Check ALFAM predictions

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1. Some bc plot with high emission

Find broadcast plots with high predictions.

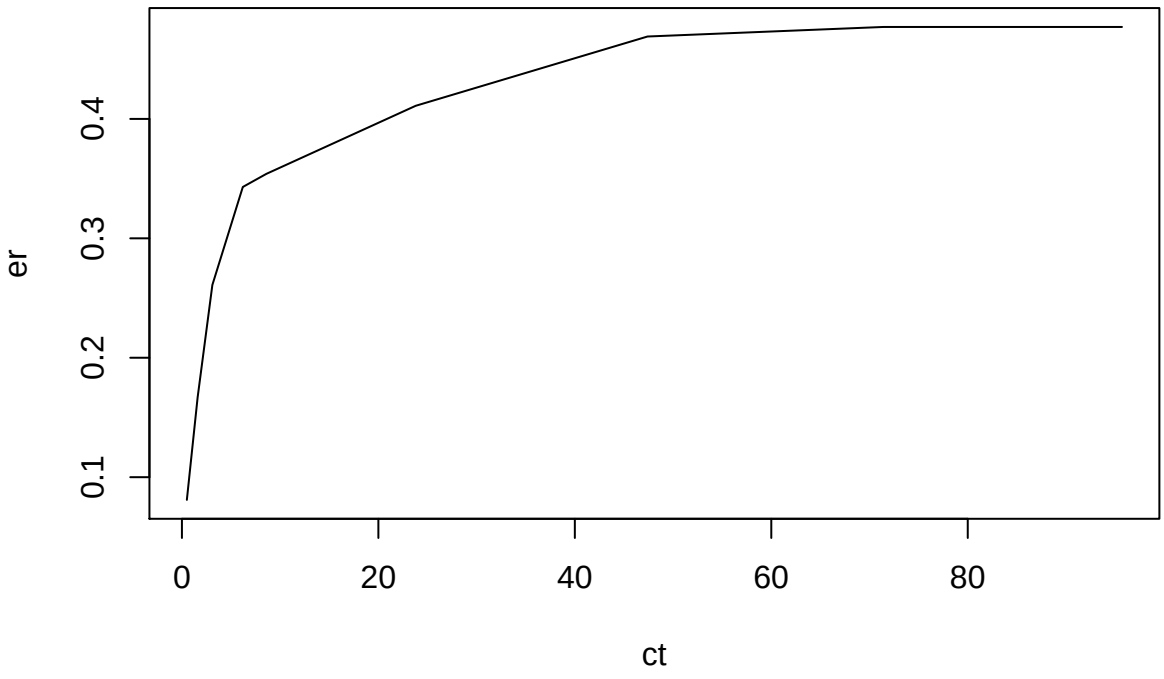
```
pp <- unique(dpredl[!is.na(dpredl$er.pred) & dpredl$er.pred > 1 & dpredl$mod == 'ALFAM', 'pmid'])
pp
```

```
## [1]  548 1532 1838 1839 1840 1841
```

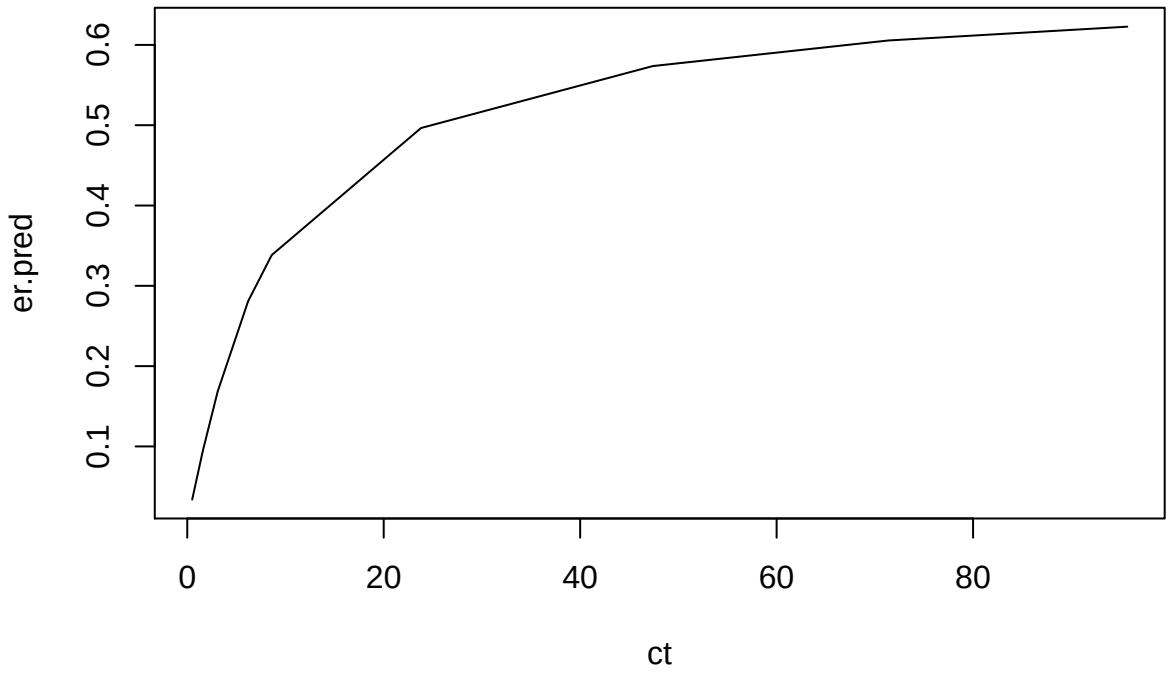
```
x <- subset(dpredl, pmid == 488 & mod == 'ALFAM')
x$er
```

```
## [1] 0.08100 0.16700 0.26100 0.34300 0.35400 0.41098 0.46900 0.47698 0.47698
```

```
plot(er ~ ct, data = x, type = 'l')
```




```
plot(er.pred ~ ct, data = x, type = 'l')
```




```
x1 <- x[, c('ct', 'app.mthd.bsth', 'app.mthd.os', 'app.rate',
            'man.source', 'man.source.pig', 'incorp.none',
            'man.dm', 'man.ph', 'man.tan', 'app.mthd',
            'wind.2m', 'air.temp', 'meas.tech.mm')]
x1
```

```
##         ct app.mthd.bsth app.mthd.os app.rate man.source man.source.pig incorp.none man.dm man.ph ma
## 38847  0.5         FALSE       FALSE     19.7        cat          FALSE        TRUE   8.83    7.1
## 38857  1.6         FALSE       FALSE     19.7        cat          FALSE        TRUE   8.83    7.1
## 38867  3.1         FALSE       FALSE     19.7        cat          FALSE        TRUE   8.83    7.1
## 38877  6.2         FALSE       FALSE     19.7        cat          FALSE        TRUE   8.83    7.1
## 38887  8.6         FALSE       FALSE     19.7        cat          FALSE        TRUE   8.83    7.1
## 38897 23.8         FALSE       FALSE     19.7        cat          FALSE        TRUE   8.83    7.1
## 38907 47.4         FALSE       FALSE     19.7        cat          FALSE        TRUE   8.83    7.1
## 38917 71.4         FALSE       FALSE     19.7        cat          FALSE        TRUE   8.83    7.1
## 38927 95.7         FALSE       FALSE     19.7        cat          FALSE        TRUE   8.83    7.1
```

```
pred1 <- ALFAM1mod(x1, time.name = 'ct')
```

```
## Warning in ALFAM1mod(x1, time.name = "ct"): Some parameters not used: wetsoil, app.mthd.ts, app.mthd
```

```
pred1
```

```
##       group   ct      nmax       km            j     er.int         er
## 38847     1  0.5 0.6466972 9.057491 0.0676639052 0.03383195 0.03383195
## 38857     1  1.6 0.6376197 9.207582 0.0559587130 0.06155458 0.09538654
## 38867     1  3.1 0.6711858 8.475925 0.0487740960 0.07316114 0.16854768
## 38877     1  6.2 0.7083095 7.747073 0.0362714611 0.11244153 0.28098921
## 38887     1  8.6 0.7029514 7.914266 0.0238681295 0.05728351 0.33827272
## 38897     1 23.8 0.6751518 8.569562 0.0104103191 0.15823685 0.49650957
## 38907     1 47.4 0.7821806 7.003412 0.0032688258 0.07714429 0.57365386
## 38917     1 71.4 0.6327031 9.734786 0.0013286748 0.03188819 0.60554206
## 38927     1 95.7 0.7172997 8.121462 0.0007056077 0.01714627 0.62268832
```

Try constant weather.

```
x1c <- x1
x1c$wind.2m <- 3
x1c$air.temp <- 11
```

```
pred1c <- ALFAM1mod(x1c, time.name = 'ct')
```

```
## Warning in ALFAM1mod(x1c, time.name = "ct"): Some parameters not used: wetsoil, app.mthd.ts, app.mth
```

```
pred1c
```

```
##       group   ct      nmax       km            j     er.int         er
## 38847     1  0.5 0.6847636 8.429872 0.0766823606 0.03834118 0.03834118
## 38857     1  1.6 0.6847636 8.429872 0.0644497236 0.07089470 0.10923588
## 38867     1  3.1 0.6847636 8.429872 0.0499162328 0.07487435 0.18411023
## 38877     1  6.2 0.6847636 8.429872 0.0342213123 0.10608607 0.29019629
## 38887     1  8.6 0.6847636 8.429872 0.0231691316 0.05560592 0.34580221
## 38897     1 23.8 0.6847636 8.429872 0.0105169956 0.15985833 0.50566054
## 38907     1 47.4 0.6847636 8.429872 0.0032080153 0.07570916 0.58136971
## 38917     1 71.4 0.6847636 8.429872 0.0012951784 0.03108428 0.61245399
## 38927     1 95.7 0.6847636 8.429872 0.0006944179 0.01687435 0.62932834
```

Manual check for Nmax

```
0.0495 * 1.0223^11 * 1.0417^3 * 1.108^9 * 0.828^2.2 * 0.996^19.7 * 11.3 * 0.578
```

```
## [1] 0.7152123
```

```
0.0495 * 1.0223^11 * 1.0417^3 * 1.108^9 * 0.828^2.2 * 0.996^19.7 * 0.578
```

```
## [1] 0.06329313
```

```
exp(log(0.0495) + log(1.0223)*11 + log(1.0417)*3 + log(1.108)*9 + log(0.828)*2.2 + log(0.996)*19.7 + log
```

```
## [1] 0.7152123
```

```
c(log(0.0495), log(1.0223), log(1.0417), log(1.108), log(0.828), log(0.996), log(11.3), log(0.578))
```

```
## [1] -3.005782609  0.022054991  0.040853994  0.102556588 -0.188742125 -0.004008021  2.424802726 -0.548
```

```
exp(-3.026 + 0.02205 * 11 + 0.04085 * 3 + 0.10256 * 9 - 0.1887 * 2.2 - 0.00401 * 19.7 + 2.425 - 0.548)
```

```
## [1] 0.7011755
```

2. Max predicted bc emission

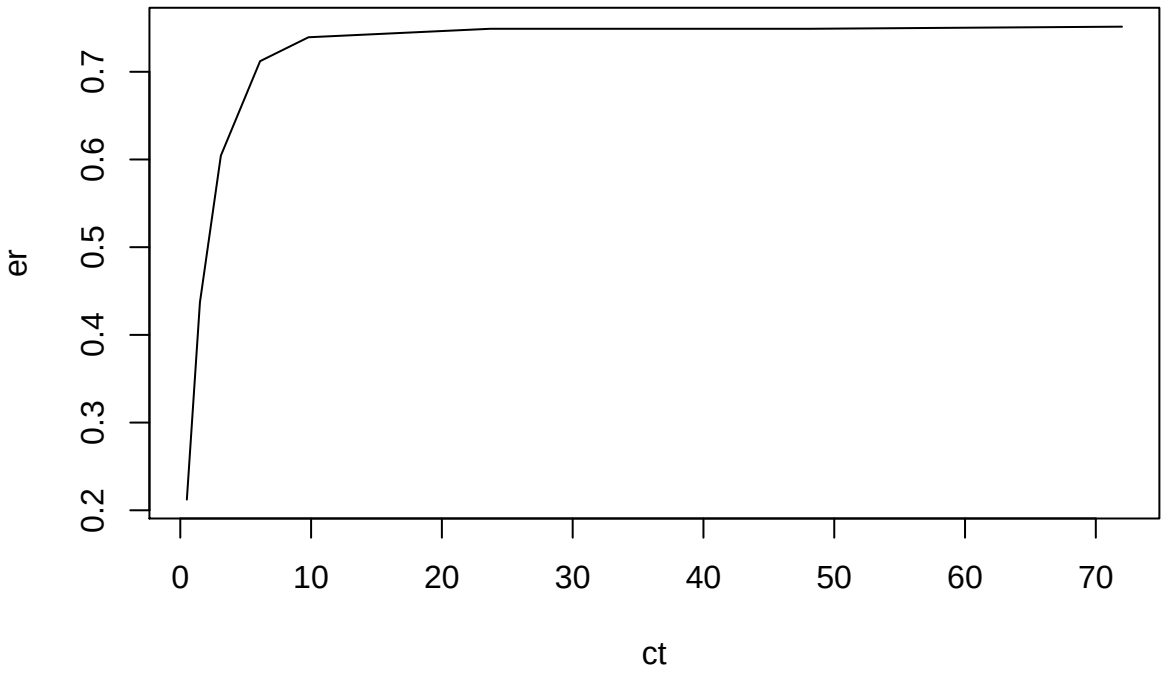
Find max emission.

```
dpredl[which.max(dpredl$er.pred), 'pmid']
```

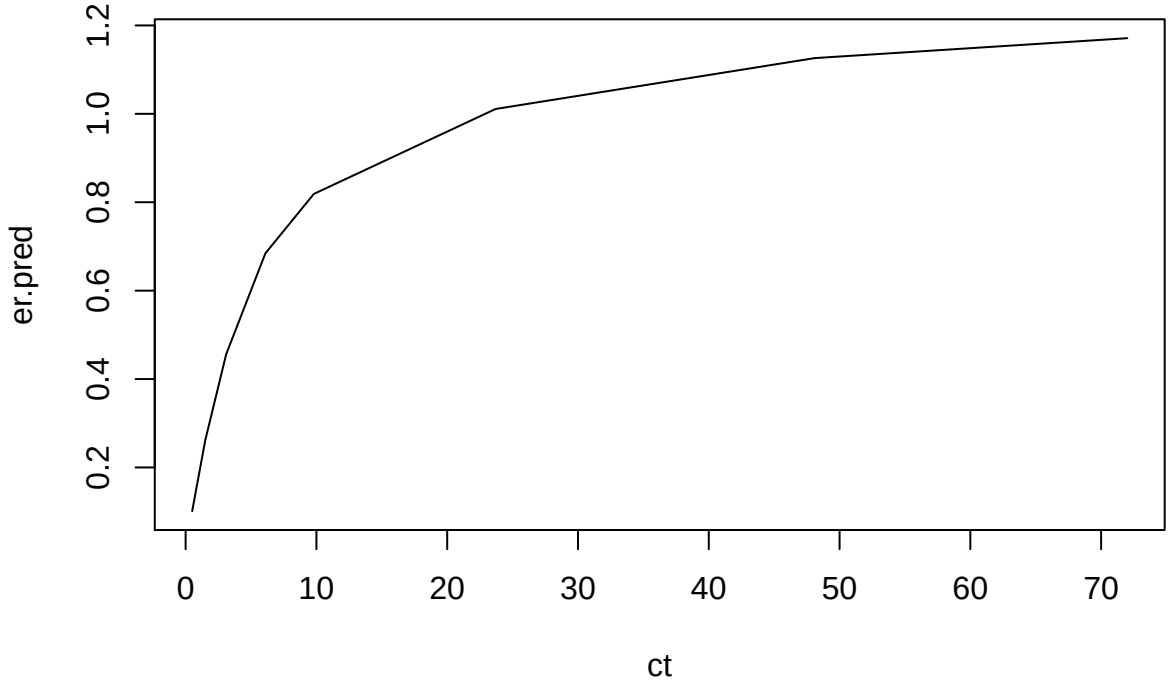
```
## [1] 1840
```

```
x <- subset(dpredl, pmid == 1840 & mod == 'ALFAM')
```

```
plot(er ~ ct, data = x, type = 'l')
```




```
plot(er.pred ~ ct, data = x, type = 'l')
```




```
x2 <- x[, c('ct', 'app.mthd.bsth', 'app.mthd.os', 'app.rate',
            'man.source', 'man.source.pig', 'incorp.none',
            'man.dm', 'man.ph', 'man.tan', 'app.mthd',
            'wind.2m', 'air.temp', 'meas.tech.mm')]
x2
```

```
##          ct app.mthd.bsth app.mthd.os app.rate man.source man.source.pig incorp.none man.dm man.ph ma
## 303207  0.5         FALSE       FALSE     13.1        cat          FALSE        TRUE   11.2    7.1
## 303217  1.5         FALSE       FALSE     13.1        cat          FALSE        TRUE   11.2    7.1
```

```
## 303227  3.1         FALSE       FALSE     13.1        cat          FALSE        TRUE   11.2    7.1
## 303237  6.1         FALSE       FALSE     13.1        cat          FALSE        TRUE   11.2    7.1
## 303247  9.8         FALSE       FALSE     13.1        cat          FALSE        TRUE   11.2    7.1
## 303257 23.7         FALSE       FALSE     13.1        cat          FALSE        TRUE   11.2    7.1
## 303267 48.1         FALSE       FALSE     13.1        cat          FALSE        TRUE   11.2    7.1
## 303277 72.0         FALSE       FALSE     13.1        cat          FALSE        TRUE   11.2    7.1
```

```
pred2 <- ALFAM1mod(x2, time.name = 'ct')
```

```
## Warning in ALFAM1mod(x2, time.name = "ct"): Some parameters not used: wetsoil, app.mthd.ts, app.mthd
```

```
pred2
```

```
##        group   ct     nmax        km           j     er.int        er
## 303207     1  0.5 1.288606  5.857836 0.202679956 0.10133998 0.1013400
## 303217     1  1.5 1.281359  5.876267 0.160091860 0.16009186 0.2614318
## 303227     1  3.1 1.339820  5.570775 0.121741057 0.19478569 0.4562175
## 303237     1  6.1 1.376548  5.363630 0.076097643 0.22829293 0.6845105
## 303247     1  9.8 1.140086  7.171501 0.036300057 0.13431021 0.8188207
## 303257     1 23.7 0.921311 10.059609 0.013823540 0.19214721 1.0109679
## 303267     1 48.1 1.010073  8.526220 0.004719350 0.11515213 1.1261200
## 303277     1 72.0 1.050901  8.059325 0.001883764 0.04502196 1.1711420
```

Try constant weather.

```
x2c <- x2
x2c$wind.2m <- 5
x2c$air.temp <- 20
```

```
pred2c <- ALFAM1mod(x2c, time.name = 'ct')
```

```
## Warning in ALFAM1mod(x2c, time.name = "ct"): Some parameters not used: wetsoil, app.mthd.ts, app.mth
```

```
pred2c
```

```
##        group   ct     nmax       km           j     er.int        er
## 303207     1  0.5 1.170957 6.925822 0.157687192 0.07884360 0.0788436
## 303217     1  1.5 1.170957 6.925822 0.129615062 0.12961506 0.2084587
## 303227     1  3.1 1.170957 6.925822 0.096001943 0.15360311 0.3620618
## 303237     1  6.1 1.170957 6.925822 0.062099367 0.18629810 0.5483599
## 303247     1  9.8 1.170957 6.925822 0.037223714 0.13772774 0.6860876
## 303257     1 23.7 1.170957 6.925822 0.015832048 0.22006546 0.9061531
## 303267     1 48.1 1.170957 6.925822 0.004812359 0.11742156 1.0235746
## 303277     1 72.0 1.170957 6.925822 0.001867354 0.04462976 1.0682044
```

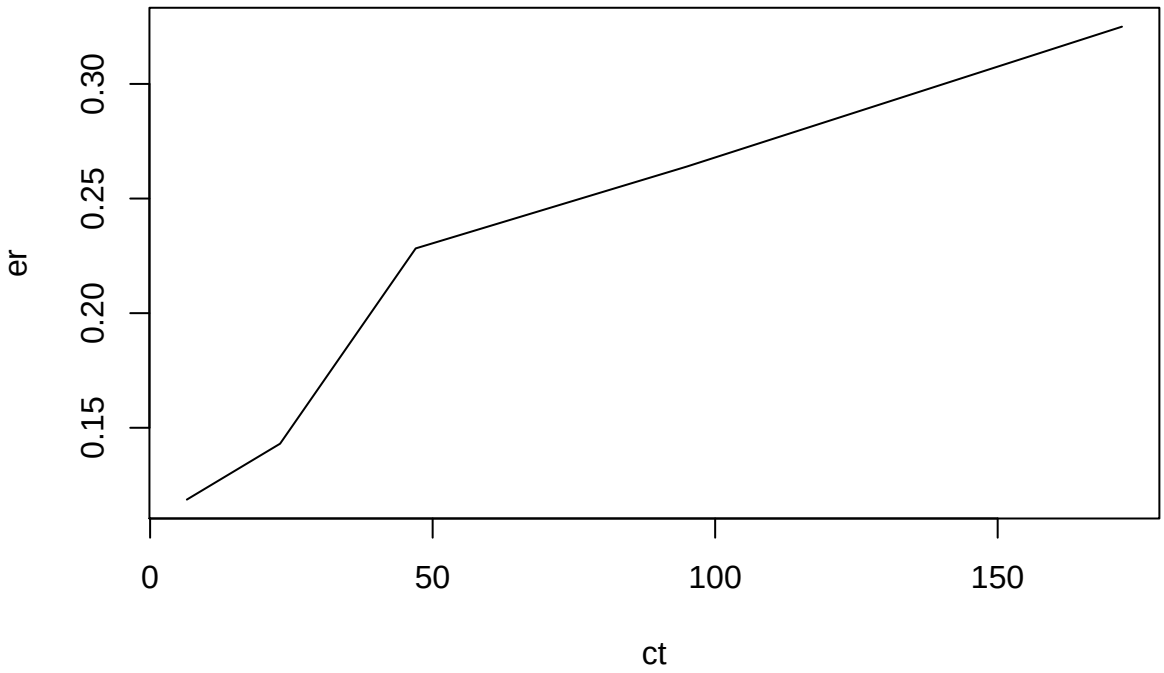
3. More typical bsth

```
dpredl[abs(dpredl$resid.er) < 0.05 & dpredl$mod == 'ALFAM' & dpredl$ct > 72, 'pmid'][1]
```

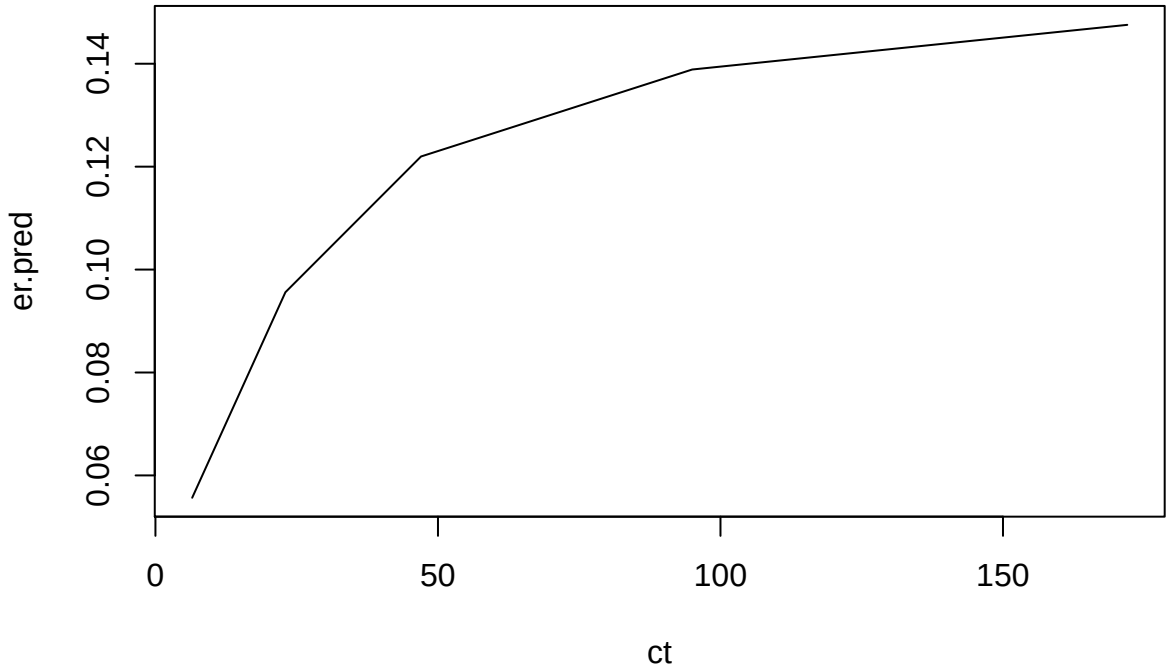
```
## [1] 183
```

```
x <- subset(dpredl, pmid == 198 & mod == 'ALFAM')
```

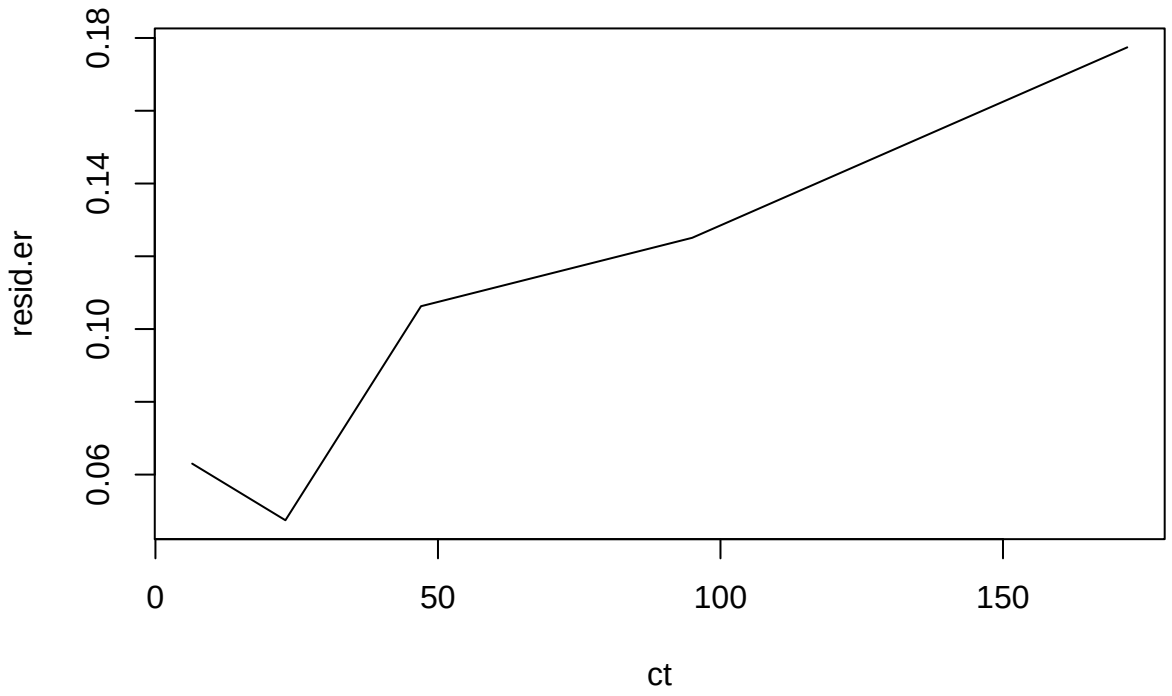
```
plot(er ~ ct, data = x, type = 'l')
```




```
plot(er.pred ~ ct, data = x, type = 'l')
```




```
plot(resid.er ~ ct, data = x, type = 'l')
```




```
x3 <- x[, c('ct', 'app.mthd.bsth', 'app.mthd.os', 'app.rate',
            'man.source', 'man.source.pig', 'incorp.none',
            'man.dm', 'man.ph', 'man.tan', 'app.mthd',
            'wind.2m', 'air.temp', 'meas.tech.mm')]
x3
```

```
##          ct app.mthd.bsth app.mthd.os app.rate man.source man.source.pig incorp.none man.dm man.ph ma
## 18007   6.5          TRUE       FALSE     19.4        pig           TRUE        TRUE    3.2   7.56
## 18017  23.0          TRUE       FALSE     19.4        pig           TRUE        TRUE    3.2   7.56
## 18027  47.0          TRUE       FALSE     19.4        pig           TRUE        TRUE    3.2   7.56
## 18037  95.0          TRUE       FALSE     19.4        pig           TRUE        TRUE    3.2   7.56
## 18047 172.0          TRUE       FALSE     19.4        pig           TRUE        TRUE    3.2   7.56
```

```
pred3 <- ALFAM1mod(x3, time.name = 'ct')
```

```
## Warning in ALFAM1mod(x3, time.name = "ct"): Some parameters not used: wetsoil, app.mthd.ts, app.mthd
```

```
pred3
```

```
##       group    ct      nmax       km            j      er.int         er
## 18007     1   6.5 0.1715789 13.53728 0.0085629818 0.055659381 0.05565938
## 18017     1  23.0 0.1367780 19.24317 0.0024203292 0.039935431 0.09559481
## 18027     1  47.0 0.1910233 11.74207 0.0010990722 0.026377732 0.12197255
## 18037     1  95.0 0.1630708 14.57270 0.0003522295 0.016907016 0.13887956
## 18047     1 172.0 0.1855482 11.94745 0.0001126855 0.008676783 0.14755634
```

Try constant weather.

```
x3c <- x3
x3c$wind.2m <- 3
x3c$air.temp <- 9
```

```
pred3c <- ALFAM1mod(x3c, time.name = 'ct')
```

```
## Warning in ALFAM1mod(x3c, time.name = "ct"): Some parameters not used: wetsoil, app.mthd.ts, app.mthd
```

```
pred3c
```

```
##       group    ct      nmax       km            j     er.int         er
## 18007     1   6.5 0.1546333 15.52889 0.0070195666 0.04562718 0.04562718
## 18017     1  23.0 0.1546333 15.52889 0.0028292040 0.04668187 0.09230905
## 18027     1  47.0 0.1546333 15.52889 0.0009967270 0.02392145 0.11623050
## 18037     1  95.0 0.1546333 15.52889 0.0003474457 0.01667739 0.13290789
## 18047     1 172.0 0.1546333 15.52889 0.0001158509 0.00892052 0.14182841
```

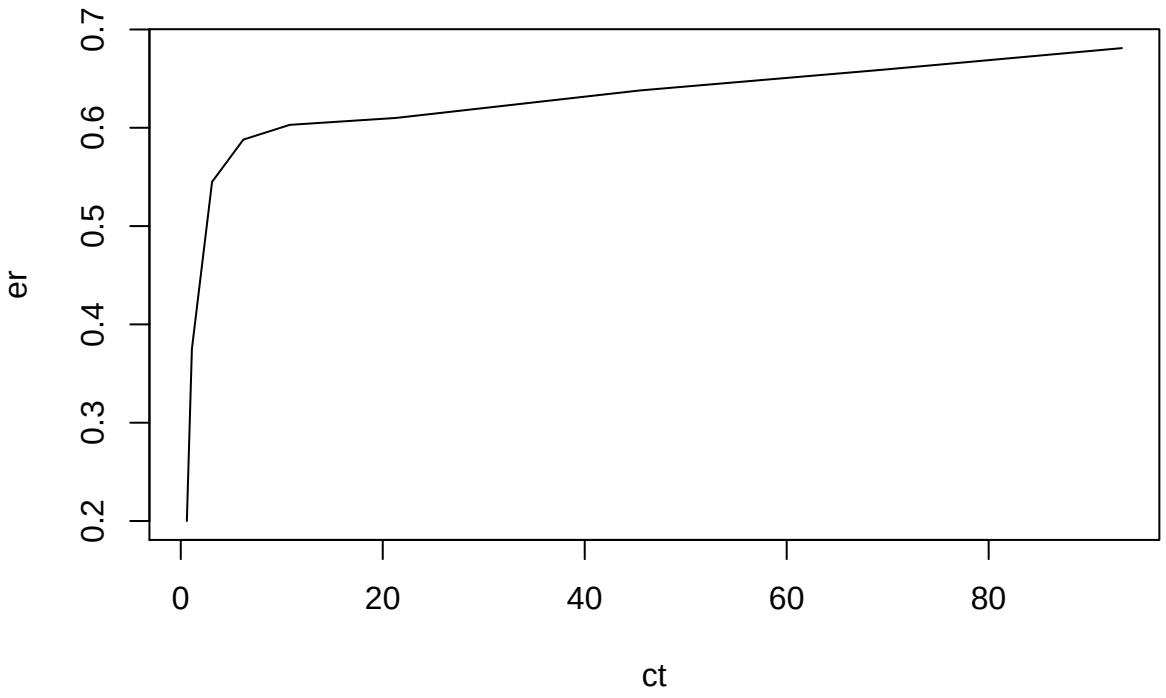
4. Some bc plot with low emission

```
dpredl[dpredl$app.mthd == 'bc' & abs(dpredl$resid.er) < 0.05 & dpredl$mod == 'ALFAM' & dpredl$ct > 72,
```

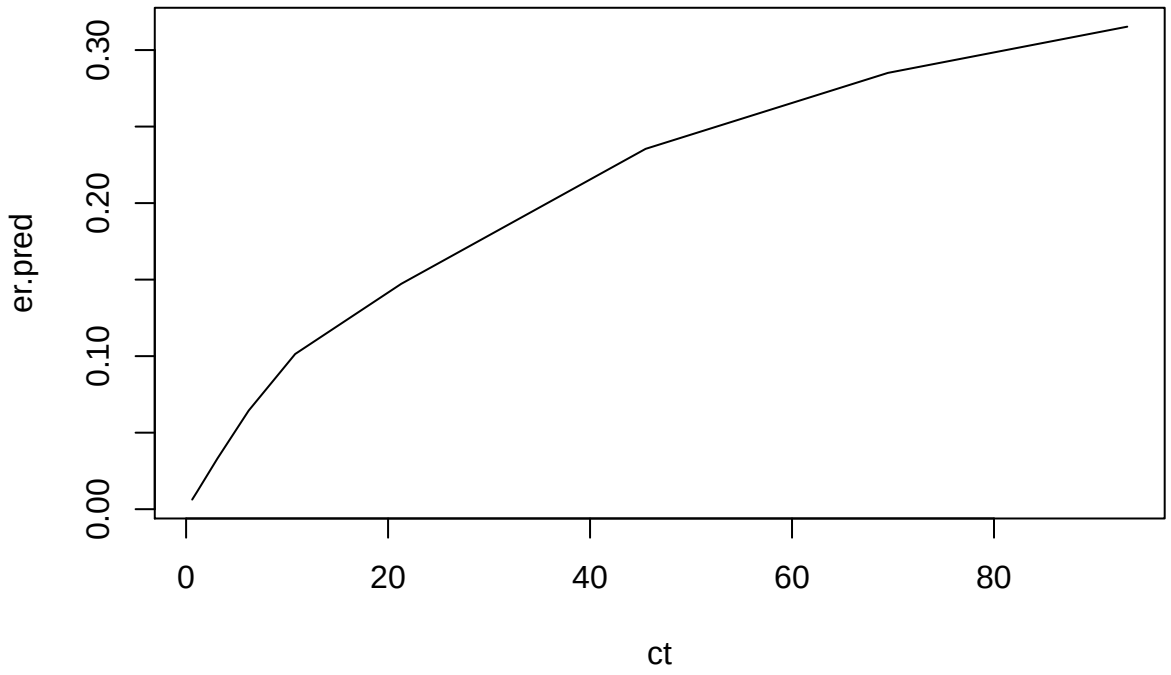
```
## [1] 197
```

```
x <- subset(dpredl, pmid == 483 & mod == 'ALFAM')
```

```
plot(er ~ ct, data = x, type = 'l')
```




```
plot(er.pred ~ ct, data = x, type = 'l')
```




```
x4 <- x[, c('ct', 'app.mthd.bsth', 'app.mthd.os', 'app.rate',
            'man.source', 'man.source.pig', 'incorp.none',
            'man.dm', 'man.ph', 'man.tan', 'app.mthd',
            'wind.2m', 'air.temp')]
x4
```

```
##         ct app.mthd.bsth app.mthd.os app.rate man.source man.source.pig incorp.none man.dm man.ph ma
## 38397  0.6         FALSE       FALSE     12.7        pig           TRUE        TRUE   10.6    7.8
## 38407  1.1         FALSE       FALSE     12.7        pig           TRUE        TRUE   10.6    7.8
## 38417  3.1         FALSE       FALSE     12.7        pig           TRUE        TRUE   10.6    7.8
## 38427  6.2         FALSE       FALSE     12.7        pig           TRUE        TRUE   10.6    7.8
## 38437 10.8         FALSE       FALSE     12.7        pig           TRUE        TRUE   10.6    7.8
## 38447 21.3         FALSE       FALSE     12.7        pig           TRUE        TRUE   10.6    7.8
## 38457 45.5         FALSE       FALSE     12.7        pig           TRUE        TRUE   10.6    7.8
## 38467 69.5         FALSE       FALSE     12.7        pig           TRUE        TRUE   10.6    7.8
## 38477 93.2         FALSE       FALSE     12.7        pig           TRUE        TRUE   10.6    7.8
```

```
pred4 <- ALFAM1mod(x4, time.name = 'ct')
```

```
## Warning in ALFAM1mod(x4, time.name = "ct"): Some parameters not used: wetsoil, app.mthd.ts, app.mthd
```

```
pred4
```

```
##       group   ct      nmax       km           j     er.int         er
## 38397     1  0.6 0.7713477 20.78292 0.036073085 0.02164385 0.02164385
## 38407     1  1.1 0.7799008 20.36302 0.035296934 0.01764847 0.03929232
## 38417     1  3.1 0.8056086 19.27015 0.034067952 0.06813590 0.10742822
## 38427     1  6.2 0.8212849 18.37010 0.028599888 0.08865965 0.19608787
## 38437     1 10.8 0.7988517 19.19573 0.020130320 0.09259947 0.28868735
## 38447     1 21.3 0.6734736 26.07453 0.010052305 0.10554920 0.39423655
## 38457     1 45.5 0.8239280 19.35896 0.006048463 0.14637280 0.54060935
## 38467     1 69.5 0.8427261 19.11722 0.002813486 0.06752367 0.60813302
## 38477     1 93.2 0.7838830 21.43669 0.001611930 0.03820274 0.64633576
```

Try constant weather.

```r
x4c <- x4
x4c$wind.2m <- 2
x4c$air.temp <- 20
```

```r
pred4c <- ALFAM1mod(x4c, time.name = 'ct')
```

```
## Warning in ALFAM1mod(x4c, time.name = "ct"): Some parameters not used: wetsoil, app.mthd.ts, app.mth
```

```r
pred4c
```

```
##       group   ct      nmax       km           j     er.int         er
## 38397     1  0.6 0.8079133 19.07551 0.041061883 0.02463713 0.02463713
## 38407     1  1.1 0.8079133 19.07551 0.038823125 0.01941156 0.04404869
## 38417     1  3.1 0.8079133 19.07551 0.034446322 0.06889264 0.11294134
## 38427     1  6.2 0.8079133 19.07551 0.027495868 0.08523719 0.19817853
## 38437     1 10.8 0.8079133 19.07551 0.020409187 0.09388226 0.29206079
## 38447     1 21.3 0.8079133 19.07551 0.012776373 0.13415192 0.42621271
## 38457     1 45.5 0.8079133 19.07551 0.005910919 0.14304425 0.56925695
## 38467     1 69.5 0.8079133 19.07551 0.002694383 0.06466520 0.63392215
## 38477     1 93.2 0.8079133 19.07551 0.001549680 0.03672743 0.67064958
```