Q1:

1: my_data<-read.table("Sediment.csv",header=TRUE,sep=',') ;

2: my_data_new<-my_data[11:50,];

write.table(my_data_new,file = "my_data_new.txt");

3: Subroutines:

library(moments);

theta<-select(my_data_new,theta)%>% unlist;

high<-length(theta[theta>1.5]);

percentage<-high/length(theta);

Percentage;

Result:

0.15

Q2:

1: mean:

a<-lapply(my_data,mean);

title	theta	Theta_p	nu	uf	Uf_p	ws	d50	cb	bnch
result	1.128944	0.615646	11.63058	80.14362	57.70311	36.21043	0.4455914	0.1025496	0.09567145

Median:

b<-lapply(my_data,median);

title	theta	Theta_p	nu	uf	Uf_p	ws	d50	cb	bnch
result	0.8829	0.4128	10.87	75.47	52.7	32.18	0.436	0.05918	0.051109

Mode:

z<-lapply(my_data,mfv);

title	theta	Theta_p	nu	uf	Uf_p	ws	d50	cb	bnch
result	0.5064/1.1218	0.2030/0.2447/1.1765	10.405	75.76/85.59/118.93	32.72	23.78	0.56	0.000144/0.00061/0.01370	0.012743/0.018934/0.217030

2:

Variance:

c<-lapply(my_data,var)；

title	theta	Theta_p	nu	uf	Uf_p	ws	d50	cb	bnch
result	0.780697	0.2342974	8.80626	880.5308	610.4776	188.7844	0.04343861	0.01236287	0.009070726

Standard deviation

d<-lapply(my_data,sd);

title	theta	Theta_p	nu	uf	Uf_p	ws	d50	cb	bnch
result	0.8835706	0.4840428	2.967534	29.67374	24.70784	13.73988	0.2084193	0.1111884	0.09524036

Interquartile range:

```
e<-lapply(my_data,IQR);
```

title	theta	Theta_p	nu	uf	Uf_p	ws	d50	cb	bnch
result	0.7733	0.7208	1.765	40.77	43.51	18.83	0.228	0.1607	0.155736

Skewness:

```
f<-lapply(my_data,skewness);
```

title	theta	Theta_p	nu	uf	Uf_p	ws	d50	cb	bnch
result	0.2047927	0.7944172	3.358169	0.7832804	0.4805202	0.9790289	1.191644	1.237314	0.6757262

Kurtosis:

```
g<-lapply(my_data,kurtosis);
```

title	theta	Theta_p	nu	uf	Uf_p	ws	d50	cb	bnch
result	8.833834	2.5154	16.9477	3.636067	2.99806	3.556631	3.987861	4.074217	2.041399

3:

```
mydata2<-my_data
mydata2[c(1,5,15),]<-NA
mydata2<-na.omit(mydata2)
mean_new<-lapply(mydata2,mean)
sd_new<-lapply(mydata2,sd)
```

Mean

title	theta	Theta_p	nu	uf	Uf_p	ws	d50	cb	bnch
result	1.121501	0.6057941	11.64322	79.92201	57.47705	36.12445	0.4465945	0.1019711	0.09574594

Standard deviation

title	theta	Theta_p	nu	uf	Uf_p	ws	d50	cb	bnch
result	0.8811976	0.4789021	2.981854	29.55227	24.53078	13.67873	0.2092765	0.1112059	0.09441528

Q3:

1:

```
data_q3<-read.table('OTCHybrid.csv',header = TRUE,sep = ',')
class(data_q3$X)
```

```
date<- as.character(data_q3$X)
class(date)
data_q3$X<-strptime(date,format = "%m/%d/%y %H:%M")
plot(data_q3$X,data_q3$Residual,'o',main = "time series of residual",xlab = "time",ylab="residual")
```

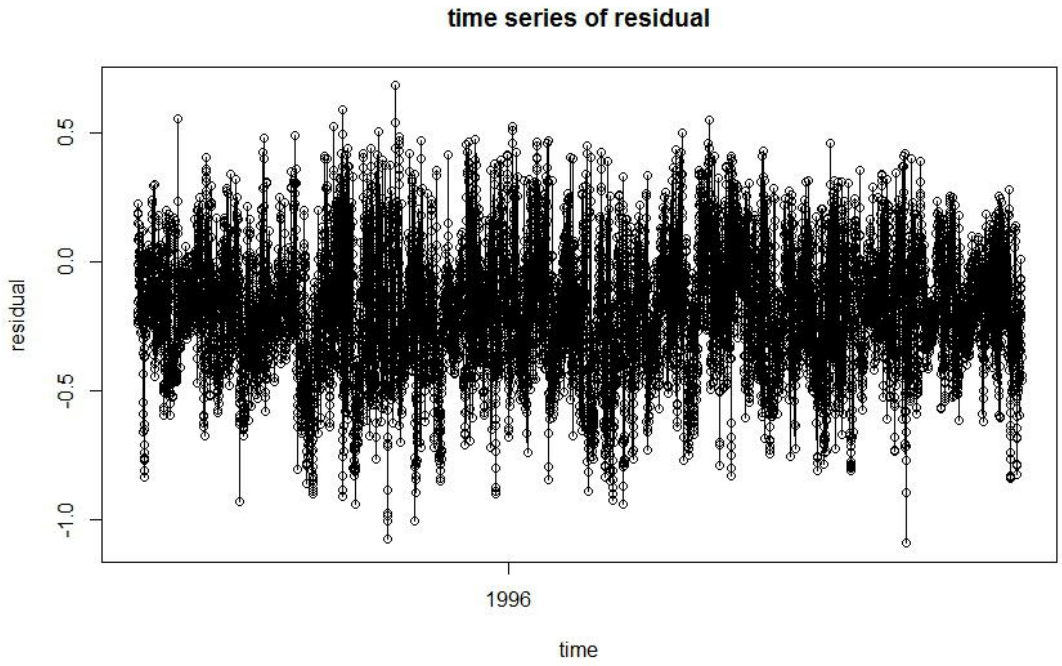

Fig.1

2:

```
library(ggplot2)
g_scatter<-ggplot(data_q3,aes(E.W.M21,N.S.M21,),main='scatter')
g_scatter+geom_point()+ggtitle("scatterplot")
```

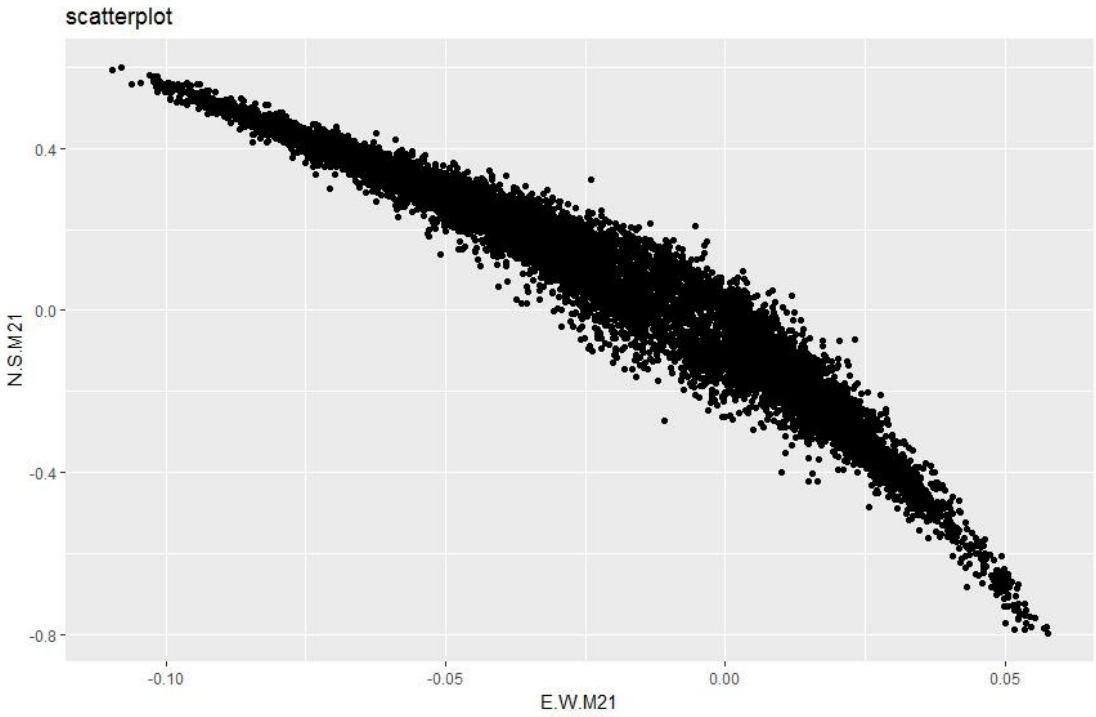

Fig.2

3:

```
g_his_E<-ggplot(data_q3,aes(Ave.E.W),main='histo')
g_his_E+geom_histogram(bins = 30)+ggtitle('Histogram of Ave.E.W')+ylab('quantity')
g_his_N<-ggplot(data_q3,aes(Ave.N.S),main='histo')
g_his_N+geom_histogram()+ggtitle('Histogram of Ave.N.S')+ylab('quantity')
g_his_A<-ggplot(data_q3,aes(AveSpeed),main='histo')
g_his_A+geom_histogram()+ggtitle('Histogram of AveSpeed')+ylab('quantity')
```

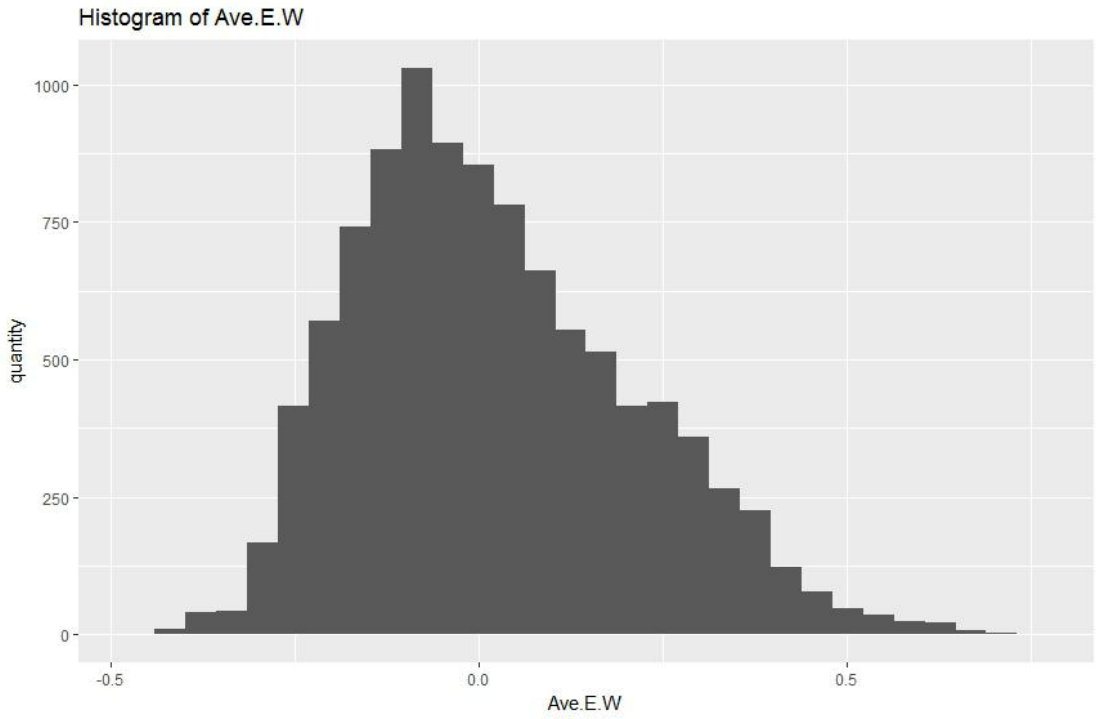

Fig.3

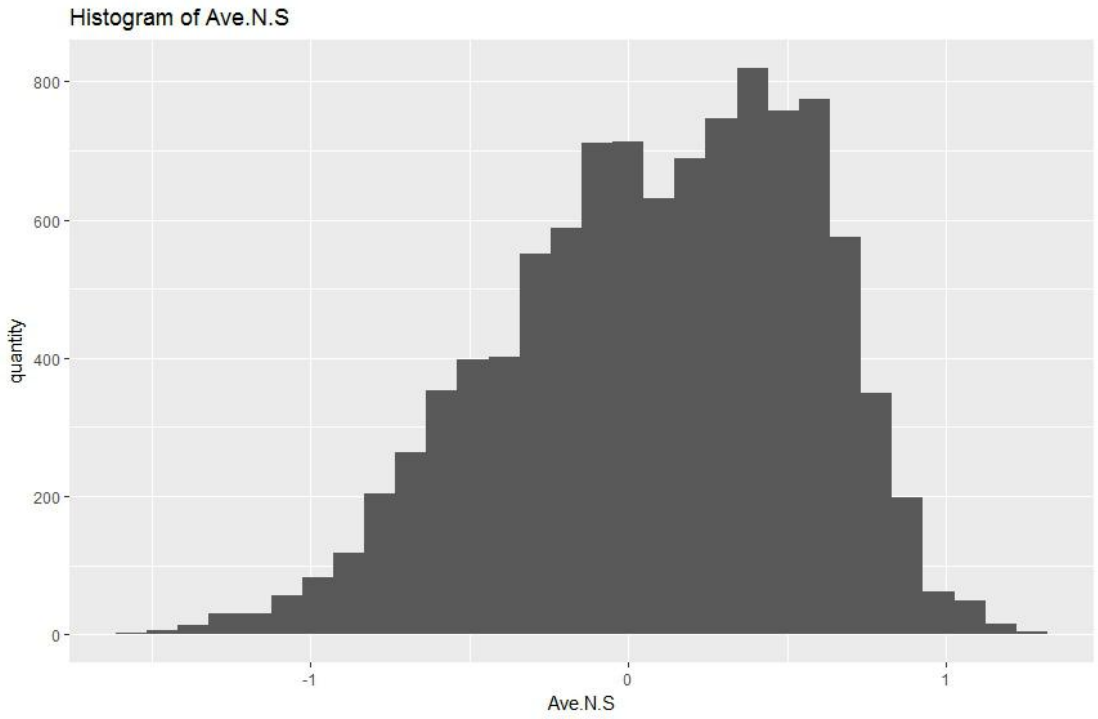

Fig.4

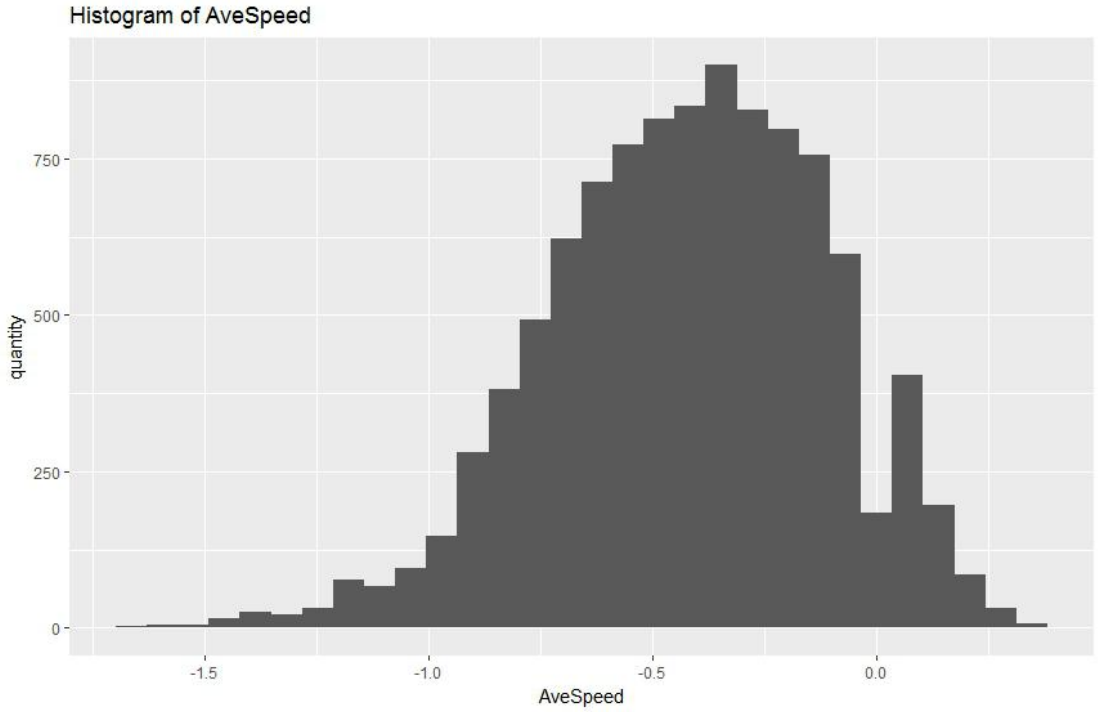

Fig.5

4:

```
sta_E<-rep('Ave.E.W',length(data_q3$Ave.E.W))
sta_N<-rep('Ave.N.S',length(data_q3$Ave.N.S))
sta_A<-rep('AveSpeed',length(data_q3$AveSpeed))
a <- factor(c(sta_E,sta_N,sta_A))
```

```
b<- c(data_q3$Ave.E.W,data_q3$Ave.N.S,data_q3$AveSpeed)
box<-data.frame(a,b)
ggplot(box,aes(x=a,y=b),main='no')+geom_boxplot() + ggtitle('comparison of 3 variables') +
ylab('value')
```

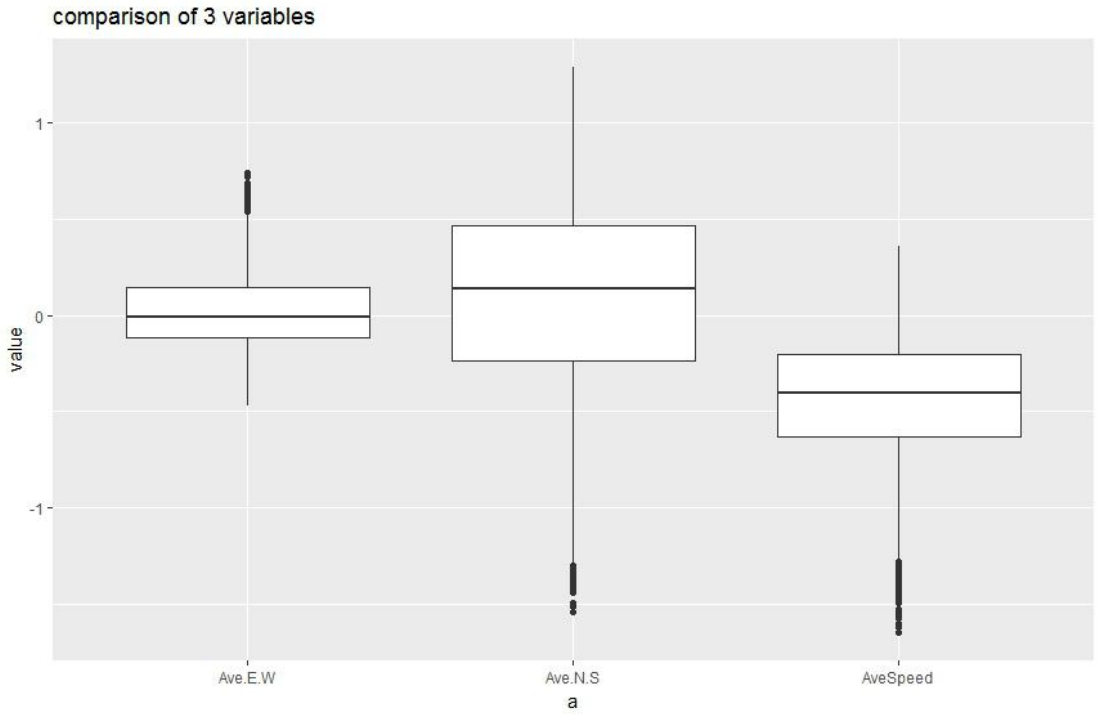

Fig.6

5:

```
#install.packages('ggthemes')
library('ggthemes')
ggplot(data_q3,aes(x=Ave.E.W,y=Ave.N.S))+geom_point()+geom_rug()+theme_tufte(ticks=F)
+ggtitle('Dot-dash')
#install.packages('ggExtra')
library(ggExtra)
m<-ggplot(data_q3,aes(x=Ave.E.W,y=Ave.N.S))
m+geom_point()+theme_tufte(ticks=F)
ggMarginal(m,type='histogram',fill='transparent')
```

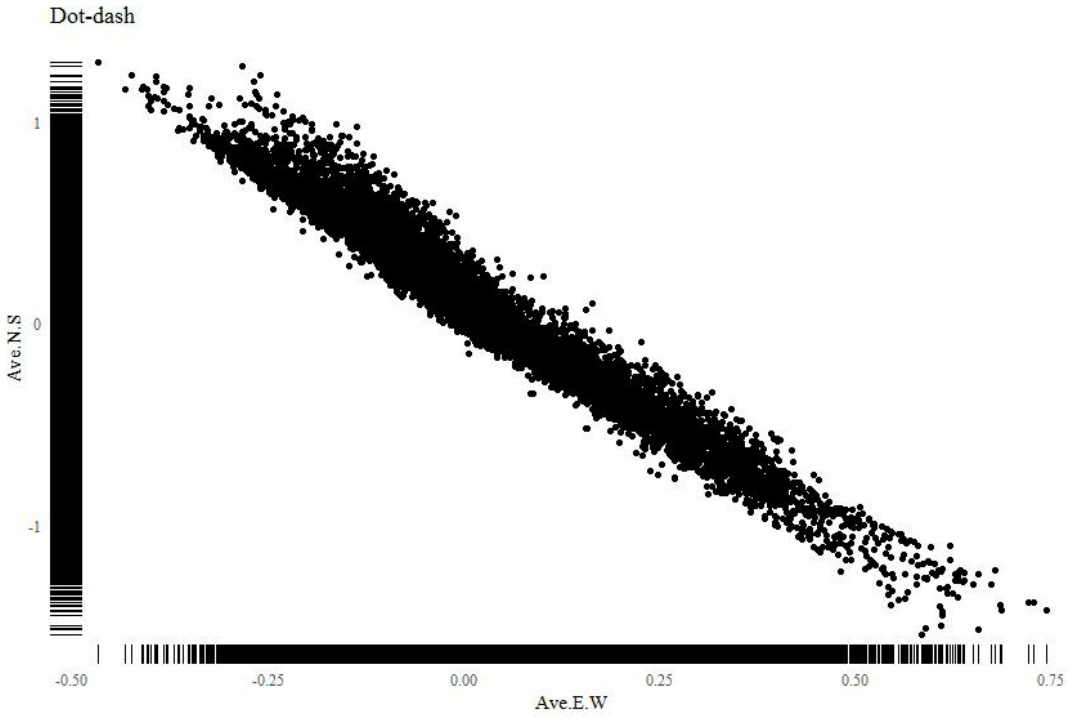
Dot-dash
Ave.N.S
1
0
-1
-0.50
-0.25
0.00
0.25
0.50
0.75
Ave.E.W

Fig.8

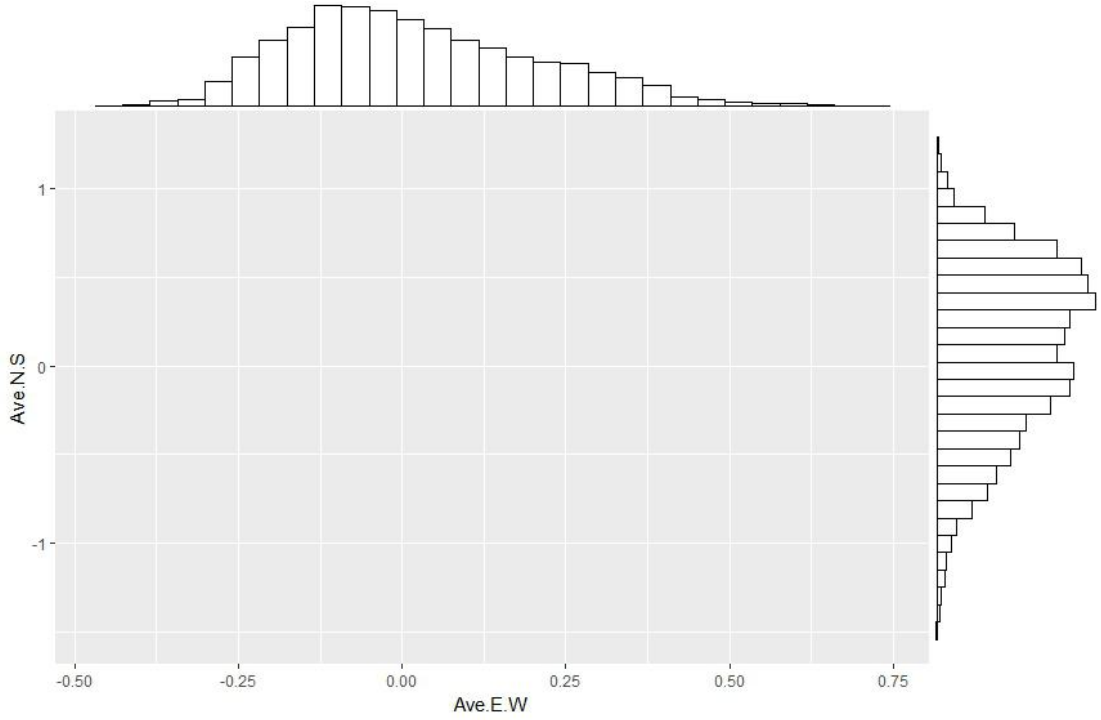
Ave.N.S
1
0
-1
-0.50
-0.25
0.00
0.25
0.50
0.75
Ave.E.W

Fig.9