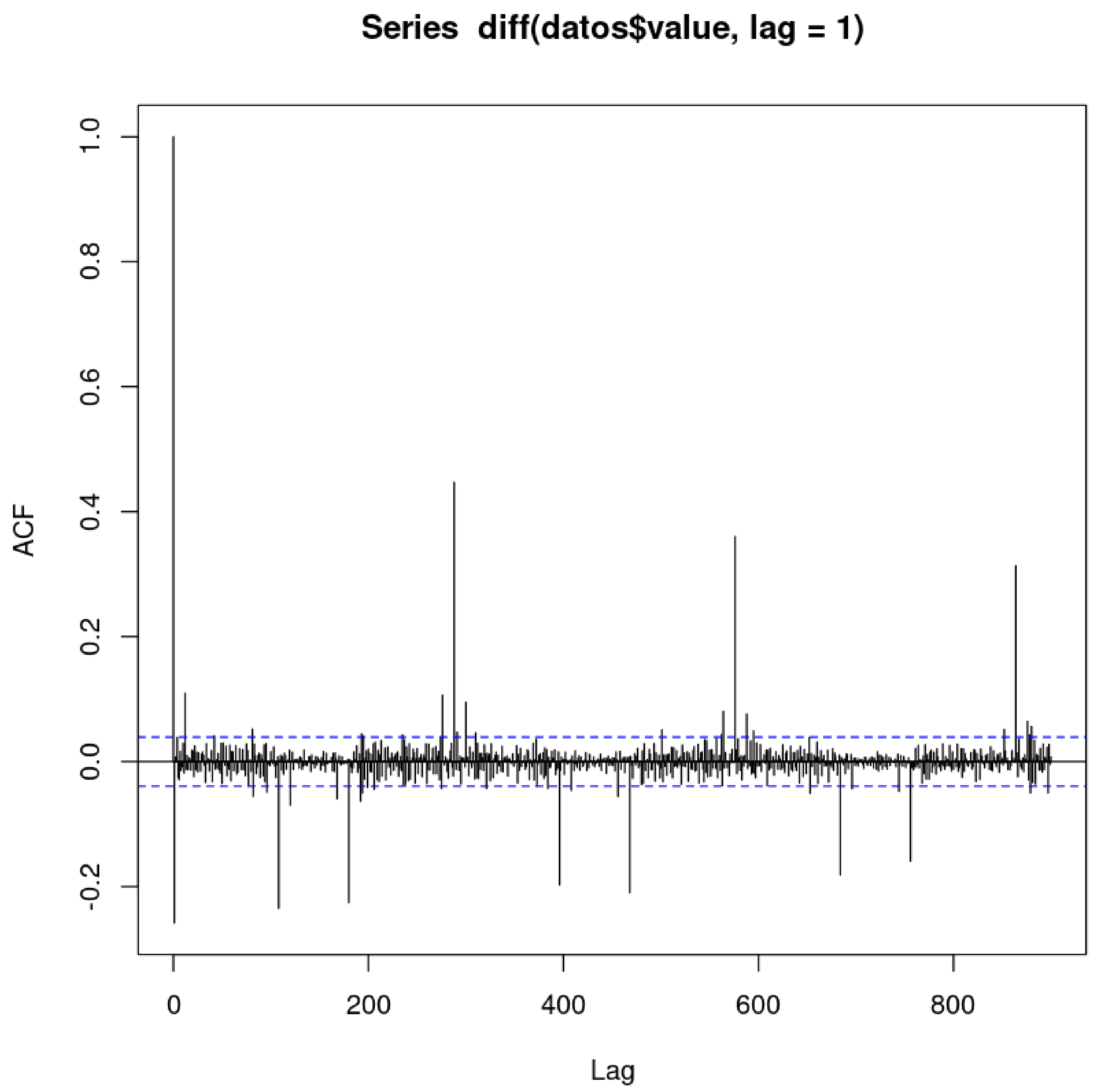
¿Qué atributos pueden servir para predecir Y_t y σ_t?

In [12]:
```
#autocorrelaciones
acf(datos$value, lag.max = 900)
```



Y_{t-1} es relevante y al restarlo $(Y_t - Y_{t-1})$ simplifica las autocorrelaciones.

In [13]:
```
#autocorrelaciones
autocorr = acf(diff(datos$value, lag = 1), lag.max = 900)
```



In [14]:

```
which( abs(autocorr$acf) > 0.2)
```

1 · 2 · 109 · 181 · 289 · 469 · 577 · 865

Los atributos seleccionados para la predicción son:

- Y_{t-1}
- Y_{t-109}
- Y_{t-181}
- Y_{t-289}.

Construyendo la matriz de entrenamiento.

In [21]:

```
Tmax = dim(datos)[1]

colnames(datos)[2] = "Y"
datos$media = media
datos$radio = desv
datos$Y1 = c(NA,datos$Y[1:(Tmax-1)])
datos$Y109 = c(rep(NA,109), datos$Y[1:(Tmax-109)])
datos$Y181 = c(rep(NA,181), datos$Y[1:(Tmax-181)])
datos$Y289 = c(rep(NA,289), datos$Y[1:(Tmax-289)])
head(datos)
```

A data.frame: 6 × 8

	timestamp	Y	media	radio	Y1	Y109	Y181	Y289
	<chr>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
1	2014-04-01 00:00:00	19.76125	20.09437	1.105089	NA	NA	NA	NA
2	2014-04-01 00:05:00	20.50083	20.09437	1.105089	19.76125	NA	NA	NA
3	2014-04-01 00:10:00	19.96164	20.09437	1.105089	20.50083	NA	NA	NA
4	2014-04-01 00:15:00	21.49027	20.09437	1.105089	19.96164	NA	NA	NA
5	2014-04-01 00:20:00	20.18774	20.09437	1.105089	21.49027	NA	NA	NA
6	2014-04-01 00:25:00	19.92313	20.09437	1.105089	20.18774	NA	NA	NA

In [22]:

```
View(datos[(Tmax-10):Tmax,])
```

A data.frame: 11 × 8

	timestamp	Y	media	radio	Y1	Y109	Y181	Y289
	<chr>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
2490	2014-04-09 15:25:00	78.18418	79.28923	4.667098	84.84505	19.85330	18.42458	83.19432
2491	2014-04-09 15:30:00	75.27373	79.28923	4.667098	78.18418	19.99196	21.81562	87.47734
2492	2014-04-09 15:35:00	73.03914	79.28923	4.667098	75.27373	20.16878	19.11425	84.97692
2493	2014-04-09 15:40:00	73.27116	79.28923	4.667098	73.03914	19.20251	19.77559	73.23895
2494	2014-04-09 15:45:00	84.15995	79.28923	4.667098	73.27116	20.66904	21.59445	83.41171
2495	2014-04-09 15:50:00	79.11609	79.28923	4.667098	84.15995	20.58034	20.70929	80.56722
2496	2014-04-09 15:55:00	83.61810	79.28923	4.667098	79.11609	20.31129	20.47215	72.26228
2497	2014-04-09 16:00:00	82.91643	79.28923	4.667098	83.61810	18.45505	20.82225	76.02028
2498	2014-04-09 16:05:00	74.16566	79.28923	4.667098	82.91643	19.90787	21.31529	86.74792
2499	2014-04-09 16:10:00	74.28606	79.28923	4.667098	74.16566	19.42491	21.51068	86.81682
2500	2014-04-09 16:15:00	84.08531	79.28923	4.667098	74.28606	19.96415	20.57056	84.78144

In [24]:

```
write.csv2(datos,"datos2.csv")
```