

Lab 3

Introduction to Health Data Science - PM566

Katrina Ninh

```
## [1] 2377343      30
```

```
##   USAFID  WBAN year month day hour min  lat      lon elev wind.dir wind.dir.qc
## 1: 690150 93121 2019     8   1   0  56 34.3 -116.166 696      220          5
## 2: 690150 93121 2019     8   1   1  56 34.3 -116.166 696      230          5
## 3: 690150 93121 2019     8   1   2  56 34.3 -116.166 696      230          5
## 4: 690150 93121 2019     8   1   3  56 34.3 -116.166 696      210          5
## 5: 690150 93121 2019     8   1   4  56 34.3 -116.166 696      120          5
## 6: 690150 93121 2019     8   1   5  56 34.3 -116.166 696      NA          9
##   wind.type.code wind.sp wind.sp.qc ceiling.ht ceiling.ht.qc ceiling.ht.method
## 1:              N     5.7          5      22000          5          9
## 2:              N     8.2          5      22000          5          9
## 3:              N     6.7          5      22000          5          9
## 4:              N     5.1          5      22000          5          9
## 5:              N     2.1          5      22000          5          9
## 6:              C     0.0          5      22000          5          9
##   sky.cond vis.dist vis.dist.qc vis.var vis.var.qc temp temp.qc dew.point
## 1:        N    16093          5        N          5 37.2          5    10.6
## 2:        N    16093          5        N          5 35.6          5    10.6
## 3:        N    16093          5        N          5 34.4          5     7.2
## 4:        N    16093          5        N          5 33.3          5     5.0
## 5:        N    16093          5        N          5 32.8          5     5.0
## 6:        N    16093          5        N          5 31.1          5     5.6
##   dew.point.qc atm.press atm.press.qc      rh
## 1:           5    1009.9          5 19.88127
## 2:           5    1010.3          5 21.76098
## 3:           5    1010.6          5 18.48212
## 4:           5    1011.6          5 16.88862
## 5:           5    1012.7          5 17.38410
## 6:           5    1012.7          5 20.01540
```

```
## Classes 'data.table' and 'data.frame':  2377343 obs. of  30 variables:
```

```
## $ USAFID      : int  690150 690150 690150 690150 690150 690150 690150 690150 690150 690150 690150 ...
## $ WBAN        : int  93121 93121 93121 93121 93121 93121 93121 93121 93121 93121 93121 ...
## $ year        : int  2019 2019 2019 2019 2019 2019 2019 2019 2019 2019 2019 ...
## $ month       : int   8 8 8 8 8 8 8 8 8 8 8 ...
## $ day         : int   1 1 1 1 1 1 1 1 1 1 1 ...
## $ hour        : int   0 1 2 3 4 5 6 7 8 9 ...
## $ min         : int  56 56 56 56 56 56 56 56 56 56 ...
## $ lat         : num  34.3 34.3 34.3 34.3 34.3 34.3 34.3 34.3 34.3 34.3 ...
## $ lon         : num -116 -116 -116 -116 -116 ...
## $ elev        : int  696 696 696 696 696 696 696 696 696 696 ...
```

```
## $ wind.dir      : int 220 230 230 210 120 NA 320 10 320 350 ...
## $ wind.dir.qc   : chr "5" "5" "5" "5" ...
## $ wind.type.code : chr "N" "N" "N" "N" ...
## $ wind.sp       : num 5.7 8.2 6.7 5.1 2.1 0 1.5 2.1 2.6 1.5 ...
## $ wind.sp.qc    : chr "5" "5" "5" "5" ...
## $ ceiling.ht    : int 22000 22000 22000 22000 22000 22000 22000 22000 22000 22000 ...
## $ ceiling.ht.qc : int 5 5 5 5 5 5 5 5 5 5 ...
## $ ceiling.ht.method: chr "9" "9" "9" "9" ...
## $ sky.cond      : chr "N" "N" "N" "N" ...
## $ vis.dist      : int 16093 16093 16093 16093 16093 16093 16093 16093 16093 16093 ...
## $ vis.dist.qc   : chr "5" "5" "5" "5" ...
## $ vis.var       : chr "N" "N" "N" "N" ...
## $ vis.var.qc    : chr "5" "5" "5" "5" ...
## $ temp          : num 37.2 35.6 34.4 33.3 32.8 31.1 29.4 28.9 27.2 26.7 ...
## $ temp.qc       : chr "5" "5" "5" "5" ...
## $ dew.point     : num 10.6 10.6 7.2 5 5 5.6 6.1 6.7 7.8 7.8 ...
## $ dew.point.qc  : chr "5" "5" "5" "5" ...
## $ atm.press     : num 1010 1010 1011 1012 1013 ...
## $ atm.press.qc  : int 5 5 5 5 5 5 5 5 5 5 ...
## $ rh            : num 19.9 21.8 18.5 16.9 17.4 ...
## - attr(*, ".internal.selfref")=<externalptr>
```

```
##
## 2019
## 2377343
```

```
##
##      1      2      3      4      5      6      7      8      9     10     11     12     13
## 75975 75923 76915 76594 76332 76734 77677 77766 75366 75450 76187 75052 76906
##      14     15     16     17     18     19     20     21     22     23     24     25     26
## 77852 76217 78015 78219 79191 76709 75527 75786 78312 77413 76965 76806 79114
##      27     28     29     30     31
## 79789 77059 71712 74931 74849
```

```
##
##      0      1      2      3      4      5      6      7      8      9     10
## 99434 93482 93770 96703 110504 112128 106235 101985 100310 102915 101880
##      11     12     13     14     15     16     17     18     19     20     21
## 100470 103605 97004 96507 97635 94942 94184 100179 94604 94928 96070
##      22     23
## 94046 93823
```

```
##      Min. 1st Qu. Median      Mean 3rd Qu.      Max.      NA's
## -40.00  19.60  23.50  23.59  27.80  56.00  60089
```

```
##      Min. 1st Qu. Median      Mean 3rd Qu.      Max.
## -13.0  101.0  252.0  415.8  400.0 9999.0
```

```
##      Min. 1st Qu. Median      Mean 3rd Qu.      Max.      NA's
## 0.00  0.00  2.10  2.46  3.60  36.00  79693
```

```
##      Min. 1st Qu. Median      Mean 3rd Qu.      Max.      NA's
## -13  101  252  413  400  4113  710
```

```

##      USAFID WBAN year month day hour min      lat      lon elev wind.dir wind.dir.qc
## 1: 722817 3068 2019      8   1    0  56 38.767 -104.3 1838      190          5
## 2: 722817 3068 2019      8   1    1  56 38.767 -104.3 1838      180          5
## 3: 722817 3068 2019      8   3   11  56 38.767 -104.3 1838        NA          9
## 4: 722817 3068 2019      8   3   12  56 38.767 -104.3 1838        NA          9
## 5: 722817 3068 2019      8   6   21  56 38.767 -104.3 1838      280          5
## 6: 722817 3068 2019      8   6   22  56 38.767 -104.3 1838      240          5
##      wind.type.code wind.sp wind.sp.qc ceiling.ht ceiling.ht.qc ceiling.ht.method
## 1:                N      7.2          5          NA          9          9
## 2:                N      7.7          5          NA          9          9
## 3:                C      0.0          5          NA          9          9
## 4:                C      0.0          5          NA          9          9
## 5:                N      2.6          5          NA          9          9
## 6:                N      7.7          5          NA          9          9
##      sky.cond vis.dist vis.dist.qc vis.var vis.var.qc temp temp.qc dew.point
## 1:                N      NA          9          N          5 -17.2          5      NA
## 2:                N      NA          9          N          5 -17.2          5      NA
## 3:                N      NA          9          N          5 -17.2          5      NA
## 4:                N      NA          9          N          5 -17.2          5      NA
## 5:                N      NA          9          N          5 -17.2          5      NA
## 6:                N      NA          9          N          5 -17.2          5      NA
##      dew.point.qc atm.press atm.press.qc rh
## 1:                9      NA          9 NA
## 2:                9      NA          9 NA
## 3:                9      NA          9 NA
## 4:                9      NA          9 NA
## 5:                9      NA          9 NA
## 6:                9      NA          9 NA

##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -17.20  19.60   23.50   23.59  27.80   56.00

```

```

##      USAFID WBAN year month day hour min      lat      lon elev wind.dir
## 1: 726764 94163 2019      8  27   11  50 44.683 -111.116 2025      NA
## 2: 726764 94163 2019      8  27   12  10 44.683 -111.116 2025      NA
## 3: 726764 94163 2019      8  27   12  30 44.683 -111.116 2025      NA
## 4: 726764 94163 2019      8  27   12  50 44.683 -111.116 2025      NA
## 5: 720411  137 2019      8  18   12  35 36.422 -105.290 2554      NA
## 6: 726764 94163 2019      8  26   12  30 44.683 -111.116 2025      NA
##      wind.dir.qc wind.type.code wind.sp wind.sp.qc ceiling.ht ceiling.ht.qc
## 1:                9                C      0          5      22000          5
## 2:                9                C      0          5      22000          5
## 3:                9                C      0          5      22000          5
## 4:                9                C      0          5      22000          5
## 5:                9                C      0          5      22000          5
## 6:                9                C      0          5      22000          5
##      ceiling.ht.method sky.cond vis.dist vis.dist.qc vis.var vis.var.qc temp
## 1:                9          N    16093          5          N          5 -3.0
## 2:                9          N    16093          5          N          5 -3.0
## 3:                9          N    16093          5          N          5 -3.0
## 4:                9          N    16093          5          N          5 -3.0
## 5:                9          N    16093          5          N          5 -2.4
## 6:                9          N    16093          5          N          5 -2.0
##      temp.qc dew.point dew.point.qc atm.press atm.press.qc      rh

```

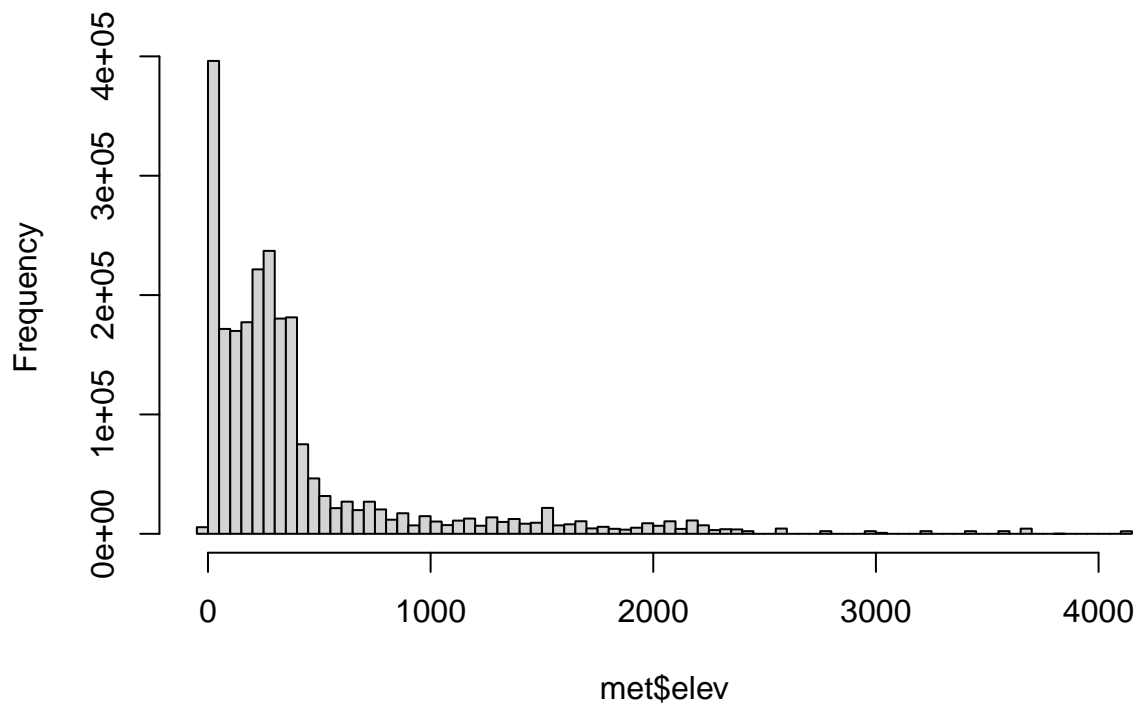
## 1:	C	-5.0	C	NA	9 86.26537
## 2:	5	-4.0	5	NA	9 92.91083
## 3:	5	-4.0	5	NA	9 92.91083
## 4:	C	-4.0	C	NA	9 92.91083
## 5:	5	-3.7	5	NA	9 90.91475
## 6:	5	-3.0	5	NA	9 92.96690

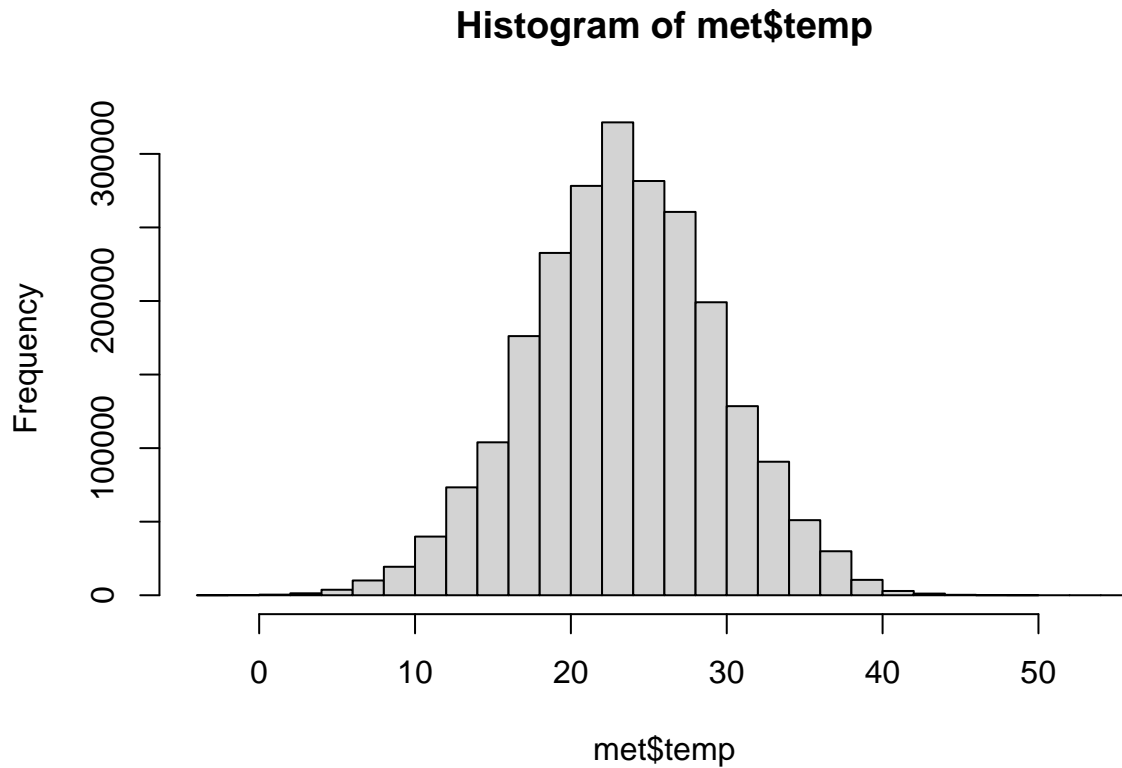
##	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
##	-3.00	19.60	23.50	23.59	27.80	56.00

##	USAFID	WBAN	year	month	day
##	Min. :720385	Min. :419	Min. :2019	Min. :8	Min. : 1.0
##	1st Qu.:720385	1st Qu.:419	1st Qu.:2019	1st Qu.:8	1st Qu.: 8.0
##	Median :720385	Median :419	Median :2019	Median :8	Median :16.0
##	Mean :720385	Mean :419	Mean :2019	Mean :8	Mean :16.1
##	3rd Qu.:720385	3rd Qu.:419	3rd Qu.:2019	3rd Qu.:8	3rd Qu.:24.0
##	Max. :720385	Max. :419	Max. :2019	Max. :8	Max. :31.0
##					
##	hour	min	lat	lon	elev
##	Min. : 0.00	Min. : 6.00	Min. :39.8	Min. : -105.8	Min. :4113
##	1st Qu.: 6.00	1st Qu.:13.00	1st Qu.:39.8	1st Qu.: -105.8	1st Qu.:4113
##	Median :12.00	Median :36.00	Median :39.8	Median : -105.8	Median :4113
##	Mean :11.66	Mean :34.38	Mean :39.8	Mean : -105.8	Mean :4113
##	3rd Qu.:18.00	3rd Qu.:53.00	3rd Qu.:39.8	3rd Qu.: -105.8	3rd Qu.:4113
##	Max. :23.00	Max. :59.00	Max. :39.8	Max. : -105.8	Max. :4113
##					
##	wind.dir	wind.dir.qc	wind.type.code	wind.sp	
##	Min. : 10.0	Length:2117	Length:2117	Min. : 0.000	
##	1st Qu.:250.0	Class :character	Class :character	1st Qu.: 4.100	
##	Median :300.0	Mode :character	Mode :character	Median : 6.700	
##	Mean :261.5			Mean : 7.245	
##	3rd Qu.:310.0			3rd Qu.: 9.800	
##	Max. :360.0			Max. :21.100	
##	NA's :237			NA's :168	
##	wind.sp.qc	ceiling.ht	ceiling.ht.qc	ceiling.ht.method	
##	Length:2117	Min. : 30	Min. :5.000	Length:2117	
##	Class :character	1st Qu.: 2591	1st Qu.:5.000	Class :character	
##	Mode :character	Median :22000	Median :5.000	Mode :character	
##		Mean :15145	Mean :5.008		
##		3rd Qu.:22000	3rd Qu.:5.000		
##		Max. :22000	Max. :9.000		
##		NA's :4			
##	sky.cond	vis.dist	vis.dist.qc	vis.var	
##	Length:2117	Min. : 0	Length:2117	Length:2117	
##	Class :character	1st Qu.:16093	Class :character	Class :character	
##	Mode :character	Median :16093	Mode :character	Mode :character	
##		Mean :15913			
##		3rd Qu.:16093			
##		Max. :16093			
##		NA's :683			
##	vis.var.qc	temp	temp.qc	dew.point	
##	Length:2117	Min. : 1.00	Length:2117	Min. : -6.0000	
##	Class :character	1st Qu.: 6.00	Class :character	1st Qu.: 0.0000	
##	Mode :character	Median : 8.00	Mode :character	Median : 0.0000	

```
##          Mean   : 8.13                      Mean   : 0.8729
##          3rd Qu.:10.00                     3rd Qu.: 2.0000
##          Max.   :15.00                     Max.   : 7.0000
##
## dew.point.qc      atm.press      atm.press.qc      rh
## Length:2117      Min.   : NA      Min.   :9      Min.   :53.63
## Class :character  1st Qu.: NA      1st Qu.:9      1st Qu.:58.10
## Mode  :character  Median : NA      Median :9      Median :61.39
##                  Mean   :NaN      Mean   :9      Mean   :60.62
##                  3rd Qu.: NA      3rd Qu.:9      3rd Qu.:61.85
##                  Max.   : NA      Max.   :9      Max.   :70.01
##                  NA's   :2117
##
## [1] -0.09373843
##
## [1] 0.4397261
##
## [1] 0.3643079
##
## [1] 0.08807315
##
## [1] -0.003857766
```

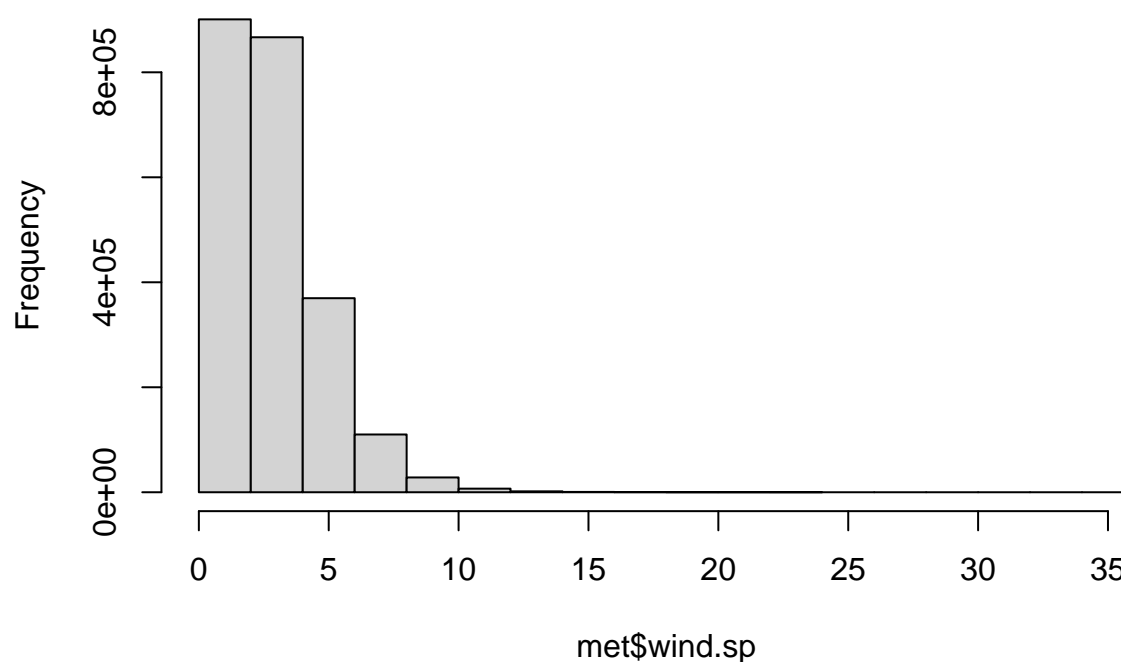
Histogram of met\$elev





```
## The legacy packages maptools, rgdal, and rgeos, underpinning the sp package,  
## which was just loaded, will retire in October 2023.  
## Please refer to R-spatial evolution reports for details, especially  
## https://r-spatial.org/r/2023/05/15/evolution4.html.  
## It may be desirable to make the sf package available;  
## package maintainers should consider adding sf to Suggests:.  
## The sp package is now running under evolution status 2  
## (status 2 uses the sf package in place of rgdal)
```

Histogram of met\$wind.sp



```
##
## Attaching package: 'lubridate'

## The following objects are masked from 'package:data.table':
##
##   hour, isoweek, mday, minute, month, quarter, second, wday, week,
##   yday, year

## The following objects are masked from 'package:base':
##
##   date, intersect, setdiff, union

##           Min.           1st Qu.
## "2019-08-01 00:00:00.0000" "2019-08-08 11:00:00.0000"
##           Median           Mean
## "2019-08-16 22:00:00.0000" "2019-08-16 14:09:56.8823"
##           3rd Qu.           Max.
## "2019-08-24 11:00:00.0000" "2019-08-31 22:00:00.0000"

##   USAFID WBAN year month day hour min  lat      lon elev wind.dir wind.dir.qc
## 1: 720385 419 2019     8   1   0  36 39.8 -105.766 4113     170         5
## 2: 720385 419 2019     8   1   0  54 39.8 -105.766 4113     100         5
## 3: 720385 419 2019     8   1   1  12 39.8 -105.766 4113      90         5
## 4: 720385 419 2019     8   1   1  35 39.8 -105.766 4113     110         5
## 5: 720385 419 2019     8   1   1  53 39.8 -105.766 4113     120         5
```

```

## 6: 720385 419 2019      8 1 2 12 39.8 -105.766 4113      120      5
##      wind.type.code wind.sp wind.sp.qc ceiling.ht ceiling.ht.qc ceiling.ht.method
## 1:      N      8.8      5      1372      5      M
## 2:      N      2.6      5      1372      5      M
## 3:      N      3.1      5      1981      5      M
## 4:      N      4.1      5      2134      5      M
## 5:      N      4.6      5      2134      5      M
## 6:      N      6.2      5      22000      5      9
##      sky.cond vis.dist vis.dist.qc vis.var vis.var.qc temp temp.qc dew.point
## 1:      N      NA      9      N      5      9      5      1
## 2:      N      NA      9      N      5      9      5      1
## 3:      N      NA      9      N      5      9      5      2
## 4:      N      NA      9      N      5      9      5      2
## 5:      N      NA      9      N      5      9      5      2
## 6:      N      NA      9      N      5      9      5      2
##      dew.point.qc atm.press atm.press.qc      rh      date
## 1:      5      NA      9 57.61039 2019-08-01 00:00:00
## 2:      5      NA      9 57.61039 2019-08-01 00:00:00
## 3:      5      NA      9 61.85243 2019-08-01 01:00:00
## 4:      5      NA      9 61.85243 2019-08-01 01:00:00
## 5:      5      NA      9 61.85243 2019-08-01 01:00:00
## 6:      5      NA      9 61.85243 2019-08-01 02:00:00

```

