

Reproduce Fric et al. (2020) analysis

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Recreate original results

We wanted to confirm that we understood correctly the Fric et al. analysis. We attempted to recreate the original Fric et al. analysis. Given time in the future, we may revisit some specific datasets for which our results disagree, but we are able to recreate the results for most models.

```
#Start clean
rm(list=ls())
library(tidyverse)
```

```
## -- Attaching packages ----- tidyverse
1.3.0 --
```

```
## v ggplot2 3.3.2      v purrr  0.3.4
## v tibble  3.0.3      v dplyr  1.0.1
## v tidyr   1.1.1      v stringr 1.4.0
## v readr   1.3.1      v forcats 0.5.0
```

```
## -- Conflicts ----- tidyverse_conflic
ts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()     masks stats::lag()
```

```
library(ggplot2)
library(gridExtra)
```

```
##
## Attaching package: 'gridExtra'
```

```
## The following object is masked from 'package:dplyr':
##
##      combine
```

```
#Import fric results (fric.results; RData file created by Fric_result_import.Rmd)
load("data/fric_results.RData")

#Import formatted occurrence data (alldata; RData file created by LarsenShirey_dataFormatting.Rmd)
load("data/occurrences.RData")
fricdata<-alldata
rm(alldata)
```

Now to try the analysis.

```

fricdatasets<-fric.results %>%
  group_by(name, region) %>% tally()

### Can we recreate their analysis?
regi<-1
lm.result.diff<-NULL
for(regi in 1:nrow(fricdatasets)){
  tempdata<-fricdata %>% filter(name==fricdatasets$name[regi], region==fricdatasets$region[regi])
  #onset single regression
  temponset<-tempdata %>% group_by(rndLat) %>% filter(SuccDay==min(SuccDay))
  temponset<-temponset %>% filter(!is.na(year))
  onset.sr<-summary(lm(SuccDay~rndLat, data=temponset))$coefficients

  #onset residual regression
  onset.1<-lm(SuccDay~year, data=temponset)
  temponset$yrresid<-onset.1$residuals
  onset.2<-lm(yrresid~alt, data=temponset)
  temponset$altyrresid<-onset.2$residuals
  onset.rr<-summary(lm(altyrresid~rndLat, data=temponset))$coefficients

  #termination single regression
  tempterm<-tempdata %>% group_by(rndLat) %>% filter(SuccDay==max(SuccDay))
  tempterm<-tempterm %>% filter(!is.na(year))
  term.sr<-summary(lm(SuccDay~rndLat, data=tempterm))$coefficients

  #termination residual regression
  term.1<-lm(SuccDay~year, data=tempterm)
  tempterm$yrresid<-term.1$residuals
  term.2<-lm(yrresid~alt, data=tempterm)
  tempterm$altyrresid<-term.2$residuals
  term.rr<-summary(lm(altyrresid~rndLat, data=tempterm))$coefficients

  #filter reported results
  temp.fric<-fric.results %>%
    filter(name==fricdatasets$name[regi], region==fricdatasets$region[regi])
  tempdiff<-tibble(
    name=tempdata$name[1],
    region=tempdata$region[1],
    onset.n=nrow(temponset),
    onset.src.me = (onset.sr[2,1]),
    onset.srp.me = (onset.sr[2,4]),
    onset.srR.me = ifelse(onset.sr[2,4]<0.05,ifelse(onset.sr[2,1]>0,1,-1),0),
    onset.src.fric = (filter(temp.fric, model=="lat")$onset.coef ),
    onset.srp.fric = (filter(temp.fric, model=="lat")$onset.p_mean ),
    onset.srR.fric = (filter(temp.fric, model=="lat")$onset.response ),
    onset.rrc.me = (onset.rr[2,1]),
    onset.rrp.me = (onset.rr[2,4]),
    onset.rrR.me = ifelse(onset.rr[2,4]<0.05,ifelse(onset.rr[2,1]>0,1,-1),0),
    onset.rrc.fric=(filter(temp.fric, model=="corr")$onset.coef ),
    onset.rrp.fric = (filter(temp.fric, model=="corr")$onset.p_mean ),
    onset.rrR.fric = (filter(temp.fric, model=="corr")$onset.response ),
    term.src.me = (term.sr[2,1]),

```

```
term.srp.me = (term.sr[2,4]),
term.srR.me = ifelse(term.sr[2,4]<0.05,ifelse(term.sr[2,1]>0,1,-1),0),
term.src.fric = (filter(temp.fric, model=="lat")$term.coef ),
term.srp.fric = (filter(temp.fric, model=="lat")$term.p_mean ),
term.srR.fric = (filter(temp.fric, model=="lat")$term.response ),
term.rrc.me = (term.rr[2,1]),
term.rrp.me = (term.rr[2,4]),
term.rrR.me = ifelse(term.rr[2,4]<0.05,ifelse(term.rr[2,1]>0,1,-1),0),
term.rrc.fric = (filter(temp.fric, model=="corr")$term.coef ),
term.rrp.fric = (filter(temp.fric, model=="corr")$term.p_mean ),
term.rrR.fric = (filter(temp.fric, model=="corr")$term.response ) )

lm.result.diff<-bind_rows(lm.result.diff,tempdiff)
rm(tempdata, temponset, tempterm, temp.fric, onset.sr, onset.rr, term.sr, term.rr,tempdiff)
}

summary(lm.result.diff)
```

```

##      name                region      onset.n      onset.src.me
## Length:105      Length:105      Min.   : 5.0      Min.   : -2.6232
## Class :character Class :character 1st Qu.:15.0      1st Qu.: -0.6314
## Mode  :character Mode  :character Median :19.0      Median : 0.1171
##                                     Mean  :20.5      Mean   : 0.3949
##                                     3rd Qu.:27.0      3rd Qu.: 1.3741
##                                     Max.   :39.0      Max.   : 4.1775
## onset.srp.me      onset.srR.me      onset.src.fric      onset.srp.fric
## Min.   :0.00000    Min.   : -1.0000    Min.   : -2.6232    Min.   :0.00000
## 1st Qu.:0.01763    1st Qu.: 0.0000    1st Qu.: -0.6314    1st Qu.:0.01001
## Median :0.18893    Median : 0.0000    Median : 0.1232    Median :0.16922
## Mean   :0.31814    Mean   : 0.1429    Mean   : 0.3822    Mean   :0.30833
## 3rd Qu.:0.56374    3rd Qu.: 0.0000    3rd Qu.: 1.3387    3rd Qu.:0.60191
## Max.   :0.98712    Max.   : 1.0000    Max.   : 4.1775    Max.   :0.98701
## onset.srR.fric      onset.rrc.me      onset.rrp.me      onset.rrR.me
## Min.   : -1.0000    Min.   : -1.98598    Min.   :0.0000    Min.   : -1.000
## 1st Qu.: 0.0000    1st Qu.: -0.09812    1st Qu.:0.1058    1st Qu.: 0.000
## Median : 0.0000    Median : 0.40079    Median :0.3760    Median : 0.000
## Mean   : 0.1333    Mean   : 0.59771    Mean   :0.3872    Mean   : 0.181
## 3rd Qu.: 0.0000    3rd Qu.: 1.01595    3rd Qu.:0.6443    3rd Qu.: 0.000
## Max.   : 1.0000    Max.   : 4.43208    Max.   :0.9464    Max.   : 1.000
## onset.rrc.fric      onset.rrp.fric      onset.rrR.fric      term.src.me
## Min.   : -1.9099    Min.   :0.00000    Min.   : -1.000    Min.   : -2.90317
## 1st Qu.: -0.1173    1st Qu.:0.07898    1st Qu.: 0.000    1st Qu.: -0.72412
## Median : 0.3727    Median :0.37674    Median : 0.000    Median : -0.02922
## Mean   : 0.5711    Mean   :0.39276    Mean   : 0.181    Mean   : 0.07122
## 3rd Qu.: 0.8863    3rd Qu.:0.67835    3rd Qu.: 0.000    3rd Qu.: 0.91742
## Max.   : 4.3313    Max.   :0.99961    Max.   : 1.000    Max.   : 4.10620
## term.srp.me      term.srR.me      term.src.fric      term.srp.fric
## Min.   :0.000027    Min.   : -1.0000    Min.   : -2.90317    Min.   :0.0000006
## 1st Qu.:0.033905    1st Qu.: 0.0000    1st Qu.: -0.72412    1st Qu.:0.0204120
## Median :0.208278    Median : 0.0000    Median : -0.02922    Median :0.1863427
## Mean   :0.314248    Mean   : 0.1238    Mean   : 0.07225    Mean   :0.3019252
## 3rd Qu.:0.551103    3rd Qu.: 0.0000    3rd Qu.: 0.91742    3rd Qu.:0.5171176
## Max.   :0.978261    Max.   : 1.0000    Max.   : 4.10620    Max.   :0.9778691
## term.srR.fric      term.rrc.me      term.rrp.me      term.rrR.me
## Min.   : -1.0000    Min.   : -2.0572    Min.   :0.0003315    Min.   : -1.00000
## 1st Qu.: 0.0000    1st Qu.: -0.2865    1st Qu.:0.1167625    1st Qu.: 0.00000
## Median : 0.0000    Median : 0.2550    Median :0.3060596    Median : 0.00000
## Mean   : 0.1143    Mean   : 0.2180    Mean   :0.3975083    Mean   : 0.06667
## 3rd Qu.: 0.0000    3rd Qu.: 0.7297    3rd Qu.:0.6678974    3rd Qu.: 0.00000
## Max.   : 1.0000    Max.   : 3.6841    Max.   :0.9943900    Max.   : 1.00000
## term.rrc.fric      term.rrp.fric      term.rrR.fric
## Min.   : -2.0543    Min.   :0.0001309    Min.   : -1.00000
## 1st Qu.: -0.2454    1st Qu.:0.1156675    1st Qu.: 0.00000
## Median : 0.2261    Median :0.2911718    Median : 0.00000
## Mean   : 0.2213    Mean   :0.3796113    Mean   : 0.07619
## 3rd Qu.: 0.7963    3rd Qu.:0.6653921    3rd Qu.: 0.00000
## Max.   : 3.6603    Max.   :0.9960557    Max.   : 1.00000

```

compare single regression results

#Single regression comparisons

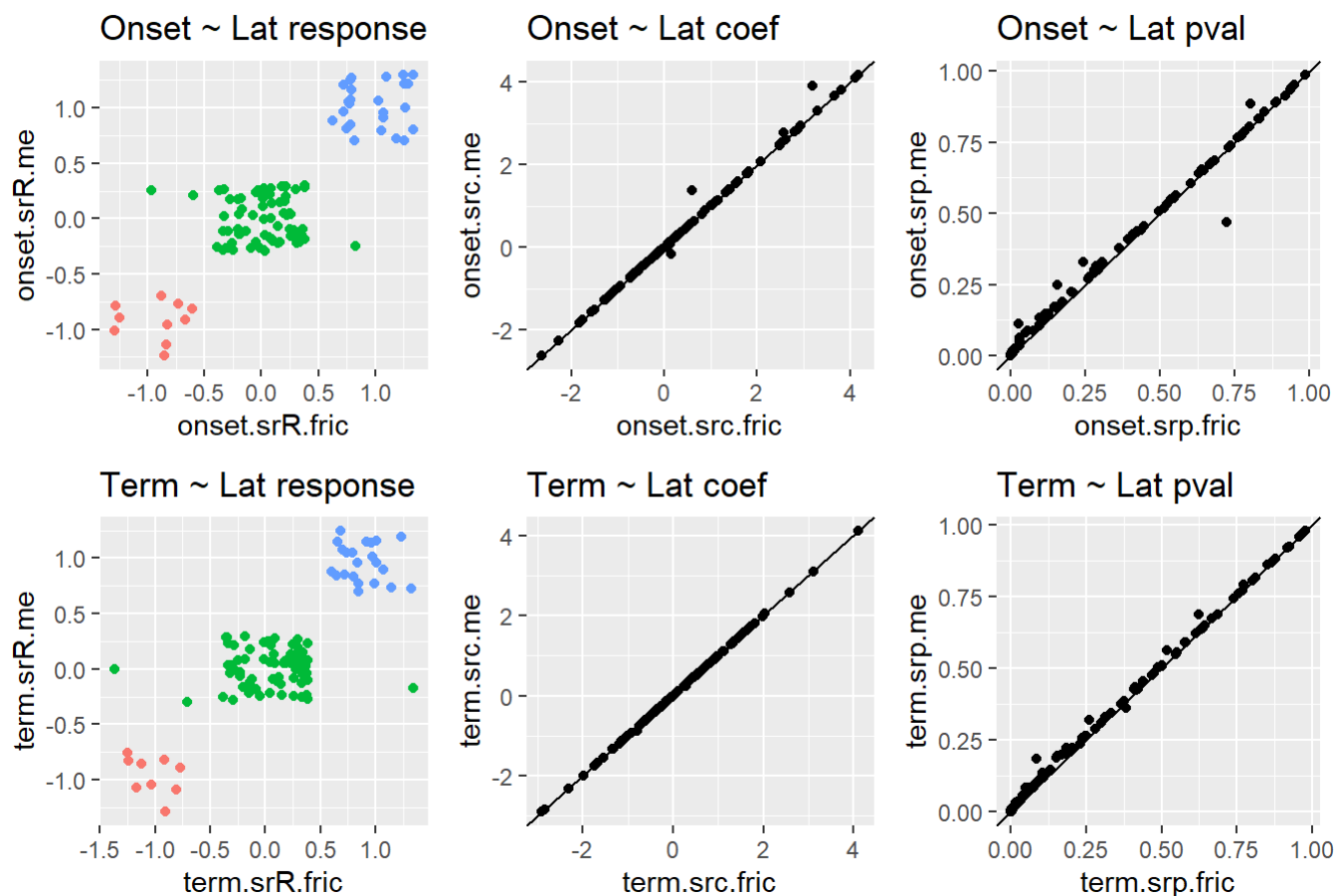
```

srplot1<-ggplot(data=lm.result.diff, aes(x=onset.srR.fric, y=onset.srR.me, color=as.factor(onset.srR.me))) + geom_jitter(height=0.3) + labs(title="Onset ~ Lat response", color="Y-resp")+ theme(legend.position = "none")
srplot2<-ggplot(data=lm.result.diff, aes(x=onset.src.fric, y=onset.src.me)) + geom_point() + geom_abline(slope=1, intercept=0) + labs(title="Onset ~ Lat coef")
srplot3<-ggplot(data=lm.result.diff, aes(x=onset.srp.fric, y=onset.srp.me)) + geom_point() + geom_abline(slope=1, intercept=0) + labs(title="Onset ~ Lat pval")
srplot4<-ggplot(data=lm.result.diff, aes(x=term.srR.fric, y=term.srR.me, color=as.factor(term.srR.me))) + geom_jitter(height=0.3) + labs(title="Term ~ Lat response", color="Y-resp") + theme(legend.position = "none")
srplot5<-ggplot(data=lm.result.diff, aes(x=term.src.fric, y=term.src.me)) + geom_point() + geom_abline(slope=1, intercept=0) + labs(title="Term ~ Lat coef")
srplot6<-ggplot(data=lm.result.diff, aes(x=term.srp.fric, y=term.srp.me)) + geom_point() + geom_abline(slope=1, intercept=0) + labs(title="Term ~ Lat pval")

grid.arrange(grobs=list(srplot1,srplot2,srplot3,srplot4,srplot5,srplot6), nrow=2, top="Single Regression Comparison")

```

Single Regression Comparison



```
failed<-NULL
```

```
paste("We did not detect the same Onset response as Fric (single reg.) for ",nrow(lm.result.diff %>% filter(onset.srR.me!=onset.srR.fric) )," datasets.",sep="")
```

```
## [1] "We did not detect the same Onset response as Fric (single reg.) for 3 datasets."
```

```
if(nrow(lm.result.diff %>% filter(onset.srR.me!=onset.srR.fric) )>0 ){
(lm.result.diff %>% filter(onset.srR.me!=onset.srR.fric) %>%
  select(name, region, onset.n, onset.src.me, onset.src.fric, onset.srp.me, onset.srp.fric, onset.srR.me, onset.srR.fric))
}
```

```
## # A tibble: 3 x 9
##   name region onset.n onset.src.me onset.src.fric onset.srp.me onset.srp.fric
##   <chr> <chr>   <int>         <dbl>         <dbl>         <dbl>         <dbl>
## 1 Coli~ N. Am~     5         -1.28         -1.28         0.112         0.0261
## 2 Erebi~ N. Am~     9          1.34          1.34         0.0631         0.0274
## 3 Euph~ Europe    11         -2.27         -2.27         0.0808         0.0492
## # ... with 2 more variables: onset.srR.me <dbl>, onset.srR.fric <dbl>
```

```
failed<-c(failed, which(lm.result.diff$onset.srR.me!=lm.result.diff$onset.srR.fric))
```

```
paste("We did not detect the same Termination response as Fric (single reg.) for ",nrow(lm.result.diff %>% filter(term.srR.me!=term.srR.fric) )," datasets.",sep="")
```

```
## [1] "We did not detect the same Termination response as Fric (single reg.) for 3 datasets."
```

```
if(nrow(lm.result.diff %>% filter(term.srR.me!=term.srR.fric) )>0 ){
  lm.result.diff %>% filter(term.srR.me!=term.srR.fric) %>%
  select(name, region, onset.n, term.src.me, term.src.fric, term.srp.me, term.srp.fric, term.srR.me, term.srR.fric)
}
```

```
## # A tibble: 3 x 9
##   name region onset.n term.src.me term.src.fric term.srp.me term.srp.fric
##   <chr> <chr>   <int>         <dbl>         <dbl>         <dbl>         <dbl>
## 1 Bolo~ Europe    19         -0.751         -0.751         0.0565         0.0388
## 2 Euch~ N. Am~    11         -1.09         -1.09         0.0834         0.0480
## 3 Lyca~ Europe    29          0.917          0.917         0.0559         0.0467
## # ... with 2 more variables: term.srR.me <dbl>, term.srR.fric <dbl>
```

```
failed<-c(failed, which(lm.result.diff$term.srR.me!=lm.result.diff$term.srR.fric))
print("Species for which our single regression response results vary:")
```

```
## [1] "Species for which our single regression response results vary:"
```

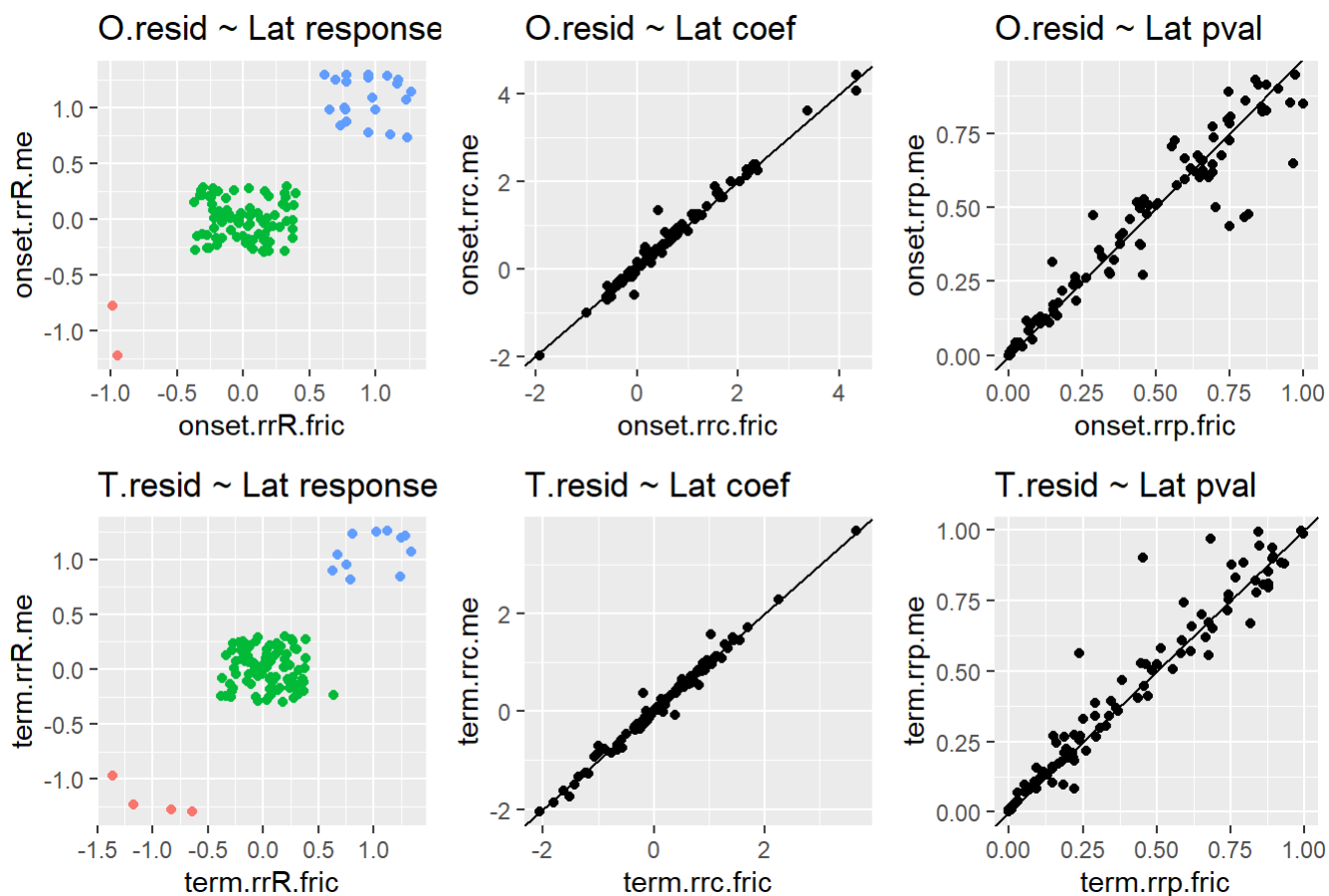
```
lm.result.diff$name[failed]
```

```
## [1] "Colias pelidne"      "Erebia mancinus"    "Euphydryas maturna"
## [4] "Boloria napaea"      "Euchloe creusa"     "Lycaena virgaureae"
```

```
#Residual regerssion comparisons
rrplot1<-ggplot(data=lm.result.diff, aes(x=onset.rrR.fric, y=onset.rrR.me , color=as.factor(onse
t.rrR.me))) + geom_jitter(height=0.3) + labs(title="O.resid ~ Lat response", color="Y-Resp") + t
heme(legend.position = "none")
rrplot2<-ggplot(data=lm.result.diff, aes(x=onset.rrc.fric, y=onset.rrc.me)) + geom_point() + geo
m_abline(slope=1, intercept=0) + labs(title="O.resid ~ Lat coef")
rrplot3<-ggplot(data=lm.result.diff, aes(x=onset.rrp.fric, y=onset.rrp.me)) + geom_point() + geo
m_abline(slope=1, intercept=0) + labs(title="O.resid ~ Lat pval")
rrplot4<-ggplot(data=lm.result.diff, aes(x=term.rrR.fric, y=term.rrR.me, color=as.factor(term.rr
R.me))) + geom_jitter(height=0.3) + labs(title="T.resid ~ Lat response", color="Y-resp") + theme
(legend.position = "none")
rrplot5<-ggplot(data=lm.result.diff, aes(x=term.rrc.fric, y=term.rrc.me)) + geom_point() + geom_
abline(slope=1, intercept=0) + labs(title="T.resid ~ Lat coef")
rrplot6<-ggplot(data=lm.result.diff, aes(x=term.rrp.fric, y=term.rrp.me)) + geom_point() + geom_
abline(slope=1, intercept=0) + labs(title="T.resid ~ Lat pval")

grid.arrange(grobs=list(rrplot1,rrplot2,rrplot3,rrplot4,rrplot5,rrplot6), nrow=2, top="Residual
Regression Comparison")
```

Residual Regression Comparison



```
failed<-NULL
paste("We did not detect the same Onset response as Fric (resid reg.) for ",nrow(lm.result.diff
%>% filter(onset.rrR.me!=onset.rrR.fric) )," datasets.",sep="")
```

```
## [1] "We did not detect the same Onset response as Fric (resid reg.) for 0 datasets."
```



```

if(nrow(lm.result.diff %>% filter(onset.rrR.me!=onset.rrR.fric) )>0 ){
lm.result.diff %>% filter(onset.rrR.me!=onset.rrR.fric) %>%
  select(name, region, onset.n, onset.rrc.me, onset.rrc.fric, onset.rrp.me, onset.rrp.fric, onset.rrR.me, onset.rrR.fric)
}
failed<-c(failed, which(lm.result.diff$onset.rrR.me!=lm.result.diff$onset.rrR.fric))

paste("We did not detect the same Termination response as Fric (resid reg.) for ",nrow(lm.result.diff %>% filter(term.rrR.me!=term.rrR.fric) )," datasets.",sep="")

```

```
## [1] "We did not detect the same Termination response as Fric (resid reg.) for 1 datasets."
```

```

if(nrow(lm.result.diff %>% filter(term.rrR.me!=term.rrR.fric) )>0 ){
  (lm.result.diff %>% filter(term.rrR.me!=term.rrR.fric) %>%
    select(name, region, onset.n, term.rrc.me, term.rrc.fric, term.rrp.me, term.rrp.fric, term.rrR.me, term.rrR.fric))
}

```

```

## # A tibble: 1 x 9
##   name region onset.n term.rrc.me term.rrc.fric term.rrp.me term.rrp.fric
##   <chr> <chr>   <int>         <dbl>         <dbl>         <dbl>         <dbl>
## 1 Bolo~ N. Am~    14          1.45          1.56          0.0680         0.0284
## # ... with 2 more variables: term.rrR.me <dbl>, term.rrR.fric <dbl>

```

```

failed<-c(failed, which(lm.result.diff$term.rrR.me!=lm.result.diff$term.rrR.fric))
print("Species for which our residual regression response results vary:")

```

```
## [1] "Species for which our residual regression response results vary:"
```

```
lm.result.diff$name[failed]
```

```
## [1] "Boloria epithore"
```

★

With regard to this mostly successful attempt above, we note:

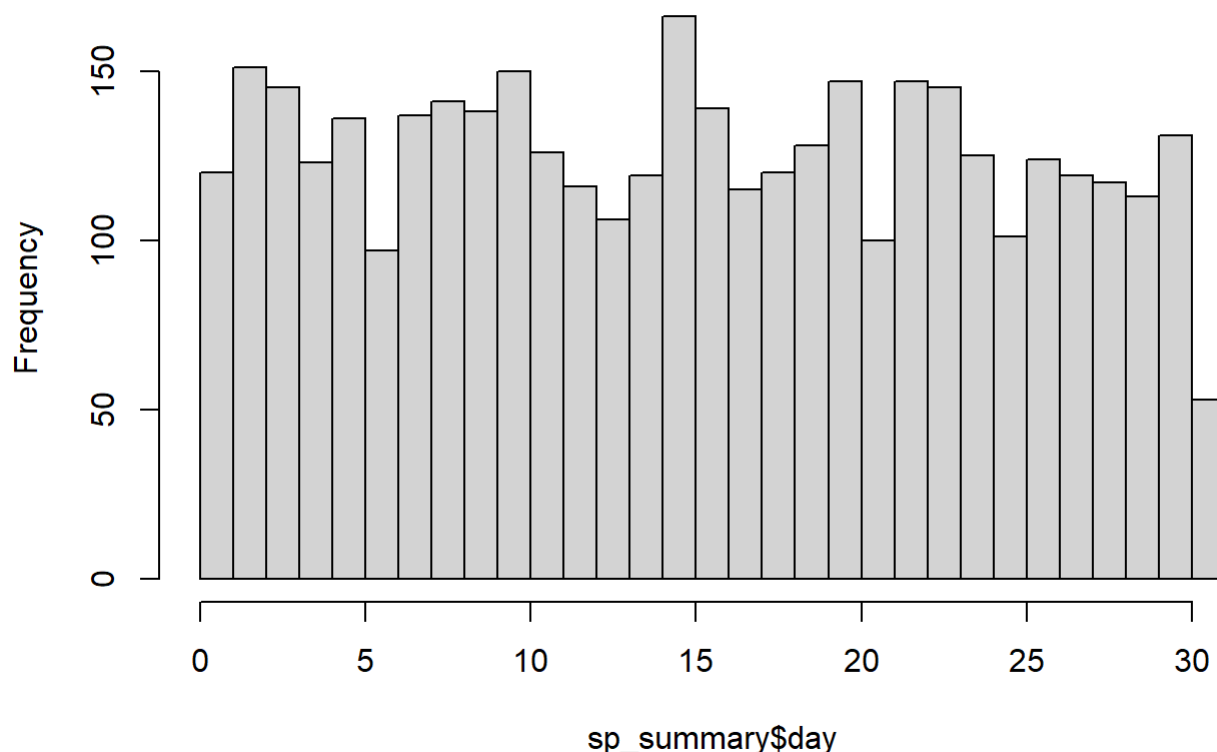
```
sp_summary<-fricdata %>%
  group_by(name, region, rndLat) %>%
  filter(name %in% fric.results$name, SuccDay==min(SuccDay) | SuccDay==max(SuccDay)) %>%
  mutate(day1=ifelse(day==1,1,0), metric=ifelse(SuccDay==min(SuccDay),"onset","term"))
sp_1<-sp_summary %>% group_by(name, region, rndLat, metric, SuccDay, day1) %>% tally()

print(paste(nrow(filter(sp_1,n>1, metric=="onset")), " onset dates and ",nrow(filter(sp_1,n>1, me
tric=="term")), " termination dates have more than one occurrence for the day; we believe that al
l data points that matched the minimum or maximum SuccDay were included in the original regressi
ons. This affected ",length(unique(sp_1$name[sp_1$n>1])), " species in the original analysis. The
re is no information in the original paper about how an occurrence record would have been select
ed when multiple occurrences occur on the onset or termination day; for residual regressions, th
is matters because the different altitudes and years associated with the occurrence records coul
d change the results.", sep=""))
```

```
## [1] "142 onset dates and 103 termination dates have more than one occurrence for the day; we
believe that all data points that matched the minimum or maximum SuccDay were included in the or
iginal regressions. This affected 85 species in the original analysis. There is no information i
n the original paper about how an occurrence record would have been selected when multiple occur
rences occur on the onset or termination day; for residual regressions, this matters because the
different altitudes and years associated with the occurrence records could change the results."
```

```
hist(sp_summary$day, breaks=c(0:31))
```

Histogram of sp_summary\$day



```
table(sp_summary$day)
```

```
##
##   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19  20
## 120 151 145 123 136  97 137 141 138 150 126 116 106 119 166 139 115 120 128 147
##  21  22  23  24  25  26  27  28  29  30  31
## 100 147 145 125 101 124 119 117 113 131  53
```

```
print(paste(nrow(filter(sp_1,day1==1, metric=="onset")), " onset dates and ",nrow(filter(sp_1,day
1==1, metric=="term")), " termination dates occur on the first day of the month; we believe that
these data points were included in the original regressions, despite the methods of the article
saying these were filtered out. This affected ",length(unique(sp_1$name[sp_1$day1==1])), " specie
s in the original analysis. We found that when we excluded these dates, an additional 7 response
s among our comparisons did not match.", sep=""))
```

```
## [1] "75 onset dates and 32 termination dates occur on the first day of the month; we believe
that these data points were included in the original regressions, despite the methods of the art
icle saying these were filtered out. This affected 51 species in the original analysis. We found
that when we excluded these dates, an additional 7 responses among our comparisons did not matc
h."
```

✱

Our initial attempt

```

#load fric results
load("data/fric_results.RData")

#load occurrence data
load('data/occurrences_FricAnalysis.RData')
fricdatasets<-fricdata %>%
  group_by(name, region) %>% tally()
## NEED TO ADD THIS CODE

### Can I recreate their analysis?
regi<-1
lm.result.diff<-NULL
for(regi in 1:nrow(fricdatasets)){
  tempdata<-fricdata %>% filter(name==fricdatasets$name[regi], region==fricdatasets$region[regi])
  #onset single regression
  temponset<-tempdata %>% group_by(rndLat) %>% filter(SuccDay==min(SuccDay))
  onset.sr<-summary(lm(SuccDay~rndLat, data=temponset))$coefficients

  #onset residual regression
  onset.1<-lm(SuccDay~year, data=temponset)
  temponset$yrresid<-onset.1$residuals
  onset.2<-lm(yrresid~alt, data=temponset)
  temponset$altyrresid<-onset.2$residuals
  onset.rr<-summary(lm(altyrresid~rndLat, data=temponset))$coefficients

  #termination single regression
  tempterm<-tempdata %>% group_by(rndLat) %>% filter(SuccDay==max(SuccDay))
  term.sr<-summary(lm(SuccDay~rndLat, data=tempterm))$coefficients

  #termination residual regression
  term.1<-lm(SuccDay~alt, data=tempterm)
  tempterm$altresid<-term.1$residuals
  term.2<-lm(altresid~year, data=tempterm)
  tempterm$altyrresid<-term.2$residuals
  term.rr<-summary(lm(altyrresid~rndLat, data=tempterm))$coefficients

  #filter reported results
  temp.fric<-fric.results %>%
    filter(name==fricdatasets$name[regi], region==fricdatasets$region[regi])
  tempdiff<-tibble(
    name=temponset$name[1],
    region=temponset$region[1],
    onset.n=nrow(temponset),
    onset.src.me = (onset.sr[2,1]),
    onset.src.fric = (filter(temp.fric, model=="lat")$onset.coef ),
    onset.srp.me = (onset.sr[2,4]),
    onset.srp.fric = (filter(temp.fric, model=="lat")$onset.p_mean ),
    onset.srR.me = ifelse(onset.sr[2,4]<0.05,ifelse(onset.sr[2,1]>0,1,-1),0),
    onset.srR.fric = (filter(temp.fric, model=="lat")$onset.response ),
    onset.rrc.me = (onset.rr[2,1]),
    onset.rrc.fric=(filter(temp.fric, model=="corr")$onset.coef ),
    onset.rrp.me = (onset.rr[2,4]),

```

```
onset.rrp.fric = (filter(temp.fric, model=="corr")$onset.p_mean ),
onset.rrR.me = ifelse(onset.rr[2,4]<0.05,ifelse(onset.rr[2,1]>0,1,-1),0),
onset.rrR.fric = (filter(temp.fric, model=="corr")$onset.response ),
term.src.me = (term.sr[2,1]),
term.src.fric = (filter(temp.fric, model=="lat")$term.coef ),
term.srp.me = (term.sr[2,4]),
term.srp.fric = (filter(temp.fric, model=="lat")$term.p_mean ),
term.srR.me = ifelse(term.sr[2,4]<0.05,ifelse(term.sr[2,1]>0,1,-1),0),
term.srR.fric = (filter(temp.fric, model=="lat")$term.response ),
term.rrc.me = (term.rr[2,1]),
term.rrc.fric = (filter(temp.fric, model=="corr")$term.coef ),
term.rrp.me = (term.rr[2,4]),
term.rrp.fric = (filter(temp.fric, model=="lat")$term.p_mean ),
term.rrR.me = ifelse(term.rr[2,4]<0.05,ifelse(term.rr[2,1]>0,1,-1),0),
term.rrR.fric = (filter(temp.fric, model=="corr")$term.response ))

lm.result.diff<-bind_rows(lm.result.diff,tempdiff)
rm(tempdata, temponset, tempterm, temp.fric, onset.sr, onset.rr, term.sr, term.rr,tempdiff)
}

summary(lm.result.diff)
```

```

##      name      region      onset.n      onset.src.me
## Length:105      Length:105      Min.   : 5.00      Min.   :-2.4370
## Class :character Class :character 1st Qu.:15.00      1st Qu.: -0.5481
## Mode  :character Mode  :character Median :19.00      Median : 0.1232
##                                     Mean  :20.46      Mean   : 0.3788
##                                     3rd Qu.:28.00      3rd Qu.: 1.3650
##                                     Max.   :39.00      Max.   : 4.2559
## onset.src.fric  onset.srp.me  onset.srp.fric  onset.srR.me
## Min.   :-2.6232 Min.   :0.0000004 Min.   :0.00000   Min.   :-1.0000
## 1st Qu.: -0.6314 1st Qu.:0.0188199 1st Qu.:0.01001   1st Qu.: 0.0000
## Median : 0.1232  Median :0.2123591 Median :0.16922   Median : 0.0000
## Mean   : 0.3822  Mean   :0.3228866 Mean   :0.30833   Mean   : 0.1429
## 3rd Qu.: 1.3387  3rd Qu.:0.5756877 3rd Qu.:0.60191   3rd Qu.: 0.0000
## Max.   : 4.1775  Max.   :0.9871186 Max.   :0.98701   Max.   : 1.0000
## onset.srR.fric  onset.rrc.me  onset.rrc.fric  onset.rrp.me
## Min.   :-1.0000 Min.   :-1.9748   Min.   :-1.9099   Min.   :0.00000
## 1st Qu.: 0.0000  1st Qu.: -0.1543  1st Qu.: -0.1173  1st Qu.:0.09619
## Median : 0.0000  Median : 0.4008   Median : 0.3727   Median :0.37605
## Mean   : 0.1333  Mean   : 0.5996   Mean   : 0.5711   Mean   :0.37926
## 3rd Qu.: 0.0000  3rd Qu.: 0.9866   3rd Qu.: 0.8863   3rd Qu.:0.62982
## Max.   : 1.0000  Max.   : 4.5447   Max.   : 4.3313   Max.   :0.95071
## onset.rrp.fric  onset.rrR.me  onset.rrR.fric  term.src.me
## Min.   :0.00000  Min.   :-1.0000   Min.   :-1.000    Min.   :-3.09680
## 1st Qu.:0.07898  1st Qu.: 0.0000   1st Qu.: 0.000    1st Qu.: -0.65171
## Median :0.37674  Median : 0.0000   Median : 0.000    Median :-0.07754
## Mean   :0.39276  Mean   : 0.1905   Mean   : 0.181    Mean   : 0.06975
## 3rd Qu.:0.67835  3rd Qu.: 0.0000   3rd Qu.: 0.000    3rd Qu.: 0.91742
## Max.   :0.99961  Max.   : 1.0000   Max.   : 1.000    Max.   : 4.10620
## term.src.fric   term.srp.me   term.srp.fric   term.srR.me
## Min.   :-2.90317 Min.   :0.000027   Min.   :0.0000006 Min.   :-1.0000
## 1st Qu.: -0.72412 1st Qu.:0.039455   1st Qu.:0.0204120 1st Qu.: 0.0000
## Median :-0.02922  Median :0.224368   Median :0.1863427 Median : 0.0000
## Mean   : 0.07225  Mean   :0.323966   Mean   :0.3019252 Mean   : 0.1238
## 3rd Qu.: 0.91742  3rd Qu.:0.556551   3rd Qu.:0.5171176 3rd Qu.: 0.0000
## Max.   : 4.10620  Max.   :0.971110   Max.   :0.9778691 Max.   : 1.0000
## term.srR.fric   term.rrc.me   term.rrc.fric   term.rrp.me
## Min.   :-1.0000  Min.   :-2.0539   Min.   :-2.0543   Min.   :0.0007642
## 1st Qu.: 0.0000  1st Qu.: -0.3022  1st Qu.: -0.2454  1st Qu.:0.1238575
## Median : 0.0000  Median : 0.2603   Median : 0.2261   Median :0.3003034
## Mean   : 0.1143  Mean   : 0.2039   Mean   : 0.2213   Mean   :0.3954863
## 3rd Qu.: 0.0000  3rd Qu.: 0.7632   3rd Qu.: 0.7963   3rd Qu.:0.6460594
## Max.   : 1.0000  Max.   : 3.7013   Max.   : 3.6603   Max.   :0.9768169
## term.rrp.fric   term.rrR.me   term.rrR.fric
## Min.   :0.0000006 Min.   :-1.00000   Min.   :-1.00000
## 1st Qu.:0.0204120 1st Qu.: 0.00000   1st Qu.: 0.00000
## Median :0.1863427 Median : 0.00000   Median : 0.00000
## Mean   :0.3019252 Mean   : 0.06667   Mean   : 0.07619
## 3rd Qu.:0.5171176 3rd Qu.: 0.00000   3rd Qu.: 0.00000
## Max.   :0.9778691 Max.   : 1.00000   Max.   : 1.00000

```

#Single regression comparisons

```

srplot1<-ggplot(data=lm.result.diff, aes(x=onset.srR.fric, y=onset.srR.me)) + geom_point() + labs(title="Onset ~ Lat response")
srplot2<-ggplot(data=lm.result.diff, aes(x=onset.src.fric, y=onset.src.me)) + geom_point() + geom_abline(slope=1, intercept=0) + labs(title="Onset ~ Lat coef")
srplot3<-ggplot(data=lm.result.diff, aes(x=onset.srp.fric, y=onset.srp.me)) + geom_point() + geom_abline(slope=1, intercept=0) + labs(title="Onset ~ Lat pval")
srplot4<-ggplot(data=lm.result.diff, aes(x=term.srR.fric, y=term.srR.me)) + geom_point() + labs(title="Onset ~ Lat response")
srplot5<-ggplot(data=lm.result.diff, aes(x=term.src.fric, y=term.src.me)) + geom_point() + geom_abline(slope=1, intercept=0) + labs(title="Term ~ Lat coef")
srplot6<-ggplot(data=lm.result.diff, aes(x=term.srp.fric, y=term.srp.me)) + geom_point() + geom_abline(slope=1, intercept=0) + labs(title="Term ~ Lat pval")

```

#Residual regression comparisons

```

rrplot1<-ggplot(data=lm.result.diff, aes(x=onset.rrR.fric, y=onset.rrR.me)) + geom_point() + labs(title="O.resid ~ Lat response")
rrplot2<-ggplot(data=lm.result.diff, aes(x=onset.rrc.fric, y=onset.rrc.me)) + geom_point() + geom_abline(slope=1, intercept=0) + labs(title="O.resid ~ Lat coef")
rrplot3<-ggplot(data=lm.result.diff, aes(x=onset.rrp.fric, y=onset.rrp.me)) + geom_point() + geom_abline(slope=1, intercept=0) + labs(title="O.resid ~ Lat pval")
rrplot4<-ggplot(data=lm.result.diff, aes(x=term.rrR.fric, y=term.rrR.me)) + geom_point() + labs(title="T.resid ~ Lat response")
rrplot5<-ggplot(data=lm.result.diff, aes(x=term.rrc.fric, y=term.rrc.me)) + geom_point() + geom_abline(slope=1, intercept=0) + labs(title="T.resid ~ Lat coef")
rrplot6<-ggplot(data=lm.result.diff, aes(x=term.rrp.fric, y=term.rrp.me)) + geom_point() + geom_abline(slope=1, intercept=0) + labs(title="T.resid ~ Lat pval")

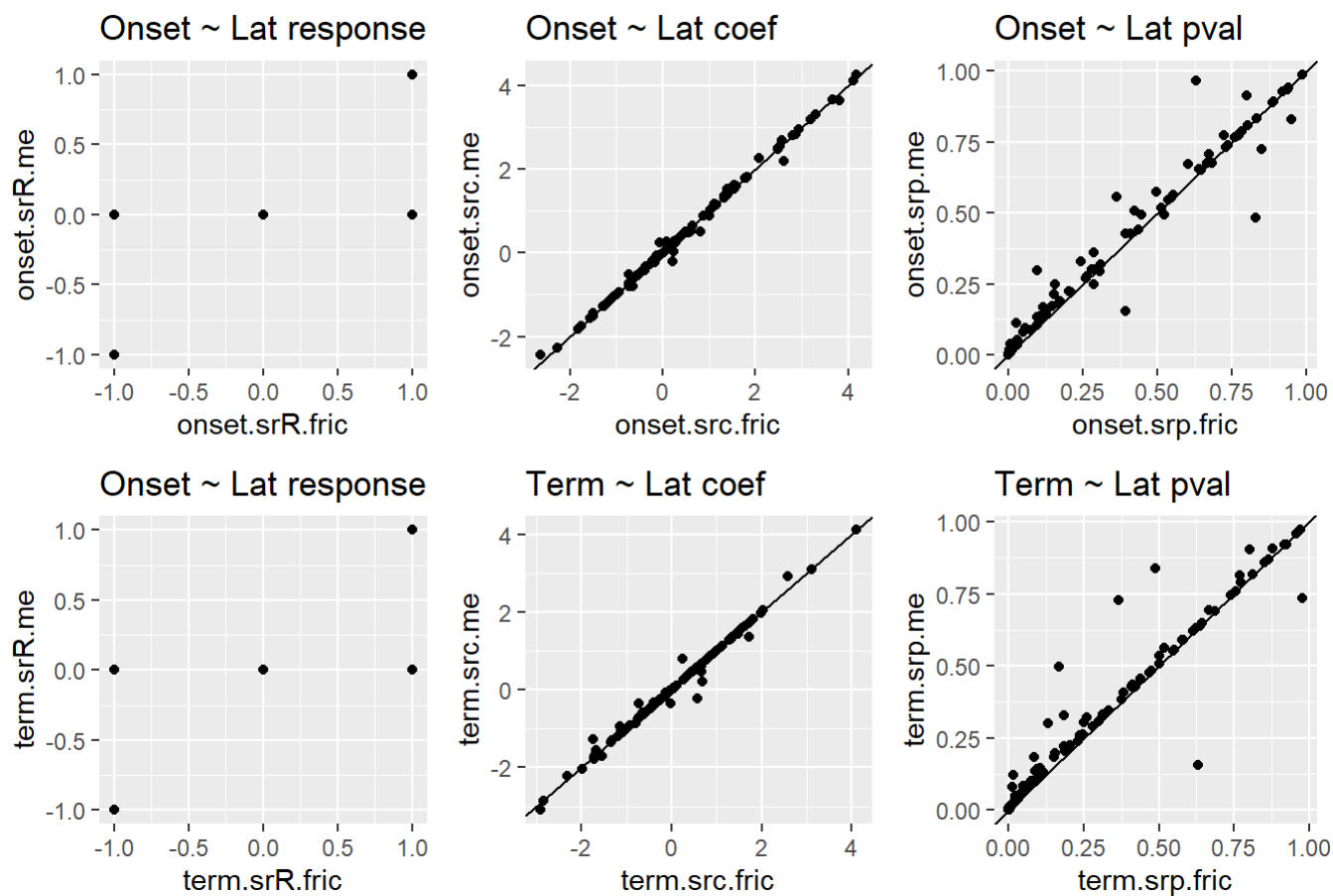
```

```

grid.arrange(grobs=list(srplot1,srplot2,srplot3,srplot4,srplot5,srplot6), nrow=2, top="Single Regression Comparison")

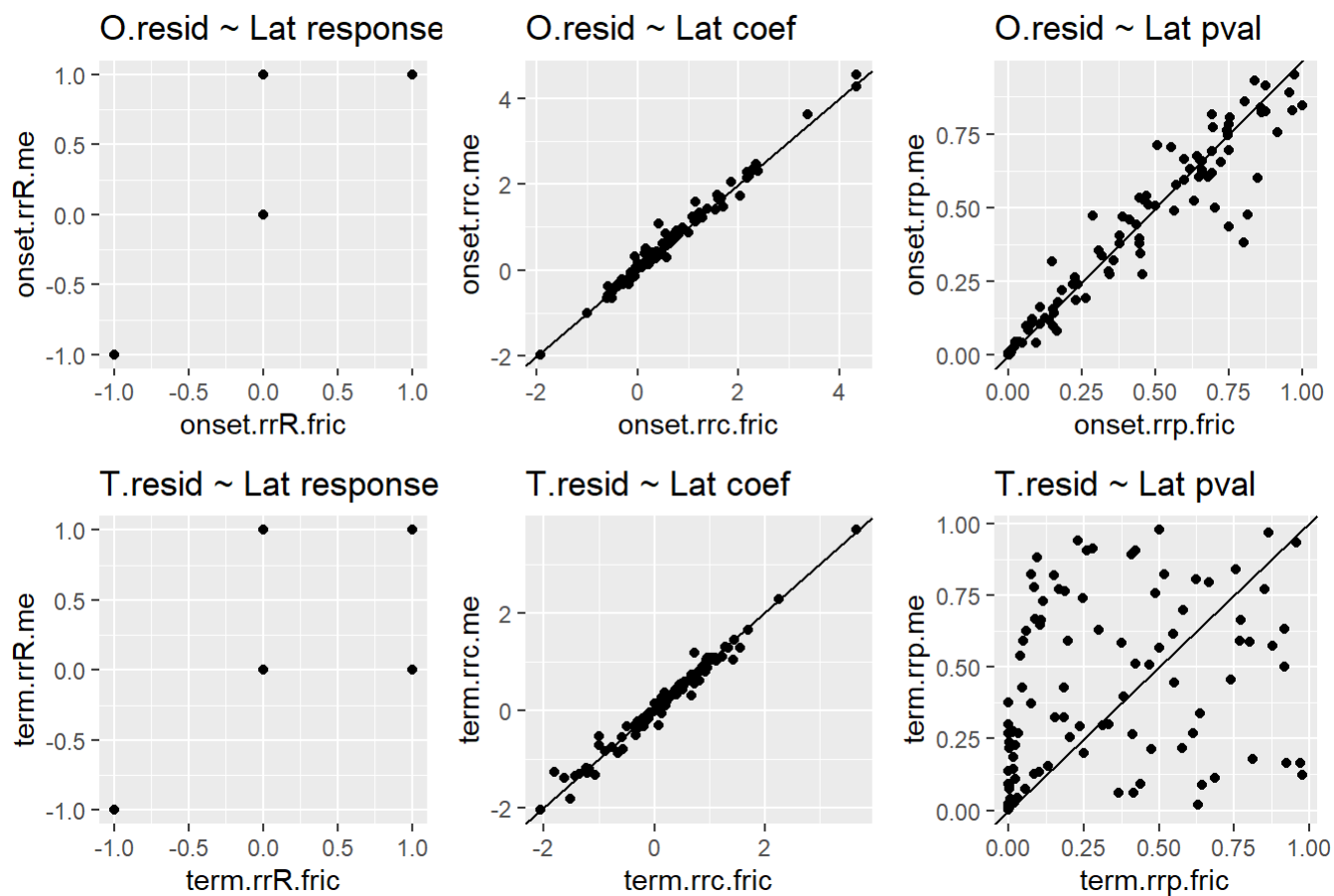
```

Single Regression Comparison



```
grid.arrange(grobs=list(rrplot1,rrplot2,rrplot3,rrplot4,rrplot5,rrplot6), nrow=2, top="Residual
Regression Comparison")
```


Residual Regression Comparison



End of File.