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*Supplement of*

## **Global analysis of seasonality in the shell flux of extant planktonic foraminifera**

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## **Supplementary figure captions**

Fig. S1 (page 2-3): Seasonality maps showing the proportion of mean annual flux per season for all species investigated. The size of the pie charts is scaled to the log of the mean annual flux.

Fig. S2 (page 4-42): periodic regression results for all sites. Black dots indicate observations, red line modelled flux. Sites are numbered according to Table 1.

Fig. S3 (page 43): observed vs. modelled peak timing for individual species. Legend as in Fig. 3A.

Fig. S4 (page 44): residual of observed-modelled peak timing for all species. Legend as in Fig. 3B.

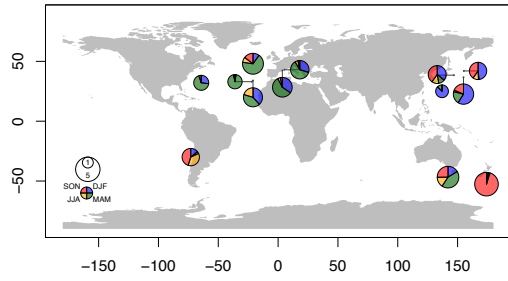
Fig. S5 (page 45-47): Maps showing presence or absence of a cyclic component in the individual time series.

Fig. S6 (page 48-49): seasonality patterns of all species. Species with a green dot bear symbionts.

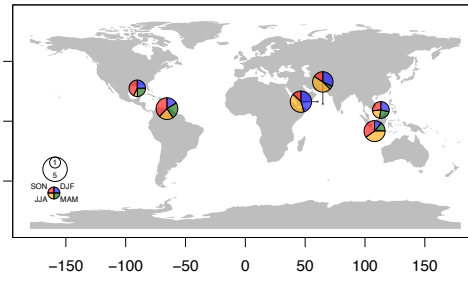
Fig. S7 (page 50): proportion of time series with single and double cycles. As Fig. 4B, but for individual species grouped by seasonality mode.

Fig. S8 (page 51-52): patterns in peak timing (cf. Fig. 7) compared to the seasonal pattern of upper ocean temperature.

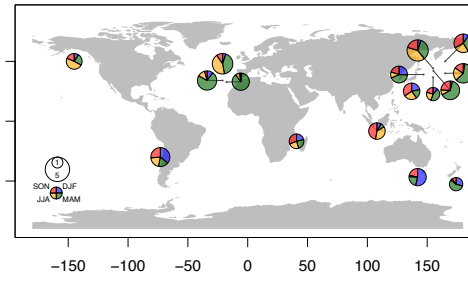
*G. inflata*



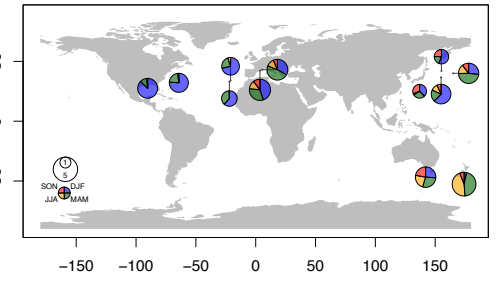
*G. menardii*



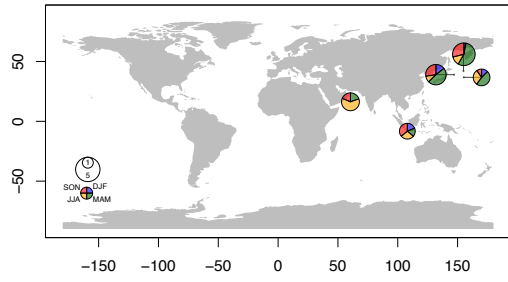
*G. scitula*



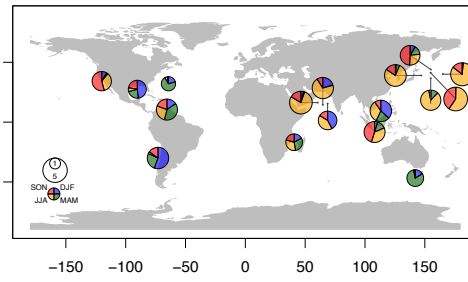
*G. truncatulinoides*



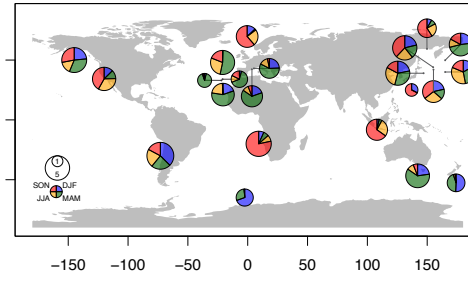
*G. theyeri*



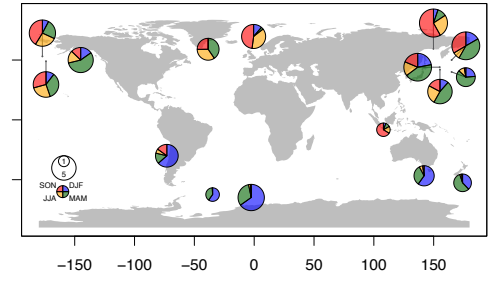
*N. dutertrei*



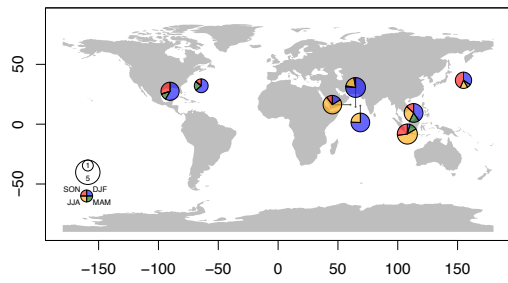
*N. incompta*



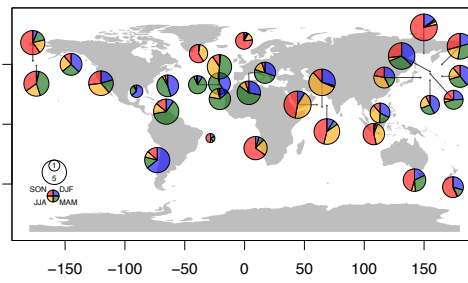
*N. pachyderma*



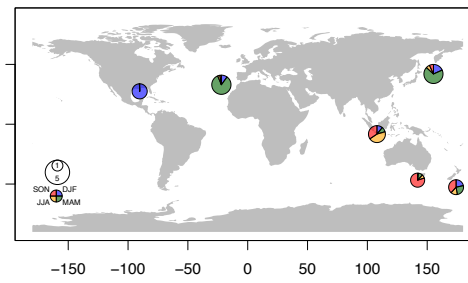
*P. obliquiloculata*



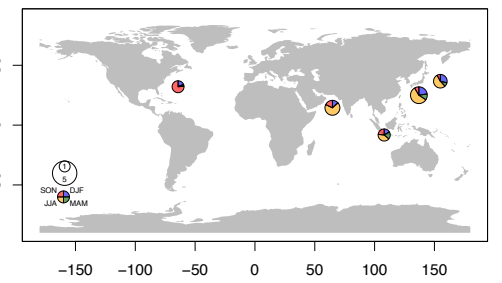
*G. bulloides*



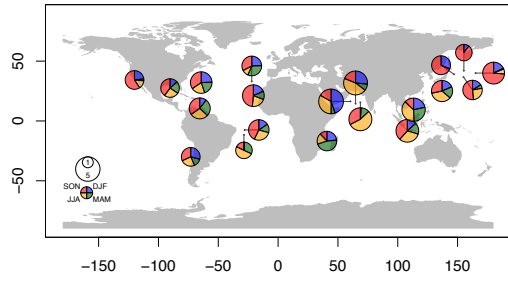
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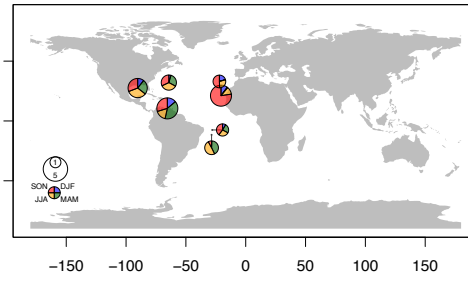
*G. conglobatus*



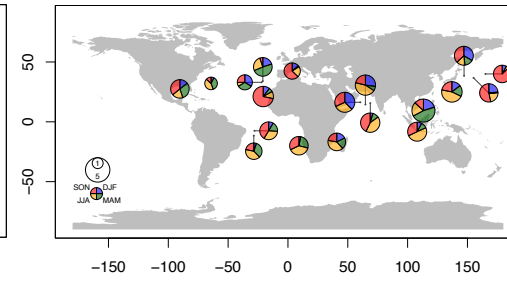
*G. ruber* (white)



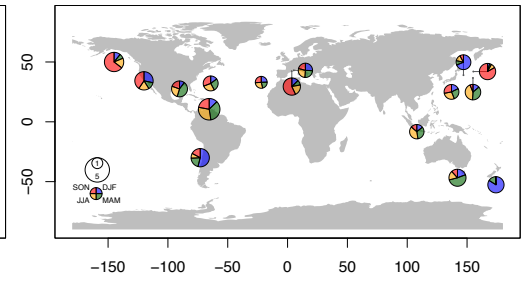
*G. ruber* (pink)



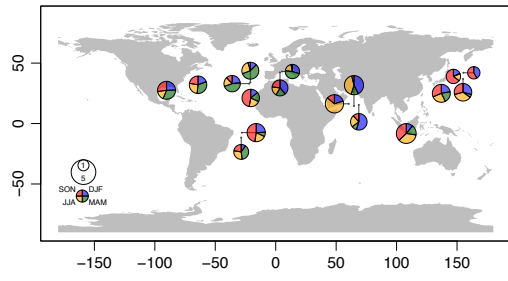
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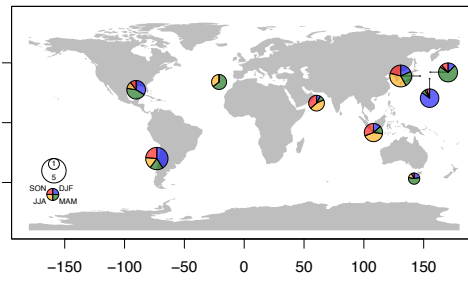
*O. universa*



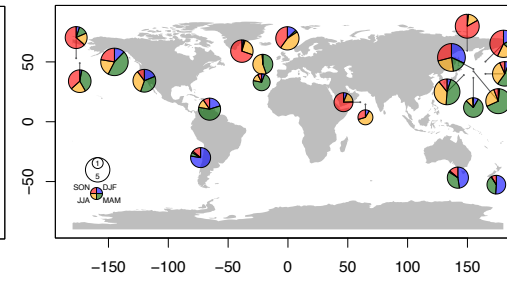
*G. siphonifera*



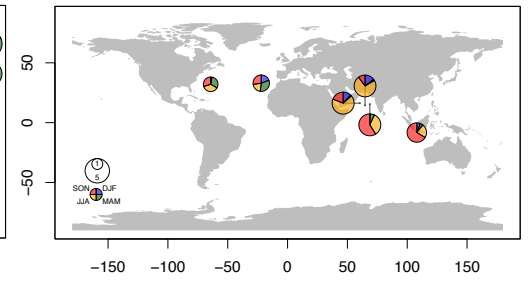
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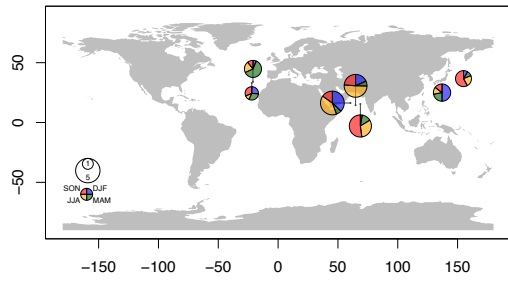
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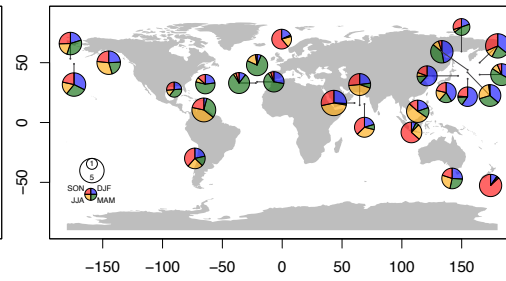
*G. rubescens*



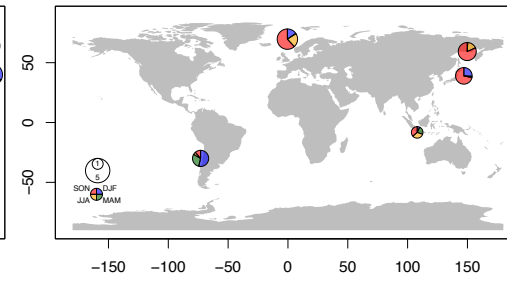
*G. tenella*



*G. glutinata*

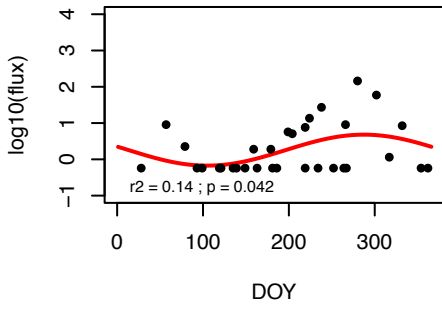


*G. uvula*

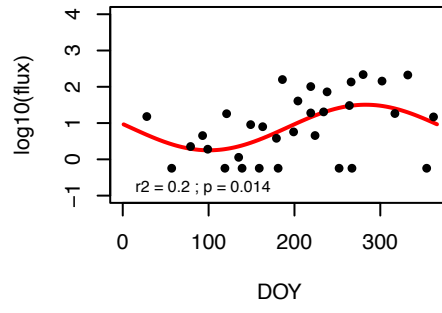


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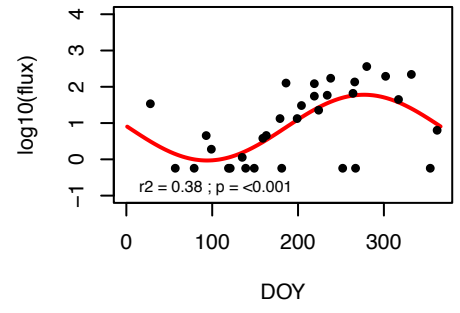
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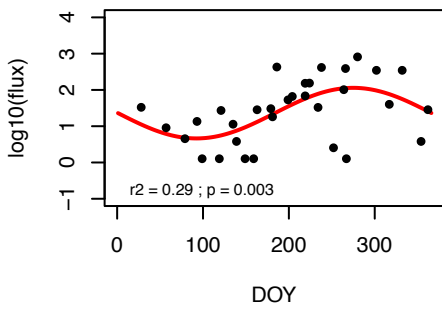
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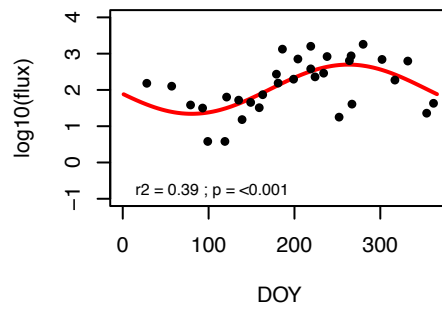
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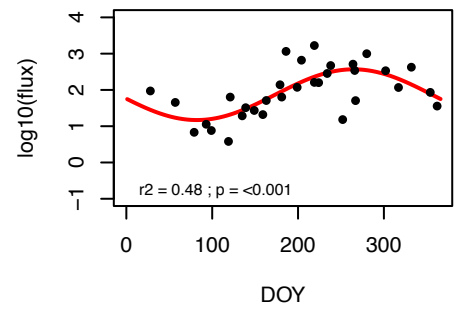
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## N\_pac

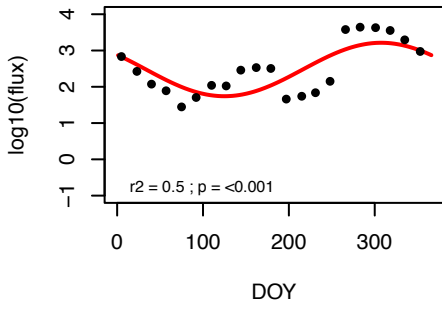


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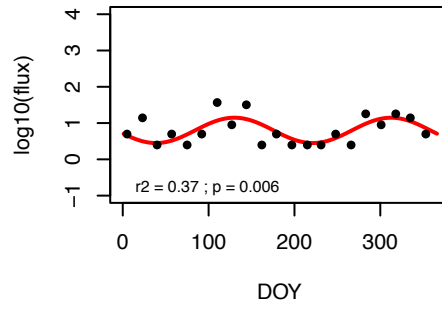


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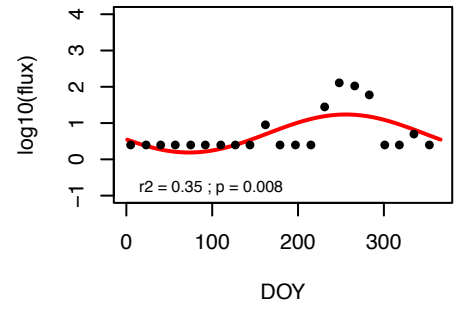
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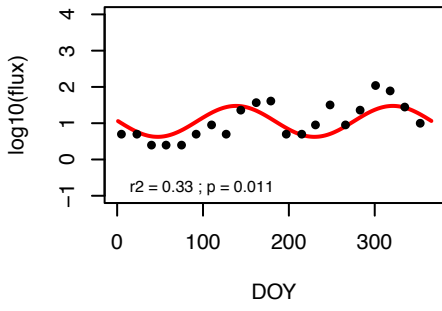
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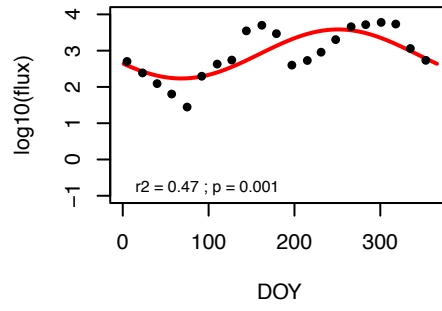
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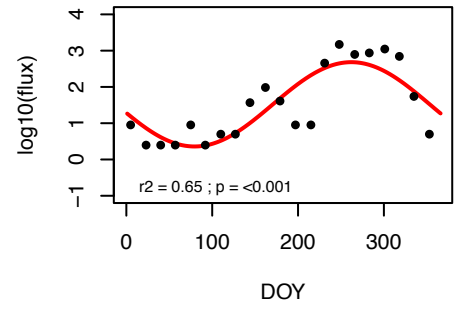
### N\_inc



### N\_pac

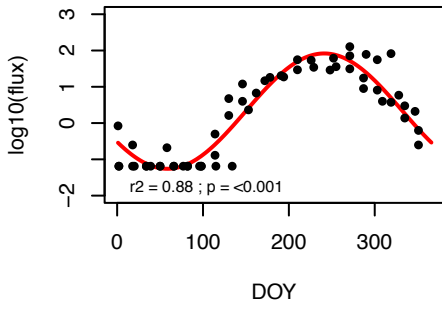


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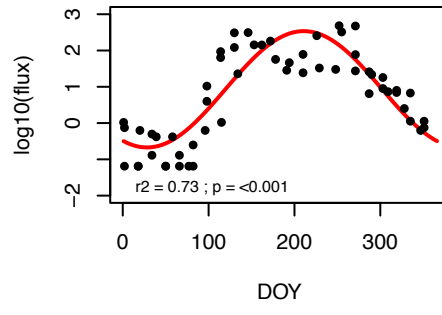


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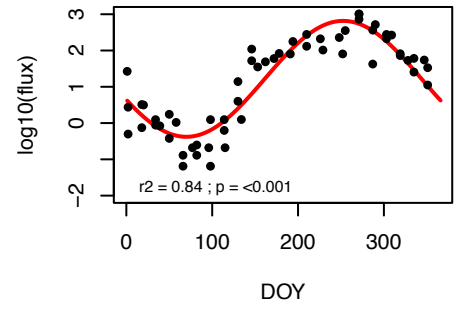
#### G\_bul



#### N\_pac

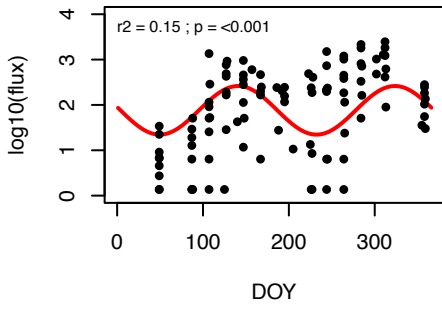


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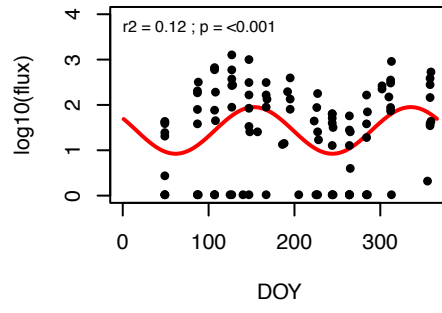


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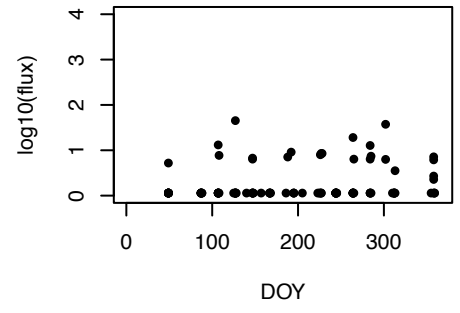
## G\_bul



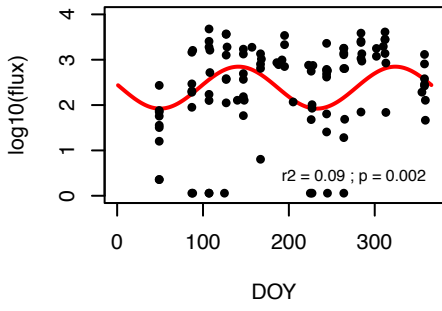
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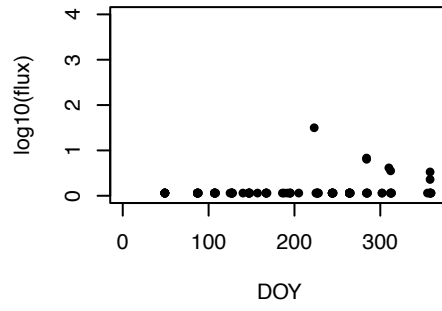
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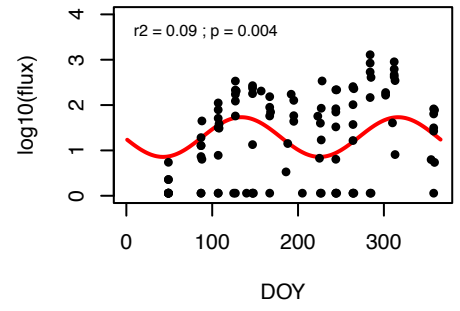
## N\_pac



## O\_uni



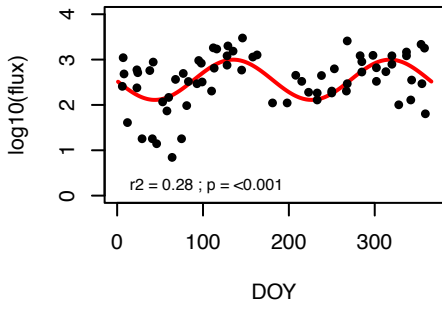
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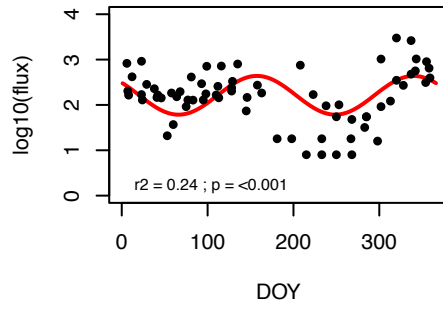


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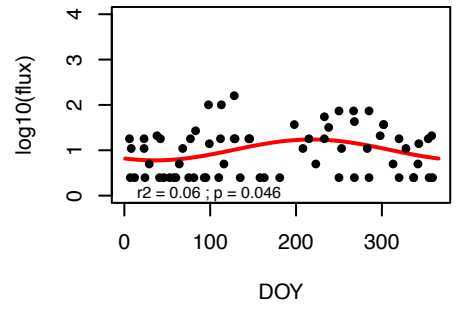
## G\_bul



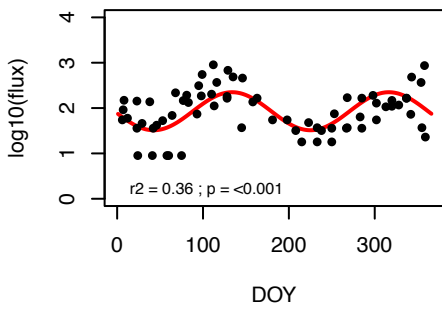
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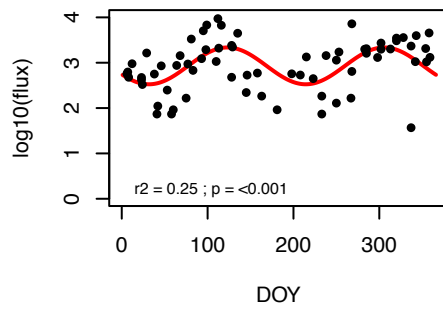
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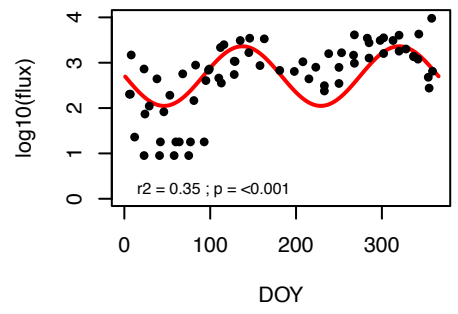
## N\_inc



## N\_pac

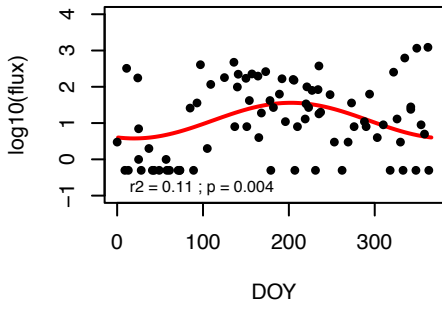


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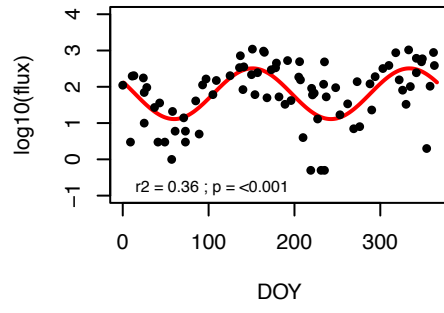


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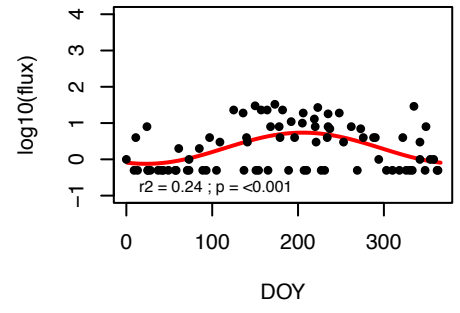
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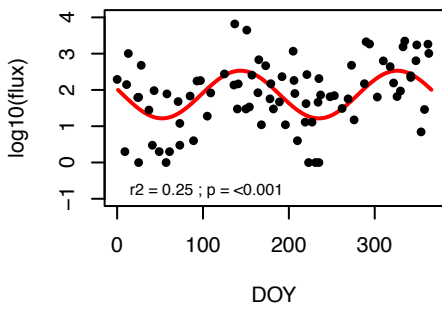
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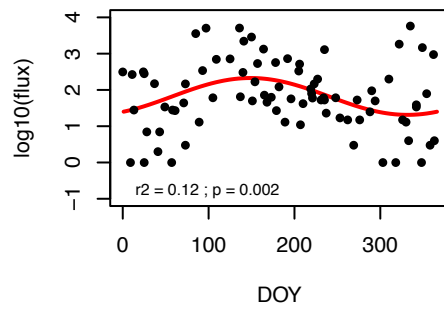
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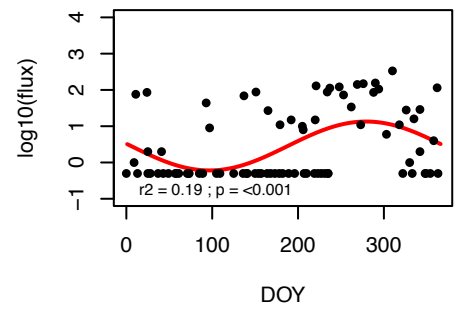
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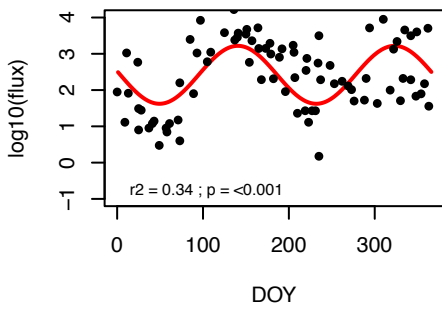
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## O\_uni

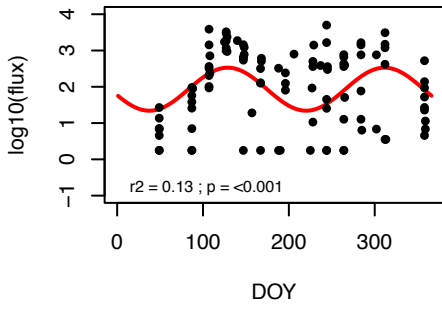


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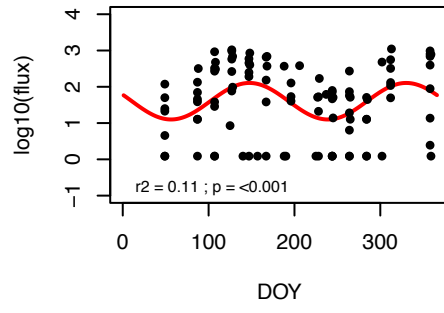


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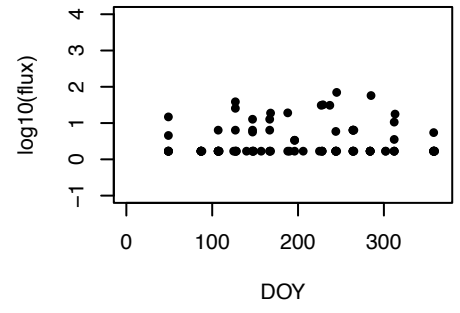
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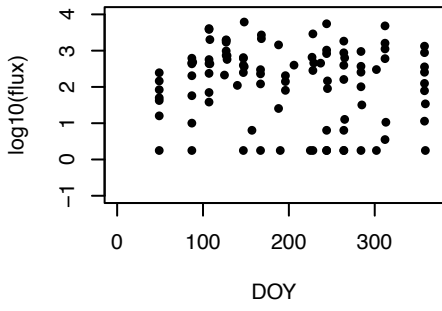
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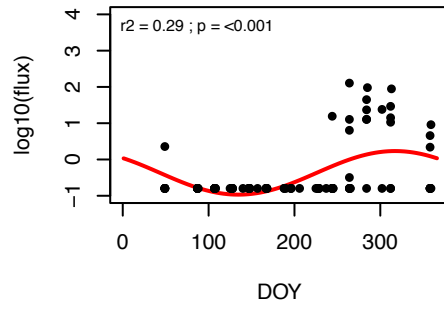
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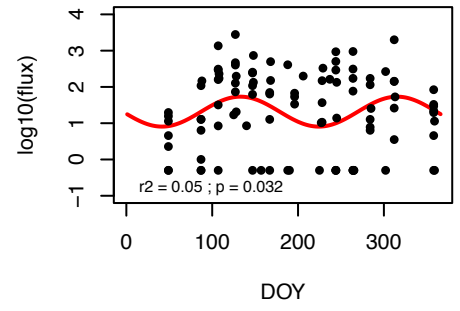
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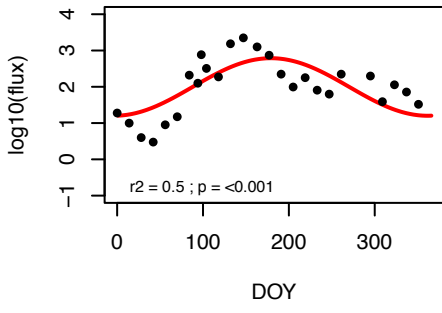


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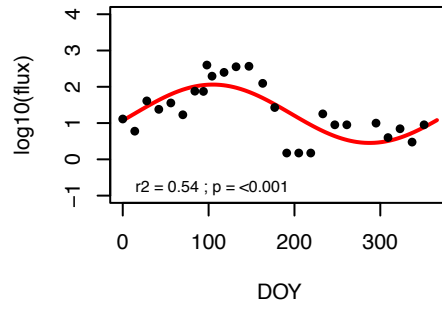


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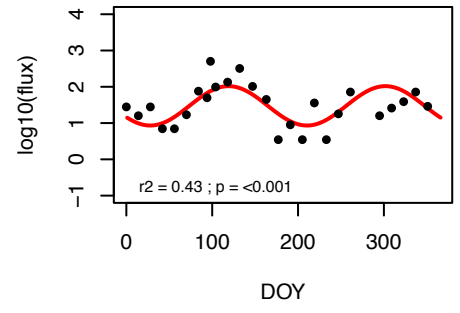
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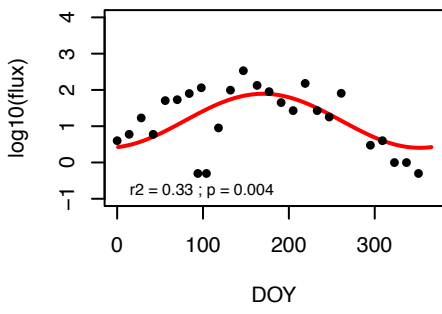
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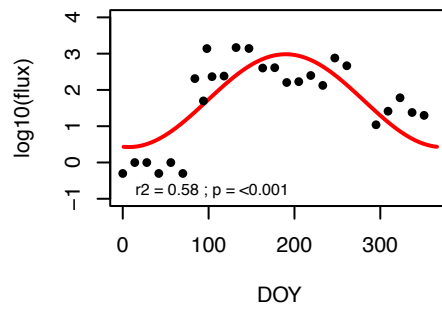
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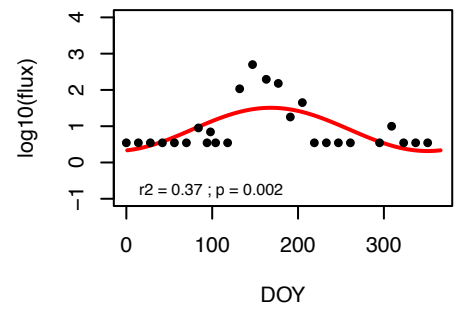
## G\_sci



## N\_inc

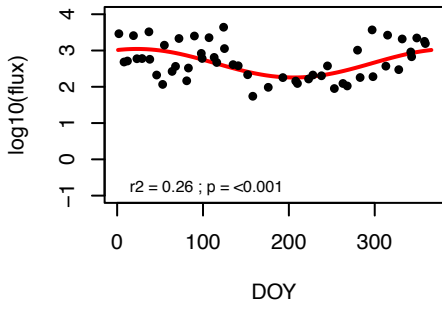


## T\_qui

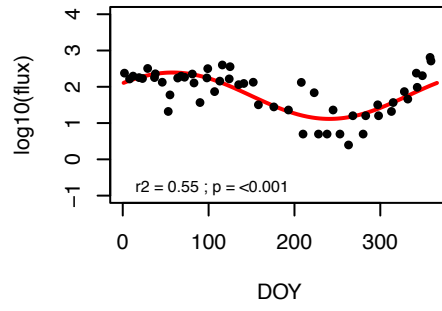


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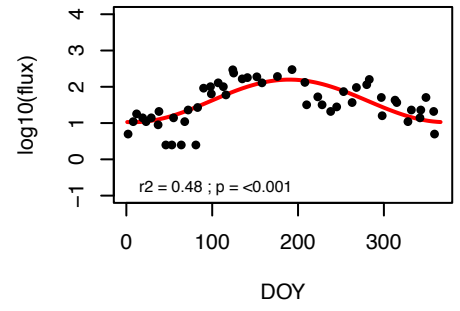
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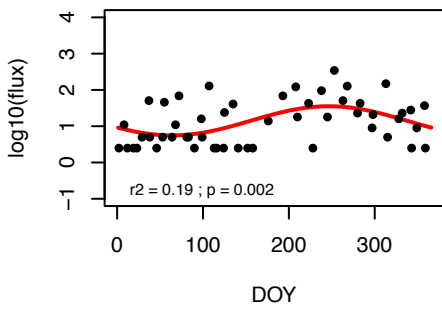
## G\_glu



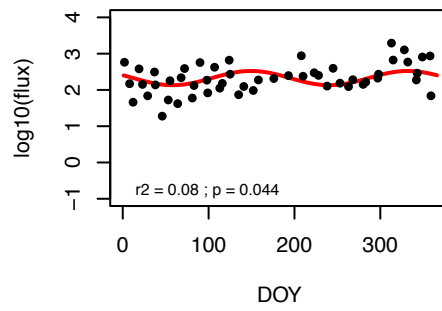
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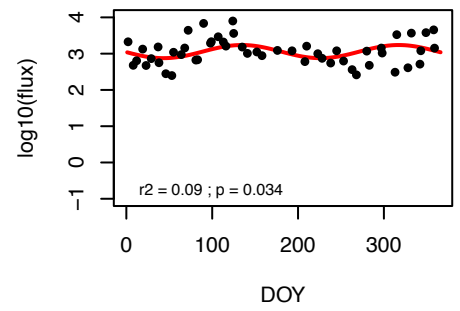
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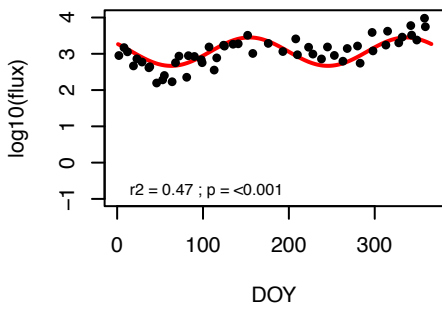
## N\_inc



## N\_pac

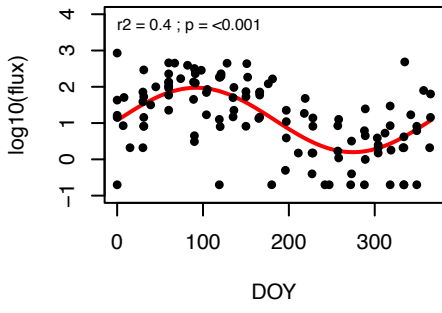


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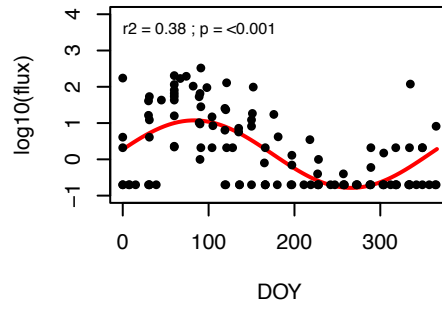


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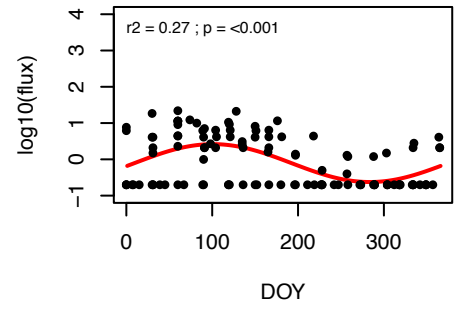
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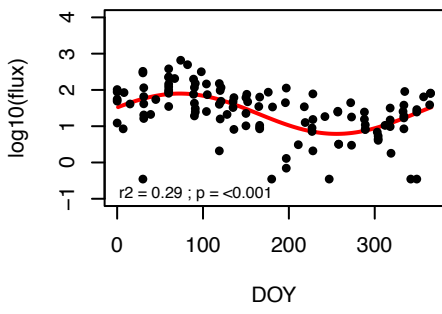
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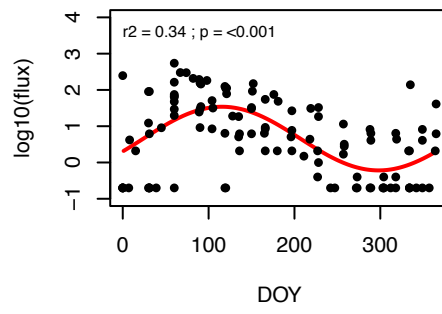
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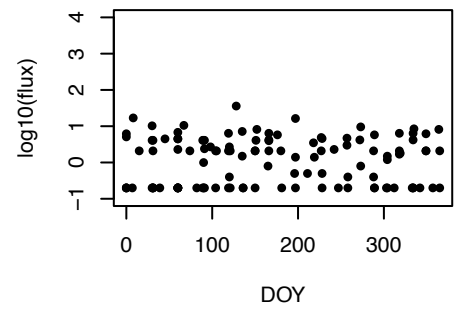
## G\_tru



## N\_inc

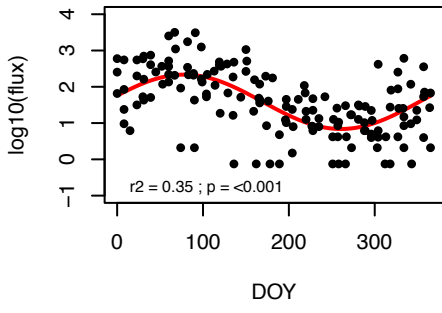


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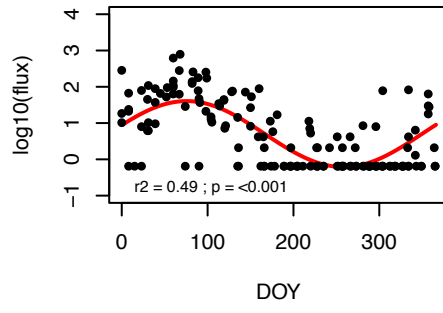


# Site 11

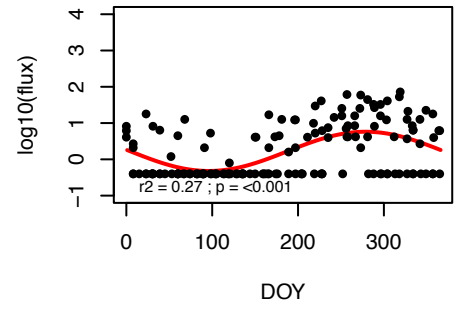
## G\_bul



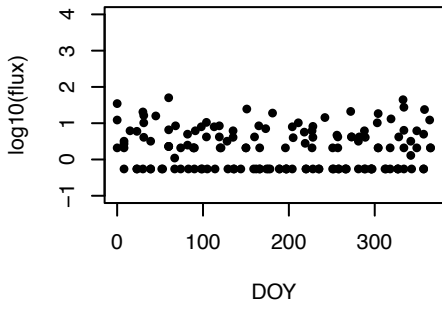
## G\_inf



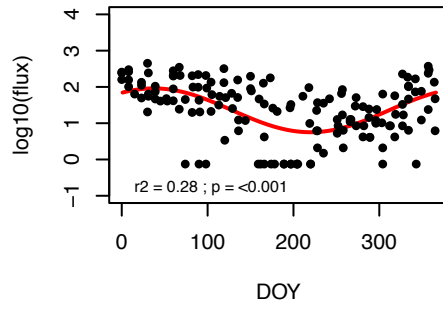
## G\_sac



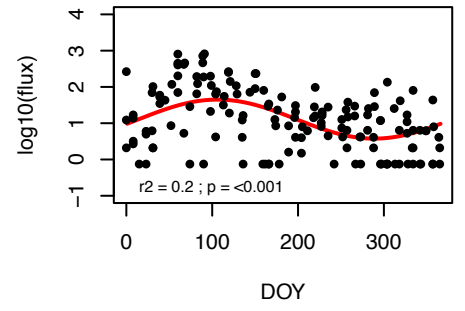
## G\_sip



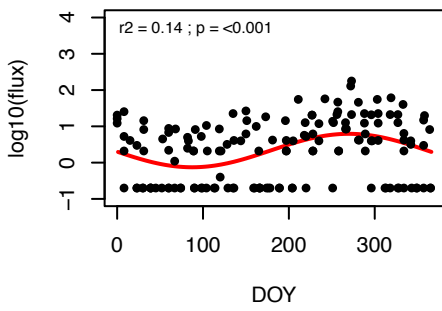
## G\_tru



## N\_inc

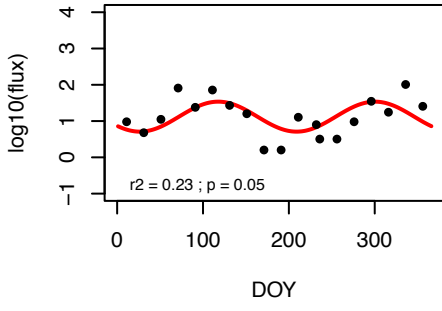


## O\_uni

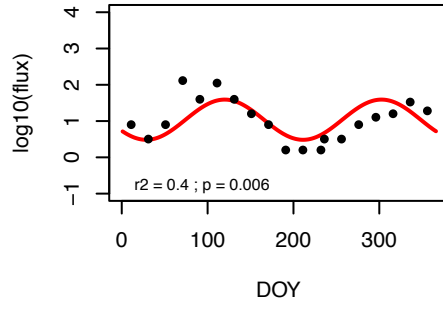


# Site 12

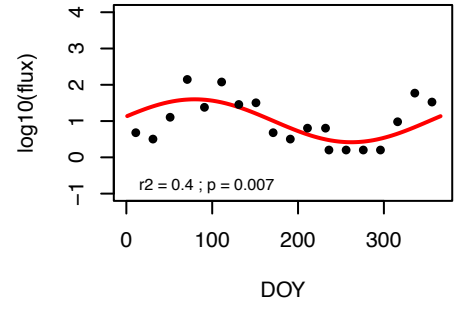
### G\_bul



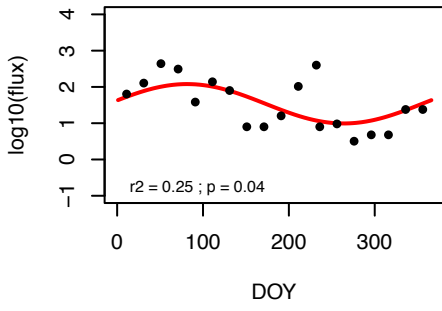
### G\_cal



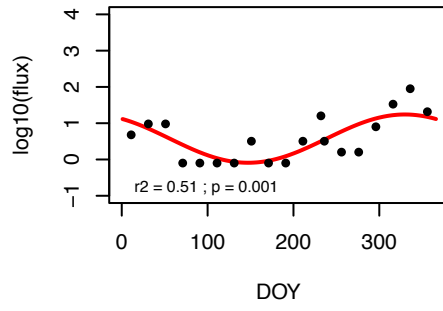
### G\_fal



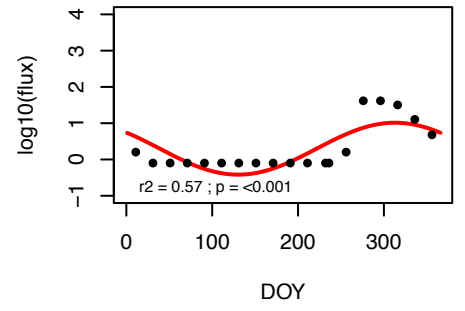
### G\_glu



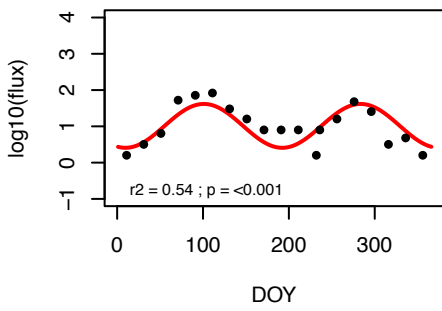
### G\_inf



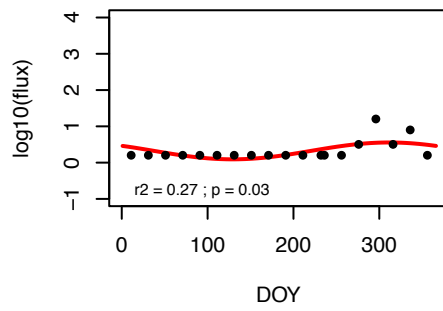
### G\_rubw



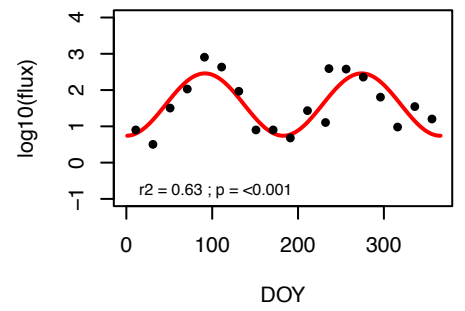
### G\_sci



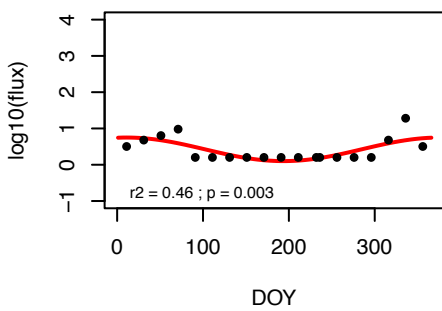
### G\_sip



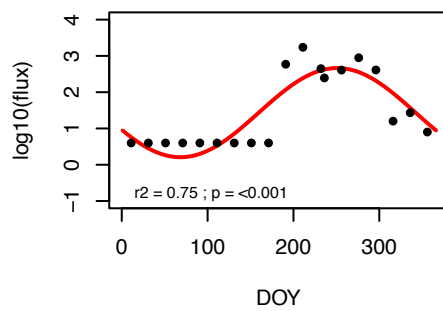
### G\_the



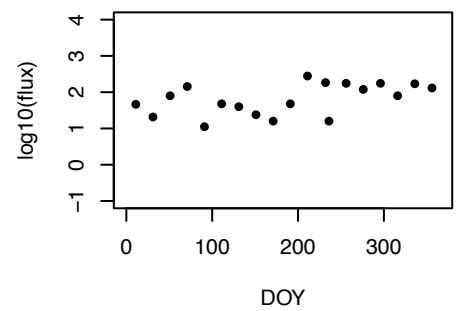
### G\_tru



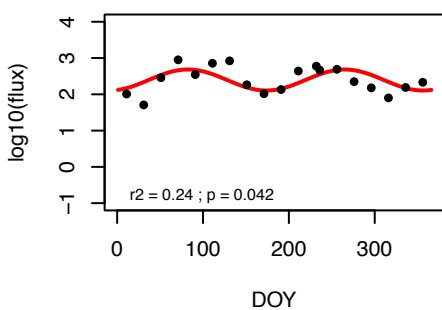
### N\_dut



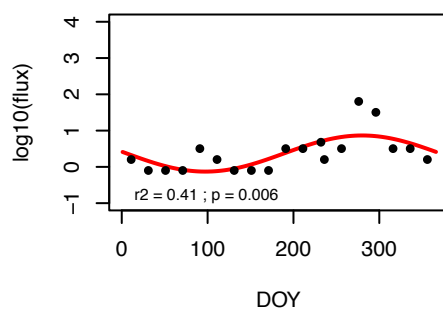
### N\_inc



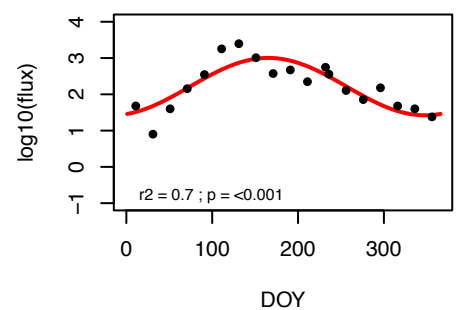
### N\_pac



### O\_uni



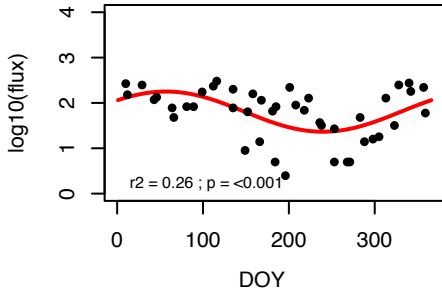
### T\_qui



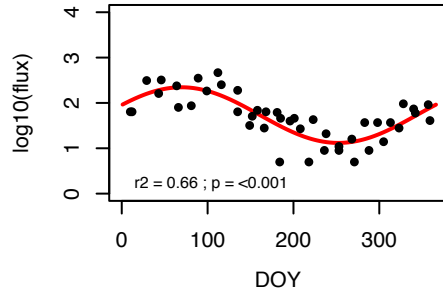


# Site 13

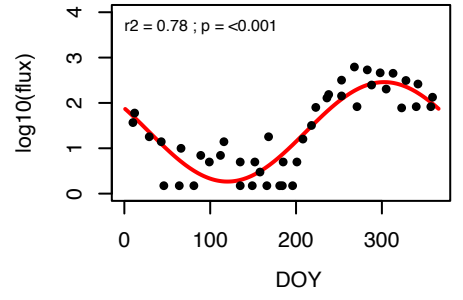
## G\_bul



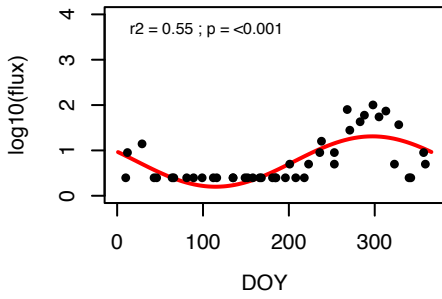
## G\_glu



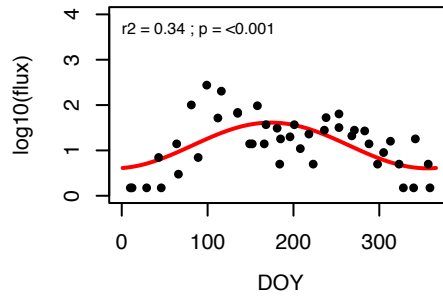
## G\_rubw



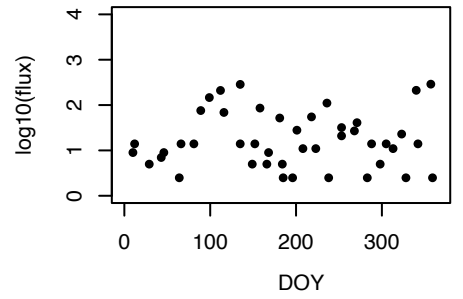
## G\_sac



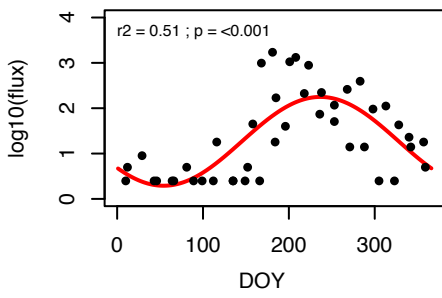
## G\_sci



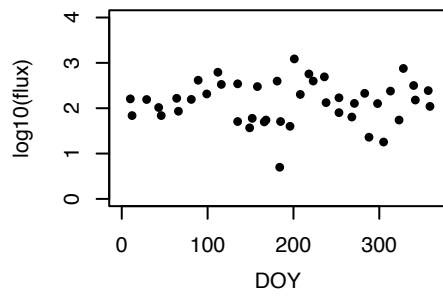
## G\_tru



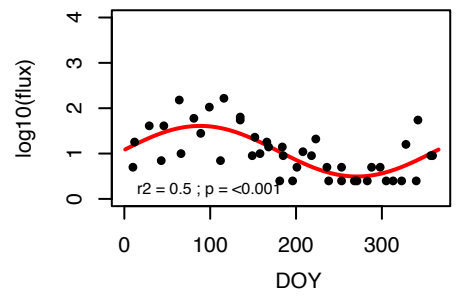
## N\_dut



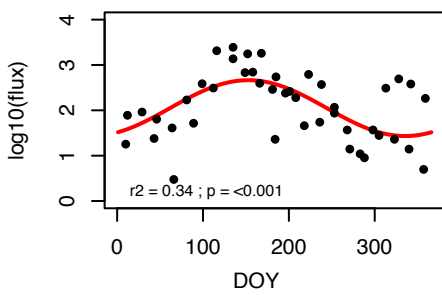
## N\_inc



## N\_pac

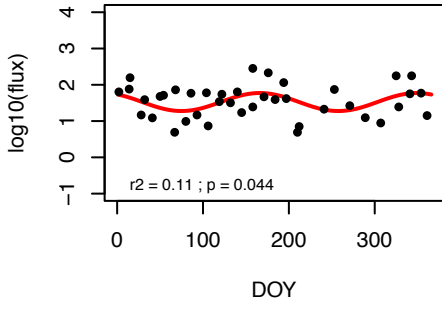


## T\_qui

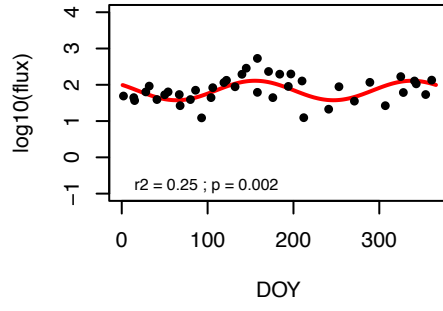


# Site 14

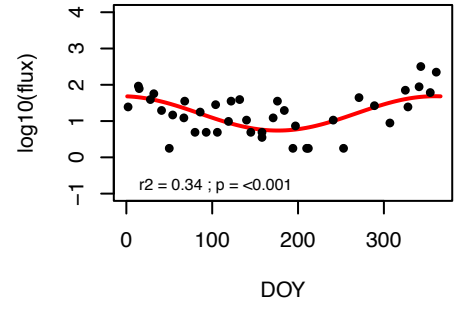
### G\_bul



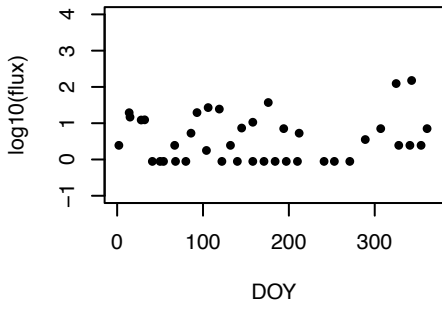
### G\_cal



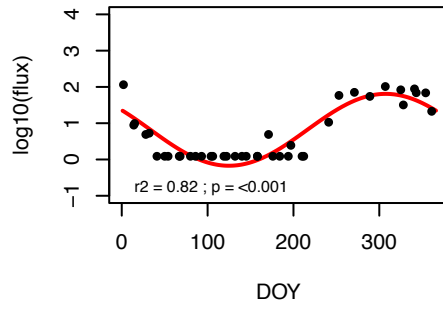
### G\_glu



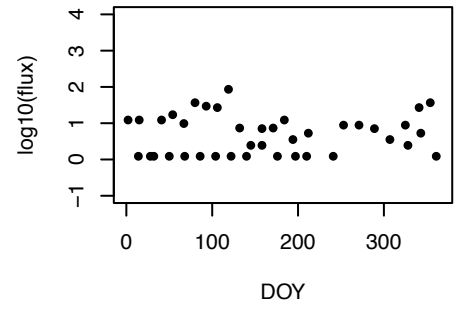
### G\_inf



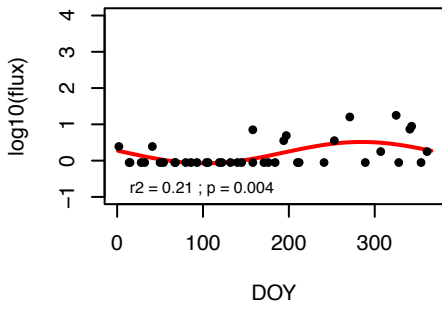
### G\_rubw



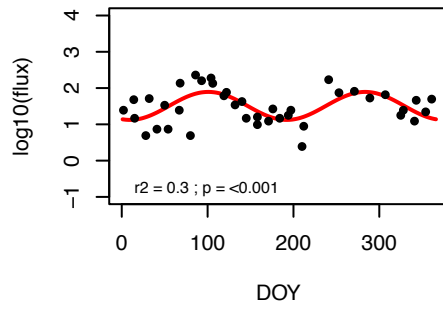
### G\_sci



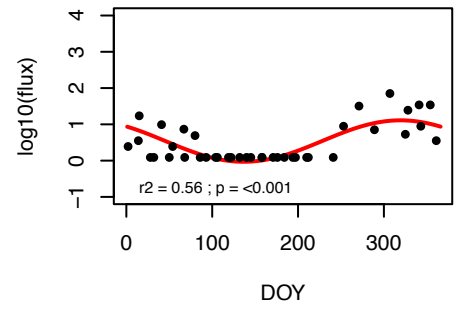
### G\_sip



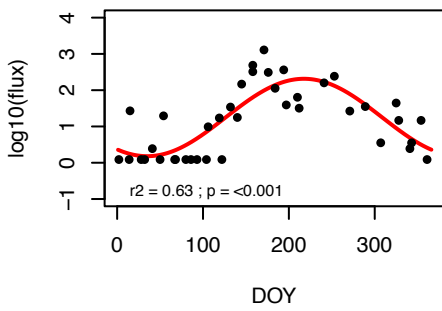
### G\_the



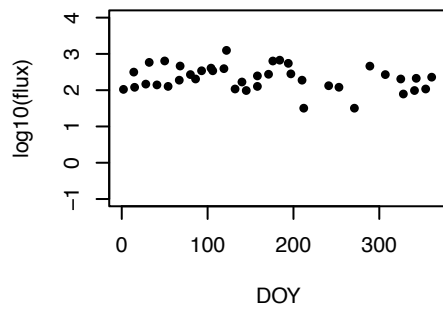
### G\_uvu



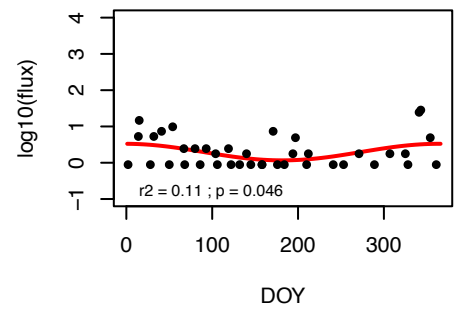
### N\_dut



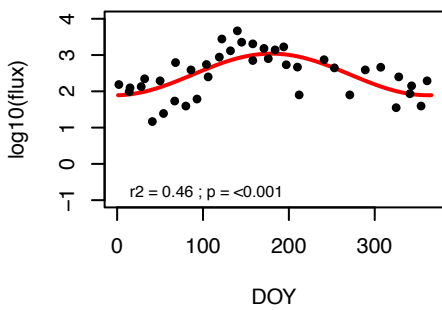
### N\_inc



### O\_uni

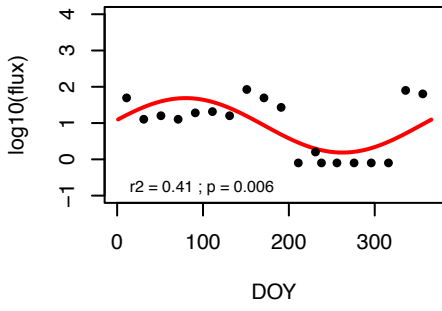


### T\_qui

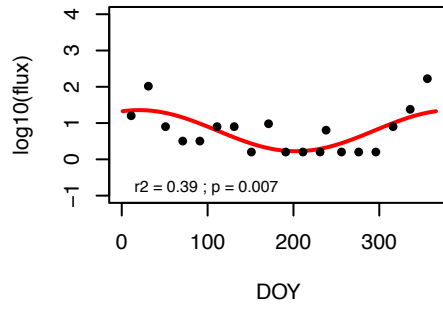


# Site 15

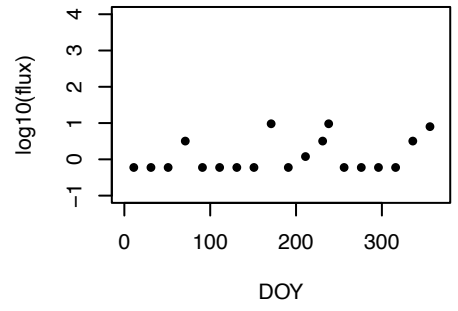
## G\_bul



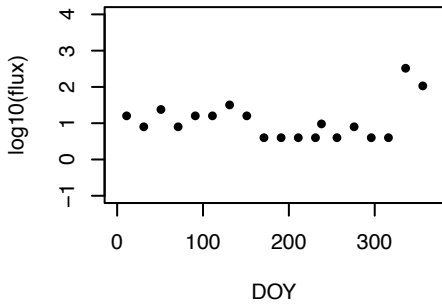
## G\_cal



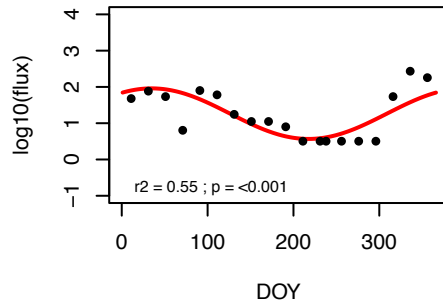
## G\_con



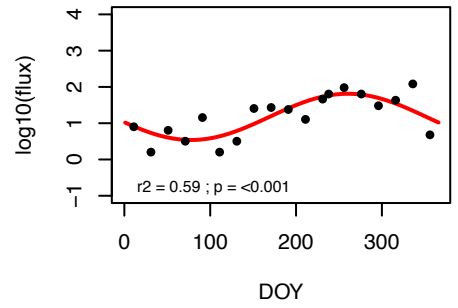
## G\_glu



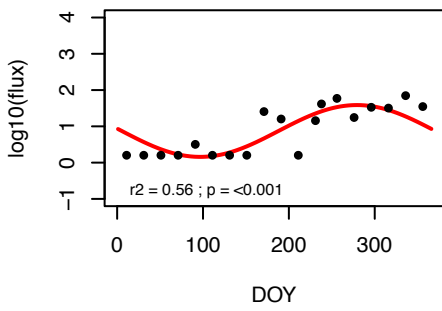
## G\_inf



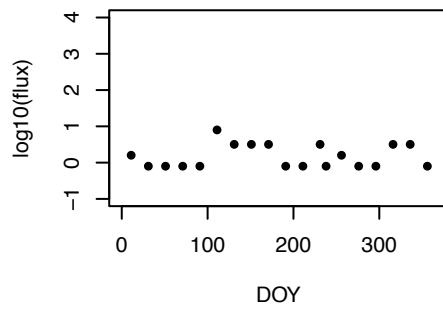
## G\_rubw



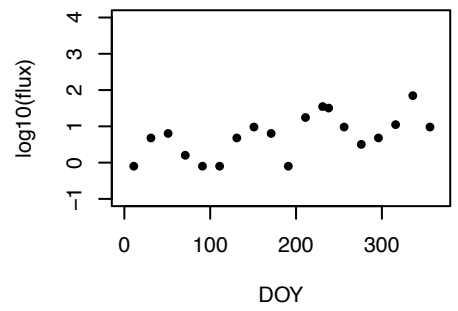
## G\_sac



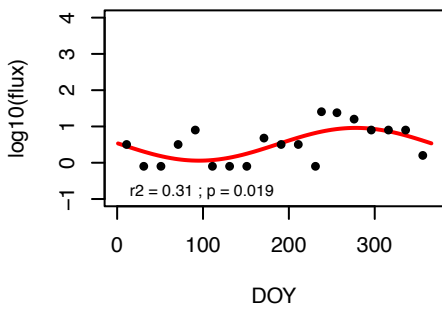
## G\_sci



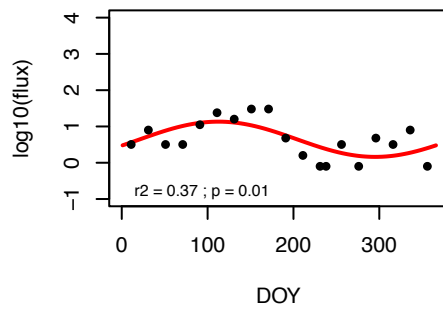
## G\_sip



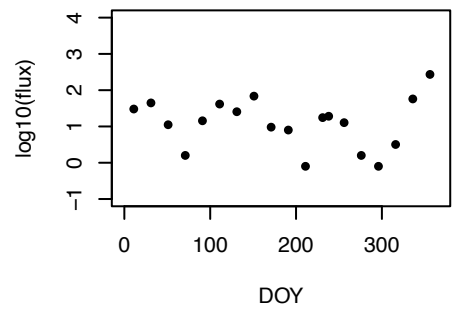
## G\_ten



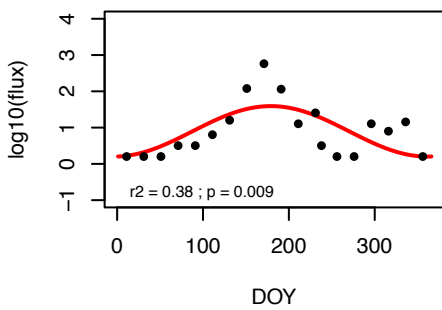
## G\_the



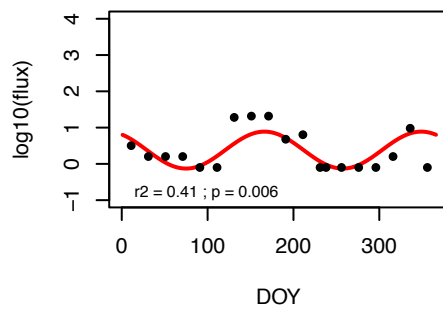
## G\_tru



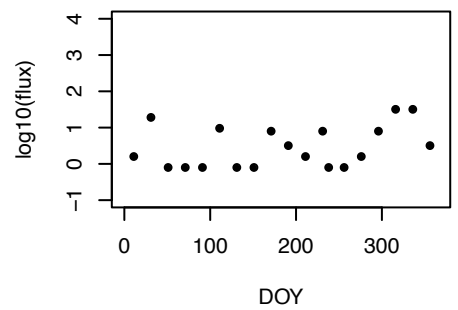
## N\_dut



## O\_uni

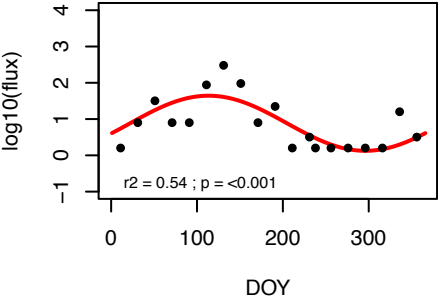


## P\_obl



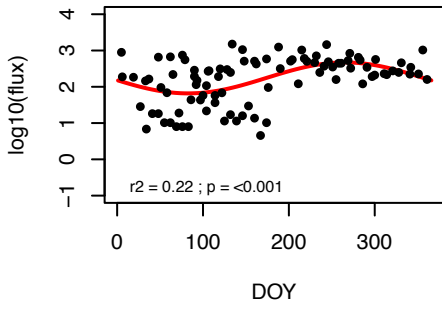
Site 15 cont.

T\_qui

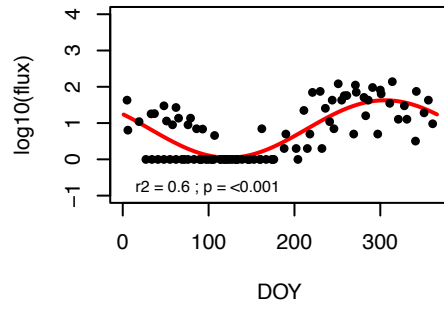


# Site 16

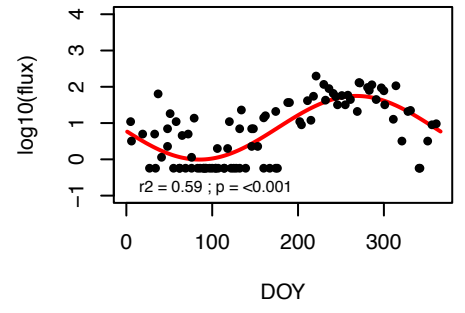
## G\_bul



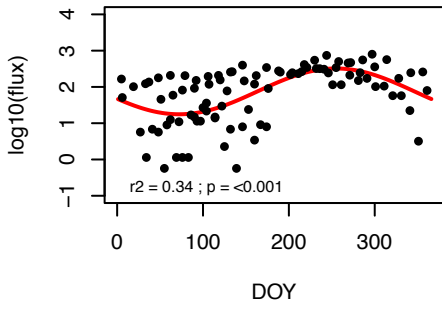
## G\_rubw



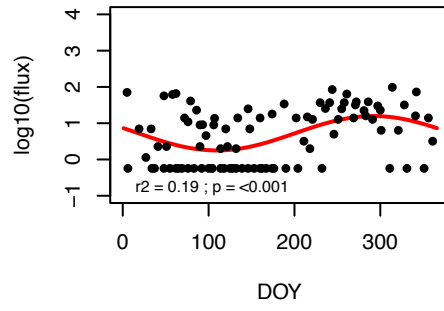
## N\_dut



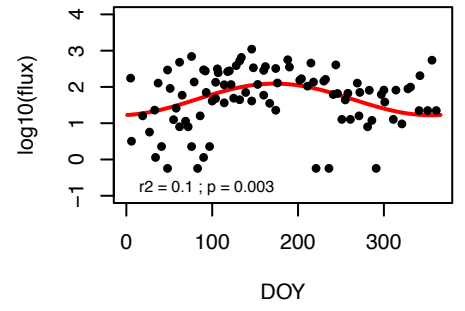
## N\_inc



## O\_uni

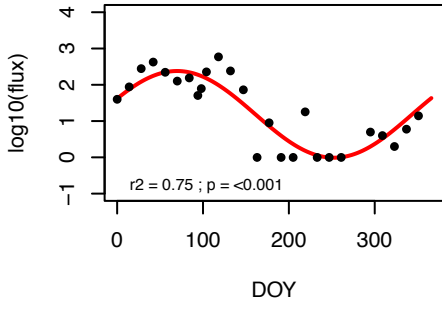


## T\_qui

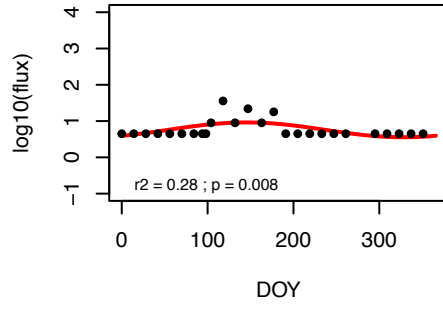


# Site 17

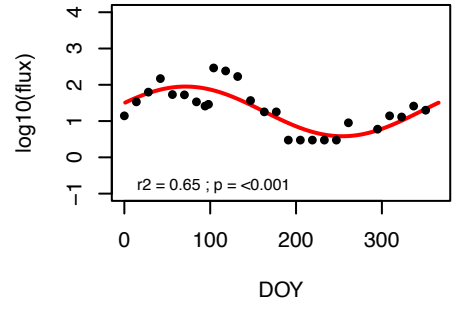
## G\_bul



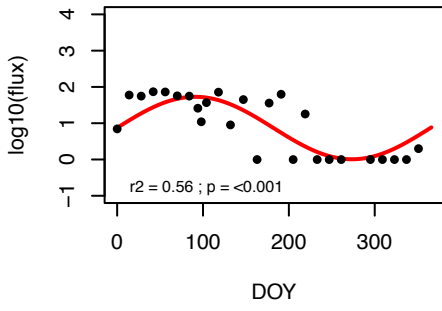
## G\_cal



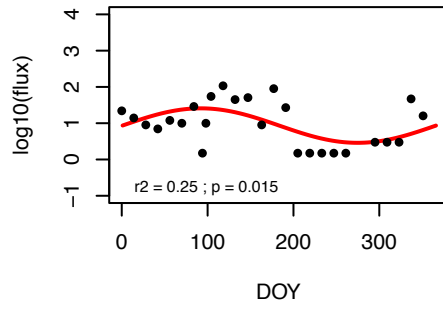
## G\_glu



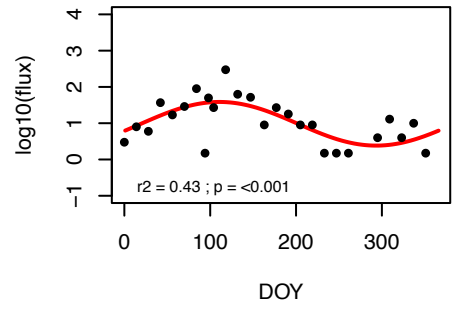
## G\_inf



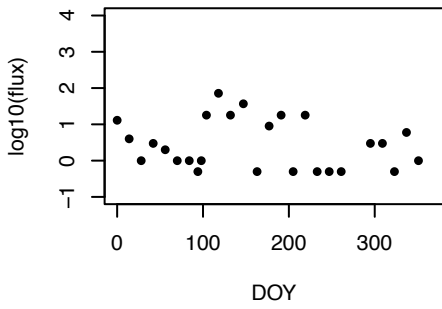
## G\_sac



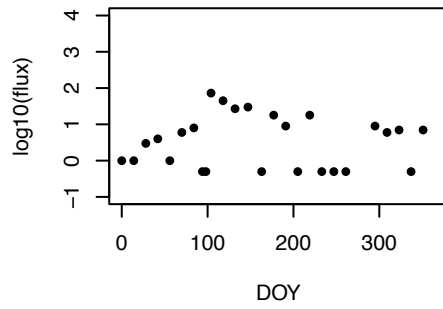
## G\_sci



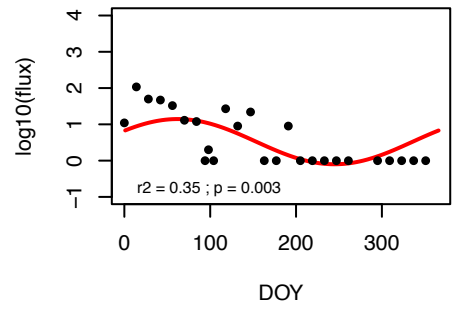
## G\_sip



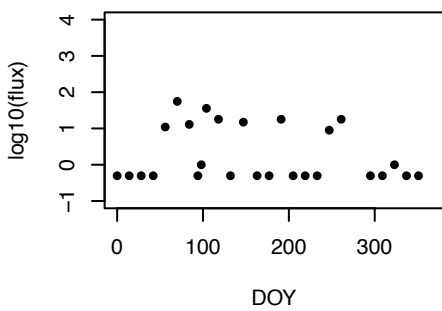
## G\_ten



## G\_tru

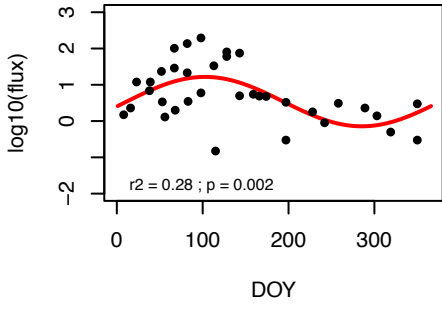


## N\_inc

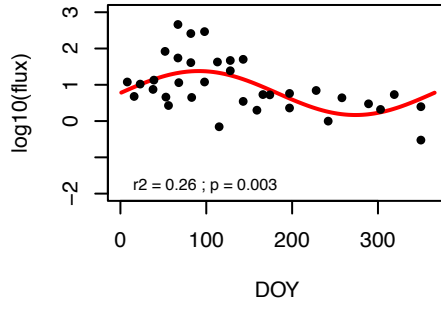


# Site 18

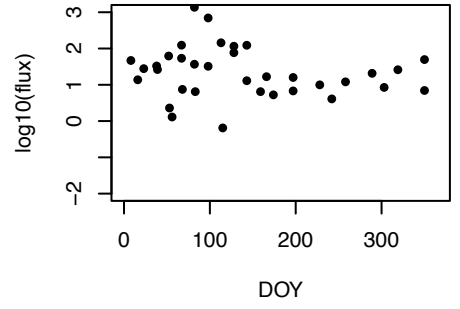
## G\_bul



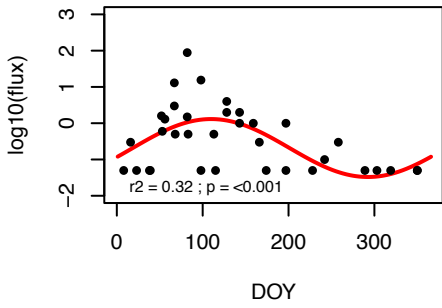
## G\_fal



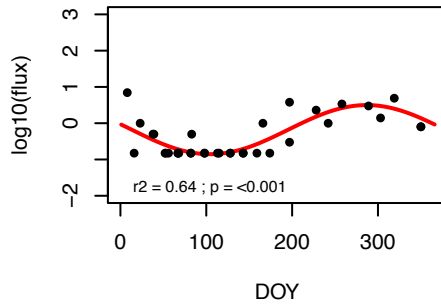
## G\_glu



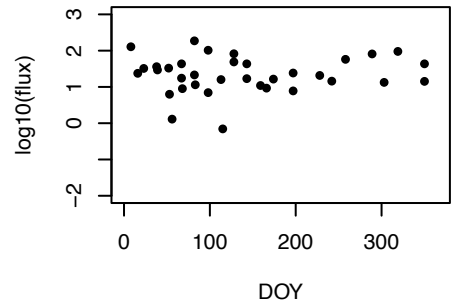
## G\_inf



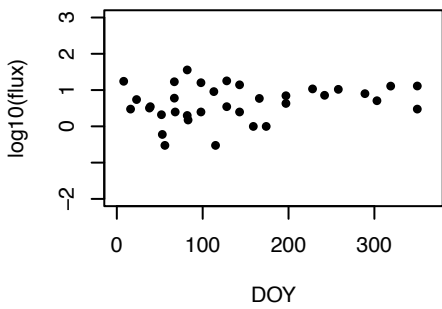
## G\_rubp



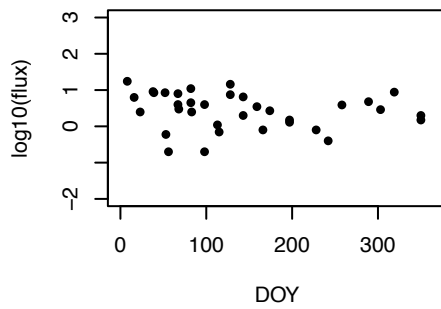
## G\_rubw



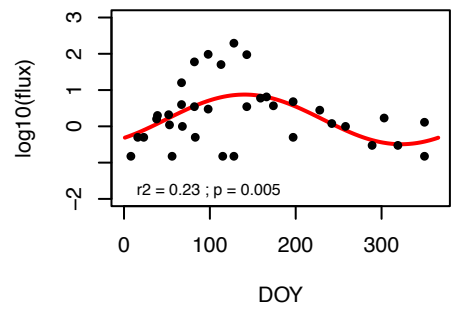
## G\_rus



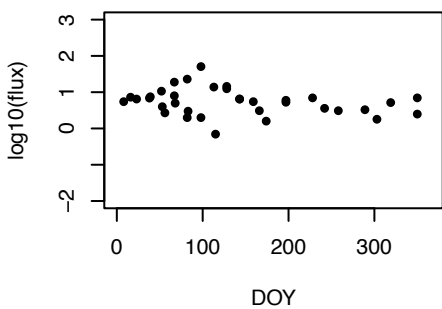
## G\_sac



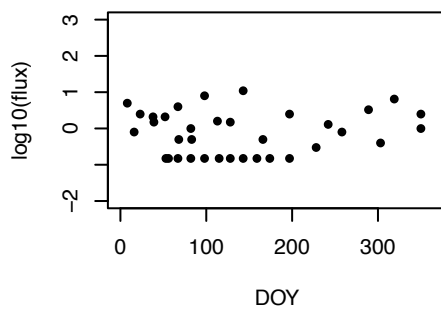
## G\_sci



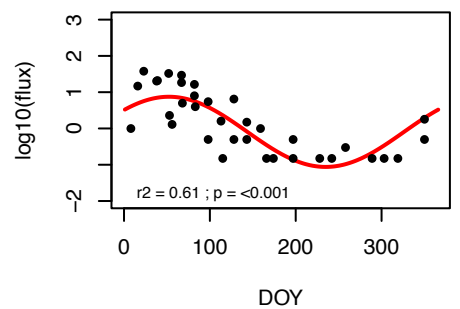
## G\_sip



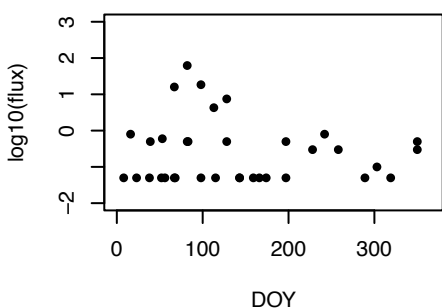
## G\_ten



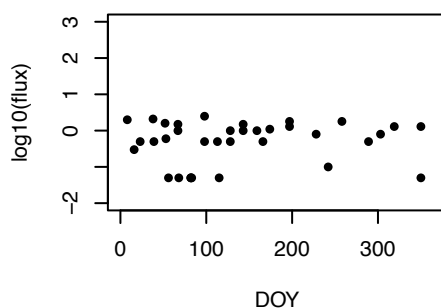
## G\_tru



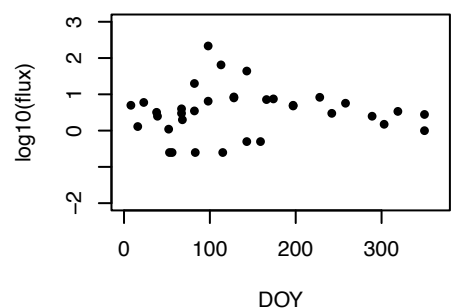
## N\_inc



## O\_uni

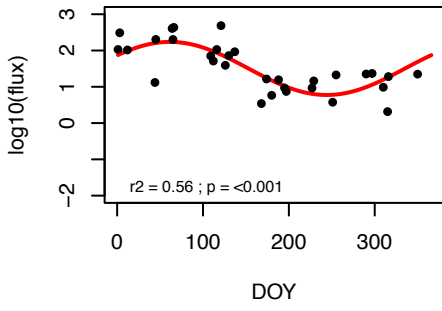


## T\_qui

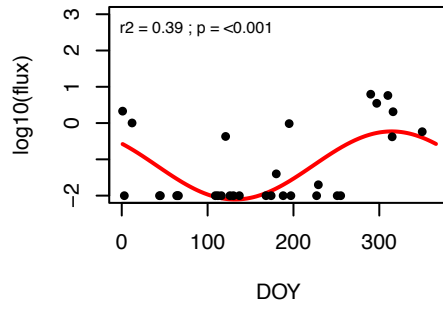


# Site 19

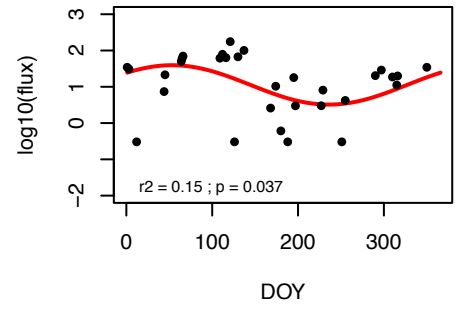
## G\_bul



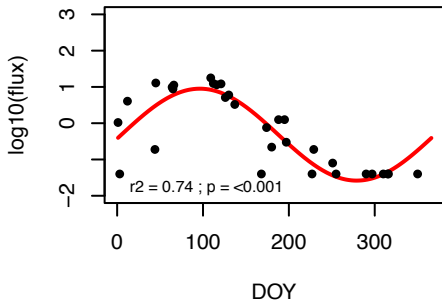
## G\_con



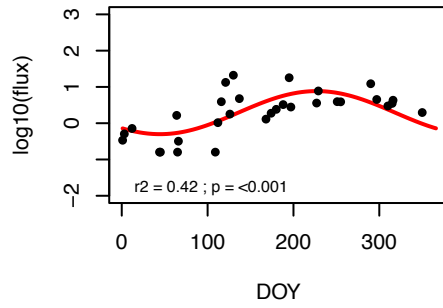
## G\_glu



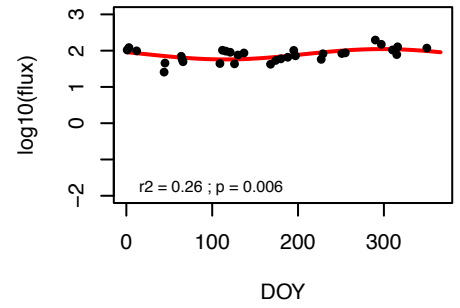
## G\_inf



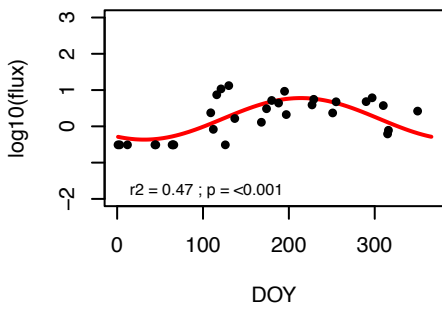
## G\_rubp



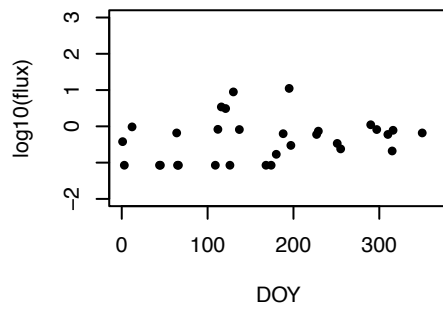
## G\_rubw



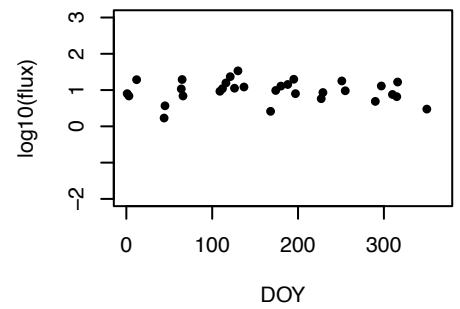
## G\_rus



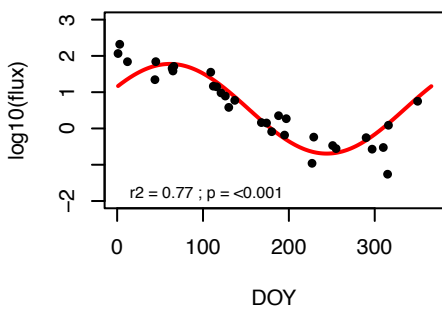
## G\_sac



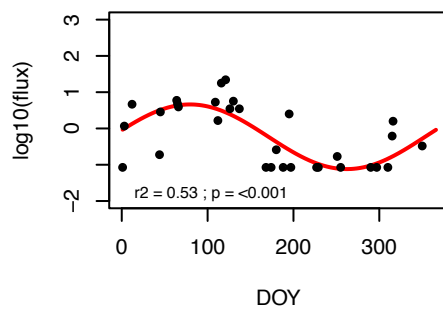
## G\_sip



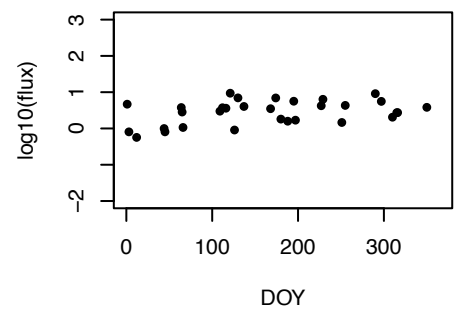
## G\_tru



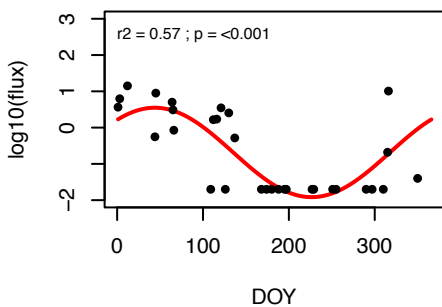
## N\_dut



## O\_uni



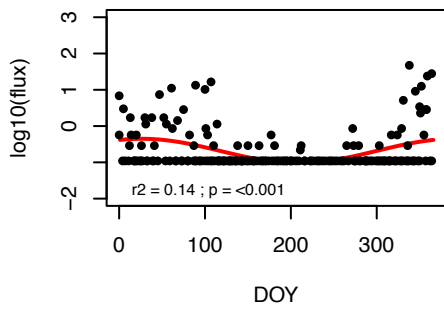
## P\_obl



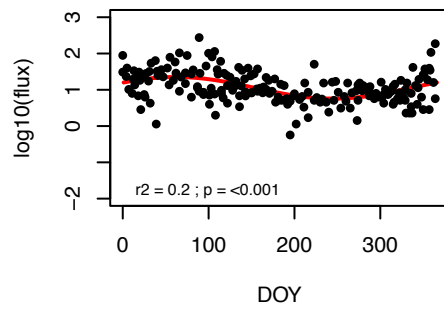


# Site 20

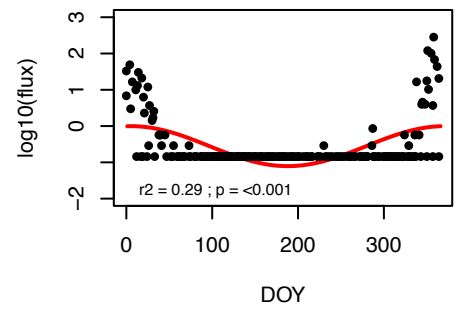
## G\_bul



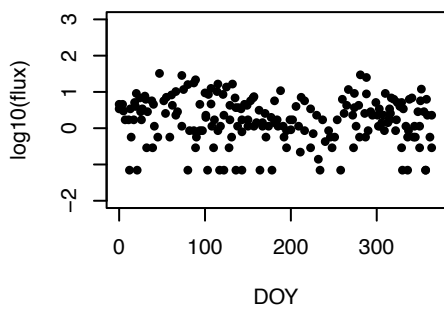
## G\_cal



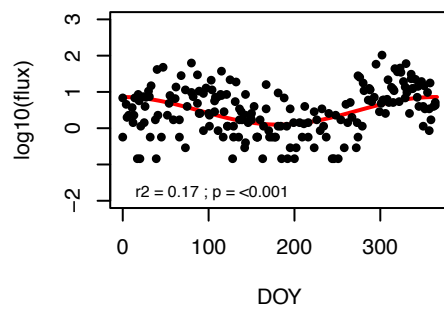
## G\_fal



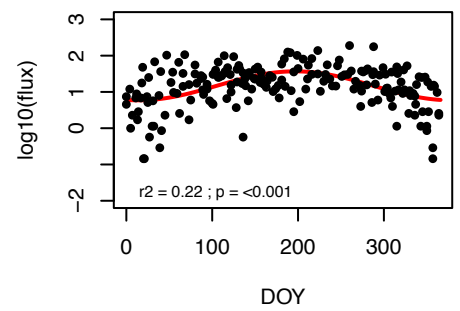
## G\_glu



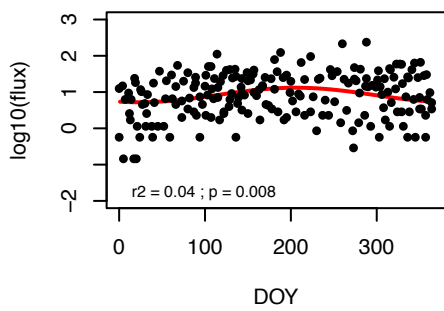
## G\_men



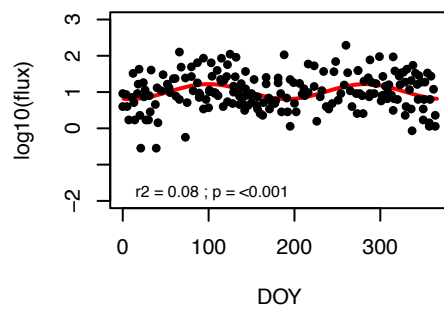
## G\_rubp



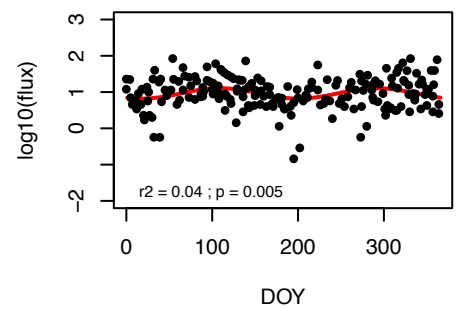
## G\_rubw



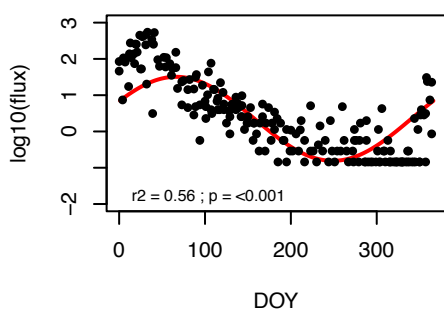
## G\_sac



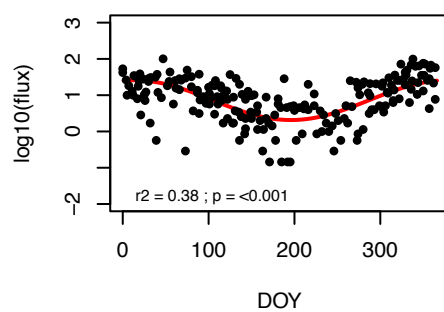
## G\_sip



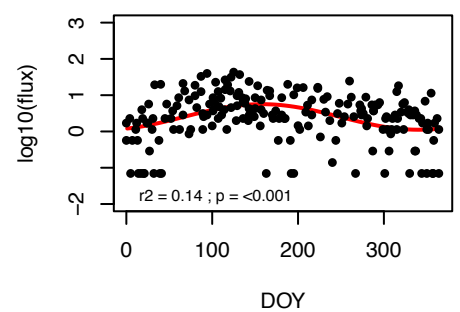
## G\_tru



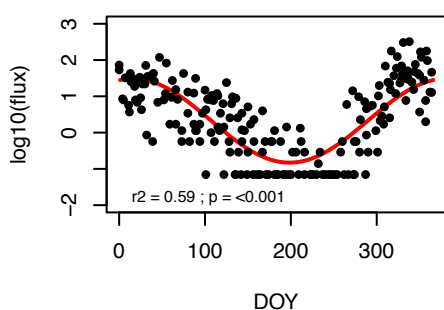
## N\_dut



## O\_uni

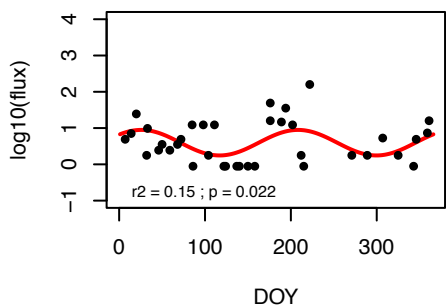


## P\_obl

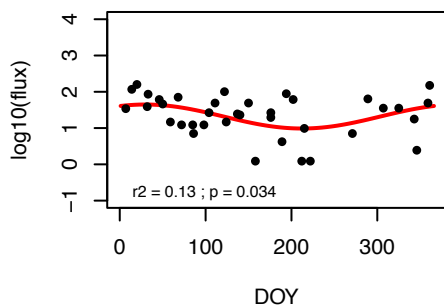


# Site 21

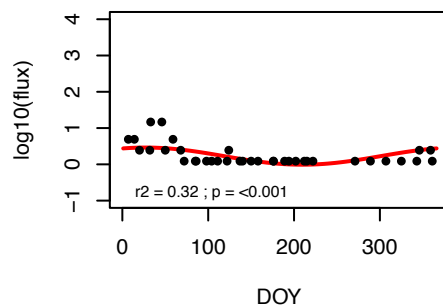
## G\_con



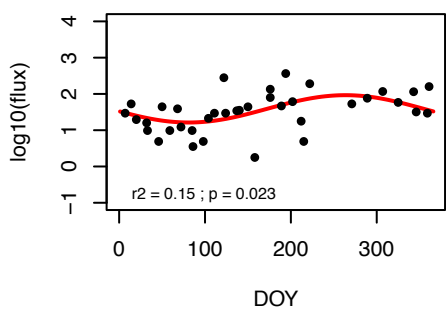
## G\_glu



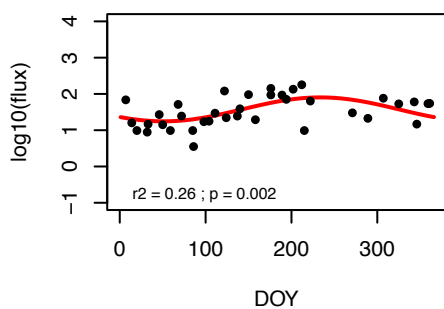
## G\_inf



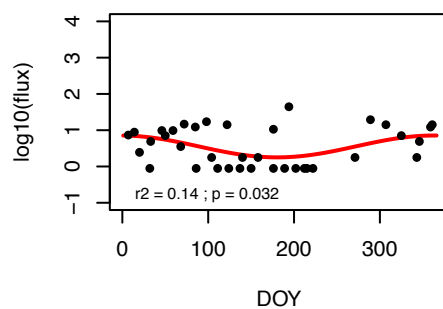
## G\_rubw



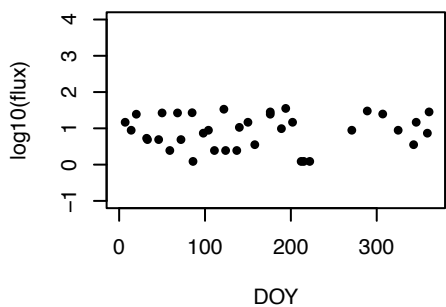
## G\_sac



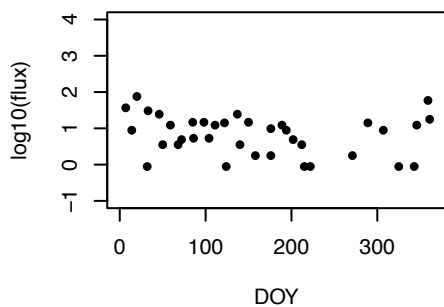
## G\_sci



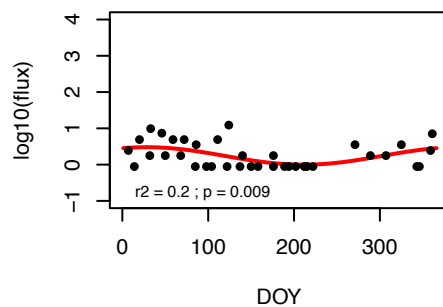
## G\_sip



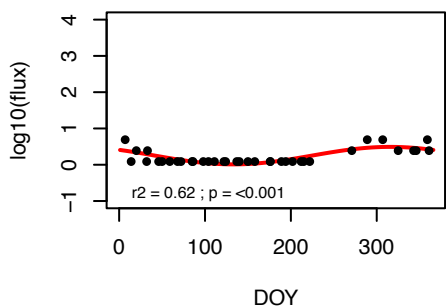
## G\_ten



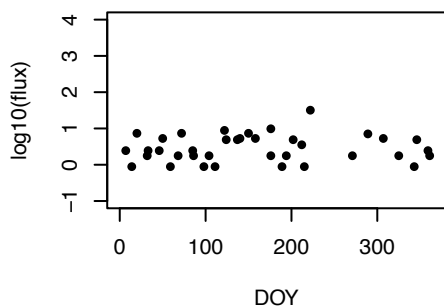
## G\_tru



## N\_inc

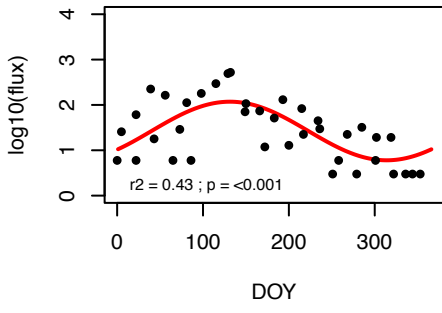


## O\_uni

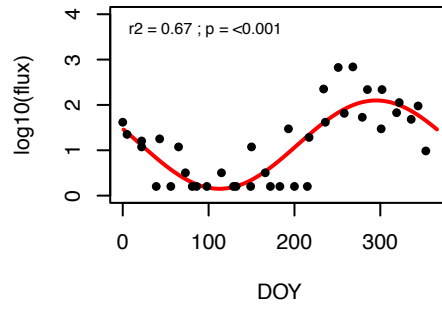


# Site 22

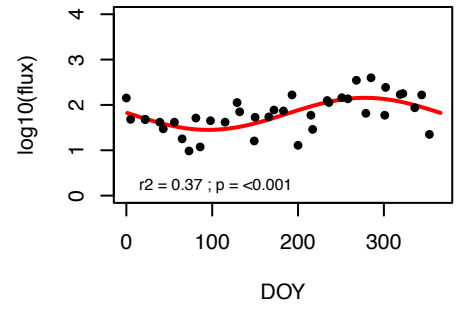
## G\_bul



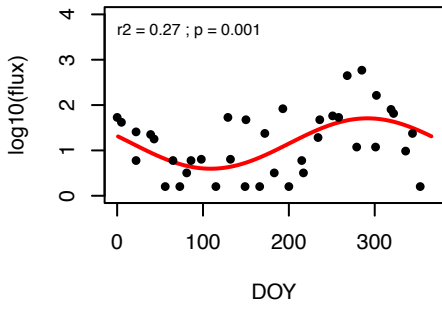
## G\_rubp



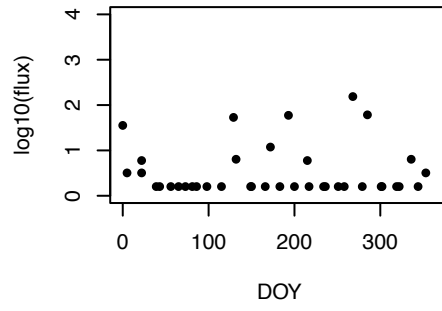
## G\_rubw



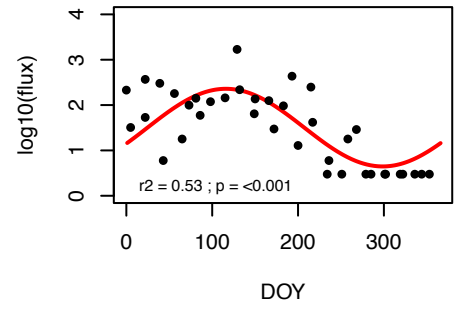
## G\_sac



## G\_sip

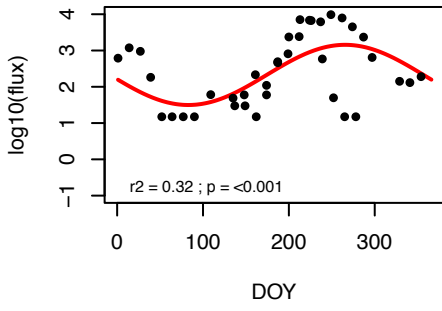


## N\_inc

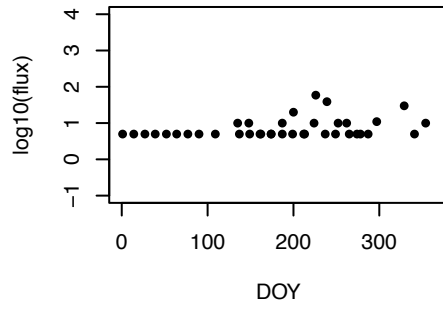


# Site 23

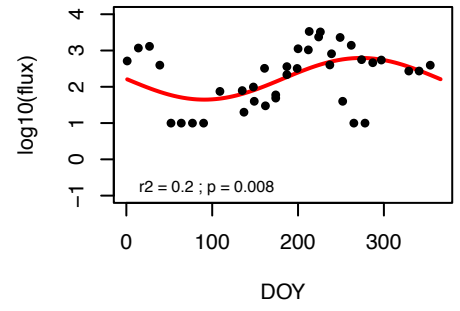
## G\_bul



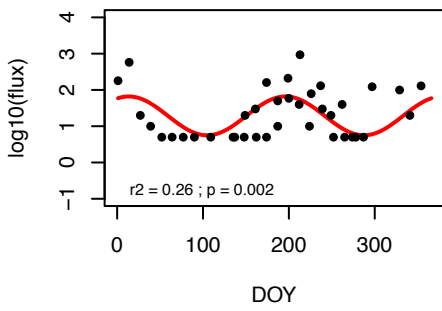
## G\_cal



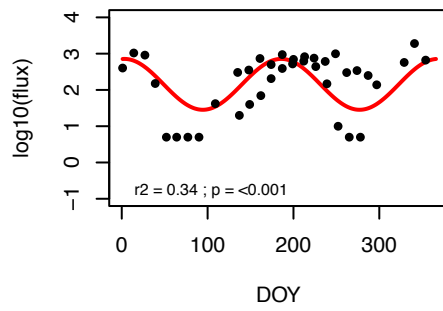
## G\_glu



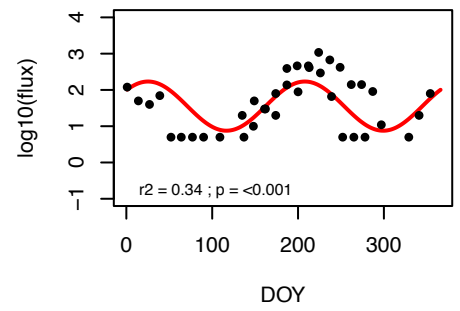
## G\_men



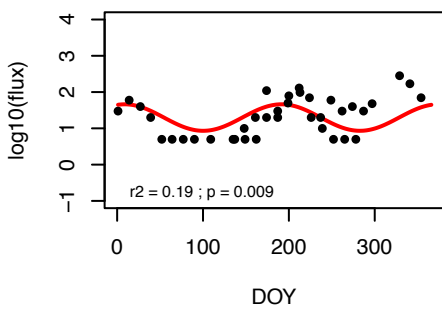
## G\_rubw



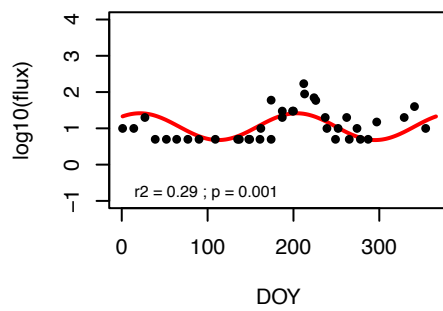
## G\_rus



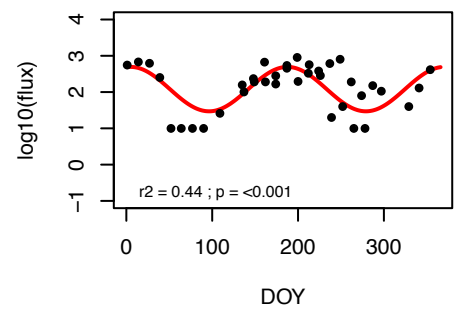
## G\_sac



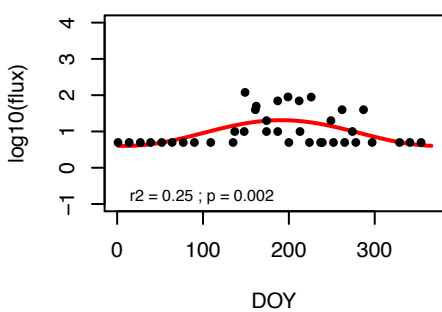
## G\_sip



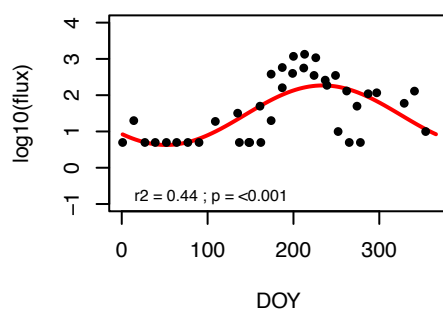
## G\_ten



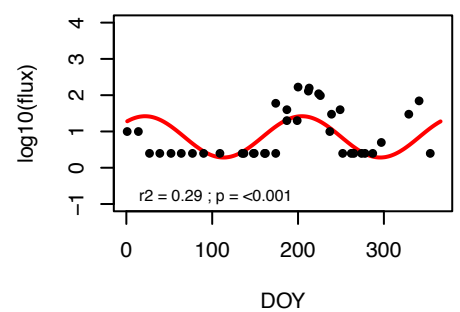
## G\_the



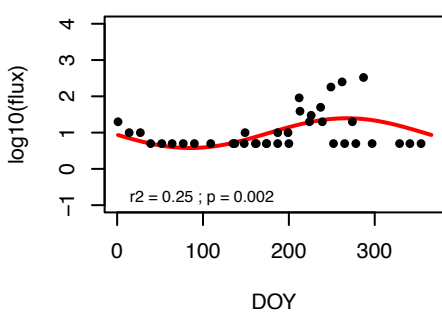
## N\_dut



## P\_obl

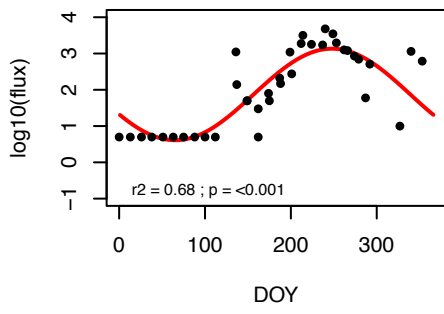


## T\_qui

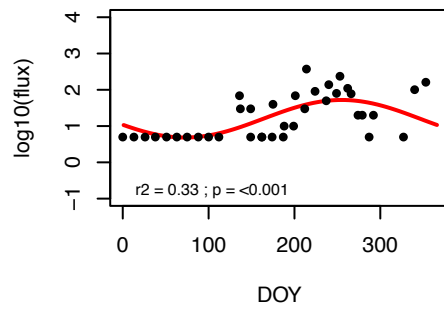


# Site 24

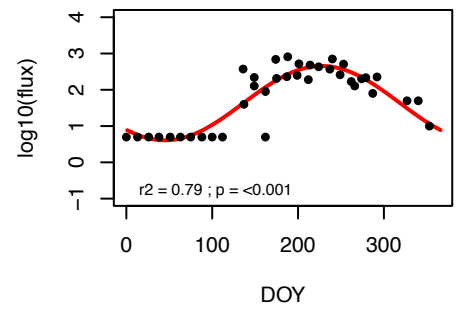
## G\_bul



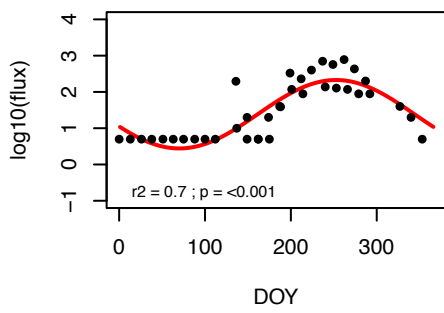
## G\_glu



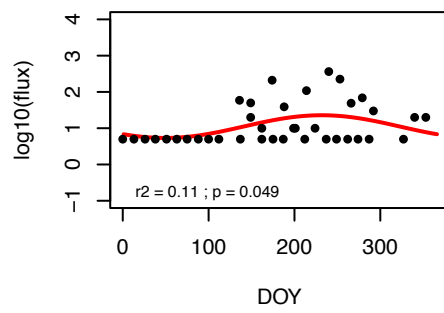
## G\_rubw



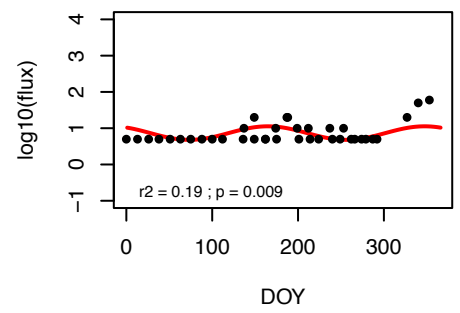
## G\_rus



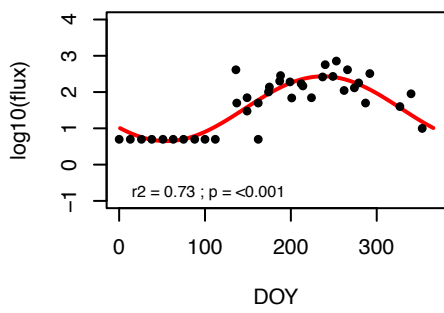
## G\_sac



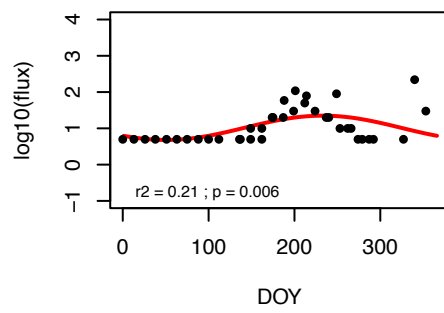
## G\_sip



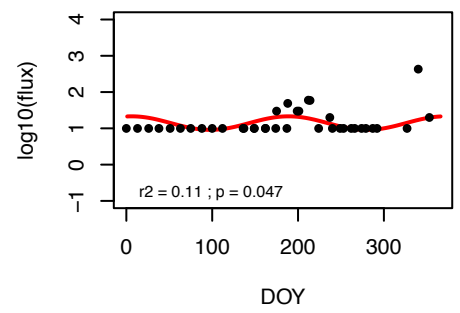
## G\_ten



## N\_dut

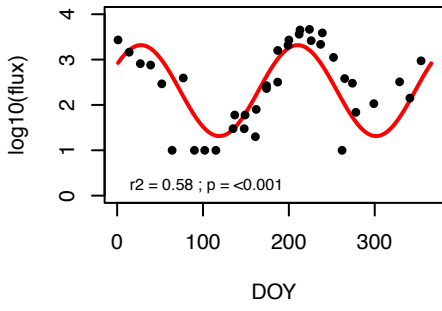


## P\_obl

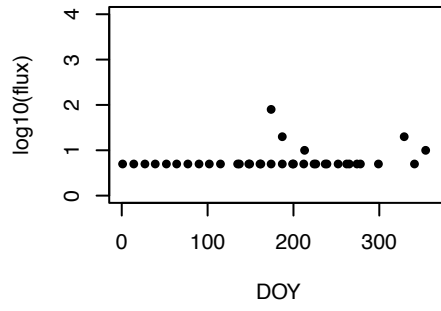


# Site 25

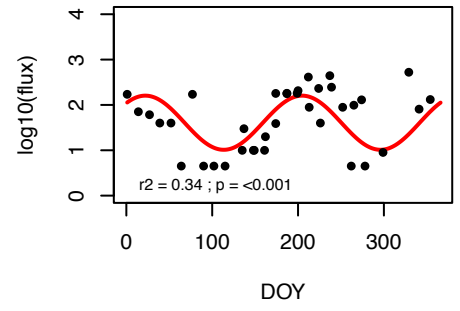
## G\_bul



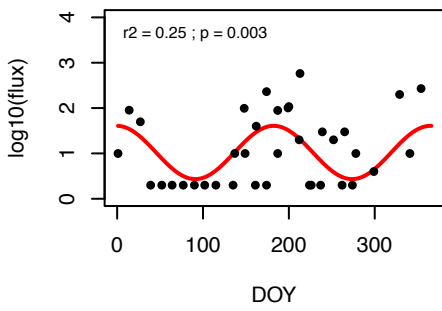
## G\_con



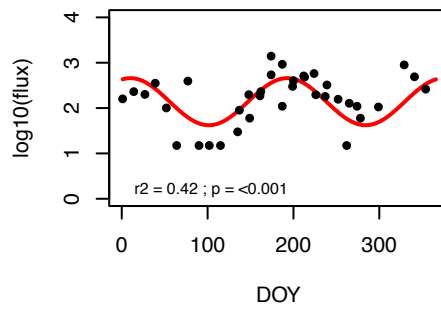
## G\_glu



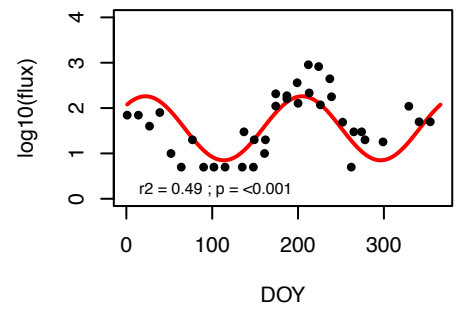
## G\_men



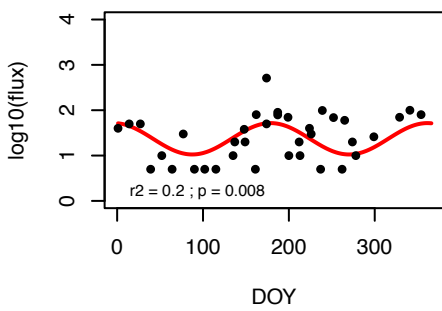
## G\_rubw



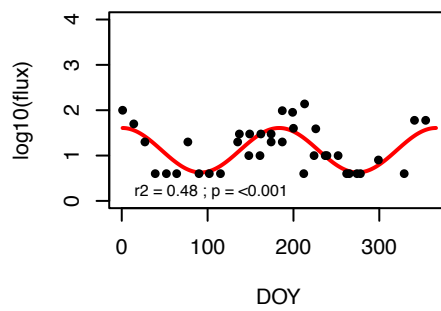
## G\_rus



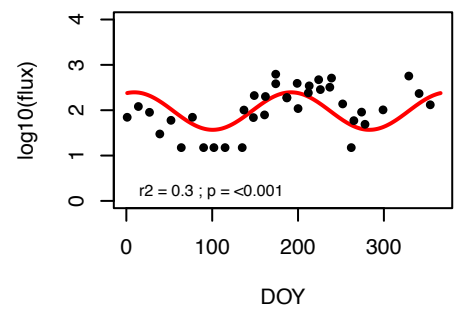
## G\_sac



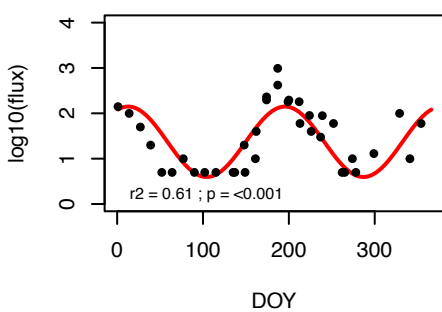
## G\_sip



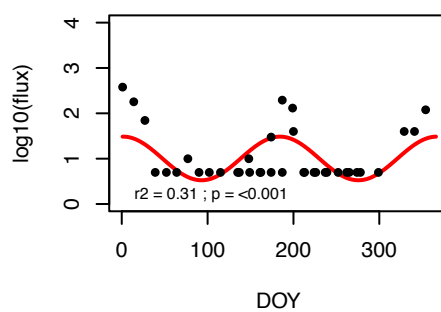
## G\_ten



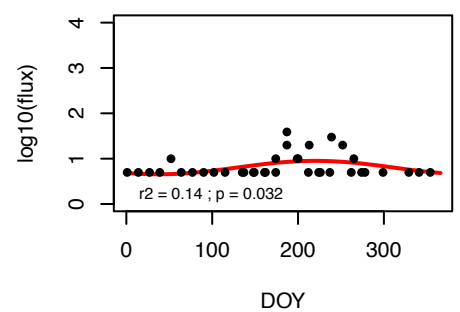
## N\_dut



## P\_obl

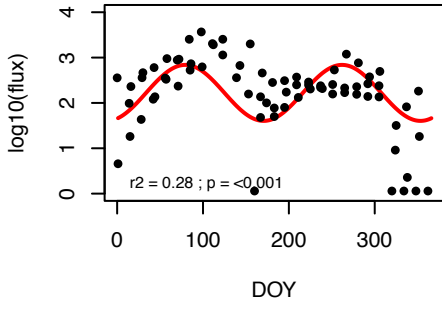


## T\_qui

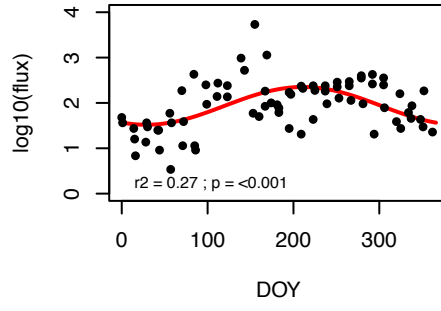


# Site 26

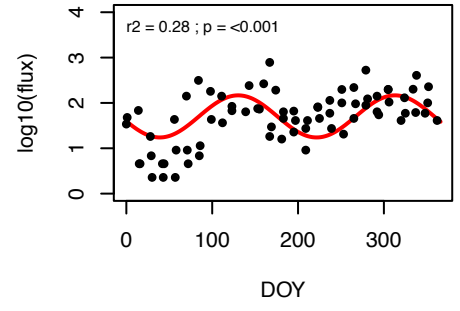
## G\_bul



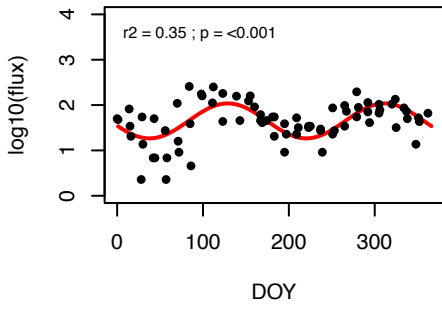
## G\_glu



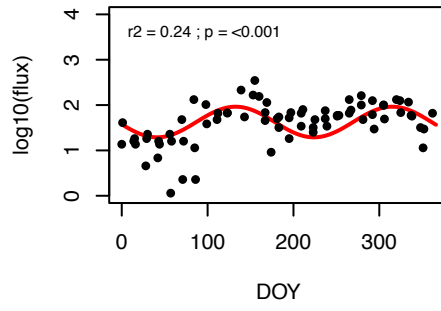
## G\_men



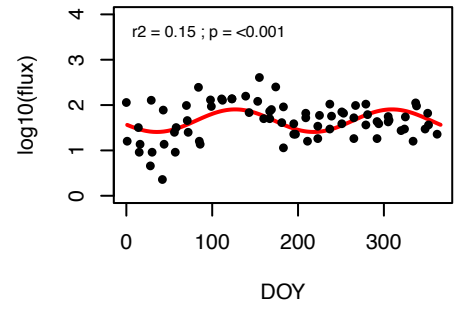
## G\_rubp



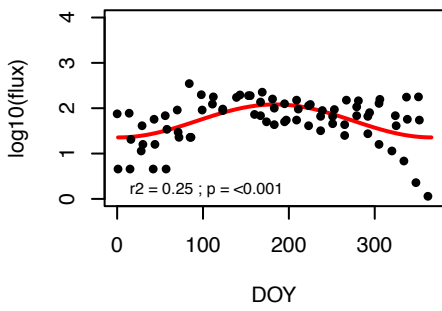
## G\_rubw



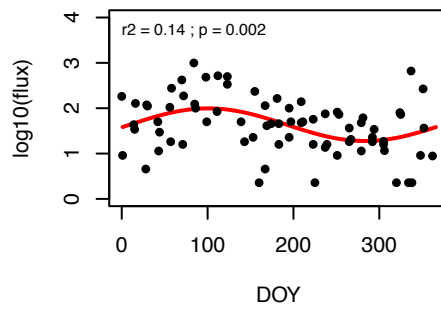
## N\_dut



## O\_uni

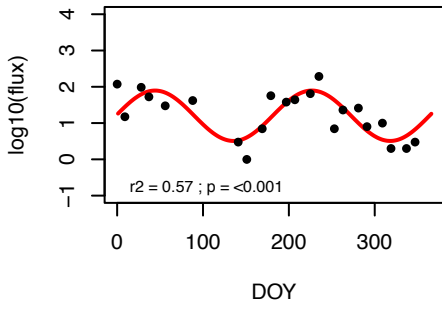


## T\_qui

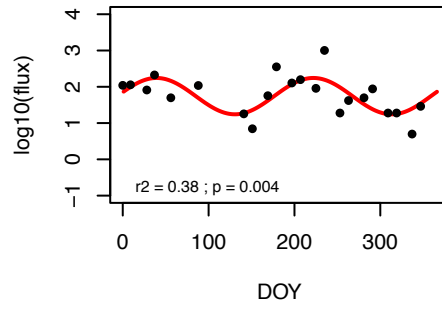


# Site 27

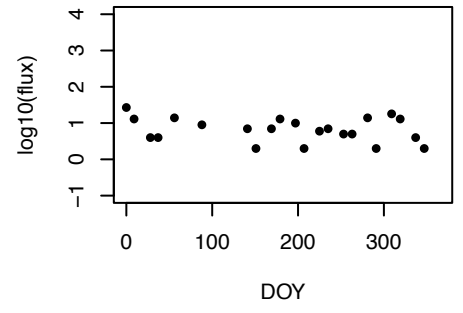
## G\_bul



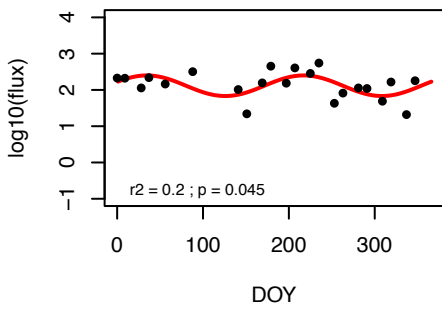
## G\_glu



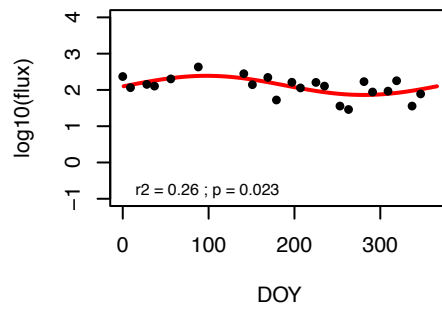
## G\_men



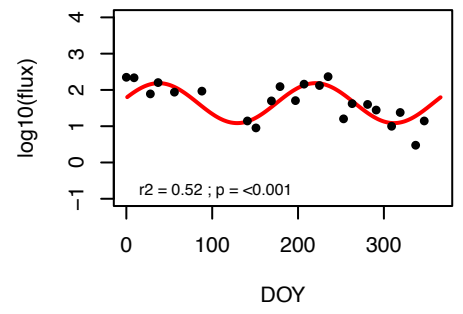
## G\_rubw



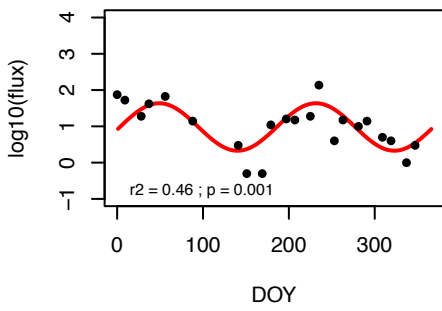
## G\_sac



## N\_dut



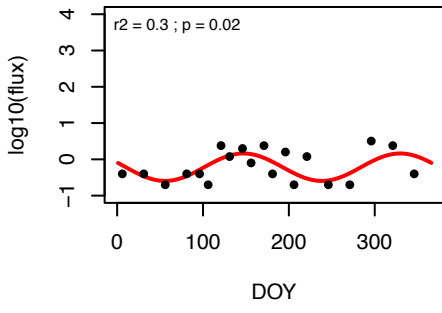
## P\_obl



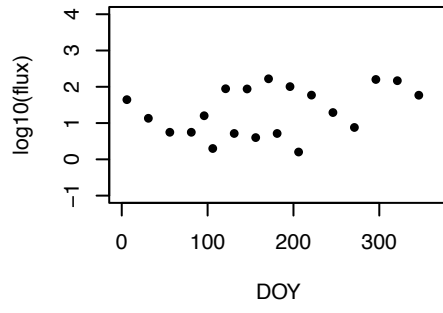


# Site 28

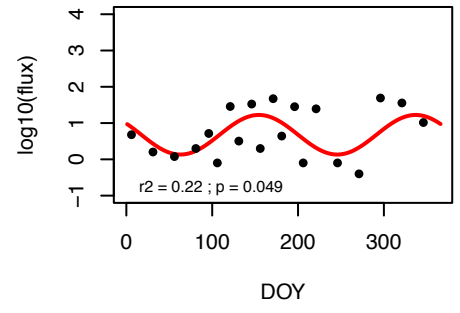
## G\_rubp



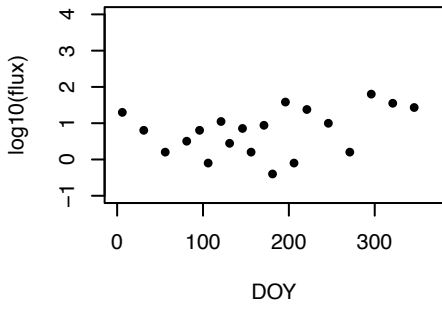
## G\_rubw



## G\_sac

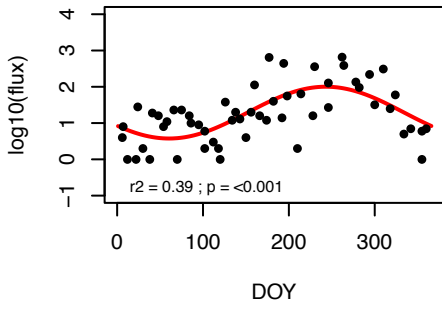


## G\_sip

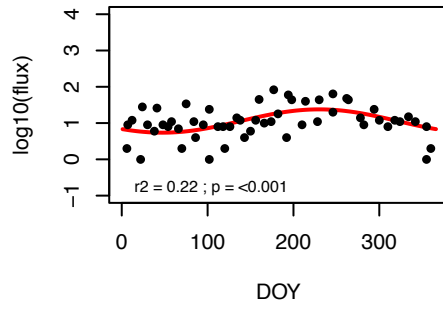


# Site 29

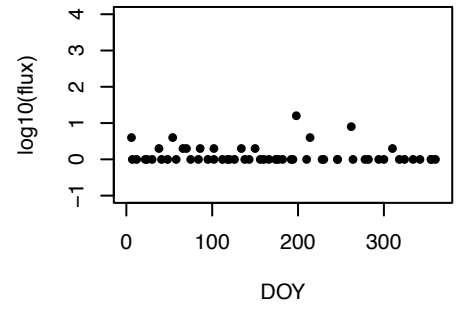
## G\_bul



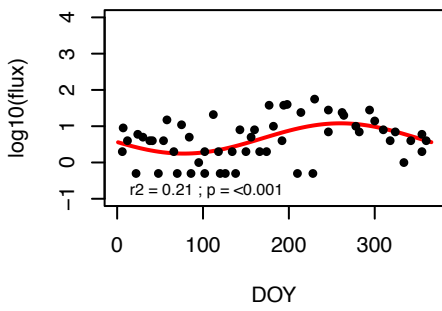
## G\_cal



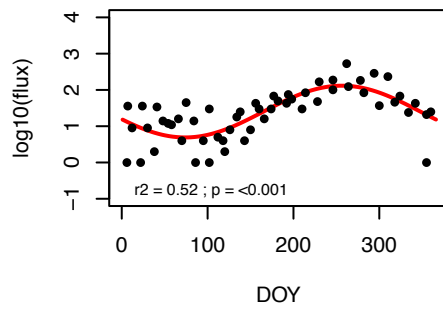
## G\_con



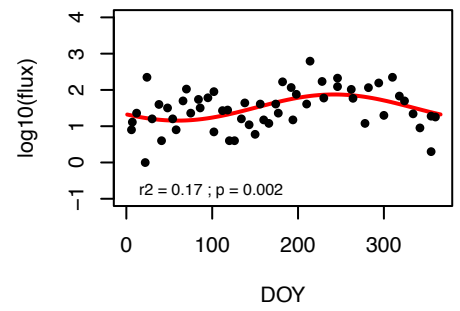
## G\_fal



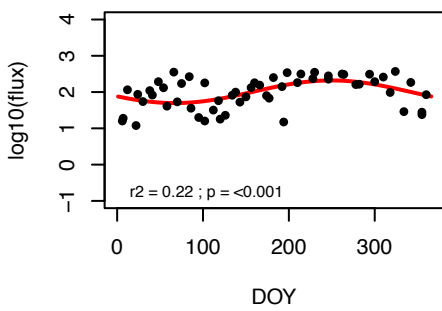
## G\_glu



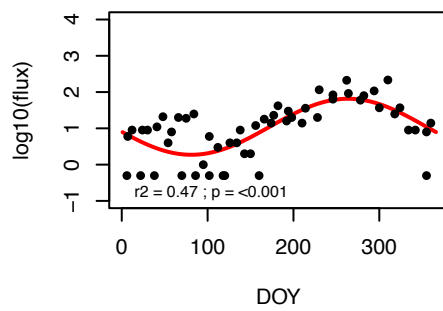
## G\_men



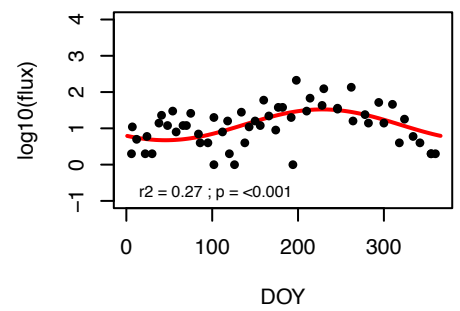
## G\_rubw



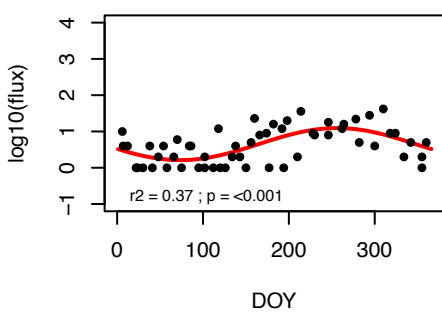
## G\_rus



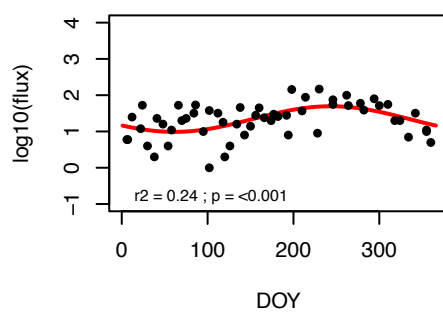
## G\_sac



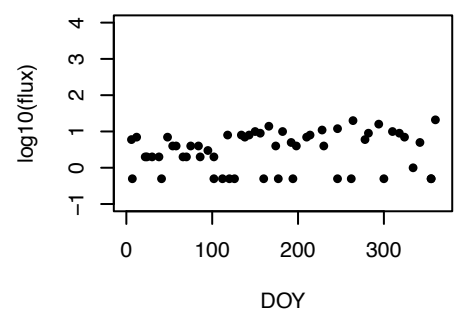
## G\_sci



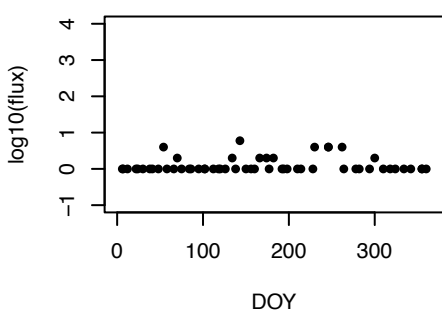
## G\_sip



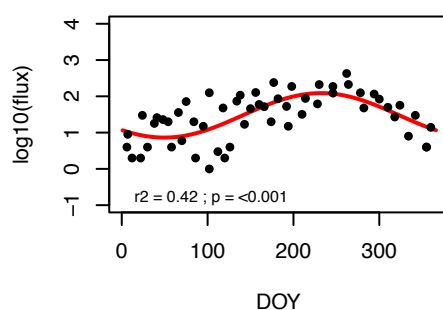
## G\_the



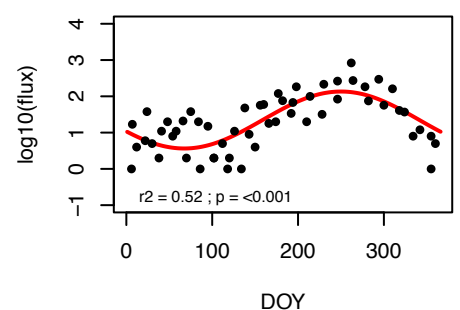
## G\_uvu



## N\_dut

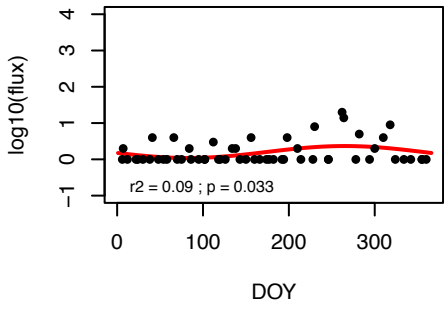


## N\_inc

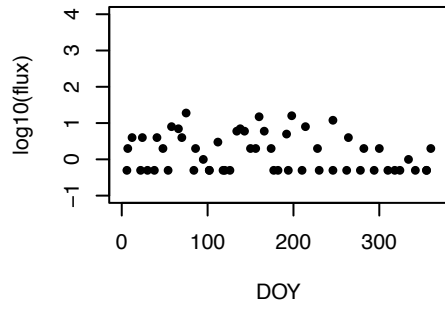


Site 29 cont.

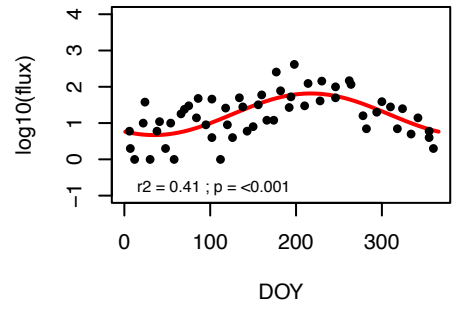
N\_pac



O\_uni

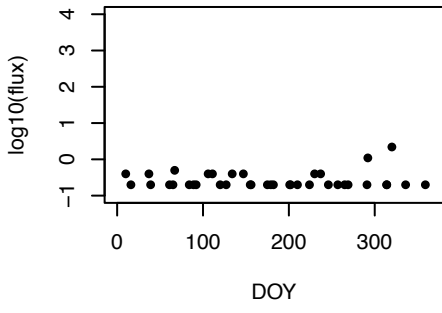


P\_obl

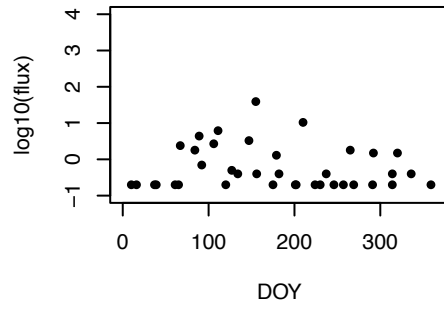


# Site 30

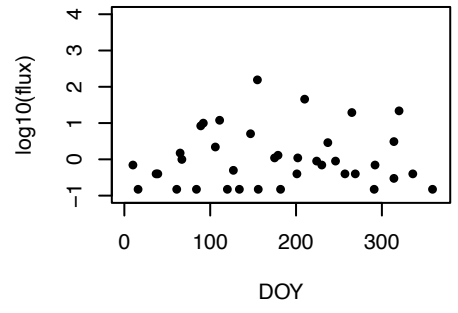
## G\_bul



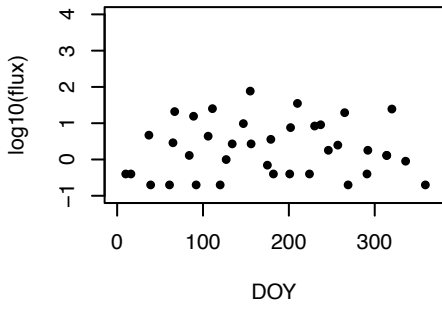
## G\_rubp



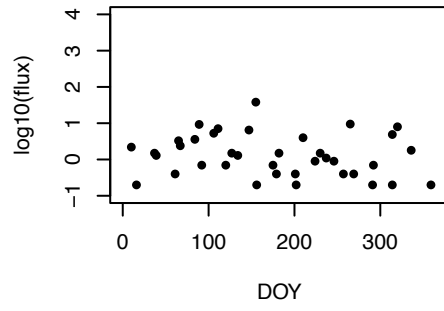
## G\_rubw



## G\_sac

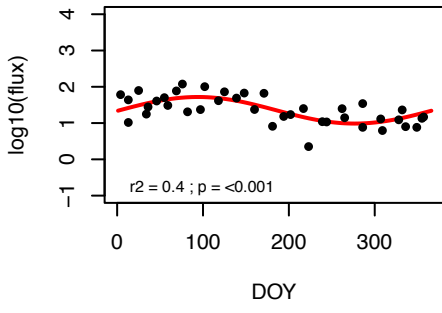


## G\_sip

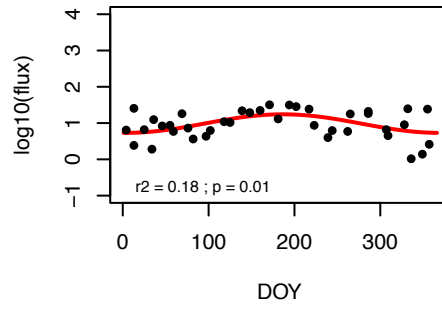


# Site 31

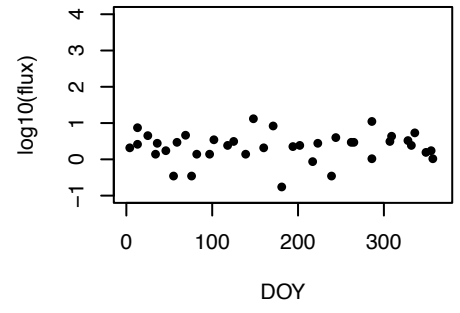
## G\_rubw



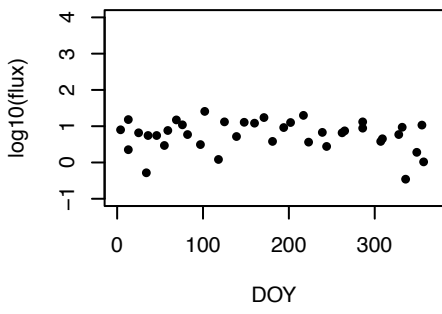
## G\_sac



## G\_sci

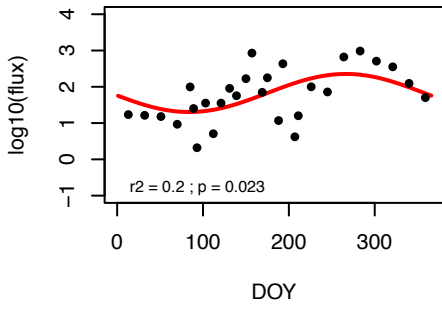


## N\_dut

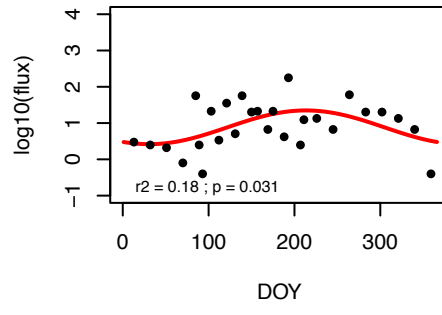


# Site 32

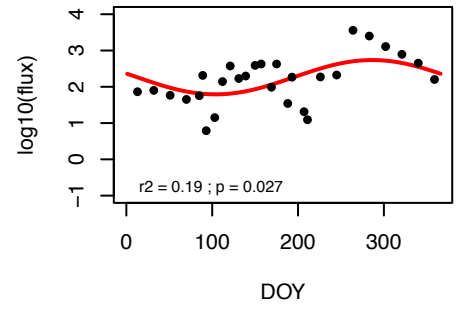
## G\_bul



## G\_sac

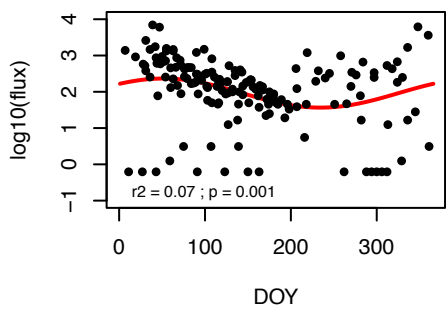


## N\_inc

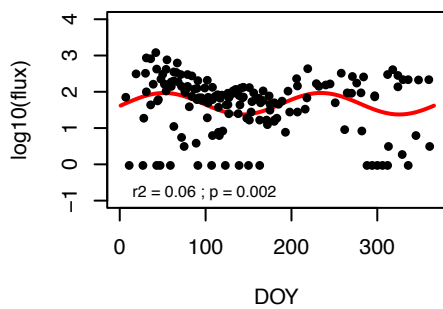


# Site 33

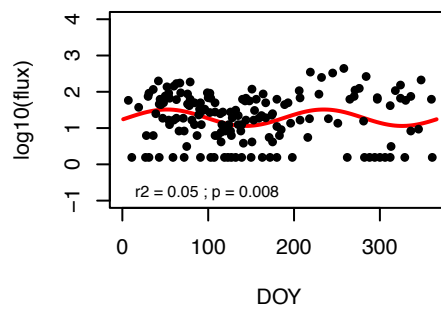
## G\_bul



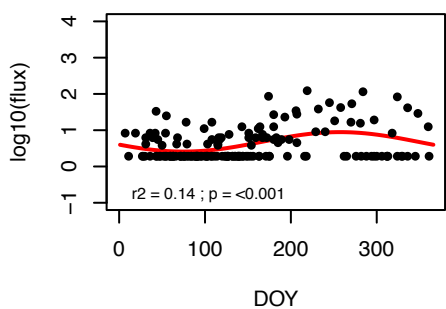
## G\_cal



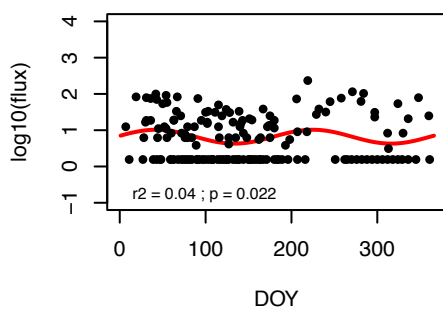
## G\_glu



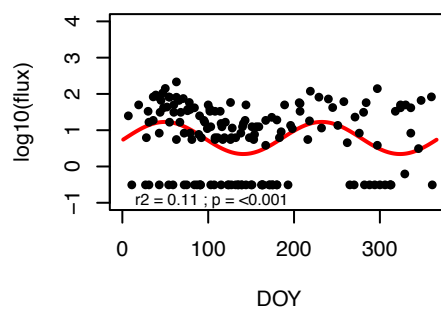
## G\_inf



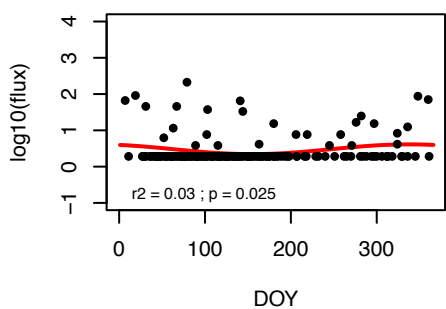
## G\_rubw



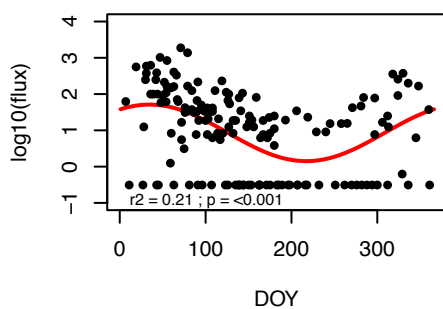
## G\_sci



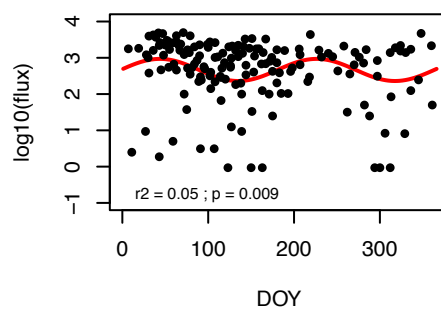
## G\_uvu



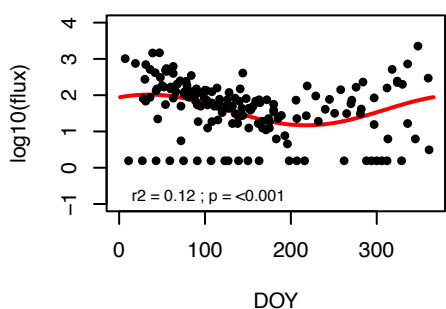
## N\_dut



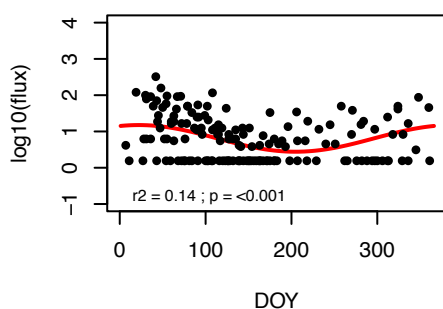
## N\_inc



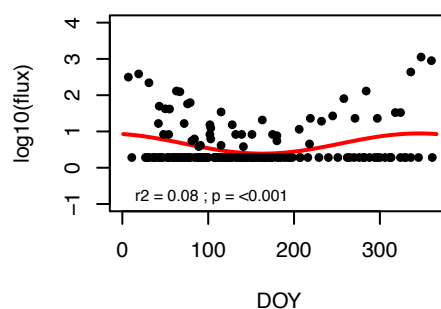
## N\_pac



## O\_uni

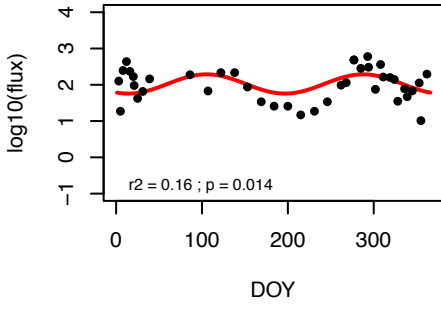


## T\_qui

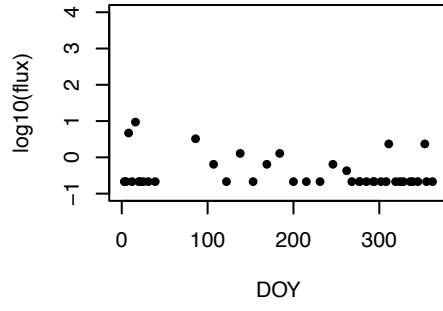


# Site 34

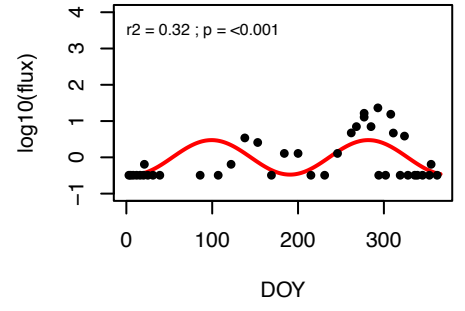
## G\_bul



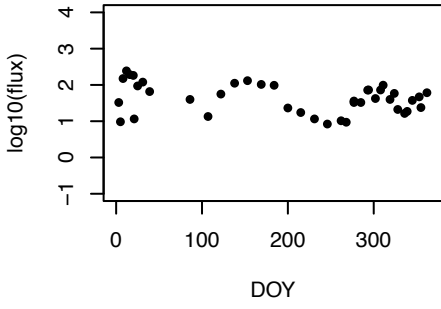
## G\_cal



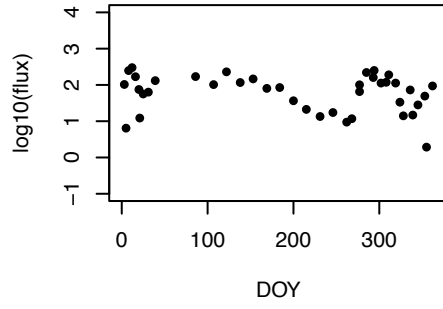
## G\_fal



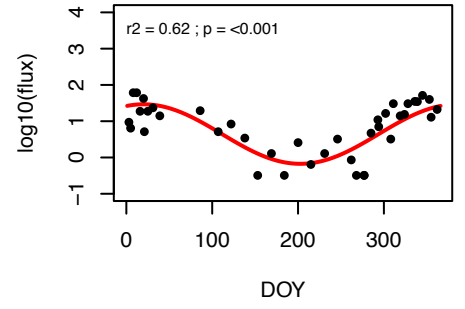
## G\_glu



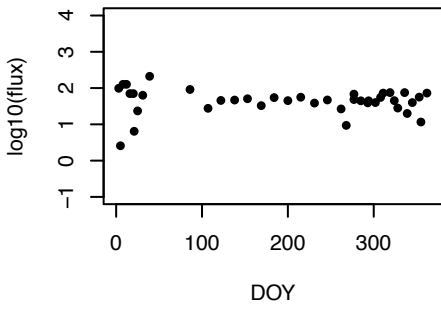
## G\_inf



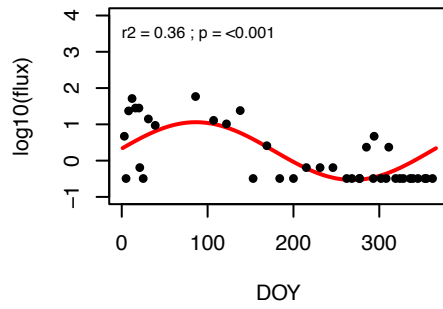
## G\_sci



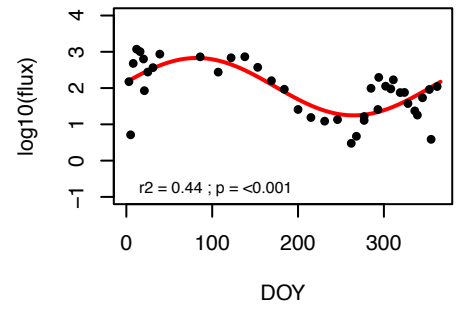
## G\_tru



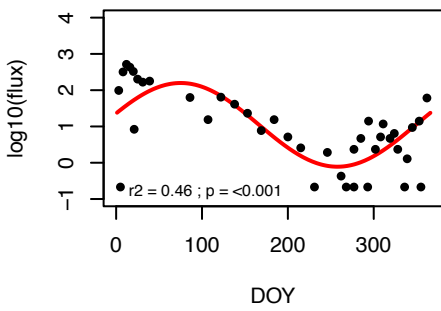
## N\_dut



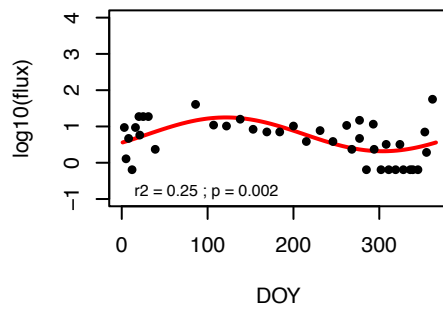
## N\_inc



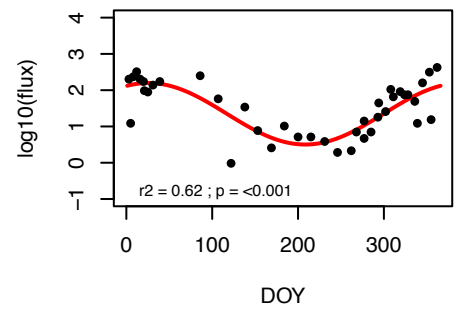
## N\_pac



## O\_uni



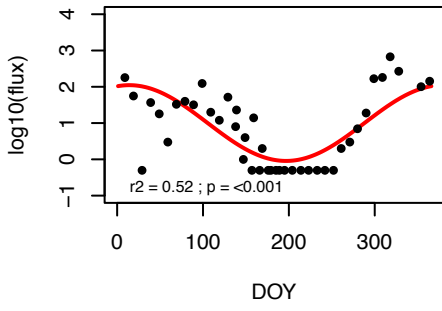
## T\_qui



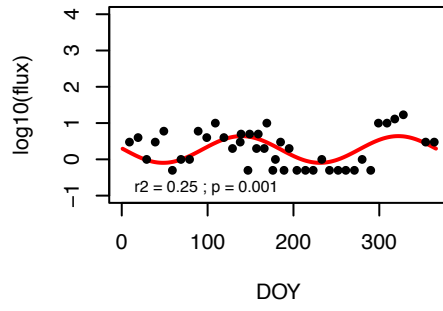


# Site 35

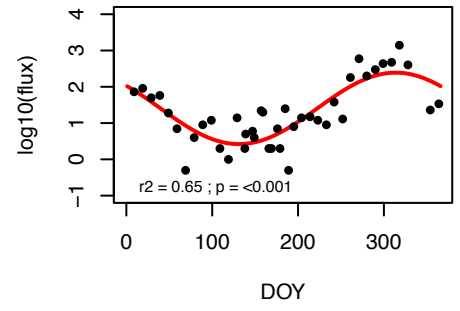
## G\_bul



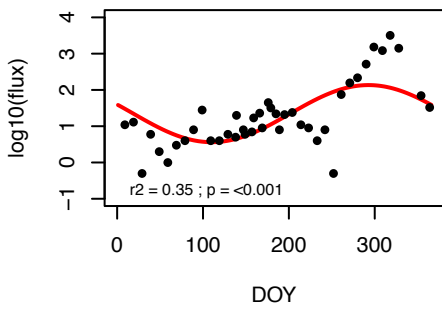
## G\_fal



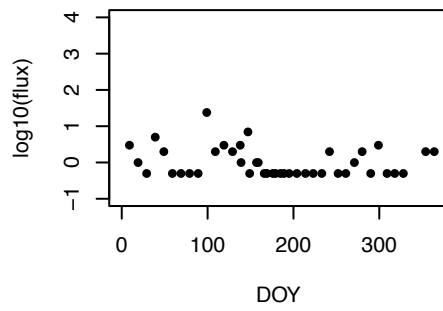
## G\_glu



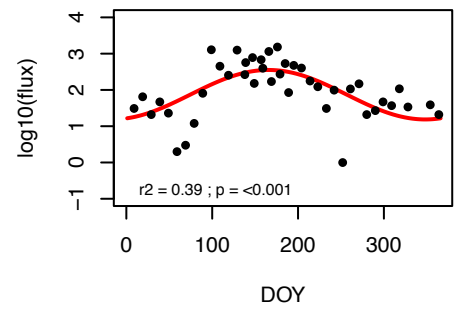
## G\_inf



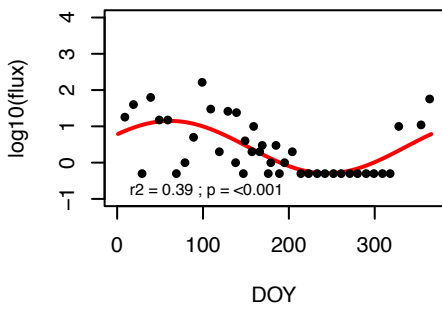
## G\_sci



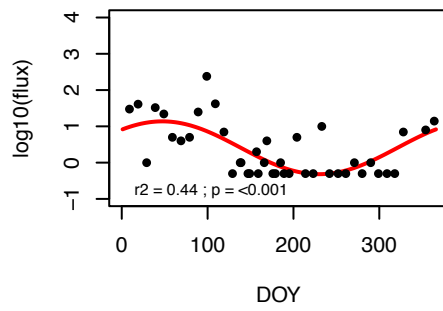
## G\_tru



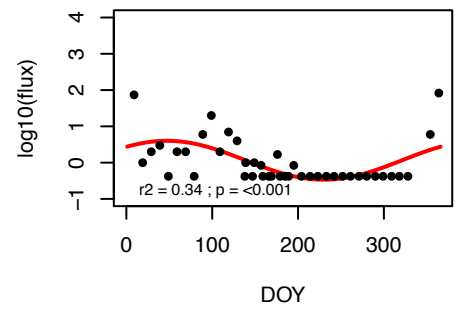
## N\_inc



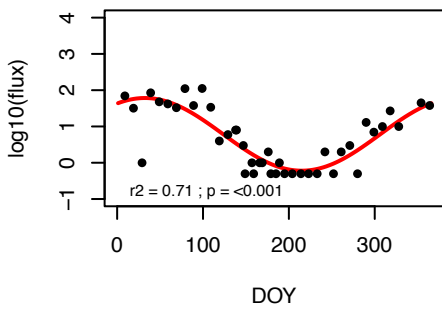
## N\_pac



## O\_uni

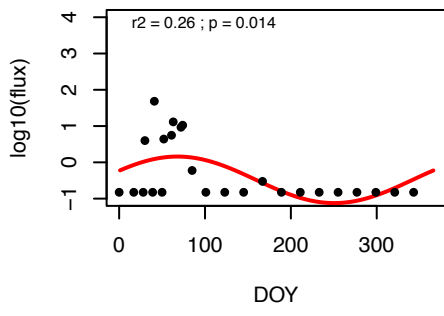


## T\_qui



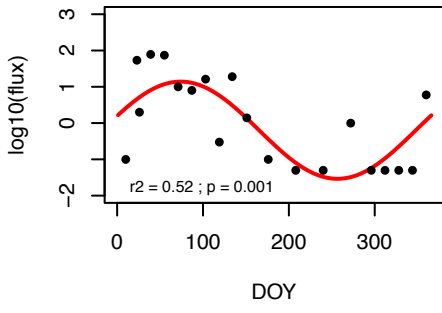
# Site 36

N\_pac

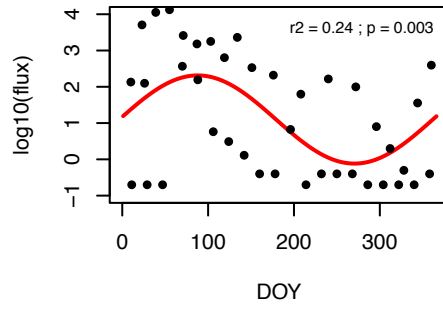


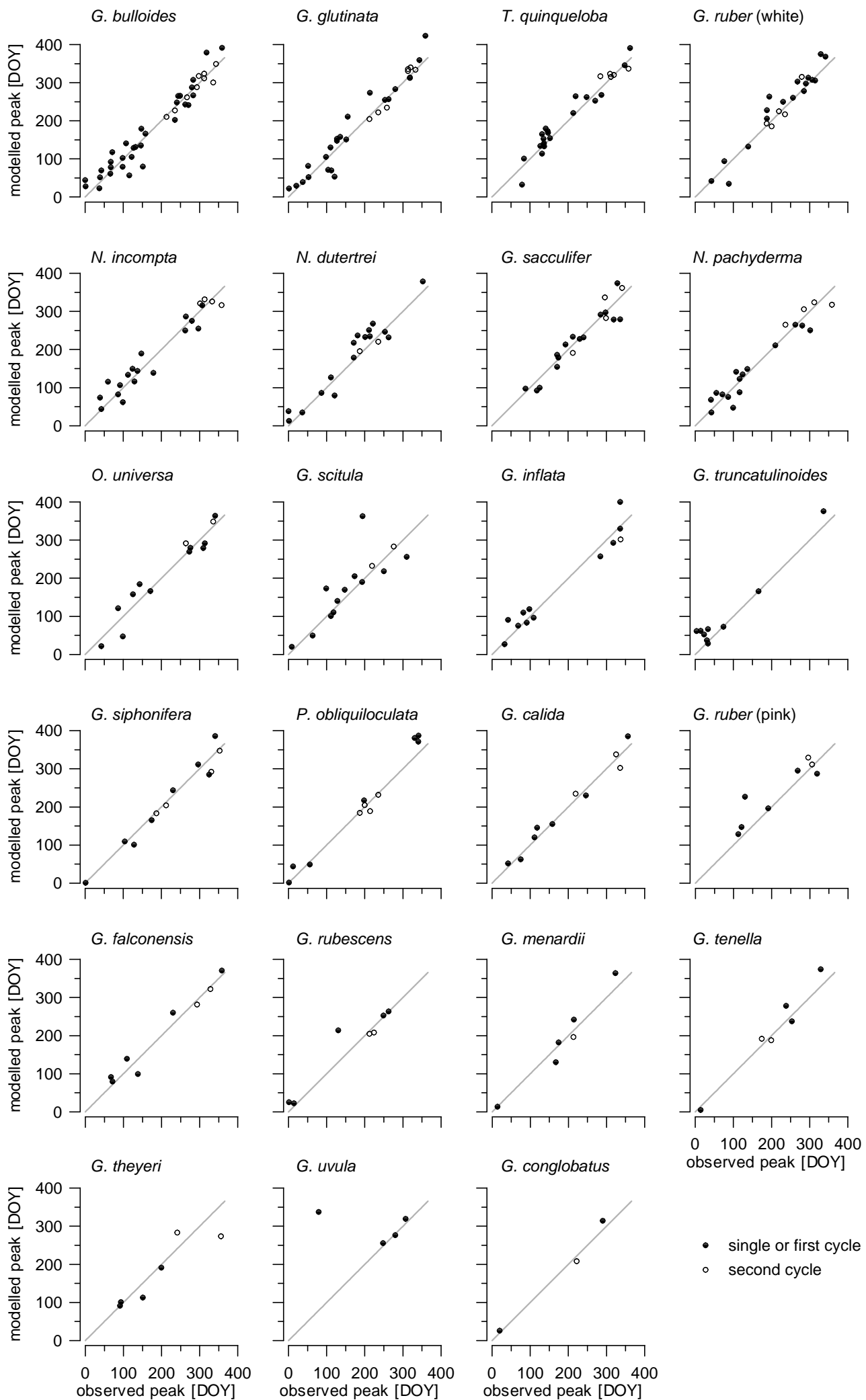
# Site 37

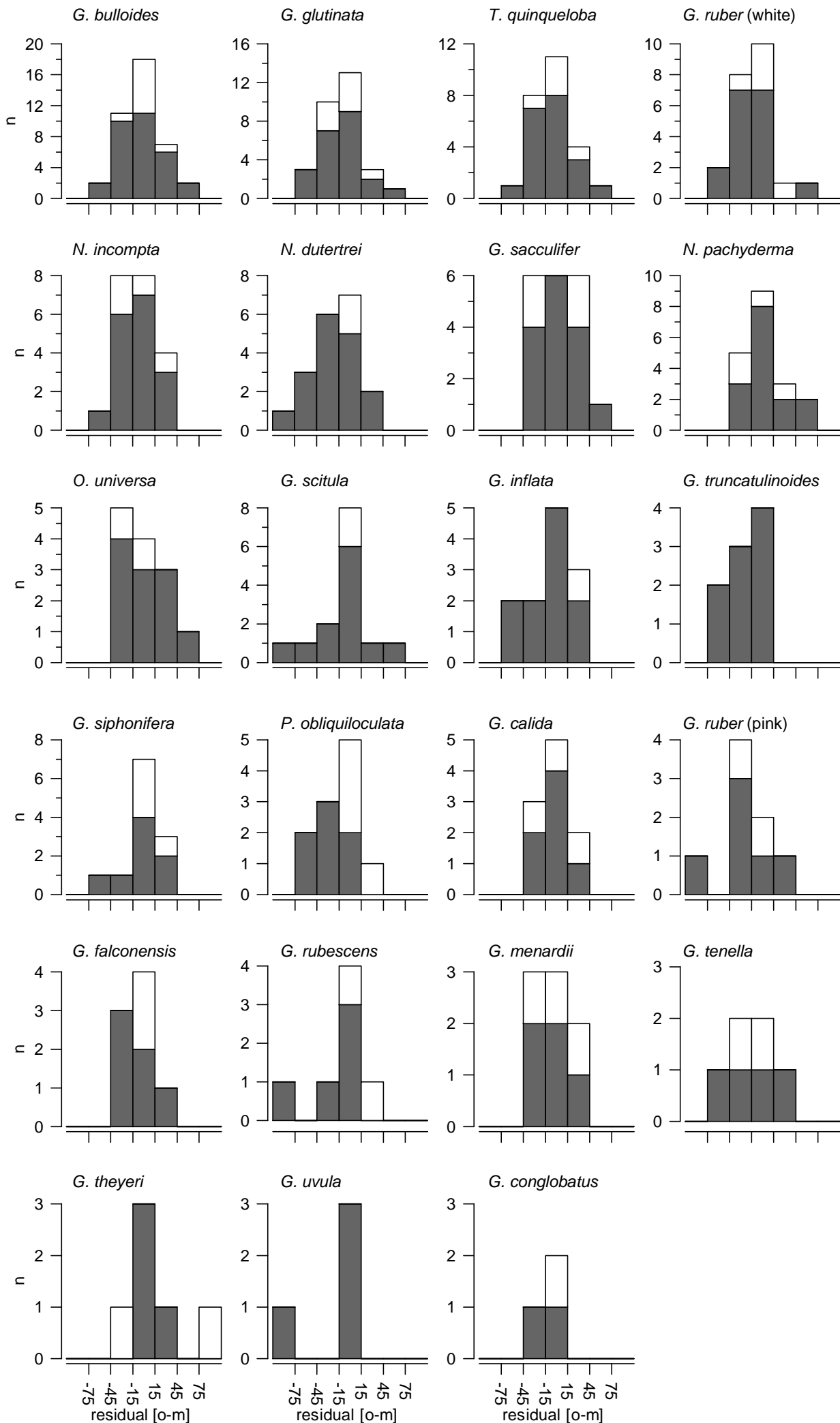
## N\_inc



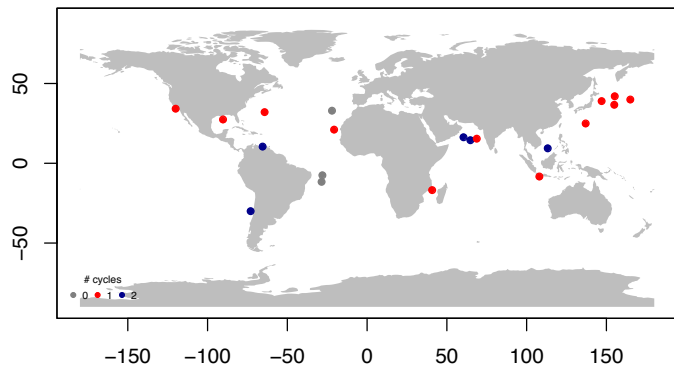
## N\_pac



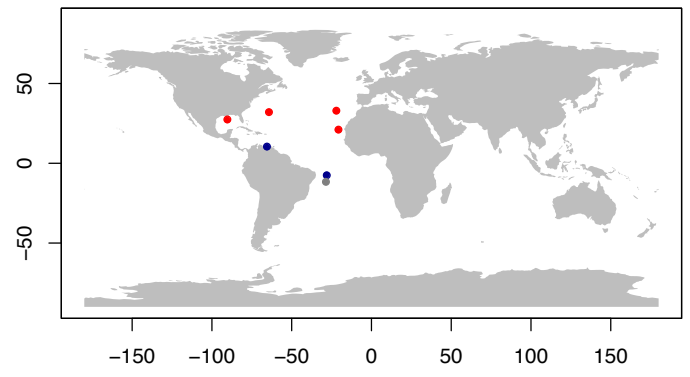




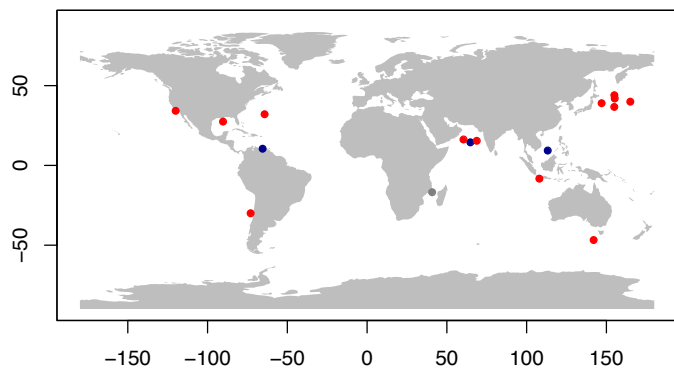
*G. ruber* (white)



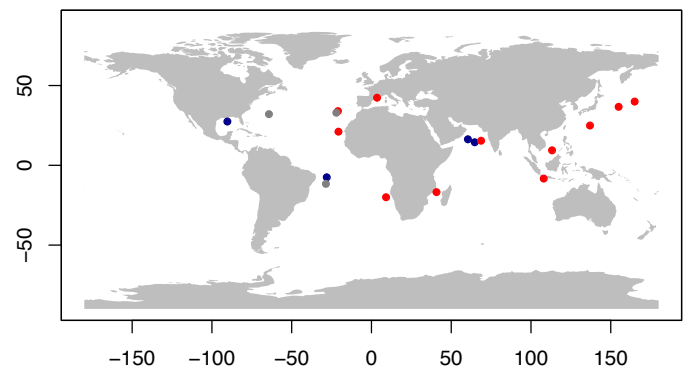
*G. ruber* (pink)



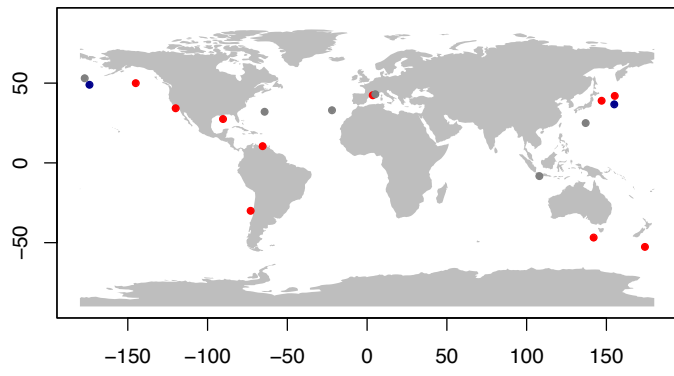
*N. dutertrei*



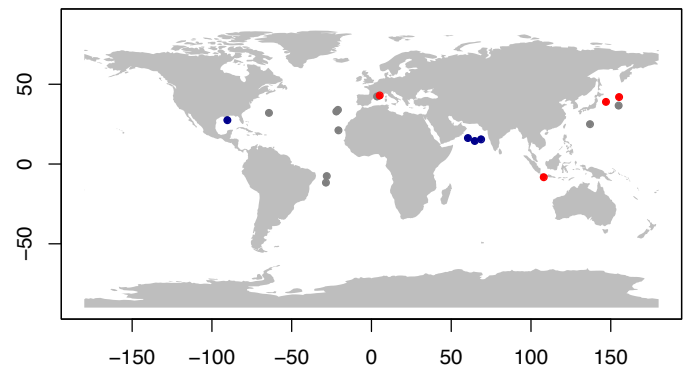
*G. sacculifer*



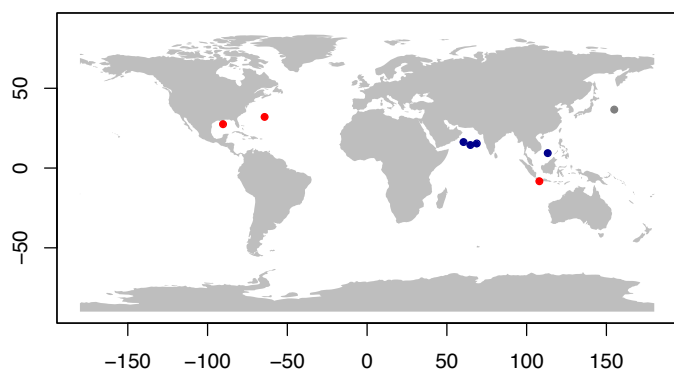
*O. universa*



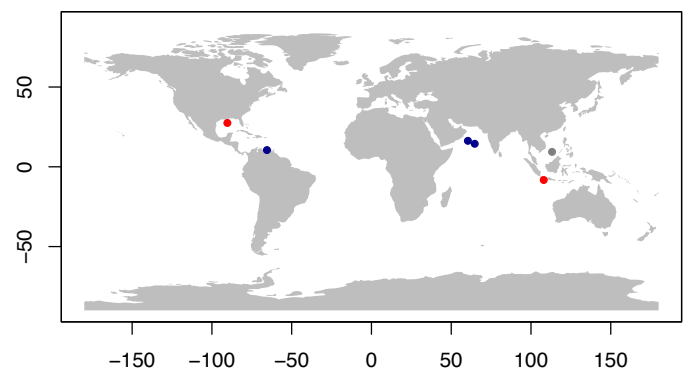
*G. siphonifera*



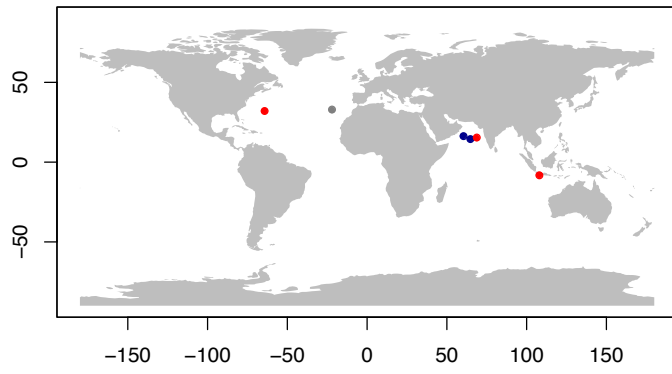
*P. obliquiloculata*



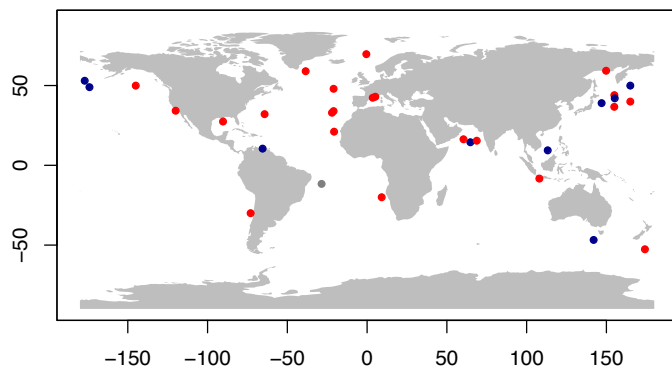
*G. menardii*



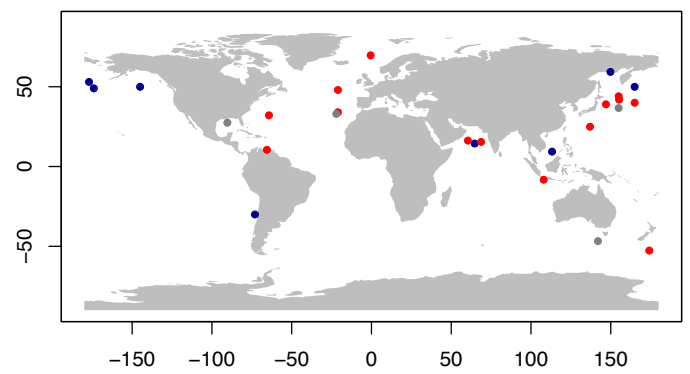
*G. rubescens*



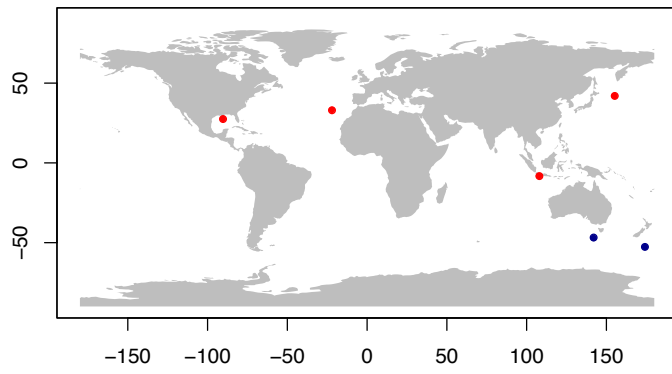
*G. bulloides*



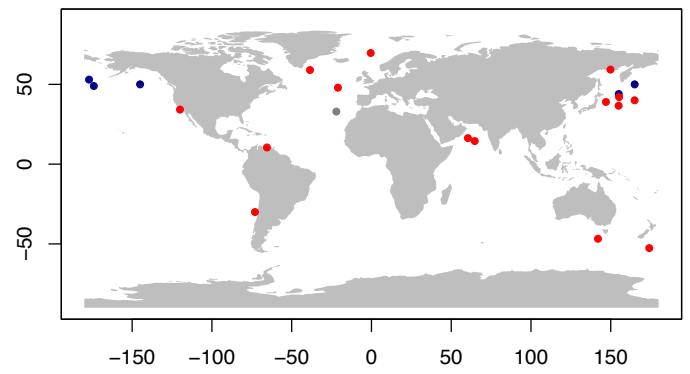
*G. glutinata*



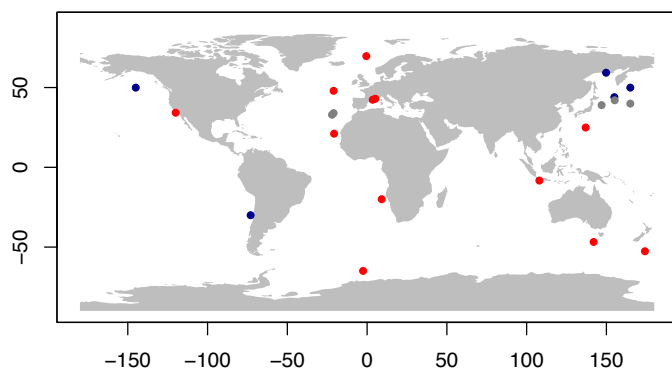
*G. falconensis*



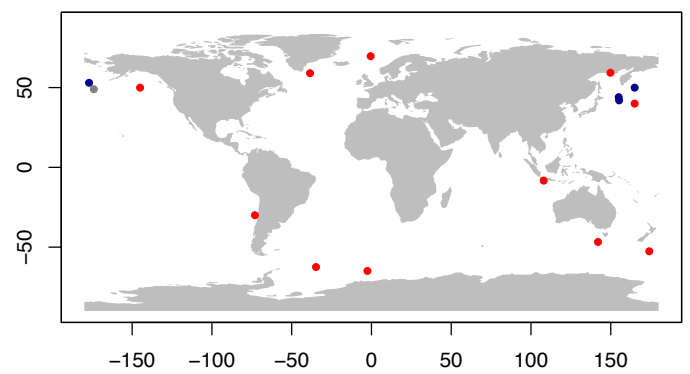
*T. quinqueloba*



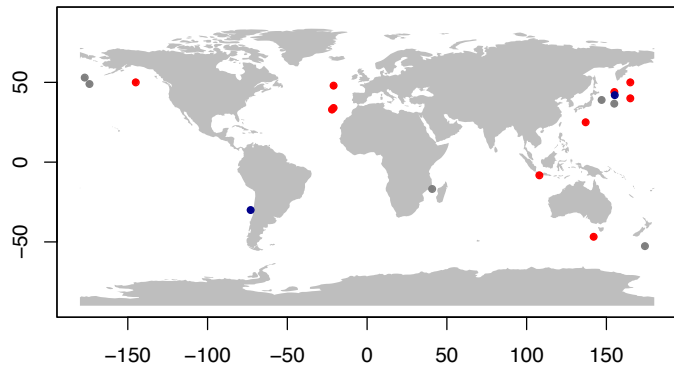
*N. incompta*



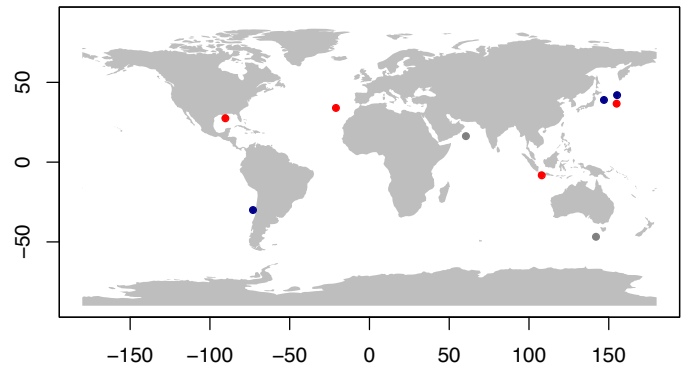
*N. pachyderma*



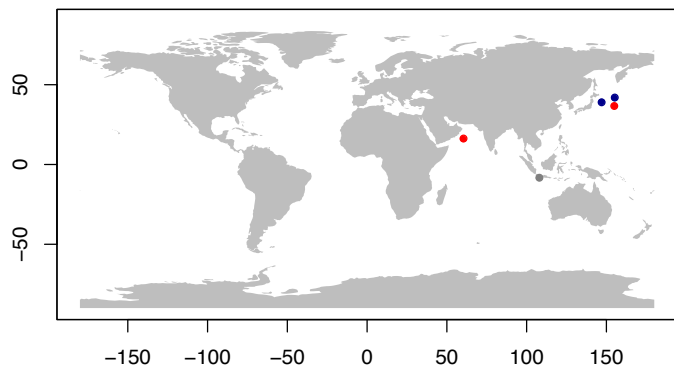
*G. scitula*



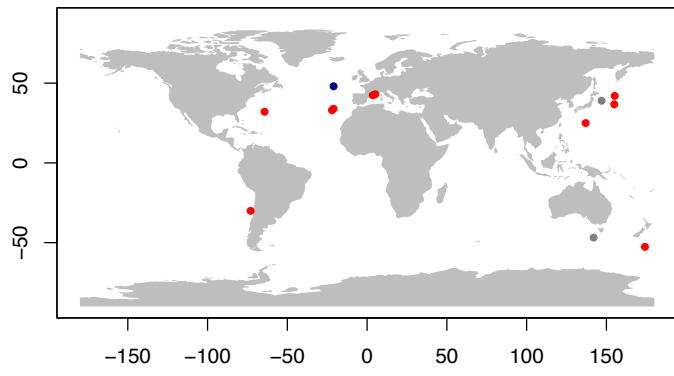
*G. calida*



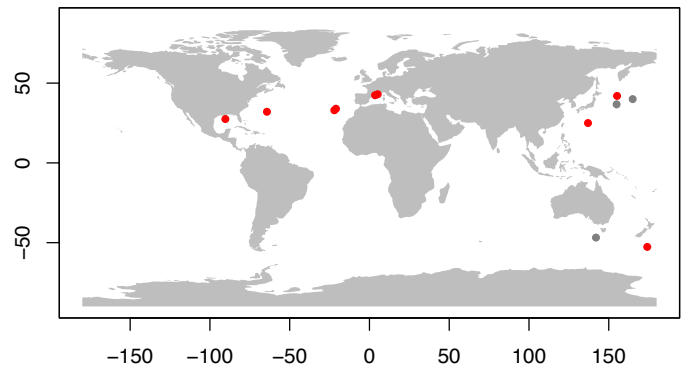
*G. theyeri*



*G. inflata*

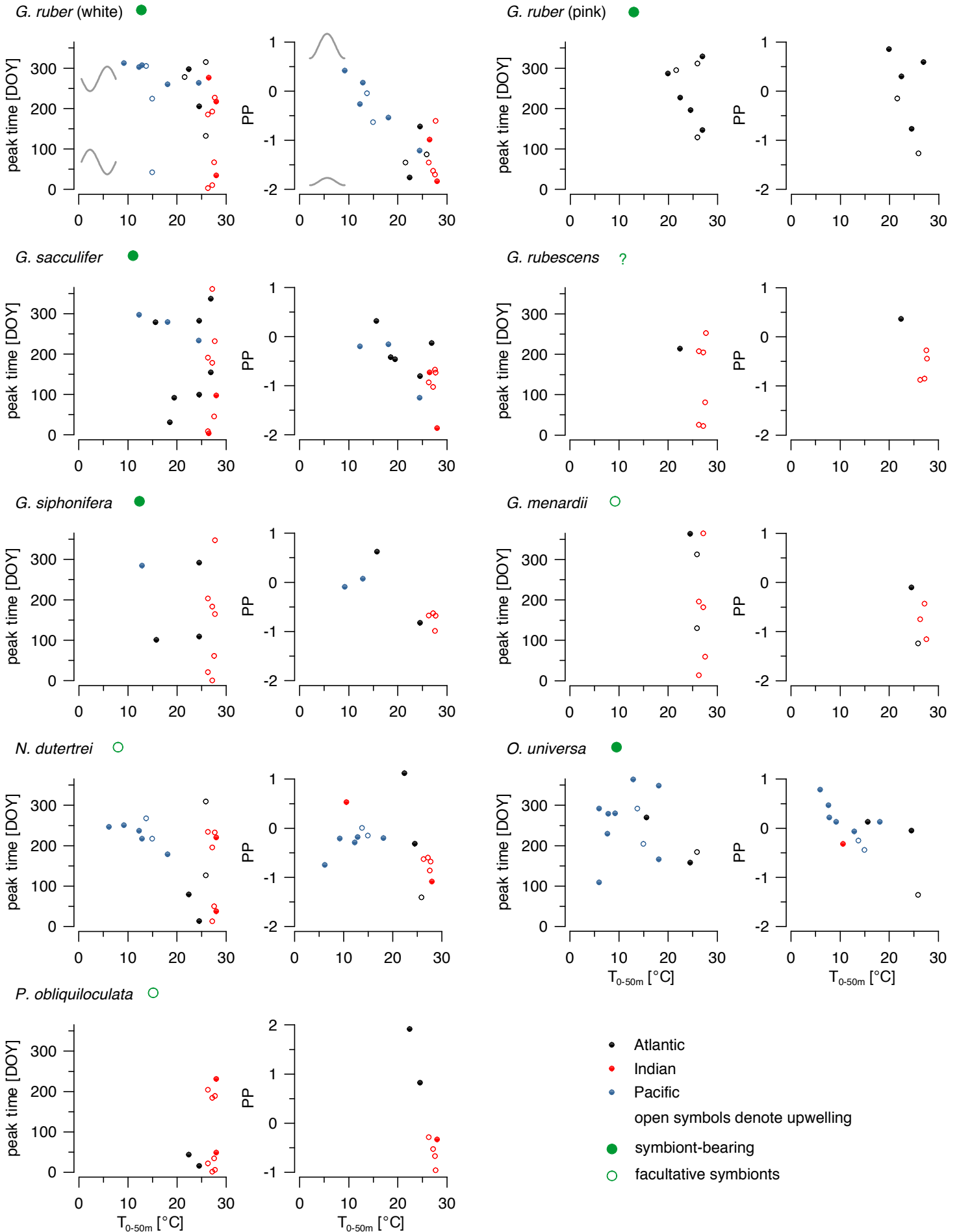


*G. truncatulinoides*



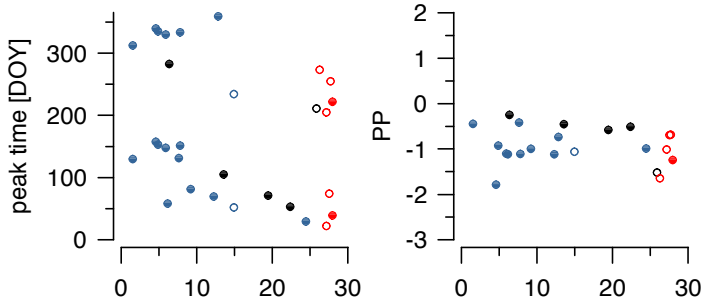


# Group A

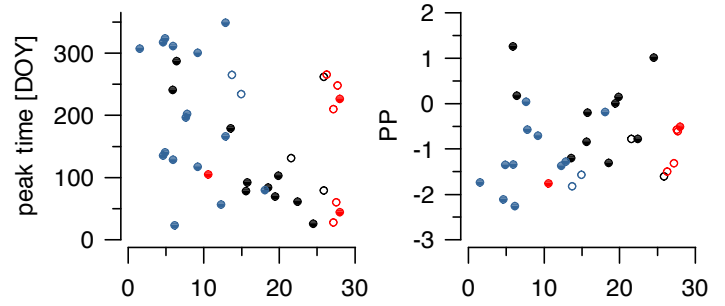


## Group B

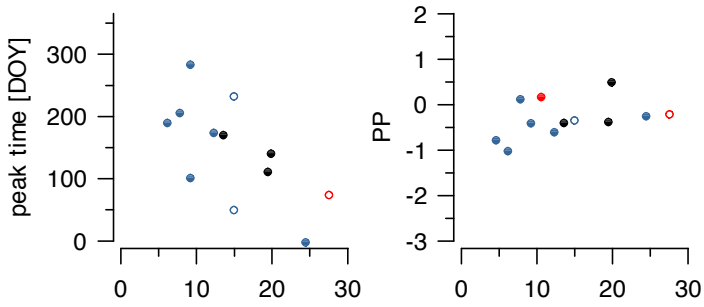
*G. glutinata* ○



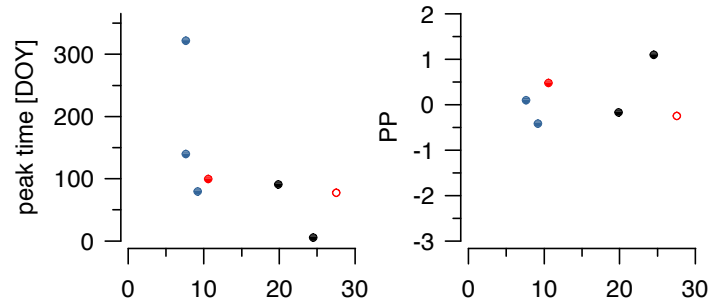
*G. bulloides*



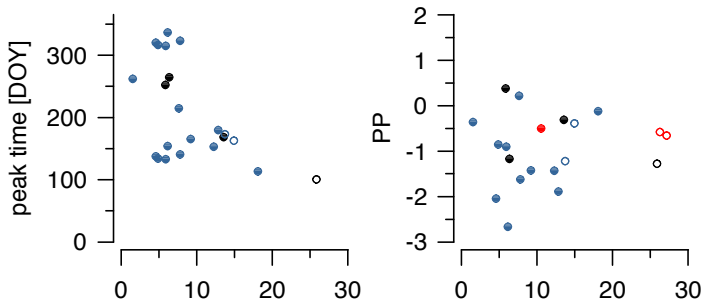
*G. scitula*



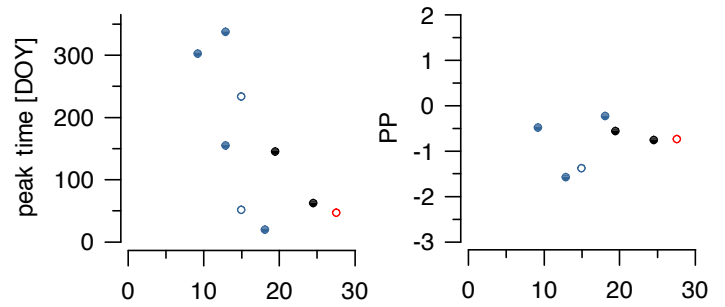
*G. falconensis*



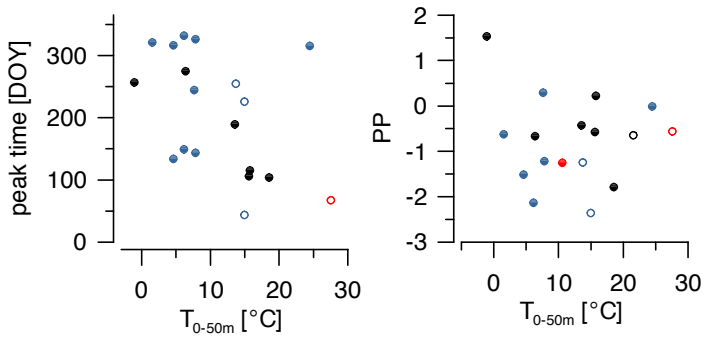
*T. quinqueloba*



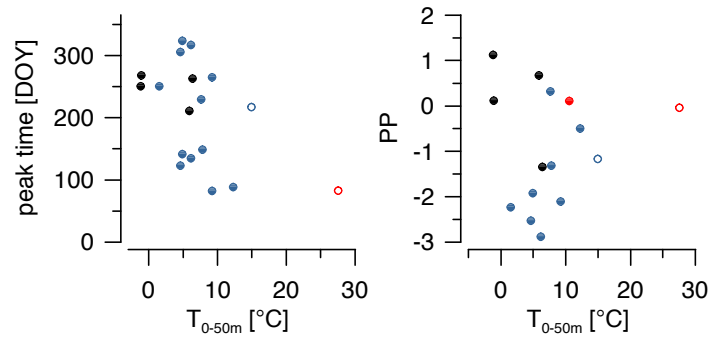
*G. calida*



*N. incompta*

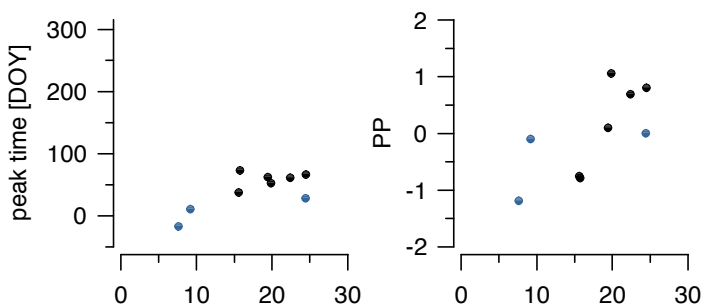


*N. pachyderma*

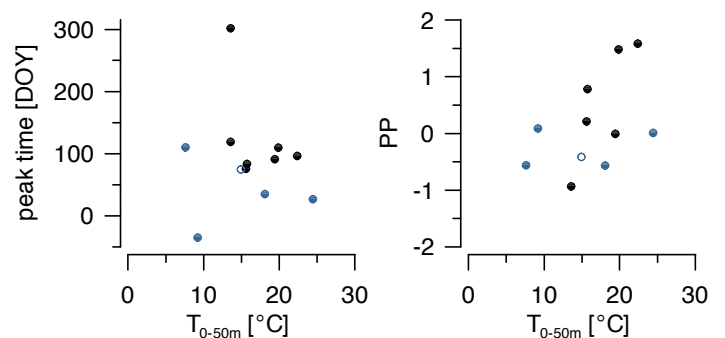


## Group C

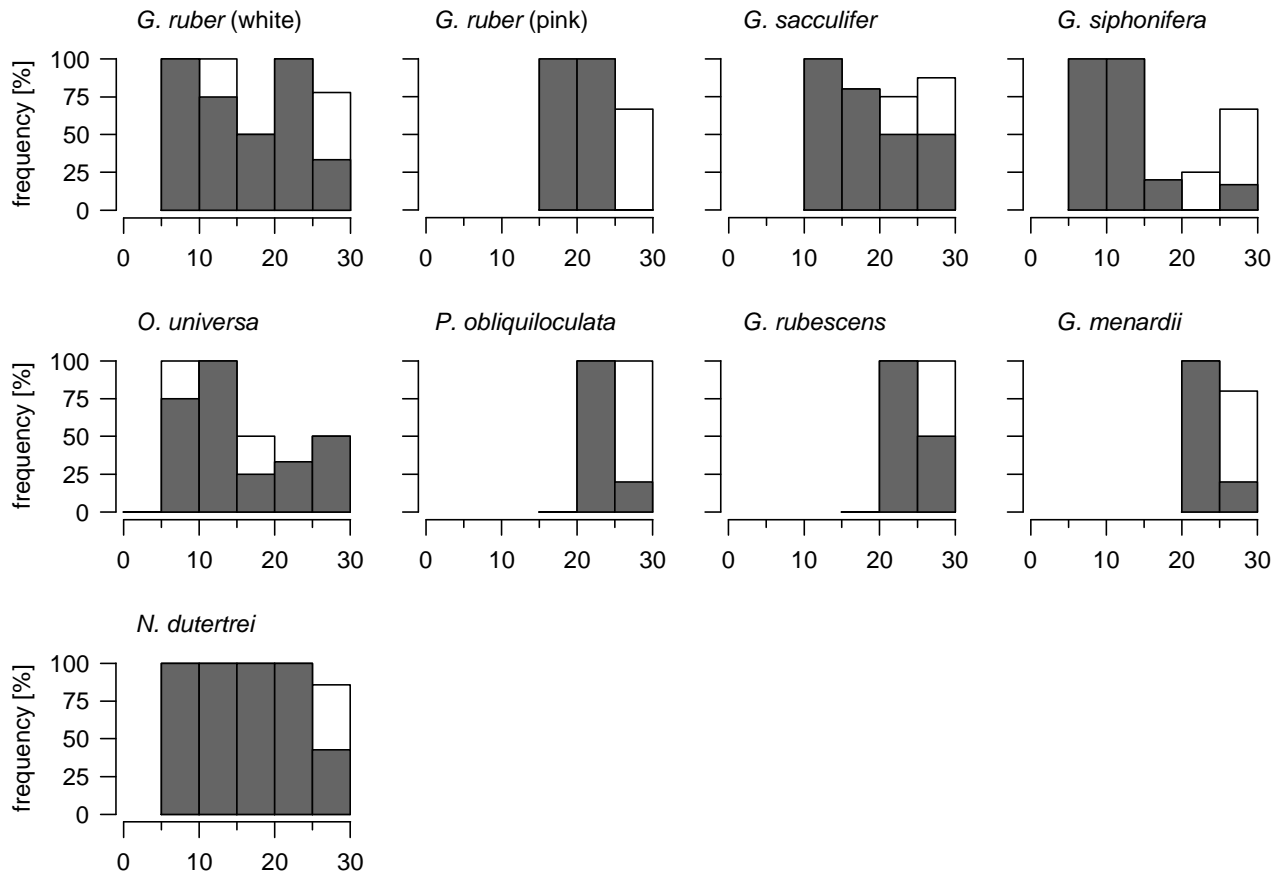
*G. truncatulinoides*



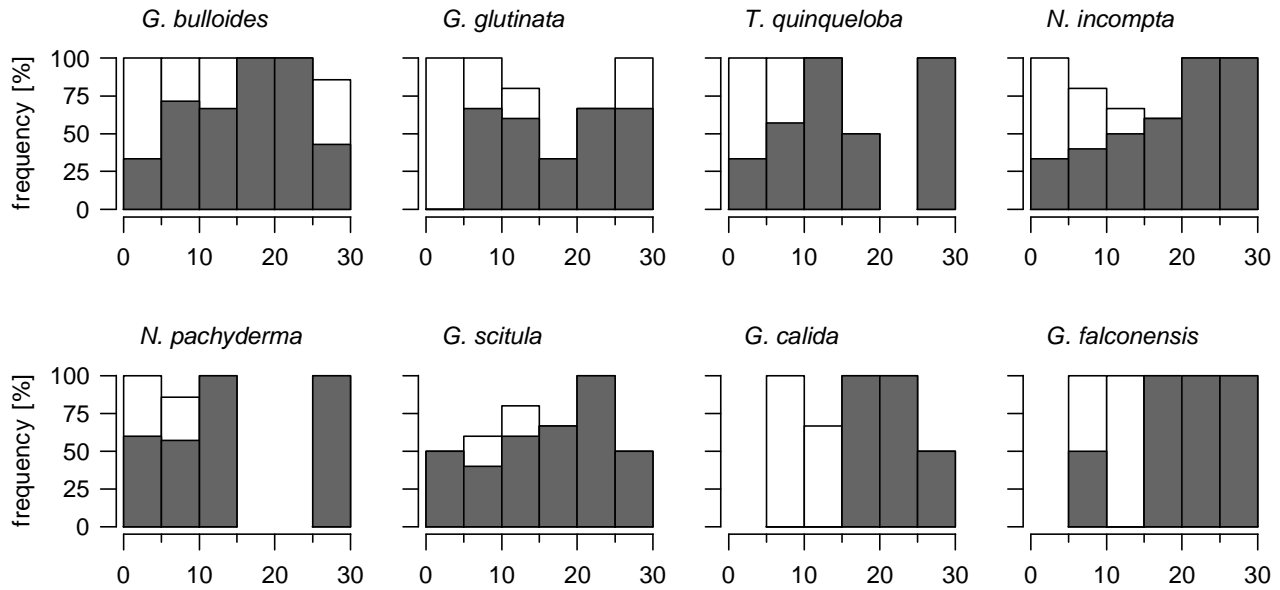
*G. inflata* ○



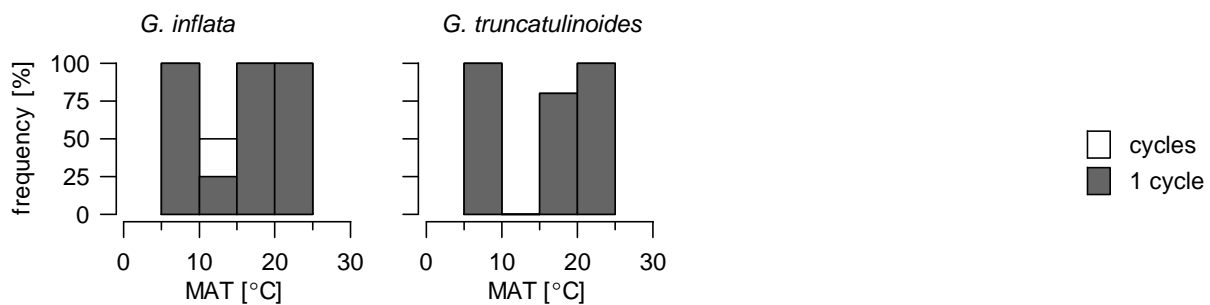
## Group A



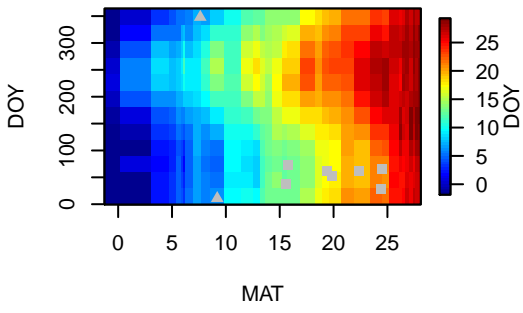
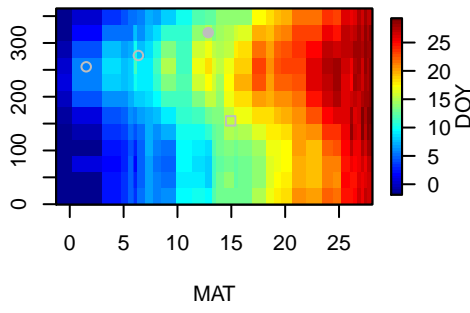
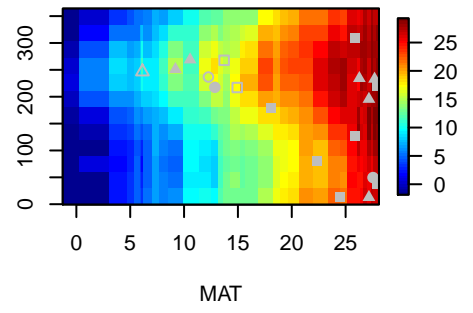
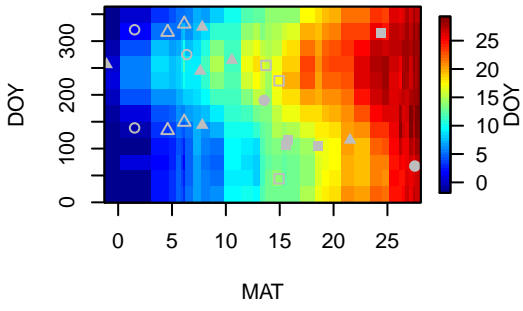
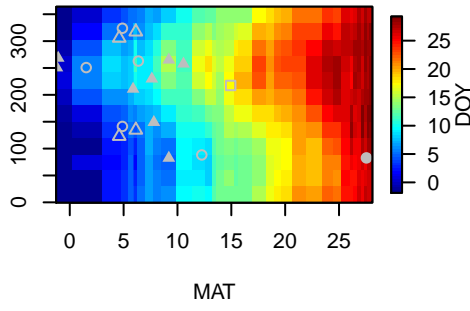
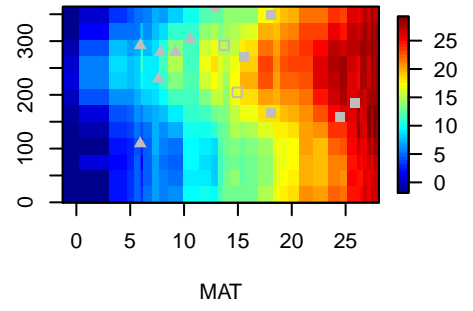
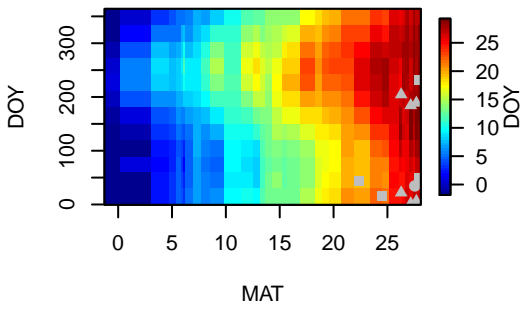
## Group B



## Group C





**G\_tru****G\_uvu****N\_dut****N\_inc****N\_pac****O\_uni****P\_obl****T\_qui**