Winchmore C Models

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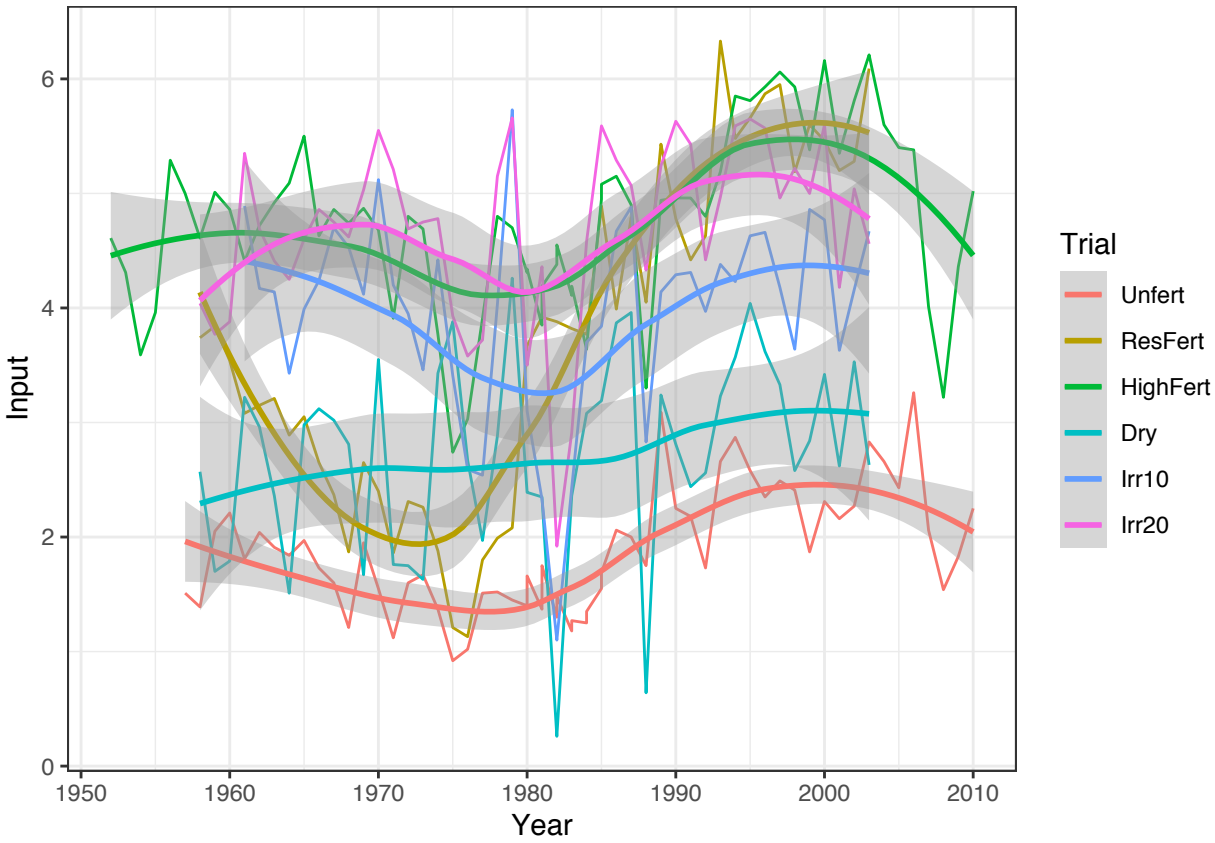


Figure 1: The Inputs

Let's set up some more variables and build the input data frame

Let's initialize and explain some of the functions

Pick trials and time frames of interest

Information and data for each trial is stored in an "if" statement.

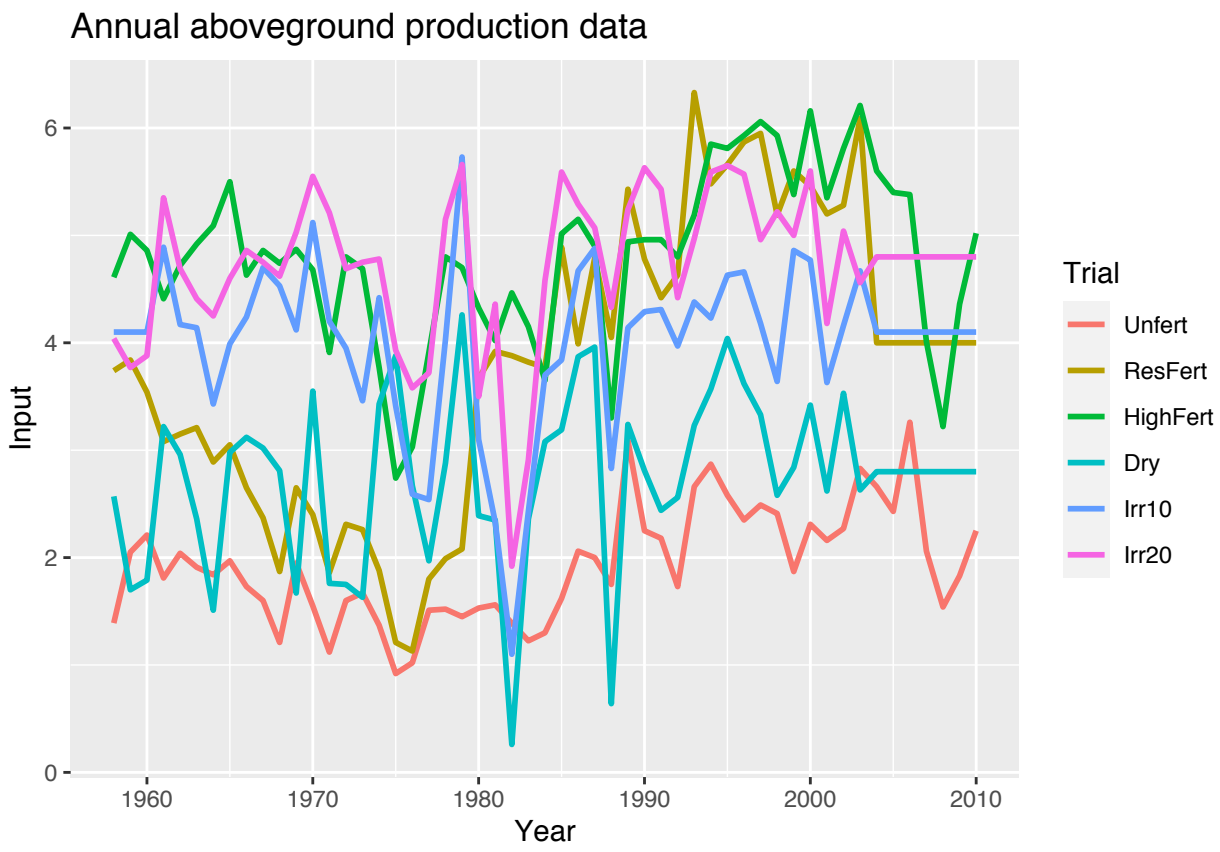


Figure 2: The Inputs

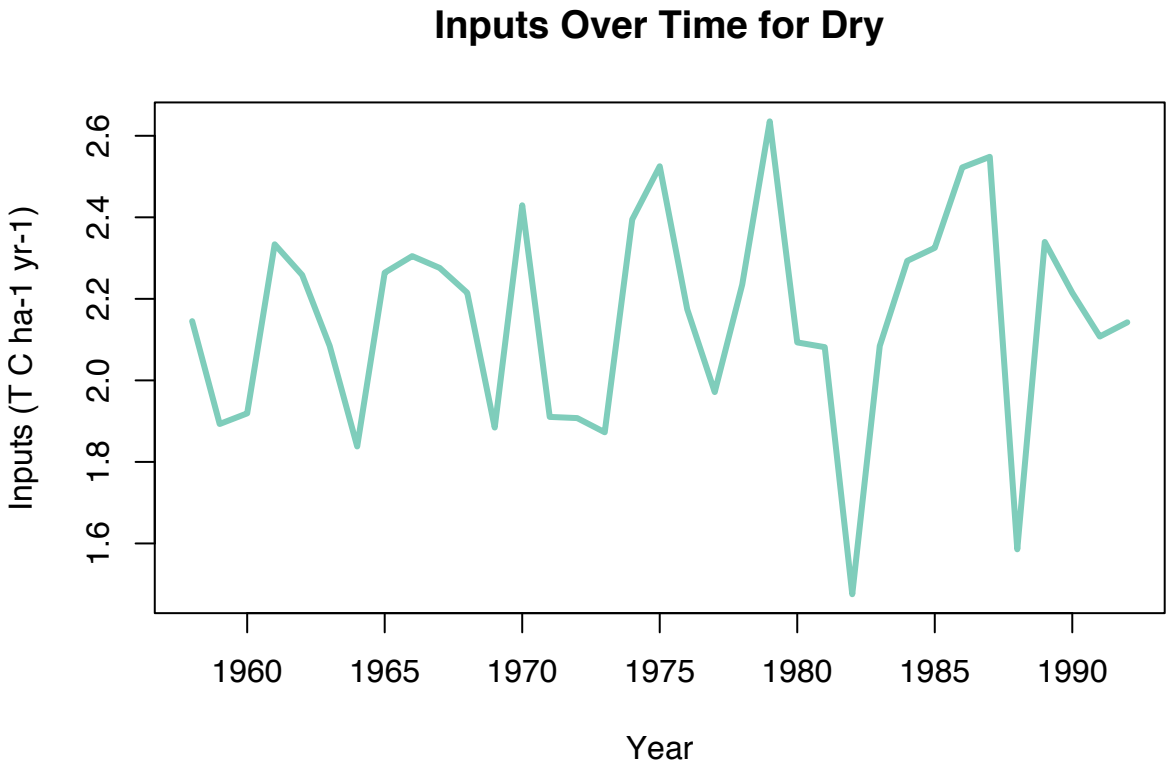
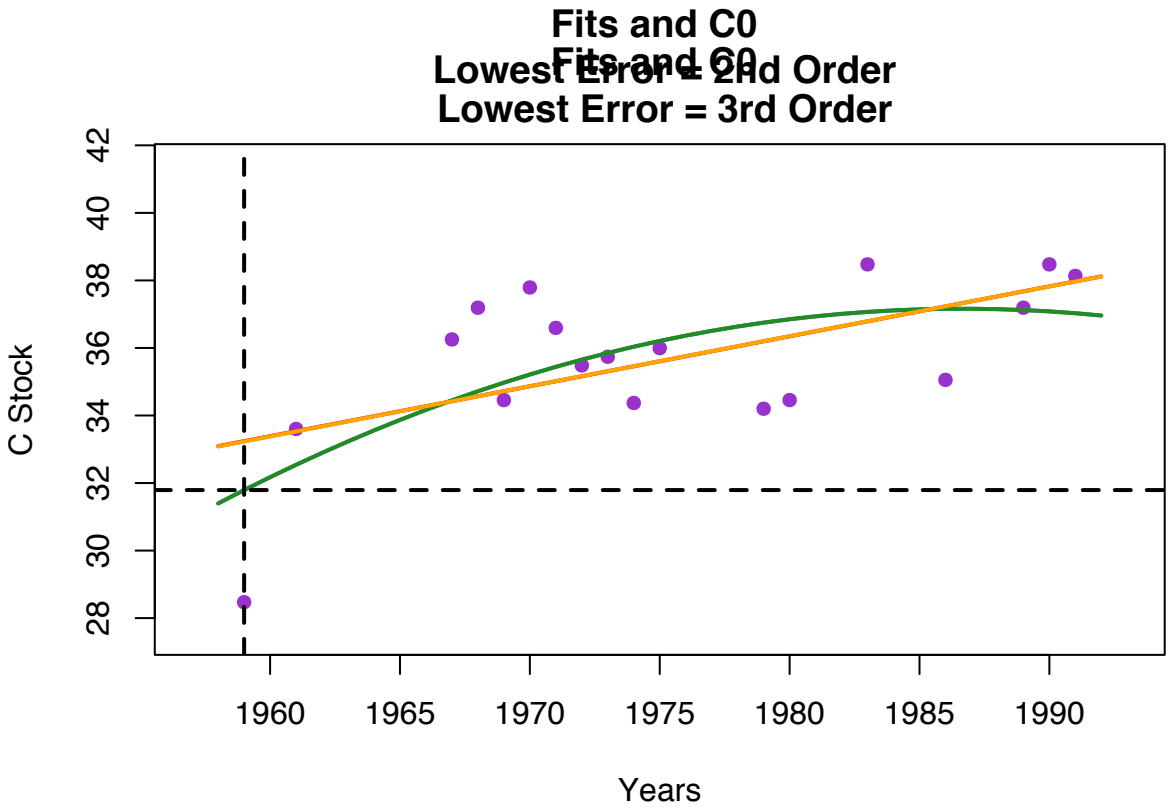
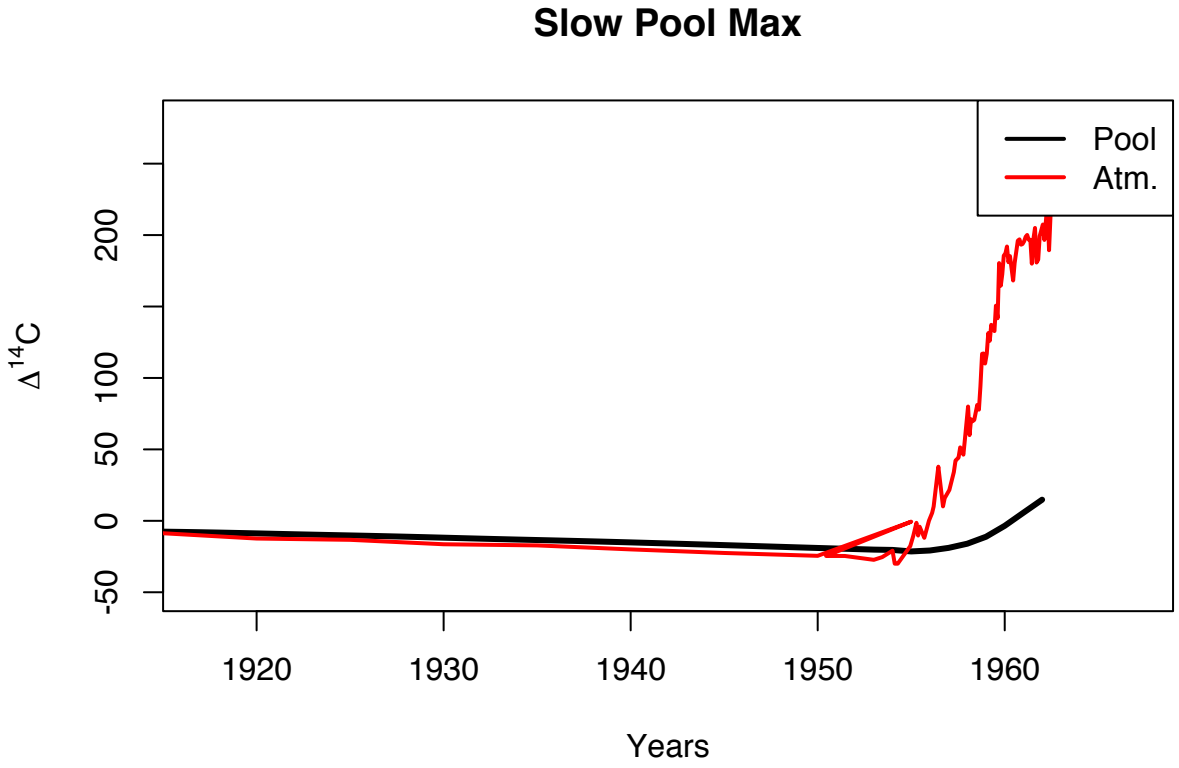
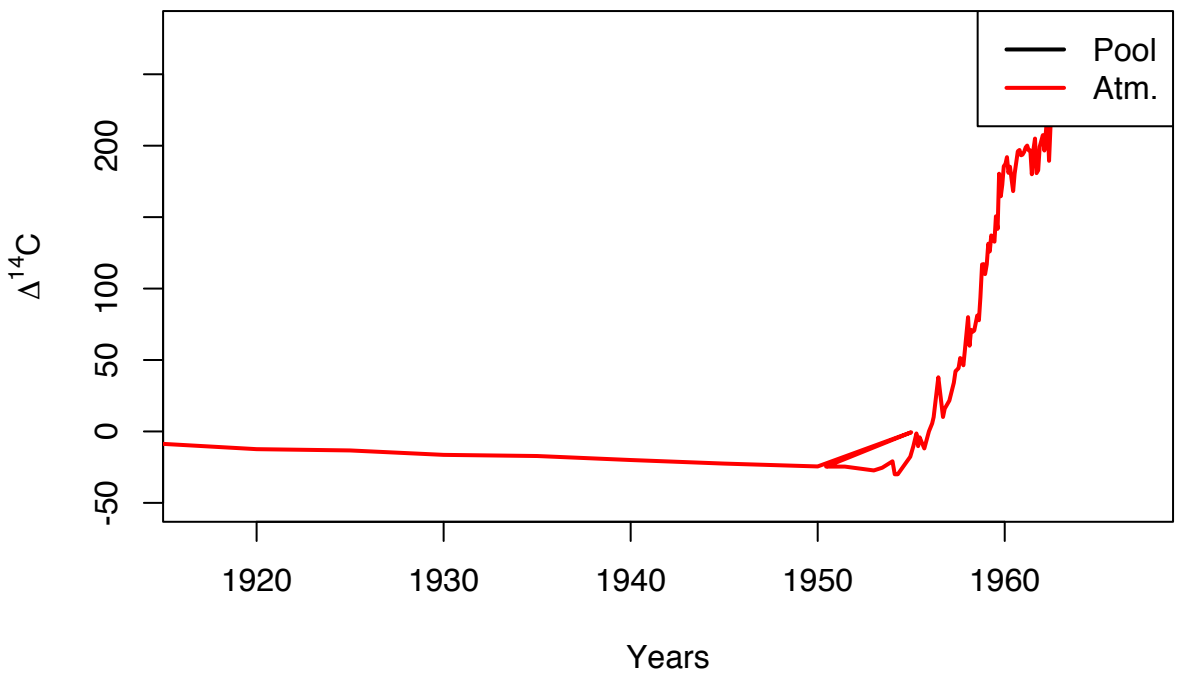
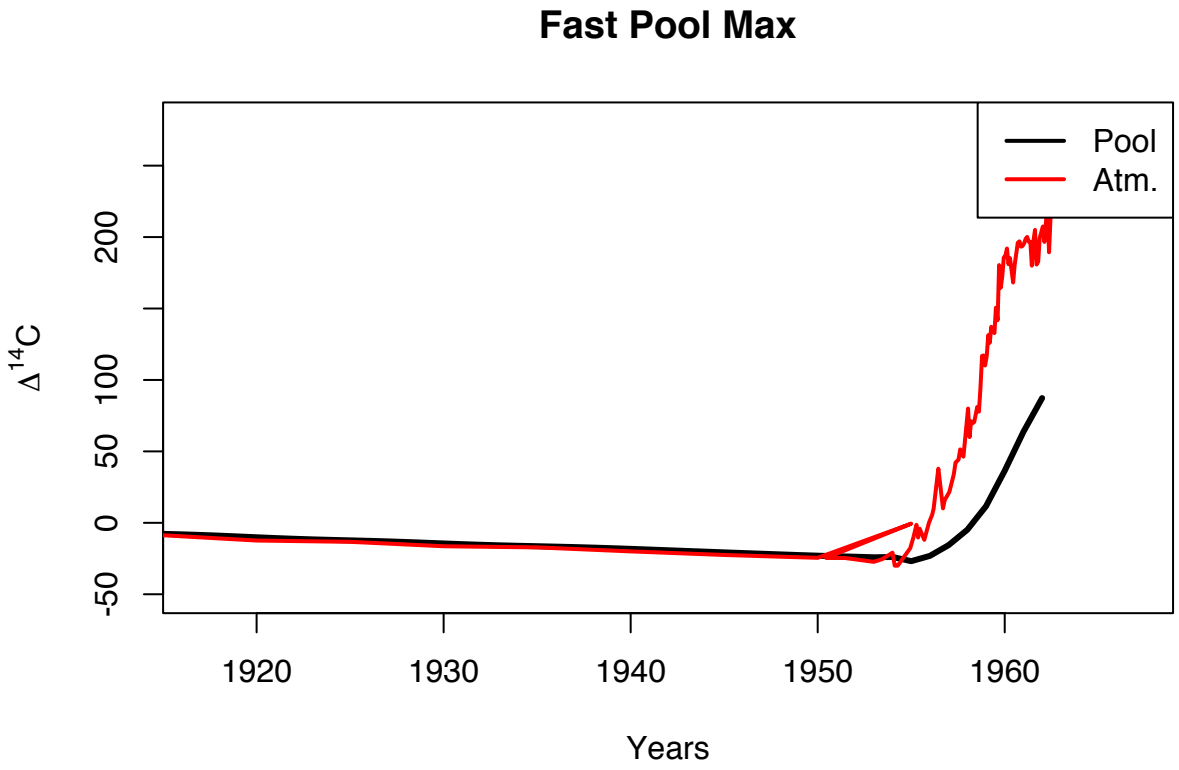


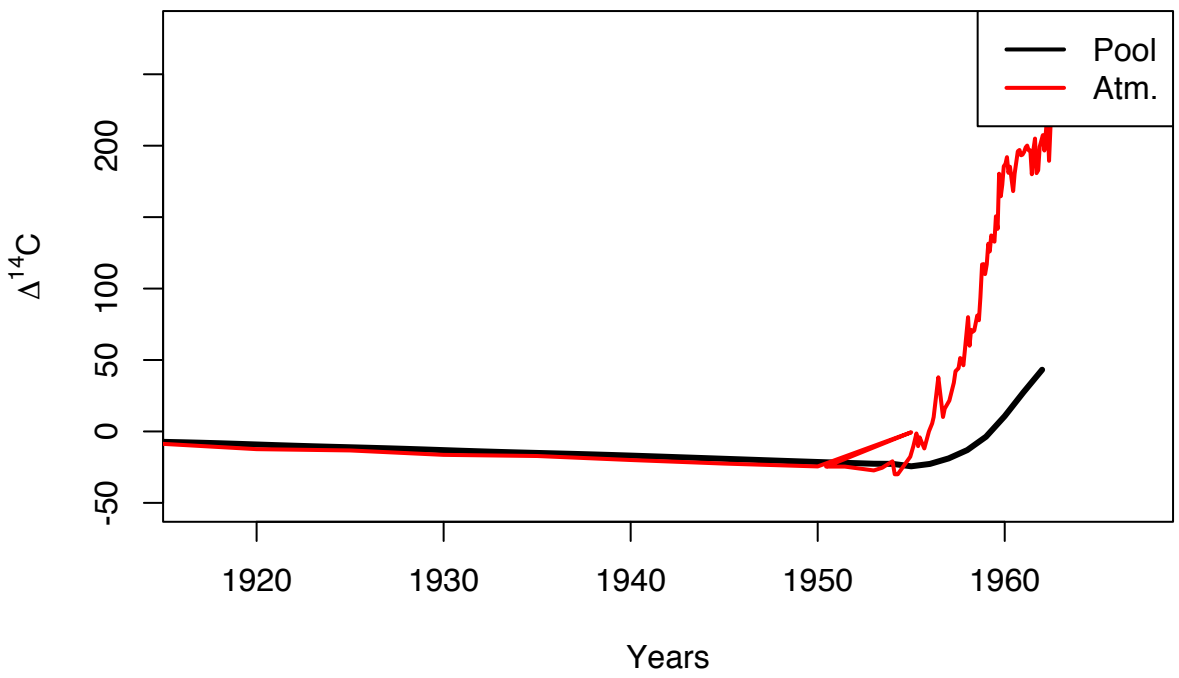
Figure 3: Inputs to soil over time



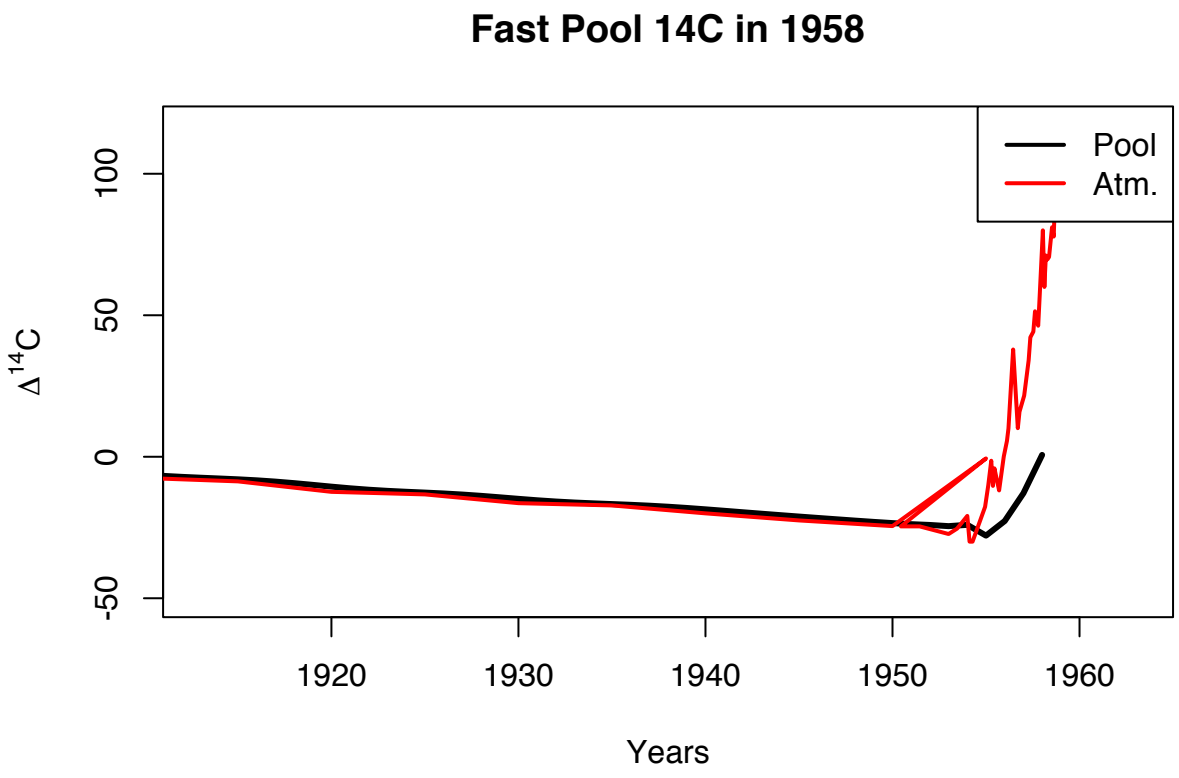

Slow Pool Max
Pool
Atm.
$\Delta^{14}C$
-50
0
50
100
200
1920
1930
1940
1950
1960
Years

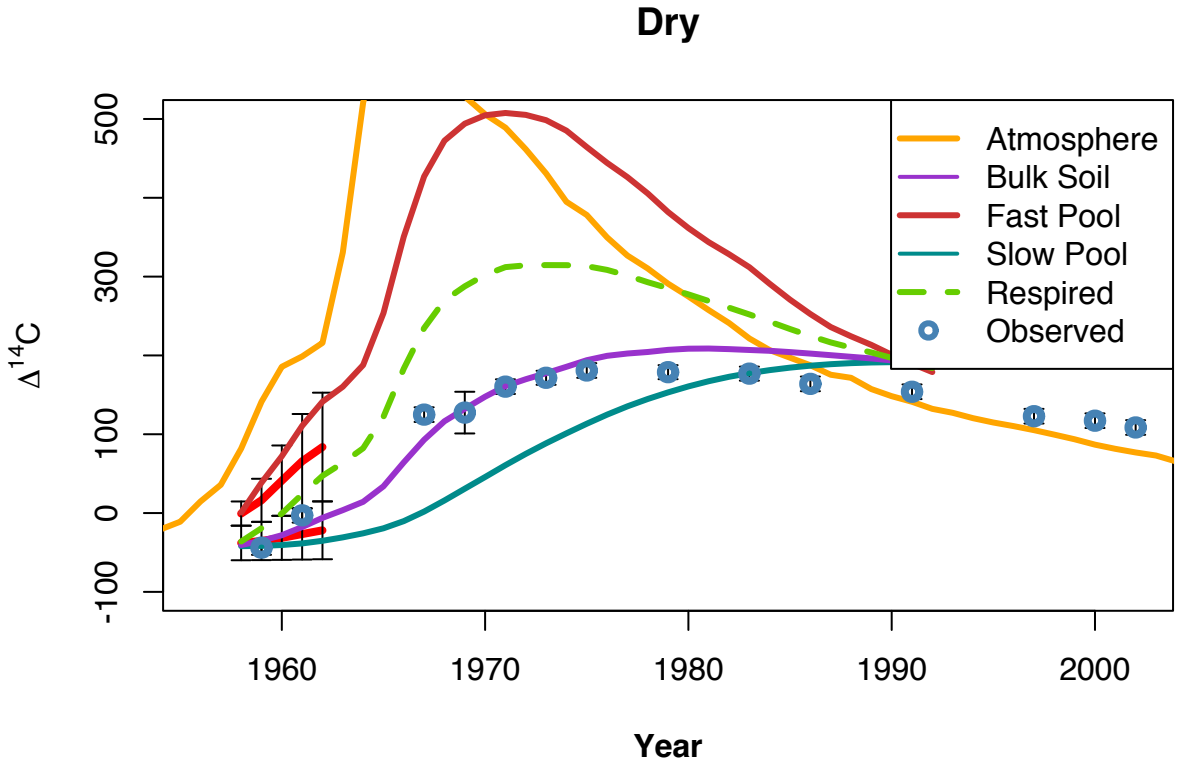

Slow Pool Min
Pool
Atm.
$\Delta^{14}C$
-50
0
50
100
200
1920
1930
1940
1950
1960
Years

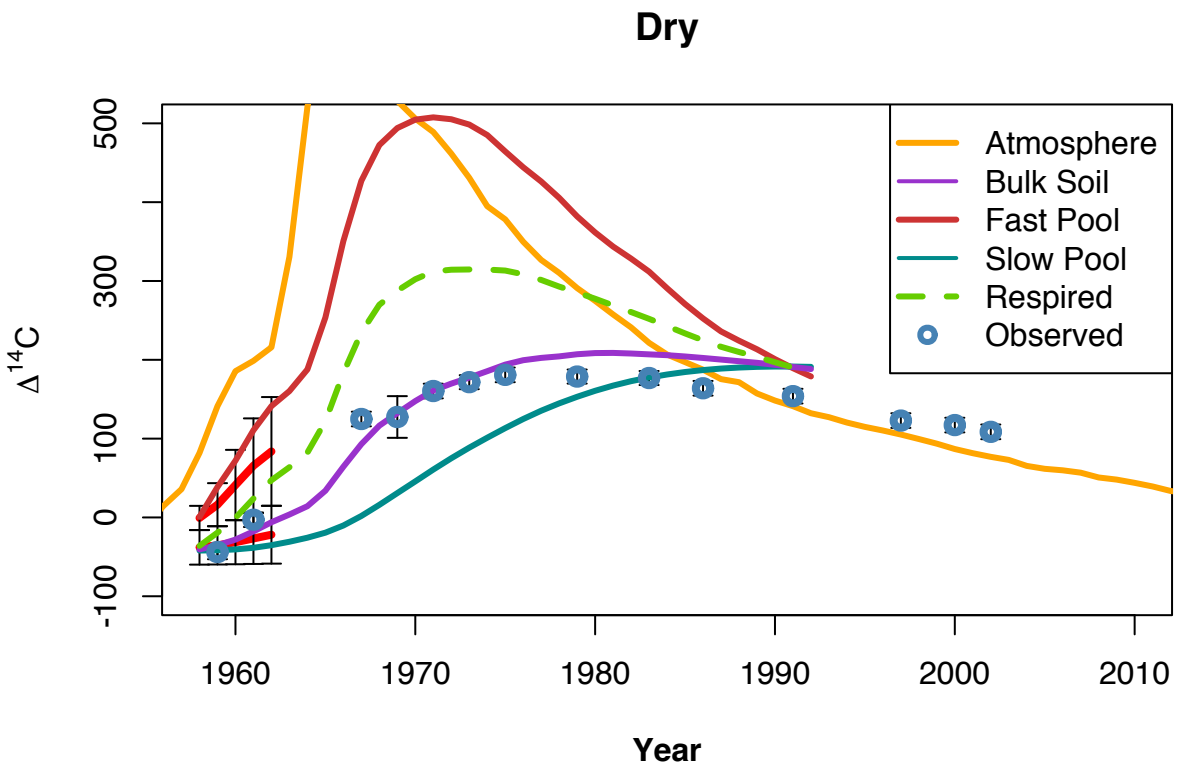


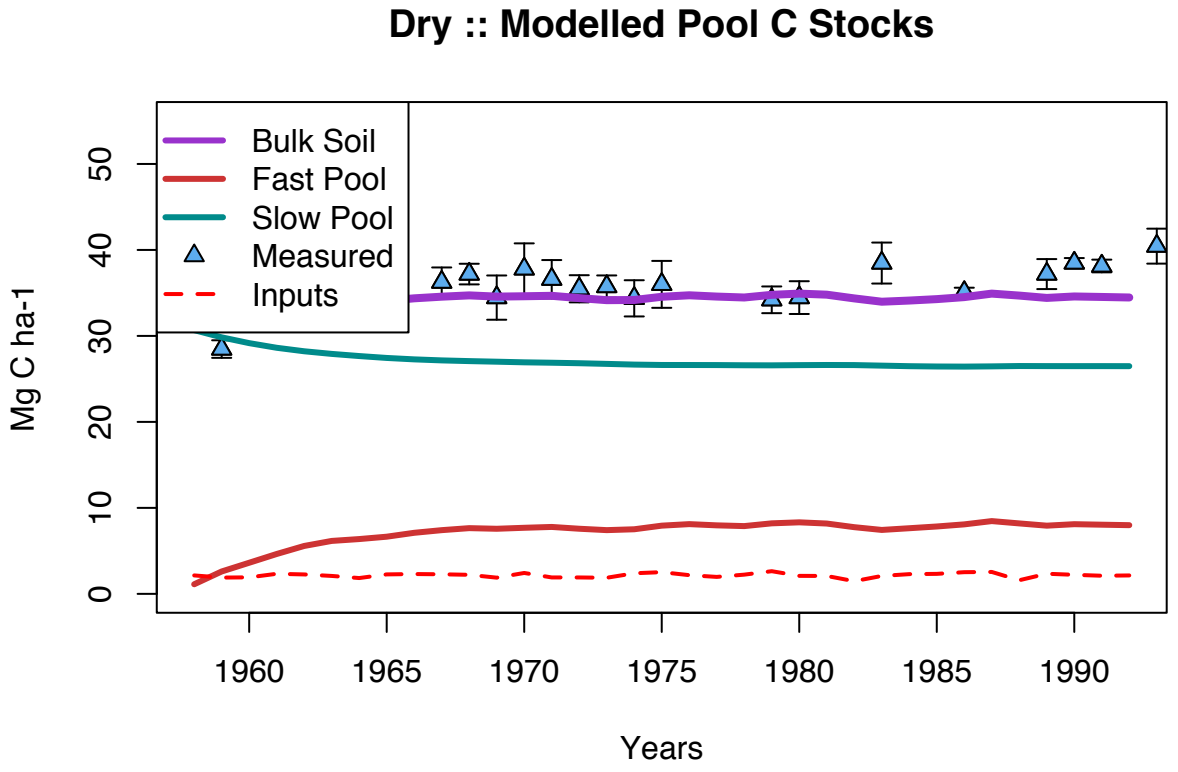



```
## Running first fit for dry
```


Fast Pool 14C in 1958
Pool
Atm.
$\Delta^{14}C$
100
50
0
-50
1920
1930
1940
1950
1960
Years


Dry
Atmosphere
Bulk Soil
Fast Pool
Slow Pool
Respired
Observed
$\Delta^{14}C$
500
300
100
0
-100
1960
1970
1980
1990
2000
Year


Dry
Atmosphere
Bulk Soil
Fast Pool
Slow Pool
Respired
Observed
Δ14C
500
300
100
0
-100
1960
1970
1980
1990
2000
2010
Year


Dry :: Modelled Pool C Stocks
Bulk Soil
Fast Pool
Slow Pool
Measured
Inputs
Mg C ha-1
50
40
30
20
10
0
1960
1965
1970
1975
1980
1985
1990
Years

Dry :: Model Inputs

	Soil Mass	Mean Inputs	P1 Transit (y)	P2 Transit	Trial Start	Trial End
[1,]	855	2.15	1.5 - 20 years	20 - 600 years	1958	1992

Model Parameter Maximums

	k1	k2	a21	slowProp
[1,]	0.667	0.05	1	1

Model Parameter Minimums

	k1	k2	a21	slowProp
[1,]	0.05	0.002	0	0.01

Dry :: WinchFit Parameters

	k1	k2	a21	slow	C MSE	C14 MSE
k1	0.271	0.0351	0.425	0.96	5.58	6.58

Pool Turnovers from Modeled Pool 14C Values

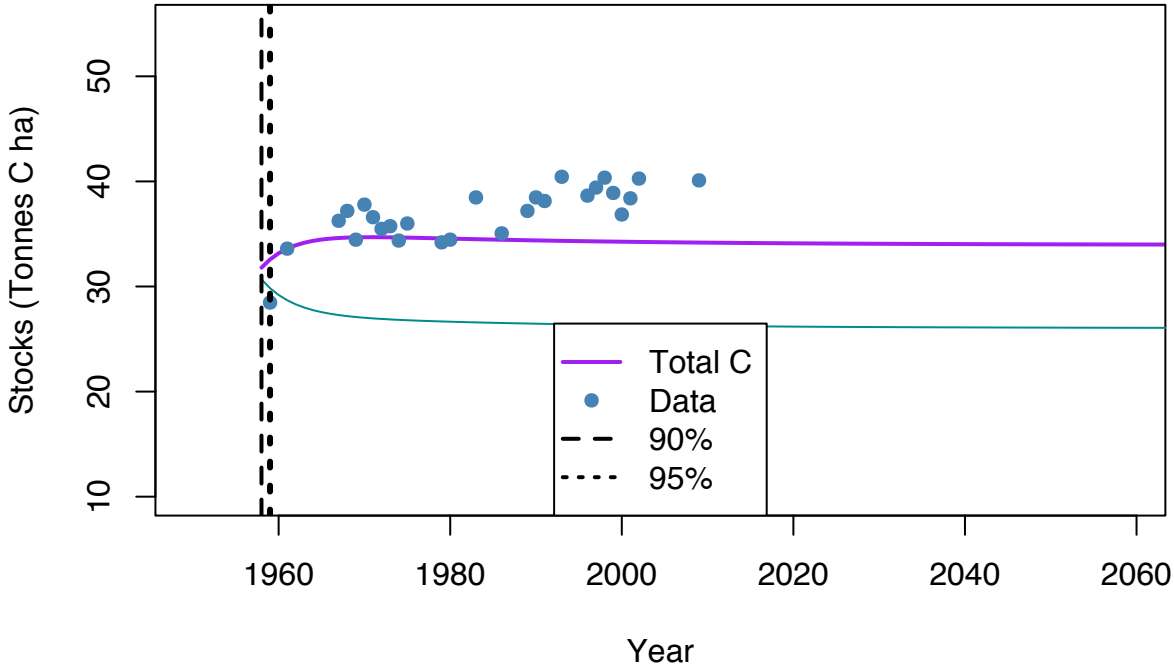
	P1 Turnover	P1 14C	P2 Turnover	P2 14C
k1	3.7	0.7	28.5	-42

Dry Simple Fit Dynamics 2

ın SA	Median SA	P1 Age	P2 Age	Mean TT	Median TT	SS Stock	95% Stock Yr.
25.5	16.19	3.68	32.14	15.79	5.91	33.82	1959

```
## [1] "Dry Mean TT: 15.79 Mean SA: 25.5"
```

```
##          k1          k2         a21    slowProp
## 0.27138157 0.03514092 0.42530778 0.96492884
```




```
## About to Start Bayesian Estimation for Dry
```

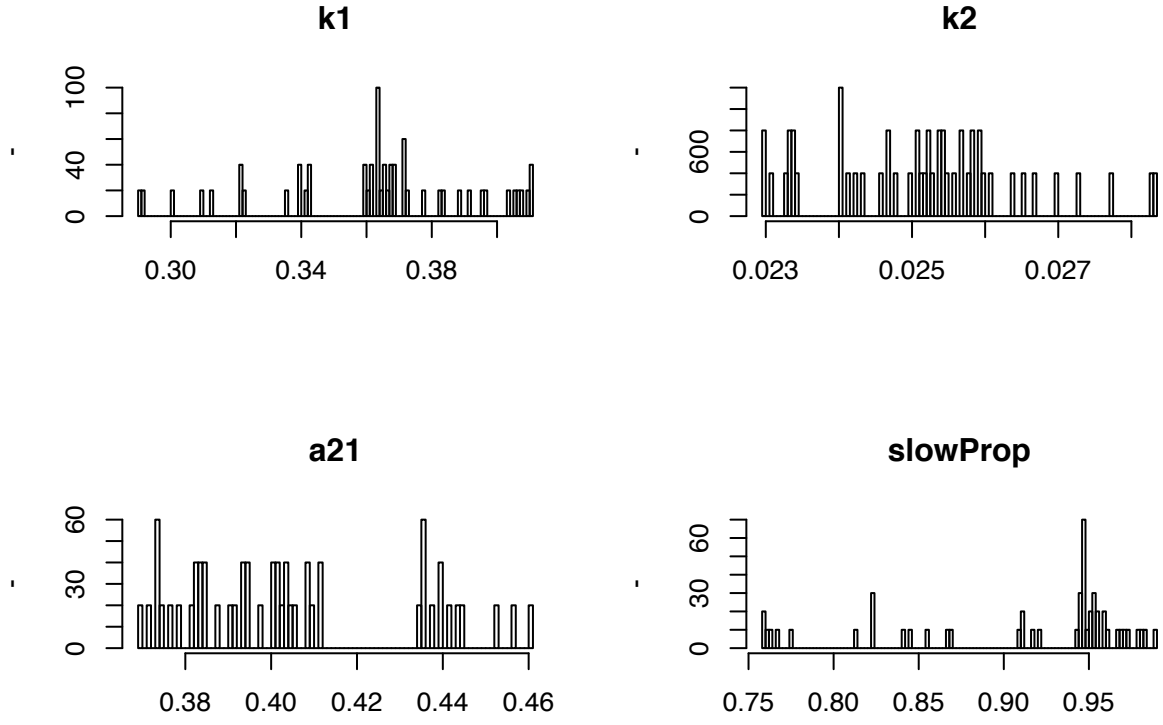
```
## [1] "Estimating parameters..."
```

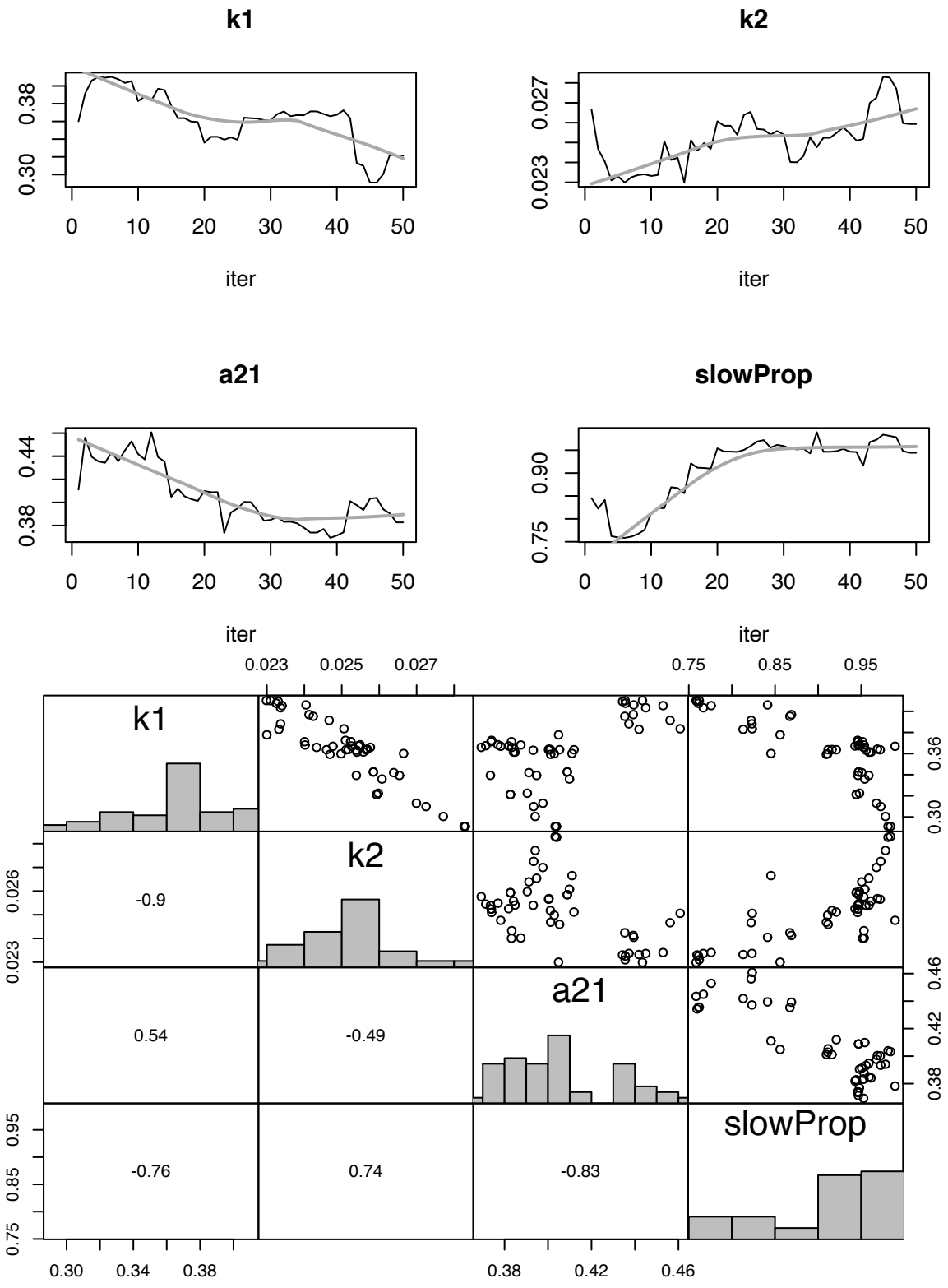
```
## number of accepted runs: 84 out of 100 (84%)
```

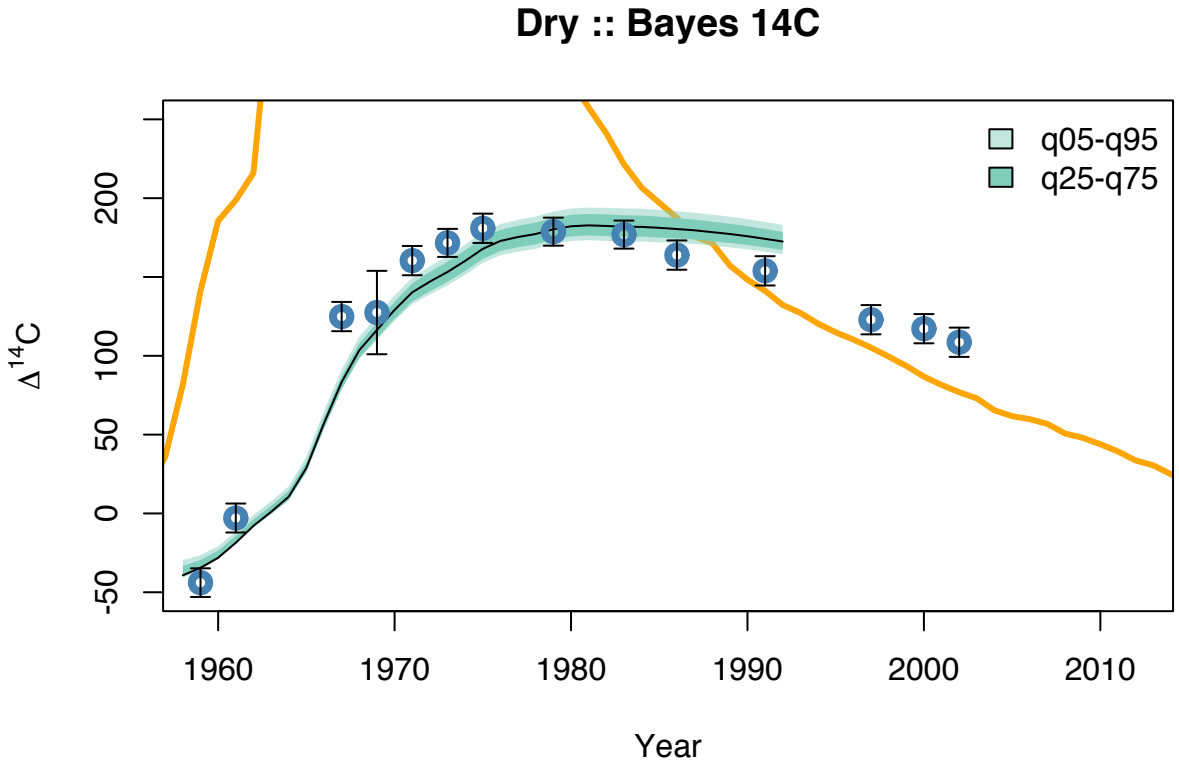
Parameter Optimization Stats

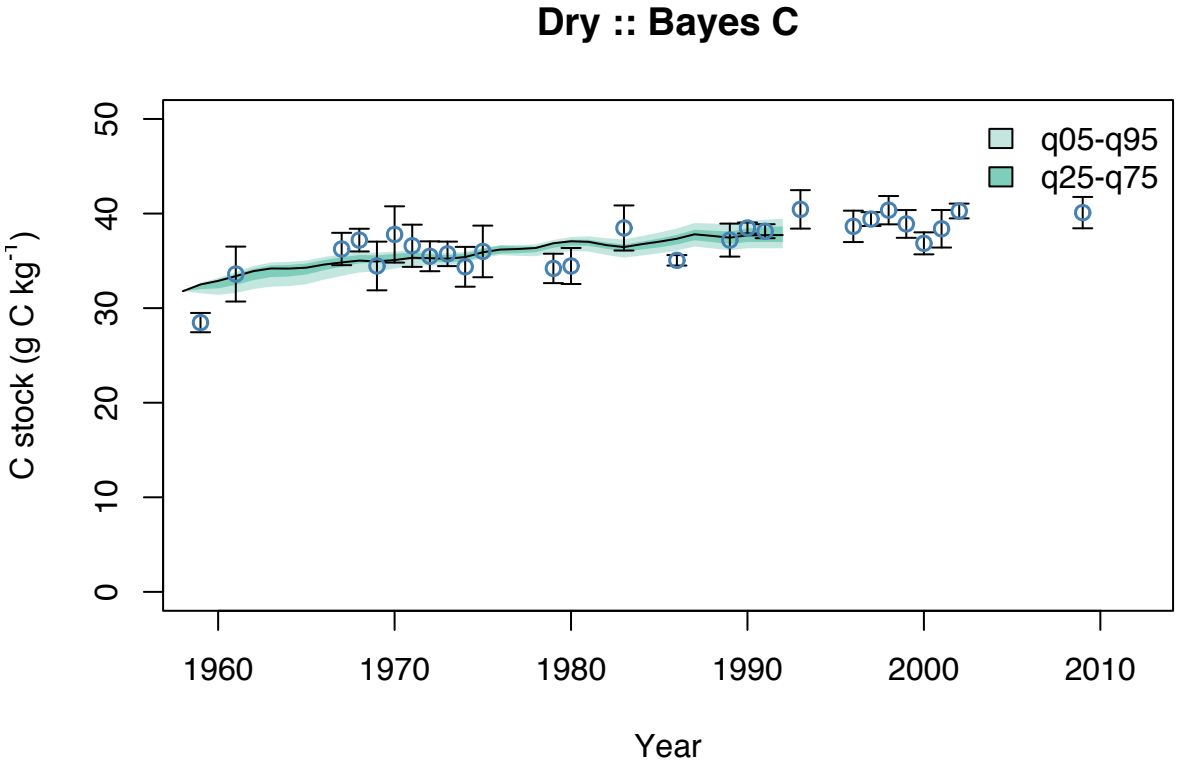
	# Iterations	# Burn-In	# Accepted
[1,]	100	50	84

```
##             k1        k2       a21   slowProp sig.var_soilc14 sig.var_soilC
## mean 0.36240259 0.02514518 0.4049347 0.90860734        554.0157      5.628385
## sd   0.03092087 0.00132174 0.0255879 0.07107726          0.0000      0.000000
## min  0.29099591 0.02298802 0.3693001 0.75849634        554.0157      5.628385
## max  0.41021151 0.02830200 0.4608028 0.98922936        554.0157      5.628385
## q025 0.34258889 0.02415378 0.3835166 0.85870551        554.0157      5.628385
## q050 0.36504468 0.02523887 0.4007531 0.94630733        554.0157      5.628385
## q075 0.38165034 0.02584504 0.4286895 0.95394284        554.0157      5.628385
```

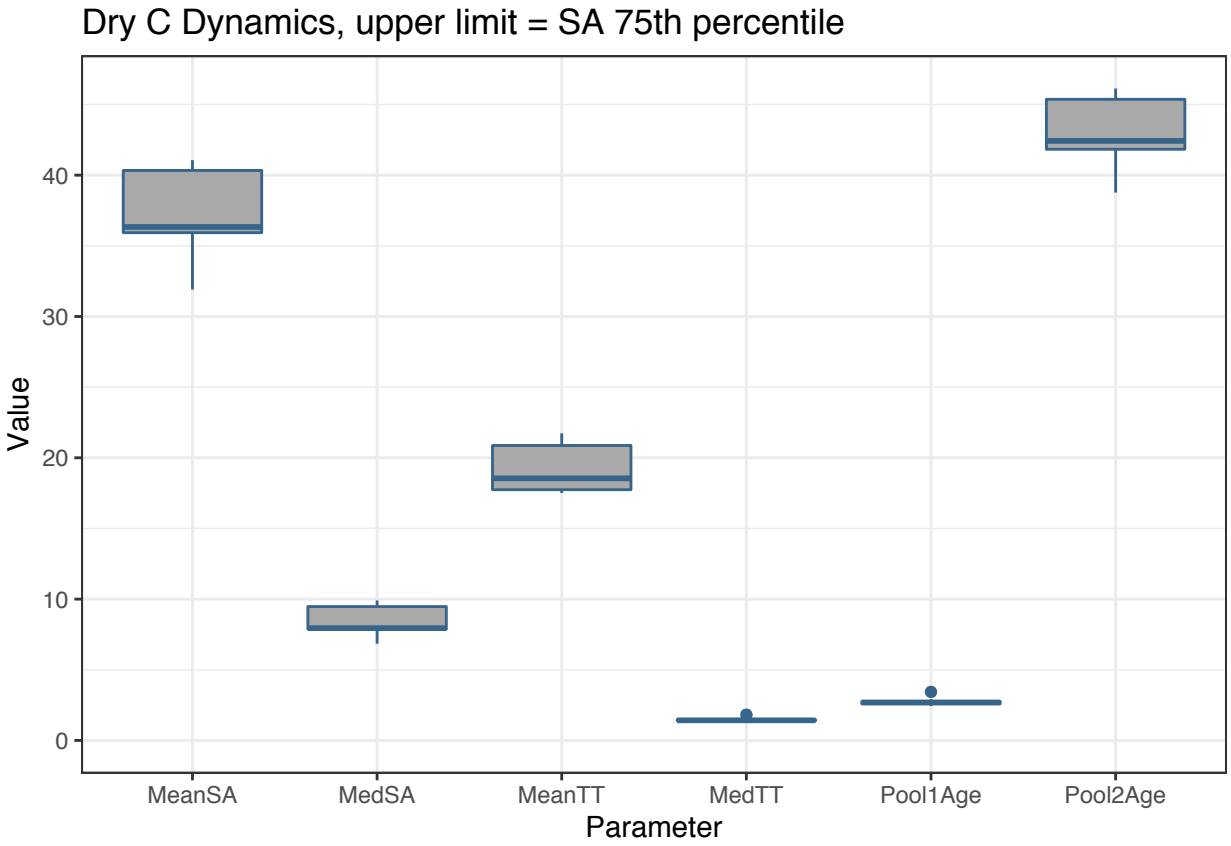



k1
k2
a21
slowProp
iter
-0.9
0.54
-0.49
-0.76
0.74
-0.83






```
## Running all parameter combos through SA and TT for Dry
## [1] "100% complete"
```



C Dynamic Means

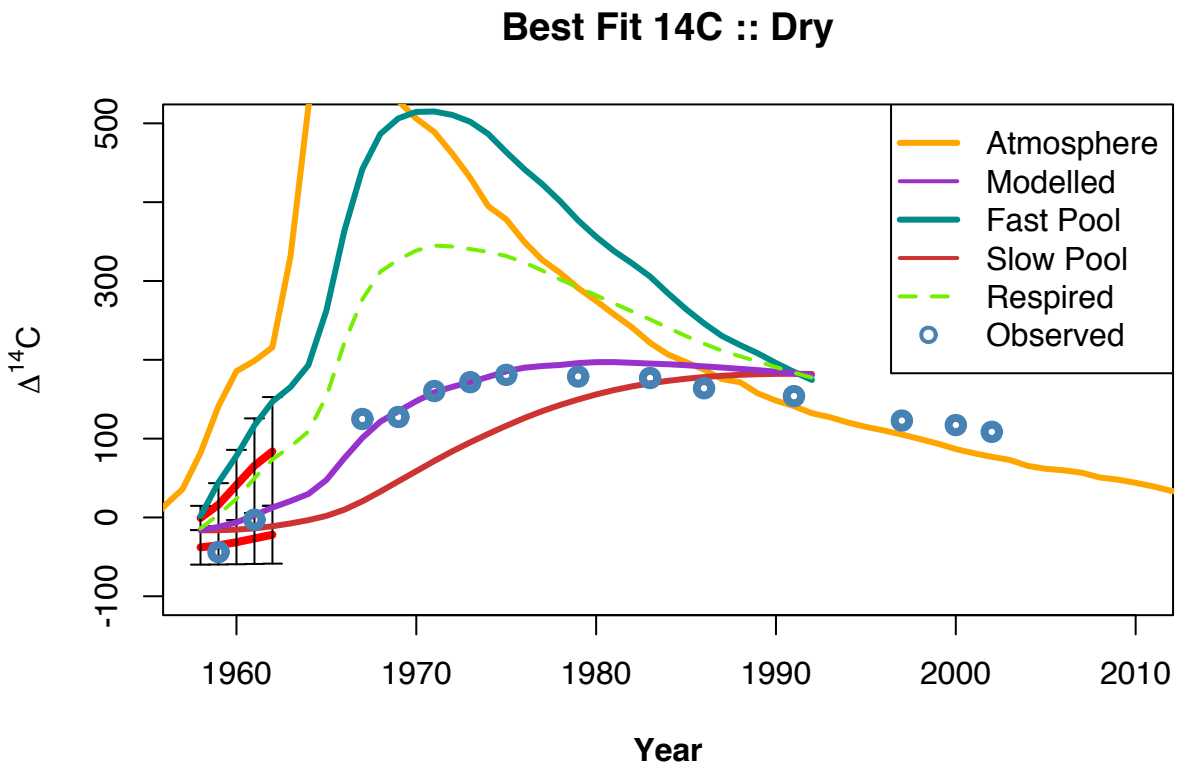
	System Age	Transit Time	P1 Age	P2 Age
[1,]	37.42	19.21	2.74	43.19

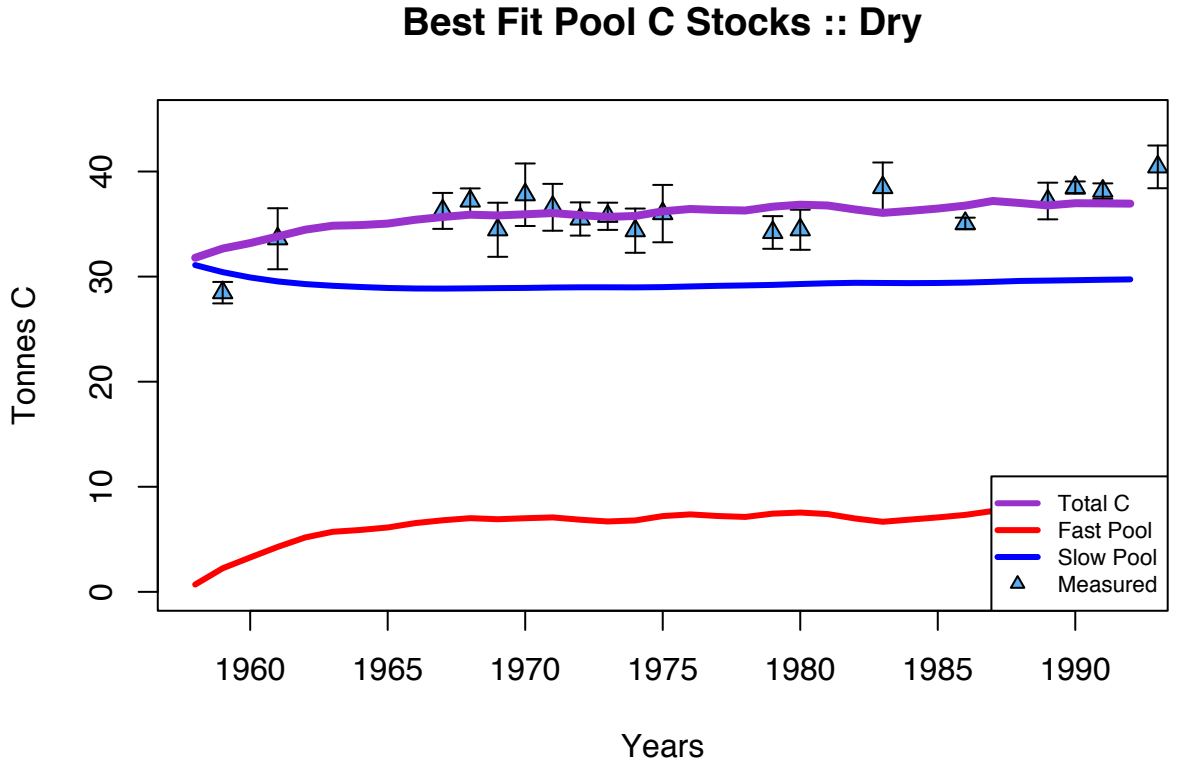
C Dynamic Medians

	System Age	Transit Time	P1 Age	P2 Age
[1,]	36.33	18.55	2.69	42.42

C Dynamic SDs

	System Age SD	Transit Time SD	P1 Age SD	P2 Age SD
[1,]	2.97	1.69	0.29	2.41


Best Fit 14C :: Dry
Δ14C
500
300
100
0
-100
1960
1970
1980
1990
2000
2010
Year
Atmosphere
Modelled
Fast Pool
Slow Pool
Respired
Observed

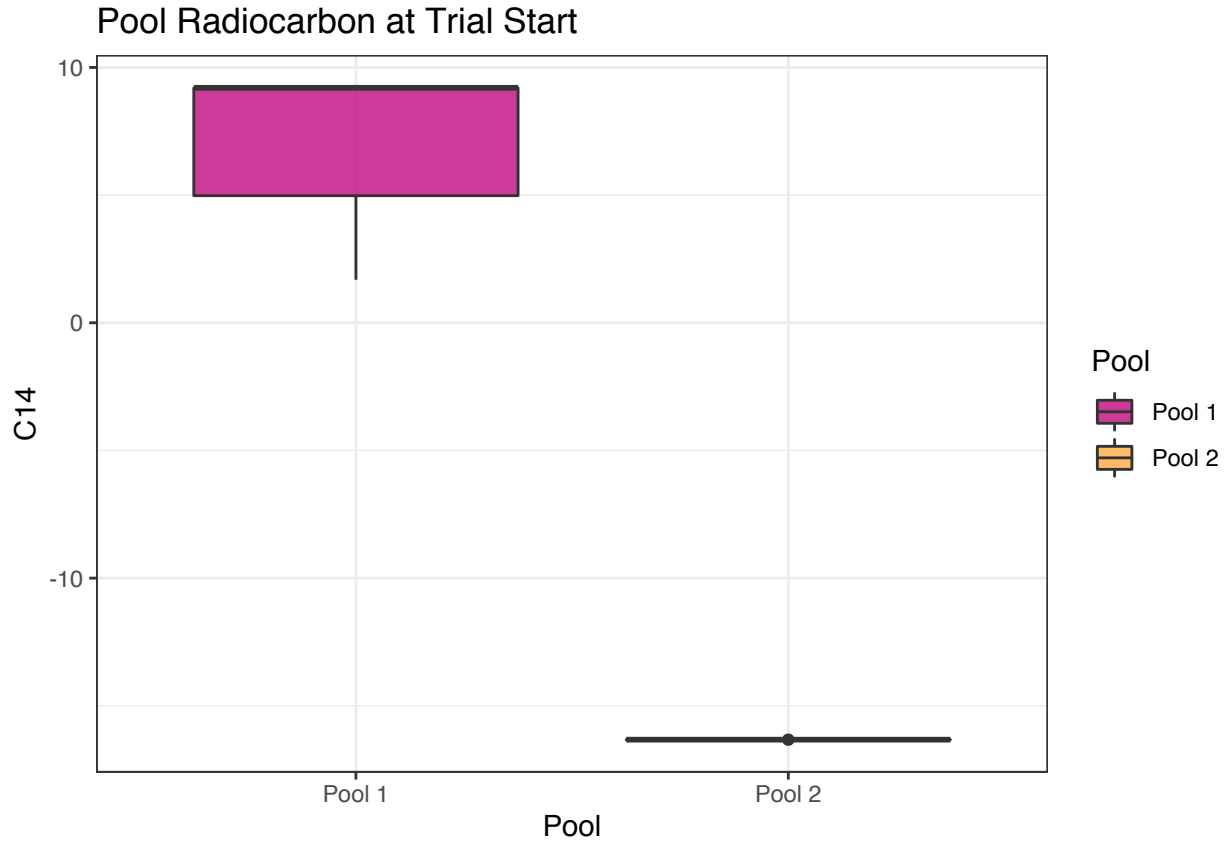

Best Fit Pool C Stocks :: Dry
Tonnes C
40
30
20
10
0
1960
1965
1970
1975
1980
1985
1990
Years
Total C
Fast Pool
Slow Pool
Measured

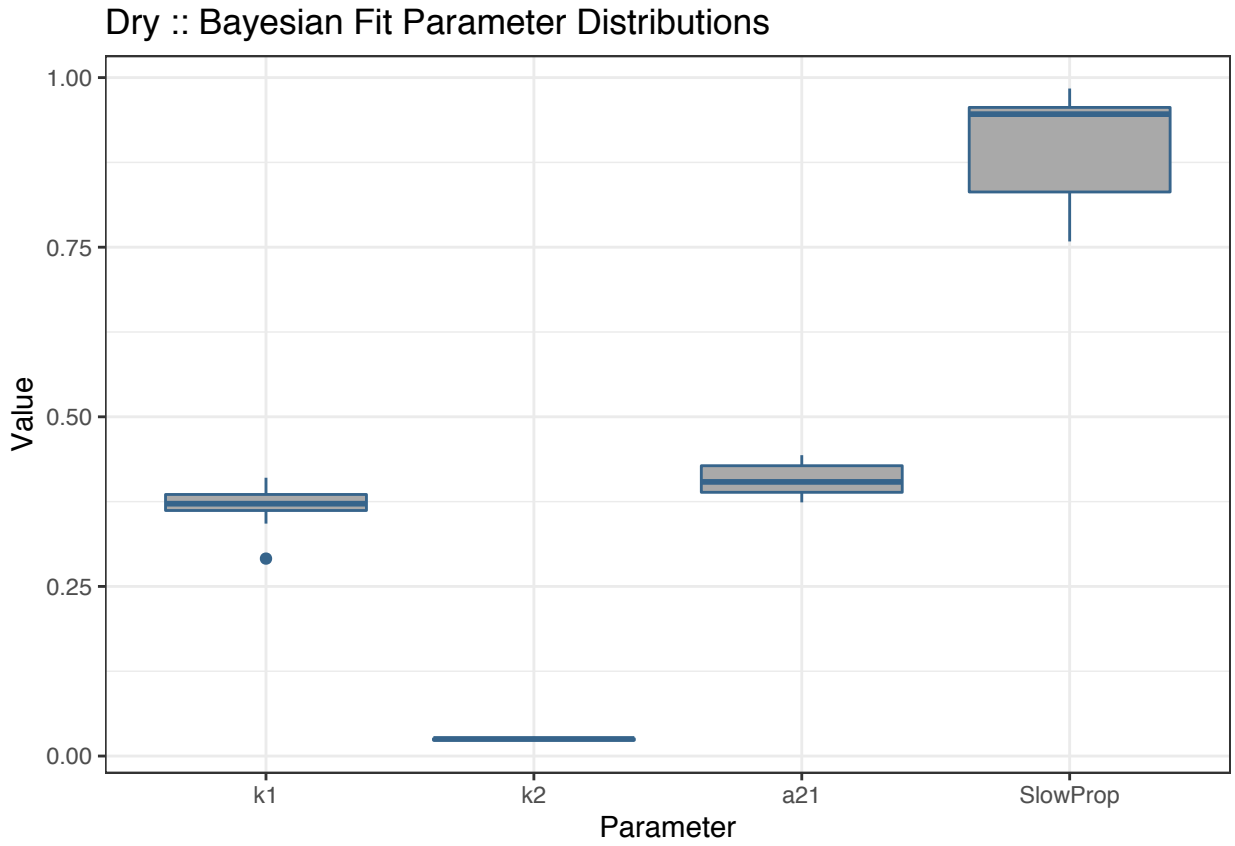
Best Fit Parameters from modMCMC

	k1	k2	a21	SlowProp	Best SS Stock
[1,]	0.3004	0.0277	0.118	0.978	37.7

C Dynamics From Best Fit Parameters

	SA	TT	p1 Age	p2 Age
[1,]	32.57	17.55	3.33	39.41





Best fit from parameter optimization

	k1	k2	a21	slowProp
[1,]	0.3004	0.0277	0.3941	0.9781

Parameter distribution from optimization

mean	0.3624	0.0251	0.4049	0.9086	554.0157	5.6284
sd	0.0309	0.0013	0.0256	0.0711	0	0
min	0.291	0.023	0.3693	0.7585	554.0157	5.6284
max	0.4102	0.0283	0.4608	0.9892	554.0157	5.6284
q025	0.3426	0.0242	0.3835	0.8587	554.0157	5.6284
q050	0.365	0.0252	0.4008	0.9463	554.0157	5.6284
q075	0.3817	0.0258	0.4287	0.9539	554.0157	5.6284

```
## Saving outputs for Dry

## [1] "Dry finished at: 2020-11-03 11:26:44"

## [1] "Finished with 1958 through 1992 for Dry"
```