Case study, single day

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Case 1

```
ss <- subset(dath, date == '2018-04-15' & ct == 3)$sim[1]
dc <- subset(dath, sim == ss)
dc <- dc[order(dc$ct), ]
```

Use average inputs.

```
dm <- dc[, 1:15]
dm$wind.2m <- mean(dc$wind.2m)
dm$air.temp <- mean(dc$air.temp)
dm$rain.rate <- mean(dc$rain.rate)
```

```
preds <- ALFAM2mod(dm, pars = pars, app.name = 'tan.app', time.name = 'ct')
```

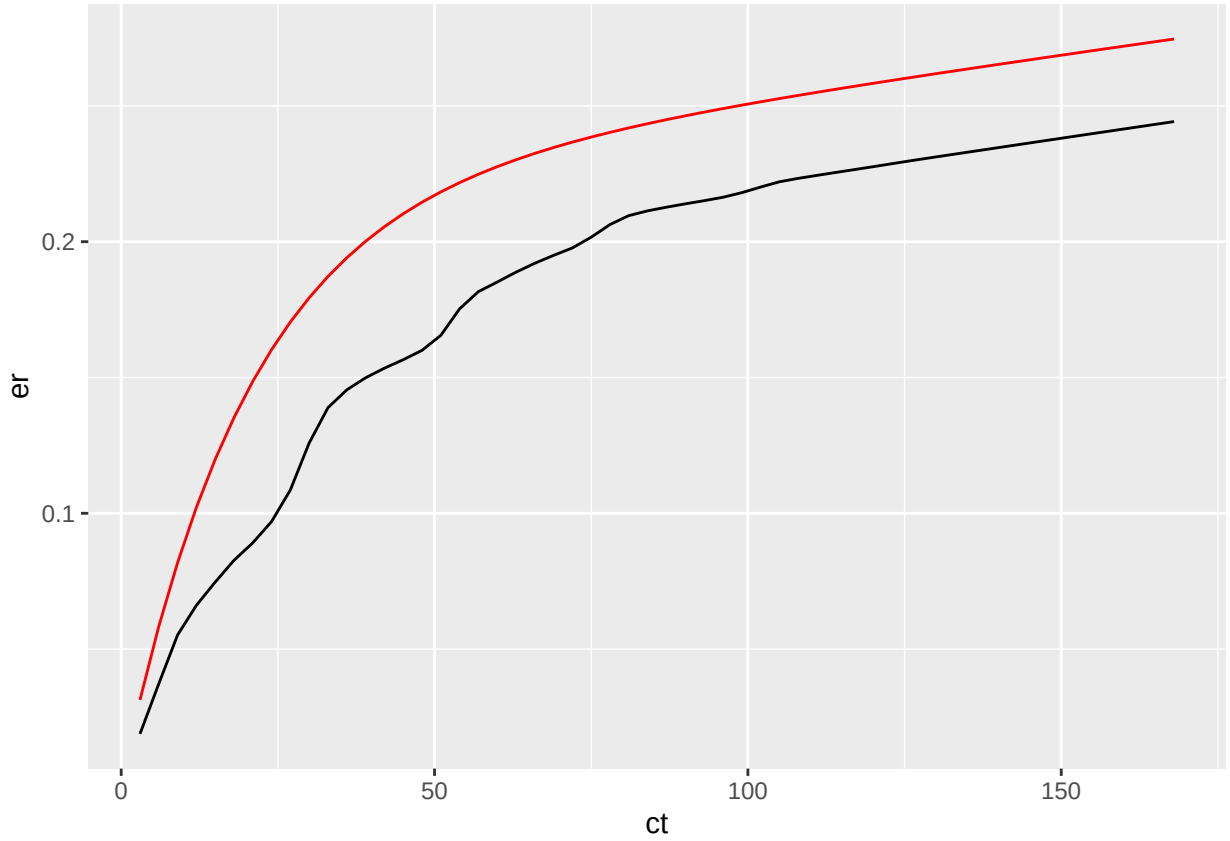
```
## User-supplied parameters are being used.
```

```
## Warning in ALFAM2mod(dm, pars = pars, app.name = "tan.app", time.name = "ct"): Running with 12 parameters. Dropped 12 with no match.
## These secondary parameters have been dropped:
##   app.mthd.os.f0
##   man.source.pig.f0
##   app.mthd.cs.f0
##   app.mthd.bc.r1
##   app.mthd.ts.r1
##   ts.cereal.hght.r1
##   app.mthd.bc.r3
##   app.mthd.cs.r3
##   incorp.shallow.f4
```

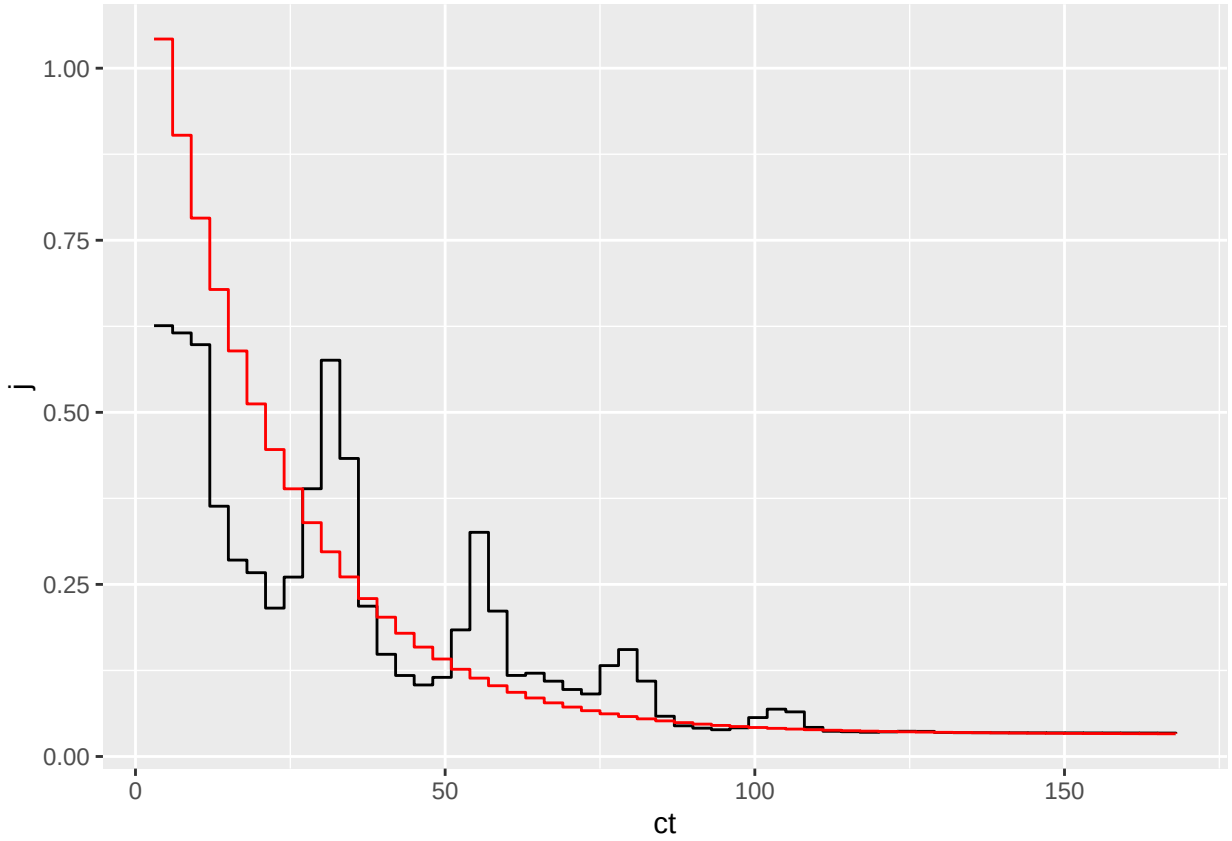
```
##   incorp.shallow.r3
##   incorp.deep.f4
##   incorp.deep.r3
##
## These secondary parameters are being used:
##   int.f0
##   app.rate.ni.f0
##   man.dm.f0
##   int.r1
##   man.dm.r1
##   air.temp.r1
##   wind.2m.r1
##   man.ph.r1
##   int.r2
##   rain.rate.r2
##   int.r3
##   man.ph.r3
```

```
dm <- cbind(dm, preds[, -1:-3])
```

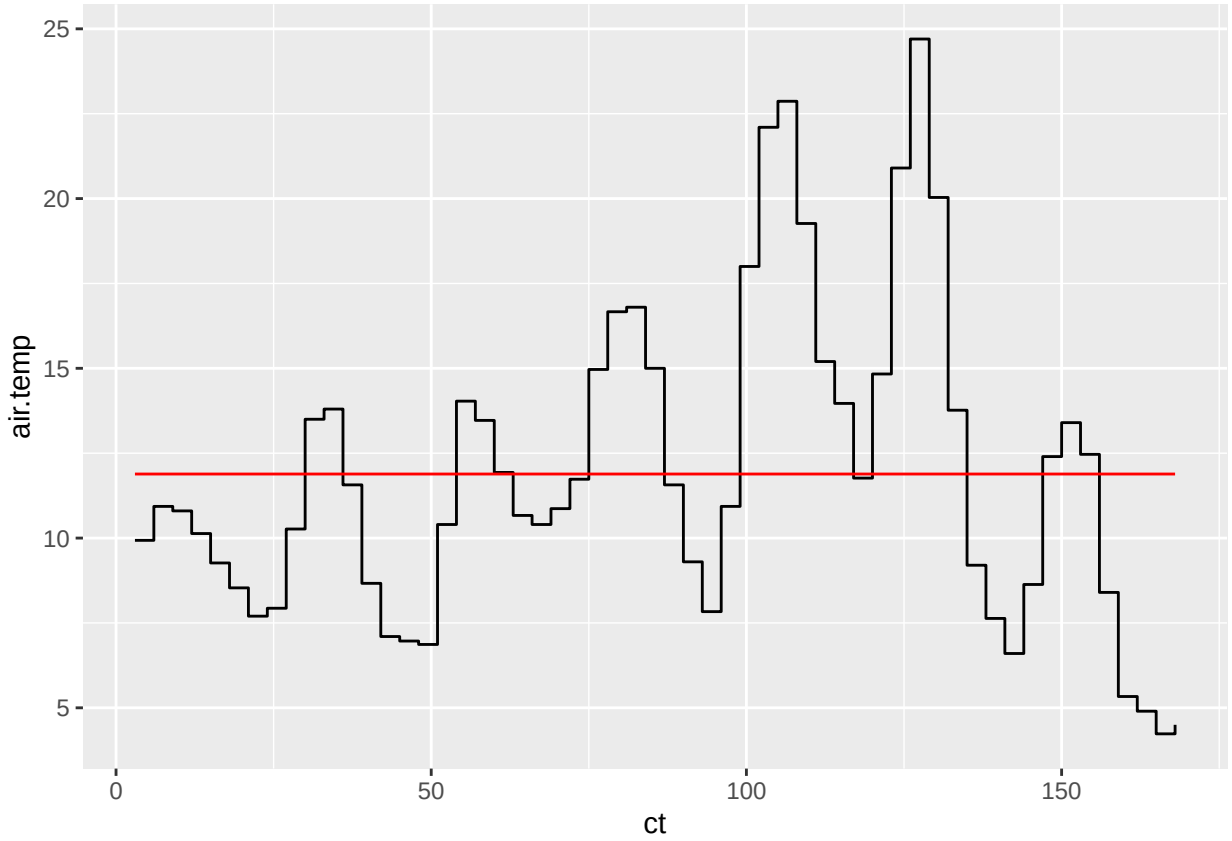
```
ggplot(dc, aes(ct, er)) + geom_line() +
  geom_line(data = dm, colour = 'red')
```



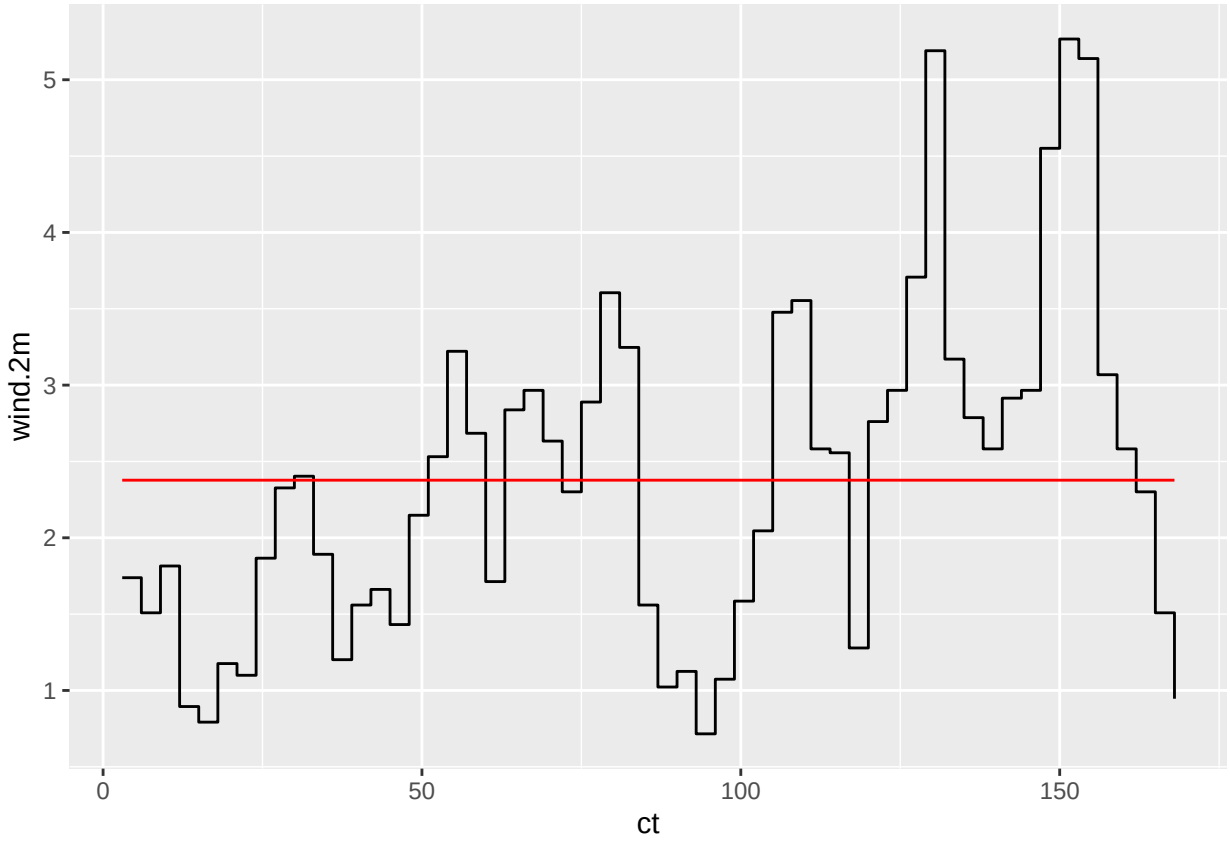

```
ggplot(dc, aes(ct, j)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```




```
ggplot(dc, aes(ct, air.temp)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```




```
ggplot(dc, aes(ct, wind.2m)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```



Case 2

```
ss <- subset(dath, date == '2020-04-01' & ct == 3)$sim[1]
dc <- subset(dath, sim == ss)
dc <- dc[order(dc$ct), ]
```

Use average inputs.

```
dm <- dc[, 1:15]
dm$wind.2m <- mean(dc$wind.2m)
dm$air.temp <- mean(dc$air.temp)
```

```r
dm$rain.rate <- mean(dc$rain.rate)
```

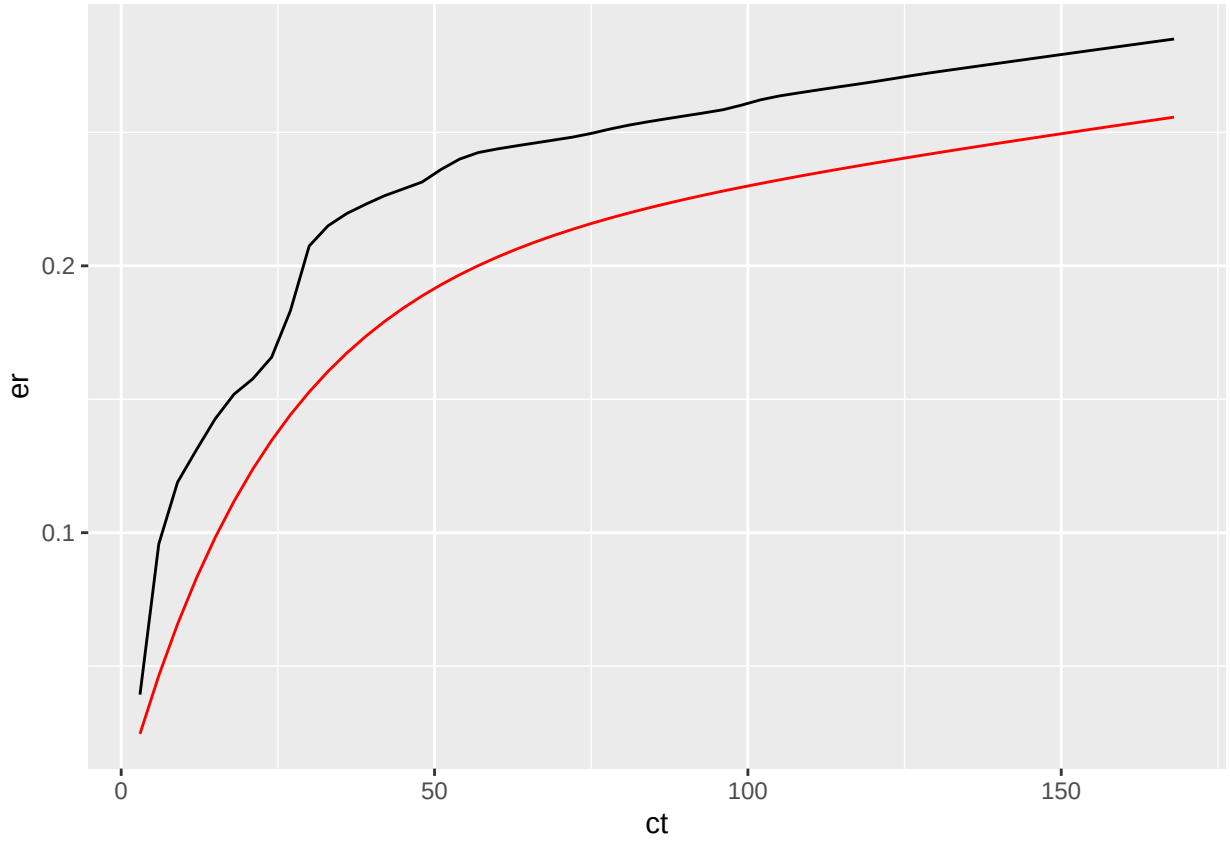
```r
preds <- ALFAM2mod(dm, pars = pars, app.name = 'tan.app', time.name = 'ct')
```

```
## User-supplied parameters are being used.
```

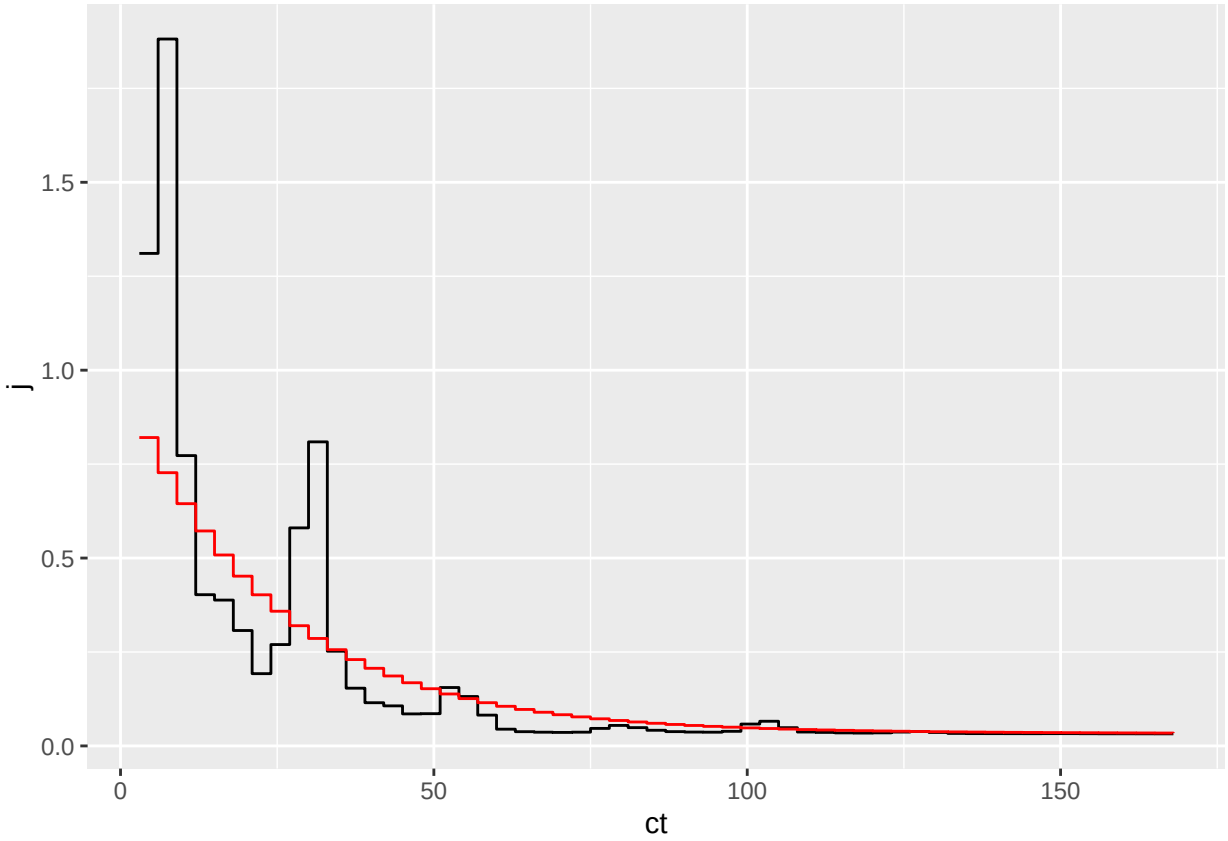
```
## Warning in ALFAM2mod(dm, pars = pars, app.name = "tan.app", time.name = "ct"): Running with 12 parameters. Dropped 12 with no match.
## These secondary parameters have been dropped:
##   app.mthd.os.f0
##   man.source.pig.f0
##   app.mthd.cs.f0
##   app.mthd.bc.r1
##   app.mthd.ts.r1
##   ts.cereal.hght.r1
##   app.mthd.bc.r3
##   app.mthd.cs.r3
##   incorp.shallow.f4
##   incorp.shallow.r3
##   incorp.deep.f4
##   incorp.deep.r3
##
## These secondary parameters are being used:
##   int.f0
##   app.rate.ni.f0
##   man.dm.f0
##   int.r1
##   man.dm.r1
##   air.temp.r1
##   wind.2m.r1
##   man.ph.r1
##   int.r2
##   rain.rate.r2
##   int.r3
##   man.ph.r3
```

```r
dm <- cbind(dm, preds[, -1:-3])
```

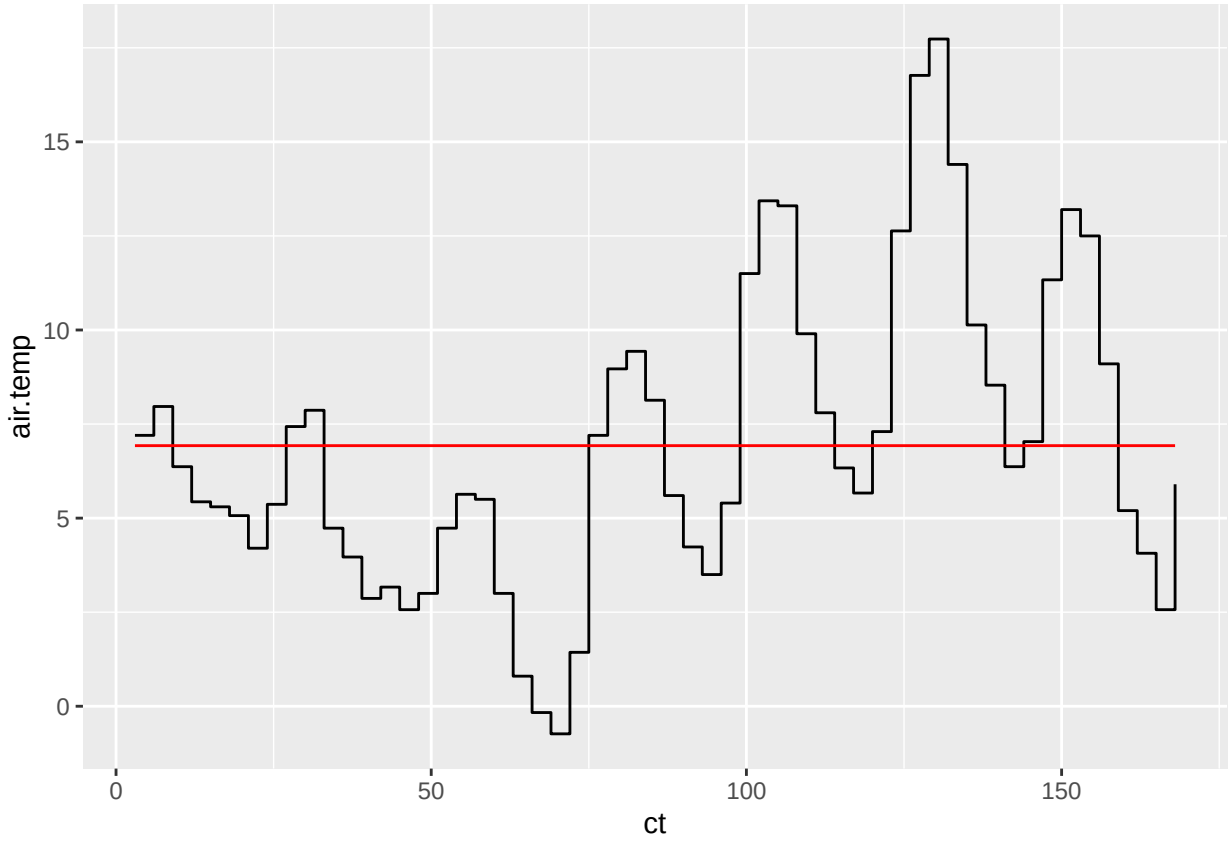
```r
ggplot(dc, aes(ct, er)) + geom_line() +
  geom_line(data = dm, colour = 'red')
```



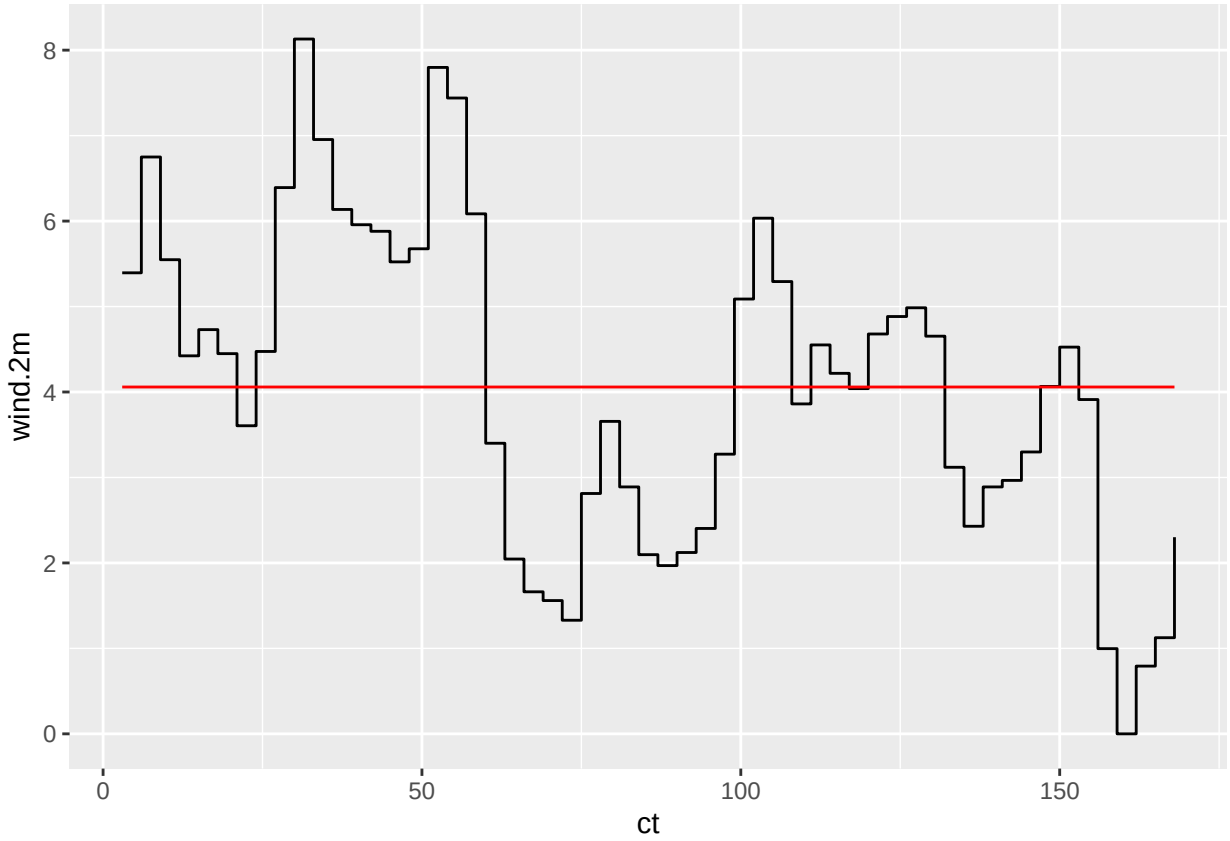

```
ggplot(dc, aes(ct, j)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```




```
ggplot(dc, aes(ct, air.temp)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```




```
ggplot(dc, aes(ct, wind.2m)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```



Case 3. Random

```
dc <- data.frame(ct = 1:168, wind.2m = rnorm(168, mean = 4, sd = 1), air.temp = rnorm(168, mean = 7, sd = 2), tan.app = 100)
preds <- ALFAM2mod(dc, pars = pars, app.name = 'tan.app', time.name = 'ct')
```

```
## User-supplied parameters are being used.
```

```
## Warning in ALFAM2mod(dc, pars = pars, app.name = "tan.app", time.name = "ct"): Running with 6 parameters. Dropped 18 with no match.
## These secondary parameters have been dropped:
##   app.mthd.os.f0
##   app.rate.ni.f0
```

```
##   man.dm.f0
##   man.source.pig.f0
##   app.mthd.cs.f0
##   app.mthd.bc.r1
##   man.dm.r1
##   app.mthd.ts.r1
##   ts.cereal.hght.r1
##   man.ph.r1
##   rain.rate.r2
##   app.mthd.bc.r3
##   app.mthd.cs.r3
##   man.ph.r3
##   incorp.shallow.f4
##   incorp.shallow.r3
##   incorp.deep.f4
##   incorp.deep.r3
##
## These secondary parameters are being used:
##   int.f0
##   int.r1
##   air.temp.r1
##   wind.2m.r1
##   int.r2
##   int.r3
```

```
dc <- cbind(dc, preds[, -1:-3])
```

Average.

```
dm <- data.frame(ct = 1:168, wind.2m = 4, air.temp = 7, tan.app = 100)
preds <- ALFAM2mod(dm, pars = pars, app.name = 'tan.app', time.name = 'ct')
```

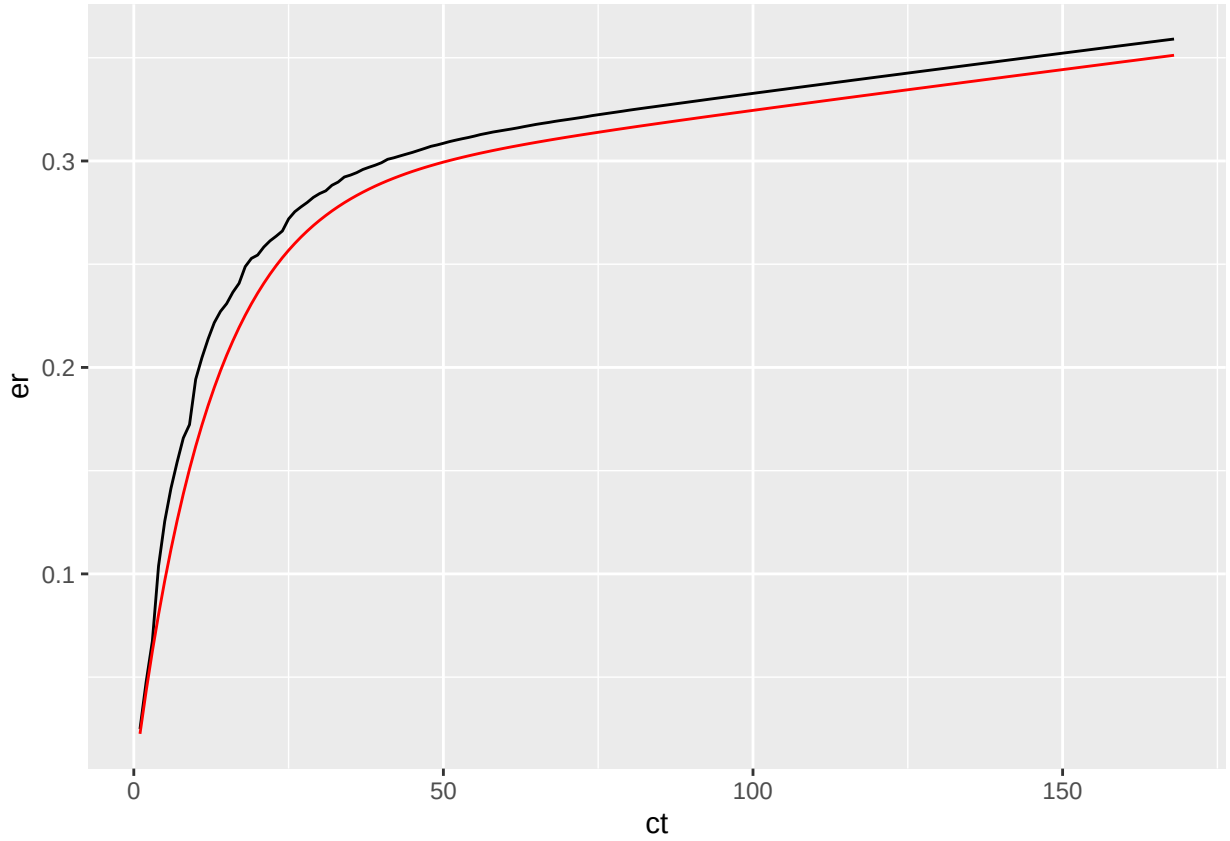
```
## User-supplied parameters are being used.
```

```
## Warning in ALFAM2mod(dm, pars = pars, app.name = "tan.app", time.name = "ct"): Running with 6 parameters. Dropped 18 with no match.
## These secondary parameters have been dropped:
##   app.mthd.os.f0
##   app.rate.ni.f0
##   man.dm.f0
##   man.source.pig.f0
##   app.mthd.cs.f0
```

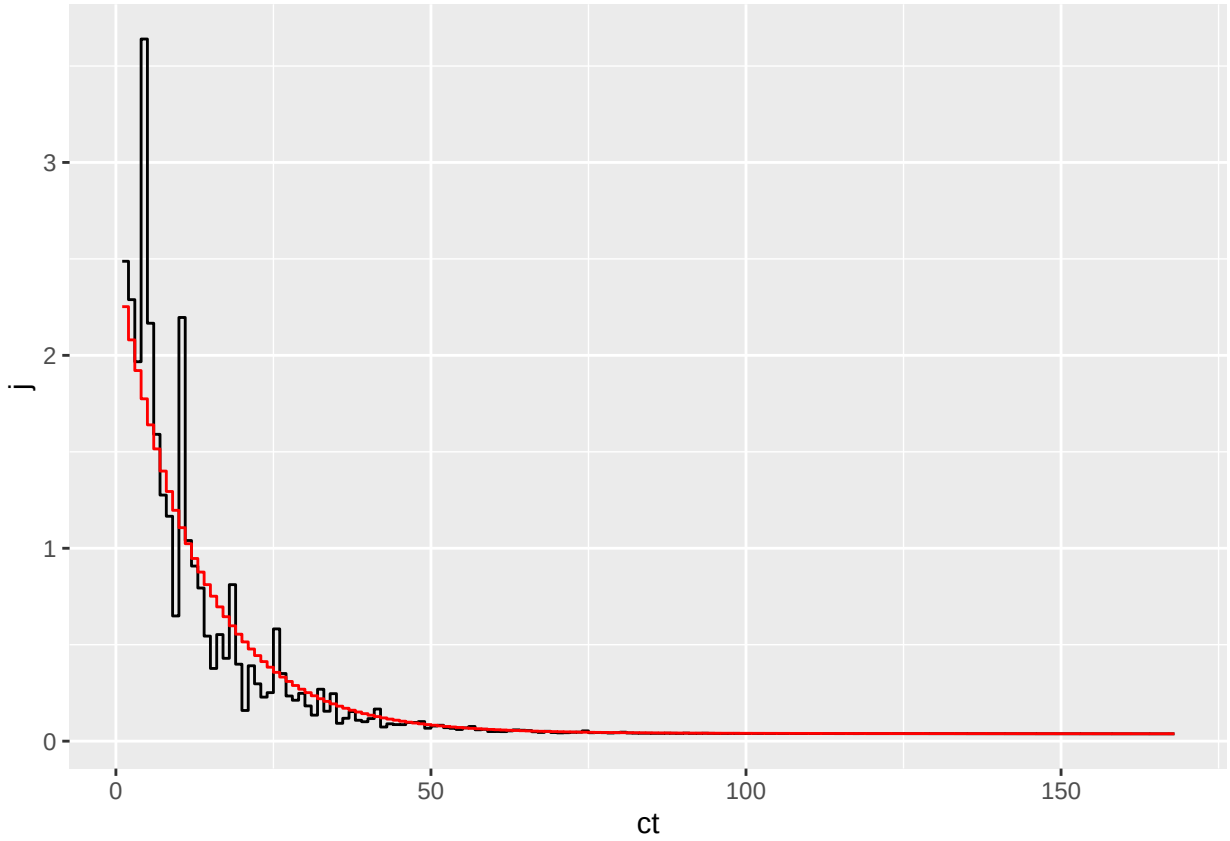
```
##   app.mthd.bc.r1
##   man.dm.r1
##   app.mthd.ts.r1
##   ts.cereal.hght.r1
##   man.ph.r1
##   rain.rate.r2
##   app.mthd.bc.r3
##   app.mthd.cs.r3
##   man.ph.r3
##   incorp.shallow.f4
##   incorp.shallow.r3
##   incorp.deep.f4
##   incorp.deep.r3
##
## These secondary parameters are being used:
##   int.f0
##   int.r1
##   air.temp.r1
##   wind.2m.r1
##   int.r2
##   int.r3
```

```
dm <- cbind(dm, preds[, -1:-3])
```

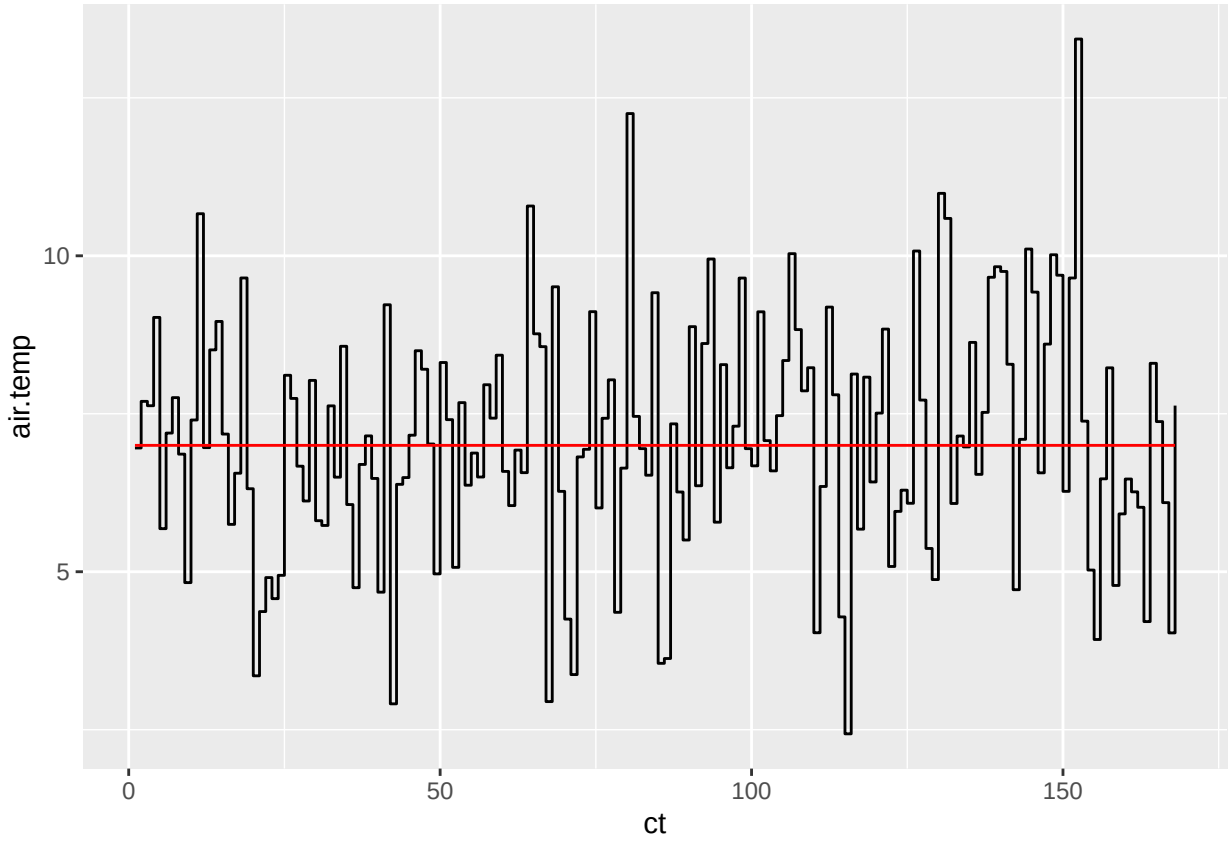
```
ggplot(dc, aes(ct, er)) + geom_line() +
  geom_line(data = dm, colour = 'red')
```



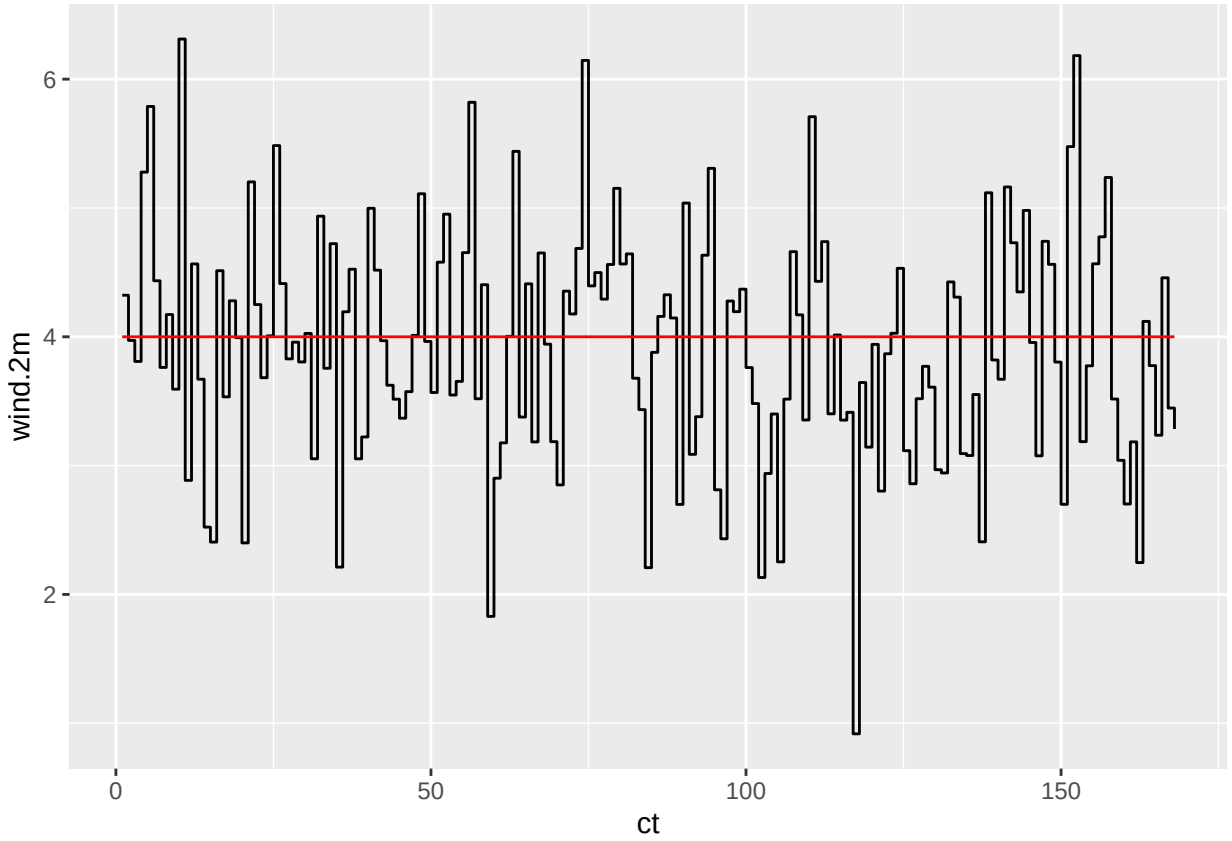

```
ggplot(dc, aes(ct, j)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```




```
ggplot(dc, aes(ct, air.temp)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```




```
ggplot(dc, aes(ct, wind.2m)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```



Case 4. Random but correlated

```
dc <- data.frame(ct = 1:168, wind.2m = rnorm(168, mean = 4, sd = 1), tan.app = 100)
dc$air.temp <- dc$wind.2m + 3 + rnorm(168, mean = 0, sd = 1)
preds <- ALFAM2mod(dc, pars = pars, app.name = 'tan.app', time.name = 'ct')
```

```
## User-supplied parameters are being used.
```

```
## Warning in ALFAM2mod(dc, pars = pars, app.name = "tan.app", time.name = "ct"): Running with 6 parameters. Dropped 18 with no match.
## These secondary parameters have been dropped:
##   app.mthd.os.f0
```

```
##   app.rate.ni.f0
##   man.dm.f0
##   man.source.pig.f0
##   app.mthd.cs.f0
##   app.mthd.bc.r1
##   man.dm.r1
##   app.mthd.ts.r1
##   ts.cereal.hght.r1
##   man.ph.r1
##   rain.rate.r2
##   app.mthd.bc.r3
##   app.mthd.cs.r3
##   man.ph.r3
##   incorp.shallow.f4
##   incorp.shallow.r3
##   incorp.deep.f4
##   incorp.deep.r3
##
## These secondary parameters are being used:
##   int.f0
##   int.r1
##   air.temp.r1
##   wind.2m.r1
##   int.r2
##   int.r3
```

```
dc <- cbind(dc, preds[, -1:-3])
```

Average.

```
dm <- data.frame(ct = 1:168, wind.2m = 4, air.temp = 7, tan.app = 100)
preds <- ALFAM2mod(dm, pars = pars, app.name = 'tan.app', time.name = 'ct')
```

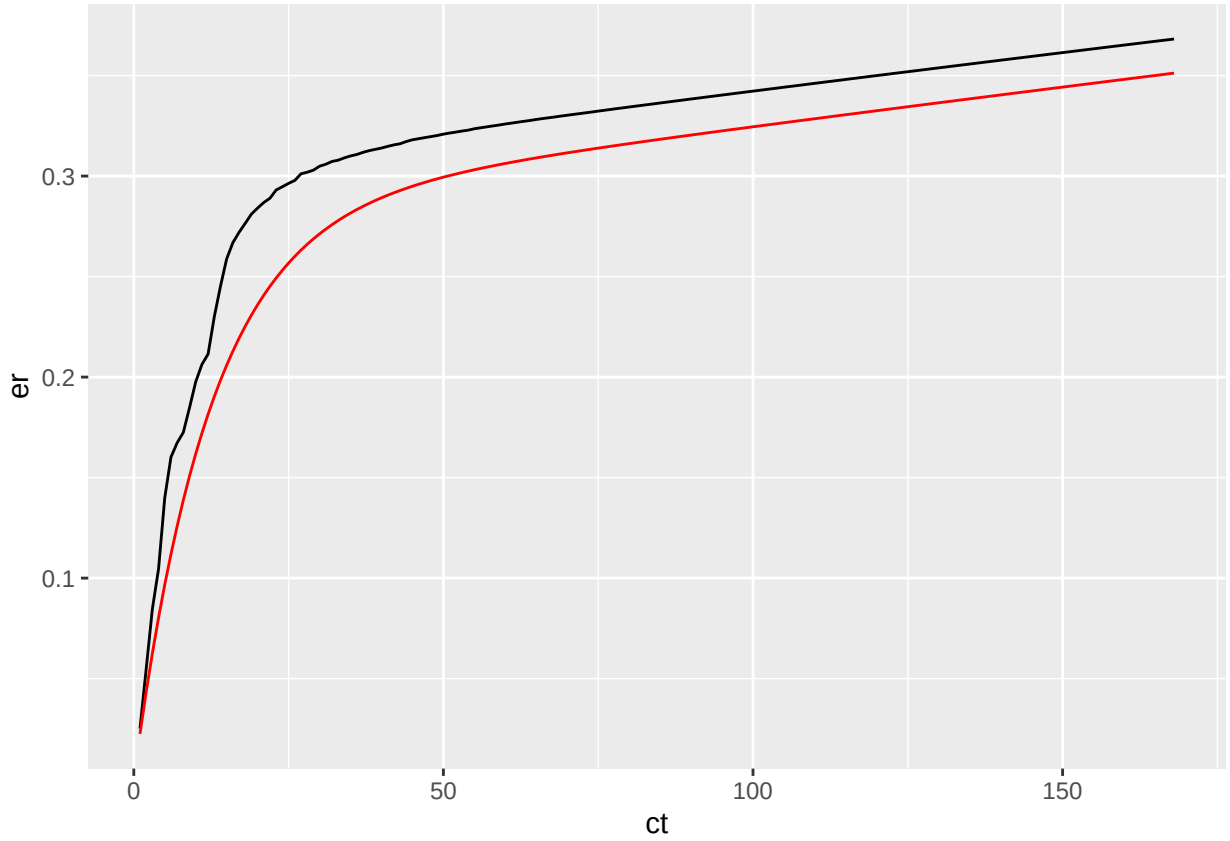
```
## User-supplied parameters are being used.
```

```
## Warning in ALFAM2mod(dm, pars = pars, app.name = "tan.app", time.name = "ct"): Running with 6 parameters. Dropped 18 with no match.
## These secondary parameters have been dropped:
##   app.mthd.os.f0
##   app.rate.ni.f0
##   man.dm.f0
##   man.source.pig.f0
```

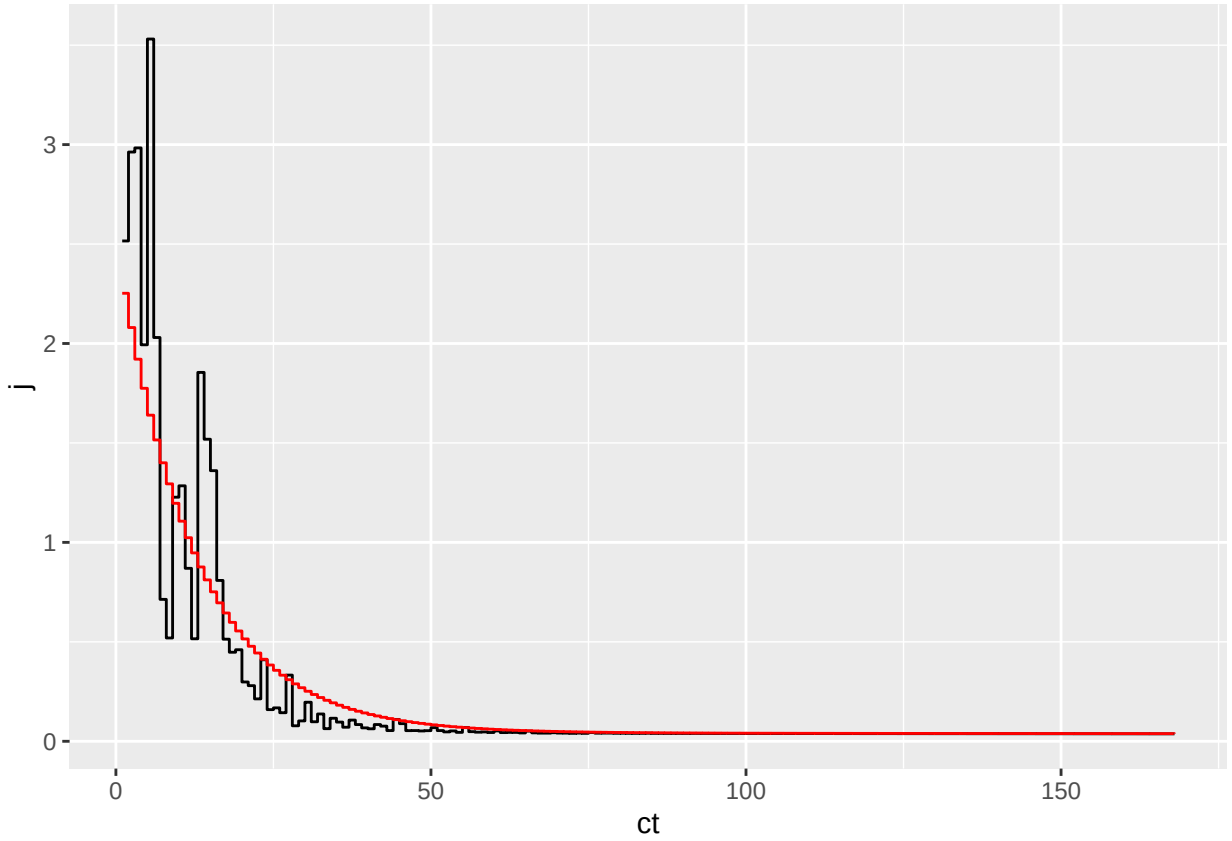
```
##   app.mthd.cs.f0
##   app.mthd.bc.r1
##   man.dm.r1
##   app.mthd.ts.r1
##   ts.cereal.hght.r1
##   man.ph.r1
##   rain.rate.r2
##   app.mthd.bc.r3
##   app.mthd.cs.r3
##   man.ph.r3
##   incorp.shallow.f4
##   incorp.shallow.r3
##   incorp.deep.f4
##   incorp.deep.r3
##
## These secondary parameters are being used:
##   int.f0
##   int.r1
##   air.temp.r1
##   wind.2m.r1
##   int.r2
##   int.r3
```

```
dm <- cbind(dm, preds[, -1:-3])
```

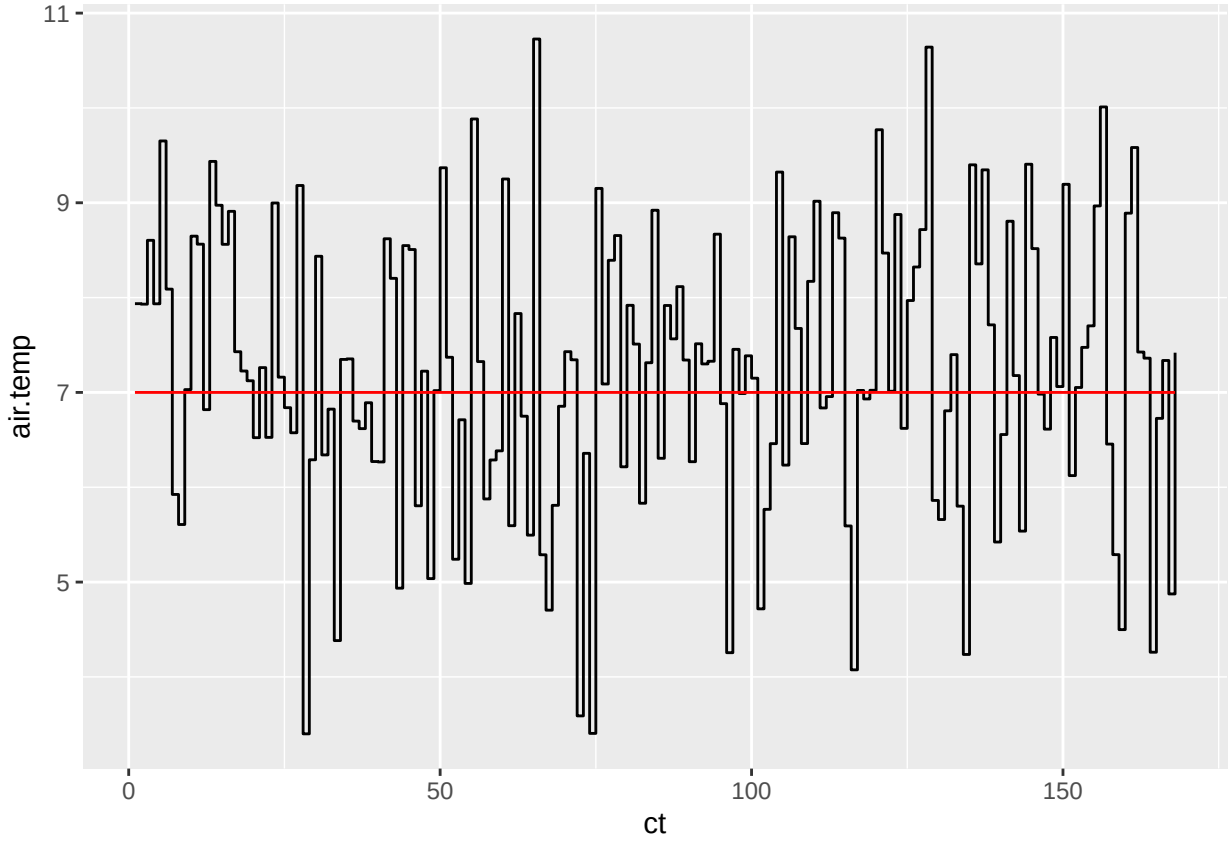
```
ggplot(dc, aes(ct, er)) + geom_line() +
  geom_line(data = dm, colour = 'red')
```



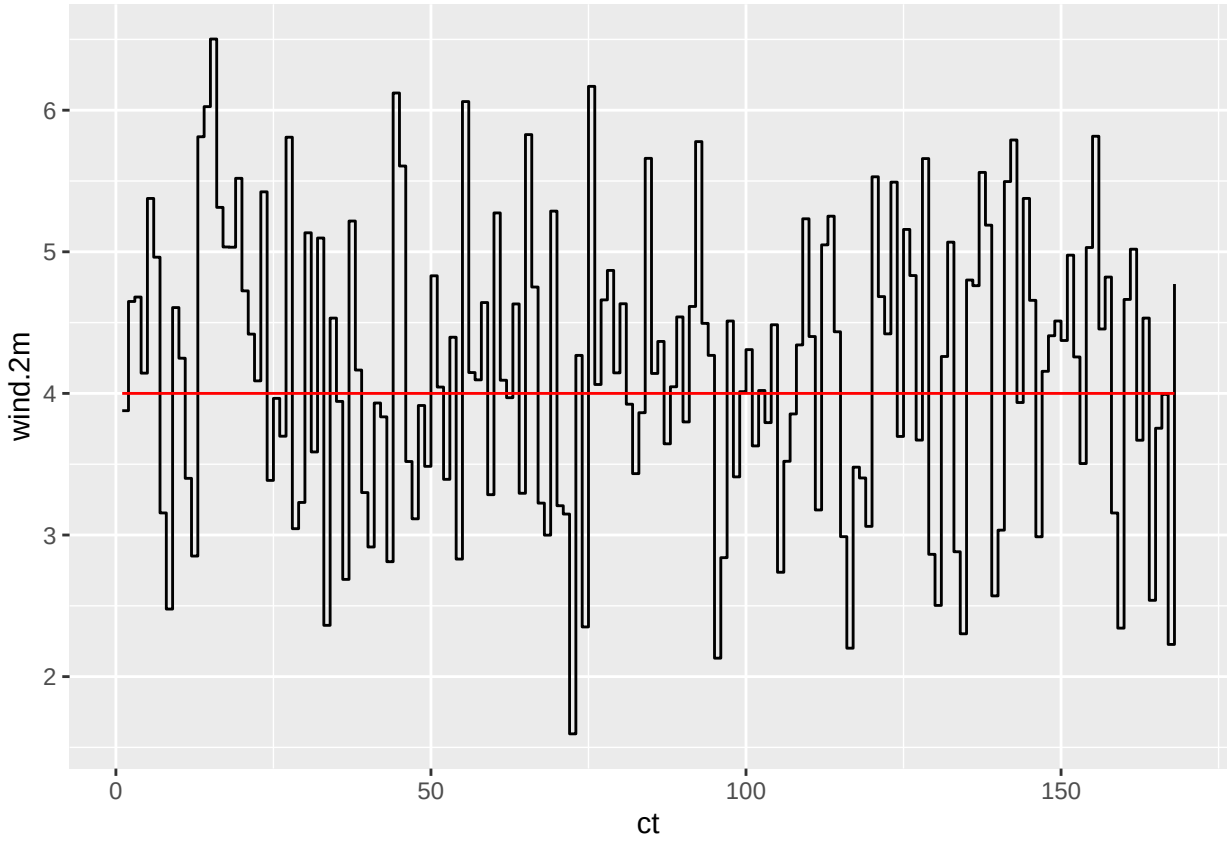

```
ggplot(dc, aes(ct, j)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```




```
ggplot(dc, aes(ct, air.temp)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```




```
ggplot(dc, aes(ct, wind.2m)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```



Case 4. Fixed diurnal

```
ss <- subset(dath, date == '2018-04-15' & ct == 3)$sim[1]
dc <- subset(dath, sim == ss & ct <= 24)
dc <- dc[order(dc$ct), ]
dc <- dc[, 1:15]
dc <- dc[rep(1:nrow(dc), 7), ]
dc$ct <- 1:nrow(dc) * 3
preds <- ALFAM2mod(dc, pars = pars, app.name = 'tan.app', time.name = 'ct')
```

```
## User-supplied parameters are being used.
```

```
## Warning in ALFAM2mod(dc, pars = pars, app.name = "tan.app", time.name = "ct"): Running with 12 parameters. Dropped 12 with no match.
## These secondary parameters have been dropped:
##   app.mthd.os.f0
##   man.source.pig.f0
##   app.mthd.cs.f0
##   app.mthd.bc.r1
##   app.mthd.ts.r1
##   ts.cereal.hght.r1
##   app.mthd.bc.r3
##   app.mthd.cs.r3
##   incorp.shallow.f4
##   incorp.shallow.r3
##   incorp.deep.f4
##   incorp.deep.r3
##
## These secondary parameters are being used:
##   int.f0
##   app.rate.ni.f0
##   man.dm.f0
##   int.r1
##   man.dm.r1
##   air.temp.r1
##   wind.2m.r1
##   man.ph.r1
##   int.r2
##   rain.rate.r2
##   int.r3
##   man.ph.r3
```

```
dc <- cbind(dc, preds[, -1:-3])
```

Use average inputs.

```
dm <- dc[, 1:15]
dm$wind.2m <- mean(dc$wind.2m)
dm$air.temp <- mean(dc$air.temp)
dm$rain.rate <- mean(dc$rain.rate)
```

```
preds <- ALFAM2mod(dm, pars = pars, app.name = 'tan.app', time.name = 'ct')
```

```
## User-supplied parameters are being used.
```

```
## Warning in ALFAM2mod(dm, pars = pars, app.name = "tan.app", time.name = "ct"): Running with 12 parameters. Dropped 12 with no match.
## These secondary parameters have been dropped:
##   app.mthd.os.f0
##   man.source.pig.f0
##   app.mthd.cs.f0
##   app.mthd.bc.r1
##   app.mthd.ts.r1
##   ts.cereal.hght.r1
##   app.mthd.bc.r3
##   app.mthd.cs.r3
##   incorp.shallow.f4
##   incorp.shallow.r3
##   incorp.deep.f4
##   incorp.deep.r3
##
## These secondary parameters are being used:
##   int.f0
##   app.rate.ni.f0
##   man.dm.f0
##   int.r1
##   man.dm.r1
##   air.temp.r1
##   wind.2m.r1
##   man.ph.r1
##   int.r2
##   rain.rate.r2
##   int.r3
##   man.ph.r3
```

```
dm <- cbind(dm, preds[, -1:-3])
```

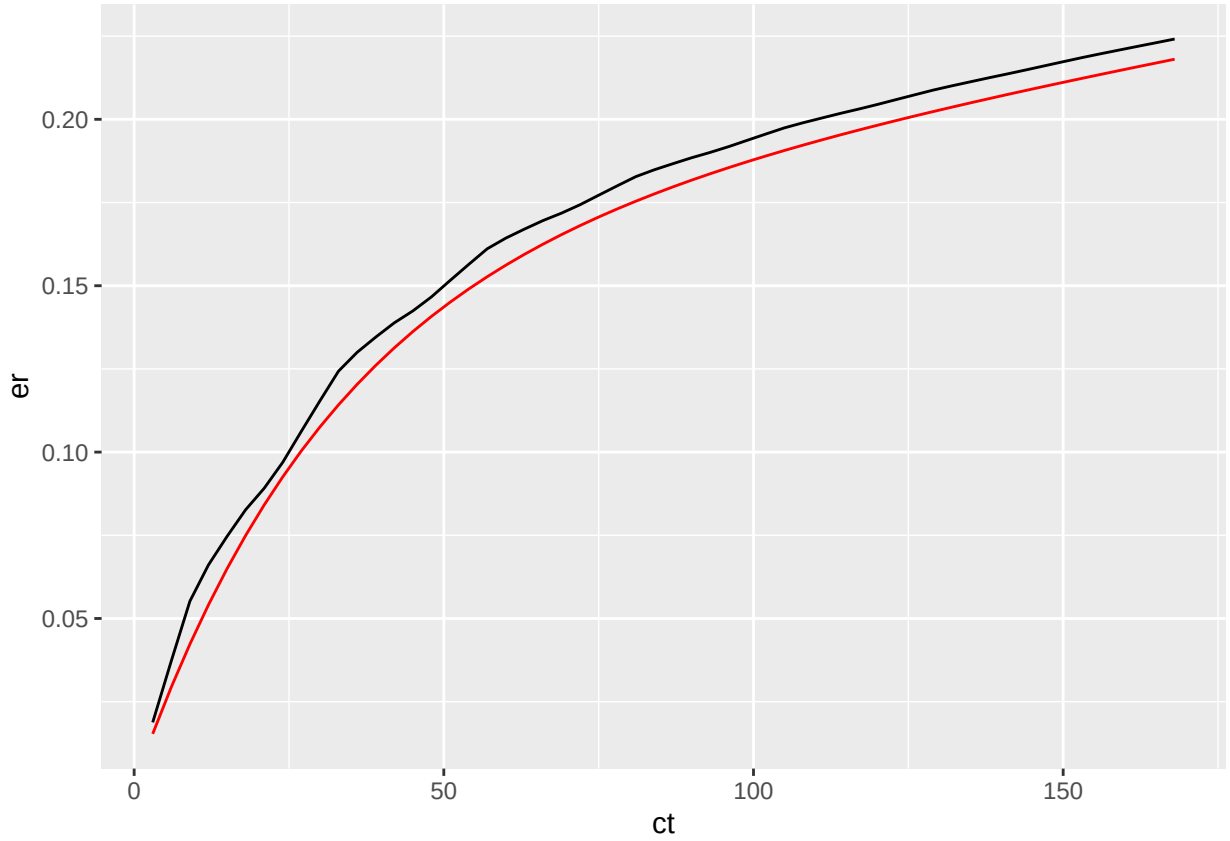
```
tail(dc$er)
```

```
## [1] 0.2185325 0.2196812 0.2208052 0.2219222 0.2230225 0.2241349
```

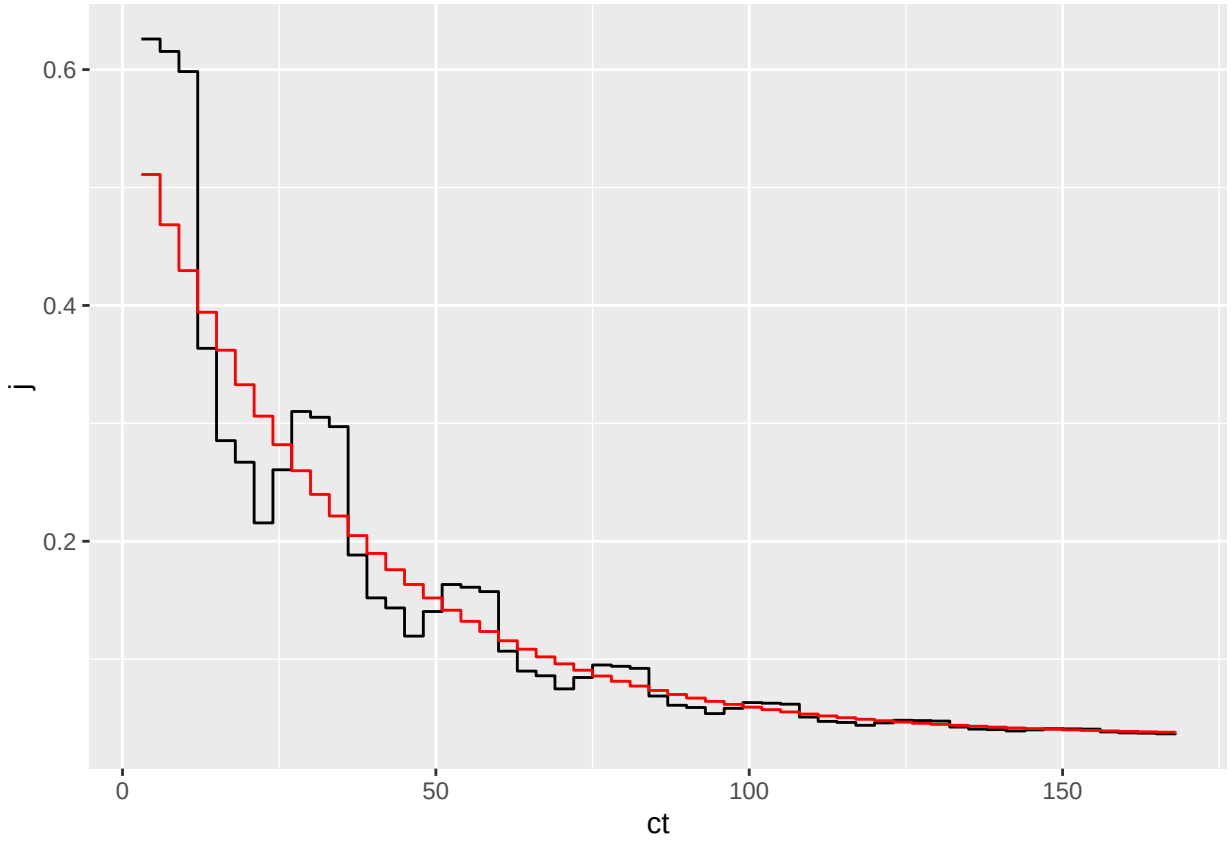
```
tail(dm$er)
```

```
## [1] 0.2122987 0.2134733 0.2146361 0.2157881 0.2169300 0.2180627
```

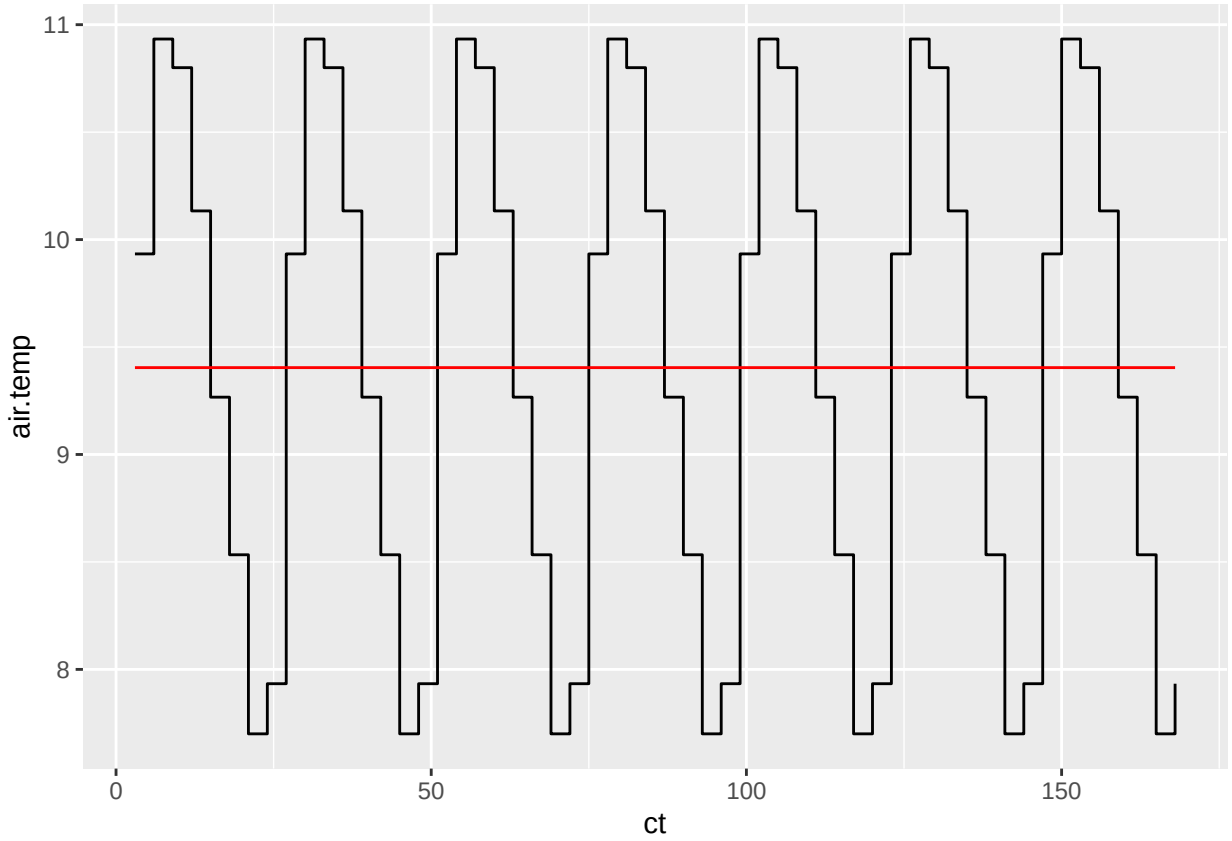
```
ggplot(dc, aes(ct, er)) + geom_line() +
  geom_line(data = dm, colour = 'red')
```



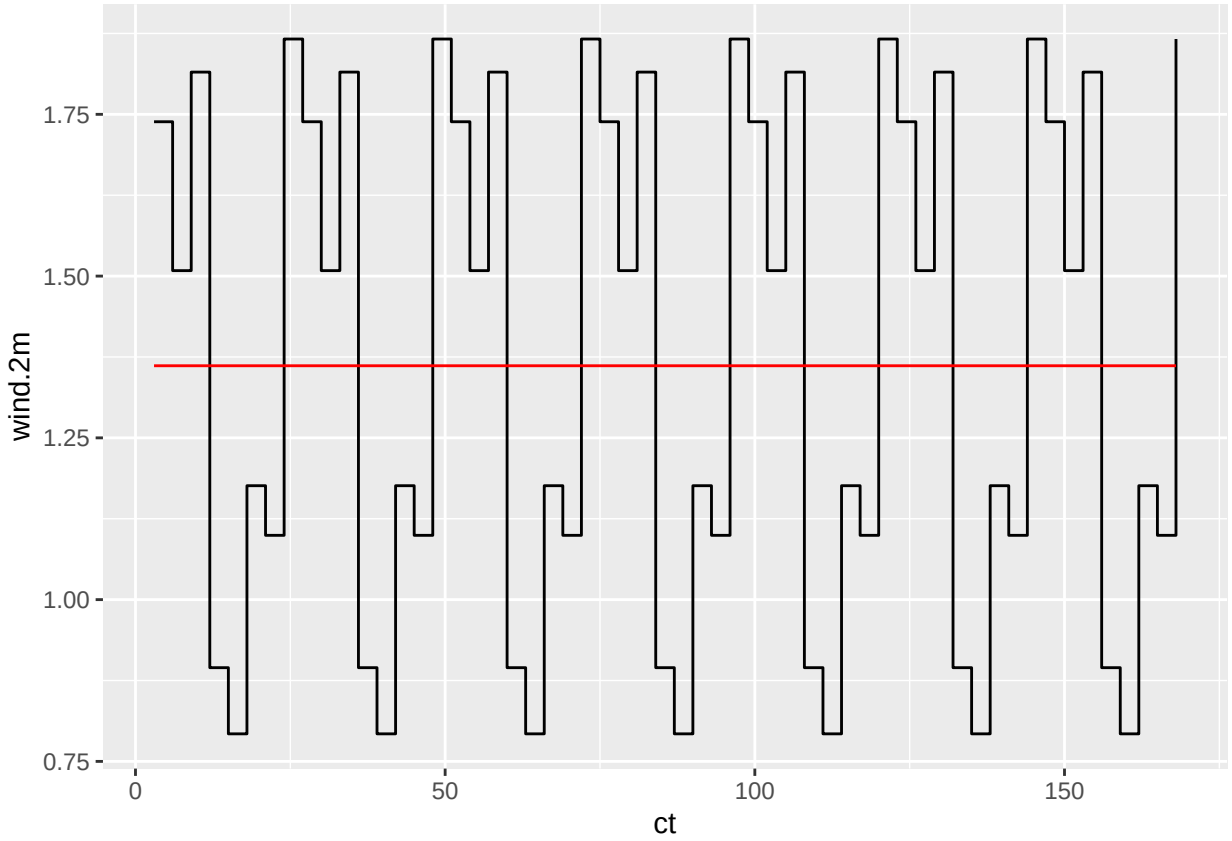

```
ggplot(dc, aes(ct, j)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```




```
ggplot(dc, aes(ct, air.temp)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```




```
ggplot(dc, aes(ct, wind.2m)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```



Case 5. Fixed diurnal but night application

```
ss <- subset(dath, date == '2018-04-15' & ct == 3)$sim[1]
dc <- subset(dath, sim == ss & ct <= 36 & ct >= 12)
dc <- dc[order(dc$ct), ]
dc <- dc[, 1:15]
dc <- dc[rep(1:nrow(dc), 7), ]
dc$ct <- 1:nrow(dc) * 3
preds <- ALFAM2mod(dc, pars = pars, app.name = 'tan.app', time.name = 'ct')
```

```
## User-supplied parameters are being used.
```

```
## Warning in ALFAM2mod(dc, pars = pars, app.name = "tan.app", time.name = "ct"): Running with 12 parameters. Dropped 12 with no match.
## These secondary parameters have been dropped:
##   app.mthd.os.f0
##   man.source.pig.f0
##   app.mthd.cs.f0
##   app.mthd.bc.r1
##   app.mthd.ts.r1
##   ts.cereal.hght.r1
##   app.mthd.bc.r3
##   app.mthd.cs.r3
##   incorp.shallow.f4
##   incorp.shallow.r3
##   incorp.deep.f4
##   incorp.deep.r3
##
## These secondary parameters are being used:
##   int.f0
##   app.rate.ni.f0
##   man.dm.f0
##   int.r1
##   man.dm.r1
##   air.temp.r1
##   wind.2m.r1
##   man.ph.r1
##   int.r2
##   rain.rate.r2
##   int.r3
##   man.ph.r3
```

```
dc <- cbind(dc, preds[, -1:-3])
```

Use average inputs.

```
dm <- dc[, 1:15]
dm$wind.2m <- mean(dc$wind.2m)
dm$air.temp <- mean(dc$air.temp)
dm$rain.rate <- mean(dc$rain.rate)
```

```
preds <- ALFAM2mod(dm, pars = pars, app.name = 'tan.app', time.name = 'ct')
```

```
## User-supplied parameters are being used.
```

```
## Warning in ALFAM2mod(dm, pars = pars, app.name = "tan.app", time.name = "ct"): Running with 12 parameters. Dropped 12 with no match.
## These secondary parameters have been dropped:
##   app.mthd.os.f0
##   man.source.pig.f0
##   app.mthd.cs.f0
##   app.mthd.bc.r1
##   app.mthd.ts.r1
##   ts.cereal.hght.r1
##   app.mthd.bc.r3
##   app.mthd.cs.r3
##   incorp.shallow.f4
##   incorp.shallow.r3
##   incorp.deep.f4
##   incorp.deep.r3
##
## These secondary parameters are being used:
##   int.f0
##   app.rate.ni.f0
##   man.dm.f0
##   int.r1
##   man.dm.r1
##   air.temp.r1
##   wind.2m.r1
##   man.ph.r1
##   int.r2
##   rain.rate.r2
##   int.r3
##   man.ph.r3
```

```
dm <- cbind(dm, preds[, -1:-3])
```

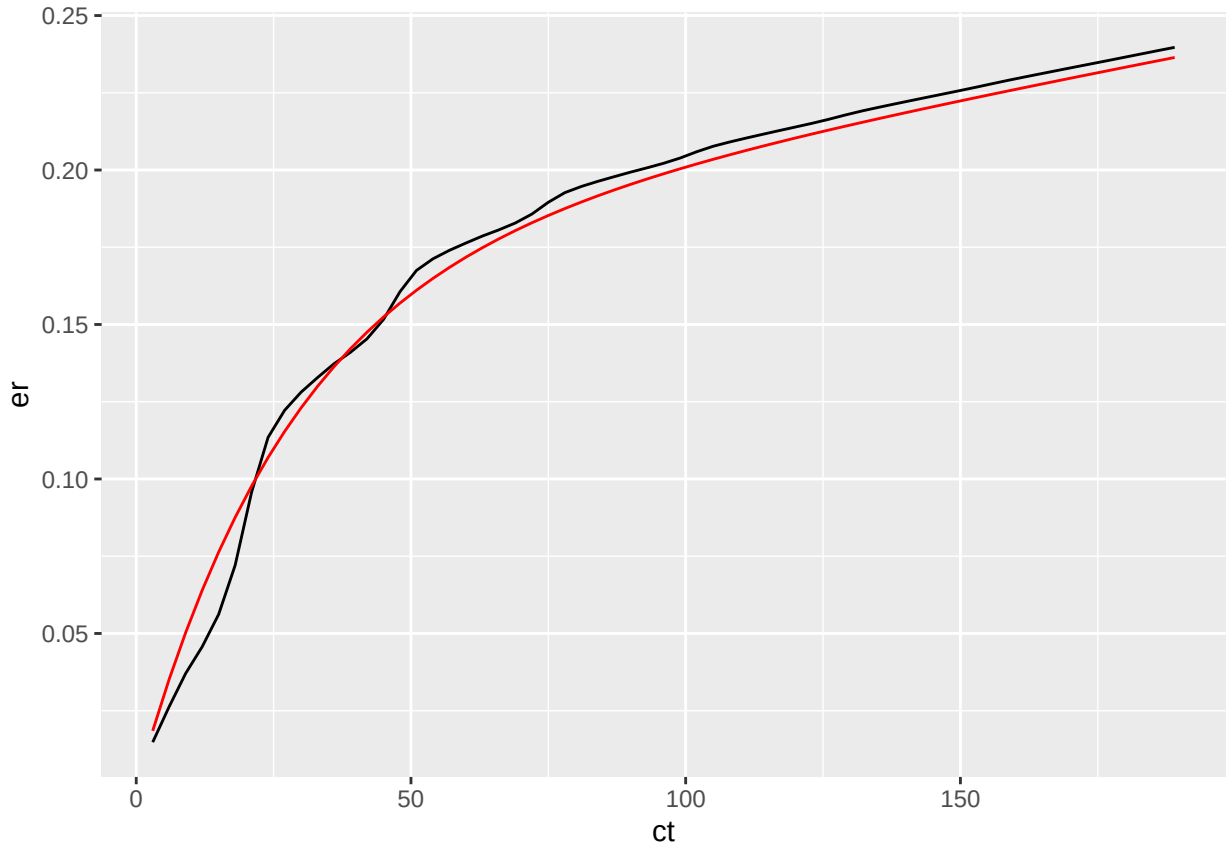
```
tail(dc$er)
```

```
## [1] 0.2344352 0.2354832 0.2365395 0.2376087 0.2386656 0.2397049
```

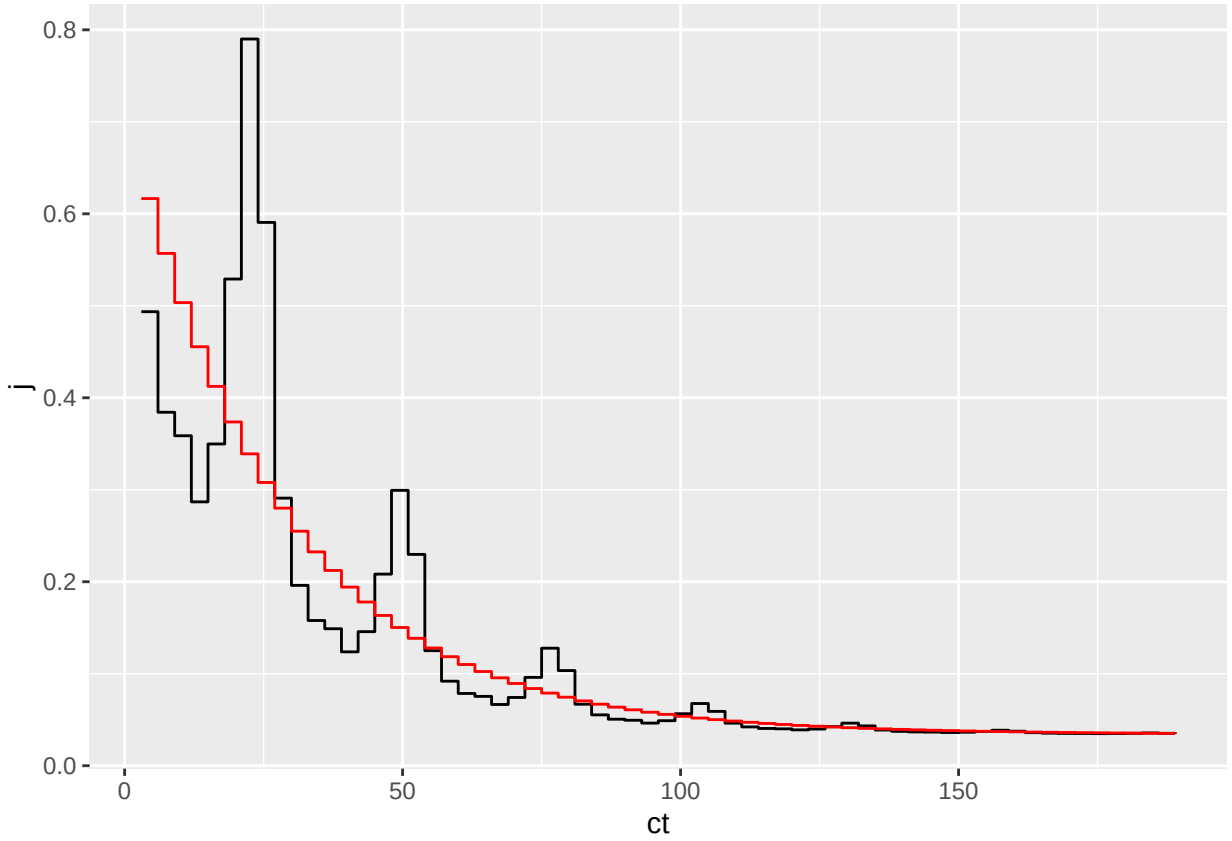
```
tail(dm$er)
```

```
## [1] 0.2311325 0.2321999 0.2332626 0.2343210 0.2353753 0.2364259
```

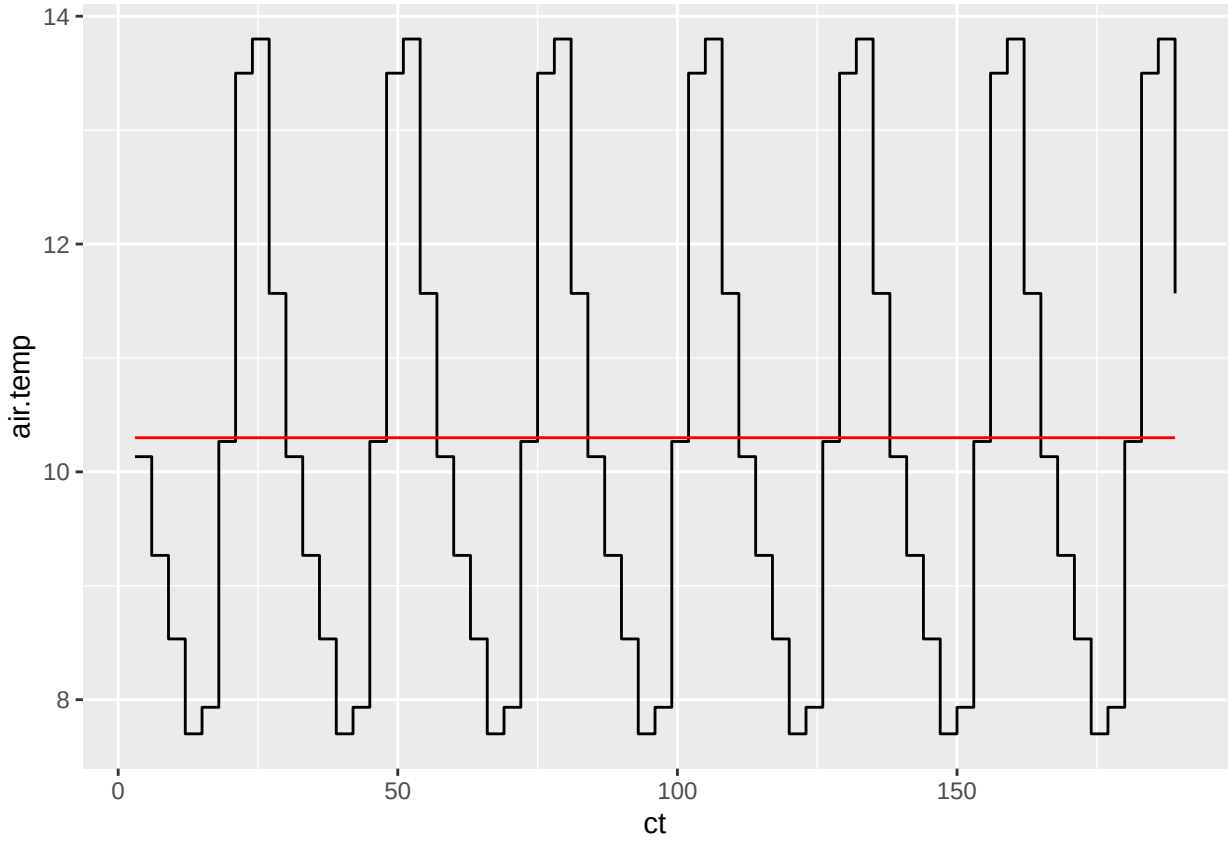
```
ggplot(dc, aes(ct, er)) + geom_line() +
  geom_line(data = dm, colour = 'red')
```



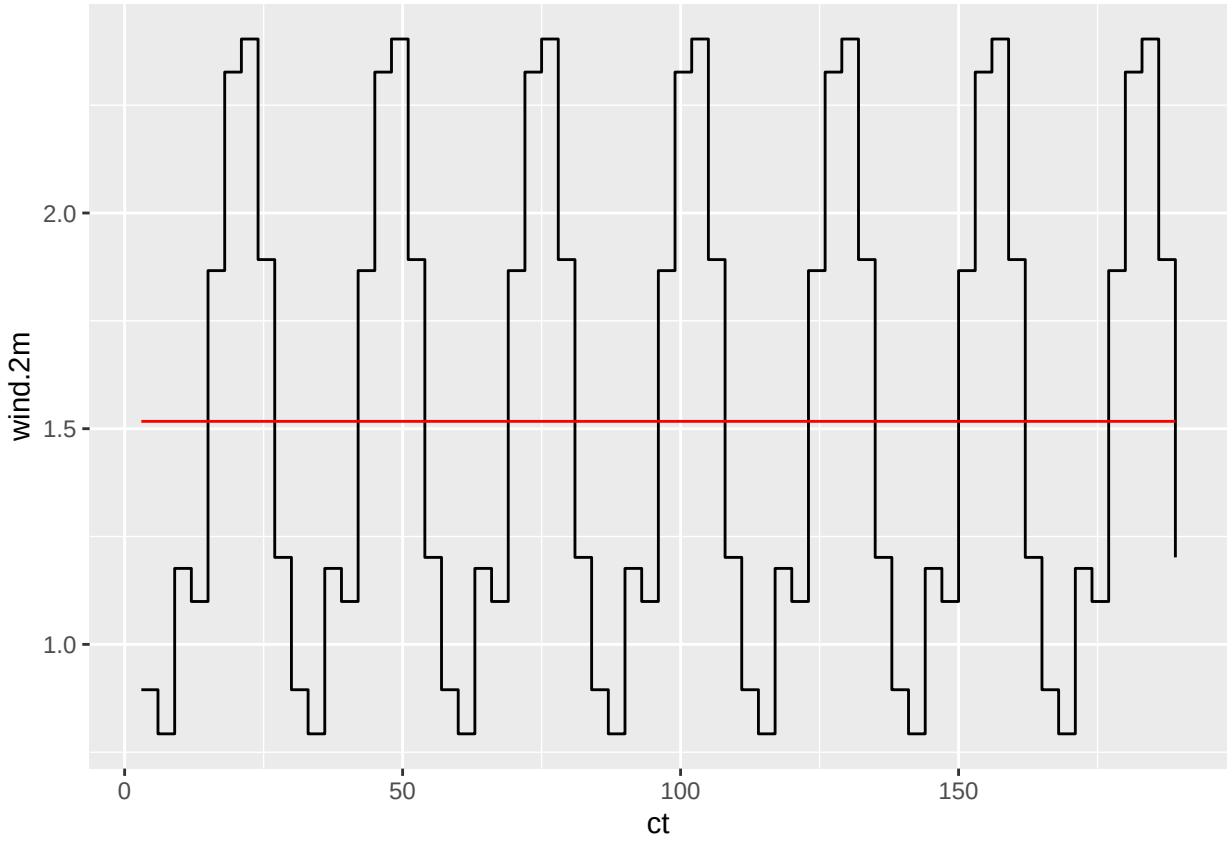

```
ggplot(dc, aes(ct, j)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```




```
ggplot(dc, aes(ct, air.temp)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```




```
ggplot(dc, aes(ct, wind.2m)) + geom_step() +
  geom_step(data = dm, colour = 'red')
```



Case 6. 2020

In 2020 the mean response was about the same as the lowest 3 hourly curve. Strange.

```
head(dath, 2)
```

```
##     yr       date h3grp time  wind.2m rain.rate air.temp           date.time ct rain.cum sim man.dm man.ph
## 4 2014 2014-04-01     3   12 3.758349         0 5.200000 2014-04-01 12:00:00  3        0   1    6.5      7
## 5 2014 2014-04-01     4   15 3.400411         0 6.966667 2014-04-01 15:00:00  6        0   1    6.5      7
##   app.rate.ni tan.app        f0         r1         r2           r3 f4        f        s         j        e    e.int
## 4          30     100 0.3229346 0.01752856 0.01587869 0.0004493531  1 29.21385 69.07808 0.5693543 1.708063 1.708063
## 5          30     100 0.3229346 0.02088744 0.01587869 0.0004493531  1 26.16296 70.30175 0.6090752 3.535288 1.827226
```

```
##           er
## 4 0.01708063
## 5 0.03535288
```

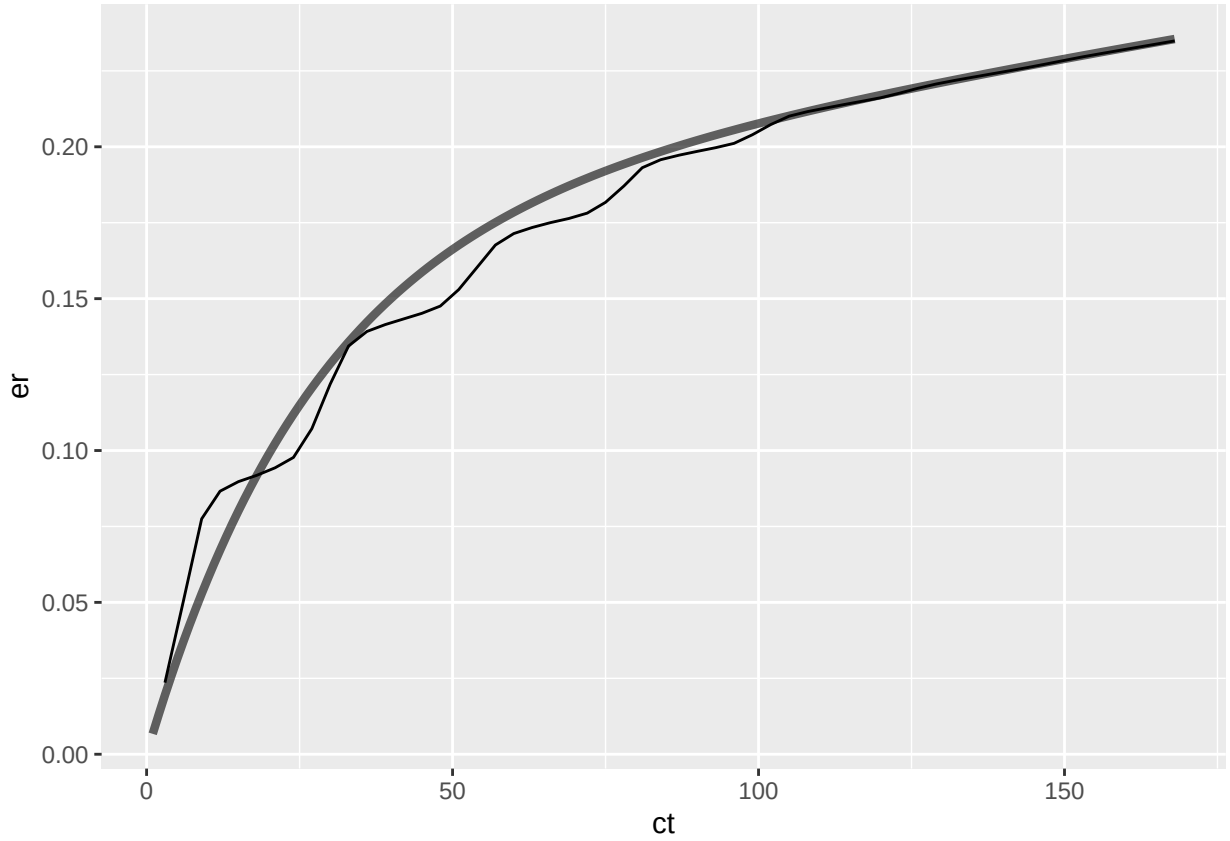
```
x <- subset(dath, yr == 2020 & ct == 168)
x <- x[order(x$er), ]
dim(x)
```

```
## [1] 23 26
```

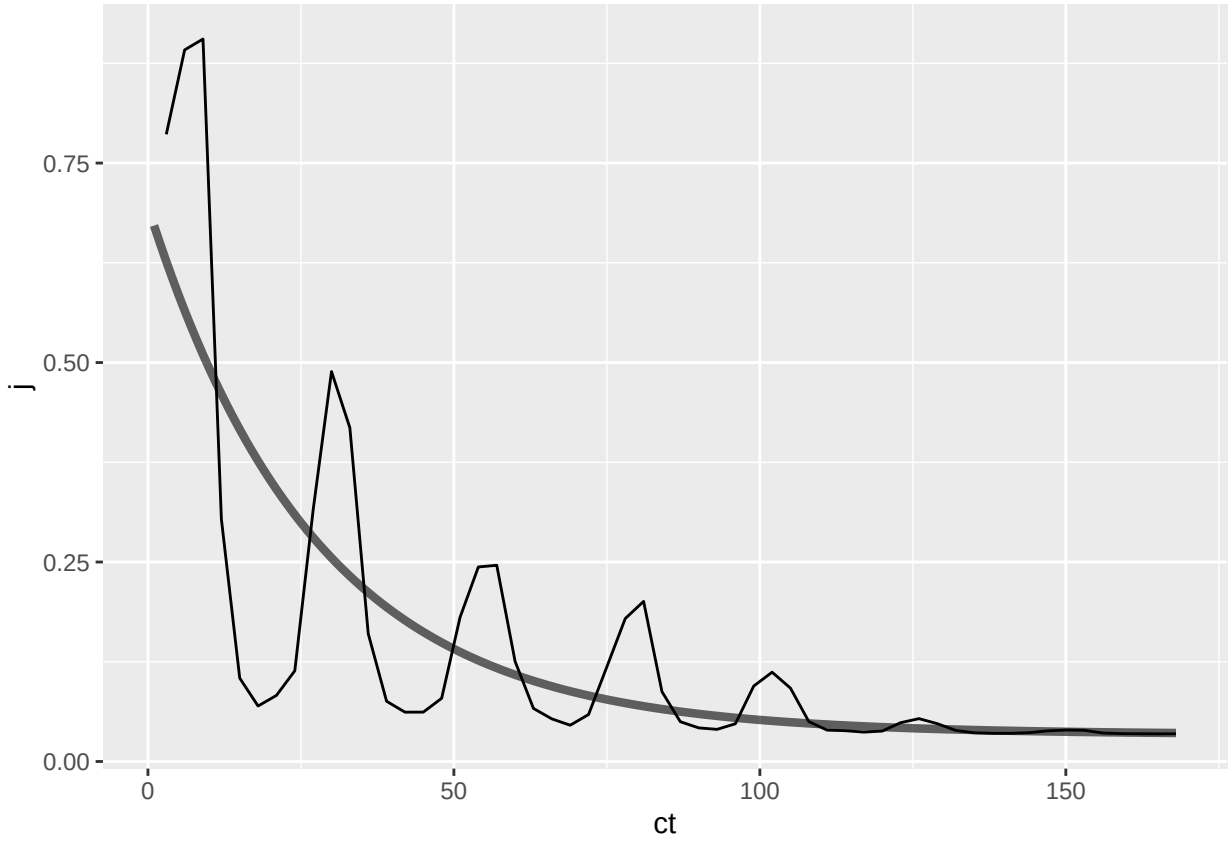
```
x$sim
```

```
##  [1] 155 148 156 149 157 147 154 151 141 142 152 158 139 145 146 140 160 150 159 153 161 143 144
```

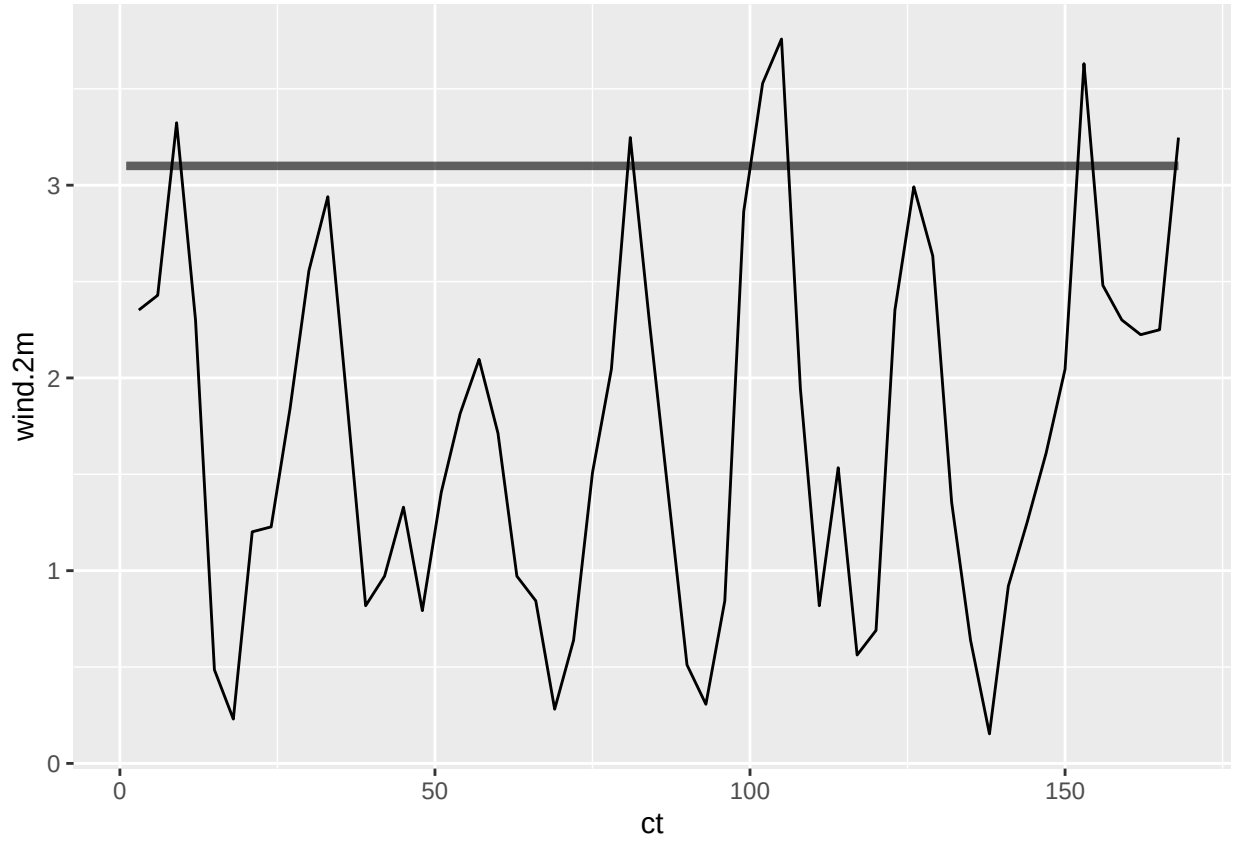
```
#155 lowest

x <- subset(dath, sim == 155)
y <- subset(datm, yr == 2020)
ggplot(x, aes(ct, er)) + geom_line() +
  geom_line(data = y, aes(ct, er), colour = 'black', lwd = 1.5, alpha = 0.6)
```



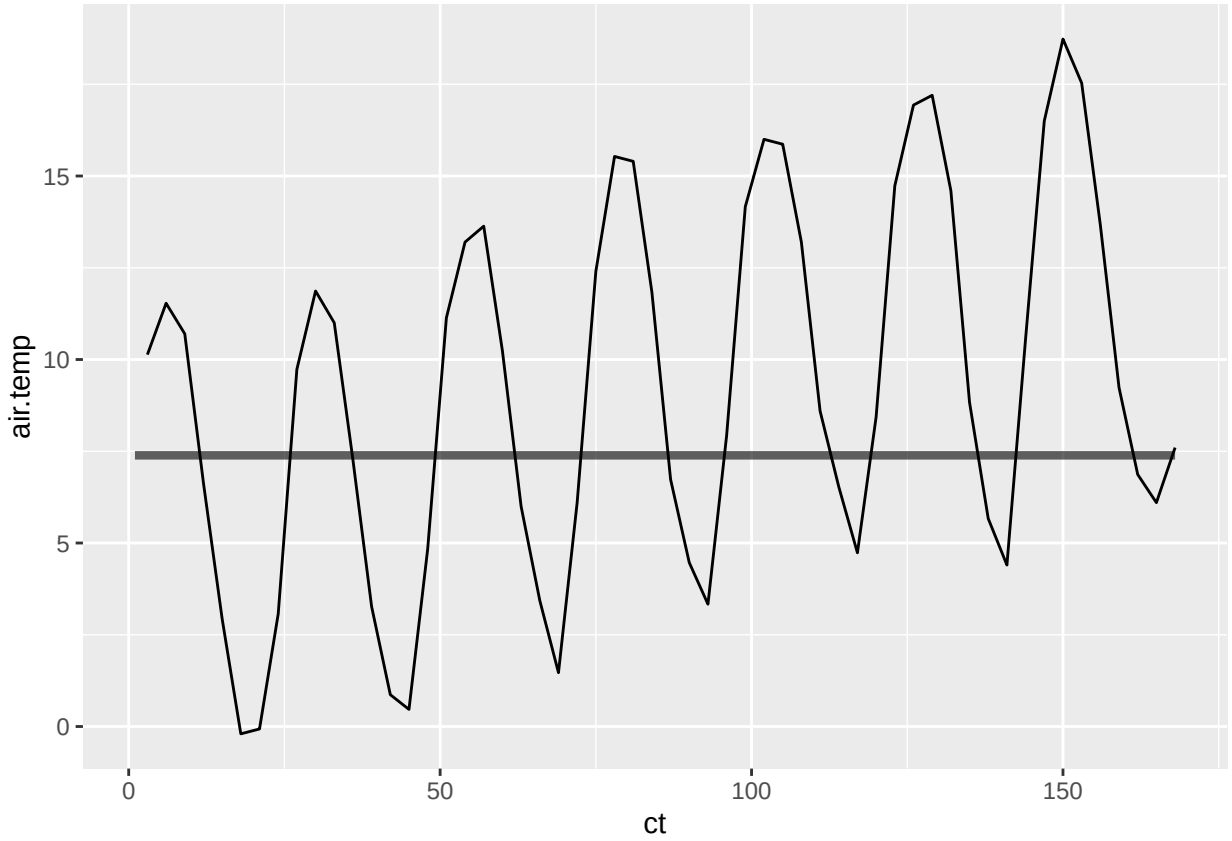

```
ggplot(x, aes(ct, j)) + geom_line() +
  geom_line(data = y, aes(ct, j), colour = 'black', lwd = 1.5, alpha = 0.6)
```



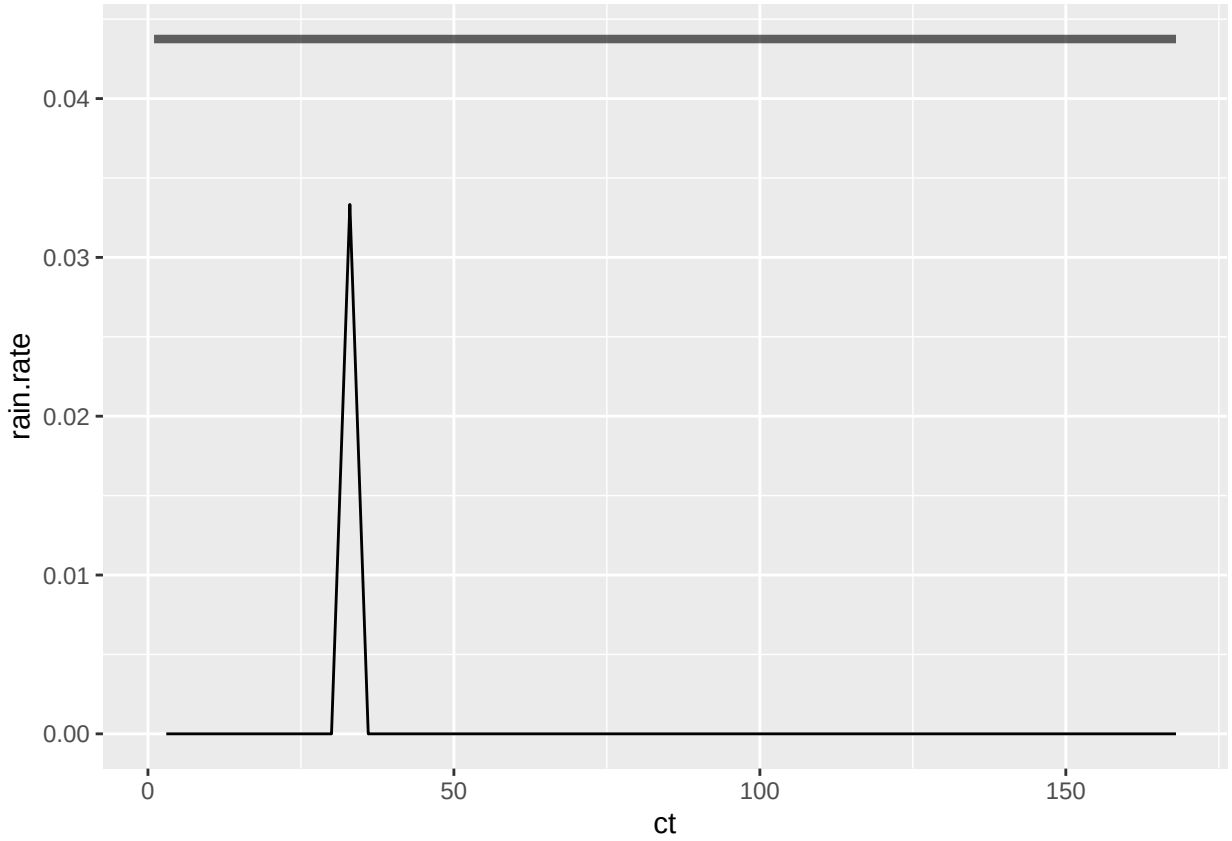

```
ggplot(x, aes(ct, wind.2m)) + geom_line() +
  geom_line(data = y, aes(ct, wind.2m), colour = 'black', lwd = 1.5, alpha = 0.6)
```



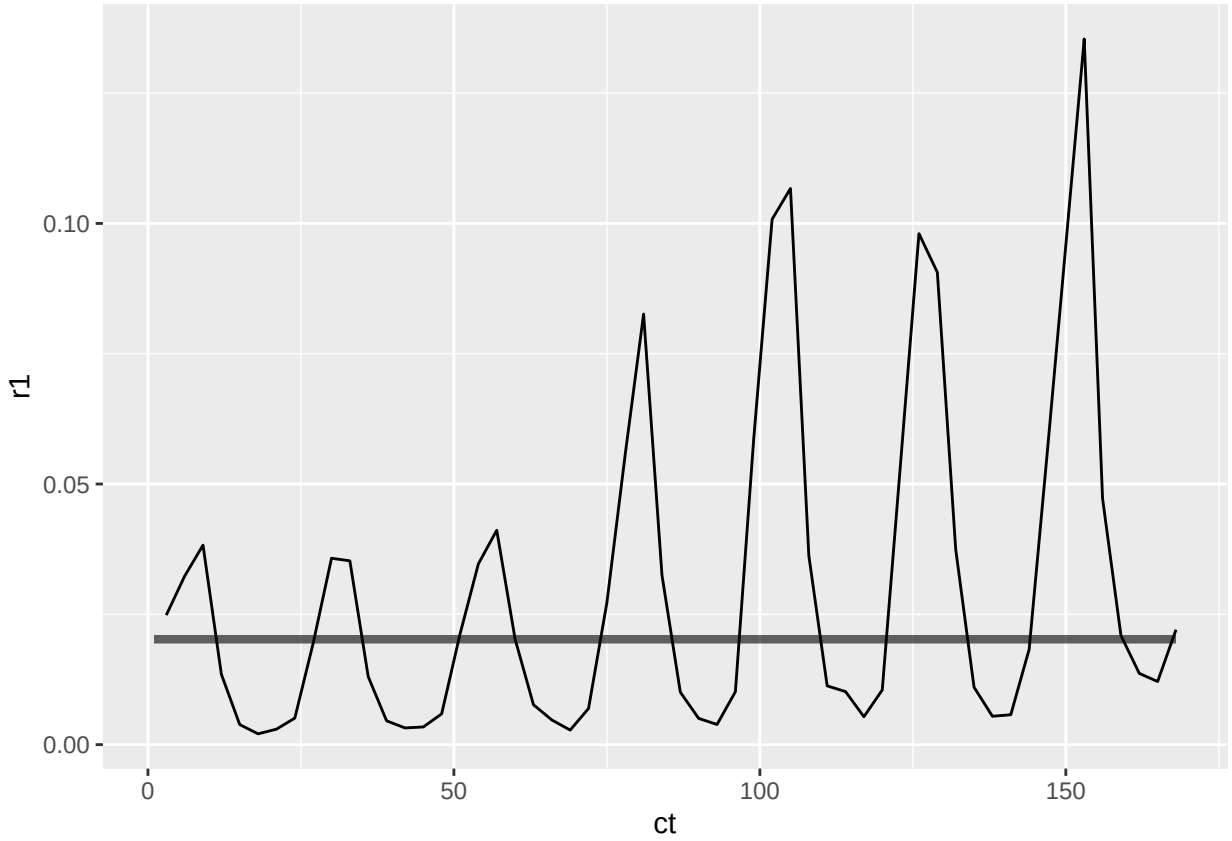

```
ggplot(x, aes(ct, air.temp)) + geom_line() +
  geom_line(data = y, aes(ct, air.temp), colour = 'black', lwd = 1.5, alpha = 0.6)
```



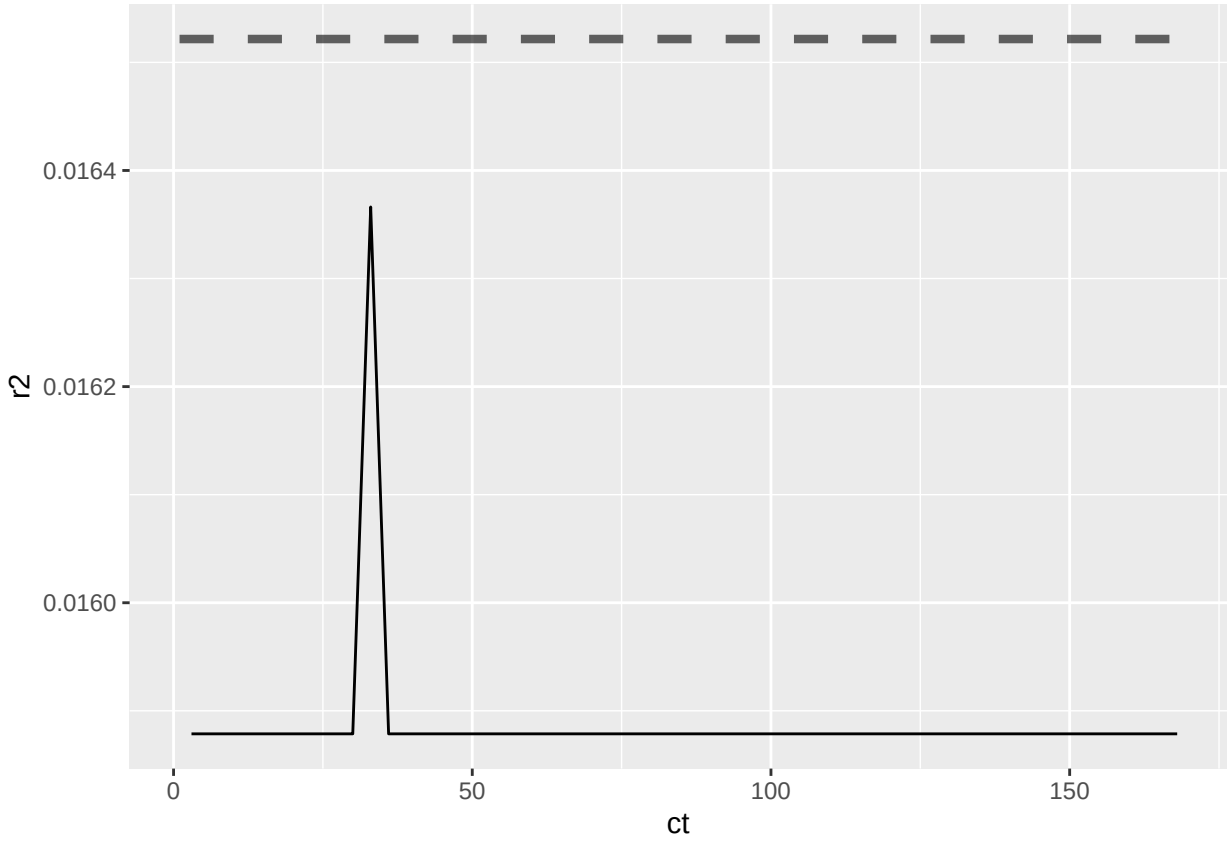

```
ggplot(x, aes(ct, rain.rate)) + geom_line() +
  geom_line(data = y, aes(ct, rain.rate), colour = 'black', lwd = 1.5, alpha = 0.6)
```



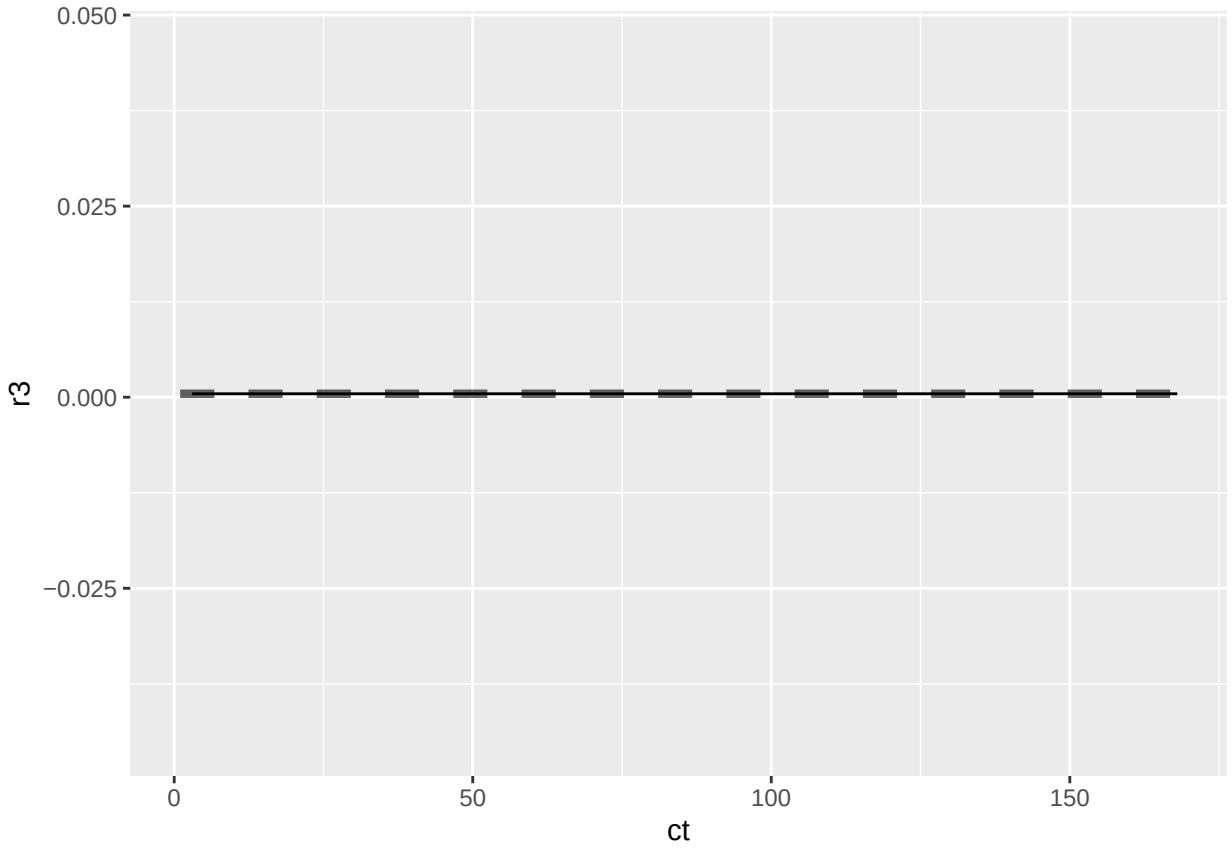

```
ggplot(x, aes(ct, r1)) + geom_line() +
  geom_line(data = y, aes(ct, r1), colour = 'black', lwd = 1.5, alpha = 0.6)
```



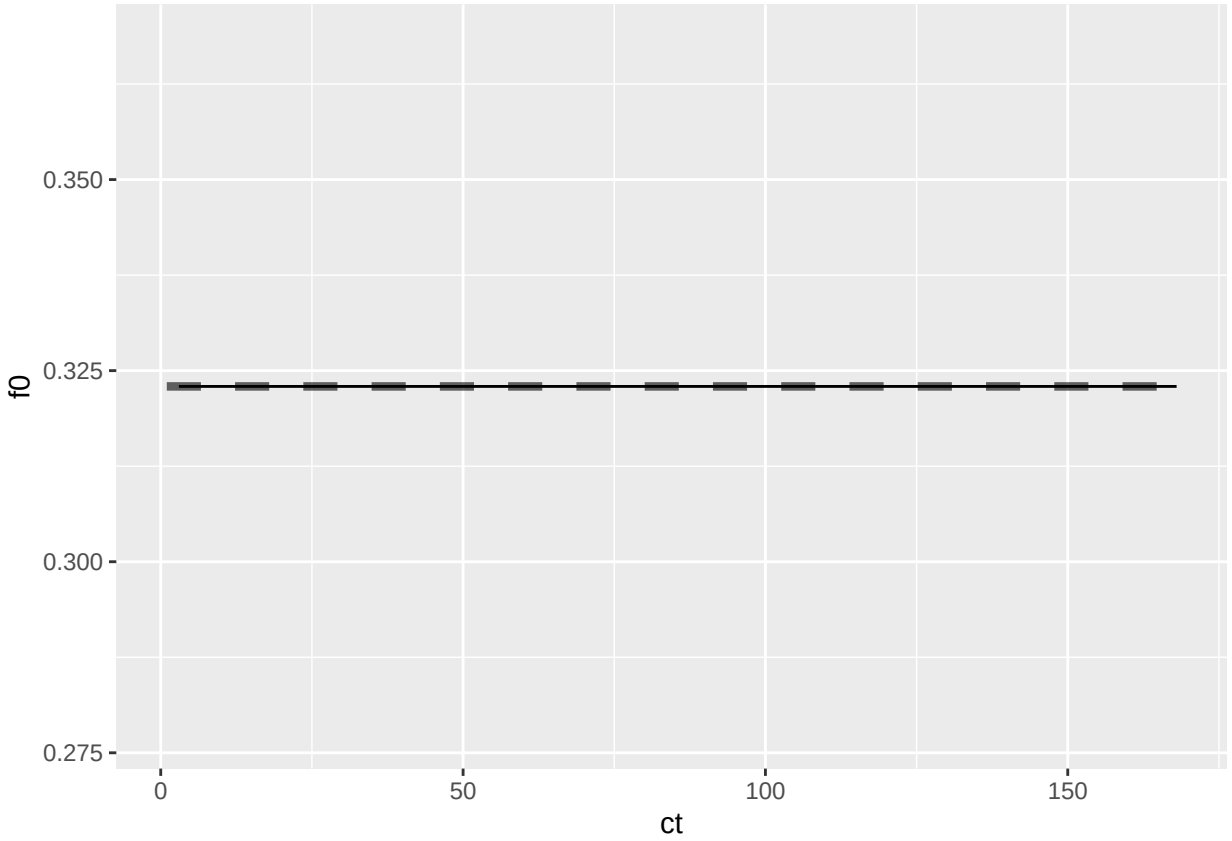

```
ggplot(x, aes(ct, r2)) + geom_line() +
  geom_line(data = y, aes(ct, r2), colour = 'black', lwd = 1.5, alpha = 0.6, lty = 2)
```




```
ggplot(x, aes(ct, r3)) + geom_line() +
  geom_line(data = y, aes(ct, r3), colour = 'black', lwd = 1.5, alpha = 0.6, lty = 2)
```




```
ggplot(x, aes(ct, f0)) + geom_line() +
  geom_line(data = y, aes(ct, f0), colour = 'black', lwd = 1.5, alpha = 0.6, lty = 2)
```




```
head(y)
```

```
##        yr  wind.2m rain.rate air.temp ct rain.cum  sim man.dm man.ph app.rate.ni tan.app        f0         r1
## 1009 2020 3.100105   0.04375 7.389028  1 0.021875 2020    6.5      7          30     100 0.3229346 0.02022184
## 1010 2020 3.100105   0.04375 7.389028  2 0.065625 2020    6.5      7          30     100 0.3229346 0.02022184
## 1011 2020 3.100105   0.04375 7.389028  3 0.109375 2020    6.5      7          30     100 0.3229346 0.02022184
## 1012 2020 3.100105   0.04375 7.389028  4 0.153125 2020    6.5      7          30     100 0.3229346 0.02022184
## 1013 2020 3.100105   0.04375 7.389028  5 0.196875 2020    6.5      7          30     100 0.3229346 0.02022184
## 1014 2020 3.100105   0.04375 7.389028  6 0.240625 2020    6.5      7          30     100 0.3229346 0.02022184
##              r2           r3 f4        f        s         j         e     e.int          er
## 1009 0.01652163 0.0004493531  1 31.12842 68.19986 0.6717172 0.6717172 0.6717172 0.006717172
## 1010 0.01652163 0.0004493531  1 30.00541 68.67407 0.6488028 1.3205200 0.6488028 0.013205200
```

```
## 1011 0.01652163 0.0004493531  1 28.92292 69.12985 0.6267146 1.9472346 0.6267146 0.019472346
## 1012 0.01652163 0.0004493531  1 27.87948 69.56787 0.6054227 2.5526573 0.6054227 0.025526573
## 1013 0.01652163 0.0004493531  1 26.87368 69.98876 0.5848983 3.1375555 0.5848983 0.031375555
## 1014 0.01652163 0.0004493531  1 25.90417 70.39316 0.5651137 3.7026693 0.5651137 0.037026693
```

```
head(x)
```

```
##         yr       date h3grp time  wind.2m rain.rate  air.temp           date.time ct rain.cum sim man.dm man.ph
## 15727 2020 2020-04-17     3   12 2.352164         0 10.133333 2020-04-17 12:00:00  3        0 155    6.5      7
## 15737 2020 2020-04-17     4   15 2.428865         0 11.533333 2020-04-17 15:00:00  6        0 155    6.5      7
## 15747 2020 2020-04-17     5   18 3.323710         0 10.700000 2020-04-17 18:00:00  9        0 155    6.5      7
## 15757 2020 2020-04-17     6   21 2.301030         0  6.633333 2020-04-17 21:00:00 12        0 155    6.5      7
## 15767 2020 2020-04-17     7   24 0.485773         0  2.933333 2020-04-18 00:00:00 15        0 155    6.5      7
## 15776 2020 2020-04-18     0    3 0.230103         0 -0.200000 2020-04-18 03:00:00 18        0 155    6.5      7
##       app.rate.ni tan.app        f0          r1         r2           r3 f4        f        s          j        e
## 15727          30     100 0.3229346 0.024845813 0.01587869 0.0004493531  1 28.57954 69.06241 0.78601588 2.358048
## 15737          30     100 0.3229346 0.032339895 0.01587869 0.0004493531  1 24.73046 70.23603 0.89182388 5.033519
## 15747          30     100 0.3229346 0.038275326 0.01587869 0.0004493531  1 21.02208 71.22800 0.90546617 7.749918
## 15757          30     100 0.3229346 0.013494913 0.01587869 0.0004493531  1 19.24888 72.08994 0.30375423 8.661180
## 15767          30     100 0.3229346 0.003848474 0.01587869 0.0004493531  1 18.14275 72.88256 0.10450330 8.974690
## 15776          30     100 0.3229346 0.002072221 0.01587869 0.0004493531  1 17.19156 73.62519 0.06951999 9.183250
##          e.int         er
## 15727 2.3580476 0.02358048
## 15737 2.6754717 0.05033519
## 15747 2.7163985 0.07749918
## 15757 0.9112627 0.08661180
## 15767 0.3135099 0.08974690
## 15776 0.2085600 0.09183250
```