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# R Scripts to parse data and generate plots per Earth and Space Science paper

# 2022EA002249 "Application of Under-Sampled Microphone Signals to Wind Measurement"

# Ralph Lorenz et al.

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# This script shows the pressure record and sound record associated with a dust devil

fnum=23

# This path should be replaced with the location of the data files

pth="C:/Users/lorenrd1/Documents/Pressurelogger/Goldstone/GS/8533/"

xt=c(0)

xm=c(0)

xp=c(0)

xh=c(0)

fnum0=22

num=40

fnam=paste("DATA-0",fnum,".CSV", sep="")

if (fnum > 99) {

fnam=paste("DATA-",fnum,".CSV", sep="")

}

if (fnum < 10) {

fnam=paste("DATA-00",fnum,".CSV", sep="")

}

x <- read.csv(paste(pth,fnam,sep=""), sep=",", skip=12, header=0)

m=x[,4]

xx=!is.na(m)

t=x[xx,1]

m=x[xx,4]

h=x[xx,3]

p=x[xx,2]

par(mfrow=c(2,1), mar=c(2,4,1,1))

xl=c(60,80)

plot(t/60, m, typ="l", xlim=xl, xlab="Time (mi)

nutes)", ylab="Sound Level (DN)")

par( mar=c(5,4,1,1))

plot(t/60, p/100 - 899.7, typ="l", xlim=xl, xlab="Time (minutes)", ylab="Pressure (mb)", ylim=c(-1,0))

pth2="C:/Users/lorenrd1/Documents/0InSight/FieldMeasurements/"

plotnam1=paste(pth2,"8533\_DATA023\_Vortices.tiff", sep="")

dev.print(tiff, compression="lzw",filename=plotnam1,width=900, height=1100, res=150)

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# Main Script

pth="C:/Users/lorenrd1/Documents/Pressurelogger/Goldstone/GS/8533/"

xt=c(0)

xm=c(0)

xp=c(0)

xh=c(0)

fnum0=22

num=40

for (fnum in fnum0:(fnum0+num)) {

fnam=paste("DATA-0",fnum,".CSV", sep="")

if (fnum > 99) {

fnam=paste("DATA-",fnum,".CSV", sep="")

}

if (fnum < 10) {

fnam=paste("DATA-00",fnum,".CSV", sep="")

}

x <- read.csv(paste(pth,fnam,sep=""), sep=",", skip=12, header=0)

m=x[,4]

xx=!is.na(m)

t=x[xx,1]

m=x[xx,4]

h=x[xx,3]

p=x[xx,2]

m=abs(m-filter(m,rep(0.01,100)))

plot(t,m, pch=22, cex=0.5, main=fnam)

offs=3.27

xt=c(xt, (fnum-fnum0)\*12 +offs+ t/3600)

xh=c(xh, h)

xp=c(xp, p)

xm=c(xm, m)

}

xxx=is.na(xm)

xm[xxx]=0

tt=1:16500

lmx=tt

rms=tt

mn=tt

md=tt

for (i in 1:165000) {

xx=c((i\*40):((i\*40)+40))

tt[i] = min(xt[xx])

lmx[i] = max(xm[xx])

rms[i] = var(xm[xx])

mn[i] = mean(xm[xx])

md[i] = median(xm[xx])

}

xxx=is.na(lmx)

lmx[xxx]=0

rms[xxx]=0

mn[xxx]=0

plot(xt,xm, pch=20, cex=0.5)

pth2="C:/Users/lorenrd1/Documents/Mars2020/Landed/"

outfil=paste(pth2,"Goldstone\_Lorenz\_Audio2.txt",sep="")

write(file=outfil,"\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*", append=FALSE)

line2="Time(hr) Mean RMS MAX (Mic Signal DN stats over 60s. Time is hrs after 6/12/2014 00:00 Pacific)"

write(file=outfil,line2, append=TRUE)

write(file=outfil,"\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*", append=TRUE)

for (i in 1:16500) {

outl=(paste(

formatC(tt[i], width=1, digits=4, format = "f", flag = "0"),

formatC(mn[i], width=1, digits=4, format = "f", flag = "0"),

formatC(rms[i], digits=4, format = "f", flag = "0"),

formatC(lmx[i], digits=4, format = "f", flag = "0"),

sep=" ") )

write(outl,file=outfil, sep=" ,",append=TRUE)

}

#y <- read.csv("C:/Users/lorenrd1/Documents/Pressurelogger/Goldstone/Goldstone\_Wind\_2014-07-18.csv",

# sep=",", skip=6, header=0)

y <- read.csv("C:/Users/lorenrd1/Documents/Pressurelogger/Goldstone/Goldstone\_Wind\_2014-07-18.csv",

sep=",", skip=37933, header=0)

# Skip 37933 starts at 6/12/2014 00:00 hrs

wind=y[,2]

gust=y[,3]

hr=(1:52251)/60

par(mfrow=c(1,1), mar=c(4,4,1,1))

xl=c(55,58)

plot(xt,xm/50, pch=20, cex=0.6, xlim=xl, ylab="Wind (m/s), MIC (DN/50)", xlab="Time (hrs)")

lines(hr, gust, col="GREY", lwd=2)

lines(hr, wind, col="RED", lwd=2)