```
> ## Library
>
> library(nlme)
> #library(heavy)
> library(lattice)
>
> # Data input
> ozone<-read.table("/home/jmsinger/Desktop/ozonio.txt",header=T,na="NA")
> names(ozone)
[1] "id"        "Reflectance"
>
>
###########################################################
#############################
>
> ## Creating groups to specify different variances for units 3 and 5
>
>
> ozone$group35 <- (ifelse(ozone$id==5,1,0) + ifelse(ozone$id==3,1,0))
> ozone$group35e19 <- (ifelse(ozone$id==5,1,0) + ifelse(ozone$id==3,1,0)) +
(ifelse(ozone$id==1,2,0) + ifelse(ozone$id==9,2,0))
> ozone$group3519 <- (ifelse(ozone$id==5,1,0) + ifelse(ozone$id==3,1,0) +
ifelse(ozone$id==1,1,0) + ifelse(ozone$id==9,1,0))
> ozone$group359e1 <- ((ifelse(ozone$id==5,1,0) + ifelse(ozone$id==3,1,0) +
ifelse(ozone$id==9,1,0)) + (ifelse(ozone$id==1,2,0)))
> ozone$group35e9e1 <- ((ifelse(ozone$id==5,1,0) + ifelse(ozone$id==3,1,0) +
ifelse(ozone$id==9,2,0)) + (ifelse(ozone$id==1,3,0)))
>
###########################################################
############################
>
> # Creating variable obs
> ozone$obs<-1:27
>
>
###########################################################
#############################
>
> ## Initial model
>
> fit1<-lme(Reflectance ~ 1, na.action=na.omit, data =ozone, random = ~1|id )
> summary(fit1)
Linear mixed-effects model fit by REML
 Data: ozone
```

```
       AIC    BIC    logLik
  214.8697 218.644 -104.4349

Random effects:
 Formula: ~1 | id
      (Intercept) Residual
StdDev:   10.02121 10.23715

Fixed effects: Reflectance ~ 1
           Value Std.Error DF  t-value p-value
(Intercept) 46.35185  3.878111 18 11.95217      0

Standardized Within-Group Residuals:
     Min        Q1        Med        Q3        Max
-1.53588919 -0.50108048 -0.03806088  0.41994873  2.07790013

Number of Observations: 27
Number of Groups: 9
> ## Model with different within units variance for units 3 and 5
>
> fit2<-lme(Reflectance ~ 1, na.action=na.omit, data =ozone, random = ~1|id,
weights= varIdent(c("0" = 0.2), form = ~ 1 | group35), control=
list(MaxIter=100000,niterEM=100000,msMaxIter=100000,tolerance=0.0001,msTol
=0.0001,msMaxEval=1000000))
> summary(fit2)
Linear mixed-effects model fit by REML
 Data: ozone
      AIC     BIC   logLik
  210.7761 215.8085 -101.388

Random effects:
 Formula: ~1 | id
      (Intercept) Residual
StdDev:   10.69062 7.039516

Variance function:
 Structure: Different standard deviations per stratum
 Formula: ~1 | group35
 Parameter estimates:
     0      1
1.000000 2.351623
Fixed effects: Reflectance ~ 1
           Value Std.Error DF  t-value p-value
(Intercept) 45.94584  3.976543 18 11.55422      0
```

Standardized Within-Group Residuals:
```
      Min         Q1         Med          Q3         Max
-1.92374039 -0.48092291 -0.08364833  0.69088416  1.44857803
```

Number of Observations: 27
Number of Groups: 9
```
> fit3<-lme(Reflectance ~ 1, na.action=na.omit, data =ozone, random = ~1|
id,weights= varIdent(c("0" = 0.2), form = ~ 1 | group35e19), control=
list(MaxIter=100000,niterEM=100000,msMaxIter=100000,tolerance=0.0001,msTol
=0.0001,msMaxEval=1000000))
> summary(fit3)
```
Linear mixed-effects model fit by REML
 Data: ozone
```
     AIC     BIC    logLik
 208.4589 214.7494 -99.22947
```

Random effects:
 Formula: ~1 | id
```
       (Intercept) Residual
StdDev:   10.18867 11.18973
```

Variance function:
 Structure: Different standard deviations per stratum
 Formula: ~1 | group35e19
 Parameter estimates:
```
     2        0        1
1.0000000 0.4341761 1.4779206
```
Fixed effects: Reflectance ~ 1
```
            Value Std.Error DF  t-value p-value
(Intercept) 46.24154  3.813259 18 12.12651      0
```

Standardized Within-Group Residuals:
```
      Min         Q1         Med          Q3         Max
-1.35791599 -0.62695671 -0.05201674  0.62487414  1.83800992
```

Number of Observations: 27
Number of Groups: 9
```
>
```