Testing multi models to data

Testing multi models to the dataset of SidB database

Here we test three different two-pool model to each individual datasets.

Dataset Andrews2000SBB

The initial corbon is missing

Dataset Arevalo2012

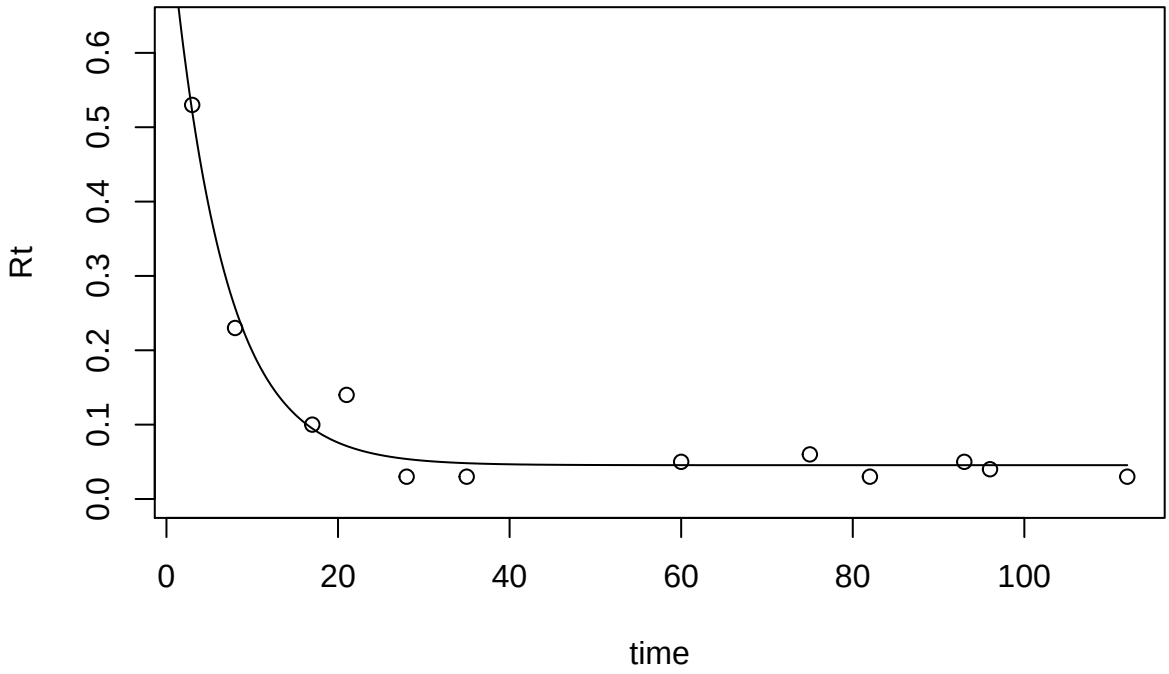
In this dataset the CO2 respiraton has been reported as cumulative. mean initial carbon

Dataset Barrett2006

V2: Dataset Barrett2006, Variable C_5deg_2gwc_LTV, site Lower Taylor Valley

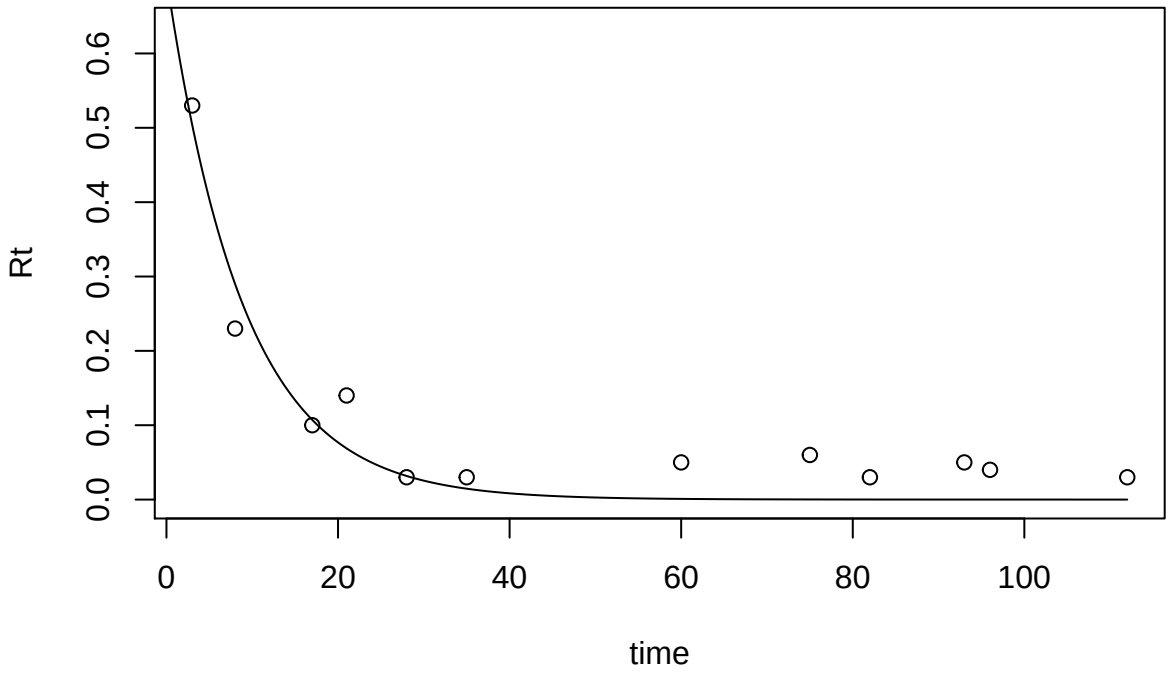
The initial amount of carbon is 69 gC/m^2

```
## [1] "k1= 0.161890699790025"
## [2] "k2= 6.59169345735351e-09"
## [3] "proportion of C0 in pool 1= 6.92566261173422e-07"
```

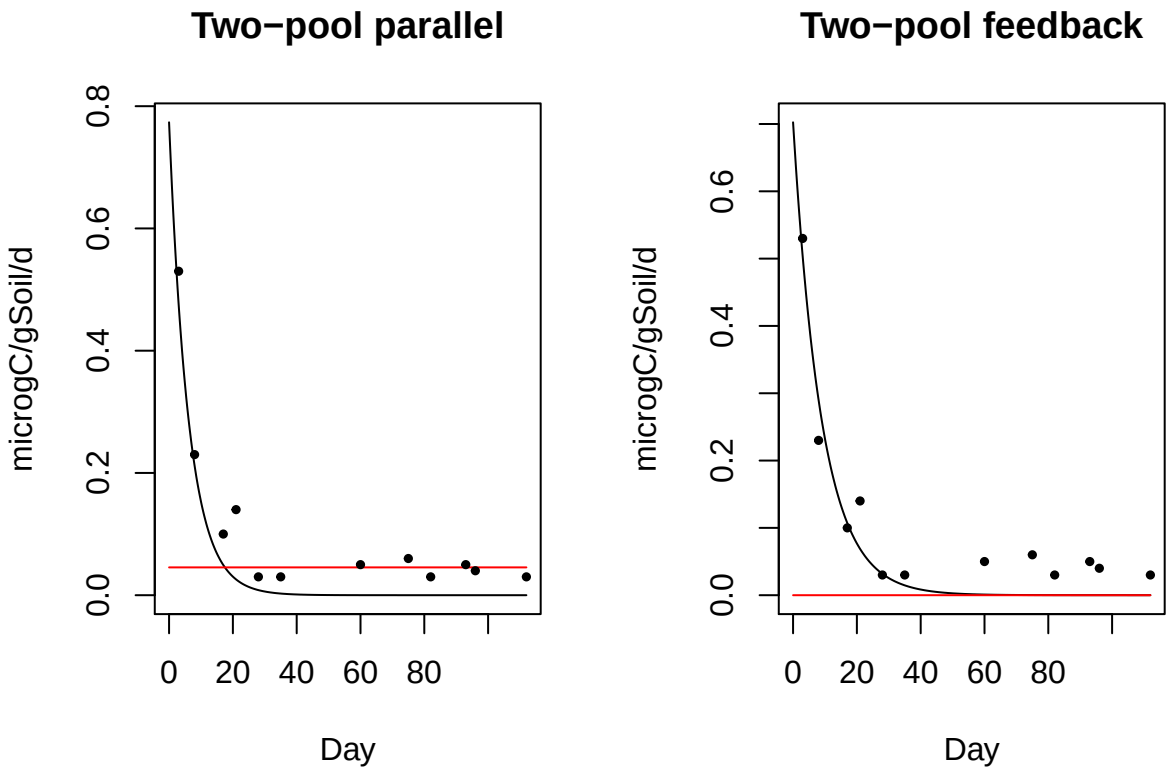



```
## [1] "AIC =  20.8309356928011"
```

```
## [1] "k1= 0.110614016322307"
## [2] "k2= 5.64001607400163e-74"
## [3] "a21= 0.999999079572951"
## [4] "a12= 1.2546009801051e-06"
## [5] "Proportion of C0 in pool 1= 0.99999959448796"
```




```
## [1] "AIC =  22.649385287265"
```

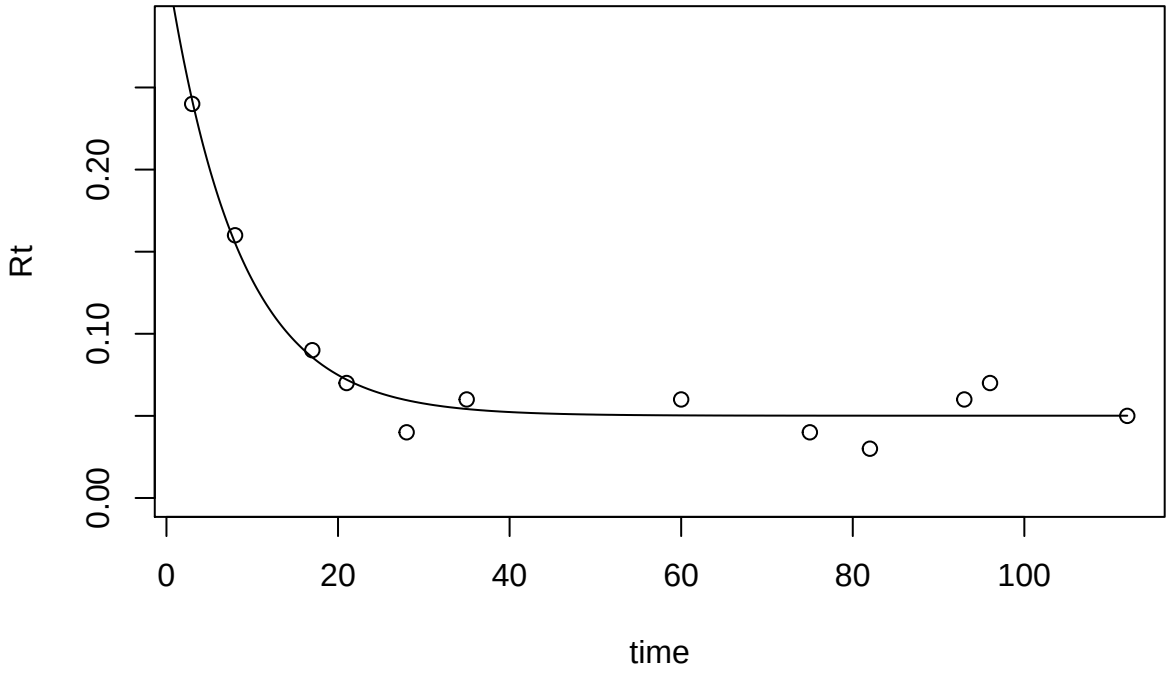



```
## $name
## [1] "C_5deg_2gwc_LTV"
##
## $temperature
## [1] 5
##
## $moisture
```

```
## [1] 2
##
## $site
## [1] "Lower Taylor Valley"
##
## $varDesc
## [1] "soil respiration rate measured at 5 degrees and 2% water content. Location: Lower Taylor Valley
##
## $units
## [1] "microgC/gSoil/d"
```

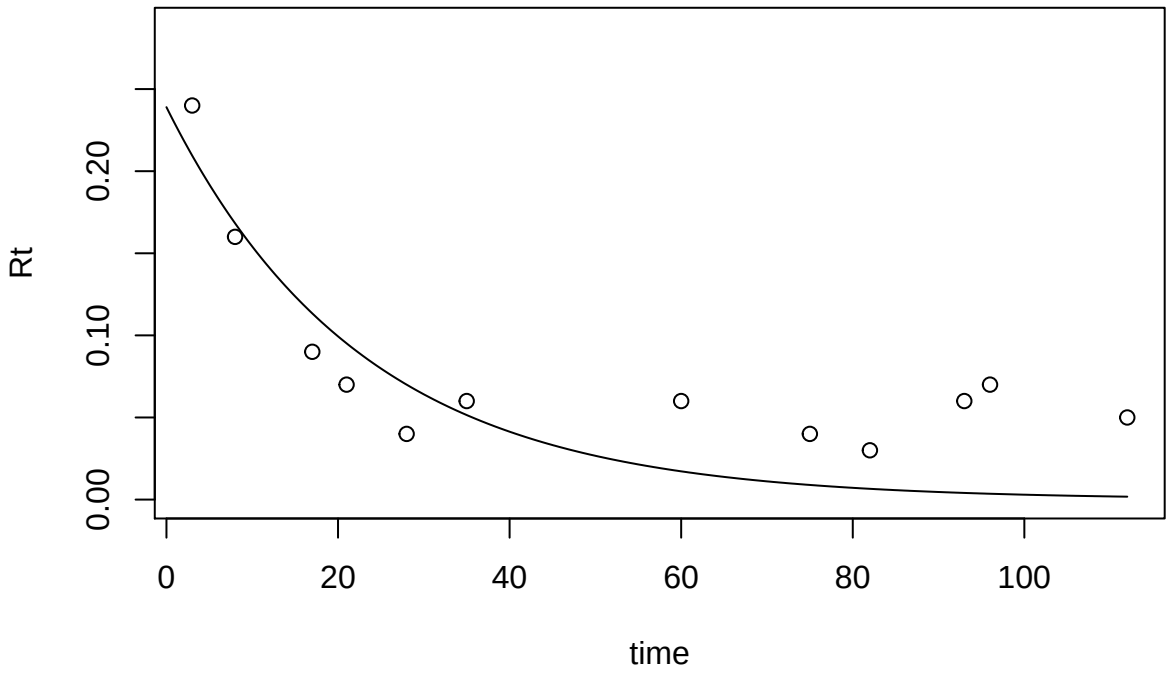
V3: Dataset Barrett2006, Variable C_5deg_2gwc_UTV, site Upper Taylor Valley

```
## [1] "k1= 0.120490449585908"
## [2] "k2= 2.17858270629527e-08"
## [3] "proportion of C0 in pool 1= 9.95375204648763e-07"
```

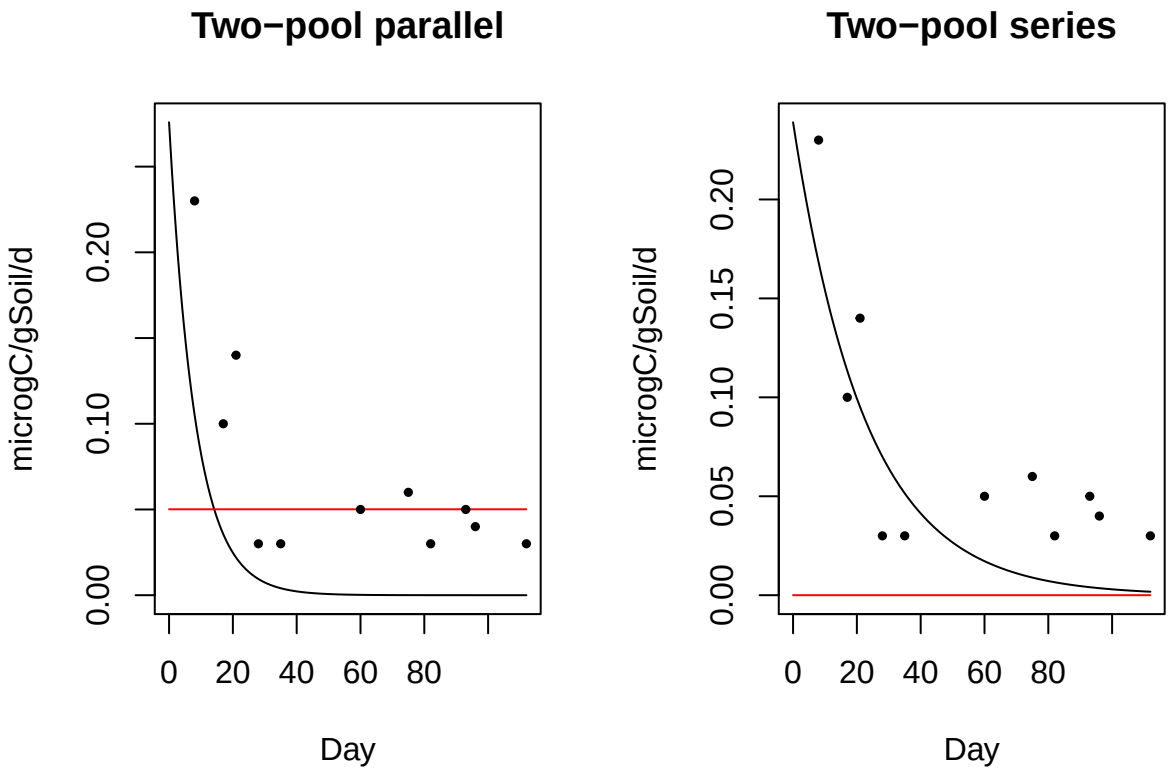



```
## [1] "AIC =  23.8938127056481"
```

```
## [1] "k1= 0.0438631412210911"
## [2] "k2= 6.87349098455287e-83"
## [3] "a21= 0.999997347186566"
## [4] "Proportion of C0 in pool 1= 0.893001561386224"
```

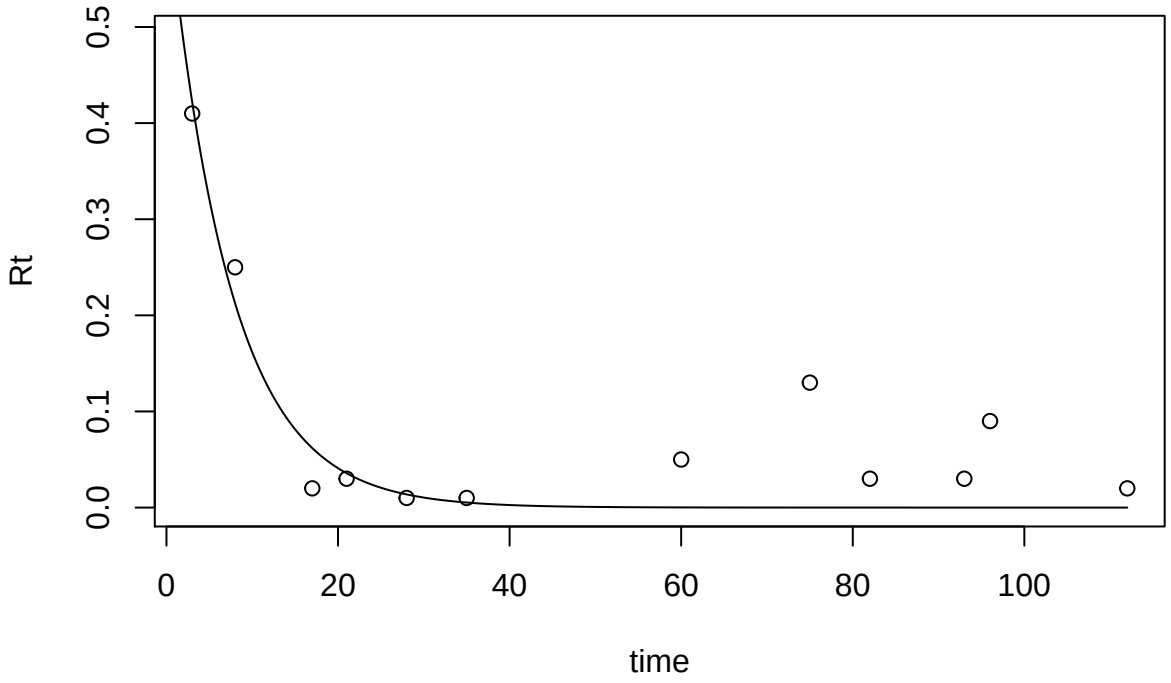



```
## [1] "AIC =  21.1943308591614"
```



V4: Dataset Barrett2006, Variable C_5deg_2gwc_B, site Beacon

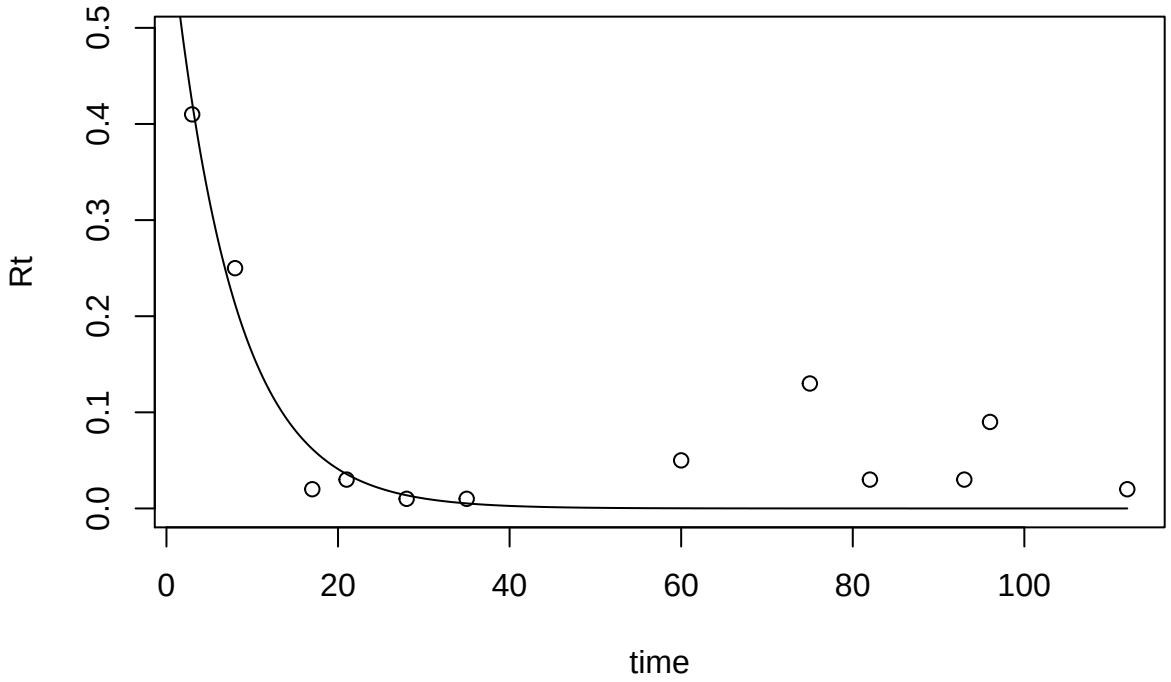
```
## [1] "k1= 0.137159341106606"
## [2] "k2= 1.6799529446051e-90"
## [3] "proportion of C0 in pool 1= 2.21151138246611e-06"
```




```
## [1] "AIC =  17.7896843526351"
```

V5: Dataset Barrett2006, Variable C_5deg_2gwc_V, site Victoria

```
## [1] "k1= 0.137159341106606"
## [2] "k2= 1.6799529446051e-90"
## [3] "proportion of C0 in pool 1= 2.21151138246611e-06"
```



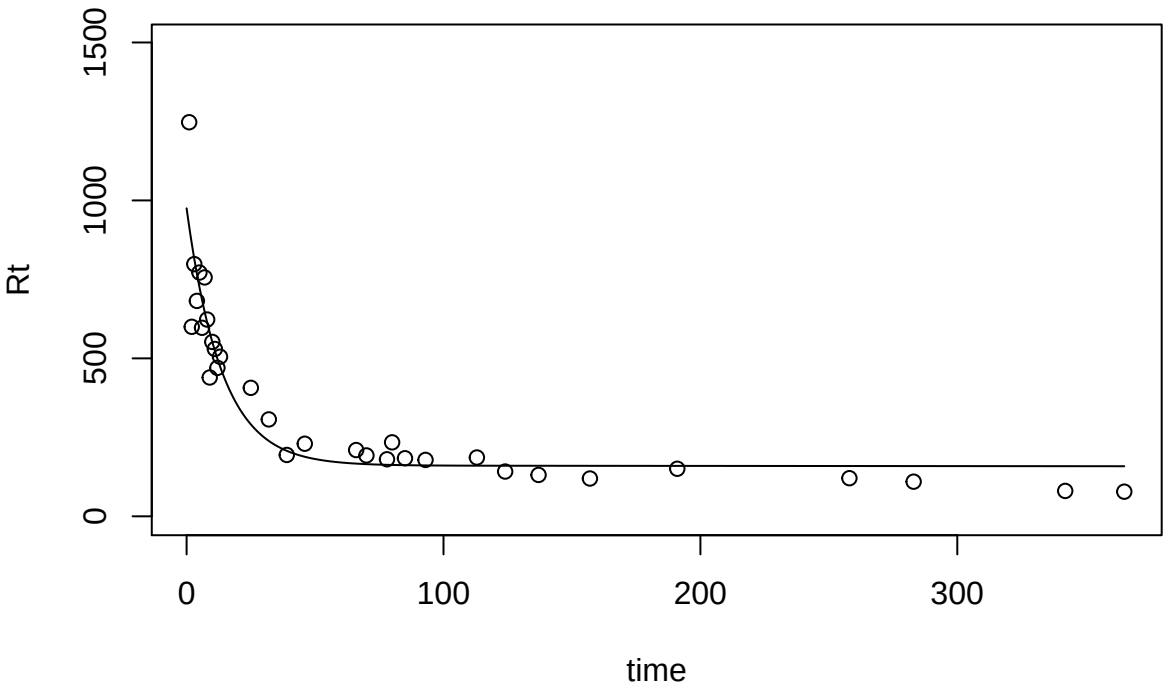

```
## [1] "AIC =  17.7896843526351"
```

Dataset Bracho2016SBB

This is the results of a depth-warming experiment with two levels of Control and warming. The dataset has 9 column of time, three depth on each warming and control. The variables V3, V5, V7, V9, V11 and V15 are the sd.

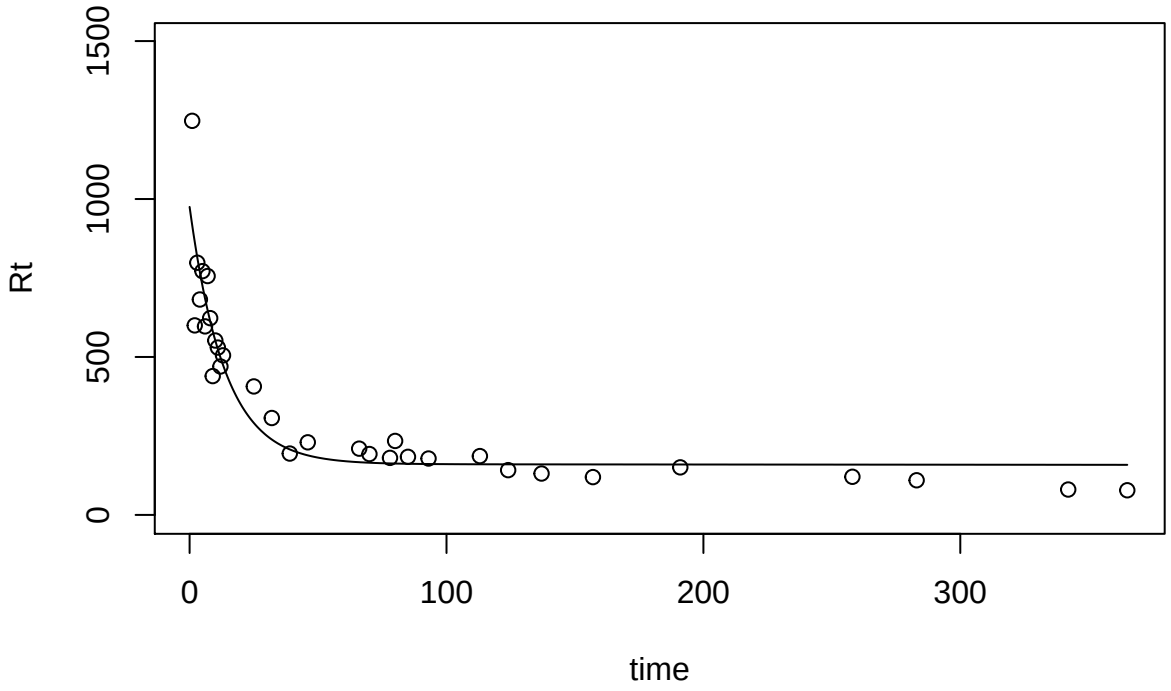
V1: Dataset Bracho2016SBB, variable control_7.5_15_mean, site 15, depth 7.5

```
## [1] "k1= 0.0732633945588067"
## [2] "k2= 3.85640257531122e-05"
## [3] "proportion of C0 in pool 1= 0.00265881046995375"
```



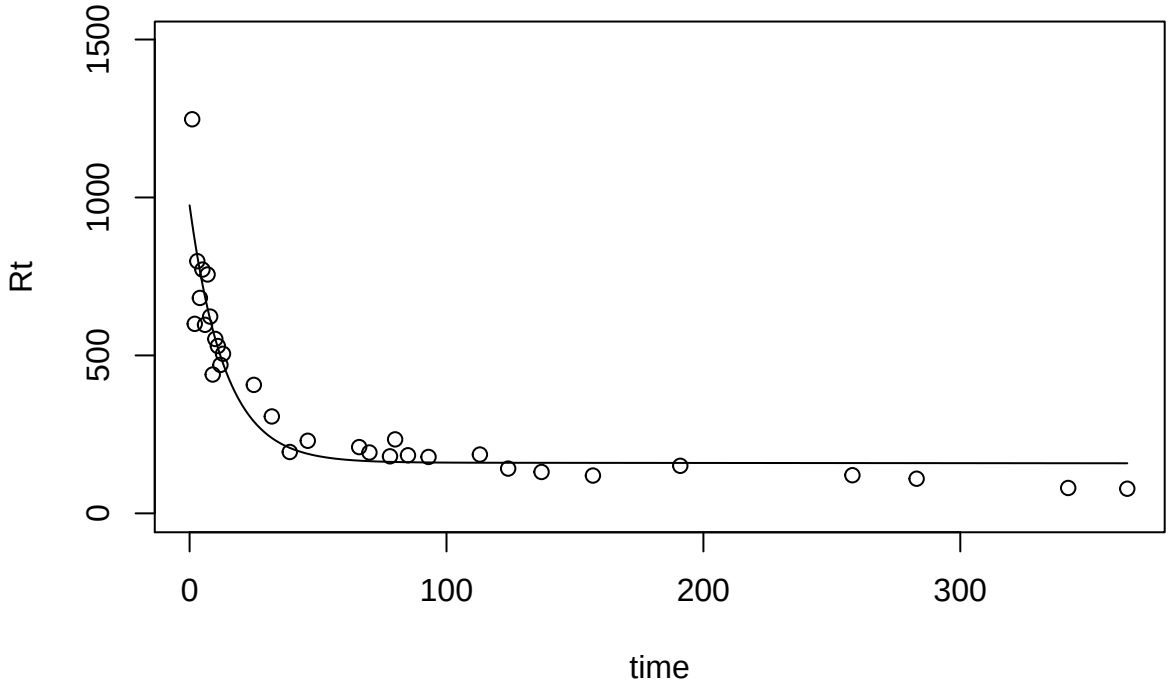

```
## [1] "AIC =  -12.1458755845537"
```

```
## [1] "k1= 0.0732650937595586"
## [2] "k2= 3.85645700239924e-05"
## [3] "a21= 0.72086715654104"
## [4] "a12= 8.1152272936591e-06"
## [5] "Proportion of C0 in pool 1= 0.00953806497394005"
```




```
## [1] "AIC =  -8.14587558340254"
```

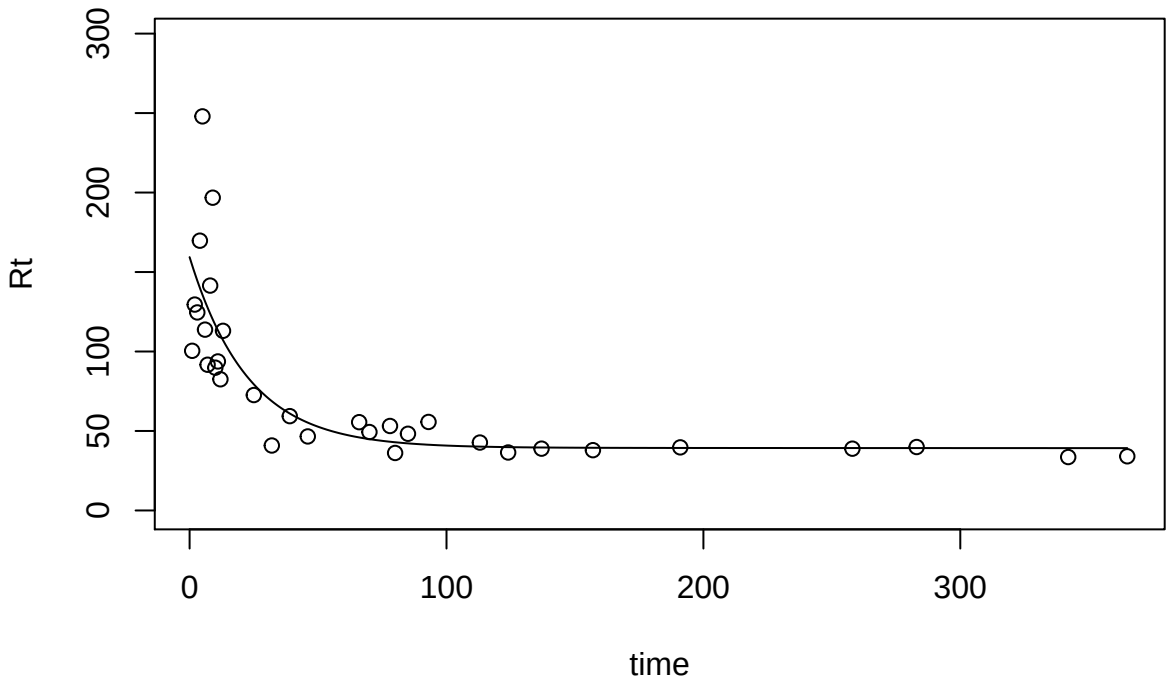
```
## [1] "k1= 0.0732659542643693"
## [2] "k2= 3.8564509041901e-05"
## [3] "a21= 0.768887132455099"
## [4] "Proportion of C0 in pool 1= 0.011524307515807"
```




```
## [1] "AIC =  -10.1458755836345"
```

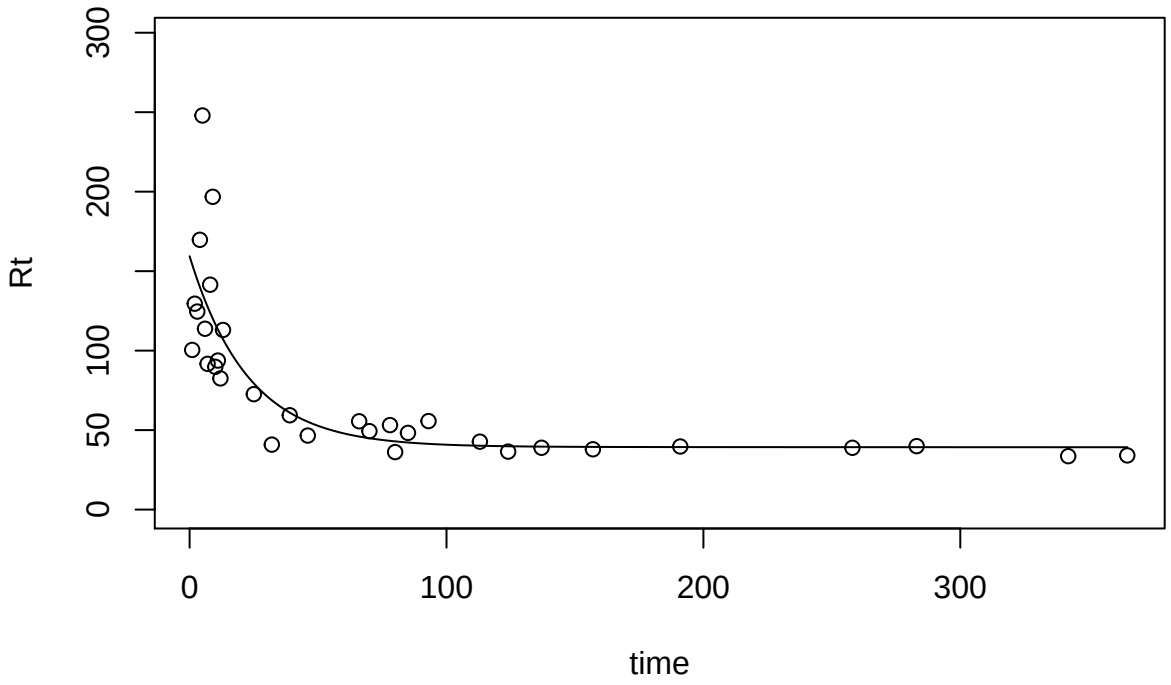
V4: Dataset Bracho2016SBB, variable control_20_15_mean, site 15, depth 20

```
## [1] "k1= 0.0439510036613616"
## [2] "k2= 1.13137275312385e-05"
## [3] "proportion of C0 in pool 1= 0.000783926724108652"
```



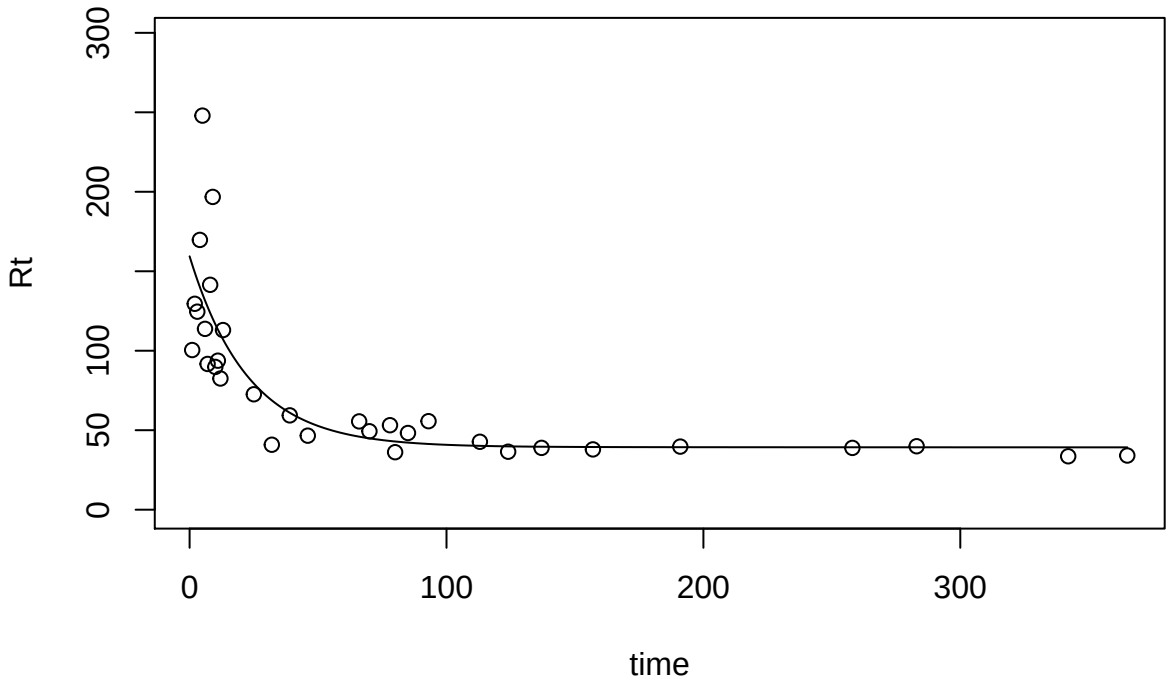

```
## [1] "AIC =  -7.571830114275"
```

```
## [1] "k1= 0.043899245164576"
## [2] "k2= 6.32107363354298e-05"
## [3] "a21= 0.820821164196925"
## [4] "a12= 0.999978210662885"
## [5] "Proportion of C0 in pool 1= 0.00581735566910335"
```




```
## [1] "AIC =  -3.57183007494485"
```

```
## [1] "k1= 0.0439513836939281"
## [2] "k2= 1.13137602855708e-05"
## [3] "a21= 0.735851808908667"
## [4] "Proportion of C0 in pool 1= 0.00296987165966861"
```

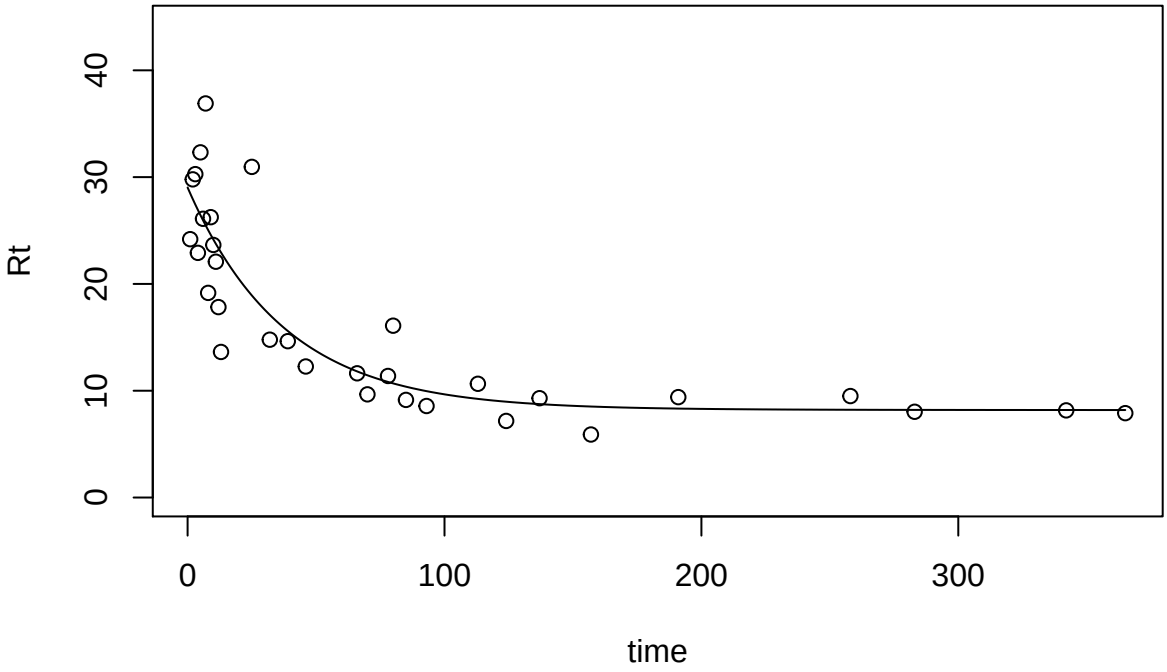



```
## [1] "AIC =  -5.57183011441464"
```

V6: Dataset Bracho2016SBB, variable control_50_15_mean, site 15, depth 50

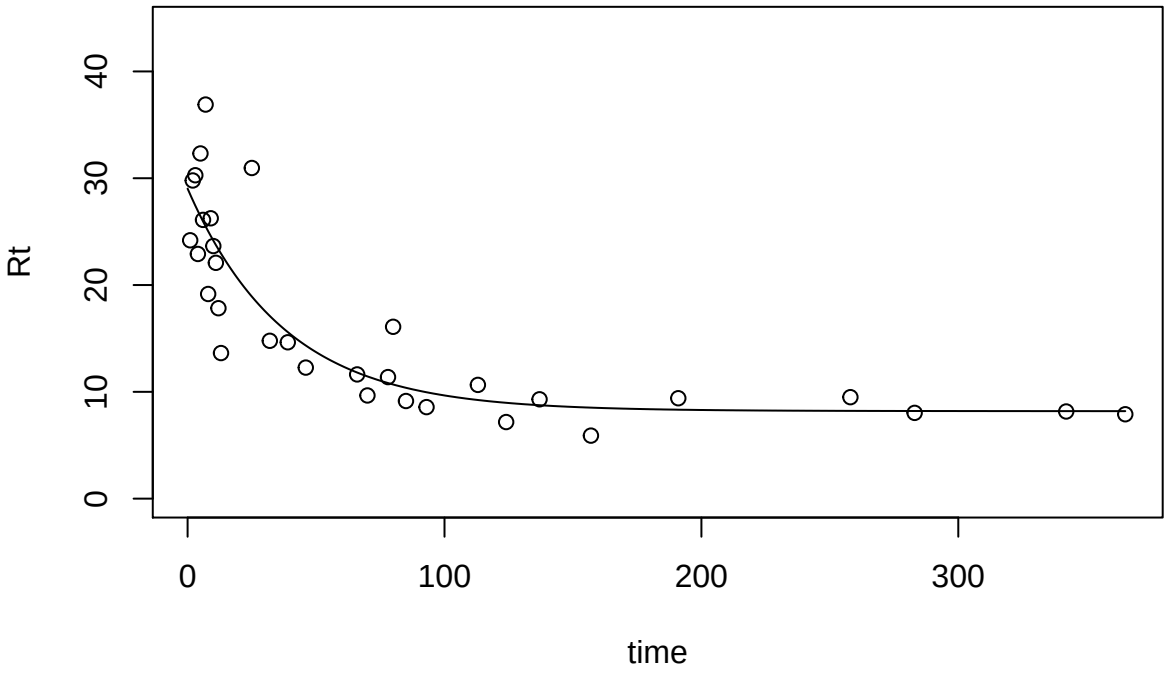
```
## [1] "k1= 0.0265687752217546"
```

```
## [2] "k2= 4.63732354133169e-06"
## [3] "proportion of C0 in pool 1= 0.000442838060020823"
```




```
## [1] "AIC =  0.221503060532193"
```

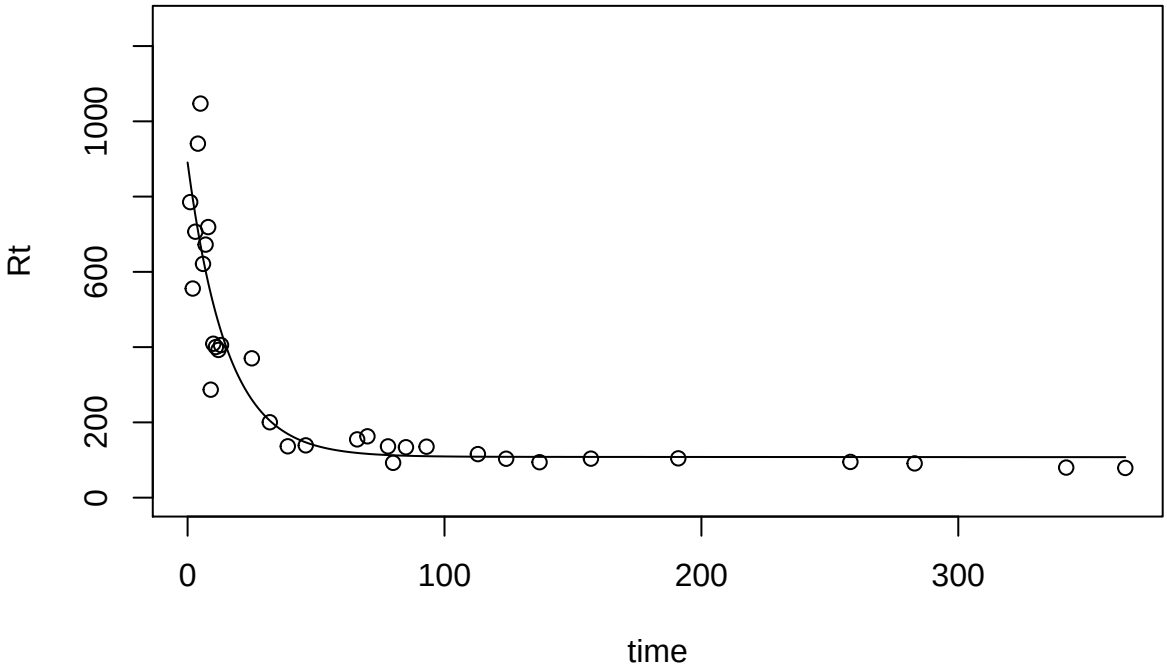
```
## [1] "k1= 0.0265698306145051"
## [2] "k2= 4.6374018827659e-06"
## [3] "a21= 0.999382557518606"
## [4] "Proportion of C0 in pool 1= 0.999629881180551"
```




```
## [1] "AIC =  2.22150326969481"
```

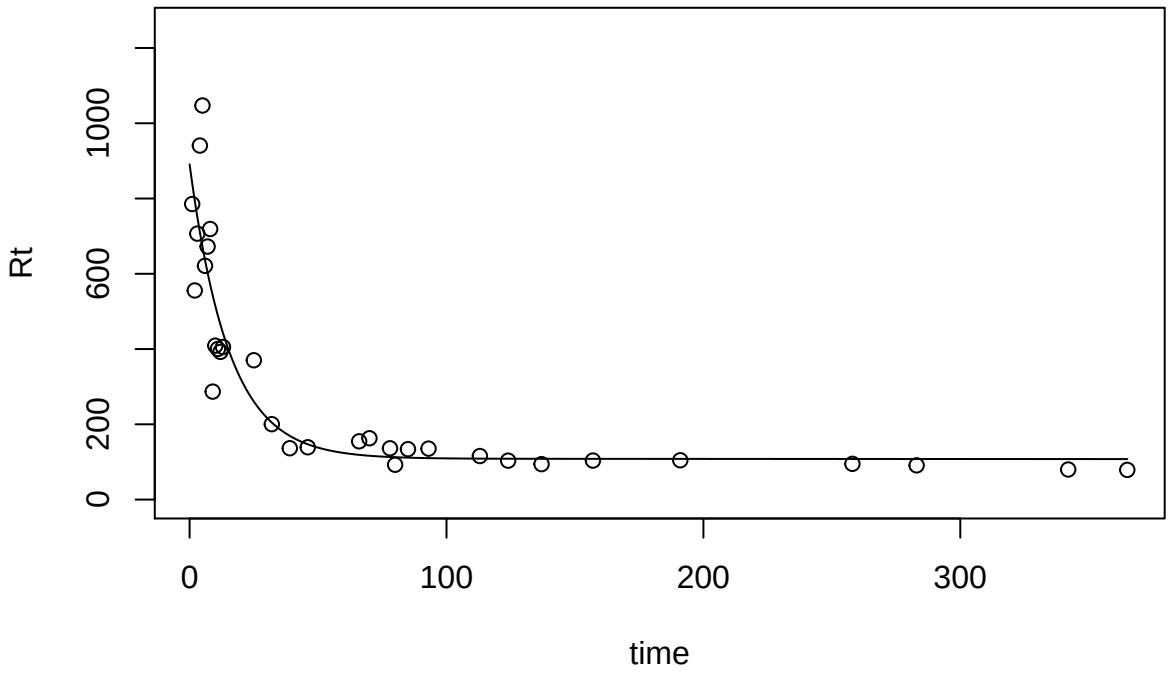
V8: Dataset Bracho2016SBB, variable warming_7.5_15_mean, site 15, depth 7.5

```
## [1] "k1= 0.06551806960121"
## [2] "k2= 2.60661943795857e-05"
## [3] "proportion of C0 in pool 1= 0.00285530627202851"
```



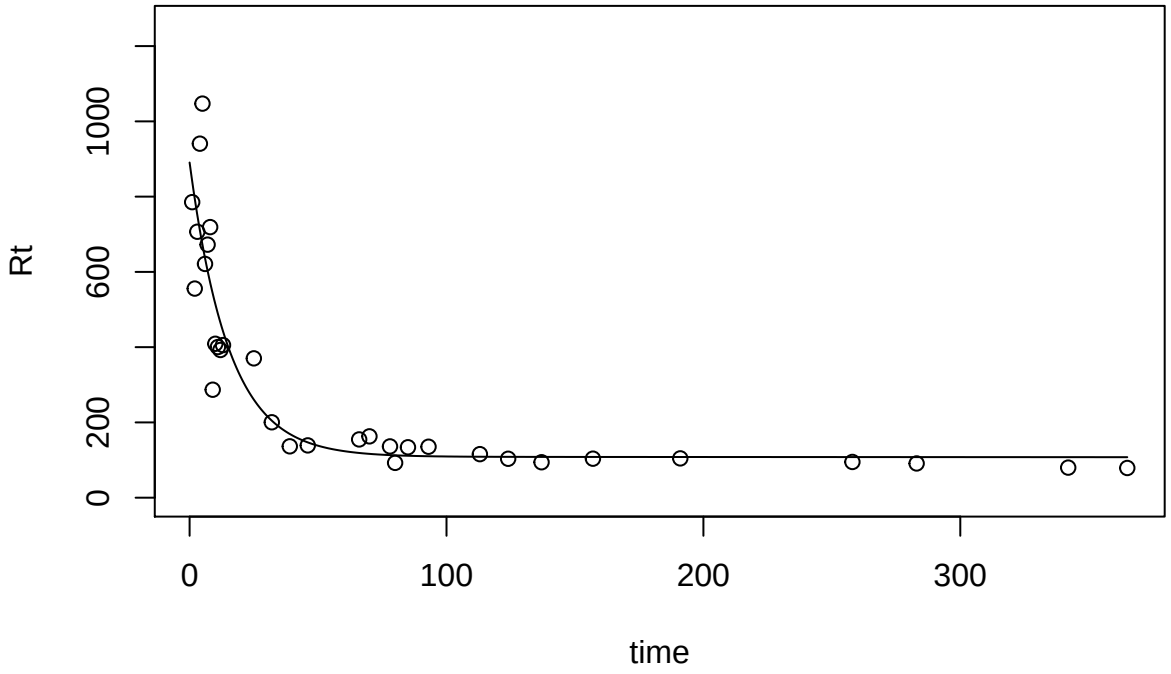

```
## [1] "AIC =  -12.8397045833618"
```

```
## [1] "k1= 0.0655180689327772"
## [2] "k2= 2.60662696638422e-05"
## [3] "a21= 0.66533941315117"
## [4] "a12= 4.36043386153884e-06"
## [5] "Proportion of C0 in pool 1= 0.00853873277156408"
```




```
## [1] "AIC =  -8.8397045836095"
```

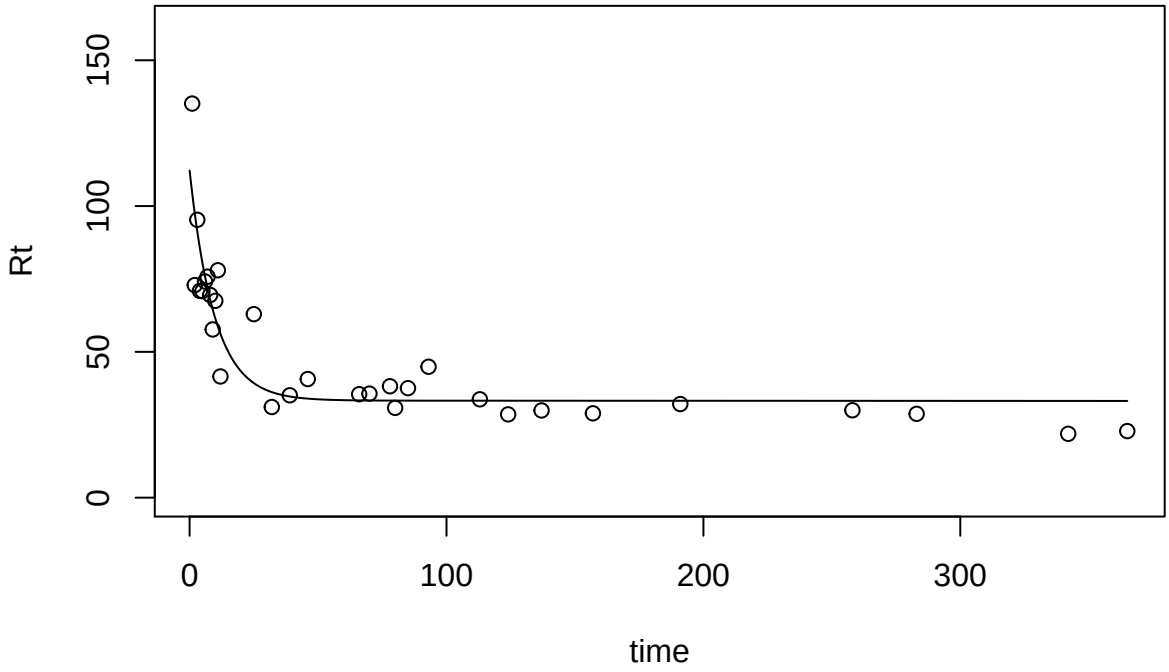
```
## [1] "k1= 0.0655180648725565"
## [2] "k2= 2.60661929159034e-05"
## [3] "a21= 0.70854043639187"
## [4] "Proportion of C0 in pool 1= 0.00980607628595404"
```




```
## [1] "AIC =  -10.8397045834384"
```

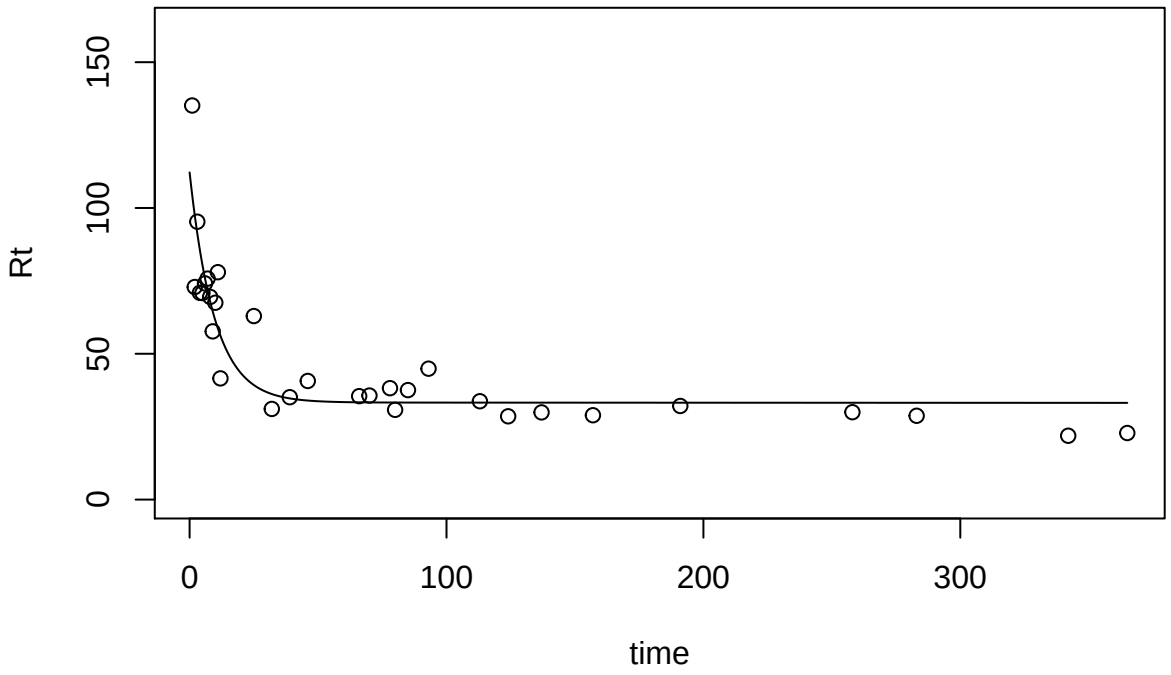
V10: Dataset Bracho2016SBB, variable warming_20_15_mean, site 15, depth 20

```
## [1] "k1= 0.103011006343888"
## [2] "k2= 9.55835079732912e-06"
## [3] "proportion of C0 in pool 1= 0.000219918334904312"
```




```
## [1] "AIC =  -3.56696731882473"
```

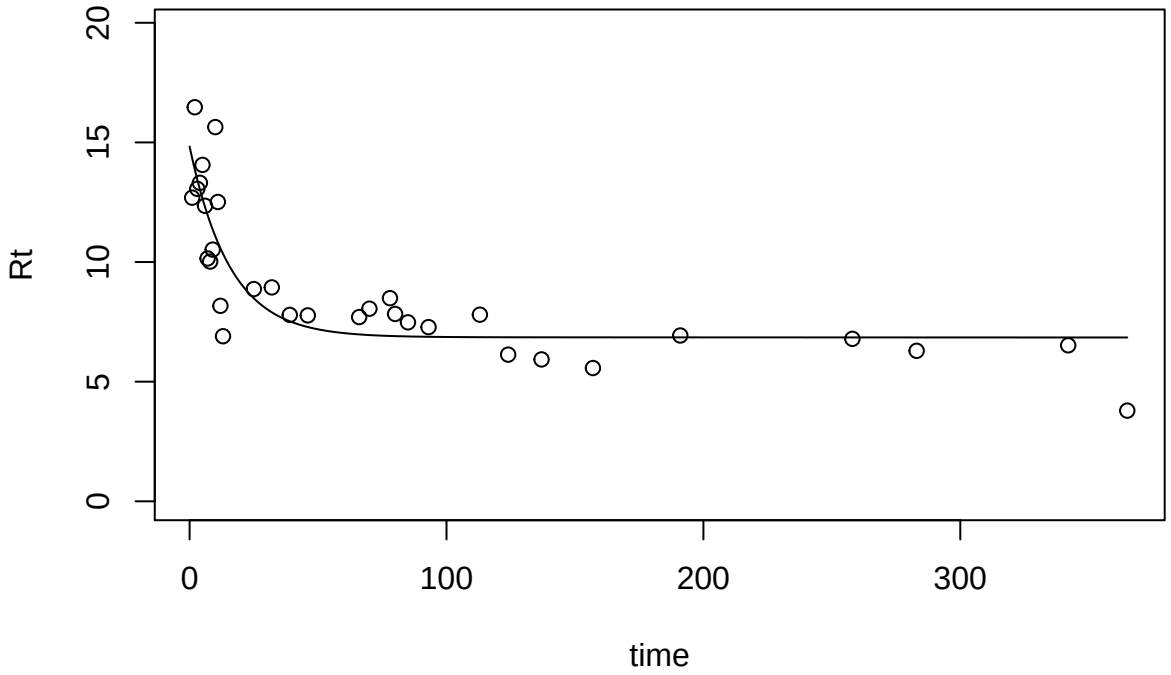
```
## [1] "k1= 0.102855327901244"
## [2] "k2= 0.000171378229613133"
## [3] "a21= 0.944157274539601"
## [4] "a12= 0.999980006719602"
## [5] "Proportion of C0 in pool 1= 0.00560741464856418"
```




```
## [1] "AIC =  0.433031015108229"
```

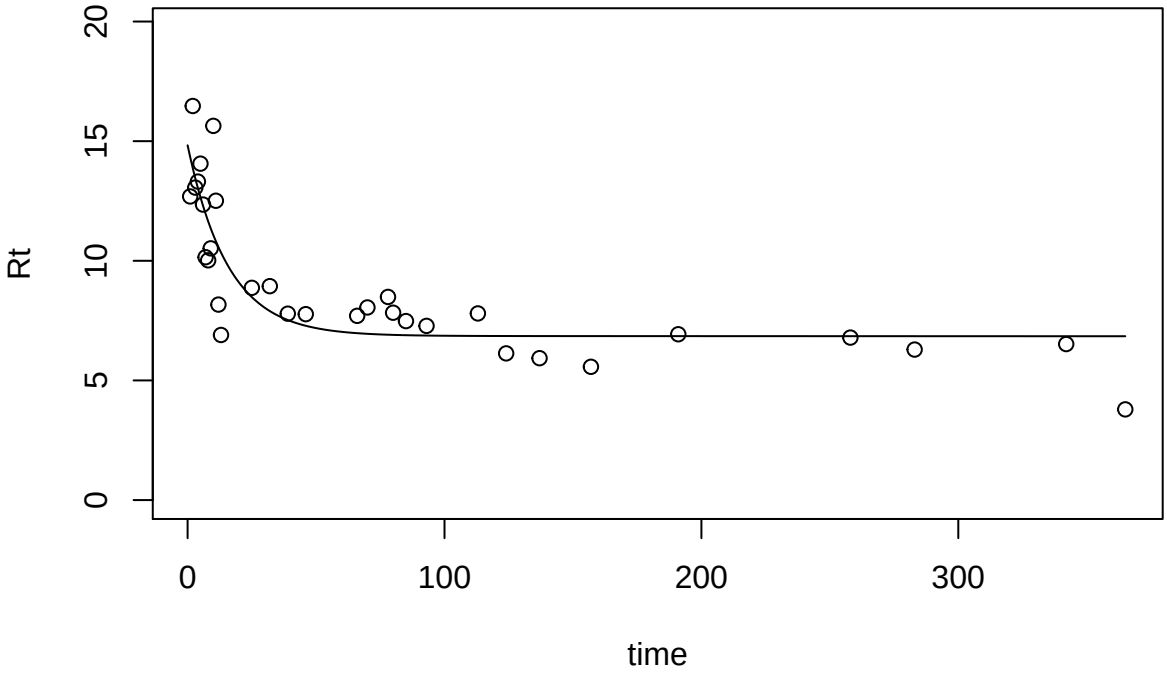
V12: Dataset Bracho2016SBB, variable warming_50_15_mean, site 15, depth 50

```
## [1] "k1= 0.063535873794109"
## [2] "k2= 3.87390360106963e-06"
## [3] "proportion of C0 in pool 1= 7.08736852718661e-05"
```




```
## [1] "AIC =  4.15656136577747"
## [1] "k1= 0.0635418293135276"
```

```
## [2] "k2= 3.87393772303094e-06"
## [3] "a21= 0.999868159768762"
## [4] "Proportion of C0 in pool 1= 0.999869836256468"
```




```
## [1] "AIC =  6.15656066636254"
```

Dataset Bradford2010

This data set is cummulative

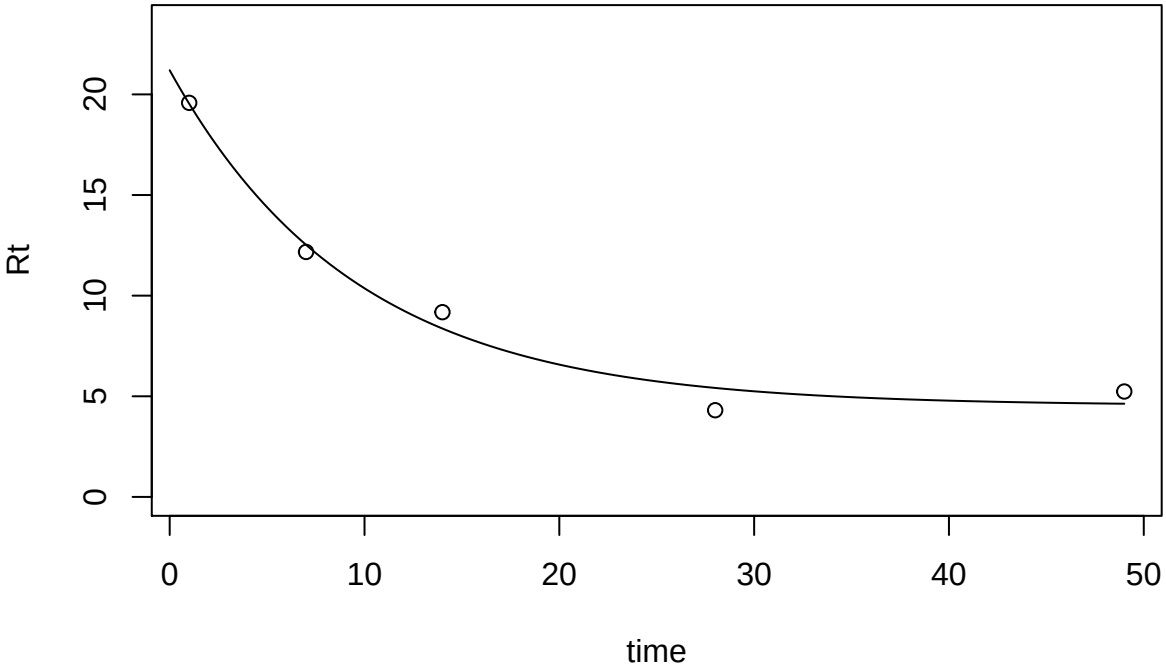
Dataset BradleyCook2016CCR

A dataset with 41 variables of Respiration of soils from graminoid and shrub tundra in response to 2 soil moistures and 5 temperatures over 49 days in three levels of depth (10, 30, 40)

V2: Dataset BradleyCook2016CCR, variable SG_40_4.5, site 4.5, depth 10

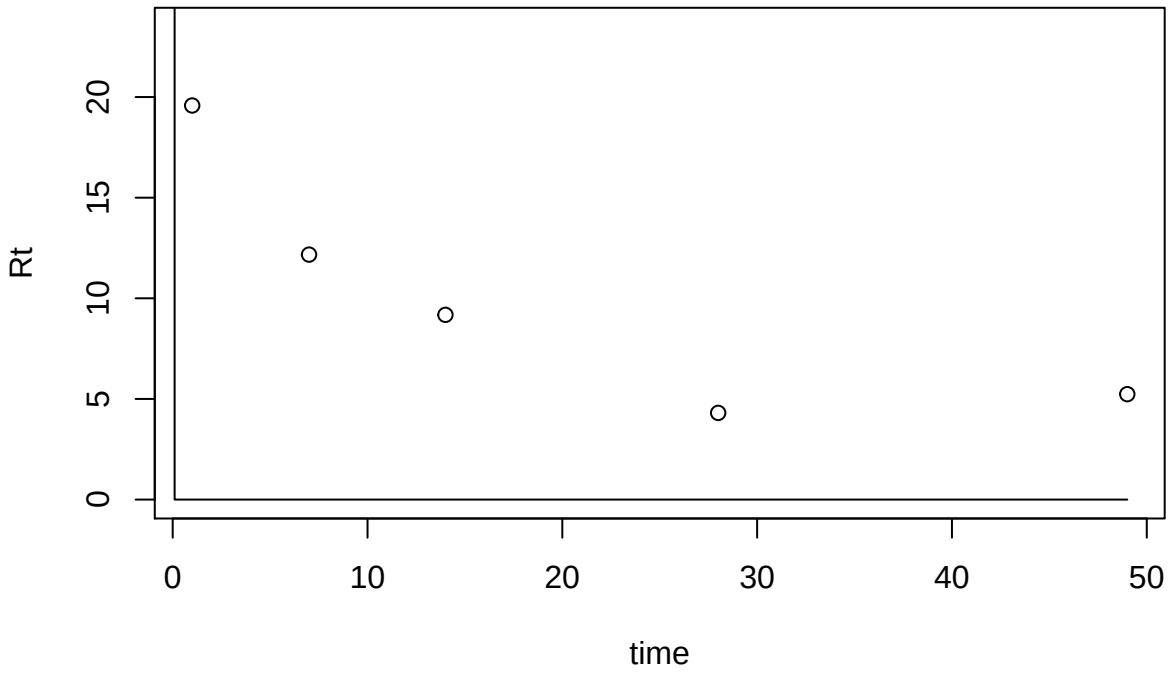
Time series is too short for two-pool feedback model and two-pool series model

```
## [1] "k1= 0.104997090626352"
## [2] "k2= 7.08692439393919e-06"
## [3] "proportion of C0 in pool 1= 0.000247994142501207"
```




```
## [1] "AIC =  7.48103440165802"
```

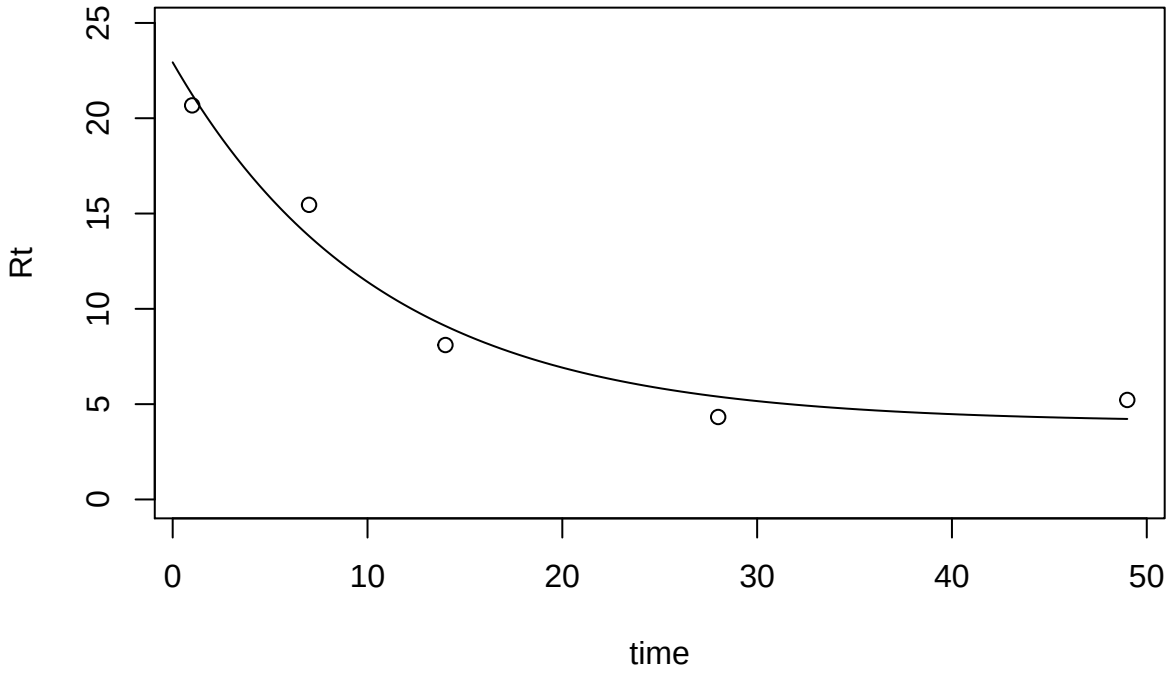
```
## [1] "k1= 624441743974730"
## [2] "k2= 7.98180480298763e+59"
## [3] "a21= 2.93568513078935e-05"
## [4] "Proportion of C0 in pool 1= 2.26761313651958e-05"
```




```
## [1] "AIC =  -1.7709303313527"
```

V3: Dataset BradleyCook2016CCR, variable SG_60_4.5, site 4.5, depth 10

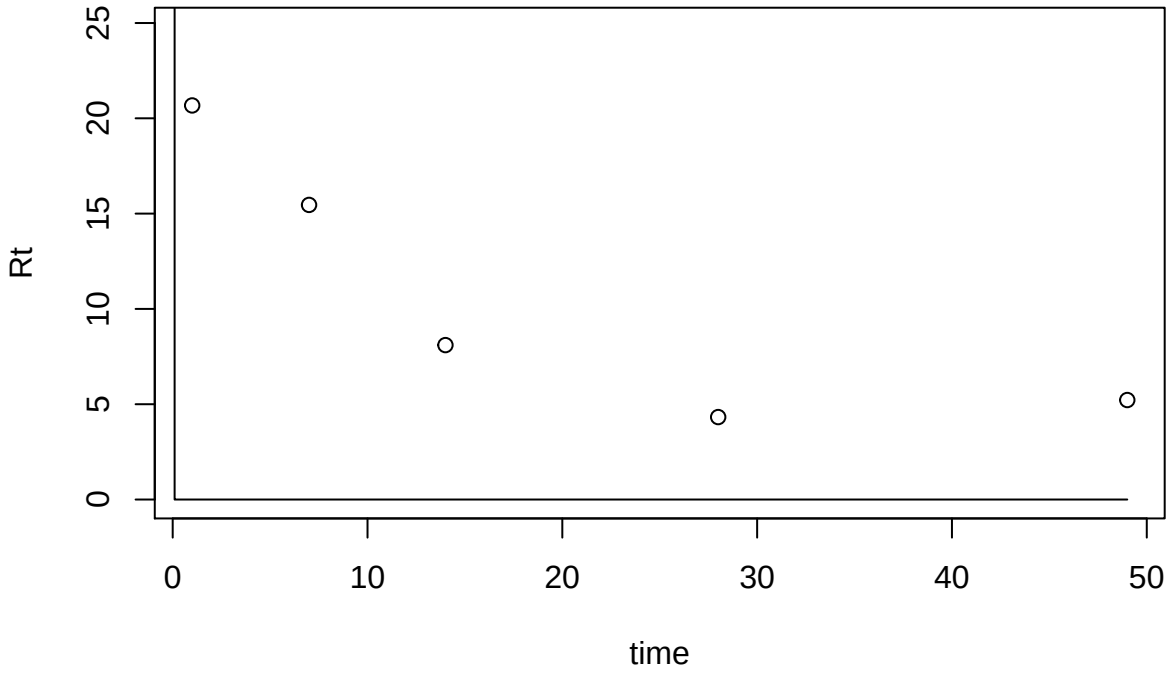
```
## [1] "k1= 0.094032830727244"
## [2] "k2= 6.30850656069119e-06"
## [3] "proportion of C0 in pool 1= 0.000314009281464134"
```




```
## [1] "AIC =  5.5942199356848"
```

```
## [1] "k1= 256404041082538368"
## [2] "k2= 7.13779334141958e+69"
```

```
## [3] "a21= 0.999975801526222"
## [4] "Proportion of C0 in pool 1= 0.999972262182771"
```




```
## [1] "AIC =  -2.09443501446917"
```

Dataset Conant2008

A dataset with 41 variables of Soil respiration rates were determined through periodic analysis of CO2 concentration of headspace gas samples using a LI-COR 6525 in three levels of temperature (4, 15, 25) The dataset is cumulative

Dataset Craine2010NatGeo

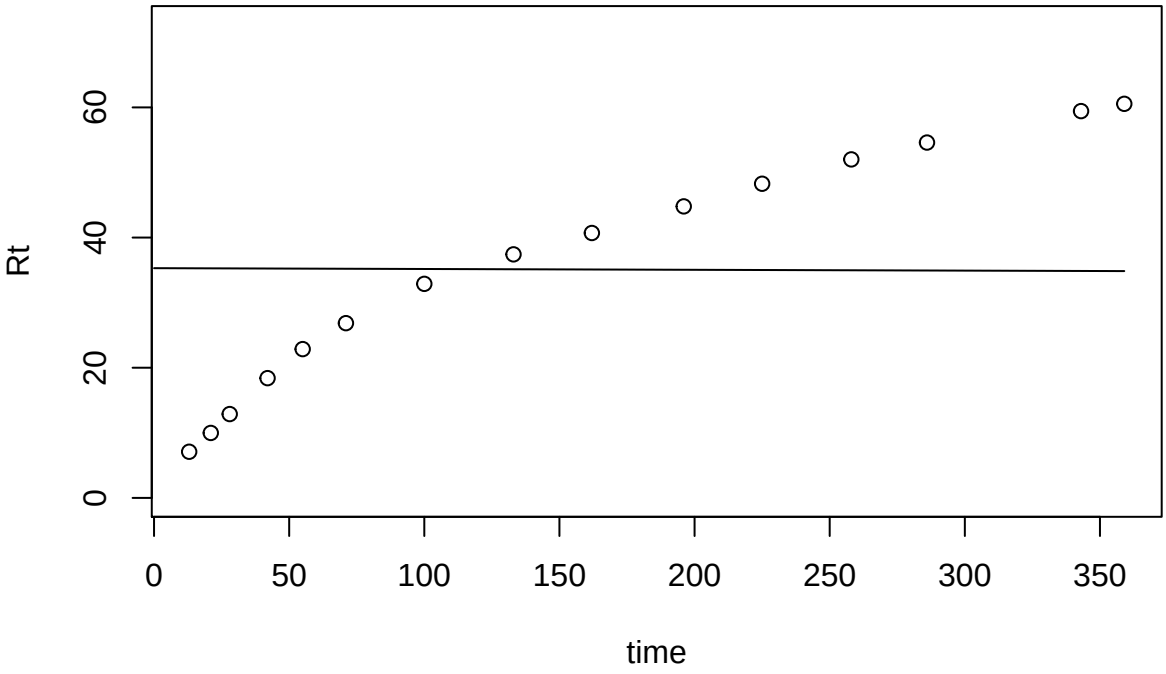
A dataset with 29 variables of We adjusted seven replicates of 20 g dry-equivalent soil to 35% water-holding capacity and placed them in 50 ml polyethylene centrifuge tubes. Replicates were then incubated at 20 _C. Periodically, the five replicates for each soil were sealed with a cap containing a rubber septum, and then distributed over five temperatures (10, 15, 20, 25 and 30 _C). Two additional replicates were maintained at 20 _C. These soils were incubated for 18_72 h and then respiration rates for each determined by removing 4 ml of gas. They were then injected in-line into a N2 gas stream and the peak heights measured with a Licor 6252 infrared gas analyser. Using a set of calibrations, peak heights were converted to CO2 concentrations in the tubes and then to respiration rates that were scaled relative to soil organic C; preincubationTime varied between 10 and 60 days

It is not clear if the dataset is cummulative or not

```
## [1] 9.9
```

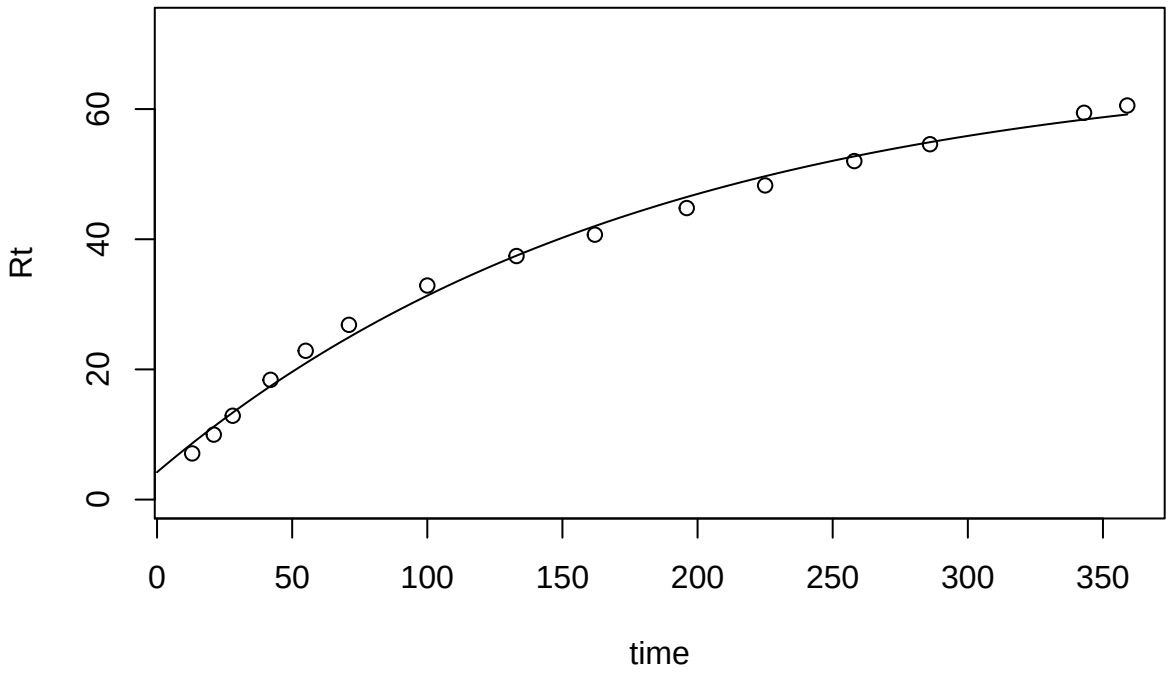
V2: Dataset Craine2010NatGeo, variable Cumresp_CDR, site

```
## [1] "k1= 3.56409629247248e-05"
## [2] "k2= 3.56545501182572e-05"
## [3] "proportion of C0 in pool 1= 0.00417203328437454"
```



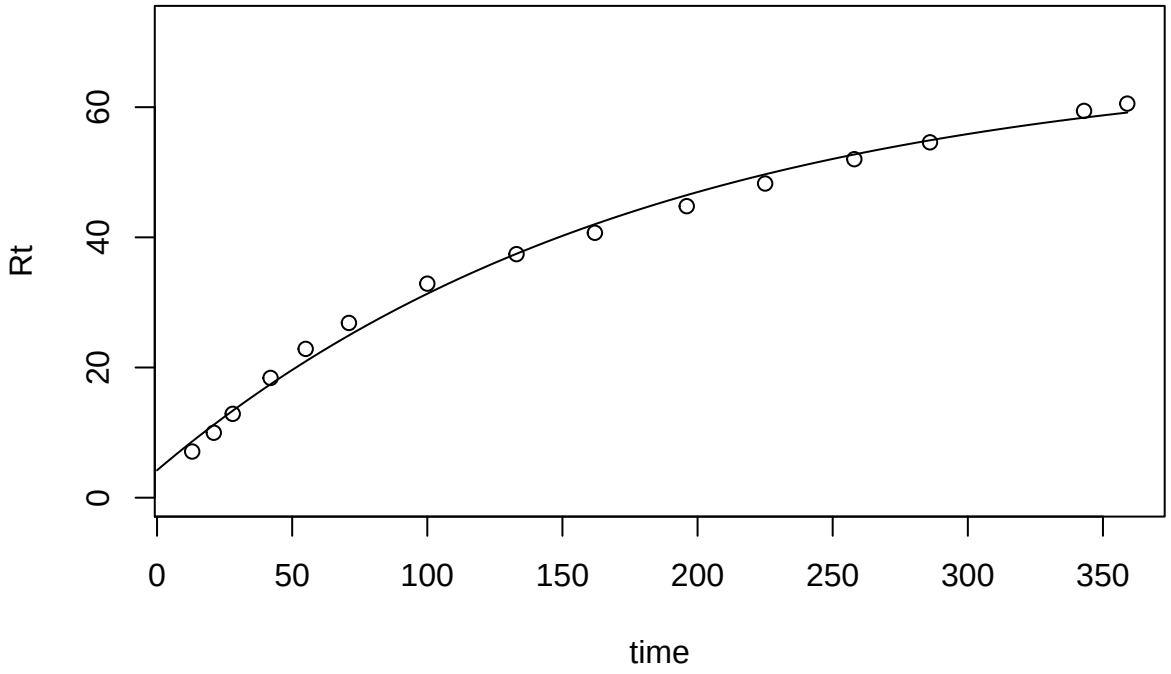

```
## [1] "AIC =  -5.49236507747717"
```

```
## [1] "k1= 0.00519892445693052"
## [2] "k2= 0.000259131812672943"
## [3] "a21= 0.718643588800708"
## [4] "a12= 0.999987431155748"
## [5] "Proportion of C0 in pool 1= 0.00290573722230197"
```




```
## [1] "AIC =  8.97890373833154"
```

```
## [1] "k1= 0.00538768600632158"
## [2] "k2= 7.035610730292e-05"
## [3] "a21= 0.999274818058645"
## [4] "Proportion of C0 in pool 1= 0.994783996088877"
```

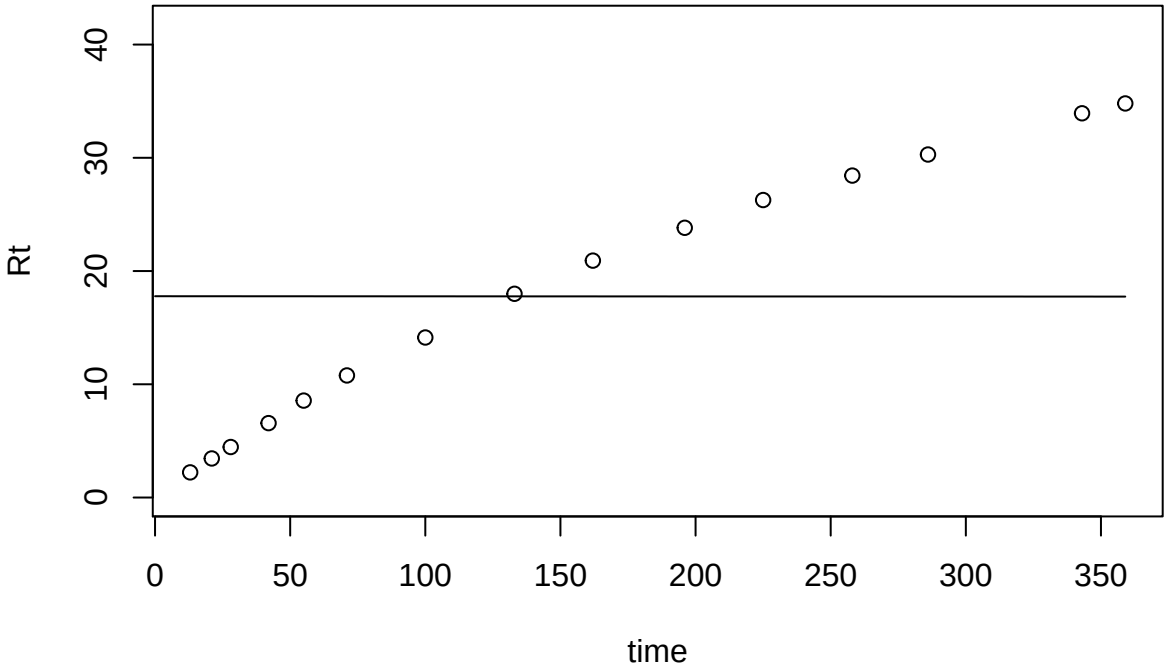



```
## [1] "AIC =  6.97890373869341"
```

V3: Dataset Craine2010NatGeo, variable Cumresp_KBS, site

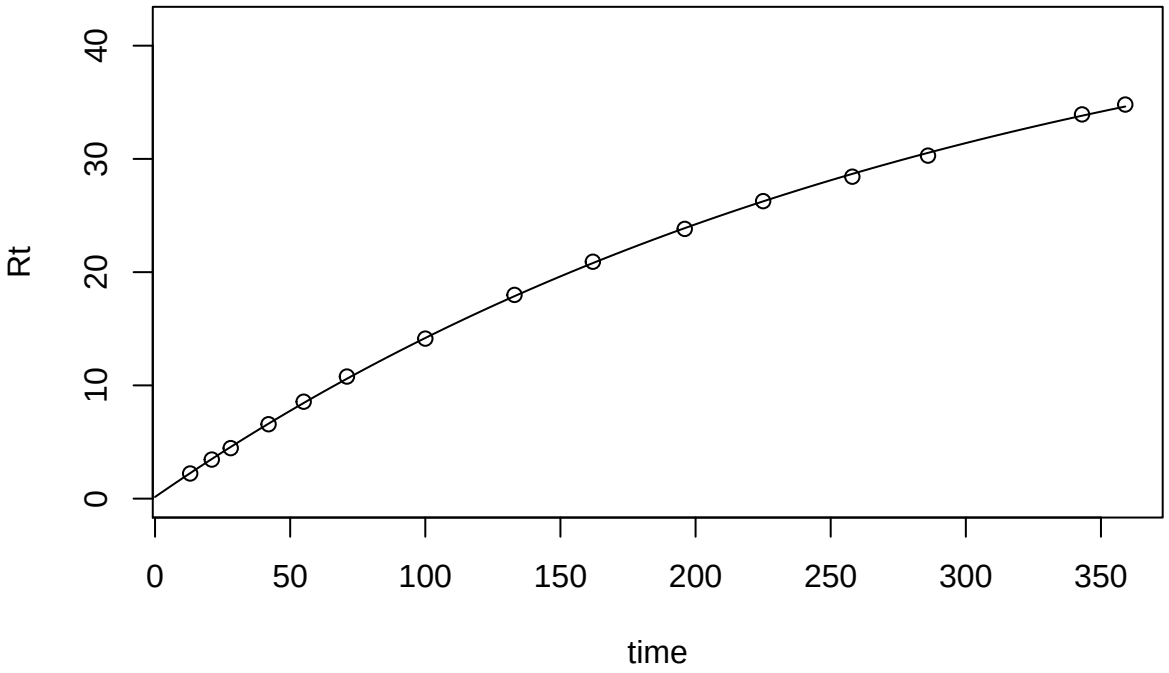
```
## [1] "k1= 1.28916431797638e-13"
```

```
## [2] "k2= 5.04994142334596e-06"
## [3] "proportion of C0 in pool 1= 9.88979711796789e-06"
```




```
## [1] "AIC =  -3.6191206484348"
```

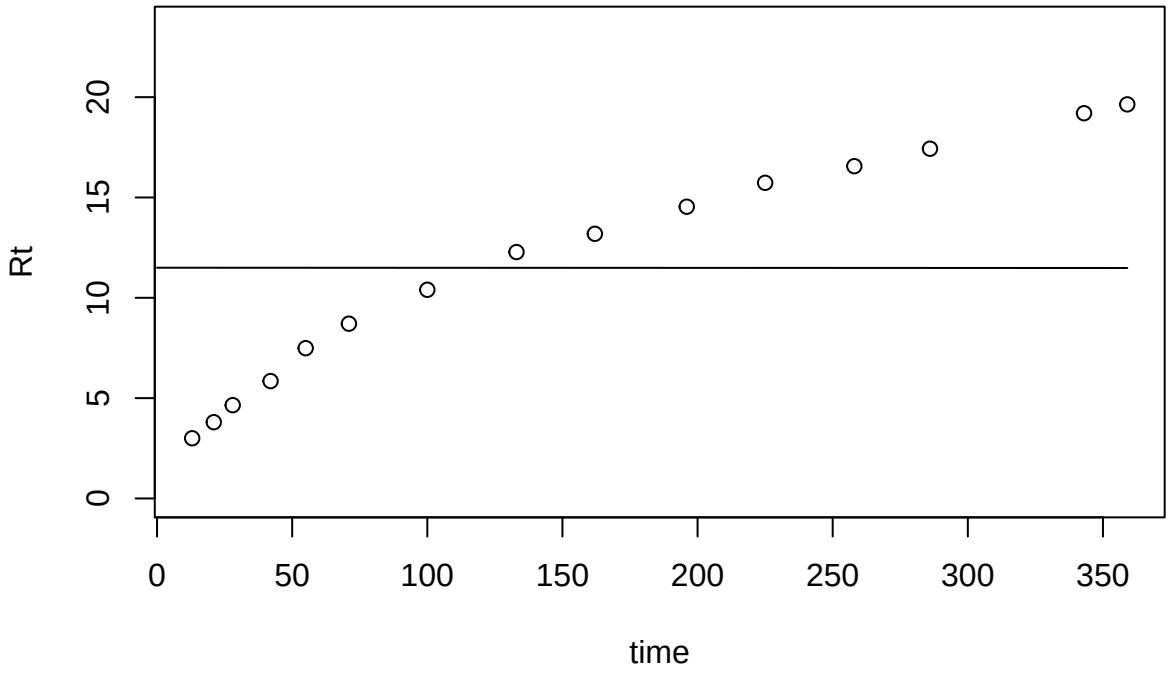
```
## [1] "k1= 0.00333370042292458"
## [2] "k2= 1.41208269824271e-05"
## [3] "a21= 0.999987408396686"
## [4] "Proportion of C0 in pool 1= 0.999990557146394"
```




```
## [1] "AIC =  16.0722539033383"
```

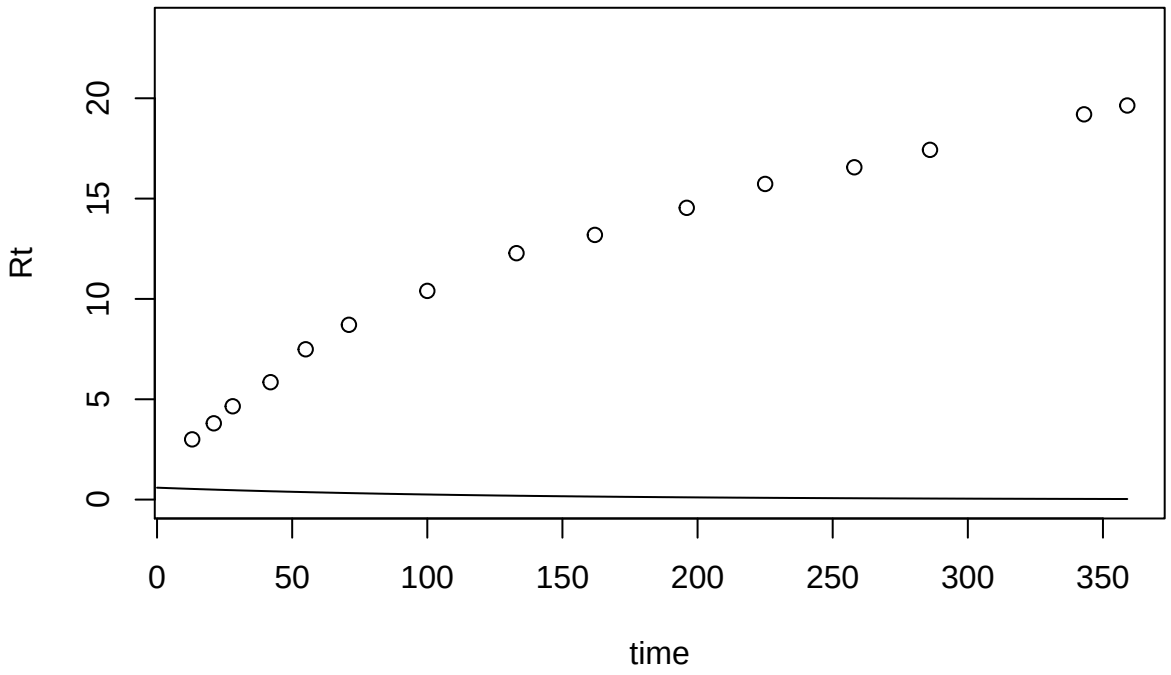
V4: Dataset Craine2010NatGeo, variable Cumresp_WR, site

```
## [1] "k1= 3.93234653426348e-22"
## [2] "k2= 3.51682836495432e-06"
## [3] "proportion of C0 in pool 1= 1.84603578314291e-05"
```



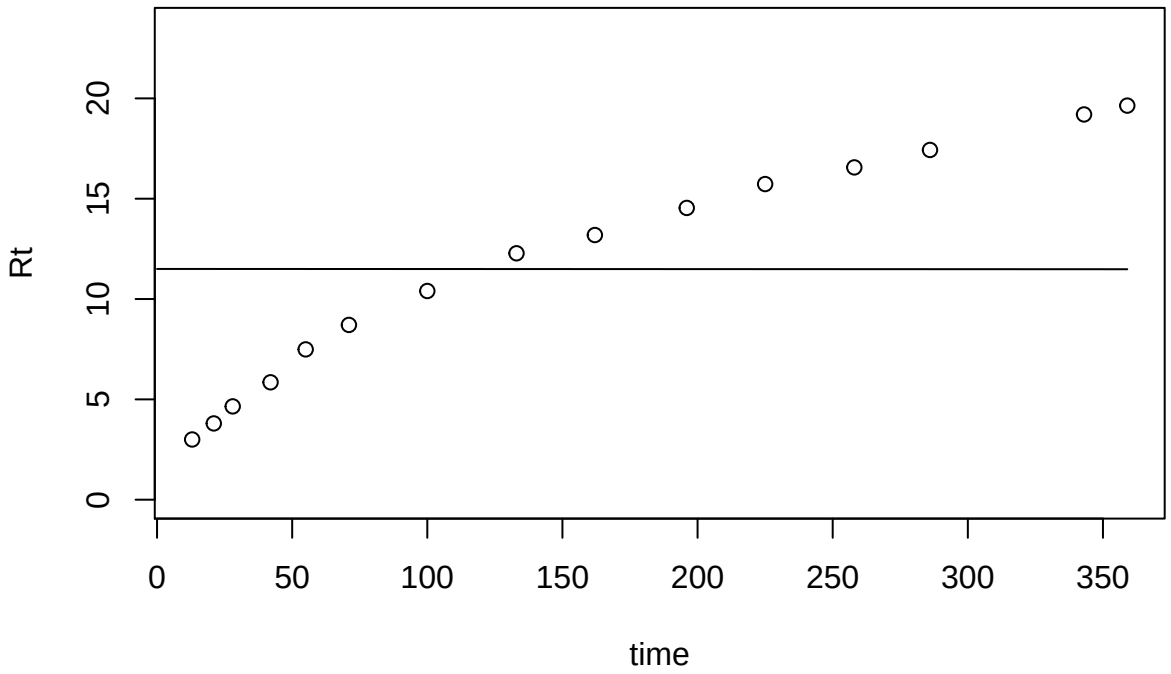

```
## [1] "AIC =  -0.81623909218487"
```

```
## [1] "k1= 0.0085036492406195"
## [2] "k2= 4.08216597101874e-30"
## [3] "a21= 2.96053121048301e-05"
## [4] "a12= 1.90660288112987e-07"
## [5] "Proportion of C0 in pool 1= 2.13229343270505e-05"
```




```
## [1] "AIC =  -0.136236267362701"
```

```
## [1] "k1= 2.62873426897776e-19"
## [2] "k2= 3.51676720834718e-06"
## [3] "a21= 2.58992274295711e-05"
## [4] "Proportion of C0 in pool 1= 5.165047454736e-07"
```

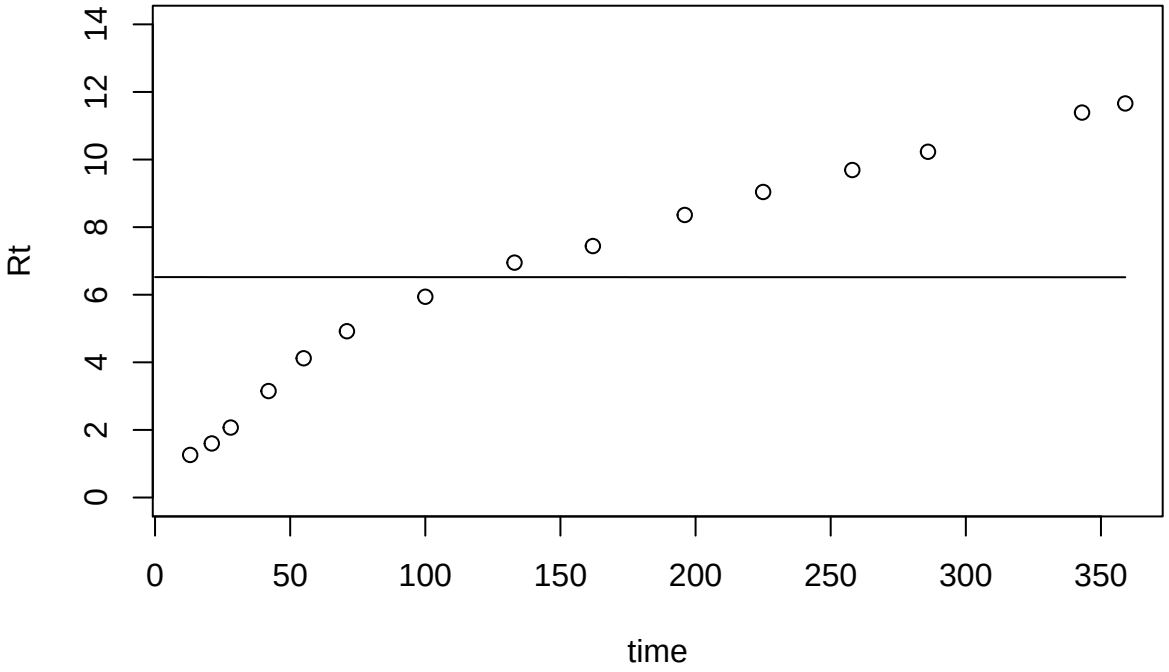



```
## [1] "AIC =  1.18376096721826"
```

V5: Dataset Craine2010NatGeo, variable Cumresp_AND, site

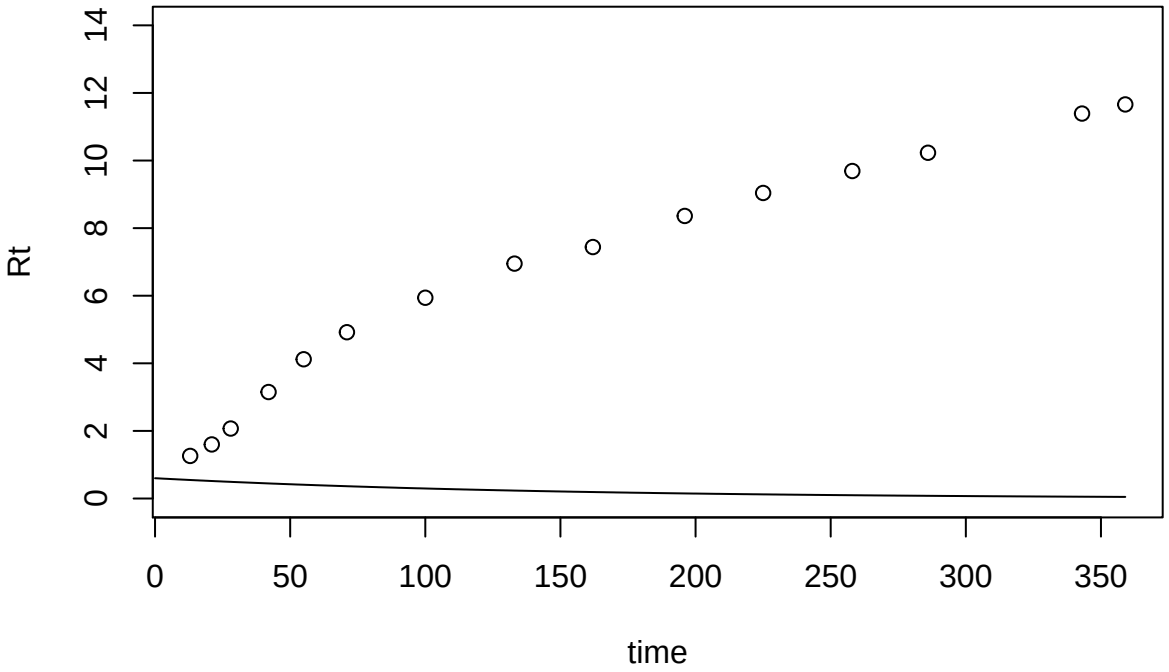
```
## [1] "k1= 1.06712760795624e-37"
```

```
## [2] "k2= 1.54916909115044e-06"
## [3] "proportion of C0 in pool 1= 6.24432779631756e-05"
```



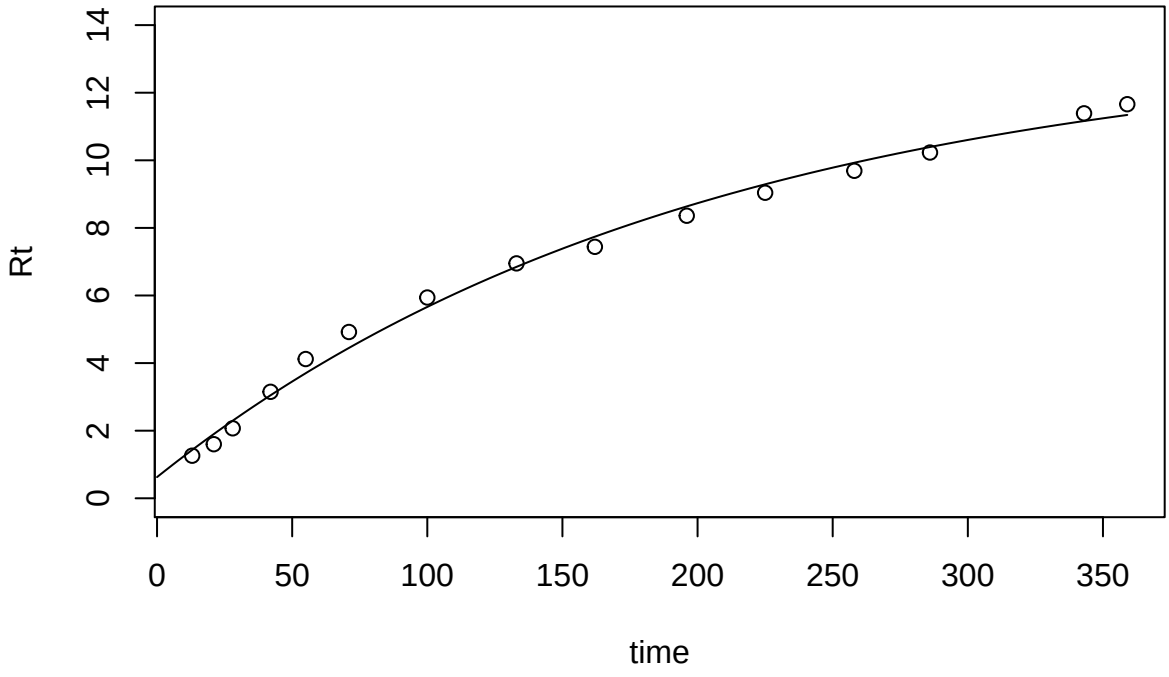

```
## [1] "AIC =  1.06919284023117"
```

```
## [1] "k1= 0.00706630722351705"
## [2] "k2= 2.02155659274751e-41"
## [3] "a21= 3.18003594937388e-05"
## [4] "a12= 1.27743858324703e-07"
## [5] "Proportion of C0 in pool 1= 2.01864847564903e-05"
```




```
## [1] "AIC =  2.09528942897876"
```

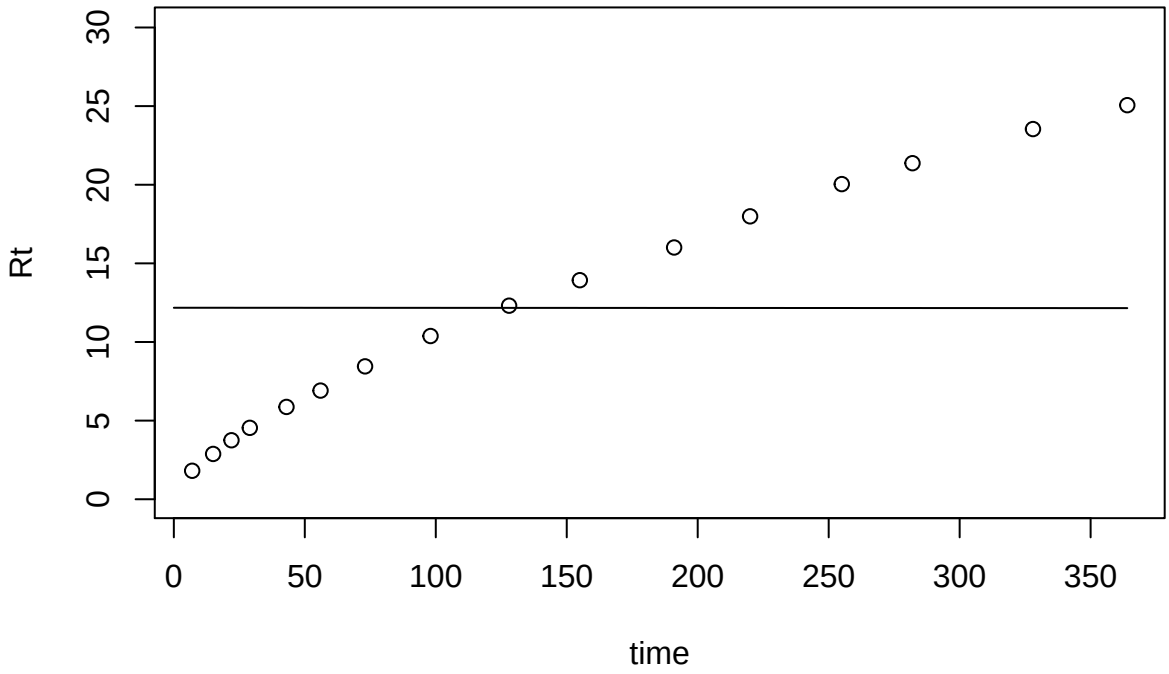
```
## [1] "k1= 0.00494314723046184"
## [2] "k2= 3.21608190313011e-06"
## [3] "a21= 0.999969898183753"
## [4] "Proportion of C0 in pool 1= 0.999967529573838"
```




```
## [1] "AIC =  13.1691988005497"
```

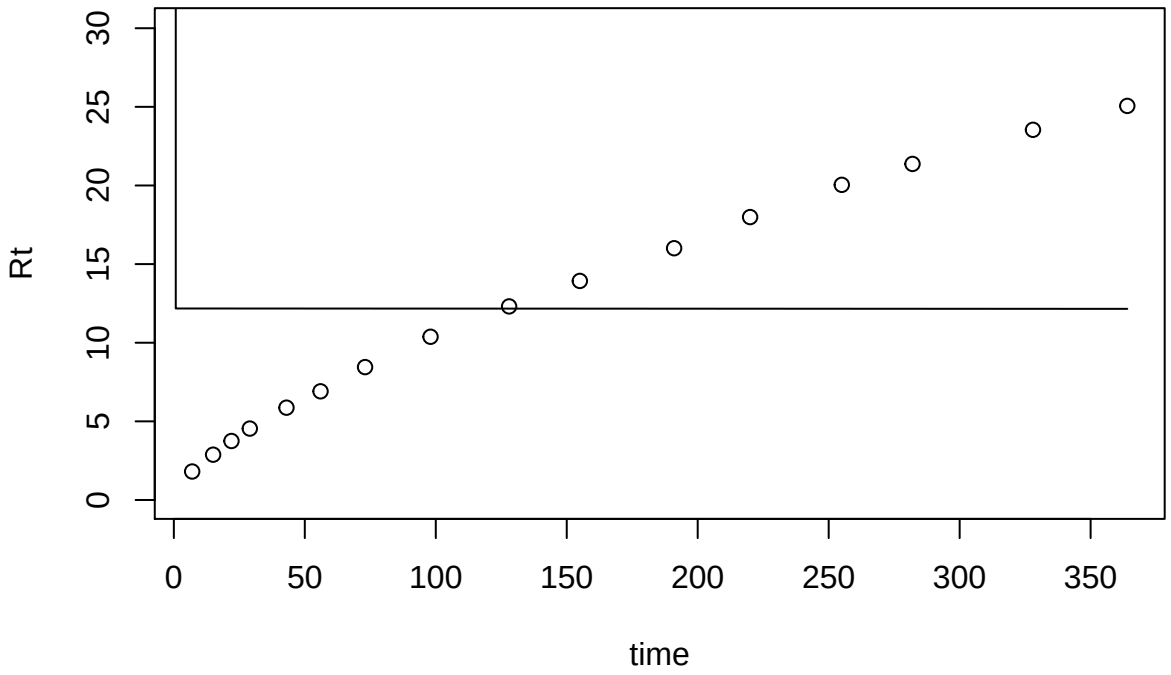
V6: Dataset Craine2010NatGeo, variable Cumresp_ARC, site

```
## [1] "k1= 2.15153097000388e-22"
## [2] "k2= 5.31784118788952e-06"
## [3] "proportion of C0 in pool 1= 2.49069093321563e-05"
```



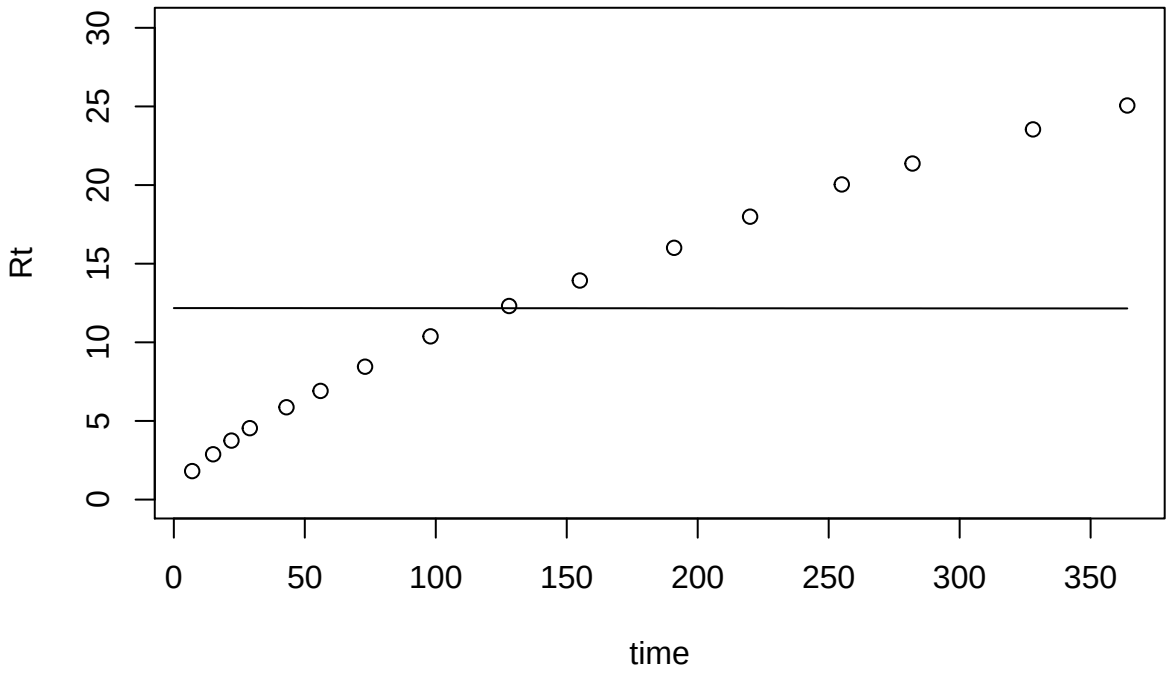
```
## [1] "AIC =  -2.06551367541675"
```

```
## [1] "k1= 0.0863555749026516"
## [2] "k2= 7.39687533042094e+77"
## [3] "a21= 0.999938488176788"
## [4] "a12= 0.99999993255701"
## [5] "Proportion of C0 in pool 1= 0.999978253758902"
```




```
## [1] "AIC =  1.93448642242981"
```

```
## [1] "k1= 1.22933305459562e-28"
## [2] "k2= 5.31771766492418e-06"
## [3] "a21= 2.60568859066224e-05"
## [4] "Proportion of C0 in pool 1= 1.04193035821432e-06"
```



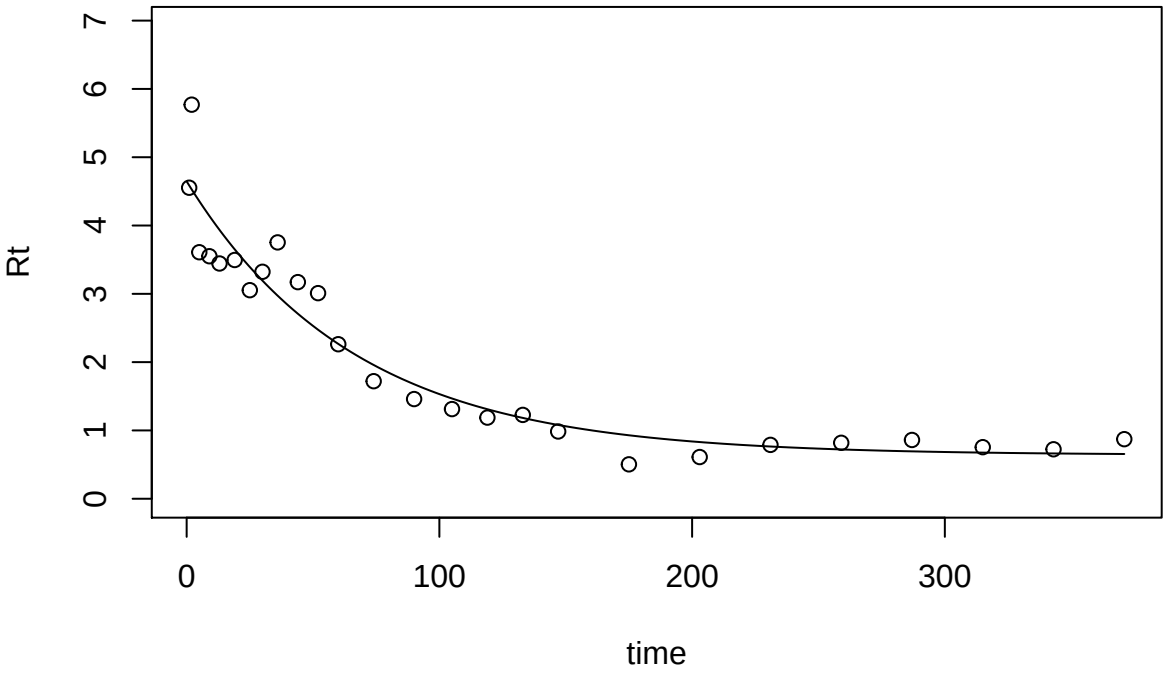

```
## [1] "AIC =  -0.0655135816632679"
```

Dataset Crow2019a

A dataset with 79 variables of 25g oven-dry equivalent sample of air-dried soil was rewetted to 60% water holding capacity, placed into a 610 mL airtight container at a controlled temperature. Soils were sampled on different days depending on the amount of CO2 acumulating to avoid concentration over 7K ppm. After sampling, headspace was purged, caps resealed, intitial concentration taken, then left to accumulate. A subset (sites 67-78) were never air-dried and correspond to sites 34-36, 46-54.

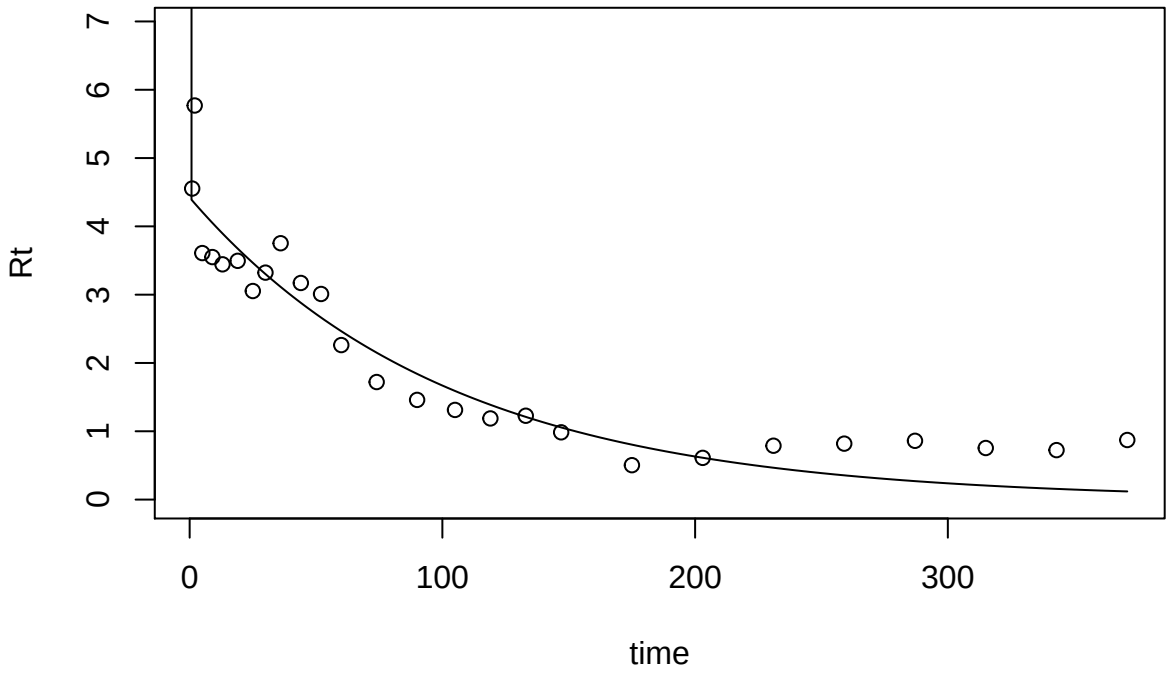
V2: Dataset Crow2019a, variable Site01, site 1_Organic Cropland Mollisol

```
## [1] "k1= 0.0150257373212587"
## [2] "k2= 3.81987783103312e-06"
## [3] "proportion of C0 in pool 1= 0.00158702946454525"
```




```
## [1] "AIC =  9.53739515319199"
```

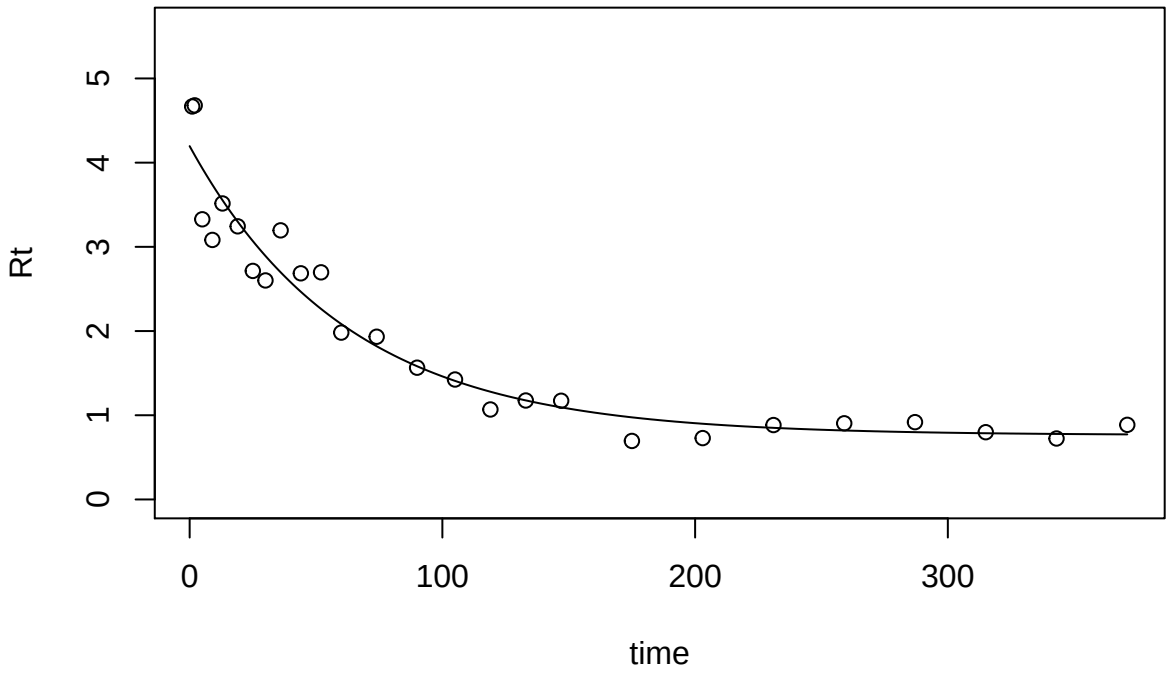
```
## [1] "k1= 1.00959144452113e+99"
## [2] "k2= 0.00973994453440852"
## [3] "a21= 2.58462888792499e-05"
## [4] "Proportion of C0 in pool 1= 0.997323406774787"
```




```
## [1] "AIC =  10.8803138822477"
```

V3: Dataset Crow2019a, variable Site02, site 2_Organic Cropland_Mollisol

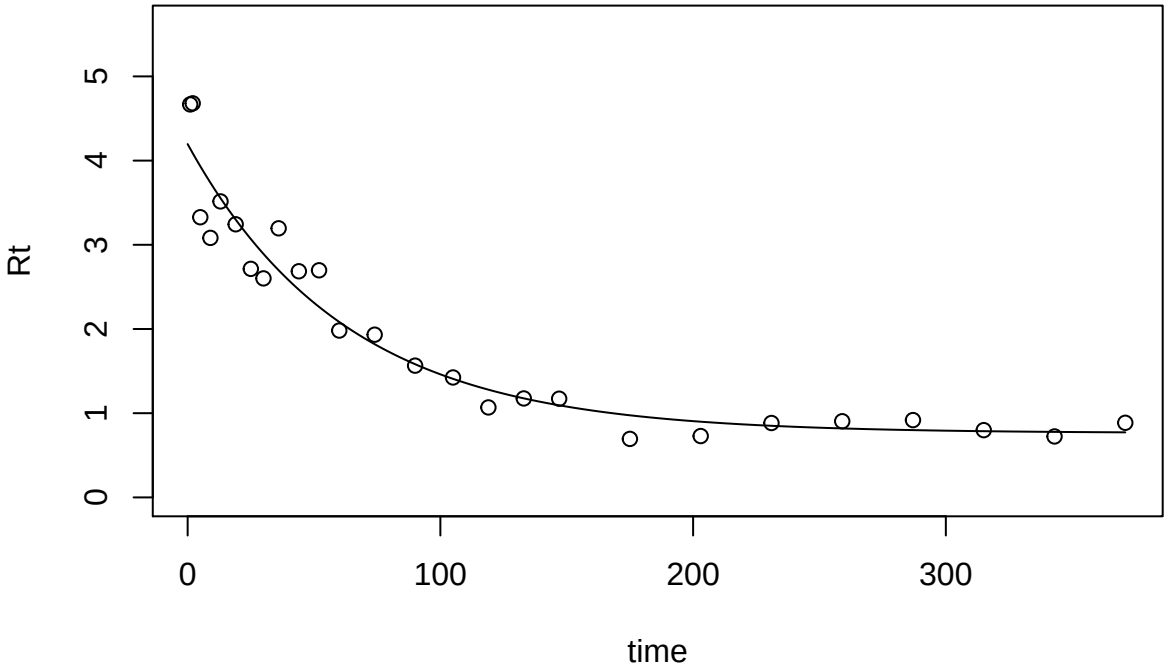
```
## [1] "k1= 0.0159365661526237"
## [2] "k2= 4.84703613524489e-06"
## [3] "proportion of C0 in pool 1= 0.00136272901335716"
```




```
## [1] "AIC =  10.8132614855341"
```

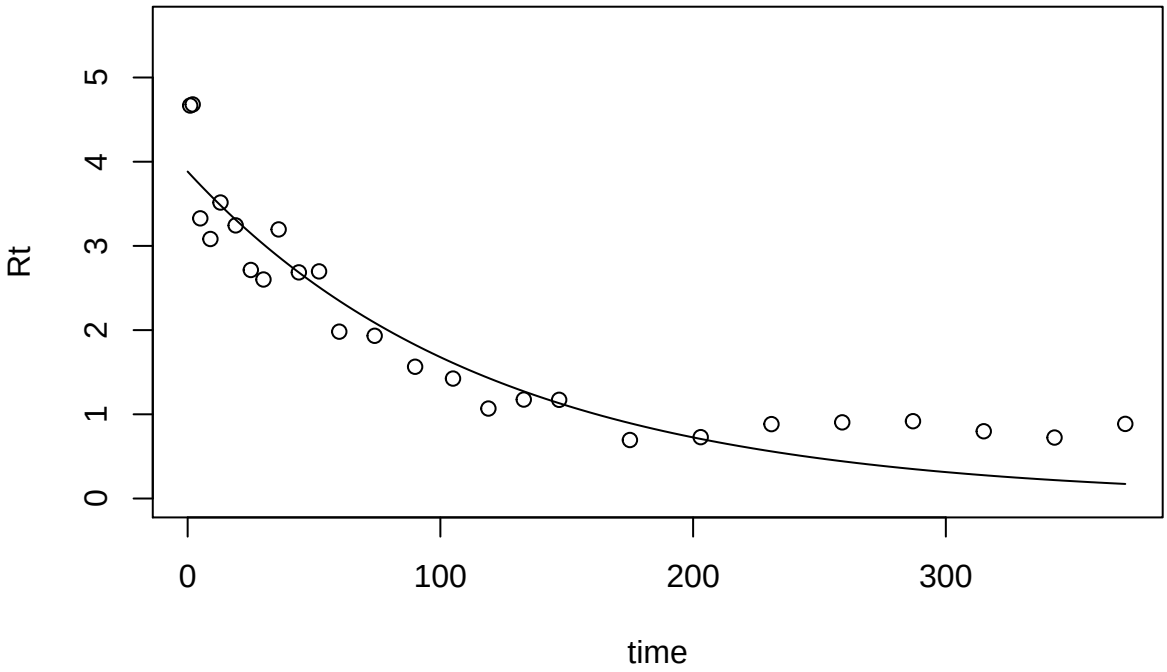
```
## [1] "k1= 0.0159235486417974"
## [2] "k2= 1.78640469473323e-05"
```

```
## [3] "a21= 0.728470740614785"
## [4] "a12= 0.999970240604666"
## [5] "Proportion of C0 in pool 1= 0.00614220995299819"
```




```
## [1] "AIC =  14.8132614855263"
```

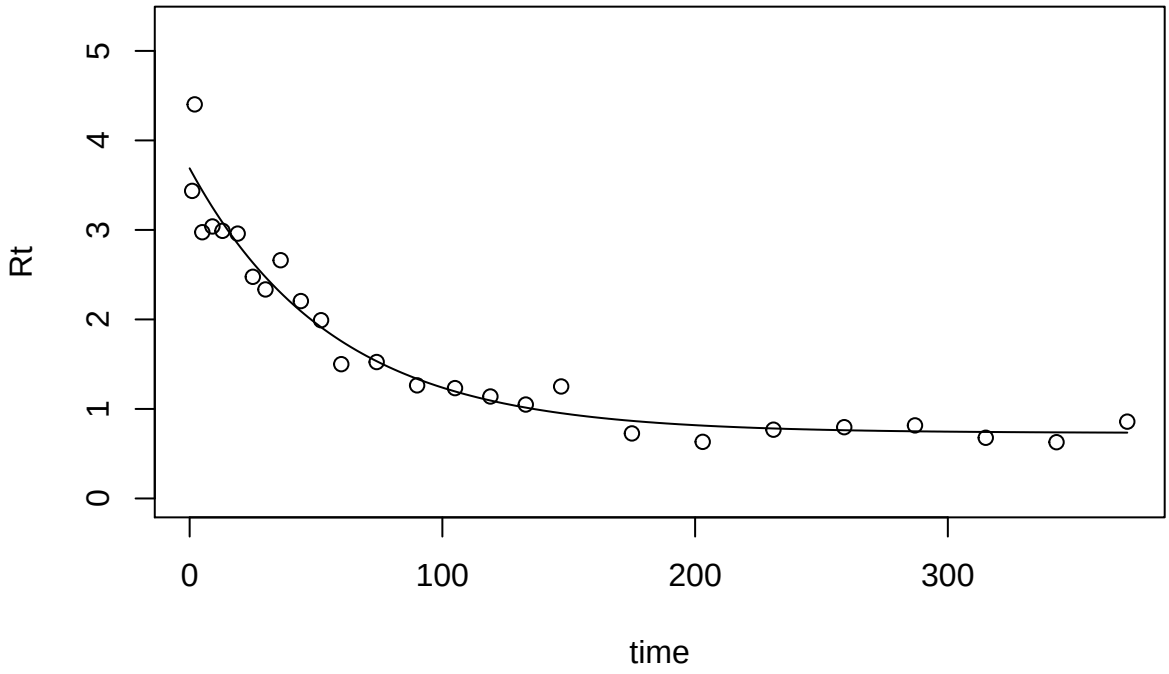
```
## [1] "k1= 5.16635298874617e-44"
## [2] "k2= 0.00838618098430706"
## [3] "a21= 2.62560313074589e-05"
## [4] "Proportion of C0 in pool 1= 0.997069507209221"
```




```
## [1] "AIC =  11.5229222887285"
```

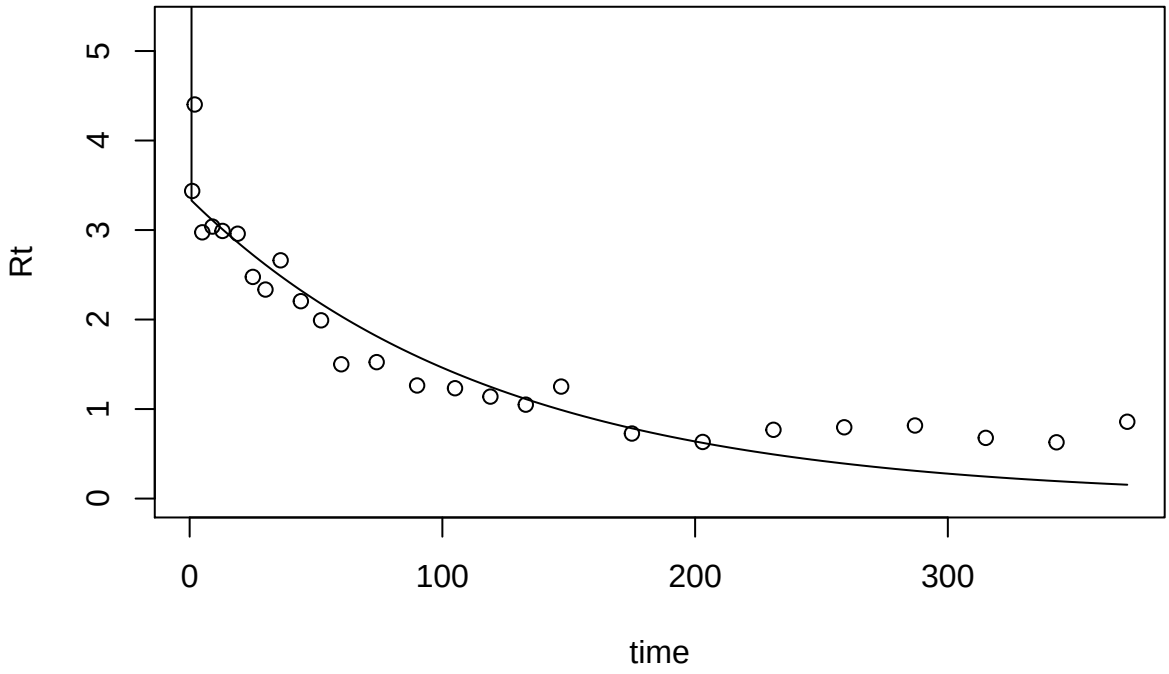
V4: Dataset Crow2019a, variable Site03, site 3_Organic Cropland_Mollisol

```
## [1] "k1= 0.0176431267362942"
## [2] "k2= 4.85659912194482e-06"
## [3] "proportion of C0 in pool 1= 0.00110947008962126"
```




```
## [1] "AIC =  11.7863749784639"
```

```
## [1] "k1= 75.5280783507886"
## [2] "k2= 0.00829263327650589"
## [3] "a21= 4.27636273861998e-05"
## [4] "Proportion of C0 in pool 1= 0.997367052730472"
```



```
## [1] "AIC =  12.016648654126"
```

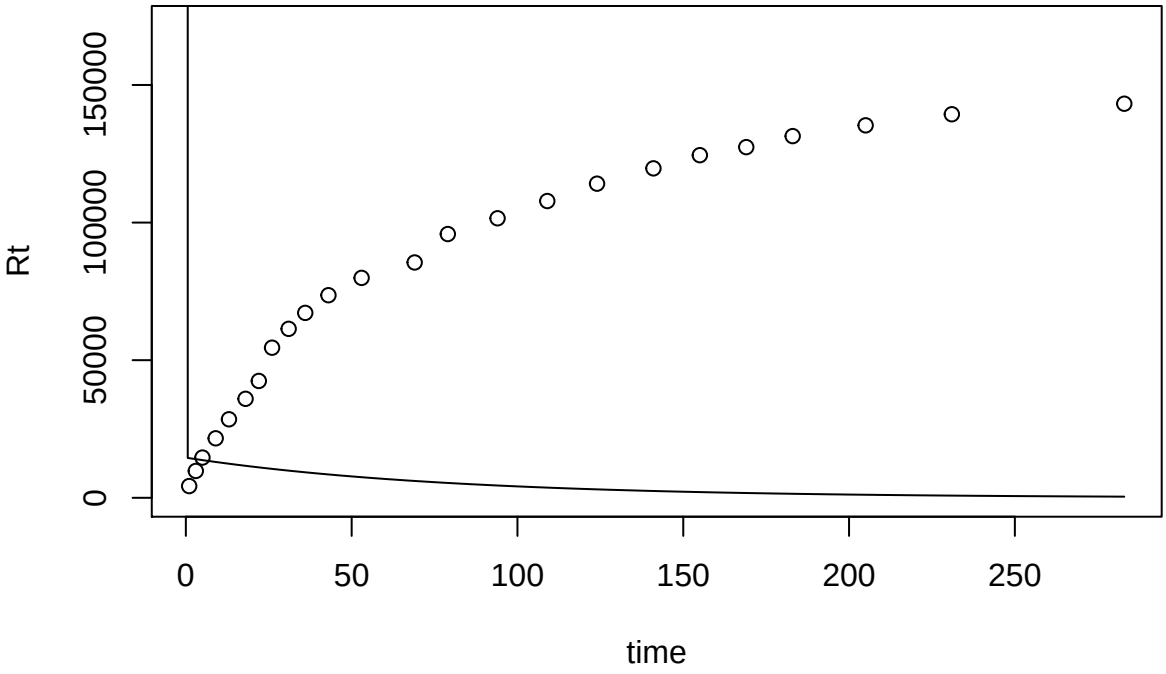
Dataset Crow2019b

A dataset with 28 variables of Sub-samples of the 0-15 cm depth section of the mineral transition layer from each plot were incubated at 16, 21, and 26°C, to determine the apparent temperature sensitivity , with 3 levels of temperature (16, 21, 26) in 9 different sites

This dataset is cumulative.

V2: Dataset Crow2019b, variable SPE800_16C, site SPE800, temperature

```
## [1] "k1= 0.0125852681635056"
## [2] "k2= 9027.17607150966"
## [3] "proportion of C0 in pool 1= 0.997813216185618"
```




```
## [1] "AIC =  -39.5372848032016"
```

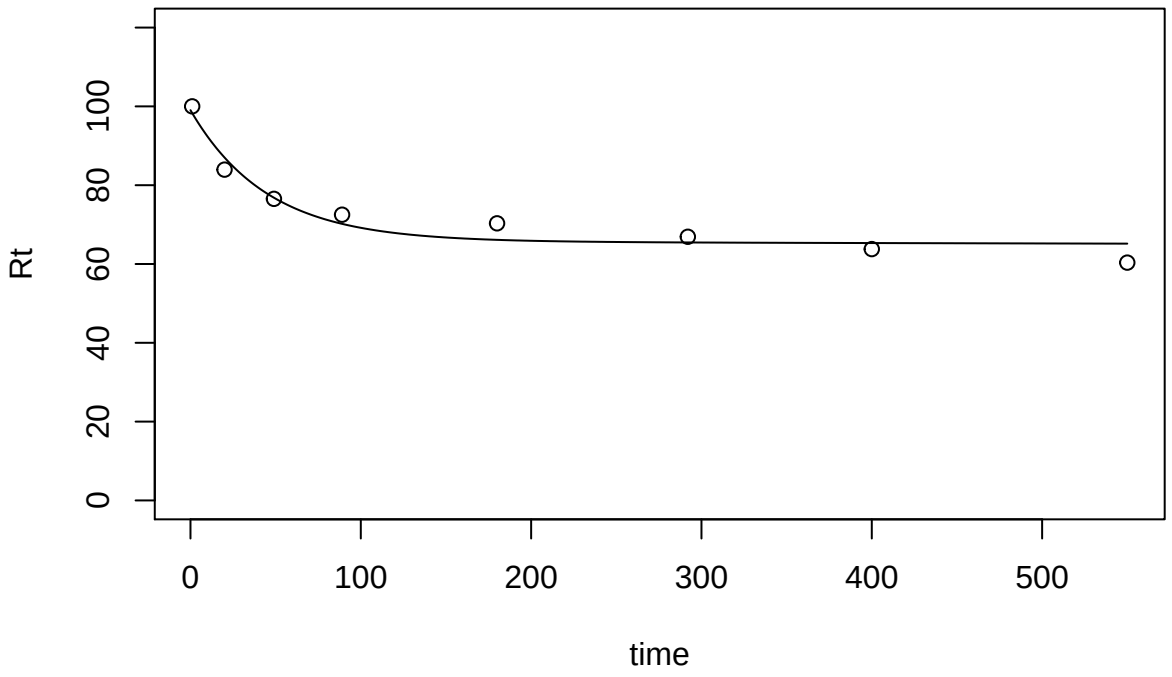
Dataset Dalias2001b

A dataset with 36 variables of , C14-labelled straw was mixed with soils collected from 7 coniferous forests located on a climatic gradient in Western Europe ranging from boreal to Mediterranean conditions. The soils were incubated in the laboratory at 4, 10, 16, 23 and 30 degrees with constant moisture over 550 days. Measurements of organic-C and14C concentrations in the straw and in the soil samples were determined using dry combustion (Carmograph 12 A carbon analyser).

** not a soil respiration data base** (Percentage of initially applied C14 remaining over time of incubation)

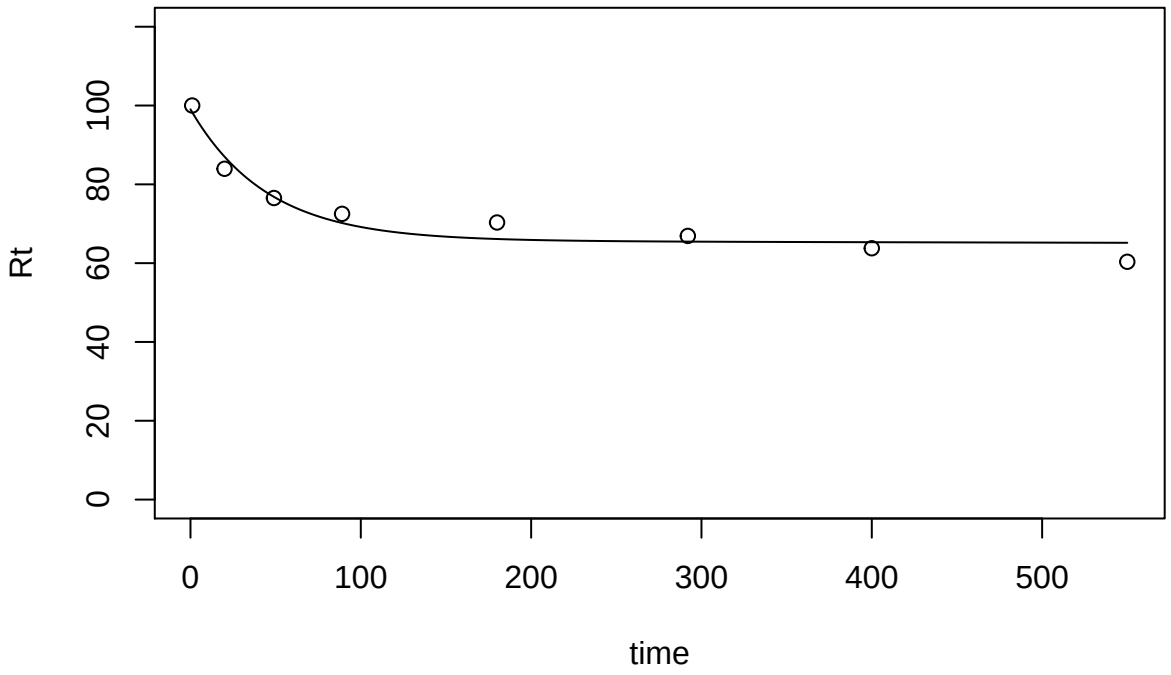
V2: Dataset Dalias2001b, variable C14_Vin_30, site Vindeln, temperature

```
## [1] "k1= 0.022320696390154"
## [2] "k2= 1.49378562021867e-05"
## [3] "proportion of C0 in pool 1= 0.000339447627341671"
```



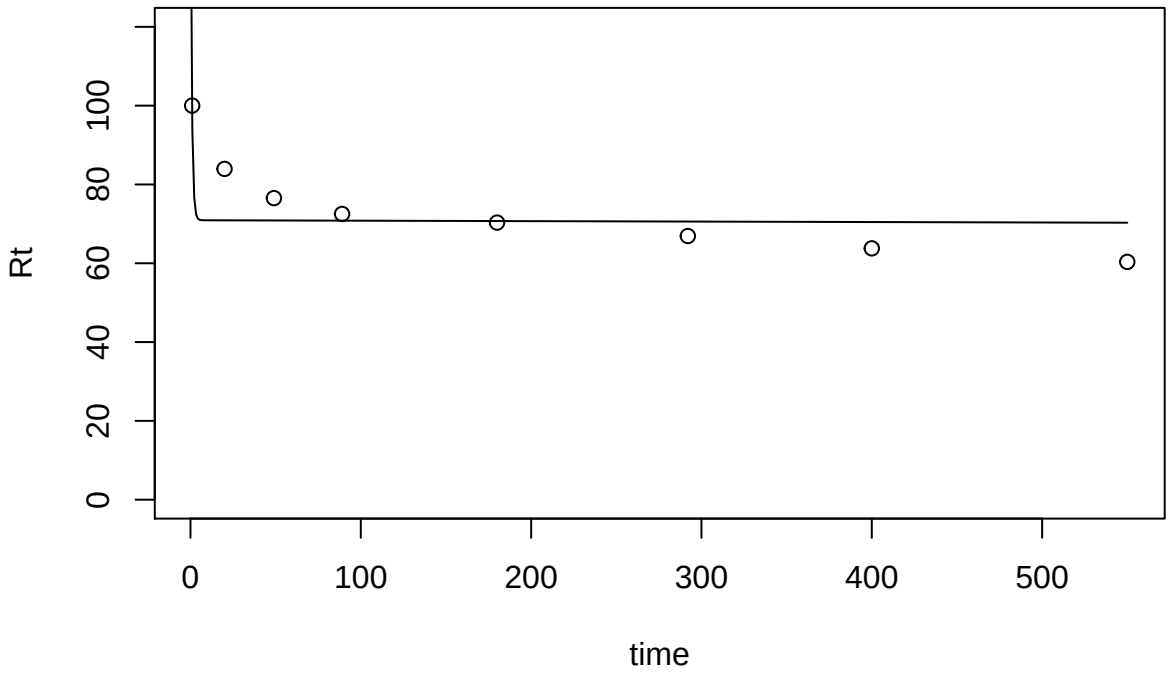

```
## [1] "AIC =  1.87227759819744"
```

```
## [1] "k1= 0.0222506836892706"
## [2] "k2= 8.47014327429927e-05"
## [3] "a21= 0.823119295547229"
## [4] "a12= 0.999962169225777"
## [5] "Proportion of C0 in pool 1= 0.00571847438628414"
```




```
## [1] "AIC =  5.87228276093052"
```

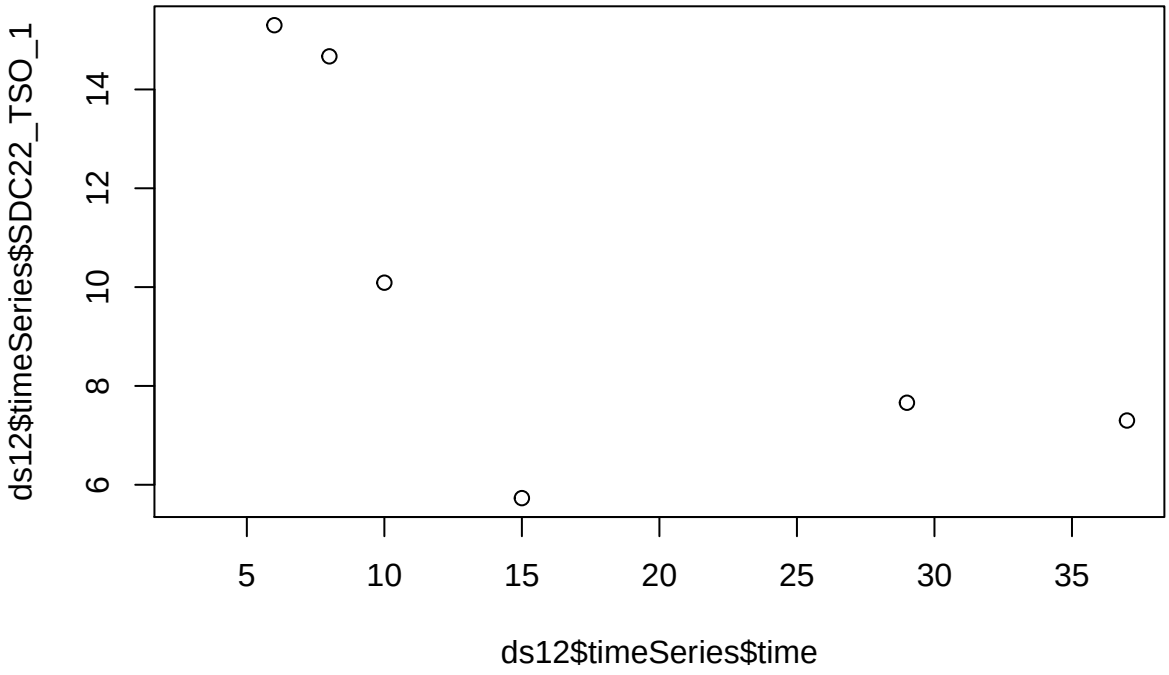
```
## [1] "k1= 1.24543376935371"
## [2] "k2= 1.61179915598316e-05"
## [3] "a21= 0.999970603355441"
## [4] "Proportion of C0 in pool 1= 0.99997679940136"
```



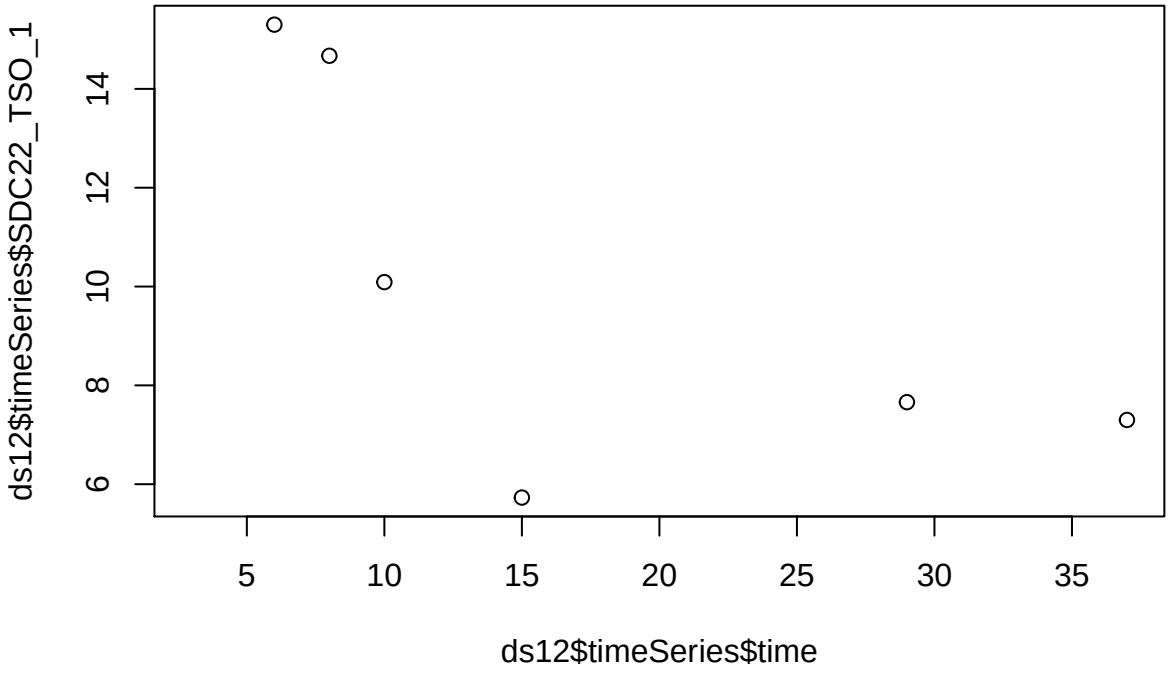

```
## [1] "AIC =  0.372384931826803"
```

Dataset Doetterl2015

A dataset with 73 variables of , 24 sites with 3 replicate per each site.



V2: Dataset Doetterl2015, variable SDC22_TSO_1, site SDC22 replicate 1



V5: Dataset Doetterl2015, variable SDC35_SPD_1, site SDC35 replicate 1