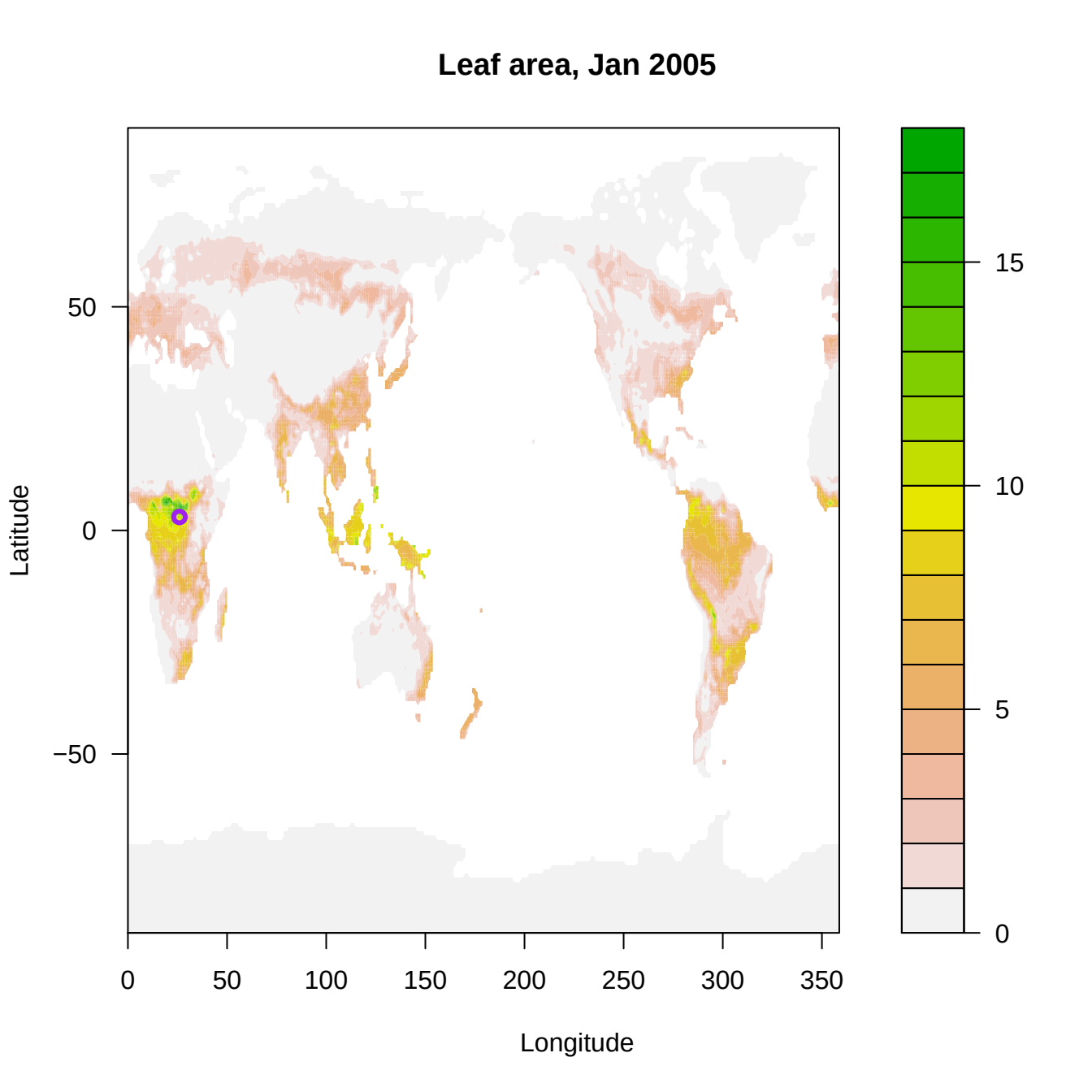
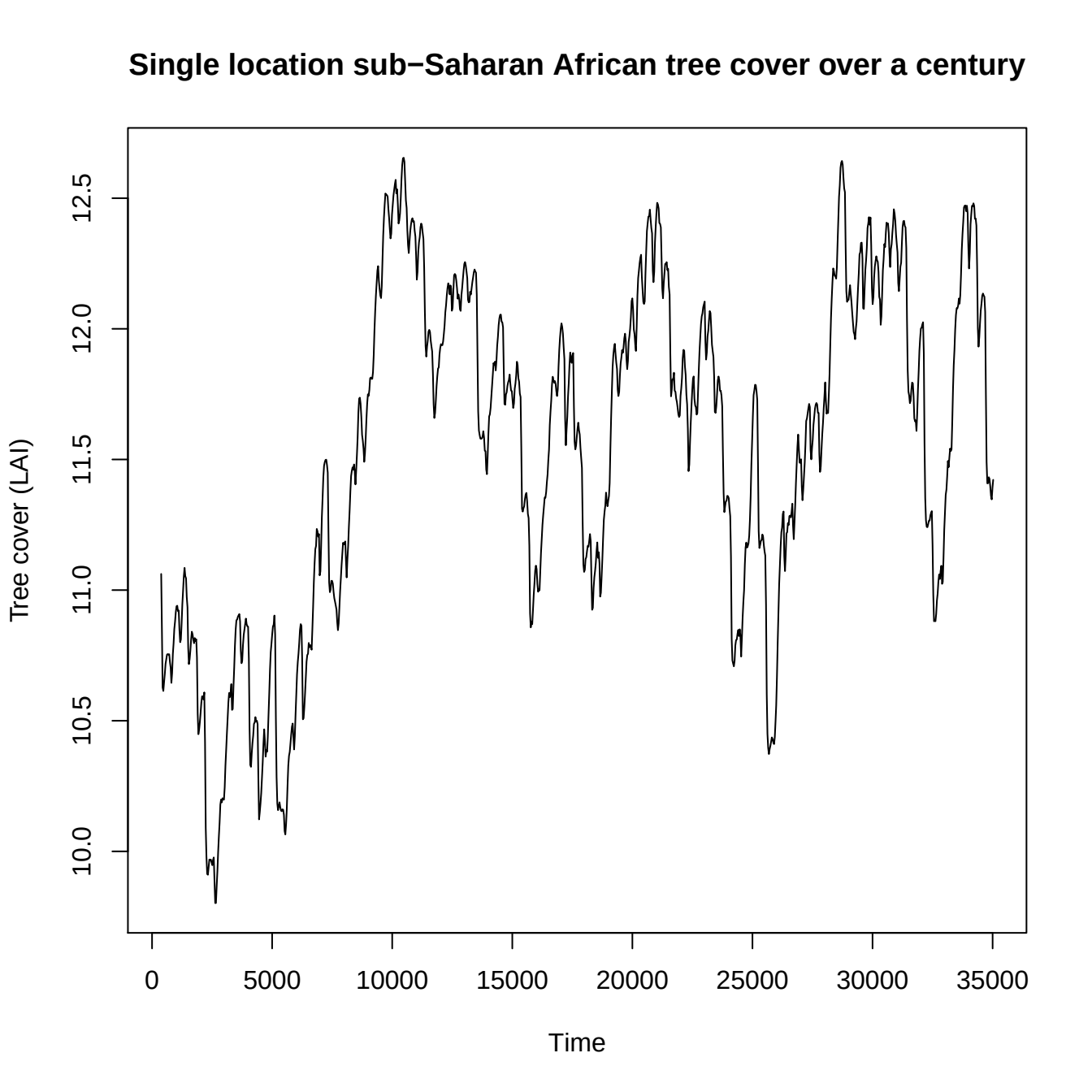
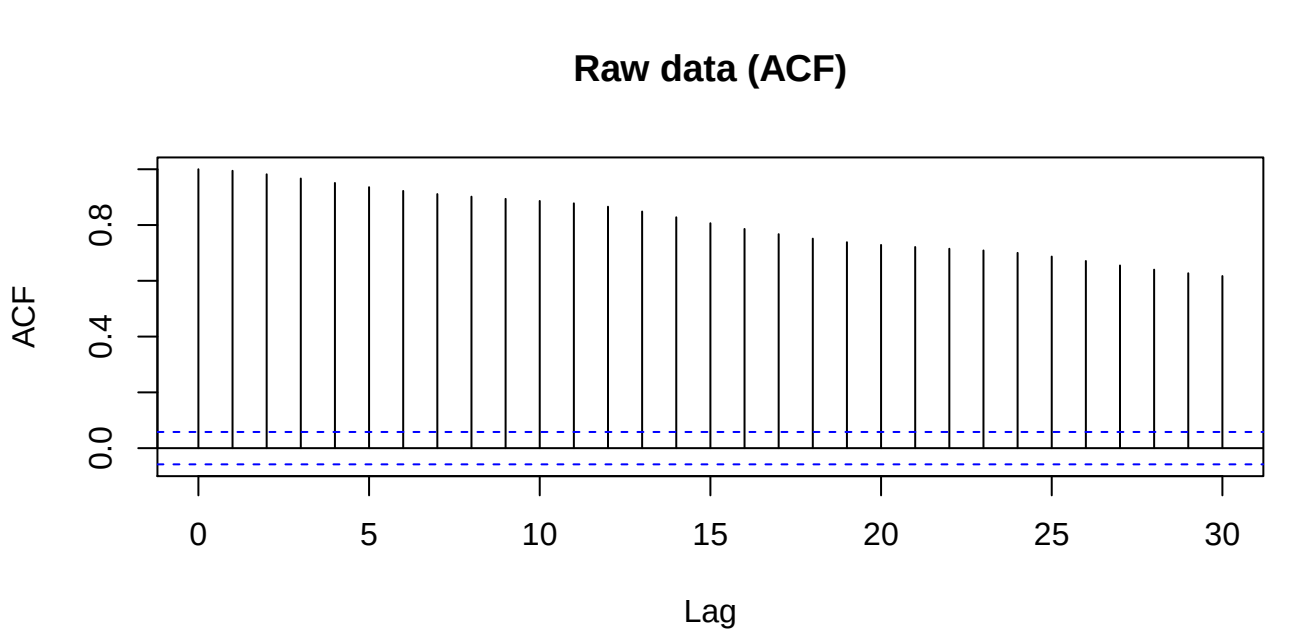
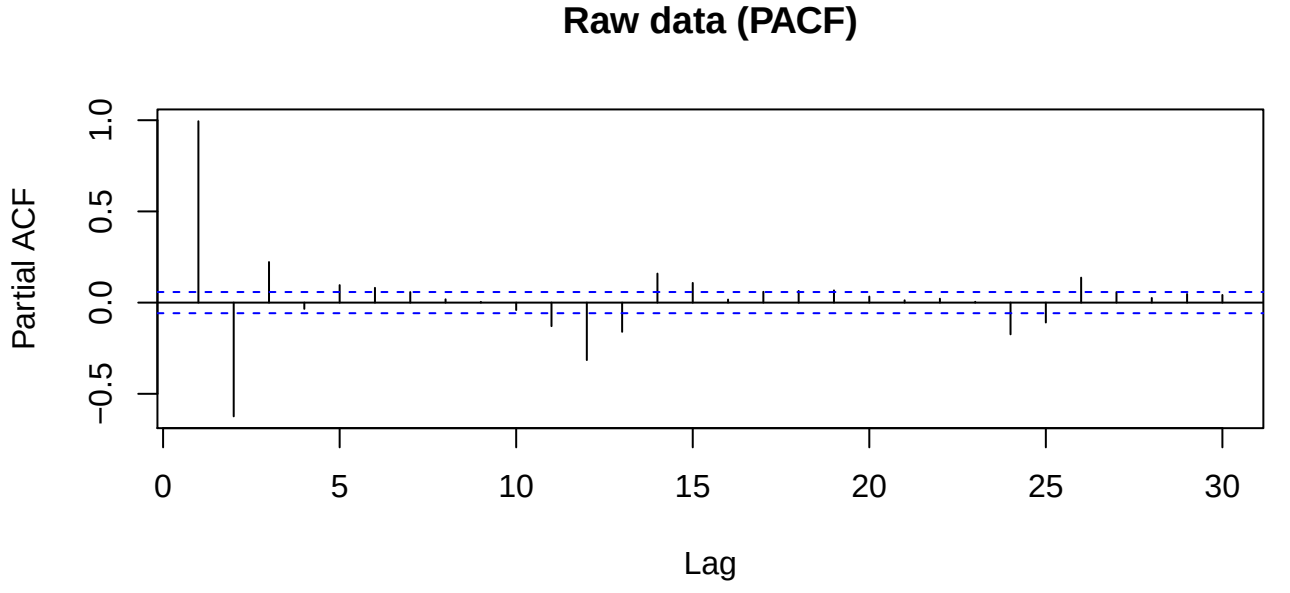
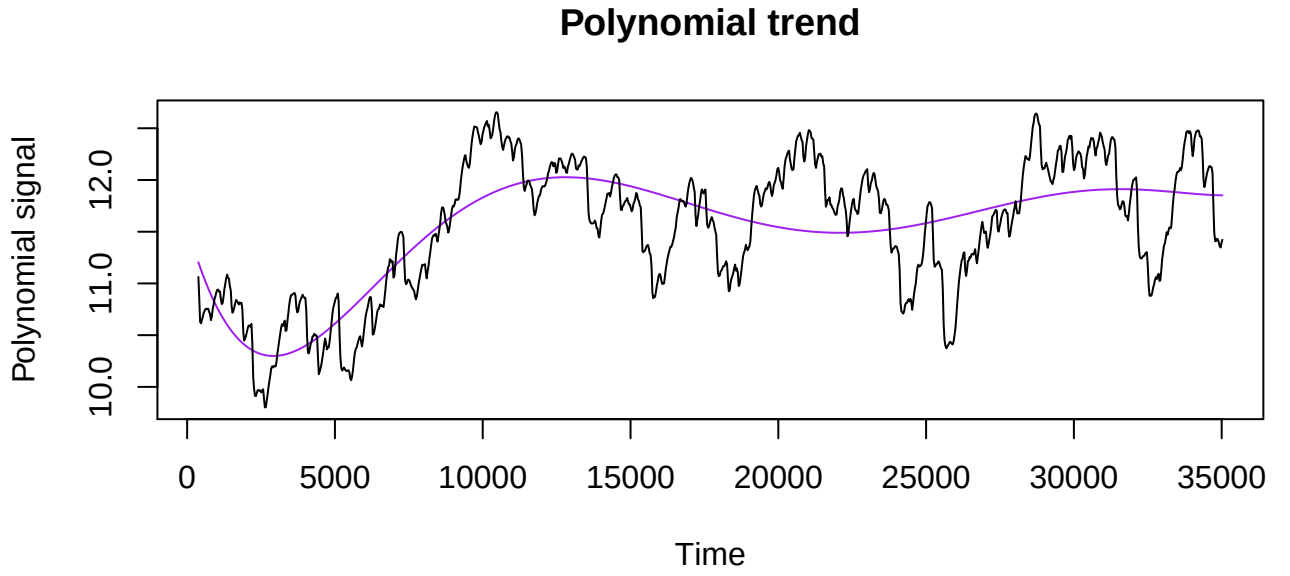
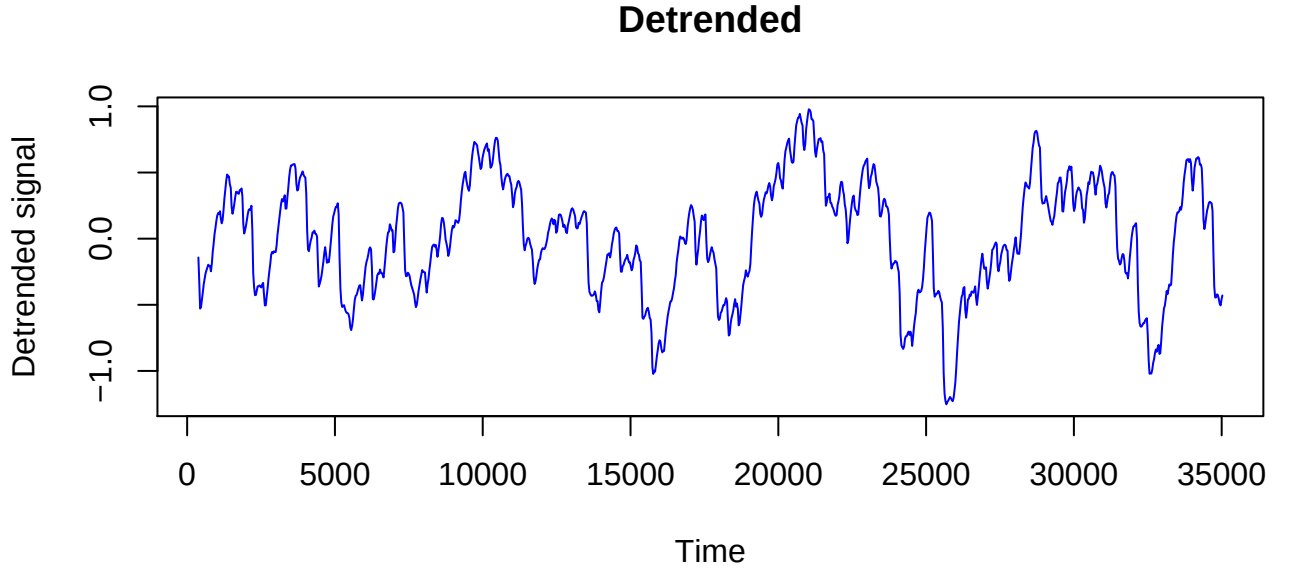

Leaf area, Jan 2005
50
0
−50
Latitude
0
50
100
150
200
250
300
350
Longitude
15
10
5
0

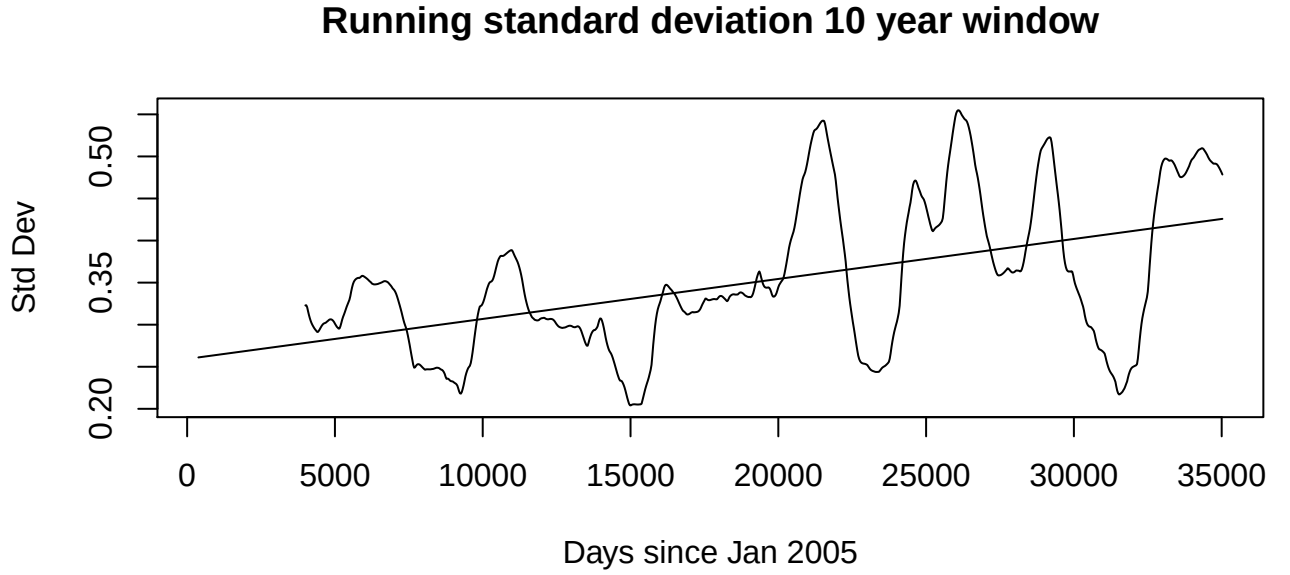

Single location sub−Saharan African tree cover over a century
Tree cover (LAI)
10.0
10.5
11.0
11.5
12.0
12.5
0
5000
10000
15000
20000
25000
30000
35000
Time

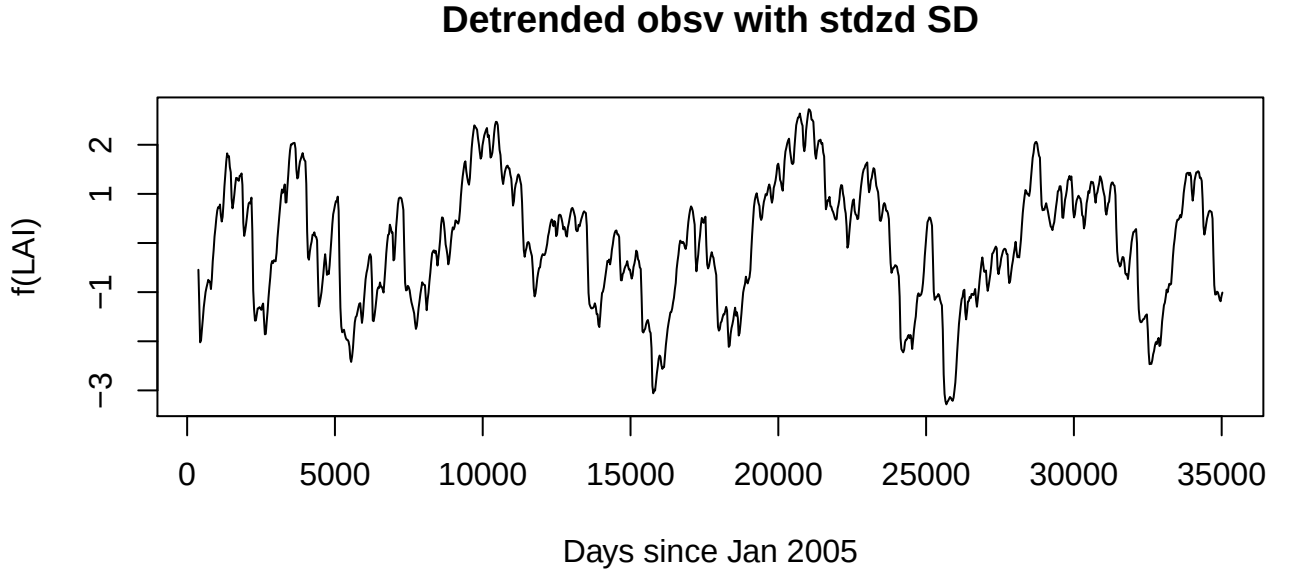

Raw data (ACF)
ACF
0.0
0.4
0.8
0
5
10
15
20
25
30
Lag

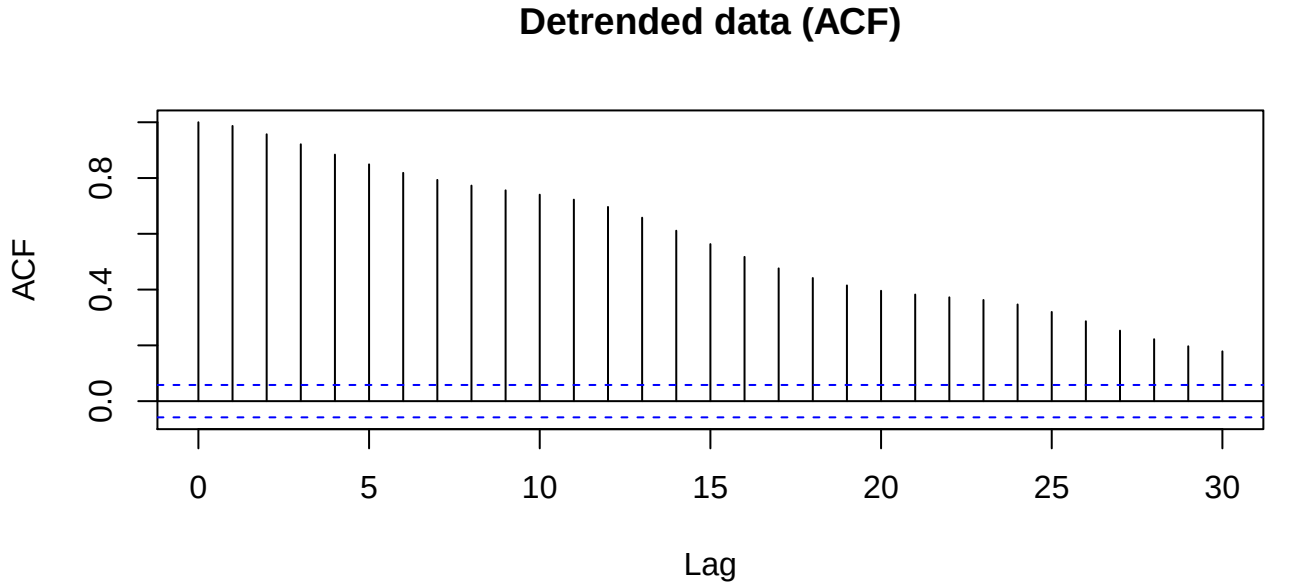

Raw data (PACF)
Partial ACF
−0.5
0.0
0.5
1.0
0
5
10
15
20
25
30
Lag

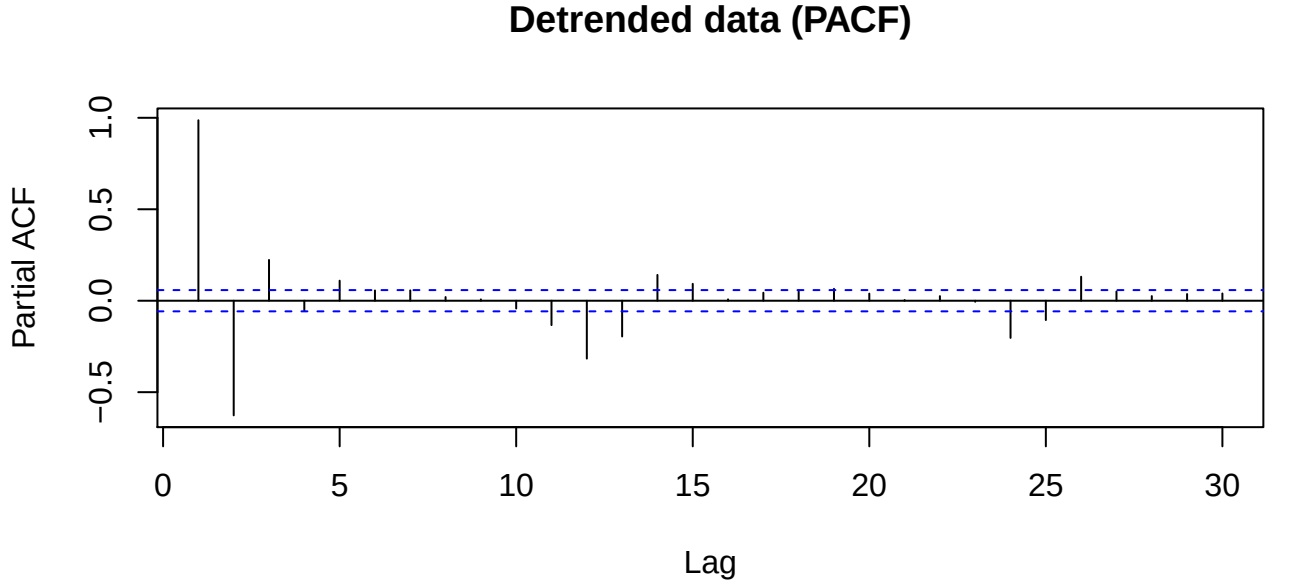

Polynomial trend
Polynomial signal
10.0
11.0
12.0
0
5000
10000
15000
20000
25000
30000
35000
Time

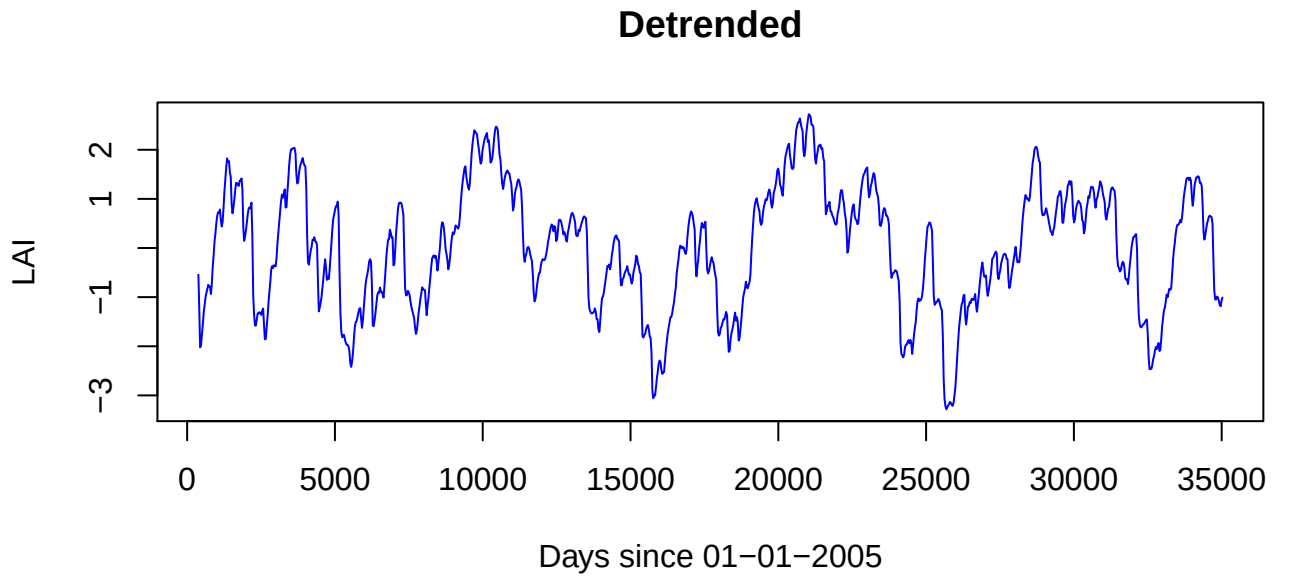

Detrended
Detrended signal
−1.0
0.0
1.0
0
5000
10000
15000
20000
25000
30000
35000
Time

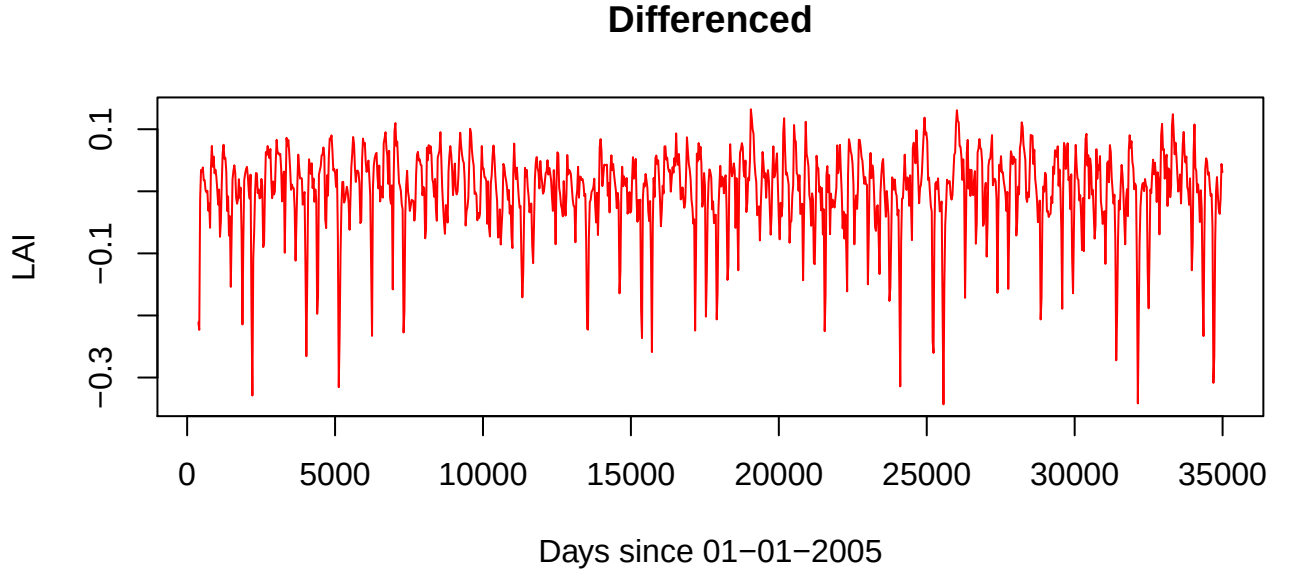

Running standard deviation 10 year window
Std Dev
0.20
0.35
0.50
0
5000
10000
15000
20000
25000
30000
35000
Days since Jan 2005

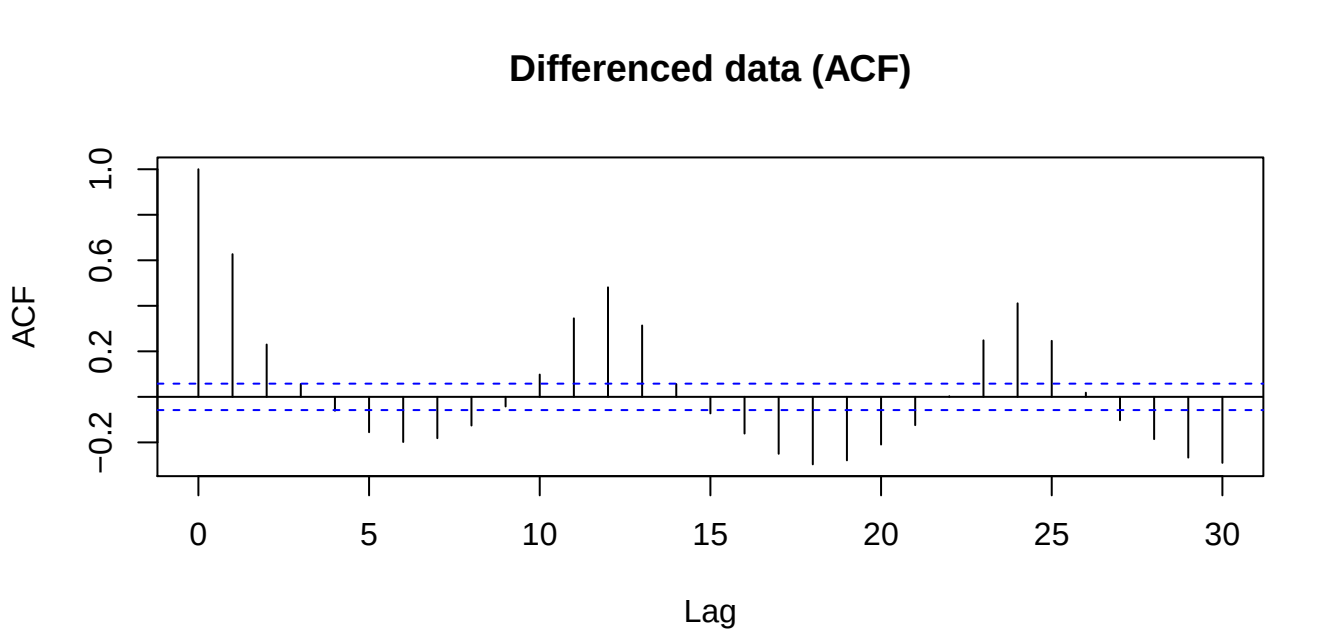

Detrended obsv with stdzd SD
f(LAI)
−3
−1
1
2
0
5000
10000
15000
20000
25000
30000
35000
Days since Jan 2005

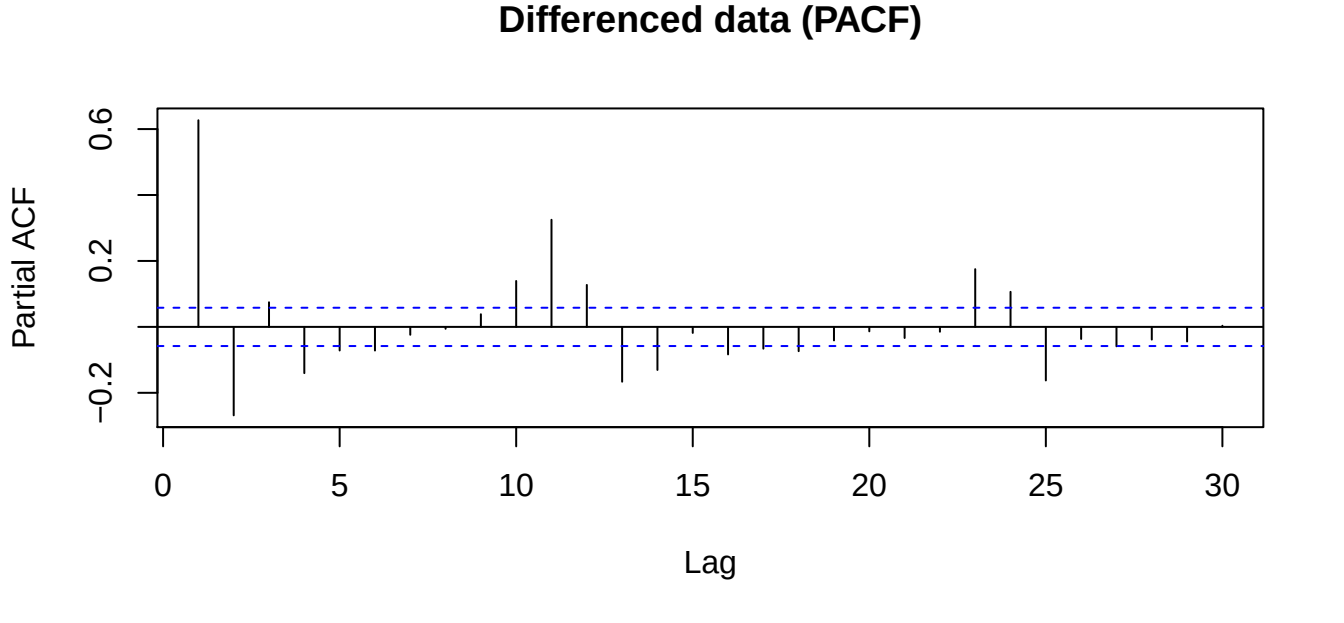

Detrended data (ACF)
ACF
0.0
0.4
0.8
0
5
10
15
20
25
30
Lag

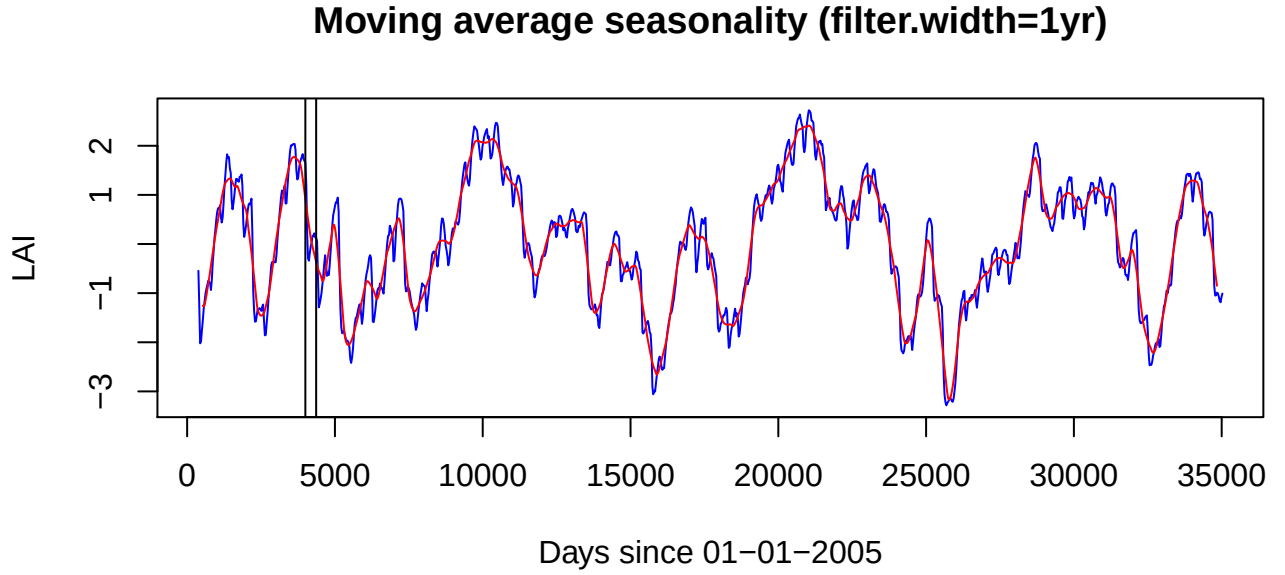

Detrended data (PACF)
Partial ACF
−0.5
0.0
0.5
1.0
0
5
10
15
20
25
30
Lag

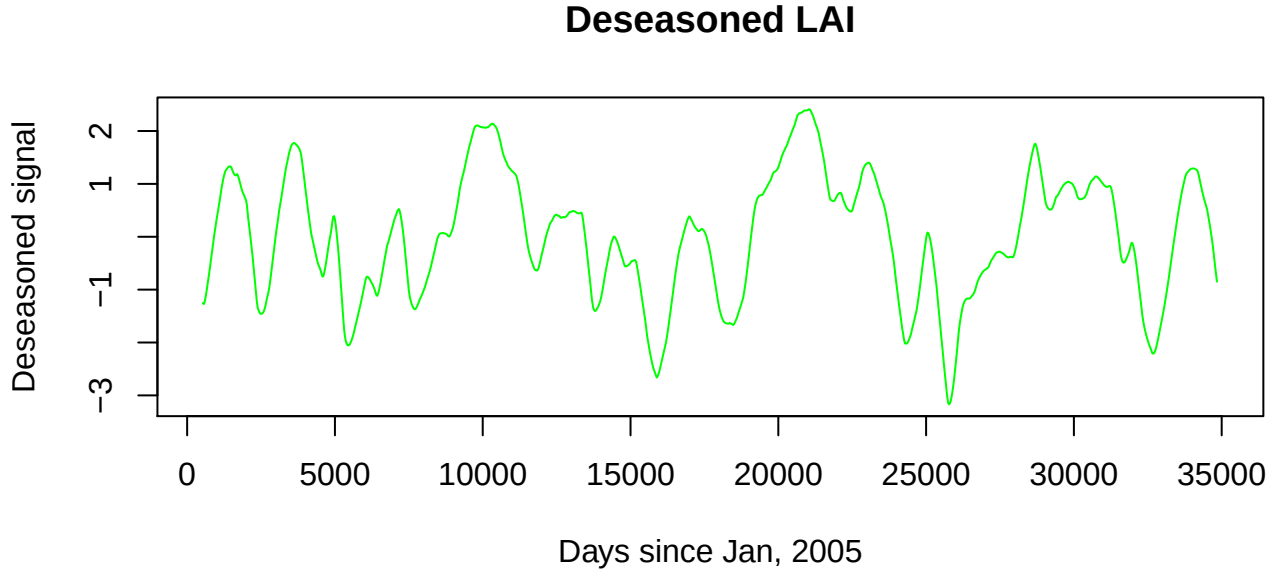

Detrended
LAI
2
1
−1
−3
0
5000
10000
15000
20000
25000
30000
35000
Days since 01−01−2005

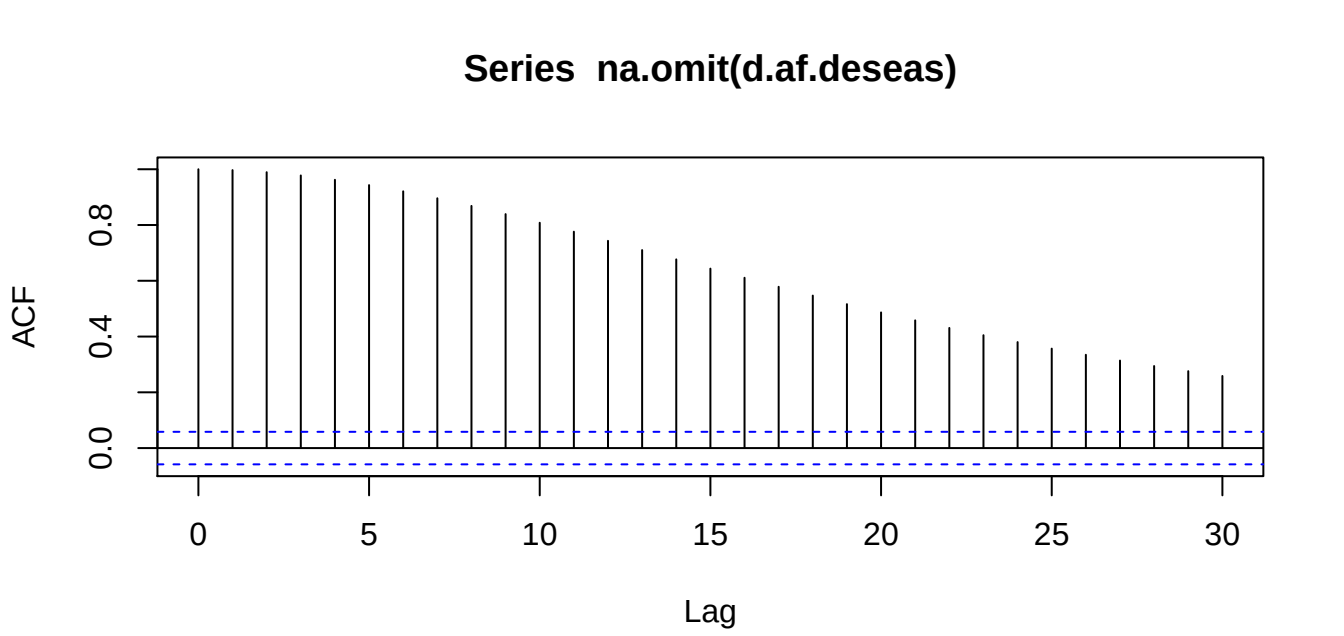

Differenced
LAI
0.1
−0.1
−0.3
0
5000
10000
15000
20000
25000
30000
35000
Days since 01−01−2005

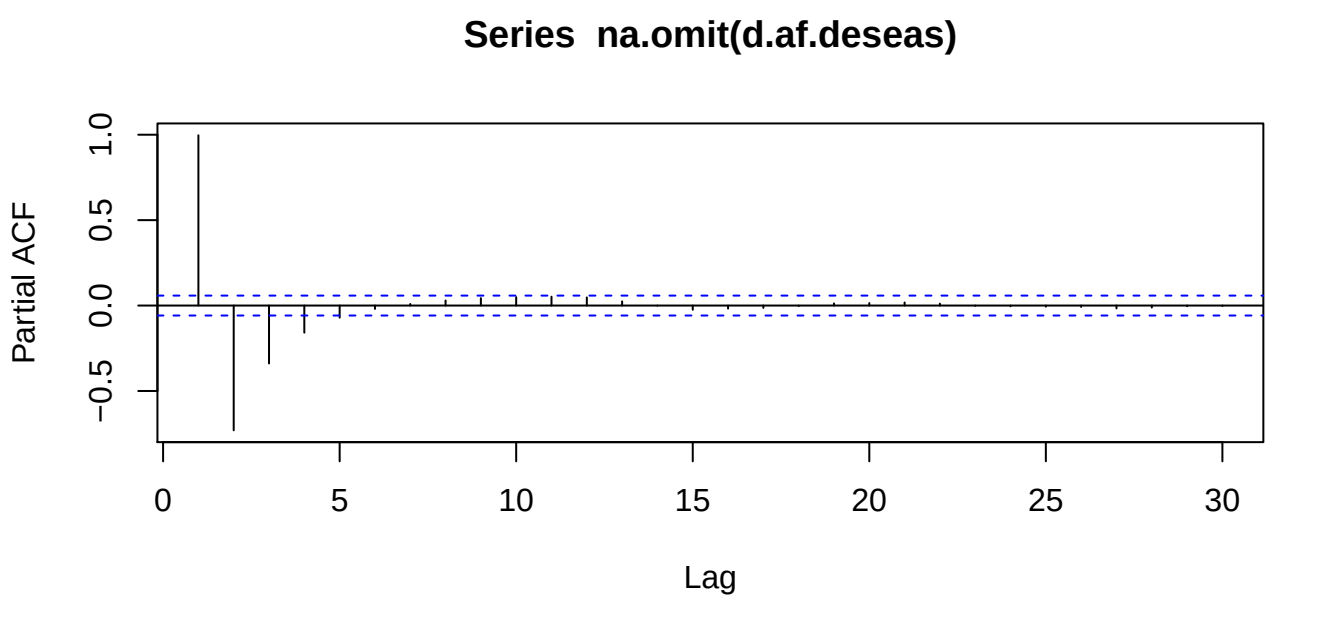

Differenced data (ACF)
ACF
1.0
0.6
0.2
−0.2
0
5
10
15
20
25
30
Lag

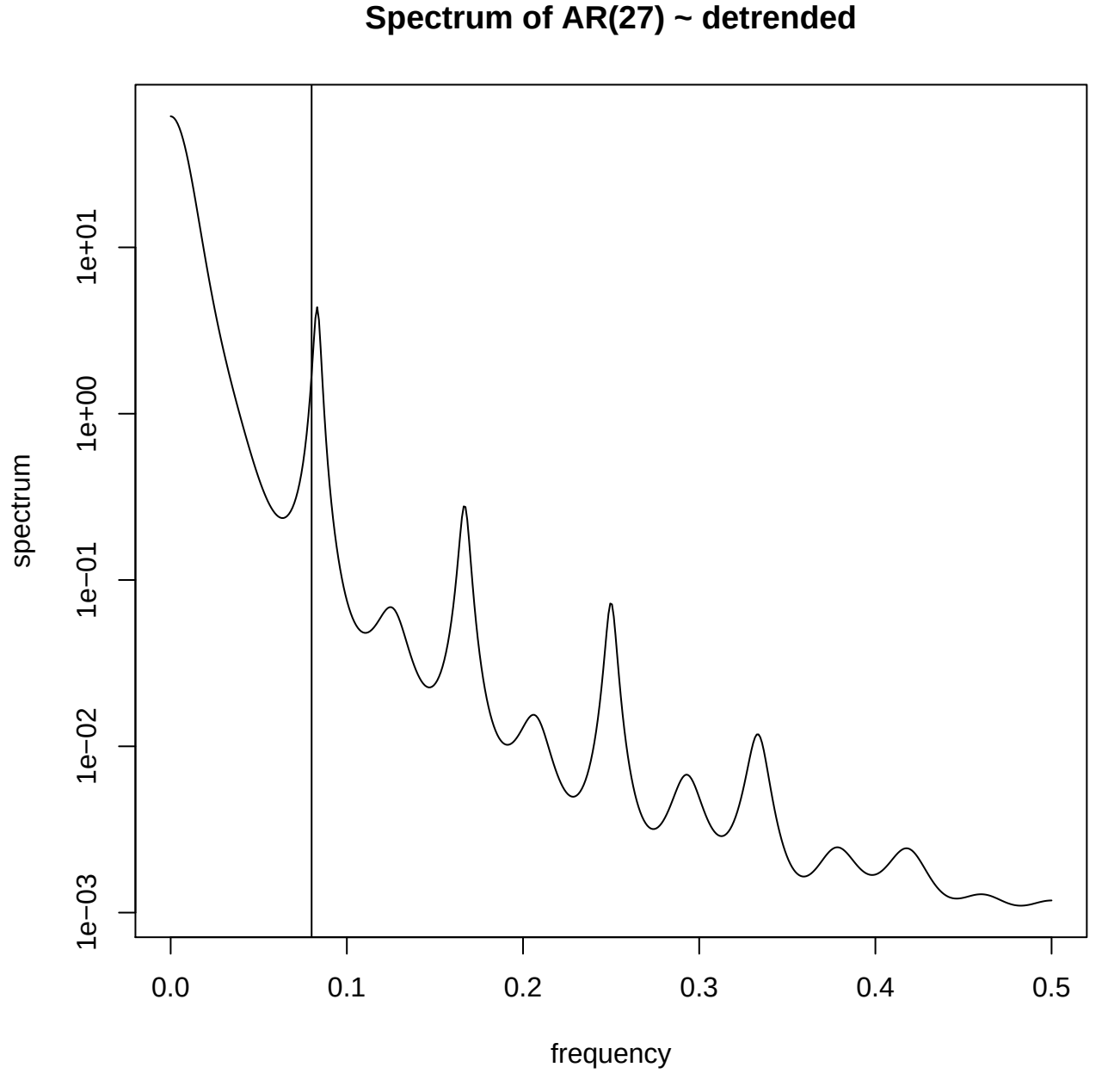

Differenced data (PACF)
Partial ACF
0.6
0.2
−0.2
0
5
10
15
20
25
30
Lag

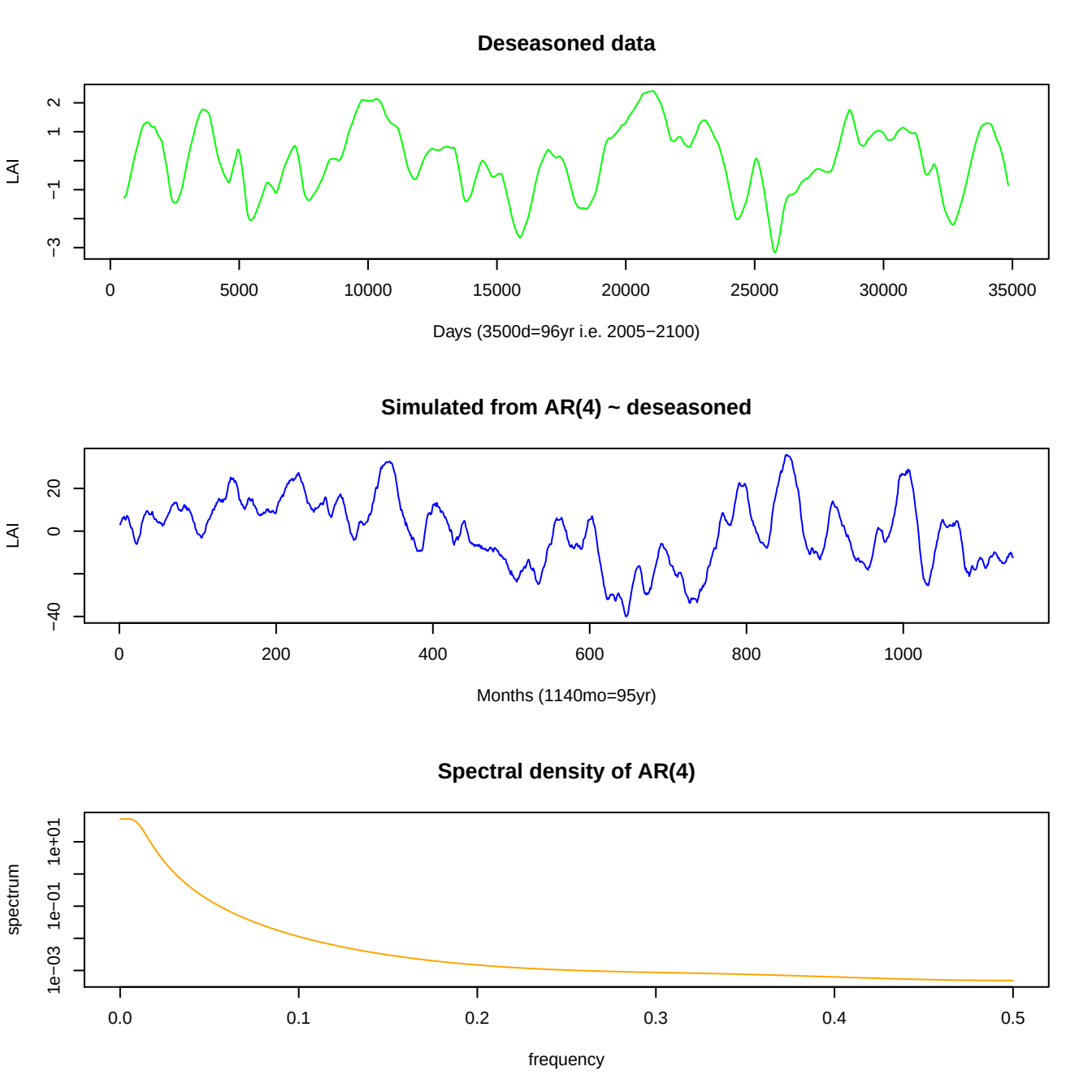

Moving average seasonality (filter.width=1yr)
LAI
−3
−1
1
2
0
5000
10000
15000
20000
25000
30000
35000
Days since 01−01−2005


Deseasoned LAI
Deseasoned signal
−3
−1
1
2
0
5000
10000
15000
20000
25000
30000
35000
Days since Jan, 2005


Series na.omit(d.af.deseas)
ACF
0.0
0.4
0.8
0
5
10
15
20
25
30
Lag


Series na.omit(d.af.deseas)
Partial ACF
−0.5
0.0
0.5
1.0
0
5
10
15
20
25
30
Lag


Spectrum of AR(27) ~ detrended
spectrum
1e+01
1e+00
1e−01
1e−02
1e−03
0.0
0.1
0.2
0.3
0.4
0.5
frequency


Deseasoned data
LAI
2
1
−1
−3
0
5000
10000
15000
20000
25000
30000
35000
Days (3500d=96yr i.e. 2005−2100)
Simulated from AR(4) ~ deseasoned
LAI
20
0
−40
0
200
400
600
800
1000
Months (1140mo=95yr)
Spectral density of AR(4)
spectrum
1e+01
1e−01
1e−03
0.0
0.1
0.2
0.3
0.4
0.5
frequency