HRV - Coherence

Contents

1 Preparatory Working

Please note:

- The ymax for wavelet transforms is only 700 compared to 8000 in the Heartmath file. This was changed on 15 Dec 2015 along with the change of LF/HF scale to ymax of 100.
- you need to change the directory in the Setfile module.
- If a set of data is taken during fast walking or running you will need to change the MaxBPM value.
- You need to set the offset from the file number that is the start. By running this once with offset =0 you will get the full list of files. The (offset+15) should not exceed the total number of files.
- From 14th started commencing breathing and recording at the start of the 20sResonanceVideo.mp4
- From 17th started using just the first 4 min approx of the above video
- 190216 - tested out 4 min sequences with paying attention to the orchestra vs focusing on the heart. Focusing on the heart def yields better results
- **Edit all measurements to 250 seconds give or take a few to ensure parity of comparison.**
- Before trying to load RHRV make sure you have loaded lomb and tkrplot. tkrplot may require you to load tcl-dev
- In order to use the zlim functions you must load RHRV through the following: **install.packages("RHRV", repos="http://R-Forge.R-project.org")**

2 Gyan of breathing

- Sit up without leaning on the back of the chair and focus on this exercise completely
- when breathing out purse your lips quite strongly so there is fairly strong resistance to your breath going out
- push your stomach in from as low as possible
- when breathing in constrict the glottis to create resistance to the inflow of air and bring the bottom of your stomach up and out.
- when breathing out push the bottom part of your stomach in and down quite strongly but smoothly
- above all - **be present totally**
- feel a sense of gratitude and wish those near and dear to you: Be safe, Be Well, Be Blessed.
- Follow visually the end of the rotating line right through the exercise.
- Wait at least an hour after a meal before doing this.

3 Words of warning

- if you find the same time and date repeating themselves it could well be that one of the files in RRdata could have been corrected and has left a "hidden file" so press controlH and check if such a file is there with a trailing ~.
- if you are having problem running a file try running it from the commandline i.e. lyx. That leaves a running commentary of what happened.
- do not do a coherent breathing after a meal. At that time we need to suppress the parasympathetic not enhance it. 201605121240PL.txt is an example of where this was done. if you run that file you will see we have depressed the sympathetic which is not what we want. That also caused me to go to the toilet directly afterwards.
- When we do a real time presentation of HF I see that the effects of the breathing are only sustained for some seconds. Then there seems to be a rest period and then again there is an

improvement.

4 Improving the software

4.1 Version 7

- We got rid of the manual offset variable and instead put in an automatic one which works out the number of line and then subtracts 15 from it to give the offset. This allow us to onlly have CB, or MB ie. Coherent Breath or Morning Breath.
- Search for **fn = dir(pattern = "[MC]B")** and you can for instance remove the C inside the squre brackets. This will give you the results for hte last 15 Morning Breaths.

```
## Loading required package:  RHRV
## Loading required package:  tcltk
## Loading required package:  tkrplot
## Loading required package:  waveslim
##
## waveslim:  Wavelet Method for 1/2/3D Signals (version = 1.7.5)
## Loading required package:  nonlinearTseries
## Loading required package:  Matrix
## Loading required package:  rgl
## Loading required package:  tseries
## Loading required package:  TSA
## Loading required package:  leaps
## Loading required package:  locfit
## locfit 1.5-9.1 2013-03-22
## Loading required package:  mgcv
## Loading required package:  nlme
## This is mgcv 1.8-12.  For overview type 'help("mgcv-package")'.
##
## Attaching package:  'TSA'
## The following objects are masked from 'package:stats':
##
##    acf, arima
## The following object is masked from 'package:utils':
##
##    tar
## Loading required package:  Rcpp
```

```
##
## Attaching package:  'nonlinearTseries'
## The following object is masked from 'package:grDevices':
##
##    contourLines
## Loading required package:  lomb
## Loading required package:  methods
```

```
NROW(fn)
```

```
## [1] 133
```

```
( m <- matrix(fn, ncol = 5) )
```

```
## Warning in matrix(fn, ncol = 5):  data length [133] is not a sub-multiple or multiple of the number of rows [27]
```

```
##       [,1]                 [,2]                 [,3]
##  [1,] "201605100957.txtMB" "201605240035.txtCB" "201606032256.txtCB"
##  [2,] "201605110728.txtMB" "201605240721.txtCB" "201606041111.txtMB"
##  [3,] "201605130914.txtCB" "201605241840.txtCB" "201606041125.txtCB"
##  [4,] "201605151128.txtMB" "201605242335.txtCB" "201606042209.txtCB"
##  [5,] "201605160953.txtCB" "201605250705.txtCB" "201606050816.txtMB"
##  [6,] "201605170821.txtCB" "201605250749.txtMB" "201606050822.txtCB"
##  [7,] "201605180820.txtCB" "201605252307.txtCB" "201606051822.txtCB"
##  [8,] "201605182305.txtCB" "201605260802.txtMB" "201606052144.txtCB"
##  [9,] "201605190741.txtCB" "201605260813.txtCB" "201606060838.txtMB"
## [10,] "201605192335.txtCB" "201605261349.txtCB" "201606060843.txtCB"
## [11,] "201605200711.txtMB" "201605262358.txtCB" "201606061521.txtCB"
## [12,] "201605200718.txtCB" "201605270828.txtCB" "201606070653.txtMB"
## [13,] "201605201849.txtCB" "201605271035.txtCB" "201606070707.txtCB"
## [14,] "201605202349.txtCB" "201605272306.txtCB" "201606080106.txtCB"
## [15,] "201605211208.txtCB" "201605280729.txtMB" "201606080829.txtMB"
## [16,] "201605211938.txtCB" "201605280737.txtCB" "201606080837.txtCB"
## [17,] "201605212132.txtCB" "201605292155.txtCB" "201606080851.txtCB"
## [18,] "201605212213.txtCB" "201605292207.txtCB" "201606081420.txtCB"
## [19,] "201605212352.txtCB" "201605300819.txtMB" "201606082320.txtCB"
```

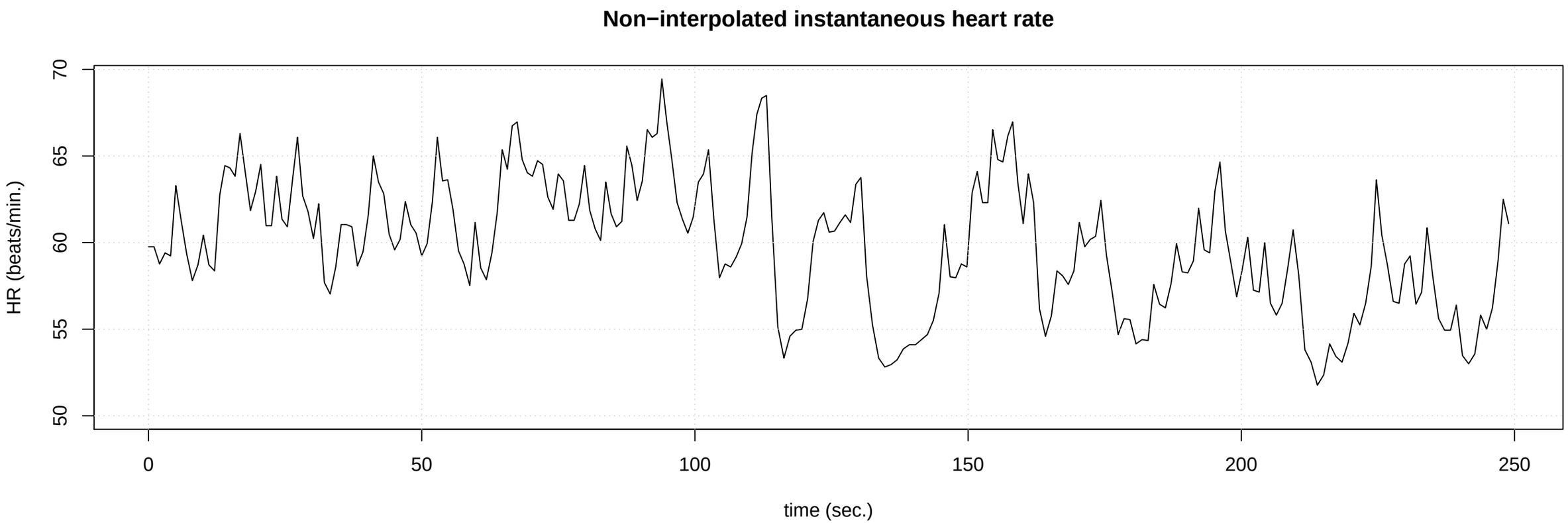
```
## [20,] "201605221019.txtCB" "201605312312.txtCB" "201606090830.txtMB"
## [21,] "201605221024.txtCB" "201606011231.txtMB" "201606090836.txtCB"
## [22,] "201605221141.txtCB" "201606011925.txtCB" "201606092147.txtCB"
## [23,] "201605221700.txtCB" "201606012356.txtCB" "201606100909.txtMB"
## [24,] "201605221747.txtCB" "201606021133.txtMB" "201606100918.txtCB"
## [25,] "201605222224.txtCB" "201606021207.txtCB" "201606110027.txtCB"
## [26,] "201605230753.txtMB" "201606022319.txtCB" "201606110728.txtMB"
## [27,] "201605230804.txtCB" "201606031938.txtCB" "201606110735.txtCB"
##       [,4]                 [,5]
##  [1,] "201606112334.txtCB" "201606230754.txtCB"
##  [2,] "201606120638.txtMB" "201606240814.txtMB"
##  [3,] "201606120645.txtCB" "201606240819.txtCB"
##  [4,] "201606122101.txtCB" "201606250834.txtCB"
##  [5,] "201606131032.txtMB" "201606261959.txtCB"
##  [6,] "201606131102.txtCB" "201606281003.txtMB"
##  [7,] "201606132217.txtCB" "201606281009.txtCB"
##  [8,] "201606132247.txtTB" "201606300737.txtTP"
##  [9,] "201606140709.txtMB" "201606300808.txtCB"
## [10,] "201606140726.txtCB" "201607011123.txtTP"
## [11,] "201606142243.txtCB" "201607011139.txtCB"
## [12,] "201606150707.txtMB" "201607020744.txtTP"
## [13,] "201606150712.txtCB" "201607020800.txtCB"
## [14,] "201606151233.txtCB" "201607030757.txtMB"
## [15,] "201606171201.txtMB" "201607030805.txtCB"
## [16,] "201606171210.txtCB" "201607050833.txtMB"
## [17,] "201606190054.txtCB" "201607050844.txtCB"
## [18,] "201606191207.txtMB" "201607051808.txtCB"
## [19,] "201606191213.txtCB" "201607051825.txtCP"
## [20,] "201606192311.txtCB" "201607071322.txtCB"
## [21,] "201606201229.txtMB" "201607082102.txtMB"
## [22,] "201606201237.txtCB" "201607090553.txtMB"
## [23,] "201606210730.txtMB" "201607090601.txtCB"
## [24,] "201606210737.txtCB" "201607100840.txtMB"
## [25,] "201606221008.txtMB" "201607100901.txtCB"
## [26,] "201606221015.txtCB" "201605100957.txtMB"
## [27,] "201606230746.txtMB" "201605110728.txtMB"
```

5 The Non-interpolated instantaneous heart rate

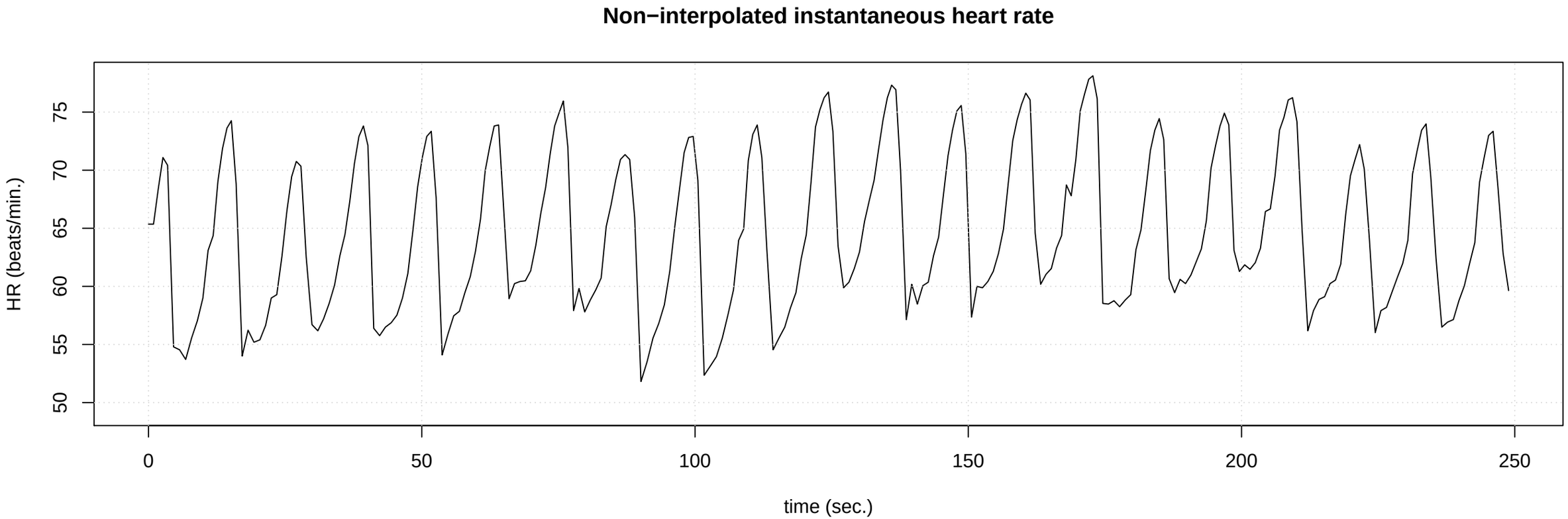
5.1 Plots of niHR data for days 1 to 15

```
## 1: 20160623 0754
```

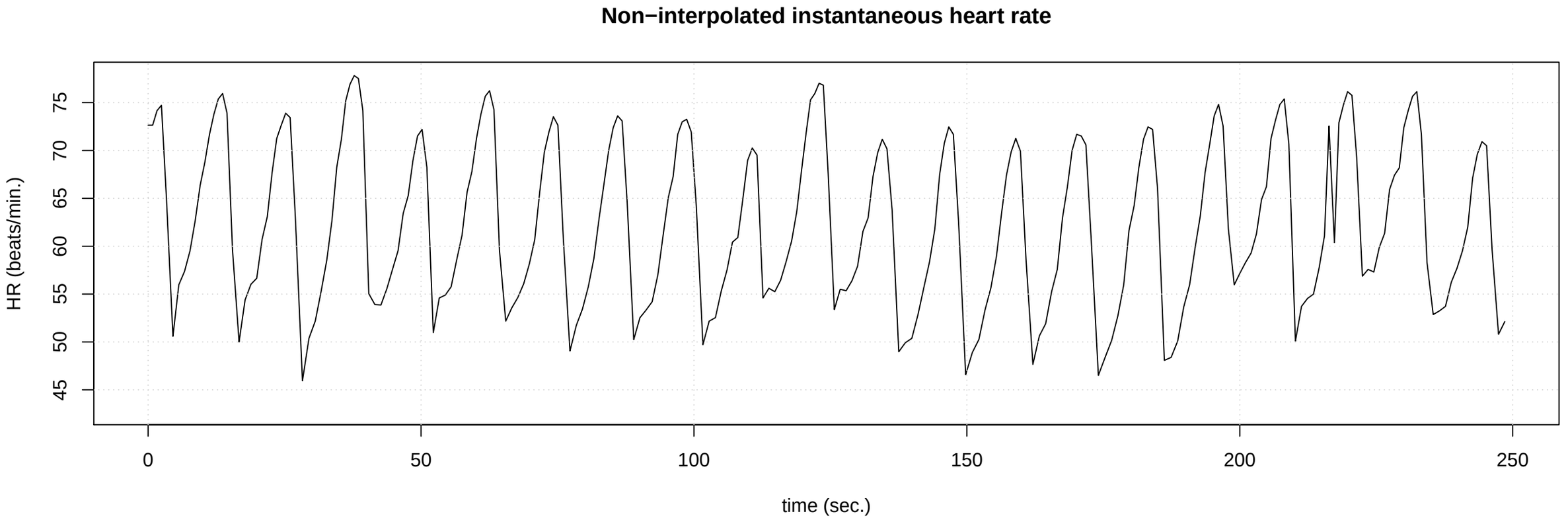
```
## 2: 20160624 0814
```



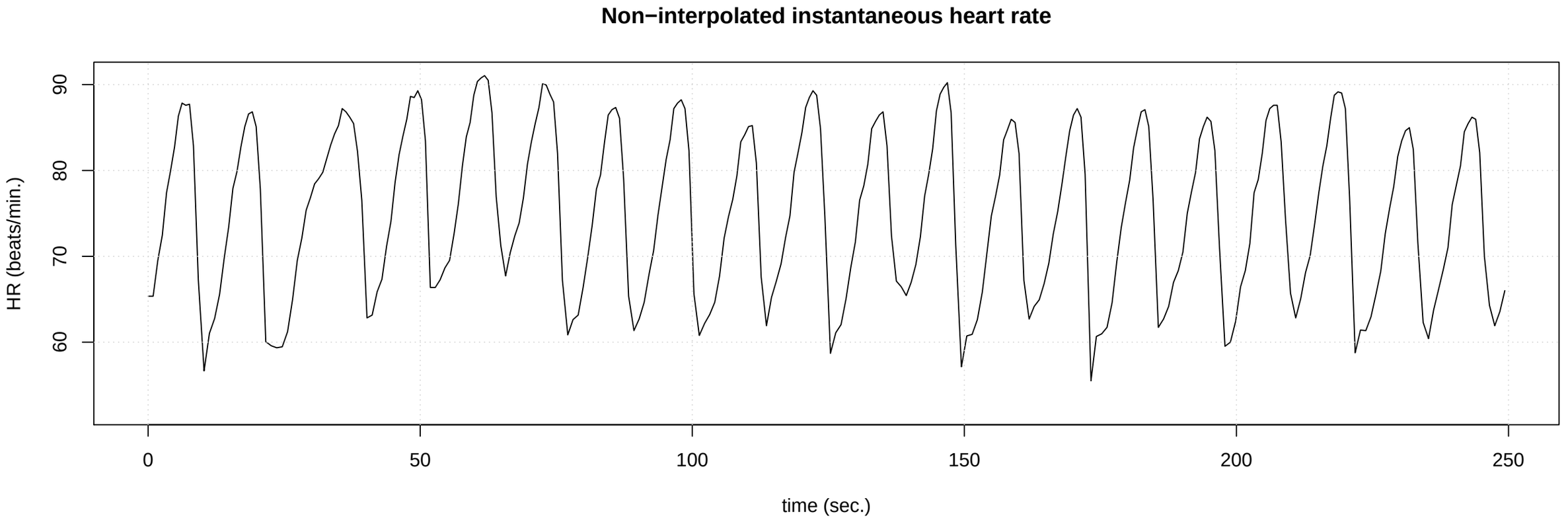

```
## 3: 20160624 0819
```



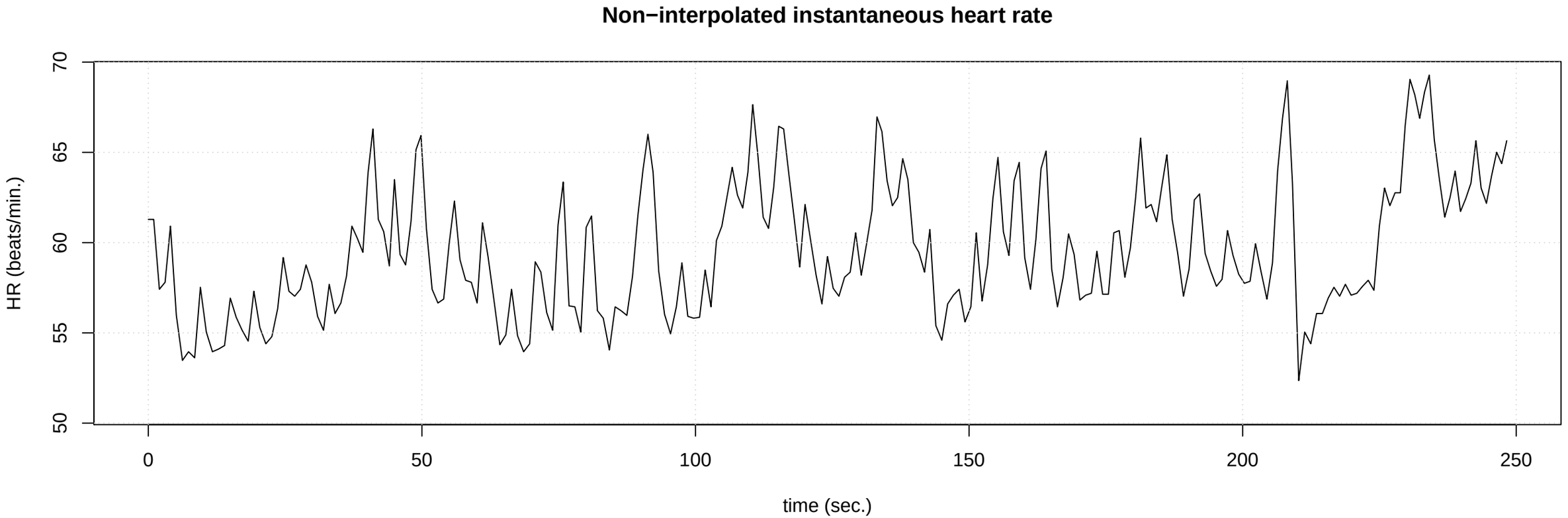

```
## 4: 20160625 0834
```



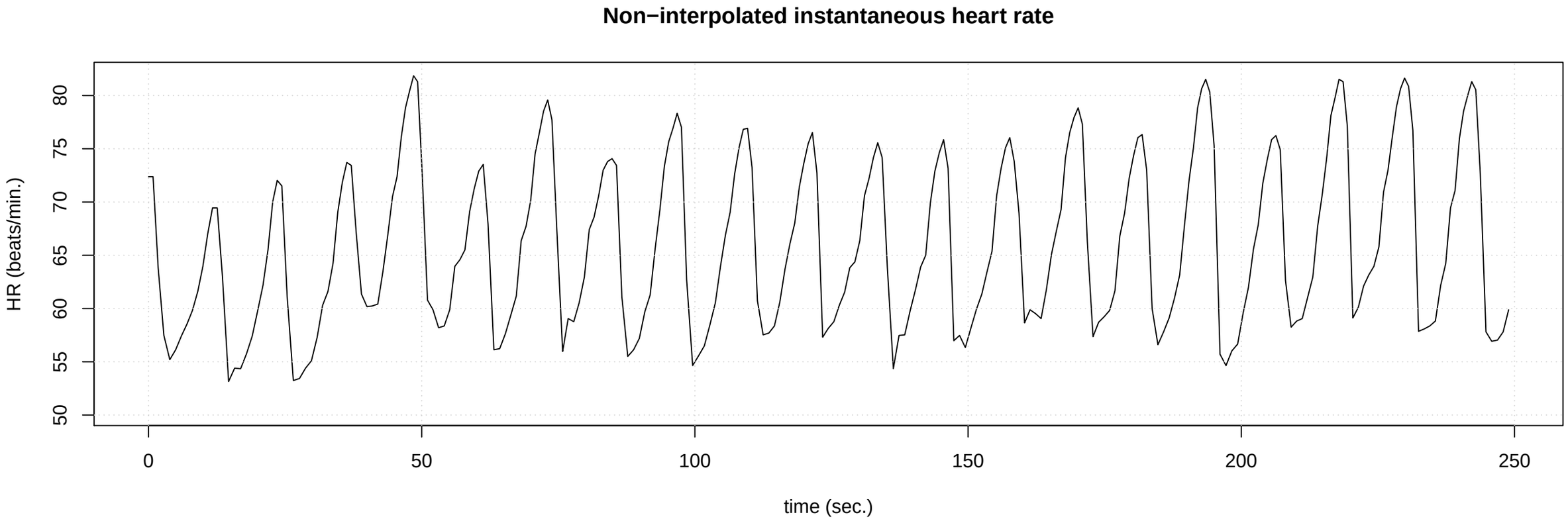

```
## 5: 20160626 1959
```



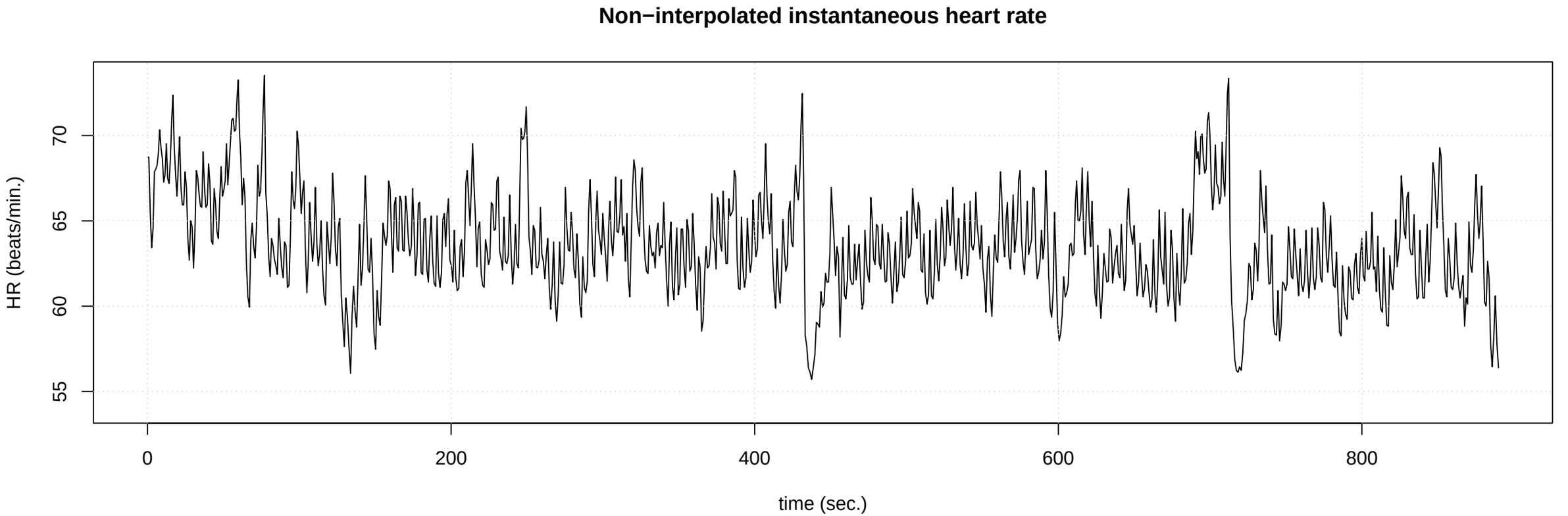

```
## 6: 20160628 1003
```



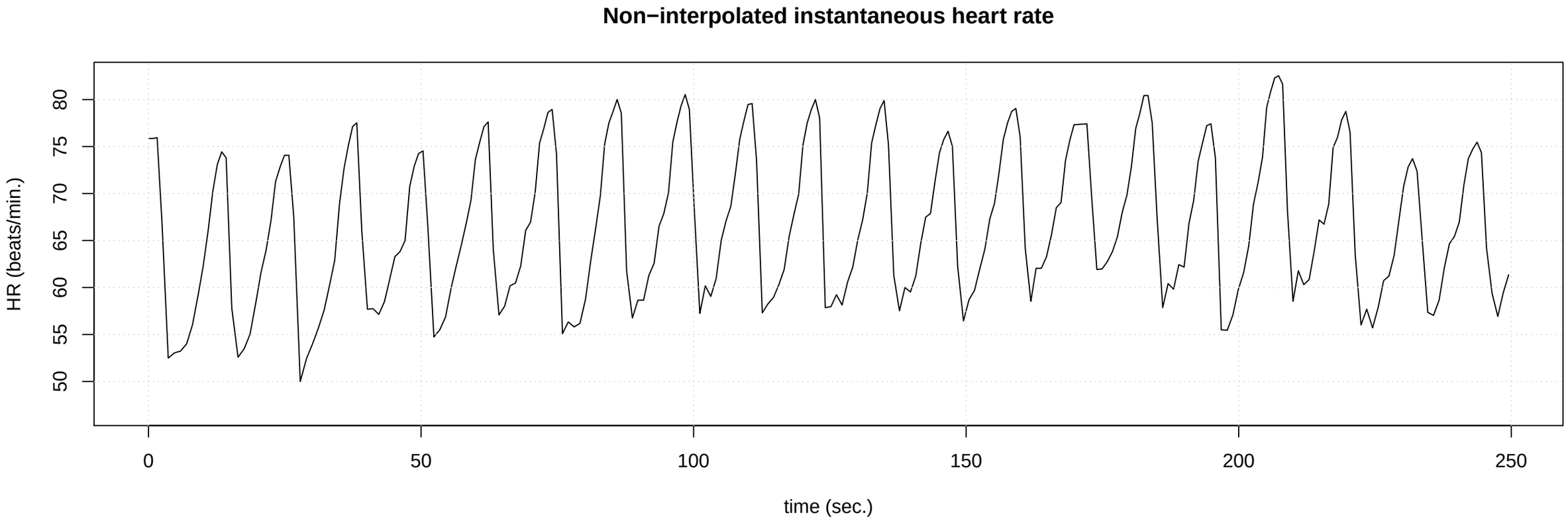

```
## 7: 20160628 1009
```



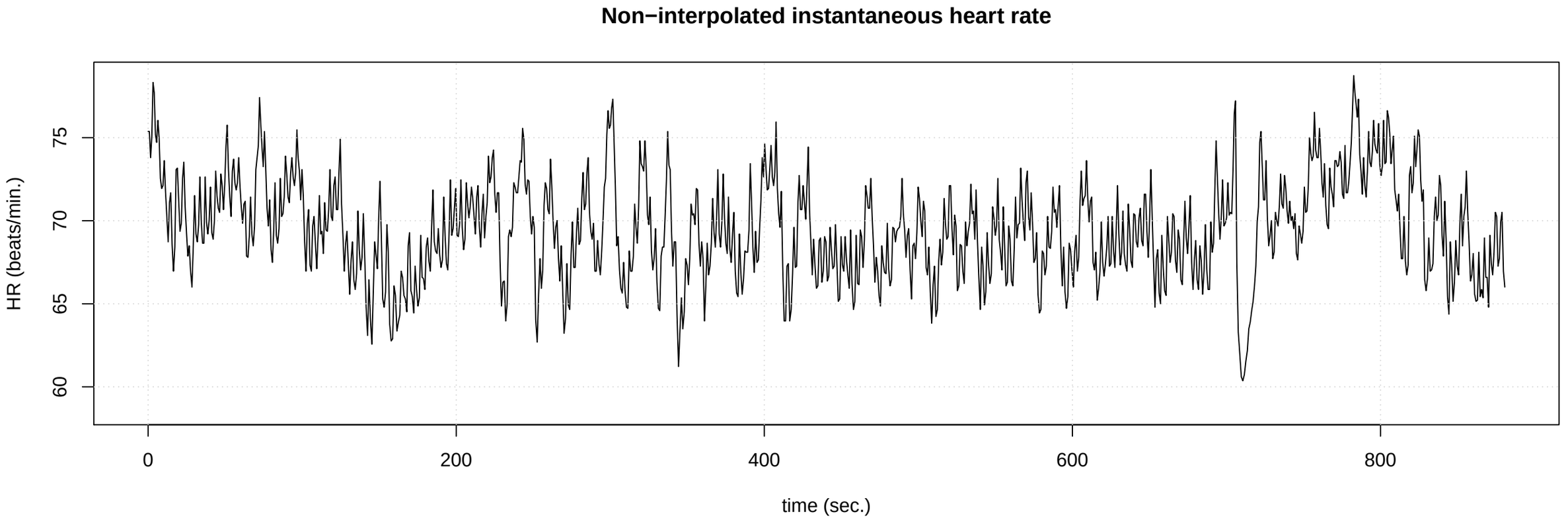

```
## 8: 20160630 0737
```



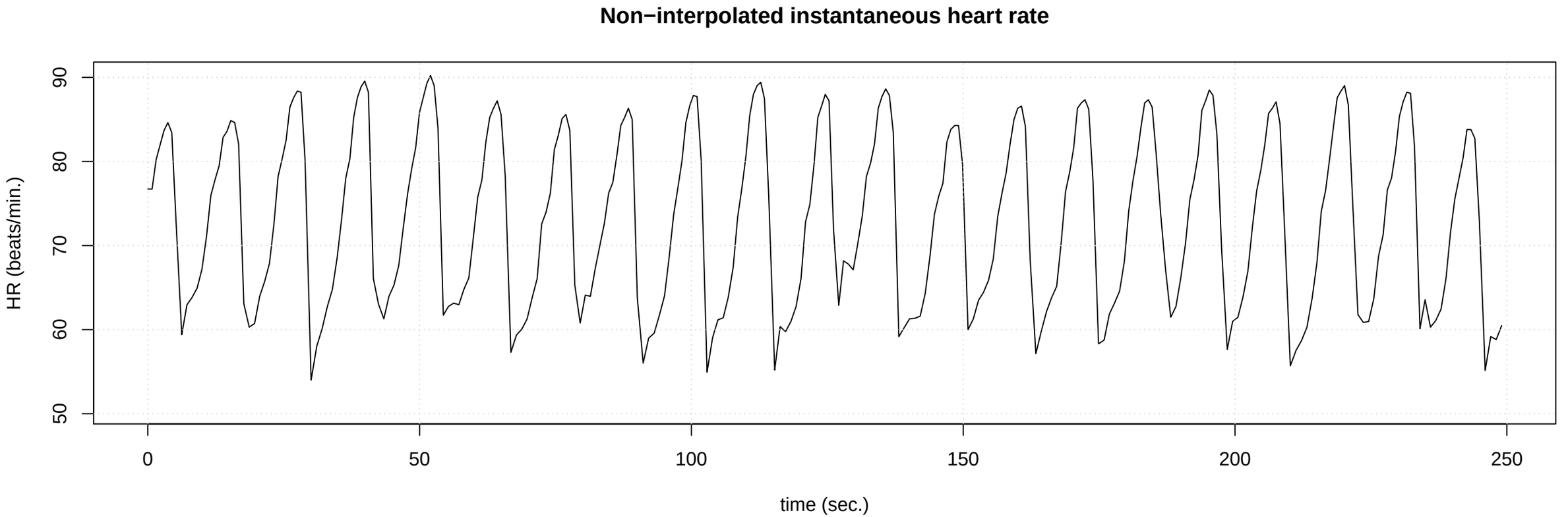

```
## 9: 20160630 0808
```



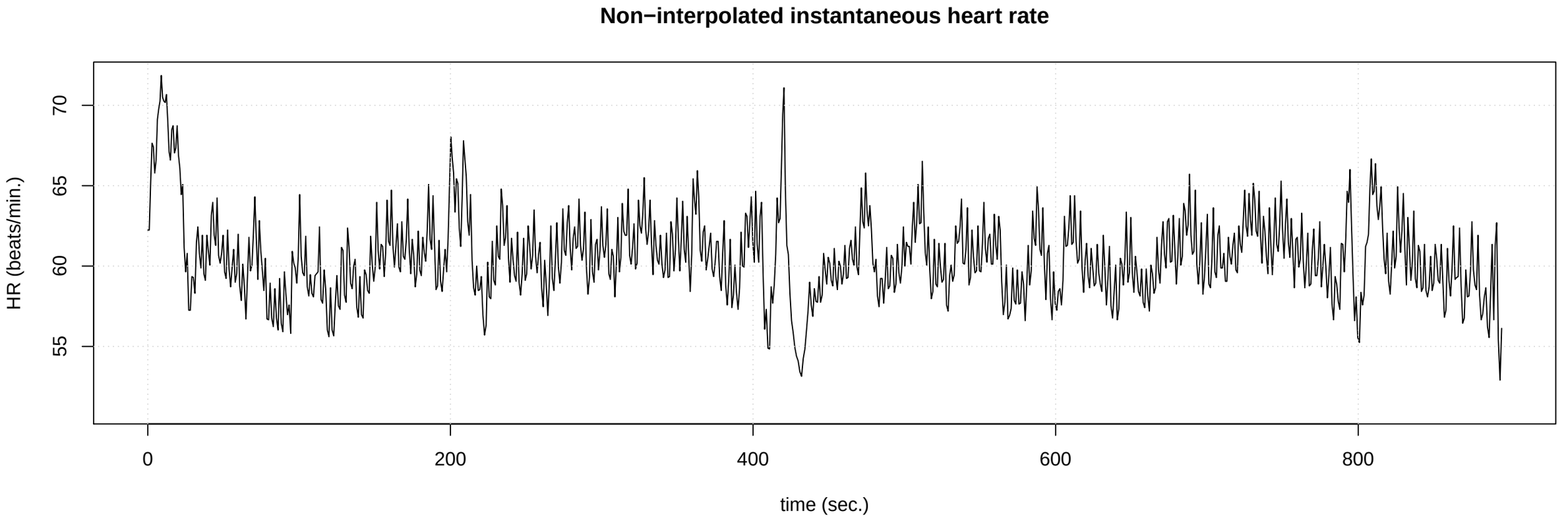

```
## 10: 20160701 1123
```



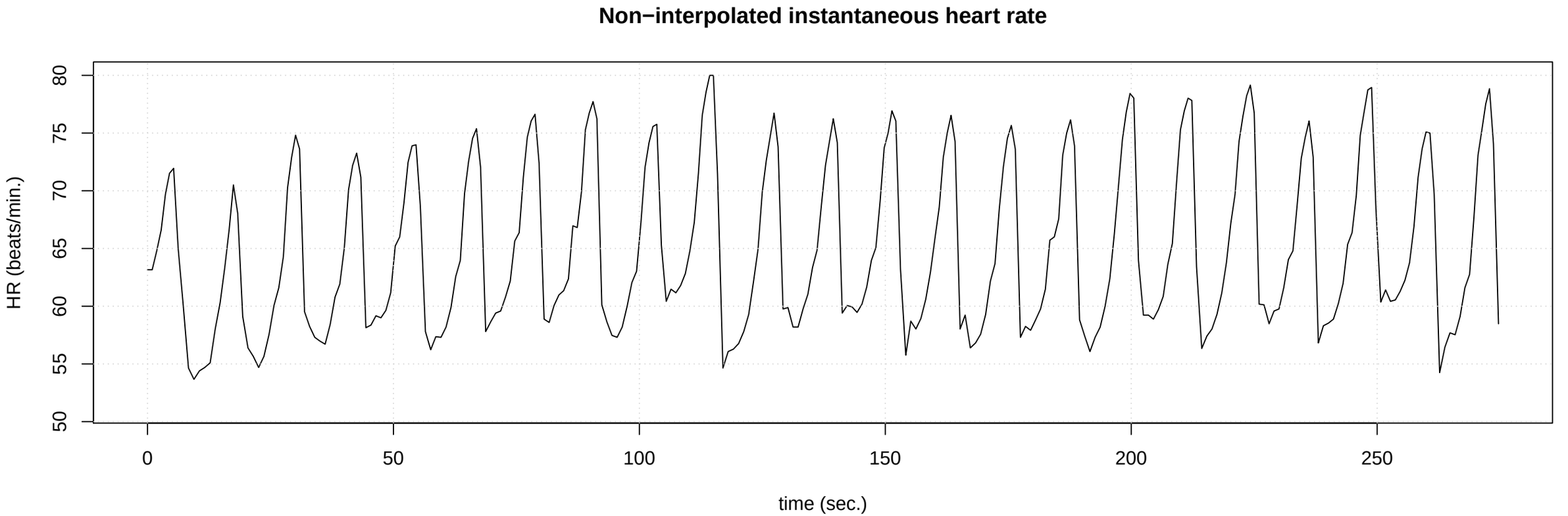

```
## 11: 20160701 1139
```



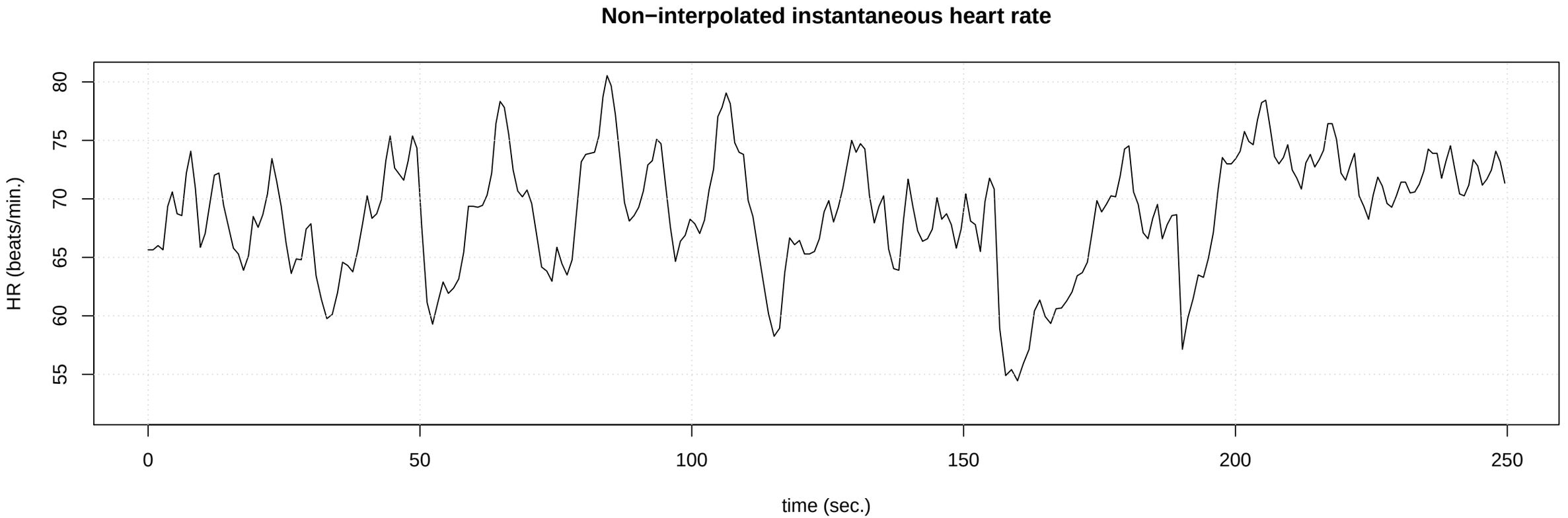

```
## 12: 20160702 0744
```



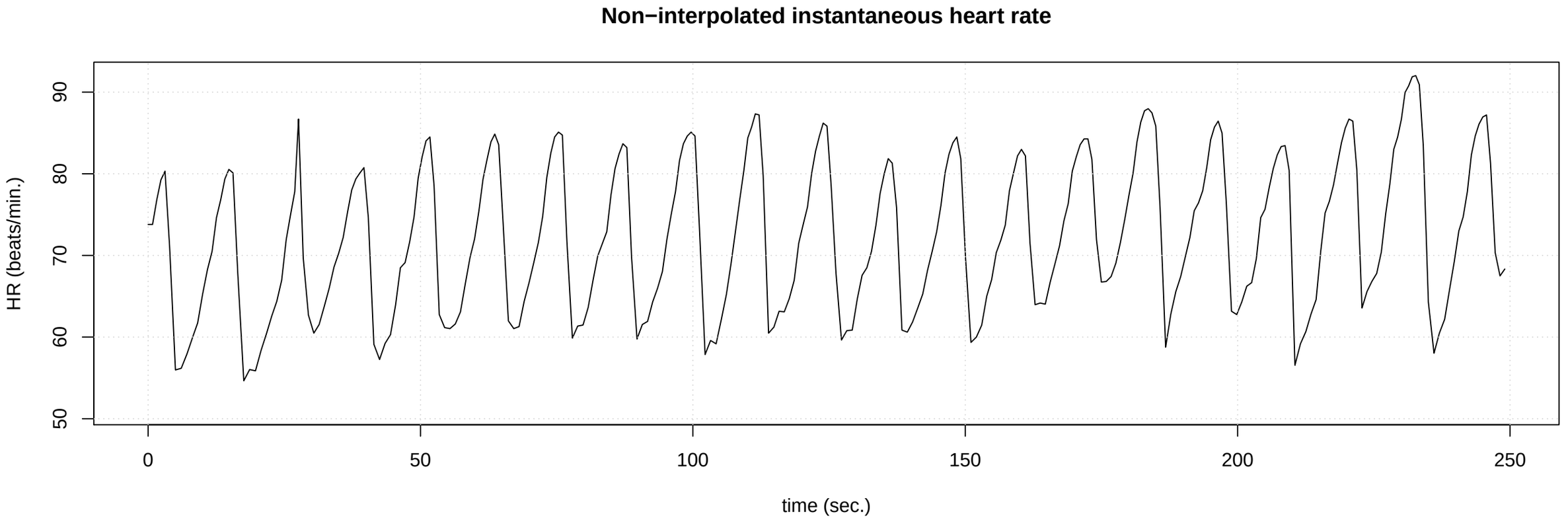

```
## 13: 20160702 0800
```



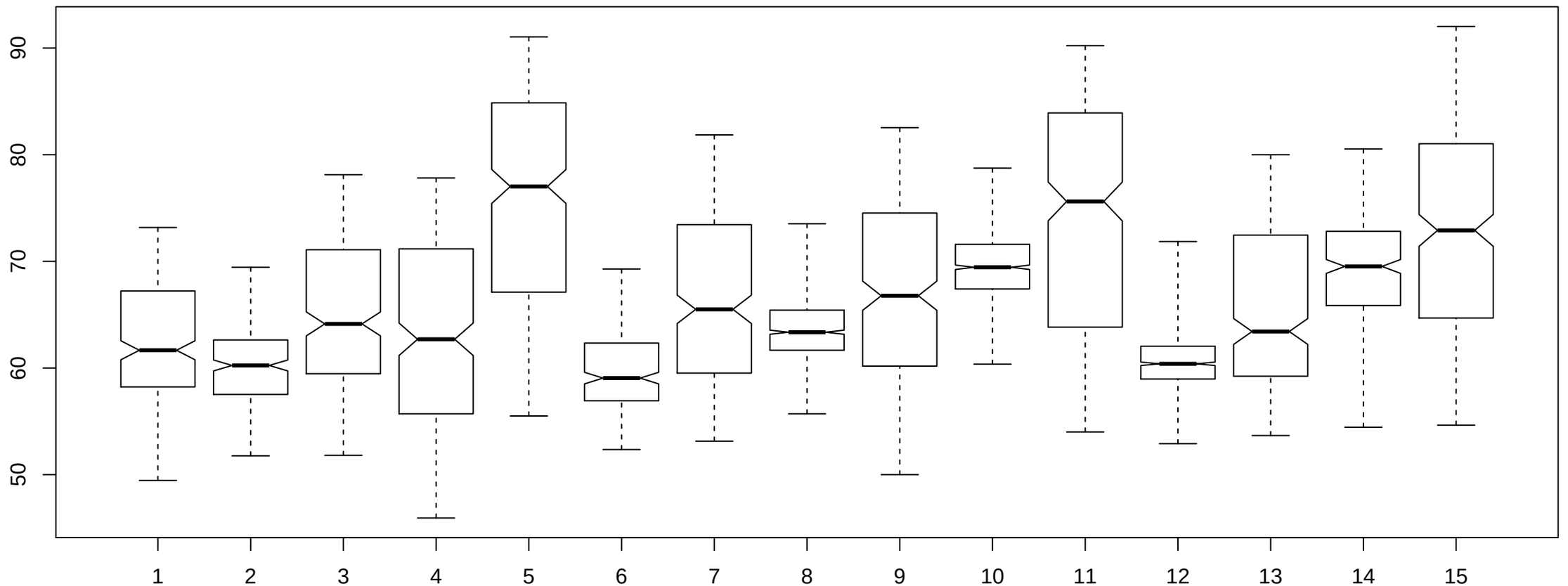

```
## 14: 20160703 0757
```



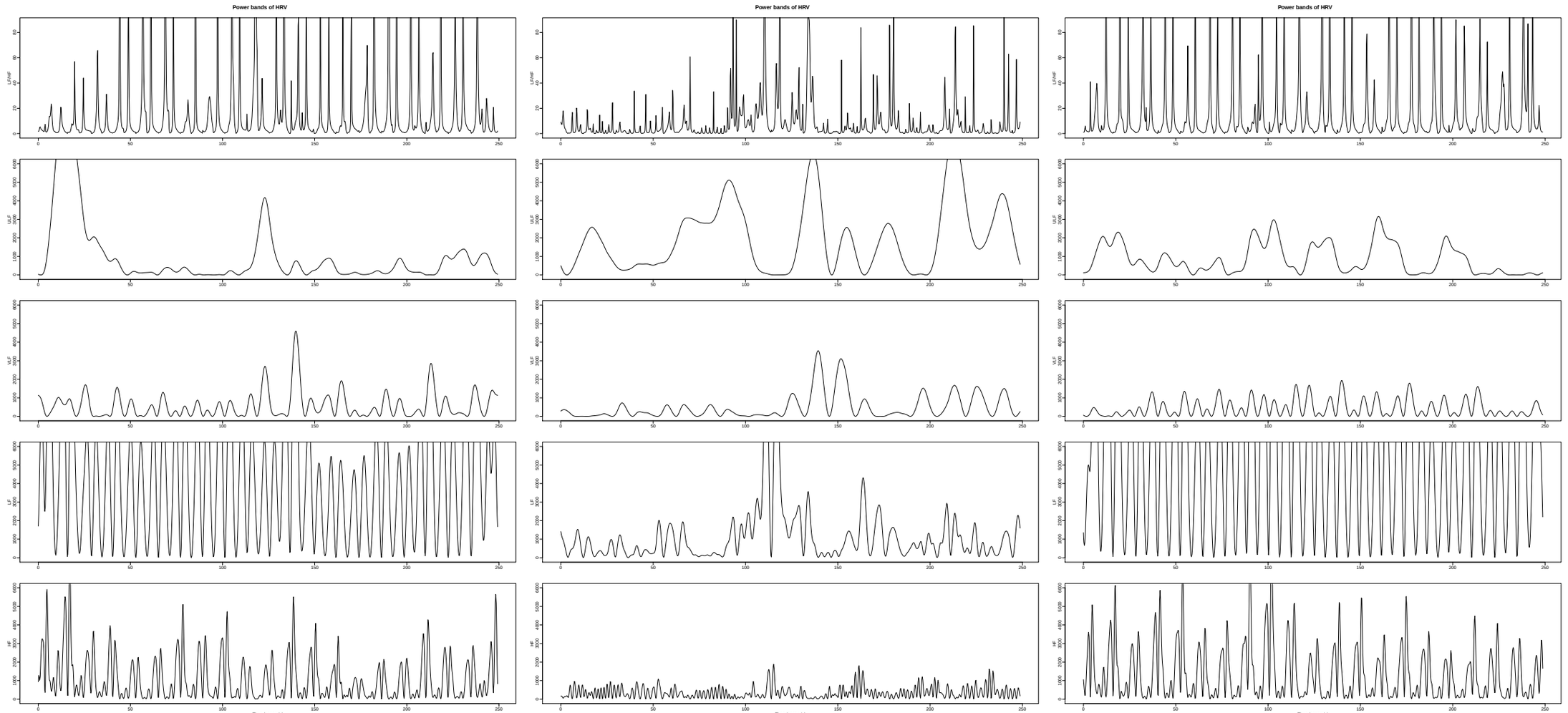

```
## 15: 20160703 0805
```


Non−interpolated instantaneous heart rate
HR (beats/min.)
50
60
70
80
90
0
50
100
150
200
250
time (sec.)

6 Boxplot


90
80
70
60
50
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

7 Plots of Wavelet transforms

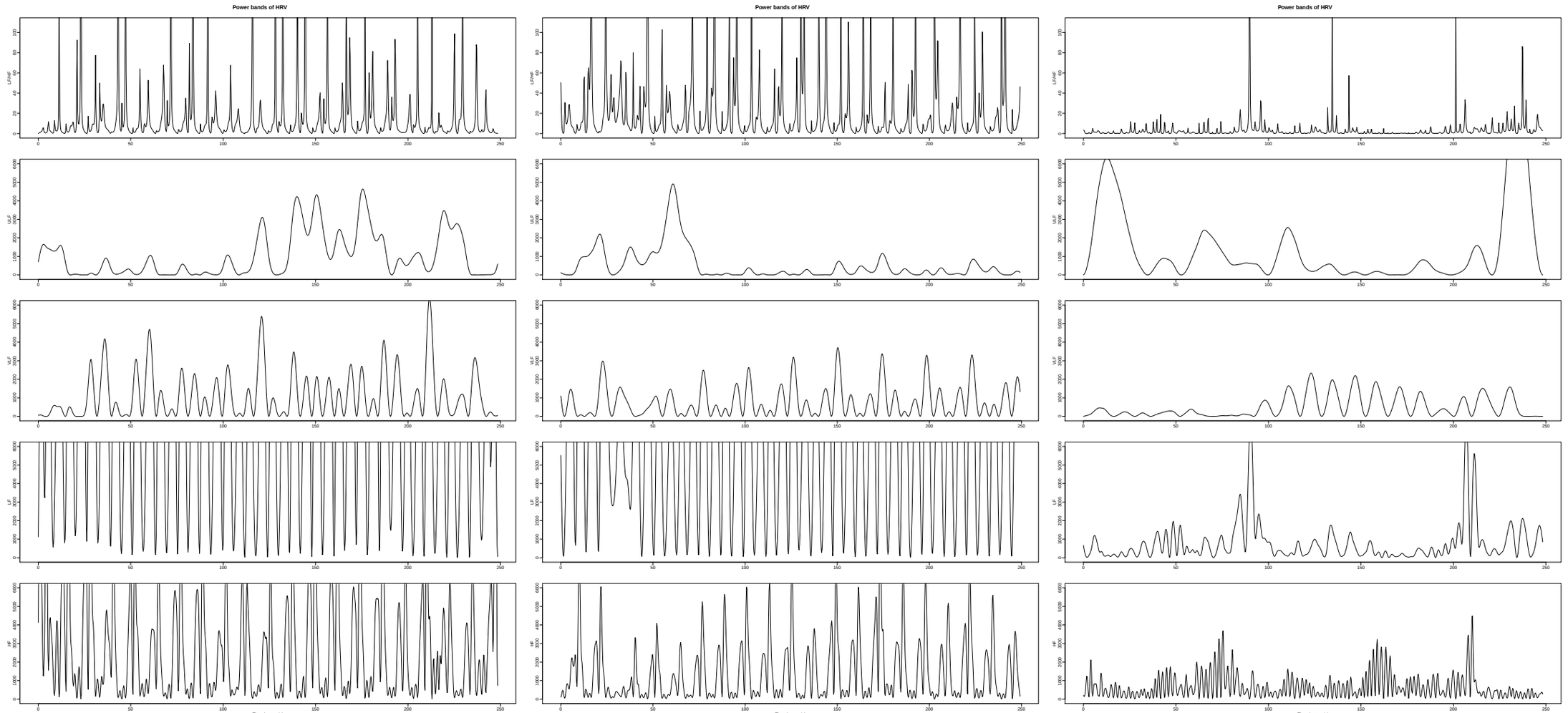



```
## [1] "20160623"
## [1] "0754"
```

```
## [1] "20160624"
## [1] "0814"
```

```
## [1] "20160624"
## [1] "0819"
```

8 Plots of Wavelet transforms

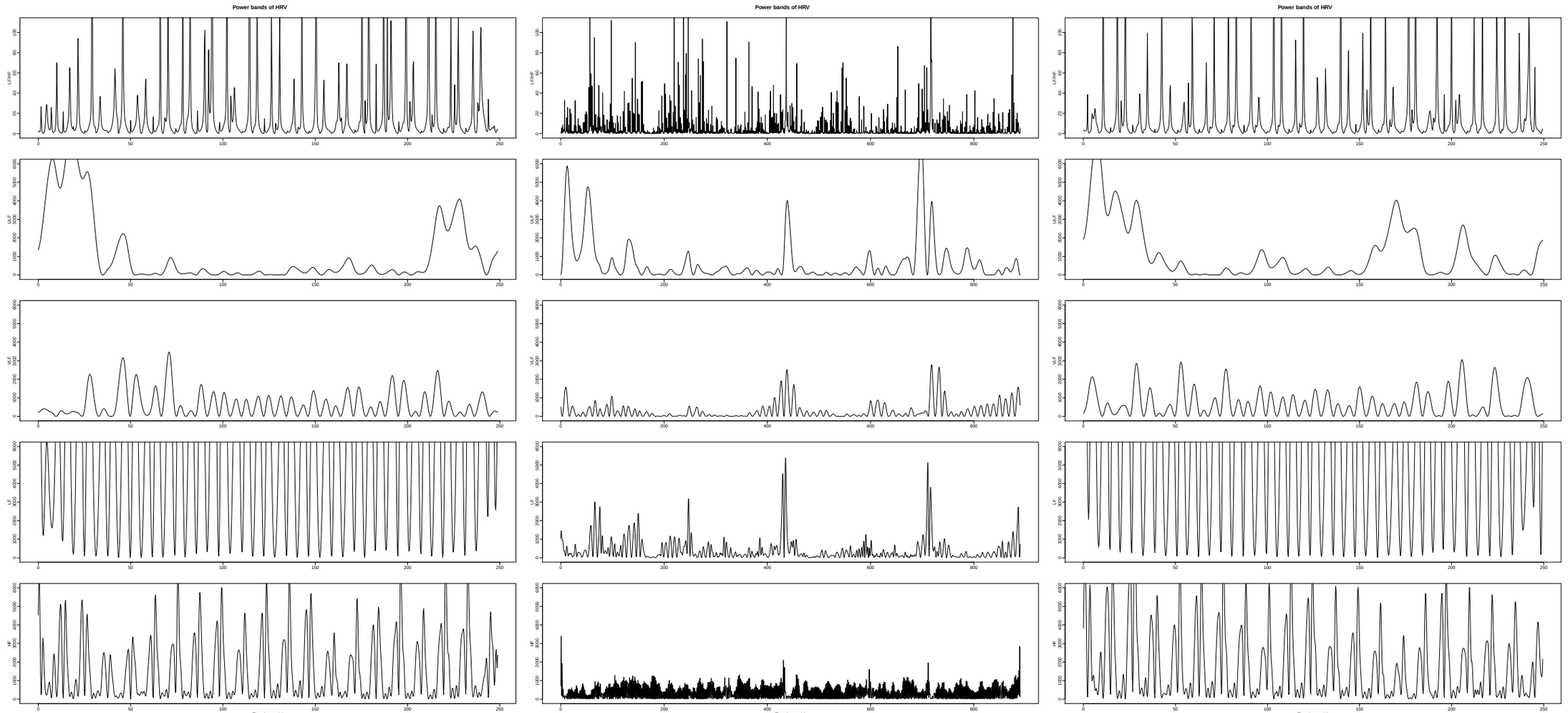



```
## [1] "20160625"
## [1] "0834"
```

```
## [1] "20160626"
## [1] "1959"
```

```
## [1] "20160628"
## [1] "1003"
```

9 Plots of Wavelet transforms

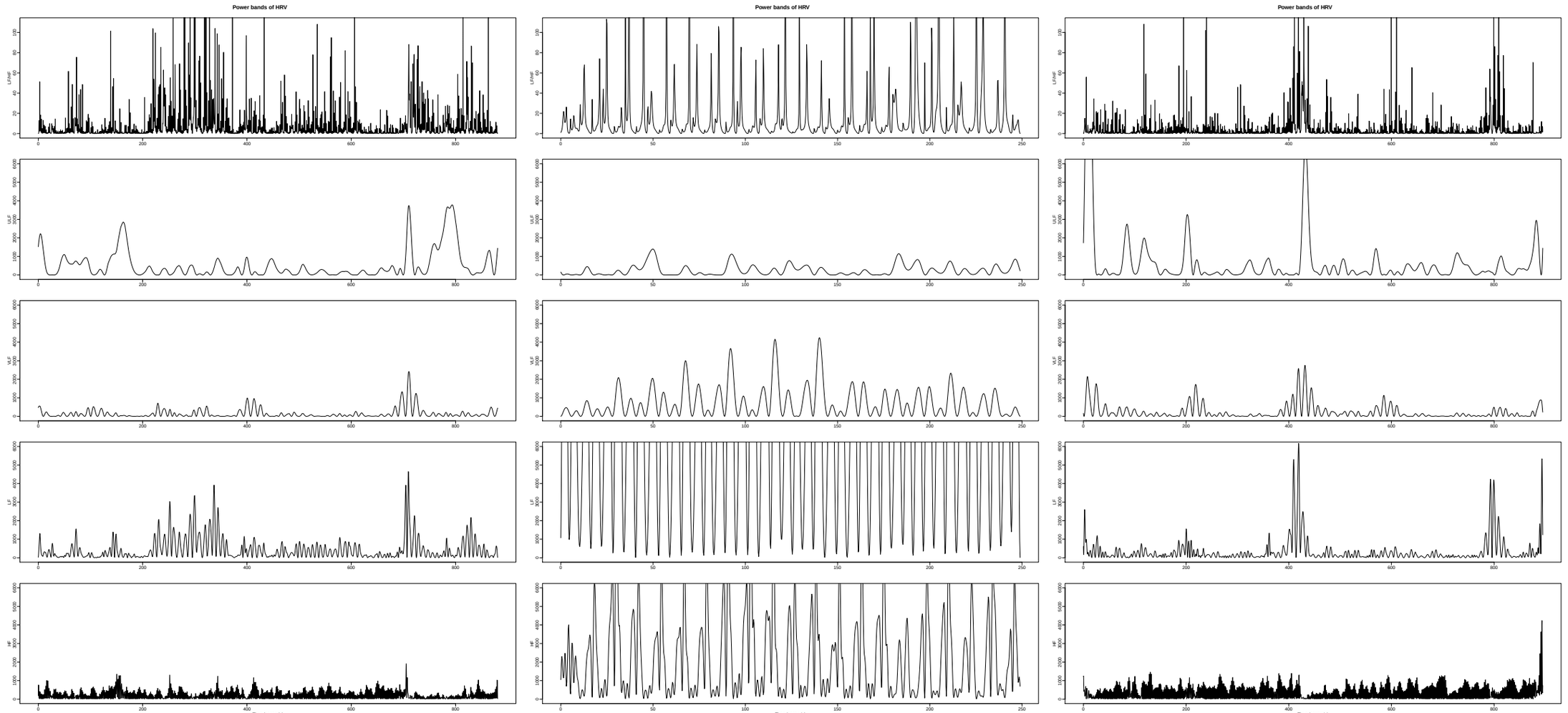



```
## [1] "20160628"
## [1] "1009"
```

```
## [1] "20160630"
## [1] "0737"
```

```
## [1] "20160630"
## [1] "0808"
```

10 Plots of Wavelet transforms

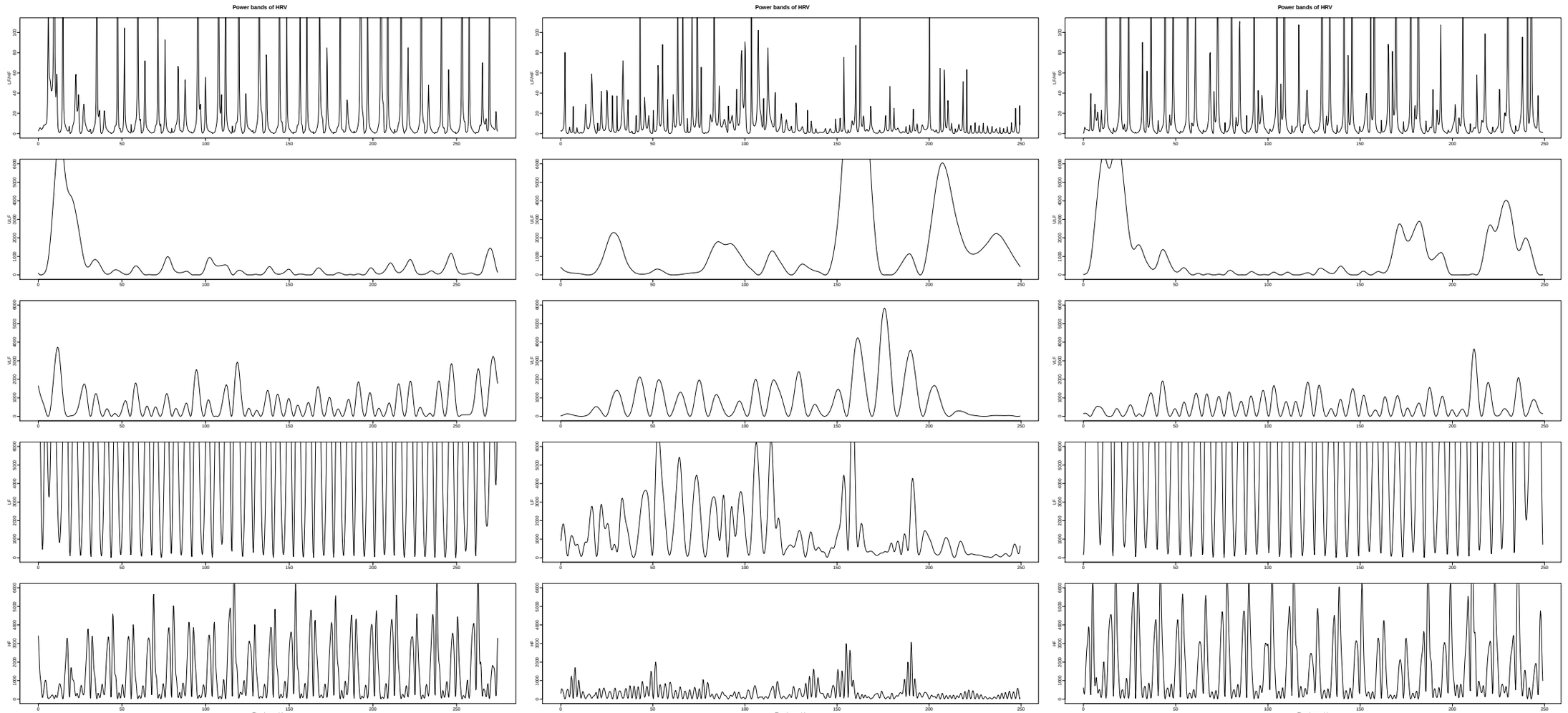



```
## [1] "20160701"
## [1] "1123"
```

```
## [1] "20160701"
## [1] "1139"
```

```
## [1] "20160702"
## [1] "0744"
```

11 Plots of Wavelet transforms




```
## [1] "20160702"
## [1] "0800"
```

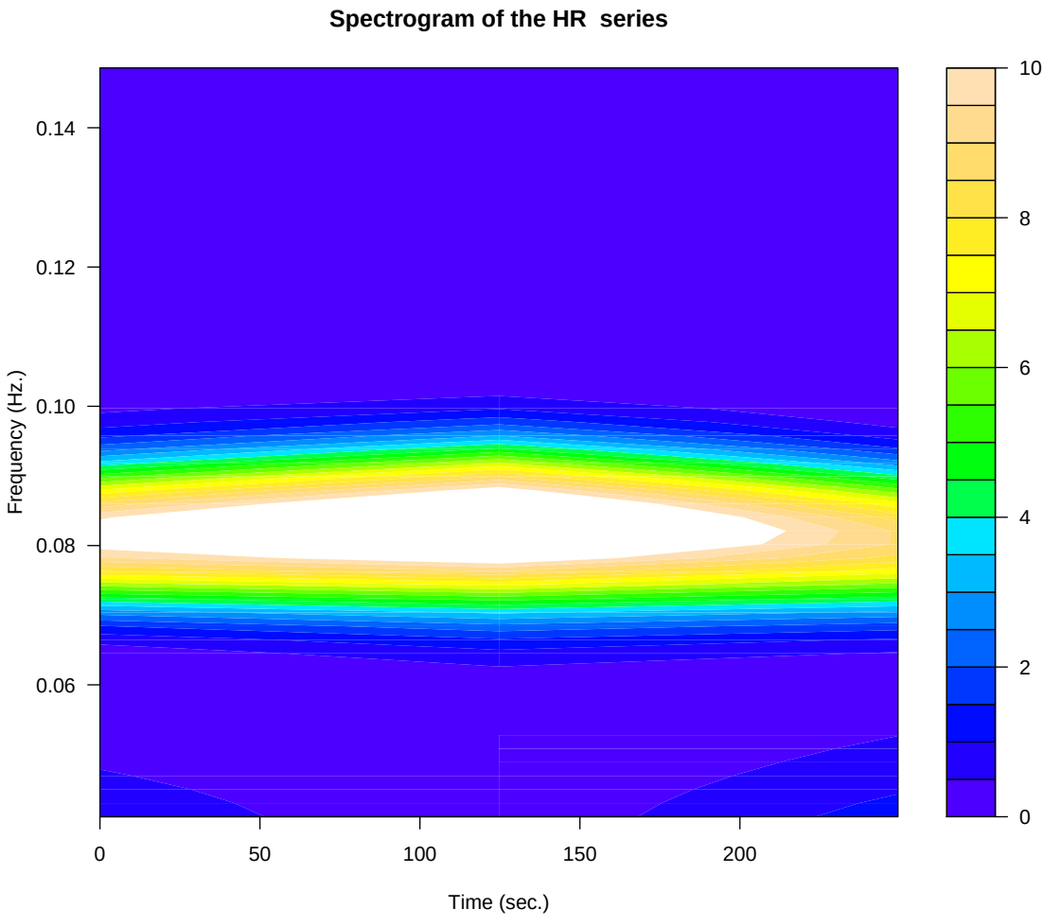
```
## [1] "20160703"
## [1] "0757"
```

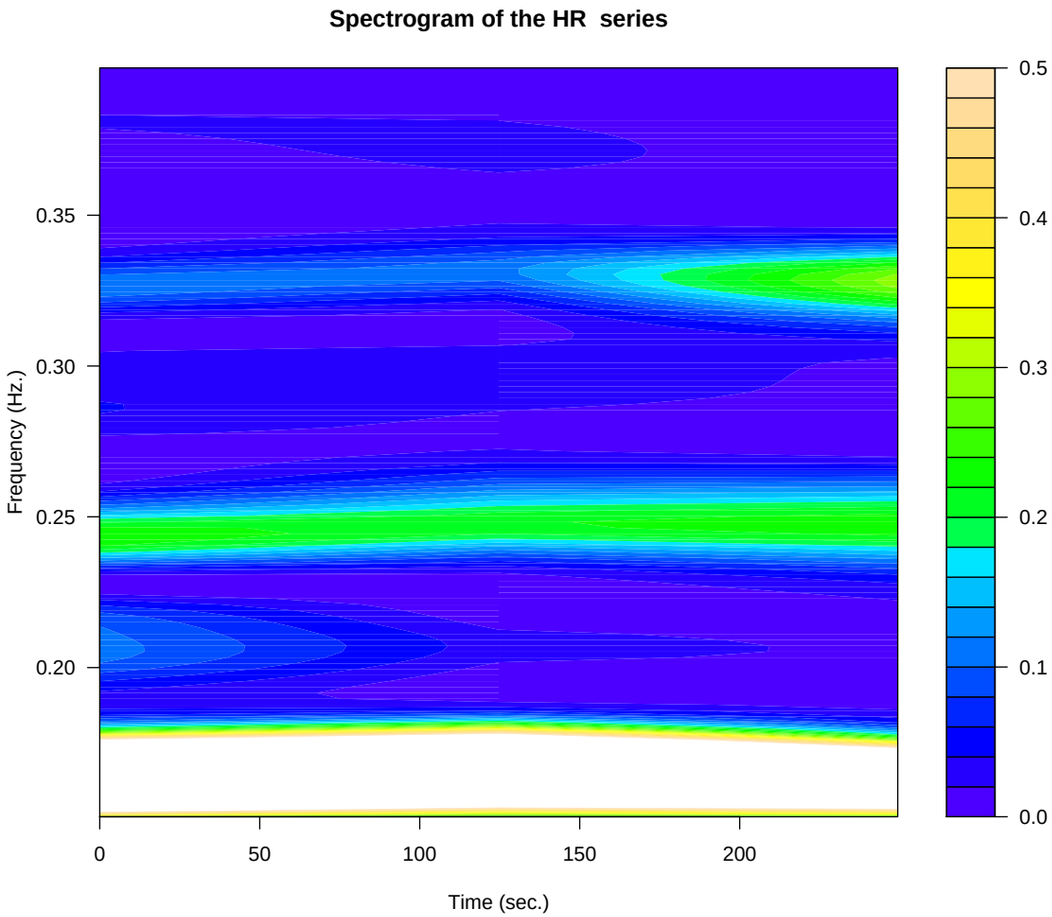
```
## [1] "20160703"
## [1] "0805"
```

12 Plots of STFT

The below formula gives the max value for hrv1. Howver this value comes to about 943. How do we get the HF value in the diagram to be so low.

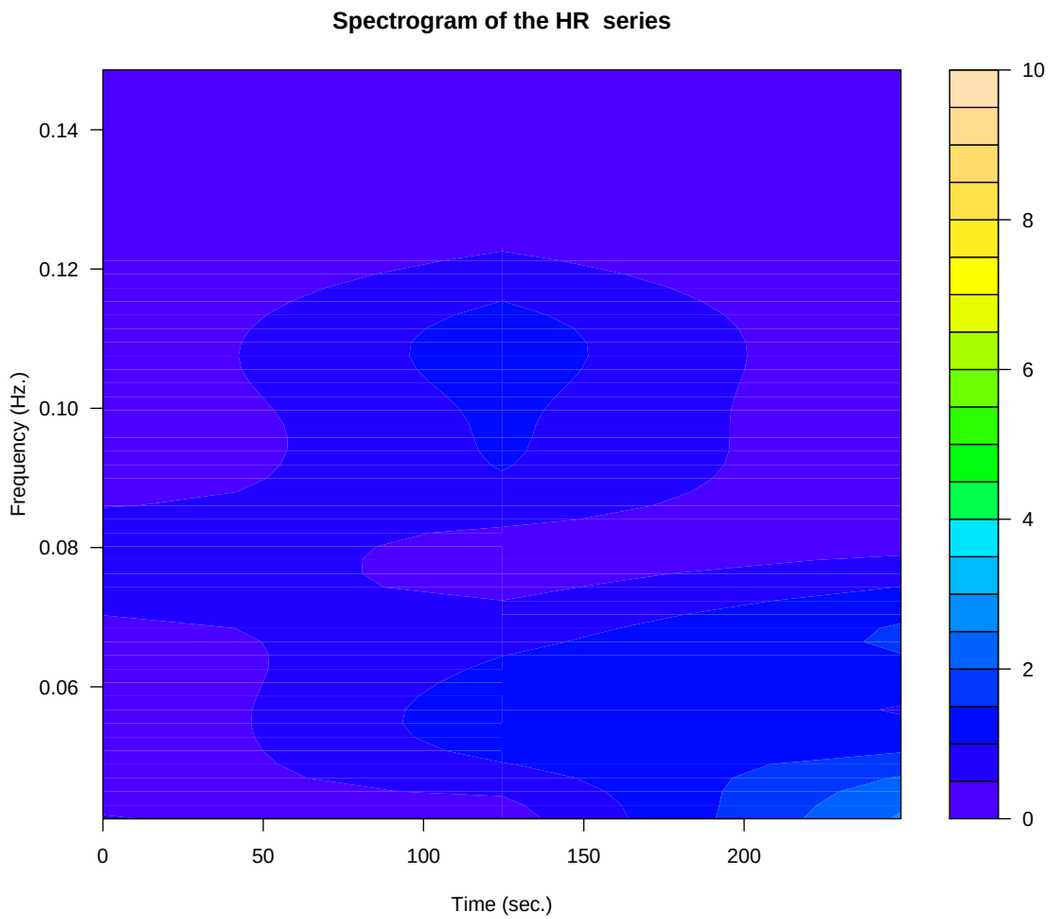
12.1 Plots of STFT-1

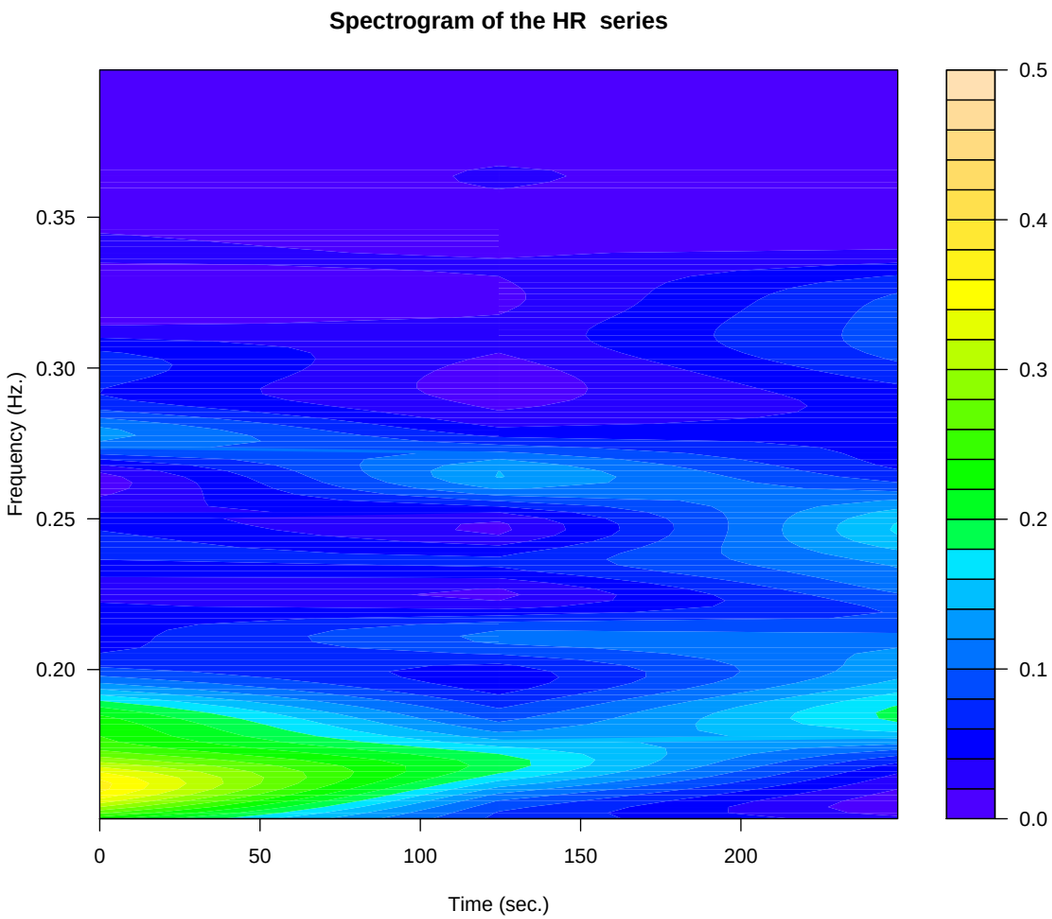





```
## [1] "20160623"                                                    ## [1] "20160623"
## [1] "0754"                                                        ## [1] "0754"
## Date:  RMSSD:  127   HRVi  4.6    MedianHeartRate:  62 Mean HiFreq: ## Date:  RMSSD:  127   HRVi  4.6    MedianHeartRate:  62 Mean HiFreq:  1098
```

12.2 Plots of STFT-2

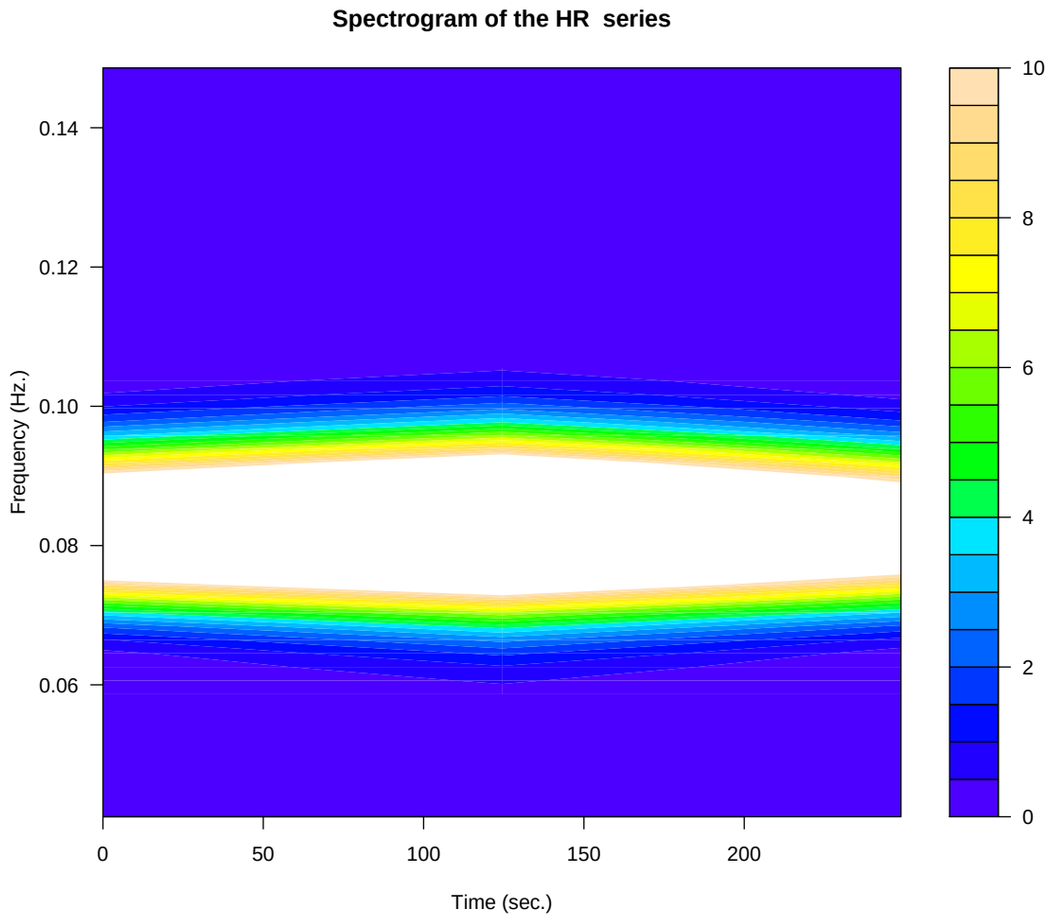


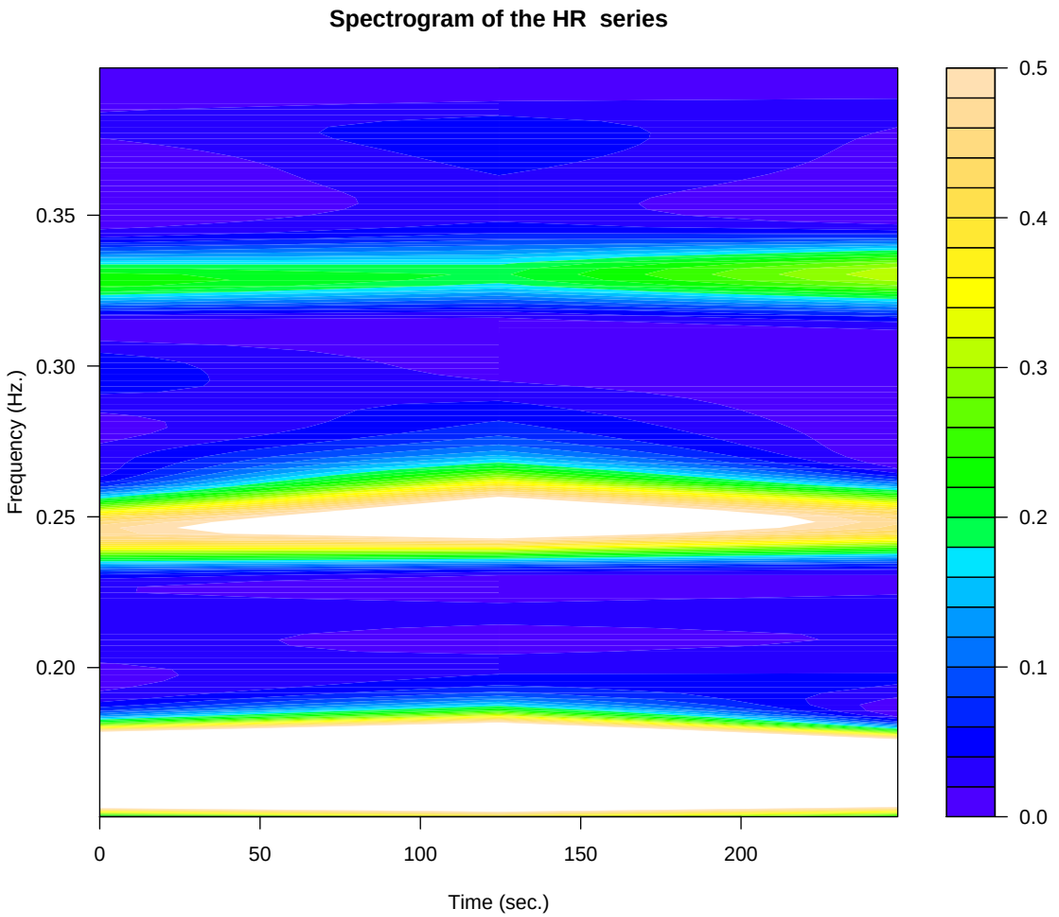



```
## [1] "20160624"
## [1] "0814"
## Date:  RMSSD:  34   HRVi  3.2    MedianHeartRate:  60 Mean HiFreq:
```

```
## [1] "20160624"
## [1] "0814"
## Date:  RMSSD:  34   HRVi  3.2    MedianHeartRate:  60 Mean HiFreq:  347
```

12.3 Plots of STFT - 3

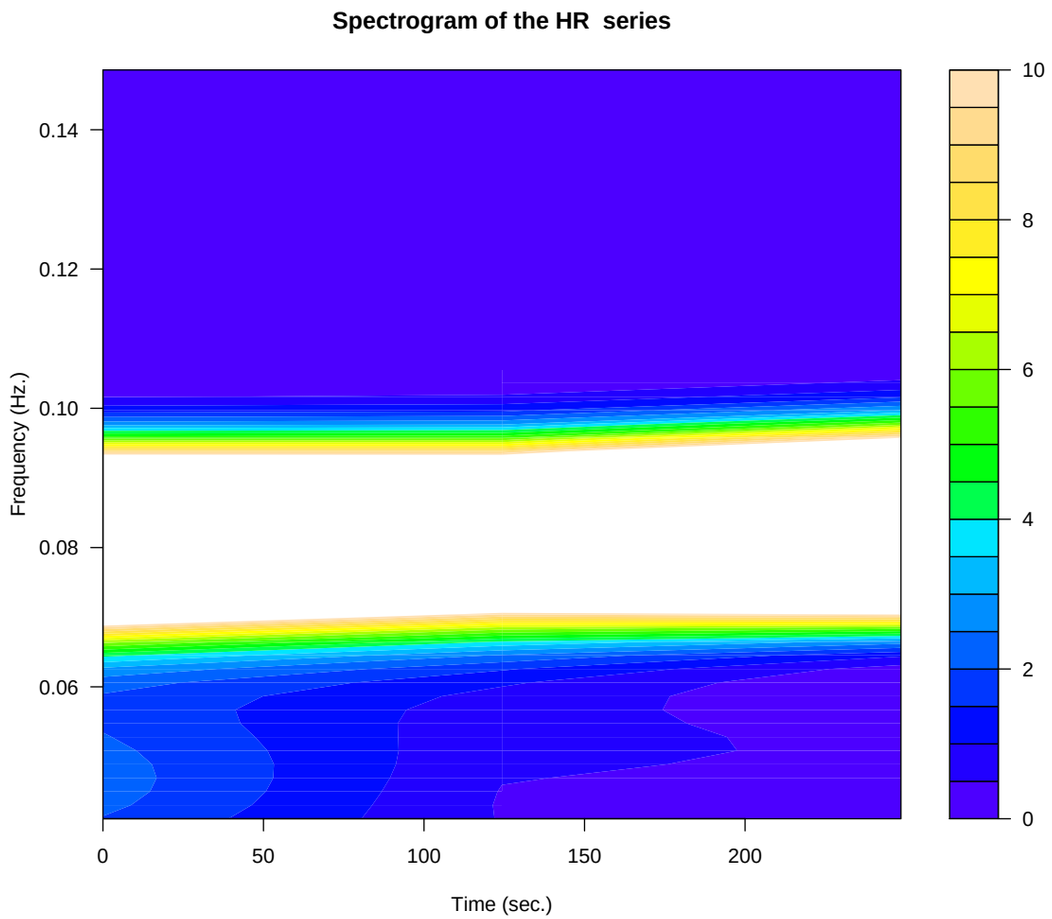


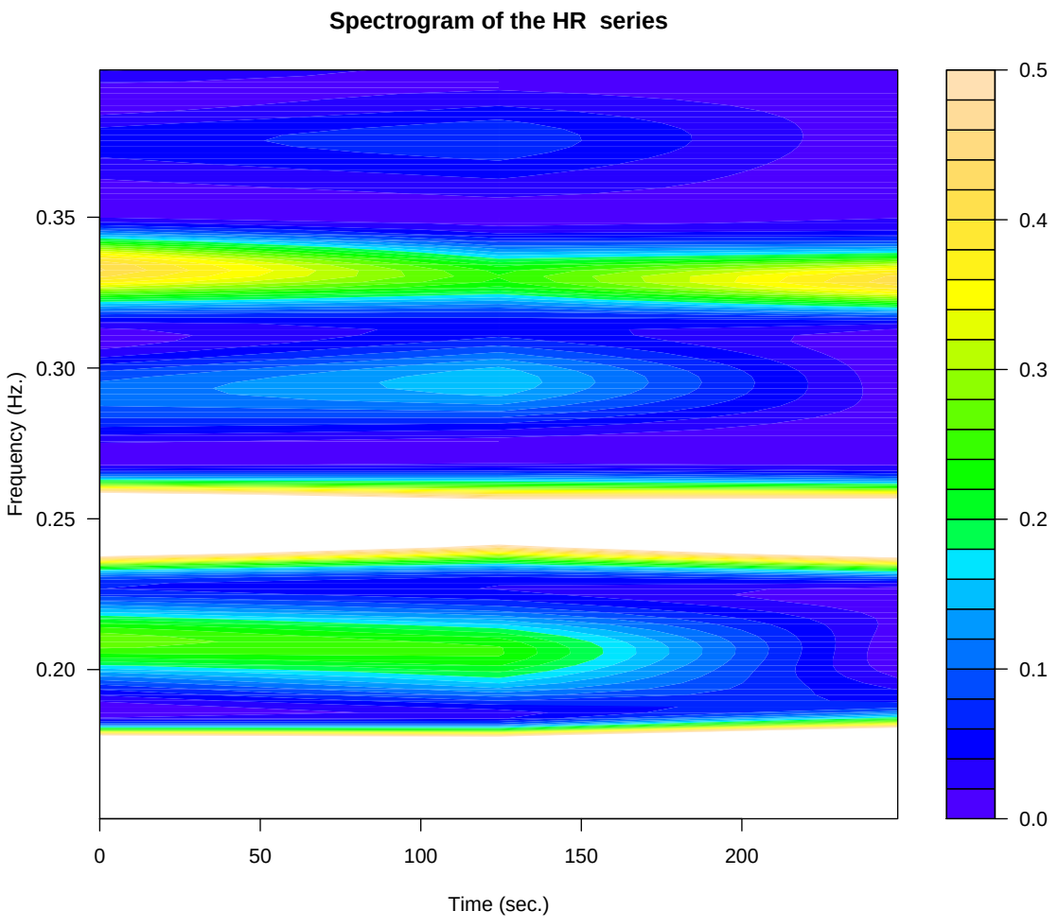



```
## [1] "20160624"
## [1] "0819"
## Date:  RMSSD:  62   HRVi  5.3    MedianHeartRate:  64 Mean HiFreq:
```

```
## [1] "20160624"
## [1] "0819"
## Date:  RMSSD:  62   HRVi  5.3    MedianHeartRate:  64 Mean HiFreq:  1365
```

12.4 Plots of STFT - 4

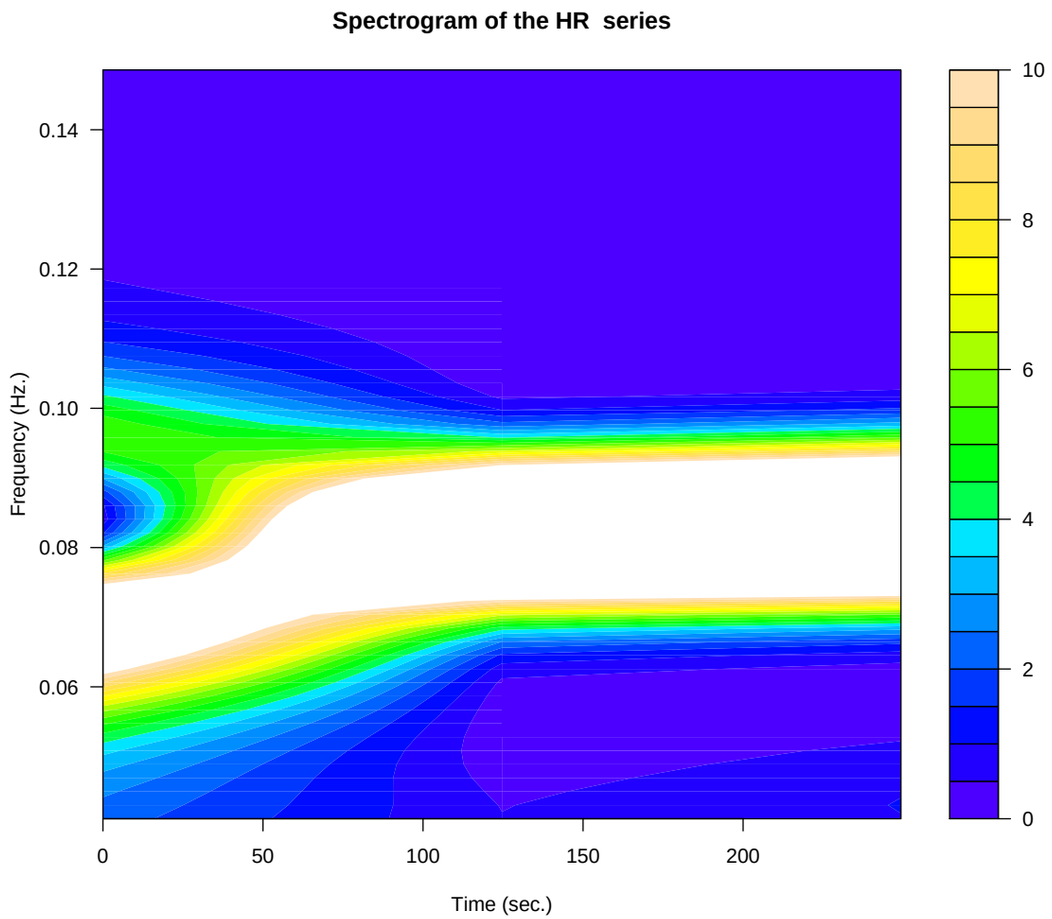


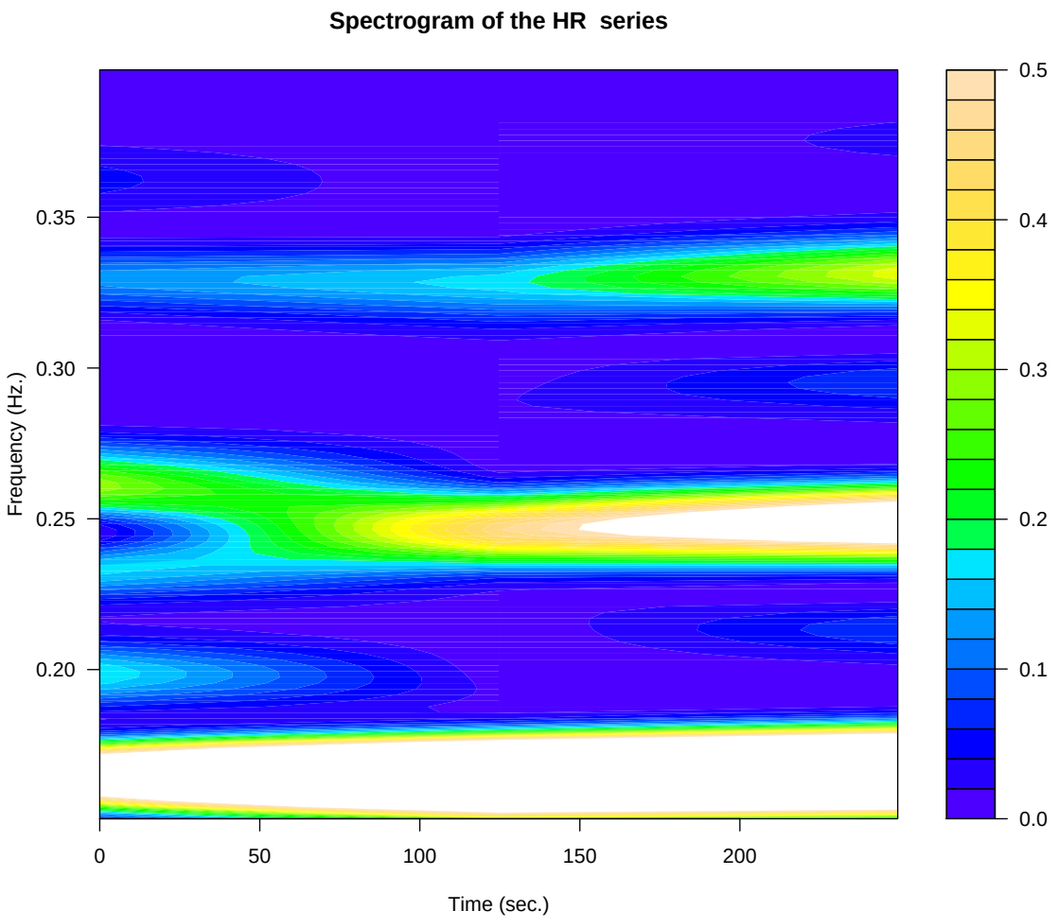



```
## [1] "20160625"
## [1] "0834"
## Date:  RMSSD:  93   HRVi  5.2    MedianHeartRate:  63 Mean HiFreq:
```

```
## [1] "20160625"
## [1] "0834"
## Date:  RMSSD:  93   HRVi  5.2    MedianHeartRate:  63 Mean HiFreq:  2955
```

12.5 Plots of STFT - 5

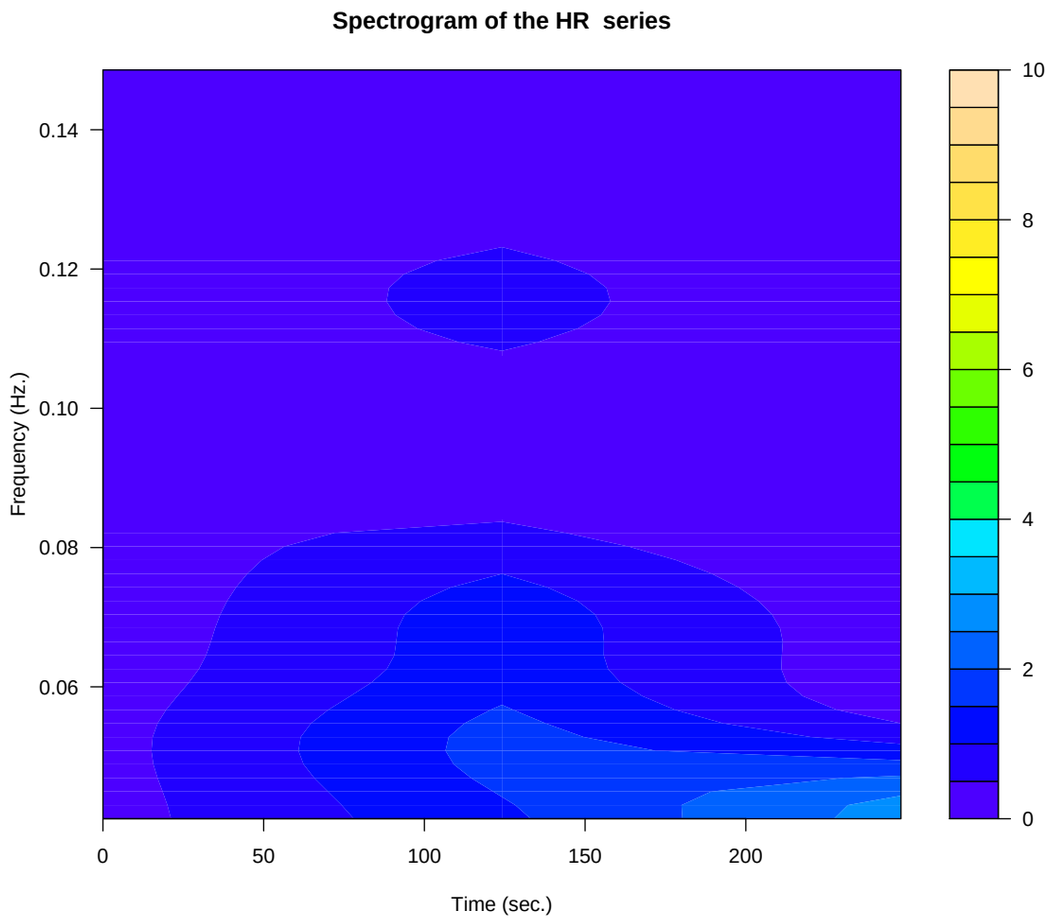


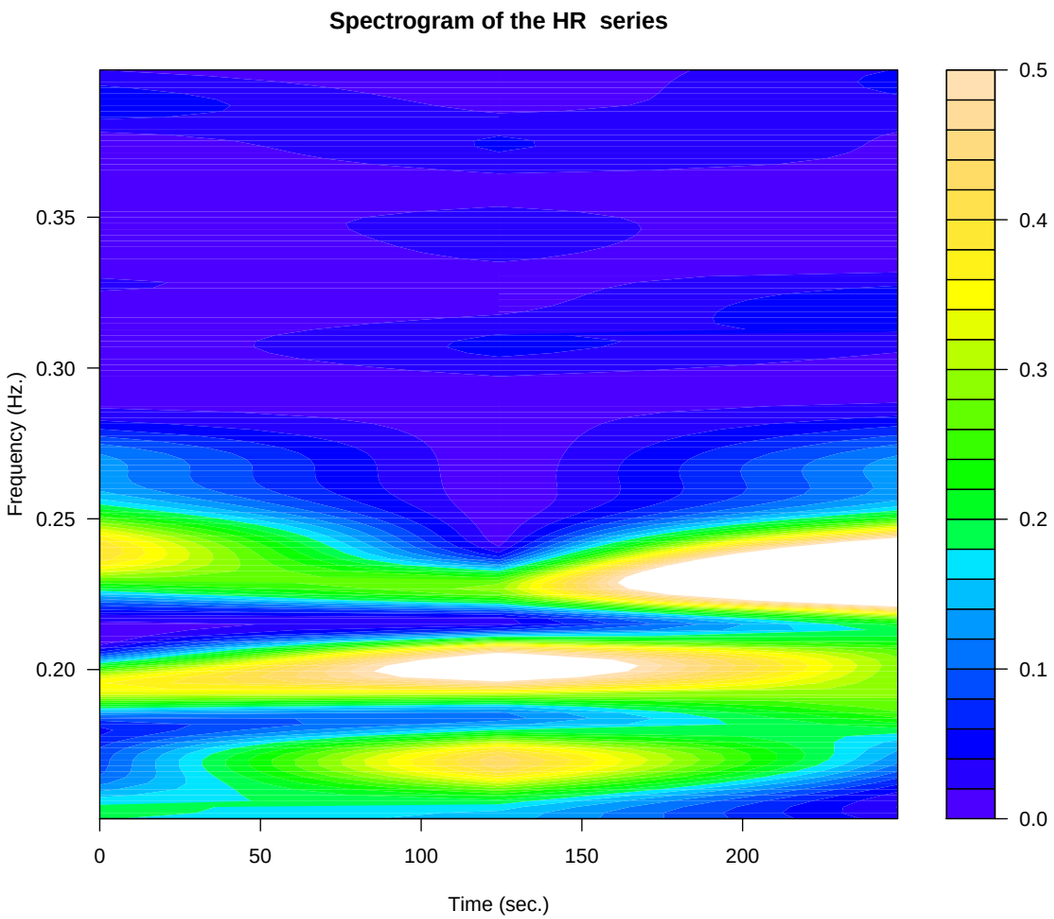



```
## [1] "20160626"
## [1] "1959"
## Date:  RMSSD:  59   HRVi  3.5    MedianHeartRate:  77 Mean HiFreq:
```

```
## [1] "20160626"
## [1] "1959"
## Date:  RMSSD:  59   HRVi  3.5    MedianHeartRate:  77 Mean HiFreq:  1475
```

12.6 Plots of STFT - 6

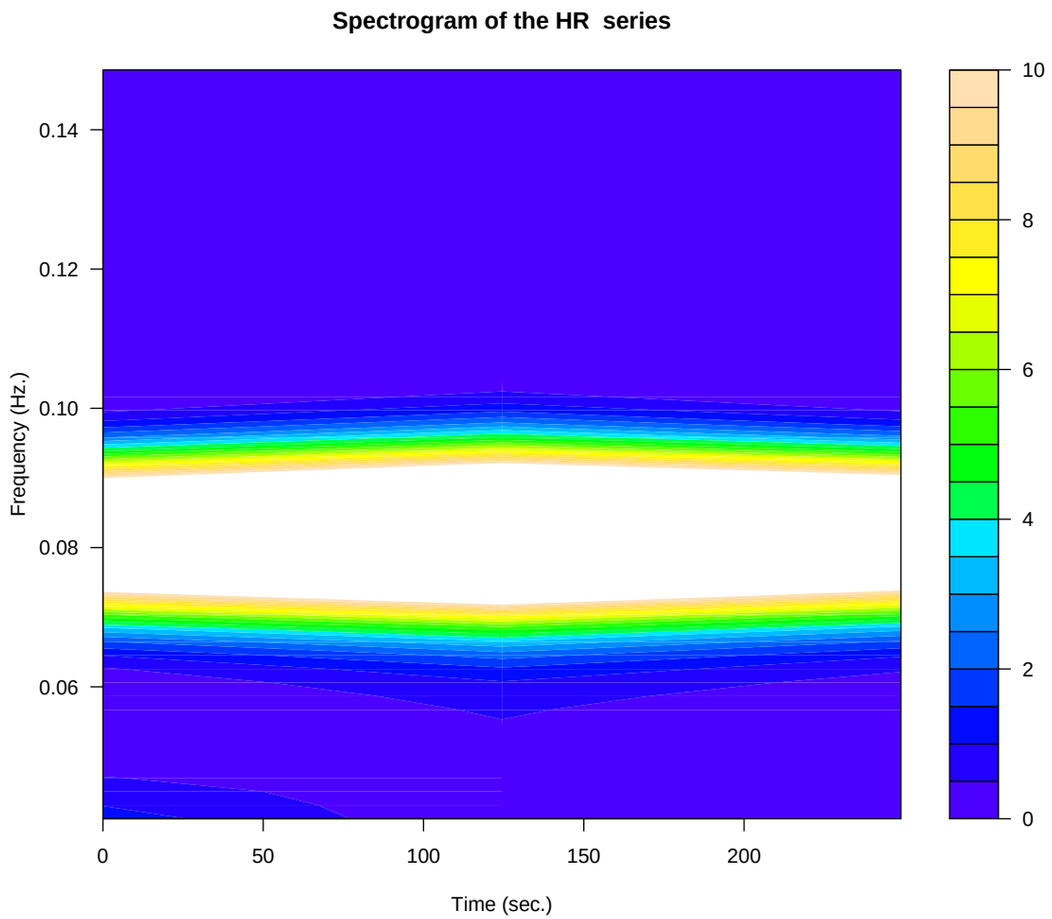


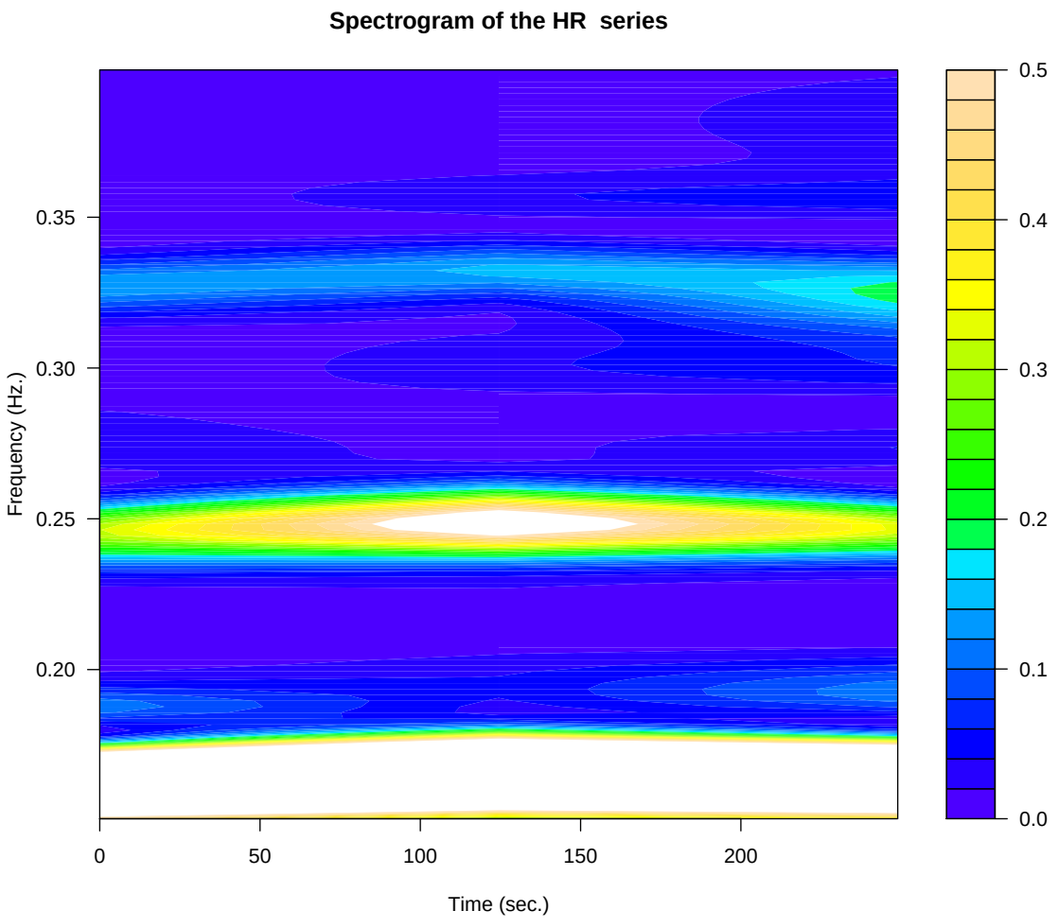



```
## [1] "20160628"
## [1] "1003"
## Date:  RMSSD:  42   HRVi  3.1    MedianHeartRate:  59 Mean HiFreq:
```

```
## [1] "20160628"
## [1] "1003"
## Date:  RMSSD:  42   HRVi  3.1    MedianHeartRate:  59 Mean HiFreq:  644
```

12.7 Plots of STFT - 7

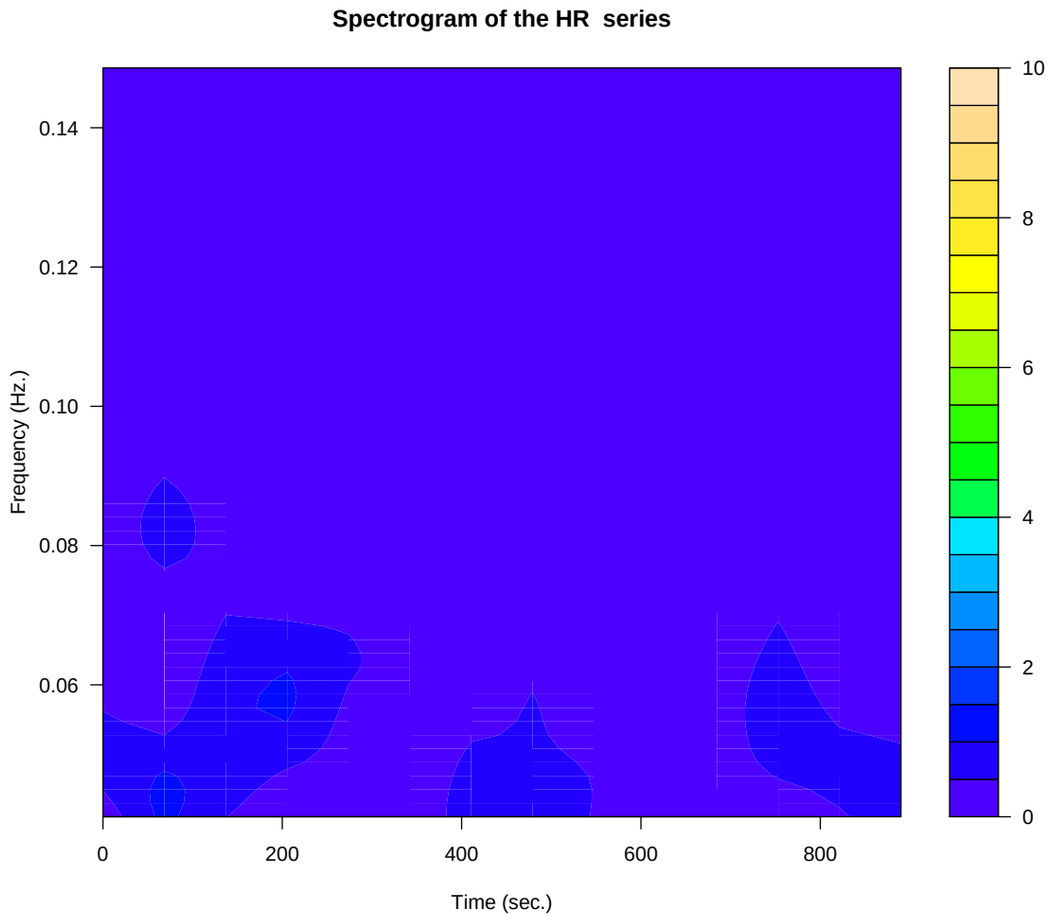


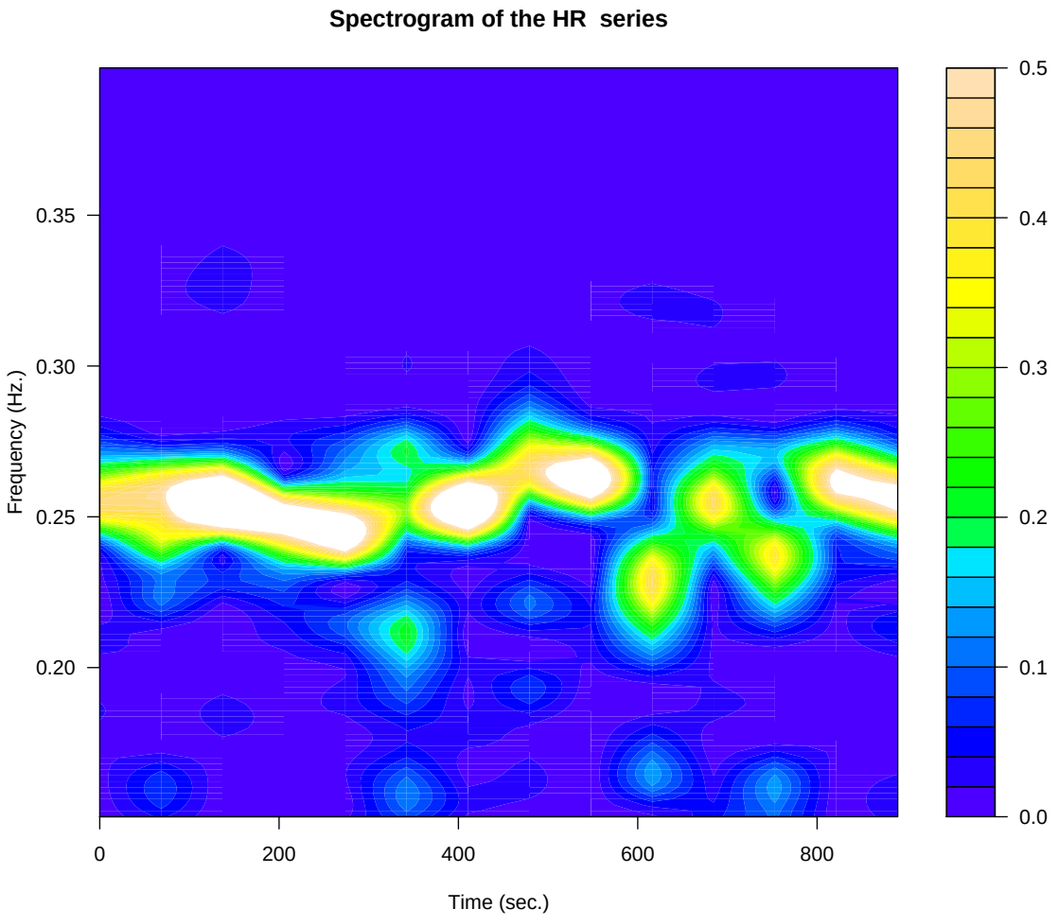



```
## [1] "20160628"
## [1] "1009"
## Date:  RMSSD:  64   HRVi  5    MedianHeartRate:  66 Mean HiFreq:  1
```

```
## [1] "20160628"
## [1] "1009"
## Date:  RMSSD:  64   HRVi  5    MedianHeartRate:  66 Mean HiFreq:  1574
```

12.8 Plots of STFT-8

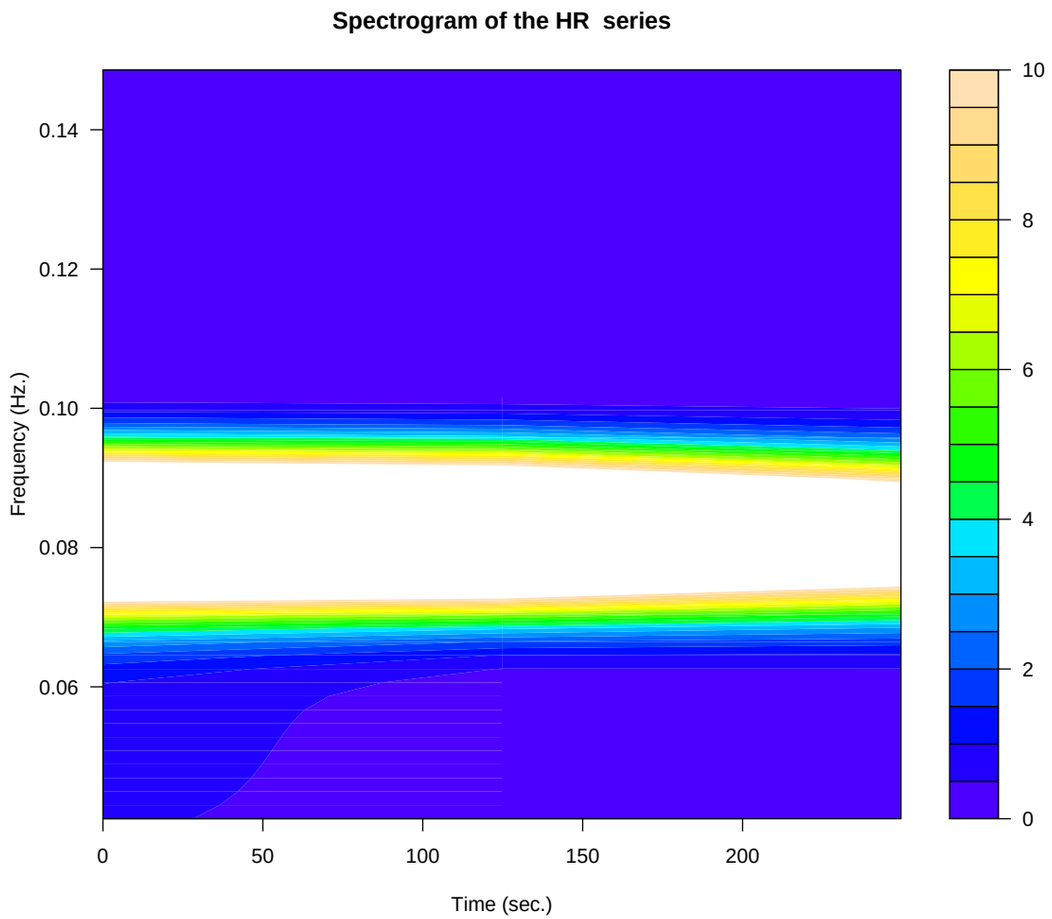


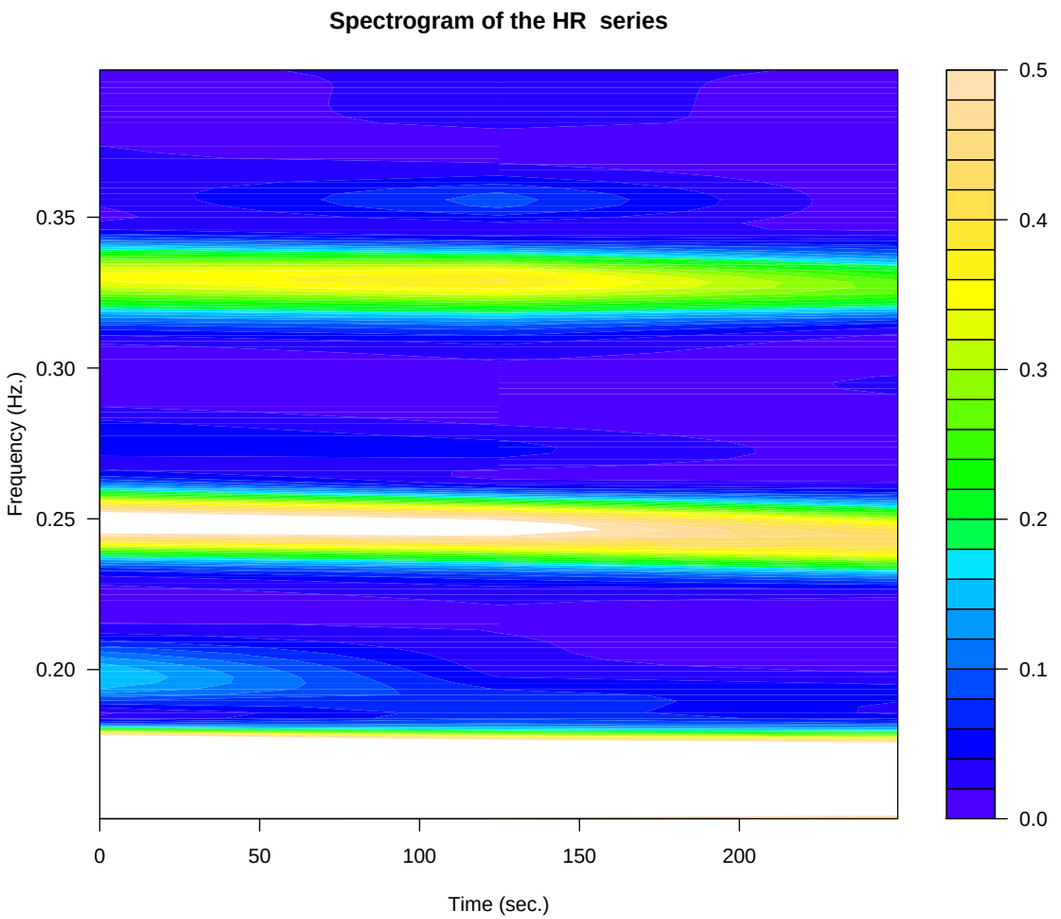



```
## [1] "20160630"
## [1] "0737"
## Date:  RMSSD:  53   HRVi  2.5    MedianHeartRate:  63 Mean HiFreq:
```

```
## [1] "20160630"
## [1] "0737"
## Date:  RMSSD:  53   HRVi  2.5    MedianHeartRate:  63 Mean HiFreq:  379
```

12.9 Plots of STFT - 9

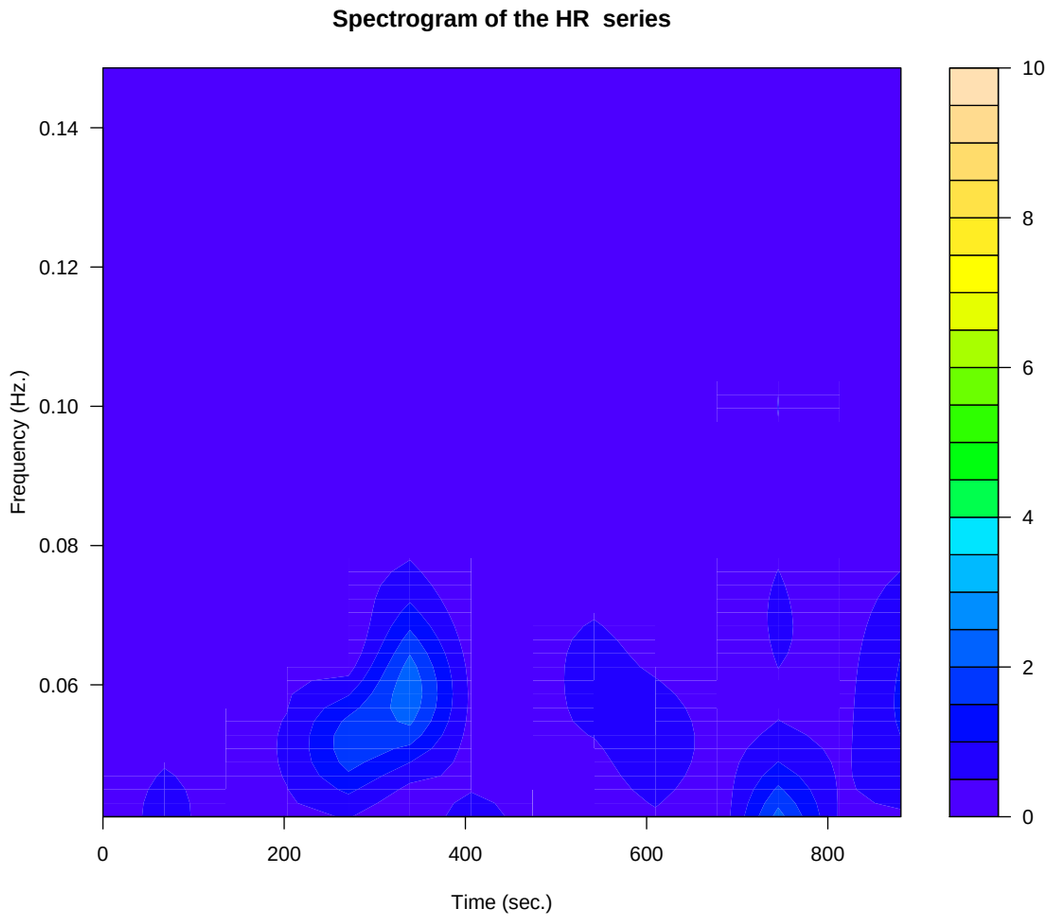


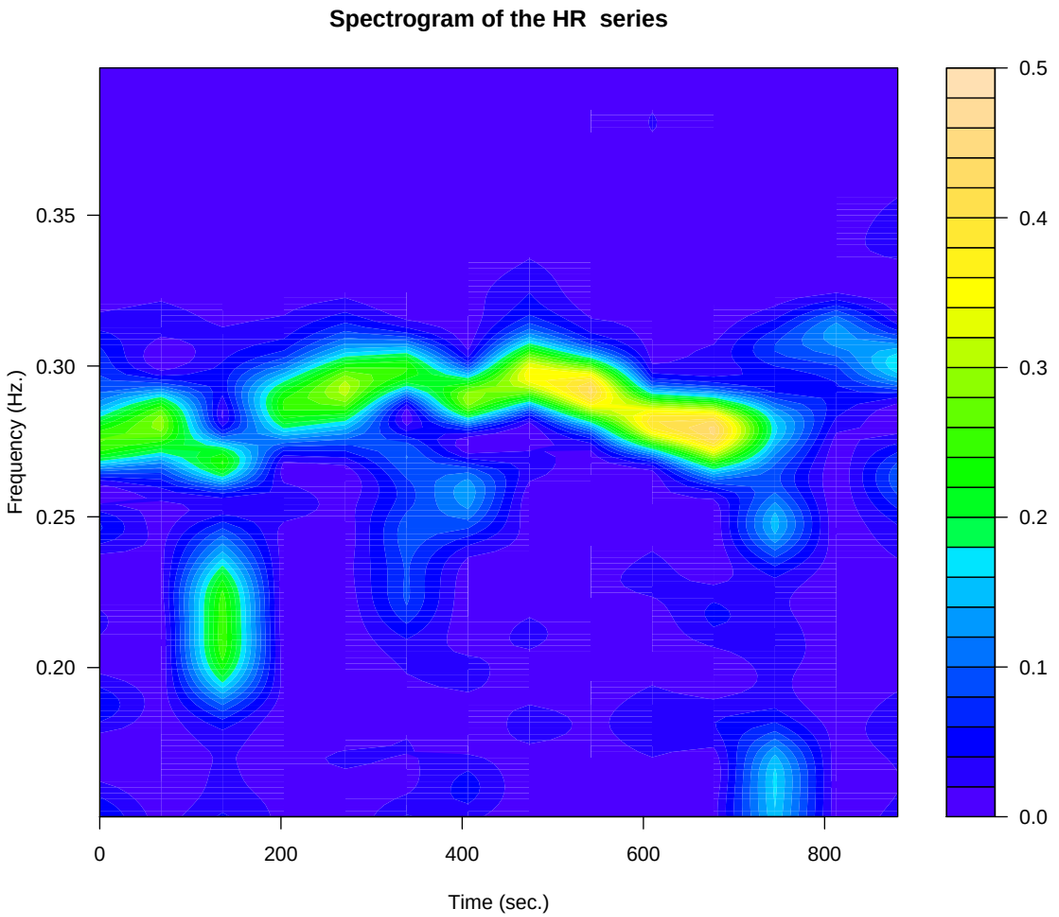



```
## [1] "20160630"
## [1] "0808"
## Date:  RMSSD:  97   HRVi  4.8    MedianHeartRate:  67 Mean HiFreq:
```

```
## [1] "20160630"
## [1] "0808"
## Date:  RMSSD:  97   HRVi  4.8    MedianHeartRate:  67 Mean HiFreq:  1843
```

12.10 Plots of STFT - 10

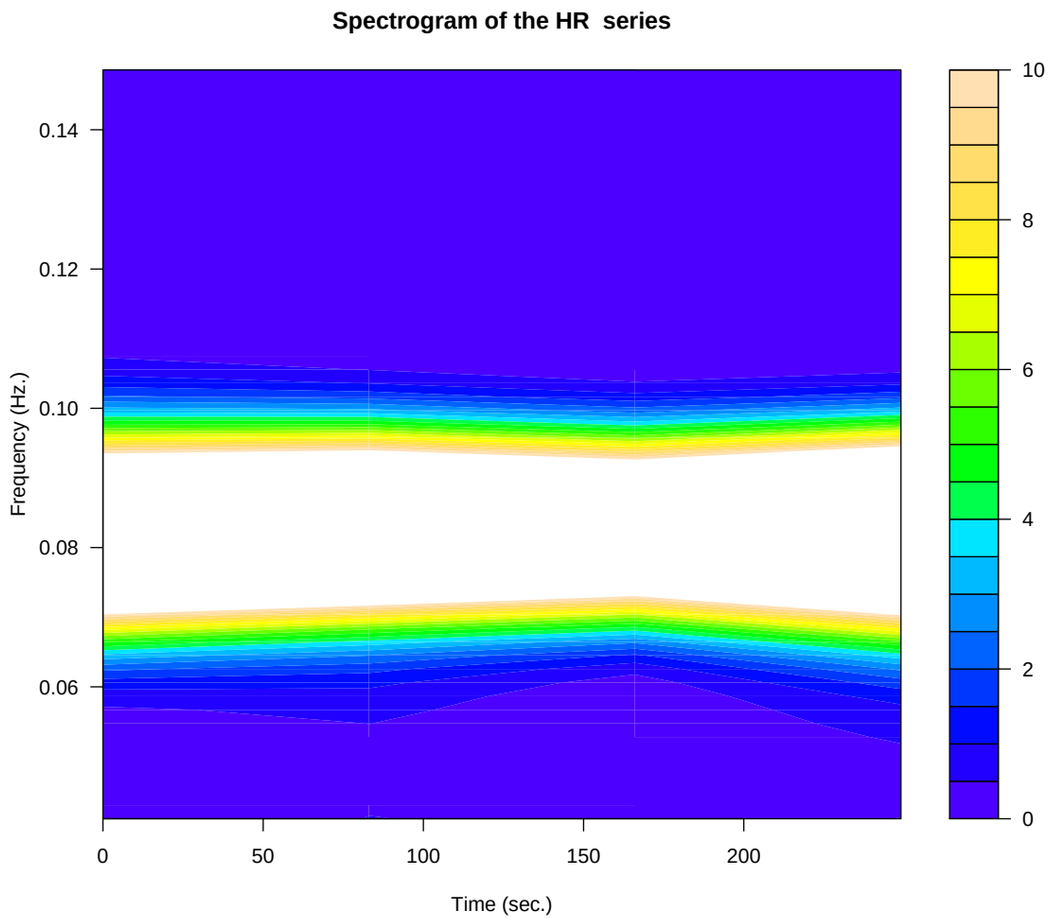


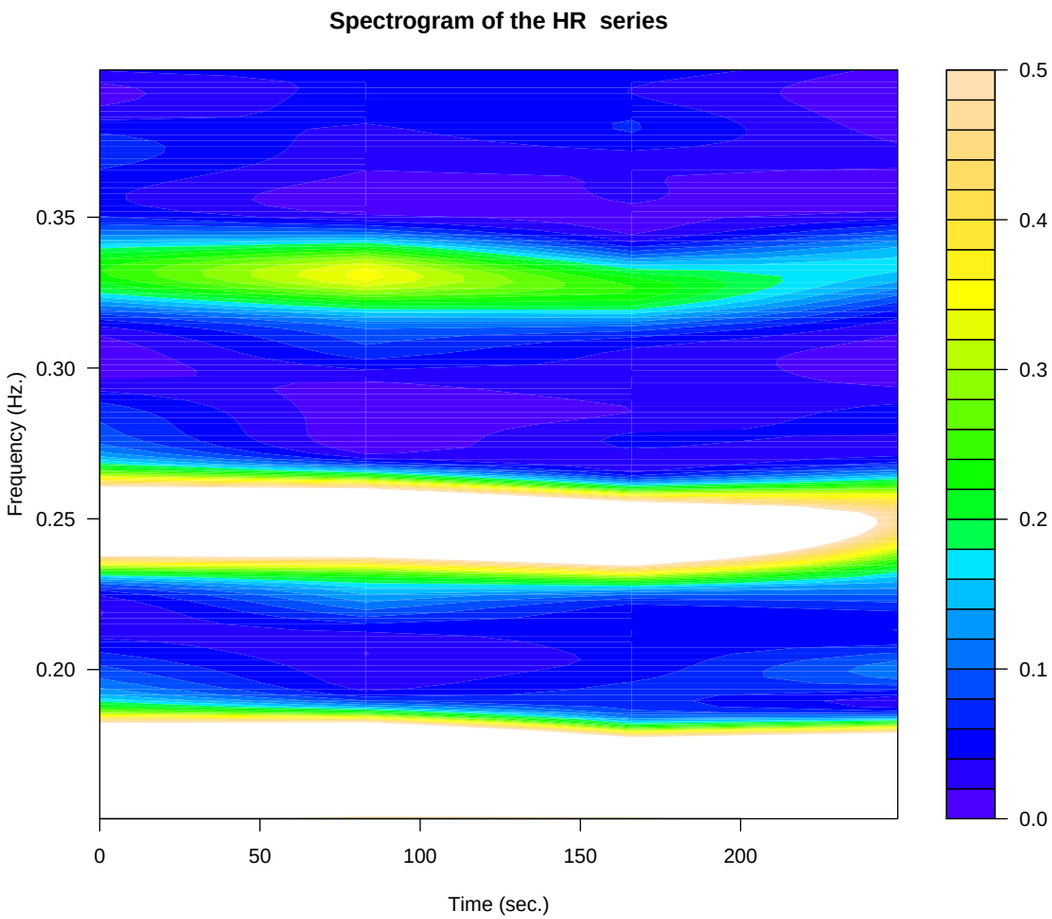



```
## [1] "20160701"
## [1] "1123"
## Date:  RMSSD:  25   HRVi  2.1    MedianHeartRate:  69 Mean HiFreq:
```

```
## [1] "20160701"
## [1] "1123"
## Date:  RMSSD:  25   HRVi  2.1    MedianHeartRate:  69 Mean HiFreq:  217
```

12.11 Plots of STFT - 11

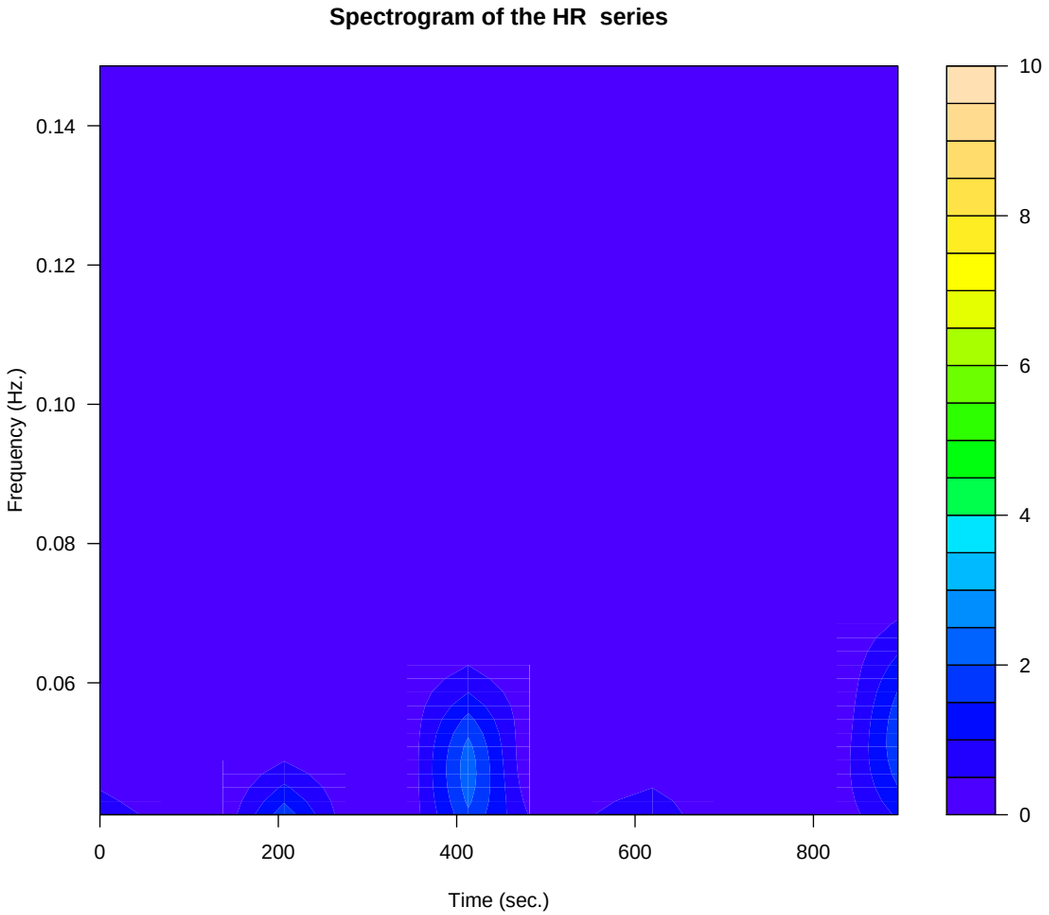


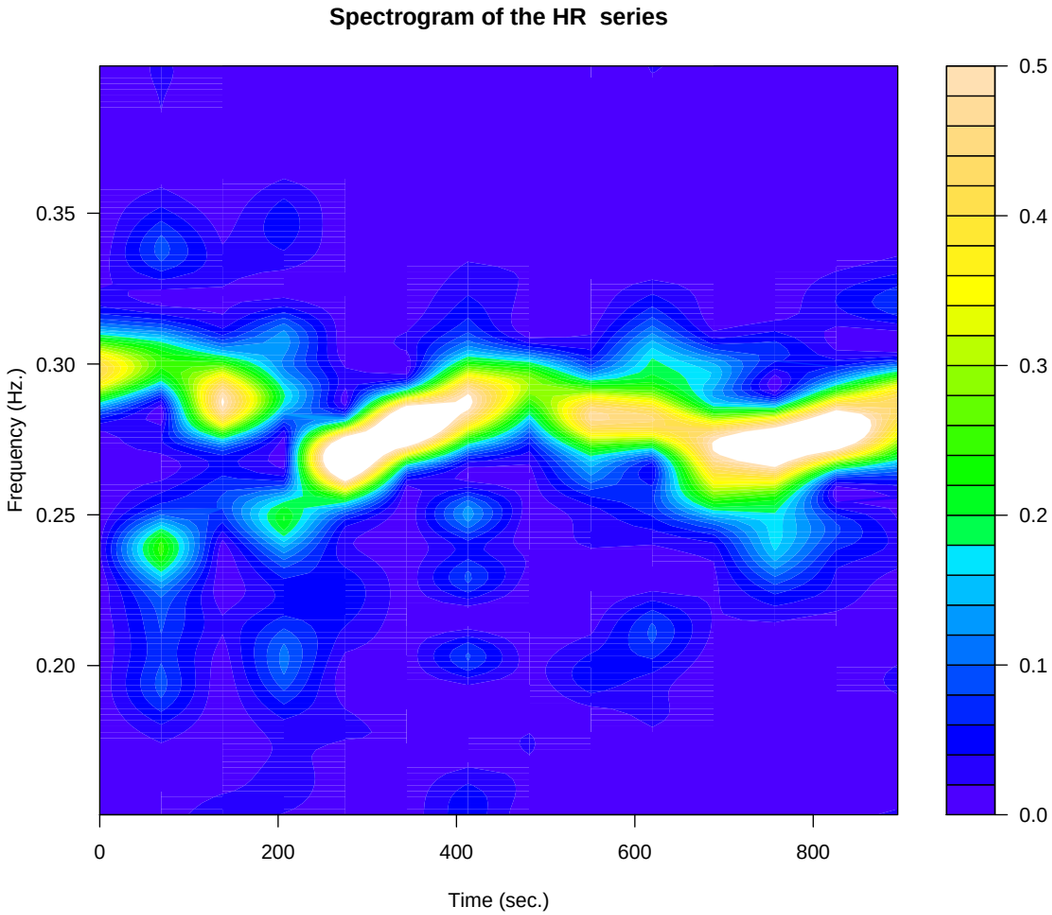



```
## [1] "20160701"
## [1] "1139"
## Date:  RMSSD:  76   HRVi  4.5    MedianHeartRate:  76 Mean HiFreq:
```

```
## [1] "20160701"
## [1] "1139"
## Date:  RMSSD:  76   HRVi  4.5    MedianHeartRate:  76 Mean HiFreq:  2283
```

12.12 Plots of STFT - 12

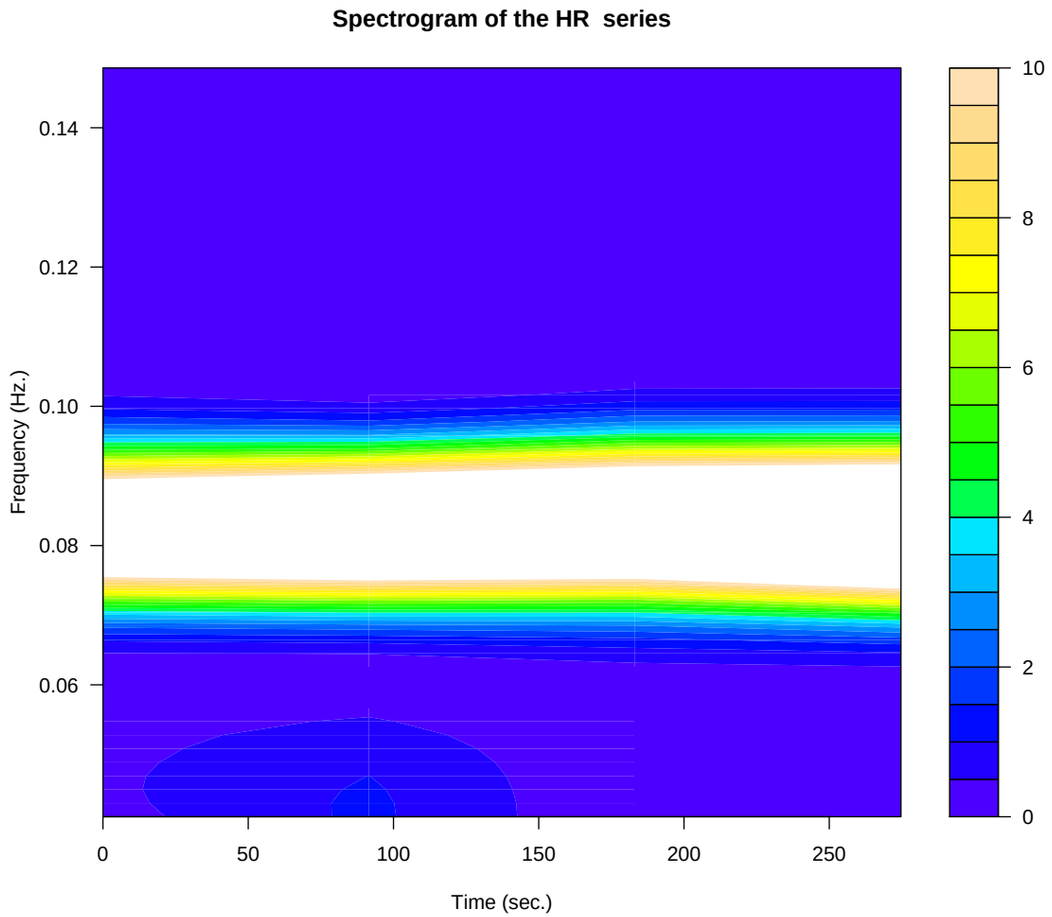


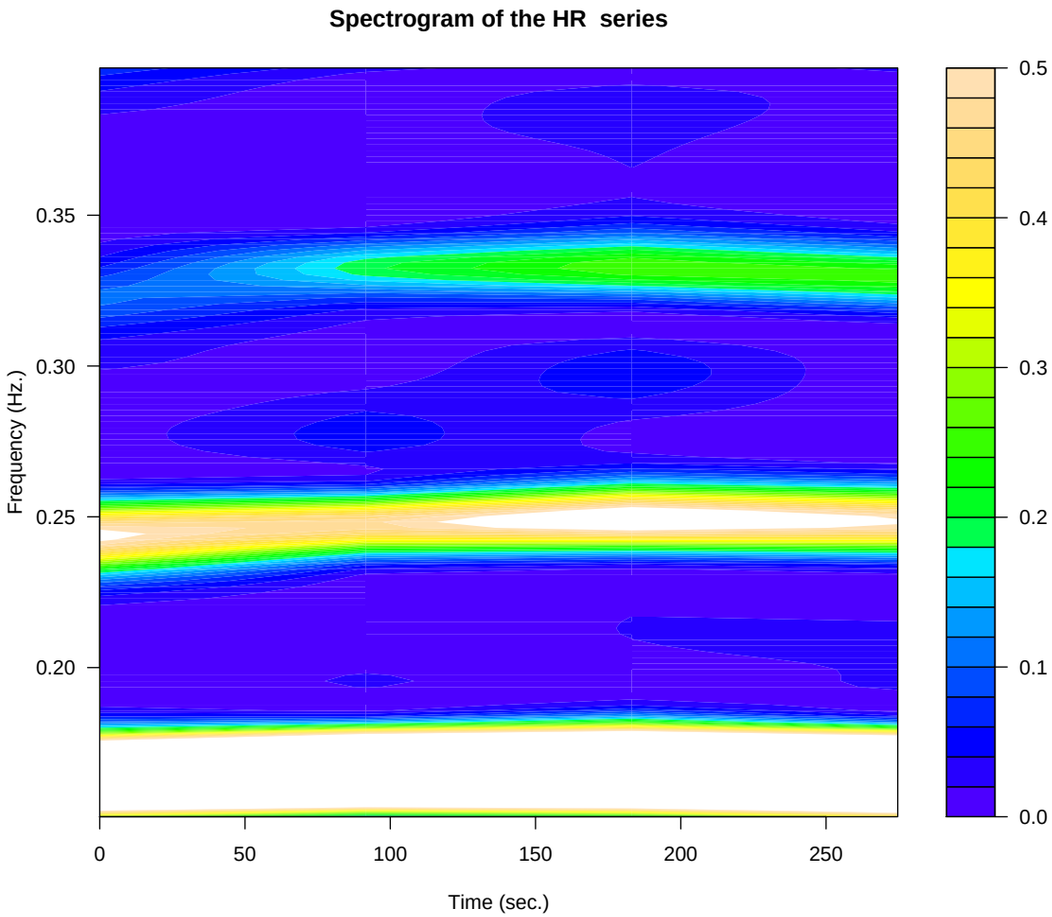



```
## [1] "20160702"
## [1] "0744"
## Date:  RMSSD:  34   HRVi  2.2    MedianHeartRate:  60 Mean HiFreq:
```

```
## [1] "20160702"
## [1] "0744"
## Date:  RMSSD:  34   HRVi  2.2    MedianHeartRate:  60 Mean HiFreq:  351
```

12.13 Plots of STFT - 13

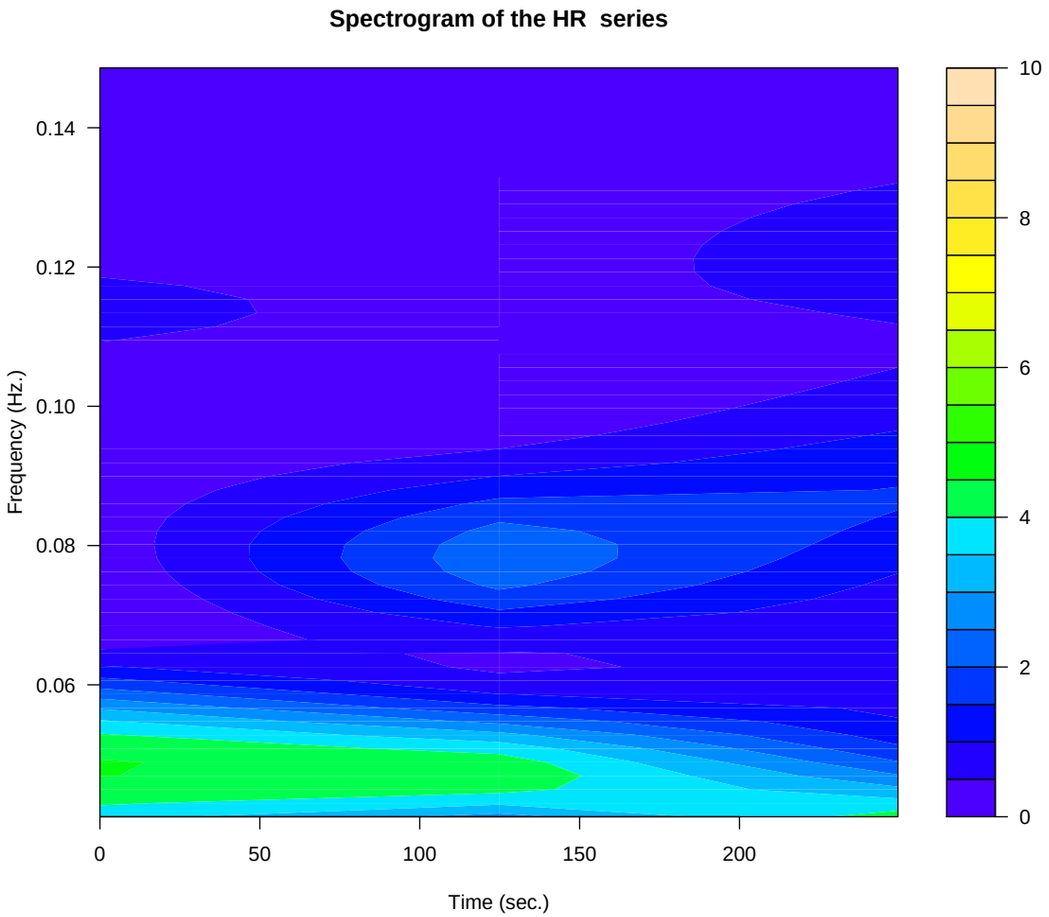


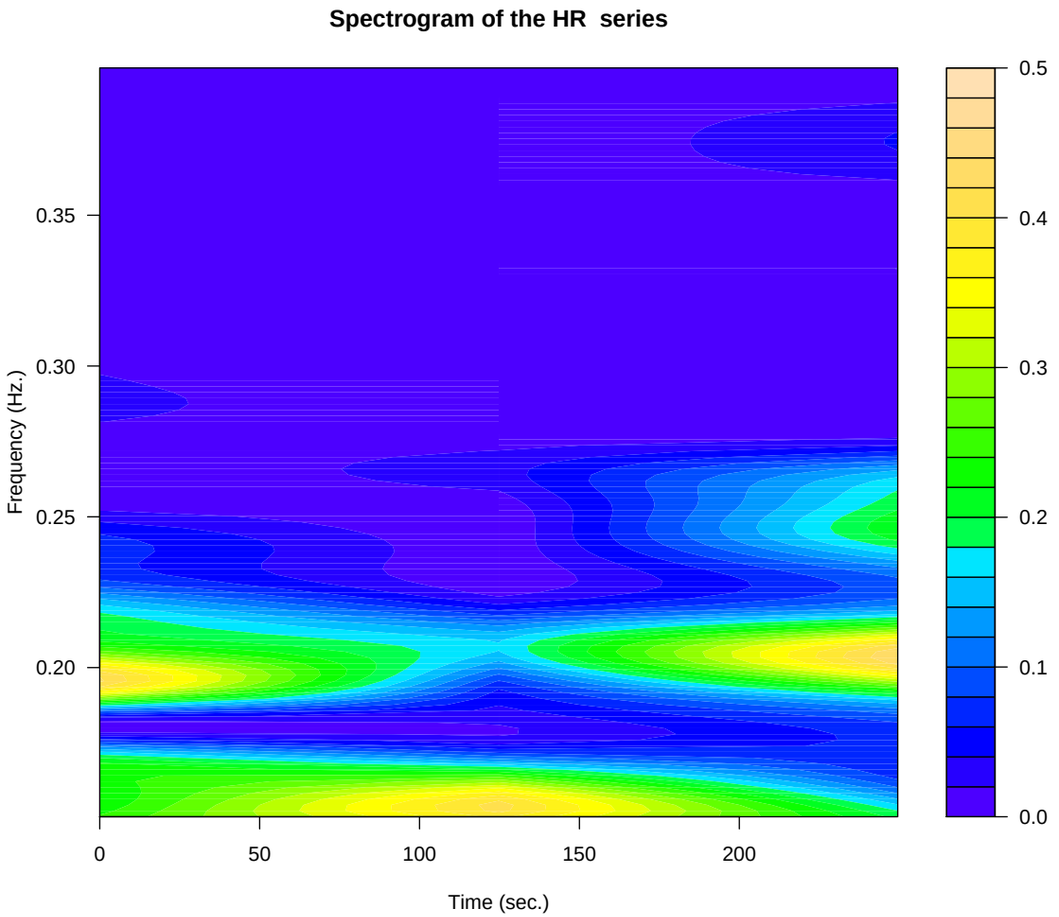



```
## [1] "20160702"
## [1] "0800"
## Date:  RMSSD:  64   HRVi  4    MedianHeartRate:  63 Mean HiFreq:  1
```

```
## [1] "20160702"
## [1] "0800"
## Date:  RMSSD:  64   HRVi  4    MedianHeartRate:  63 Mean HiFreq:  1435
```

12.14 Plots of STFT - 14

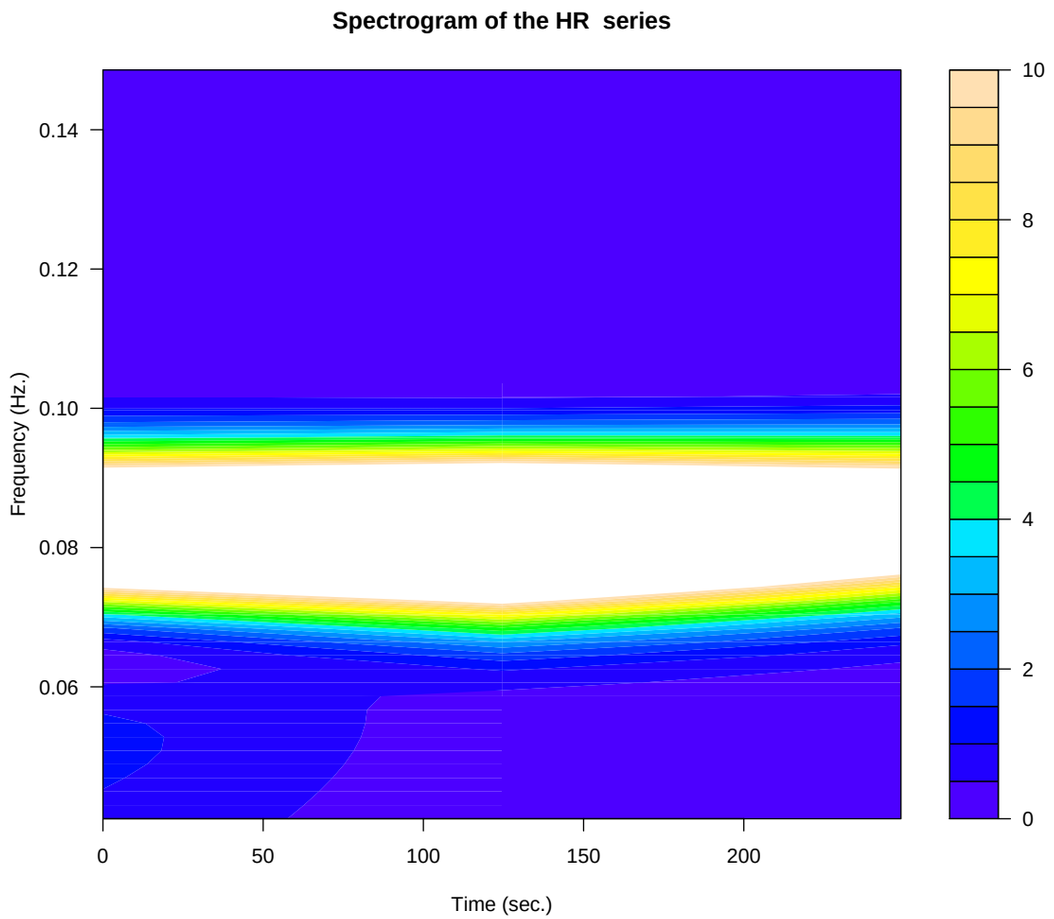


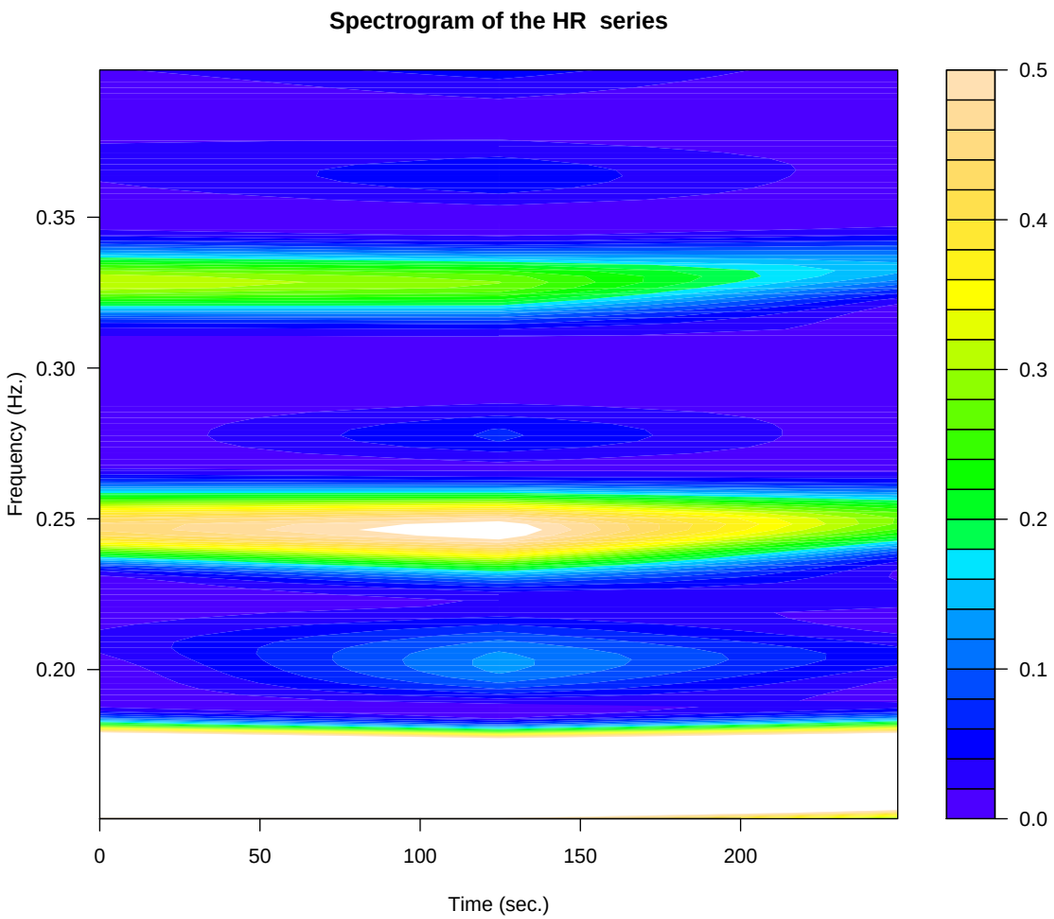



```
## [1] "20160703"
## [1] "0757"
## Date:  RMSSD:  30   HRVi  3.1    MedianHeartRate:  70 Mean HiFreq:
```

```
## [1] "20160703"
## [1] "0757"
## Date:  RMSSD:  30   HRVi  3.1    MedianHeartRate:  70 Mean HiFreq:  340
```

12.15 Plots of STFT - 15

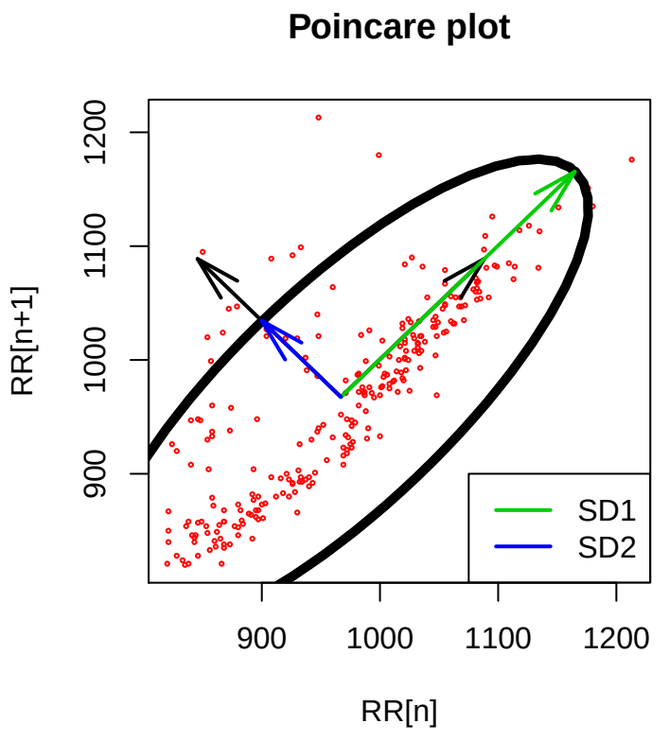




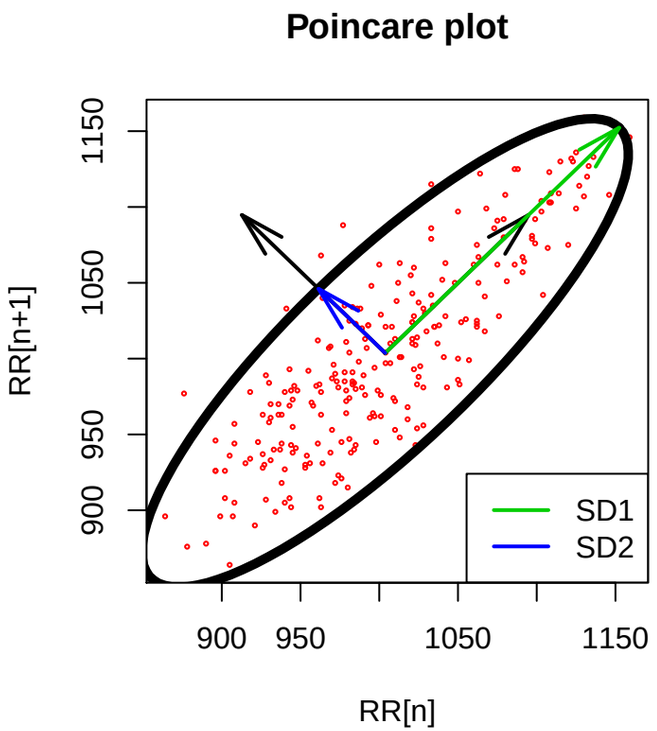

```
## [1] "20160703"
## [1] "0805"
## Date:  RMSSD:  63   HRVi  5.5    MedianHeartRate:  73 Mean HiFreq:
```

```
## [1] "20160703"
## [1] "0805"
## Date:  RMSSD:  63   HRVi  5.5    MedianHeartRate:  73 Mean HiFreq:  1760
```

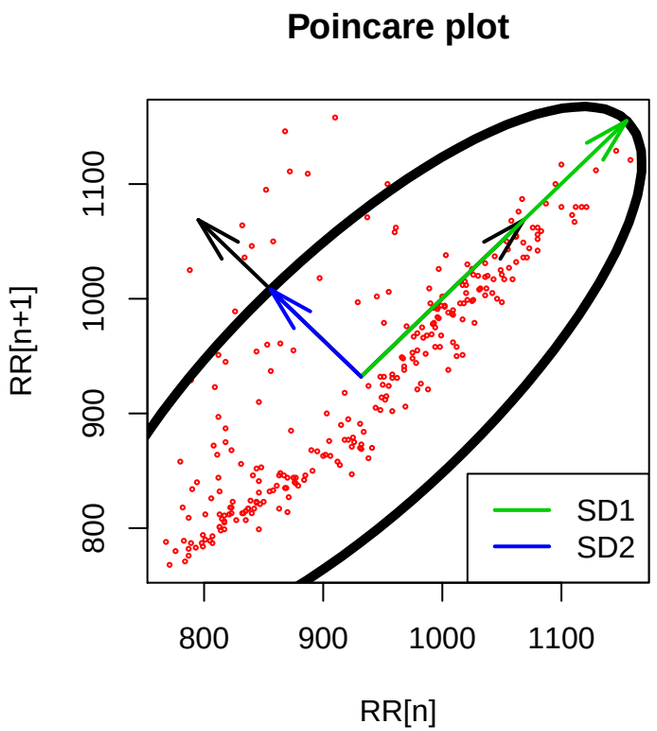
13 Poincare plots 1-3




```
## [1] "20160623"
## [1] "0754"
```

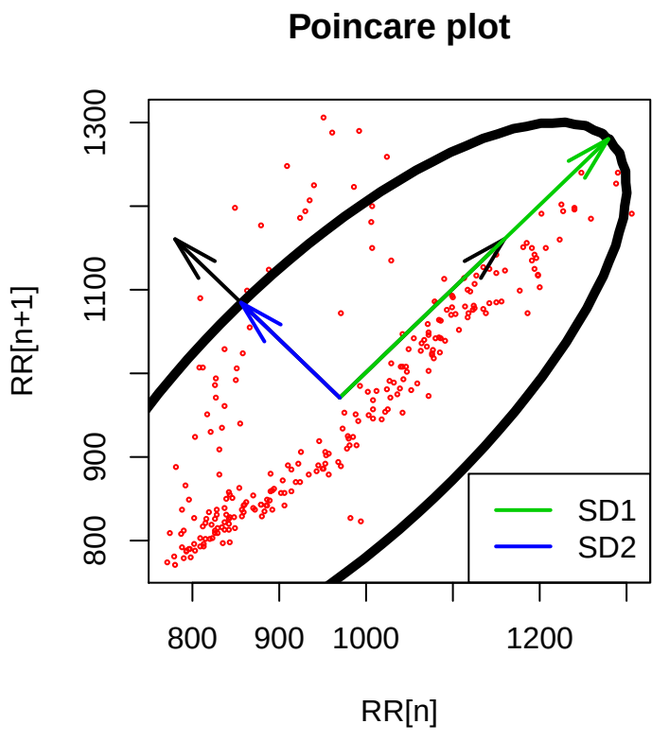


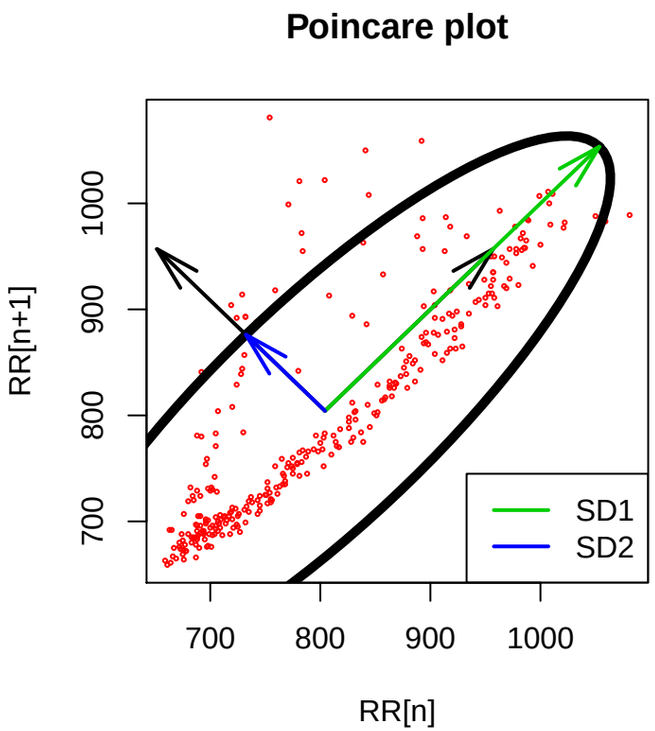

```
## [1] "20160624"
## [1] "0814"
```

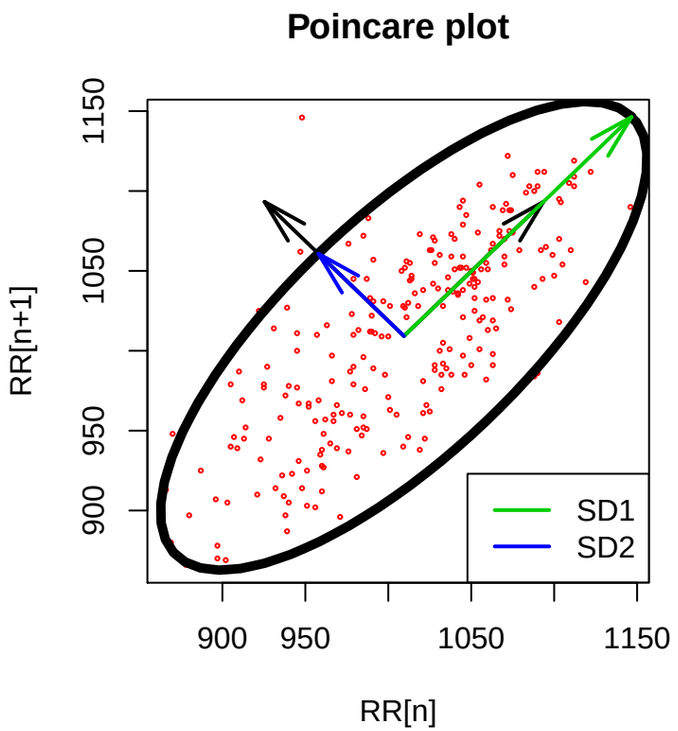



```
## [1] "20160624"
## [1] "0819"
```

14 Poincare plots 4-6





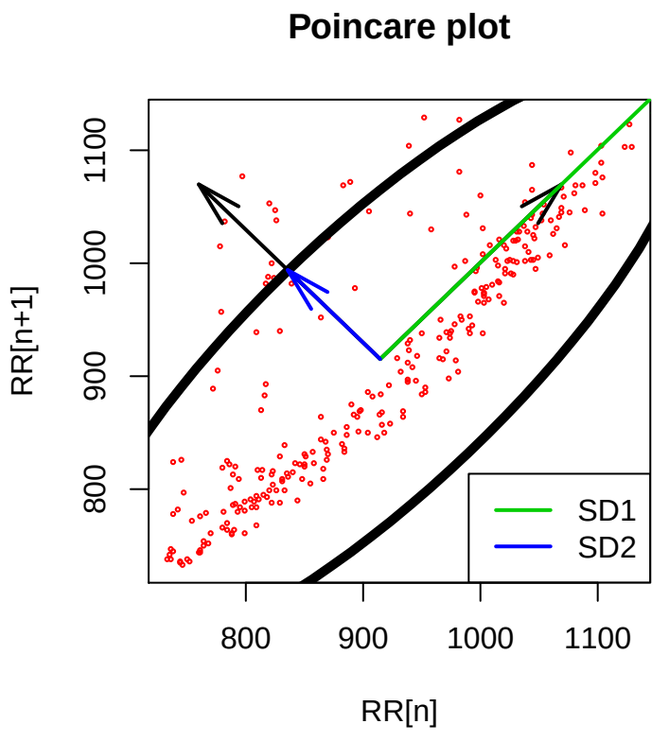


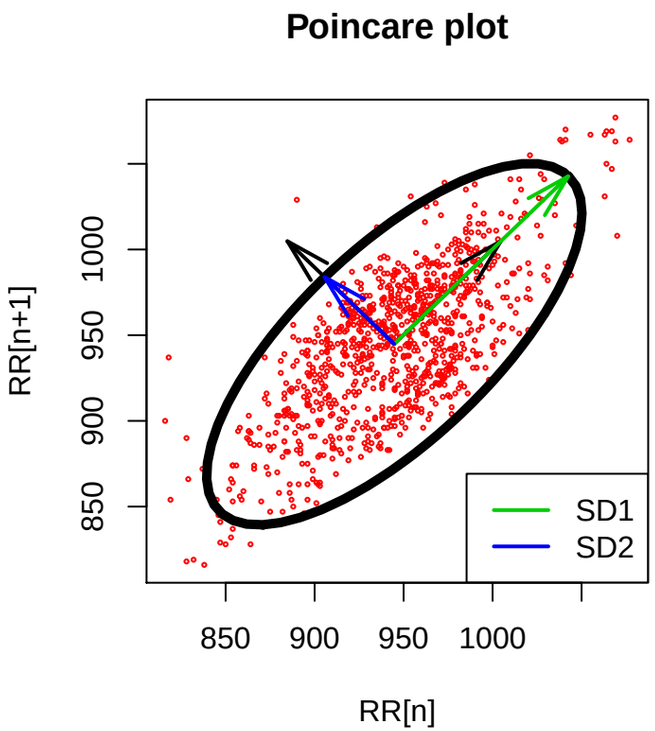

```
## [1] "20160625"
## [1] "0834"
```

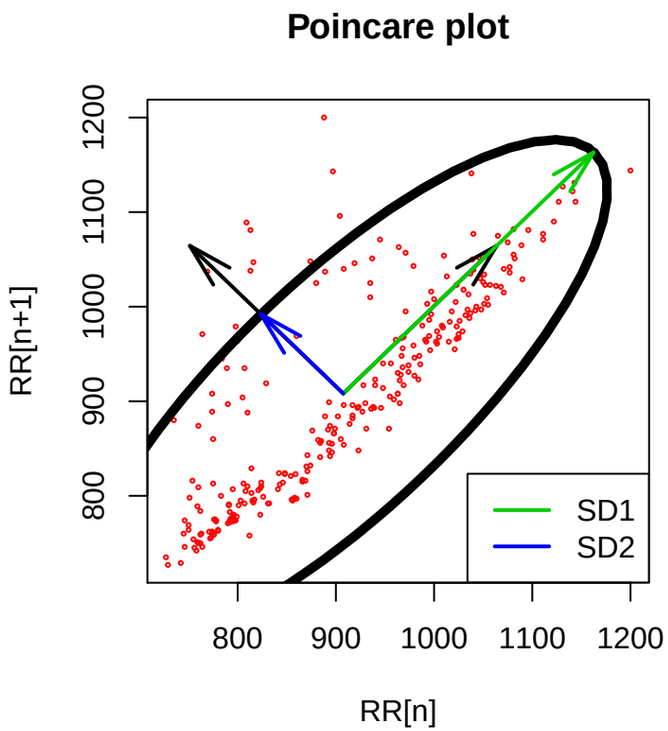
```
## [1] "20160626"
## [1] "1959"
```

```
## [1] "20160628"
## [1] "1003"
```

15 Poincare plots 7-9





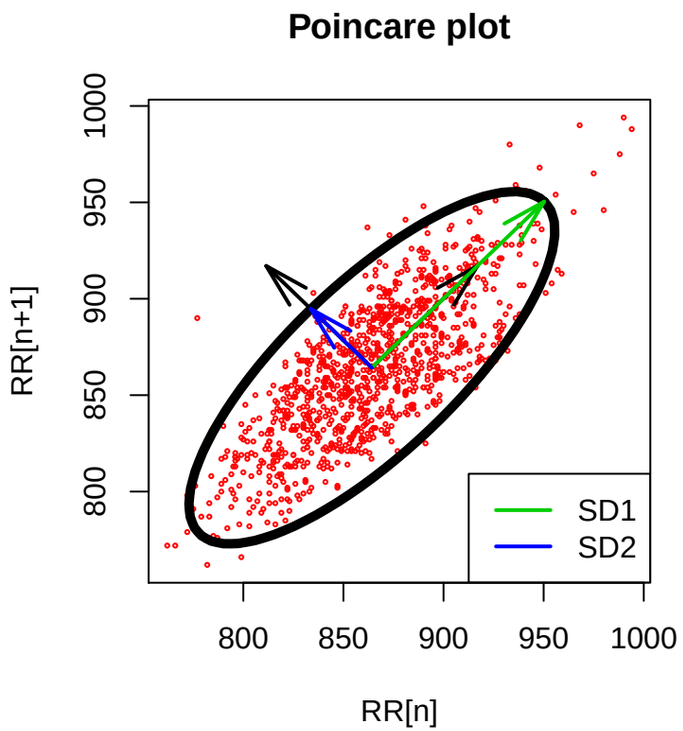


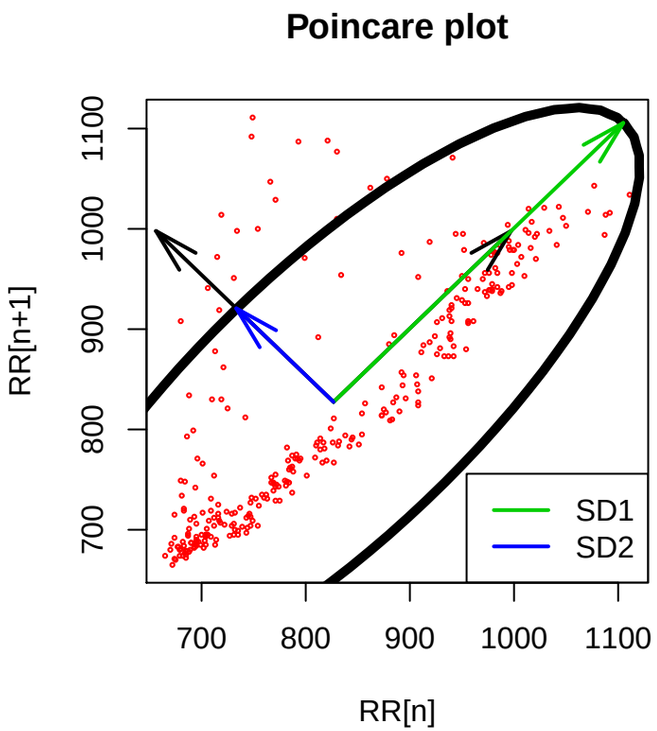

```
## [1] "20160628"
## [1] "1009"
```

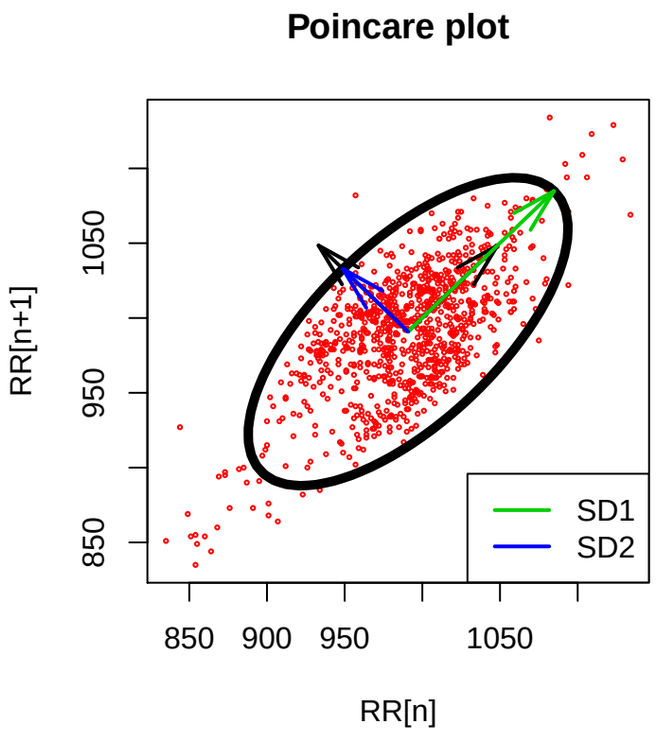
```
## [1] "20160630"
## [1] "0737"
```

```
## [1] "20160630"
## [1] "0808"
```

16 Poincare plots 10-12





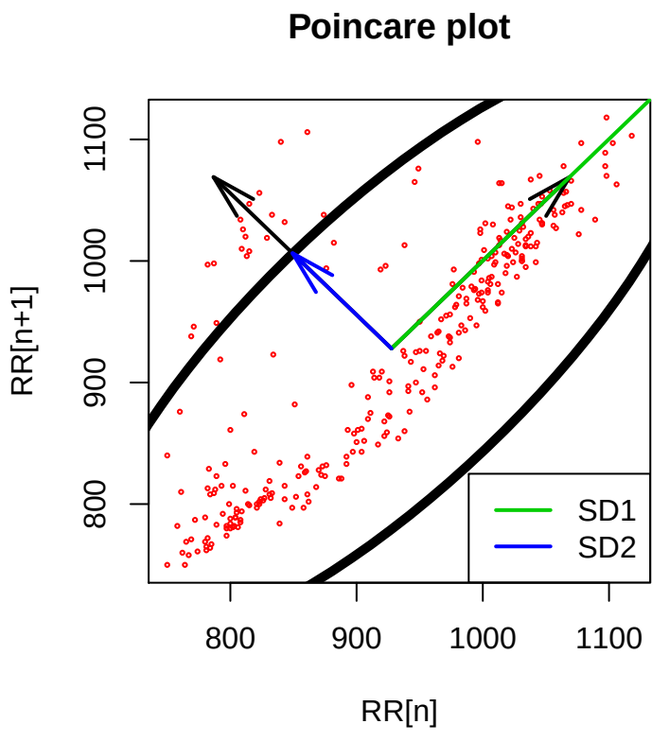


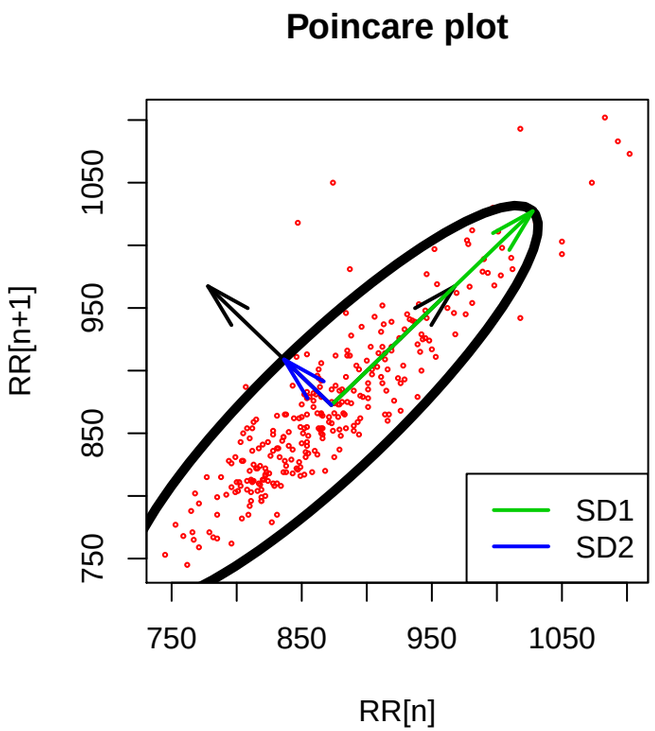

```
## [1] "20160701"
## [1] "1123"
```

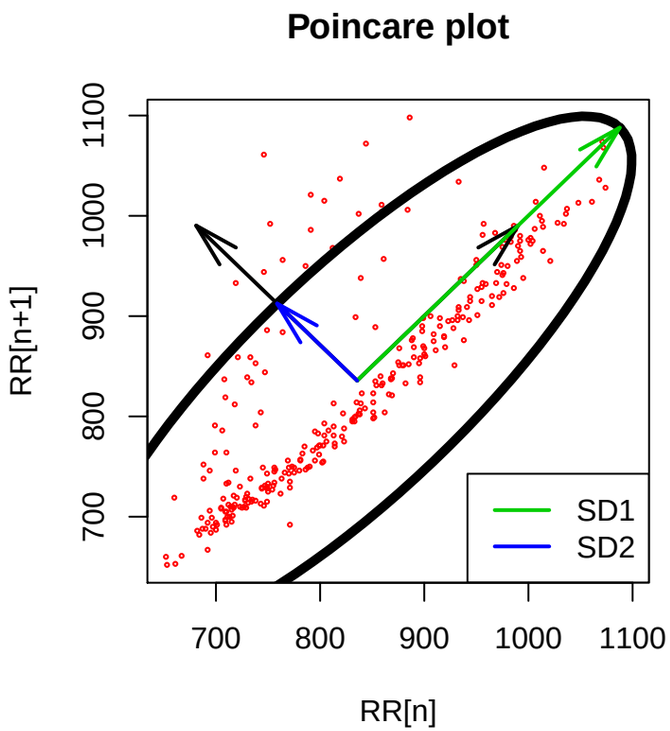
```
## [1] "20160701"
## [1] "1139"
```

```
## [1] "20160702"
## [1] "0744"
```

17 Poincare plots 12-15








```
## [1] "20160702"
## [1] "0800"
```

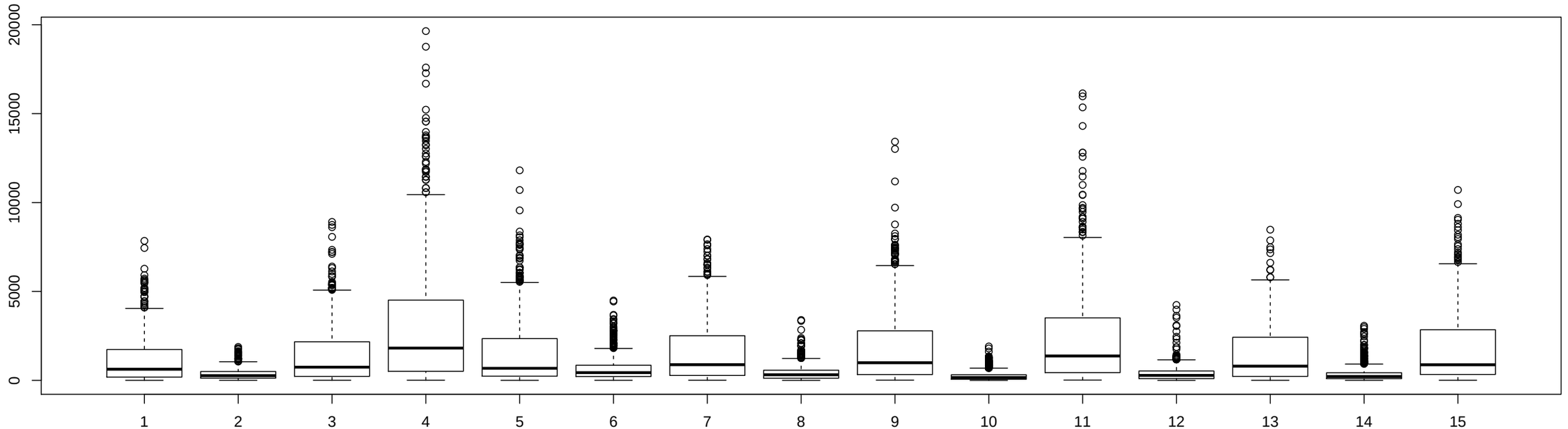
```
## [1] "20160703"
## [1] "0757"
```

```
## [1] "20160703"
## [1] "0805"
```

18 Time Analysis

To get the name of the elements of a varible in RHVR, use names e.g. names(hrv1.data$TimeAnalysis[[1]]) or names(hrv1.data$Beat)

Day	Date	Time	SDNN	RMSSD	HRV_I	pNN50	Median Heart Rate	FileType	Median LF/HF	Mean HF	StdDev.HF	SD1	SD2	SD1/SD2	Dur(s)
1	20160623	0754	113.83	127.07	4.61	20.62	61.66	CB	4.05	1097.62	1194.00	38.7	114.36	0.34	249.39
2	20160624	0814	63	34.47	3.16	14.86	60.24	MB	2.47	347.24	309.00	24.47	85.83	0.29	248.92
3	20160624	0819	96.16	61.89	5.27	21.27	64.14	CB	4.82	1365.14	1465.00	43.93	128.81	0.34	248.87
4	20160625	0834	134.81	92.58	5.16	40.08	62.7	CB	5.10	2955.10	3199.00	65.71	178.76	0.37	248.55
5	20160626	1959	105.88	58.55	3.51	19.29	77.02	CB	8.00	1475.33	1711.00	41.52	143.99	0.29	249.32
6	20160628	1003	60.17	41.96	3.1	20.65	59.06	MB	1.05	643.97	629.00	29.78	79.24	0.38	248.26
7	20160628	1009	107.81	64.21	4.98	22.71	65.5	CB	5.79	1573.64	1642.00	45.52	145.76	0.31	248.93
8	20160630	0737	50.95	52.62	2.49	9.77	63.36	TP	0.78	378.55	319.00	22.57	56.53	0.4	889.96
9	20160630	0808	116.55	96.96	4.84	27.27	66.78	CB	5.07	1843.01	1985.00	48.56	147.27	0.33	249.52
10	20160701	1123	37.3	24.94	2.08	2.75	69.44	TP	1.57	216.86	203.00	17.6	49.74	0.35	880.7
11	20160701	1139	119.91	76.06	4.52	27.15	75.61	CB	5.93	2282.92	2441.00	53.93	160.77	0.34	249.04
12	20160702	0744	42.02	34.31	2.18	13.05	60.39	TP	0.57	351.03	324.00	24.24	54.28	0.45	894.78
13	20160702	0800	99.28	63.88	4.03	22.22	63.42	CB	5.17	1434.78	1489.00	45.31	132.98	0.34	274.68
14	20160703	0757	64.87	29.64	3.06	4.88	69.52	MB	3.80	340.33	397.00	21.03	89.41	0.24	249.54
15	20160703	0805	107.53	62.58	5.45	19.4	72.9	CB	5.74	1760.36	1883.00	44.39	145.7	0.3	249.04



Notes:

- Use the iteration based format we have developed earlier. Modify the R code to enter the needed variables into a dataset that we create after each iteration.
- Eventuallly you can recreate whatever representations you want.

19 The impact of music

Date	Time	SDNN	RMSSD	HRV Index	pNN50	Median Heart Rate	Duration	Median LF/HF	Mean HF	StdDev.HF	Music	Video
20160219	0820	123.72	45.93	4.53	23.18	68.89	260.82	64.87	300.77	682.00	N	Y
20160219	0826	116.53	45.85	4.13	19.72	68.89	253.58	90.01	166.51	188.00	Y	Y
20160219	1014	111.57	42.5	3.83	20.98	76.53	234.81	70.73	194.93	194.00	N	Y
20160219	1022	101.39	40.85	3.53	17.24	79.79	275.57	59.20	199.72	241.00	Y	Y
20160219	1616	103.29	42.25	3.54	18.69	78.18	259.96	51.60	195.97	196.00	N	Y
20160219	1621	100.72	40.77	3.54	18.79	77.72	253.81	62.68	196.61	256.00	Y	Y
20160220	0854	93.01	40.09	3.18	18.93	84.87	305.17	64.97	153.09	171	N	N
20160220	0904	80.19	33.11	3.61	12.2	83.68	310.95	72.17	103.57	107	Y	Y
20160220	1526	82.76	35.58	2.54	14.41	85.59	250.44	53.58	143.24	154.00	N	N
20160220	1531	74.04	31.08	3.18	9.74	86.89	249.81	57.05	118.05	137.00	Y	Y
20160220	2316	111.75	45.33	4.3	22.37	75.76	250.05	60.72	240.19	246.00	N	N
20160220	2322	116.86	87.27	4.05	20.85	76.87	271.36	42.91	322.07	429.00	Y	Y
20160221	0755	122.21	46.54	4.42	23.55	70.09	305.34	81.83	190.88	199.00	N	N
20160221	0802	118.61	87.03	3.23	18.97	72.82	250.48	69.70	171.88	183.00	Y	Y
20160221	2206	106.33	43.41	4.45	22.9	73.98	250.21	70.28	163.49	152.00	N	N
20160221	2211	102.9	40.91	3.38	19.33	74.72	249.93	52.54	205.79	249.00	Y	Y
20160222	0758	99.33	38.93	4.24	16.71	79.79	279.93	47.37	204.36	258.00	N	N
20160222	0804	115.19	47.32	3.31	21.39	82.87	275.51	60.94	225.89	226.00	Y	Y
20160223	0831	109.44	42.37	3.74	20.25	74.3	270.1	70.23	191.34	208.00	Y	Y
20160223	0837	107.71	43.19	3.53	19.17	73.98	265.06	61.79	210.79	242.00	N	N
20160224	0726	117.68	46.53	4.94	21.23	72.86	280.91	56.50	233.96	243.00	Y	Y
20160224	0731	108.18	45.36	4.12	21.13	74.03	344.86	67.59	194.70	201.00	N	N
20160225	0008	111.16	46.7	4.3	23.03	72.38	274.59	63.94	224.09	247.00	Y	Y
20160225	0014	116.95	49.21	4.01	25.3	72.38	284.98	54.55	238.01	254.00	N	N
20160225	0817	117.78	50.01	3.98	23	75.47	421.2	50.29	260.08	304.00	N	N
20160225	0827	107.62	41.6	4.03	20.1	76.34	330.21	66.84	195.79	204.00	Y	Y
20160227	2309	103.49	41.3	4	20.8	75.81	269.98	59.58	199.76	215.00	N	N
20160227	2315	98.65	39.67	3.22	17.28	74.72	270.83	69.81	159.60	162.00	Y	Y
20160229	0008	119.45	50.13	3.78	23.17	84.27	250.7	54.35	321.97	357.00	N	N
20160229	0013	105.85	50.3	3.45	20	83.92	275.01	55.02	217.14	236.00	Y	Y
20160301	0711	130.63	50.75	4.53	28.57	66.89	259.62	72.67	268.49	368.00	N	N
20160301	0716	120.35	45.7	4.63	22.69	68.26	344.39	89.64	171.94	190.00	N	N
20160302	0904	112.13	48.06	3.5	22.22	85.71	255.69	55.87	261.20	277.00	N	N

At the moment it would appear that NO music gives better results in terms of HRV Index and also HF generally speaking. This effect tends to be more pronounced when Median Heart Rate is low. I should try removing the Video also as these may be distractors from the more important issues of being PRESENT.

20 Plotting data in real time

Take a look at this: https://www.thanassis.space/gnuplotStreaming.html
Even better look at the R code but that works only in Rstudio console.
In the file below I eliminated the hold breath after breathing in
/home/samar/Desktop/RHRV/RRdata/Heartmath/201605111621.txt
In the file below I kept the hold breath after breathing in but halved the hold breath after brearing out
/home/samar/Desktop/RHRV/RRdata/Heartmath/201605111625.txt
Generally speaking we are better off with the protocol but when breathing in consider it as a gift of God and when breathing out think about gratitude for a cleansed heart.

21 The acronyms

Underfiletype, we are getting different acronyms to indicate the conditions under which the reading was taken.
MB Morning Breath shortly after getting up. These readings were formerly under Morning. However I do not know to what extent the bug in the EliteHRV makes these readings worthless.
OB Ordinary breathing same as Morning breath but taken at a different time of day
CB Coherent breath means breath following the 12.2 seconds coherent protocol
FB This means CB along with real time feedback.
HT Hypothesis testing

21.1 The Inferences

- It seems that at the beginning there was a marked difference between FB which was higher and CB which was lower. OB was of course far lower than either.
- Over time it seems this has diluted and on 20160520 it appears that the process has reversed with CB reaching an alltime high that was only matched by an FB on 19th at 2328 which is a time when one would normally find these high readings.