setwd("XXX")

library(MCMCglmm)

bdat<-read.csv("dummy\_data.csv", header=TRUE)

DATA<-bdat

##changing names

names(DATA) <- c("loc", "date", "res", "estb", "estg", "estr", "sheet")

######using a simpler date scale

######Formatting date

DATA$Y<-unlist(strsplit(as.character(DATA$date), split="\_"))[c(TRUE,FALSE)]

DATA$M<-unlist(strsplit(as.character(DATA$date), split="\_"))[c(FALSE,TRUE)]

head(DATA)

TI<-data.frame(YM=sort(unique(DATA$date)), timeMon=(1:41)/12)

DATA<-merge(DATA,TI, by.x="date", by.y="YM", all.x=T)

DATA<-DATA[order(DATA$date),]

#######scaling abundances and time to mean=0 and sd=0.5

DATA$timeMonS<-(DATA$timeMon-mean(DATA$timeMon,na.rm=T))/(sd(DATA$timeMon, na.rm=T)/0.5)

DATA$RS<-(log(DATA$estr+1)-mean(log(DATA$estr+1),na.rm=T))/(sd(log(DATA$estr+1), na.rm=T)/0.5)

DATA$GS<-(log(DATA$estg+1)-mean(log(DATA$estg+1),na.rm=T))/(sd(log(DATA$estg+1), na.rm=T)/0.5)

DATA$BSS<-(log(DATA$estb +1)- mean(log(DATA$estg + 1),na.rm=T))/

(sd(log(DATA$estg +1), na.rm=T)/0.5)

######################################################

######################################################

######################################################

######################################################

################MCMCmodel ############################

######################################################

######################################################

######################################################

nitt=1100000

burnin=10000

thin=100

DATA$Y<-as.factor(DATA$Y)

DATA$sheet <- as.factor(DATA$sheet)

prior3 = list(R = list(V = diag(1), n = 0, fix = 1),

B = list(mu = c(rep(0,5)), V = diag(5)\*(8+pi^2/3)),

G=list(G1 = list(V = 1, nu = 1, alpha.mu=0,alpha.V=1000),

G2 = list(V=1, nu=1, alpha.mu=0, alpha.V=1000),

G3 = list(V=1, nu=1, alpha.mu=0, alpha.V=1000)))

####Note that this code takes a long time to run

mod3<-MCMCglmm(res~ timeMonS + RS + GS + BSS, random=~loc + sheet + Y,

data=DATA, family="categorical", prior=prior3,slice=F,

nitt=nitt,

burnin=burnin,

thin=thin, verbose=T)

autocorr(mod3$Sol)

autocorr(mod3$VCV)

plot(mod3$VCV)

HPDinterval(mod3$VCV)

HPDinterval(mod3$Sol)

posterior.mode(mod3$VCV)

posterior.mode(mod3$Sol)

LocV<-mod3$VCV[,1]/(mod3$VCV[,1]+mod3$VCV[,2]+mod3$VCV[,3]+1+(pi^2/3))

plot(LocV)

posterior.mode(LocV)

HPDinterval(LocV)

SheetV<-mod3$VCV[,2]/(mod3$VCV[,1]+mod3$VCV[,2]+mod3$VCV[,3]+1+(pi^2/3))

plot(SheetV)

posterior.mode(SheetV)

HPDinterval(SheetV)

yearV<-mod3$VCV[,3]/(mod3$VCV[,1]+mod3$VCV[,2]+mod3$VCV[,3]+1+(pi^2/3))

plot(yearV)

posterior.mode(yearV)

HPDinterval(yearV)

#####Note that the results will be different due to mcmc sampling and because this is not the original data