```
require(plyr)
require(dplyr)
require(tidyr)
require(ggplot2)
require(ggpubr)
require(zoo)
require(reshape2)
require(readxl)
require(SPEI)
require(hydroTSM)
require(ggrepel)

#the values of the slopes of the gcms for various things
SPEI<-c(-0.04772, -0.02528, -0.02803, 0.05672, -0.1154, 0.0775, 0.0935, 0.1075, 0.1446, 0.1517, 0.08245, -0.04754, 0.1871, -0.1264, 0.1804)
PREC<-c(7.309, 1.654, 3.097, 0.4872, 5.465, 1.13, 2.004, -1.71, -1.328, 1.177e-03, 0.9802, 1.676, -1.007, 3.189 , -2.094)
SPI<-c(-0.0868, -0.08351, -0.08982, -0.05157, -0.1874, -0.01188, -0.04269, -0.003214, 0.04156, 0.01091, -0.04489, -0.08409, 0.1065, -0.2346,
0.09246)

PREC1<-c(7.309, 1.654, 3.097, 0.4872, 5.465, 1.13, 2.004, -1.71, -1.328, 1.177e-03, 0.9802, 1.676, -1.007, 3.189 , -2.094, 7.309, 1.654, 3.097,
0.4872, 5.465, 1.13, 2.004, -1.71, -1.328, 1.177e-03, 0.9802, 1.676, -1.007, 3.189 , -2.094)
COMBO<-c(-0.04772, -0.02528, -0.02803, 0.05672, -0.1154, 0.0775, 0.0935, 0.1075, 0.1446, 0.1517, 0.08245, -0.04754, 0.1871, -0.1264, 0.1804,
-0.0868, -0.08351, -0.08982, -0.05157, -0.1874, -0.01188, -0.04269, -0.003214, 0.04156, 0.01091, -0.04489, -0.08409, 0.1065, -0.2346, 0.09246)

#the order of the GCM values above
name<-c("canesm2", "ccms4", "cesm1-bgc", "cmcc-cms", "cnrm-cm5", "gfdl-cm3", "hadgem2-cc", "hadgem2-es", "miroc5", "csiro-mk3-6-0", "gfdl-
esm2g","","mpi-esm-lr", "mri-cgcm3", "norems1-m","", "", "", "", "", "", "", "", "", "", "","inmcm4","", "", "")
data<-data.frame(SPEI, PREC)
data2<-data.frame(SPI, PREC)
data1<-data.frame(COMBO, PREC1)
names(data)<-c("COMBO", "PREC1")

lm1<-lm(SPEI~PREC)
lm2<-lm(SPI~PREC)

graph1<-ggplot(data, aes(x=PREC, y=SPEI))+geom_point()+theme_bw()+
  geom_abline(intercept=0.09103, slope=-0.03234)+
  scale_x_continuous(breaks = seq(-2,8, by=2),limits=c(-3,8),expand=c(0,0))+
  scale_y_continuous(breaks = seq(-0.25,0.2, by=0.05),limits=c(-0.25,0.2),expand=c(0,0))+
  geom_hline(yintercept=0)+geom_vline(xintercept=0)+
  xlab("Trend in Precipitation (mm/Year)")+ylab("Trend in Drought Years(per 50 years)")

graph2<-ggplot(data, aes(x=PREC, y=SPI))+geom_point()+theme_bw()+
  geom_abline(intercept=-0.007708, slope=-0.026538)+
  scale_x_continuous(breaks = seq(-2,8, by=2),limits=c(-3,8),expand=c(0,0))+
  scale_y_continuous(breaks = seq(-0.25,0.2, by=0.05),limits=c(-0.25,0.2),expand=c(0,0))+
  geom_hline(yintercept=0)+geom_vline(xintercept=0)+
  xlab("Trend in Precipitation (mm/Year)")+ylab("Trend in Drought Years(per 50 years)")

#the combination plot

graph3<-ggplot(data1, aes(x=PREC1, y=COMBO))+geom_point(aes(color="SPI"))+
  geom_text(aes(label=name),hjust=-0.1, vjust=0,angle=270)+theme_bw()+
  geom_point(data=data, aes(color="SPEI"))+
  scale_color_manual(name="Index",values=c("SPI"="Red", "SPEI"="Blue"))+
  geom_abline(intercept=0.09103, slope=-0.03234, colour="blue")+geom_abline(intercept=-0.007708, slope=-0.026538, colour="red")+
  scale_x_continuous(breaks = seq(-2,8, by=2),limits=c(-3,8),expand=c(0,0))+
  scale_y_continuous(breaks = seq(-0.25,0.2, by=0.05),limits=c(-0.25,0.2),expand=c(0,0))+
  geom_hline(yintercept=0)+geom_vline(xintercept=0)+
  xlab("Trend in Precipitation (mm/Year)")+ylab("Trend in Drought Years(per 50 years)")

graph3
```