

Is the global temperature increasing?

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1 Introduction

According to the IPCC, the temperature has been changing about 0.X degrees per XX years – but how is this value derived? How reliable is the value?

1.1 Learning Goals

For this project, you will evaluate determine if the Earth's temperature has in fact changed, and if so, by how much?

1.2 Driving Question

Is my region's climate changing?

How does climate change impact my community?

1.3 Public Product

Narrative Blog...

with professional graphics and statistics.

1.4 Approach

2 Procedures

2.1 How is temperature data collected?

2.2 How are the data store, curated and checked for quality?

3 Data Source

3.1 Compressed Files

```
# Uncompress the files.
# ghcnd_all

tarfile = "C:\\workspace\\GitHub\\RTricks\\300_Global_Warming\\Raw Data\\ghcnd_all.tar.gz"

#ftpsource = ftp://ftp.ncdc.noaa.gov/pub/data/ghcn/v3/ghcnm.tmax.latest.qca.tar.gz

#ghcnm.tmax.latests.qca.tar.qz
tarfile = "C:\\workspace\\GitHub\\RTricks\\300_Global_Warming\\Raw Data\\ghcnm.tmax.latest.q
# untar(tarfile)

#stationfile = "C:\\workspace\\GitHub\\RTricks\\300_Global_Warming\\Raw Data\\ghcnd-stations
```

3.2 Uptain Locations

```
# read.table(stationfile, header=F, fill=T, row.names=NULL); head(stations)
stations = (read.fwf(stationfile, fill=T, widths= c(11, 9, 10, 7, 3, 32, 3, 4, 9), ))

## Error in read.fwf(stationfile, fill = T, widths = c(11, 9, 10, 7,
3, 32, : object 'stationfile' not found

names(stations)= c("ID", "LAT", "LONG", "ELEV", "STATE", "NAME", "GSN", "HCN_CRN", "WHOID")

## Error in names(stations) = c("ID", "LAT", "LONG", "ELEV", "STATE",
"NAME", : object 'stations' not found

head(stations)

## Error in head(stations): object 'stations' not found

str(stations)

## Error in str(stations): object 'stations' not found
```

Example of data:

AG000060680 22.8000 5.4331 1362.0 TAMANRASSET GSN 60680

subsectionSelecting and Example Location

Here's what the data look like:

ID 1-11 Character YEAR 12-15 Integer MONTH 16-17 Integer ELEMENT
18-21 Character VALUE1 22-26 Integer MFLAG1 27-27 Character QFLAG1 28-
28 Character SFLAG1 29-29 Character VALUE2 30-34 Integer MFLAG2 35-35
Character QFLAG2 36-36 Character SFLAG2 37-37 Character
. VALUE31 262-266 Integer MFLAG31 267-267 Character QFLAG31 268-268
Character SFLAG31 269-269 Character

Arizona, let's check import process for the sites...

```
stations[stations$ID=="US1AZMR0013",]  
  
## Error in eval(expr, envir, enclos): object 'stations' not found  
  
# head(stations[stations$HCN_CRN==" CRN",])
```

Let's get the arizona data into R

```
file = "C:\\workspace\\GitHub\\RTricks\\Climate_Change_Narratives\\Data\\ghcnd-stations.txt"
```

```
# practicing loops  
for (year in c(2010,2011,2012,2013,2014,2015)){  
  print(paste("The year is", year))  
}  
  
## [1] "The year is 2010"  
## [1] "The year is 2011"  
## [1] "The year is 2012"  
## [1] "The year is 2013"  
## [1] "The year is 2014"  
## [1] "The year is 2015"  
  
# Create New Variable Names  
MFLAG=NA; QFLAG=NA; SFLAG=NA; VALUE=NA  
for (i in 1:31){  
  VALUE[i] = paste("DATE", i, sep="")  
  MFLAG[i] = paste("MFLAG", i, sep="")  
  QFLAG[i] = paste("QFLAG", i, sep="")  
  SFLAG[i] = paste("SFLAG", i, sep="")  
}  
  
print(QFLAG)  
  
## [1] "QFLAG1" "QFLAG2" "QFLAG3" "QFLAG4" "QFLAG5" "QFLAG6" "QFLAG7"  
## [8] "QFLAG8" "QFLAG9" "QFLAG10" "QFLAG11" "QFLAG12" "QFLAG13" "QFLAG14"  
## [15] "QFLAG15" "QFLAG16" "QFLAG17" "QFLAG18" "QFLAG19" "QFLAG20" "QFLAG21"  
## [22] "QFLAG22" "QFLAG23" "QFLAG24" "QFLAG25" "QFLAG26" "QFLAG27" "QFLAG28"  
## [29] "QFLAG29" "QFLAG30" "QFLAG31"  
  
# Vector of variable names converted from a transposed matrix  
tmp = as.vector(t(matrix(data=c(VALUE, MFLAG, QFLAG, SFLAG), ncol=4)))  
Names = c("ID", "YEAR", "MONTH", "ELEMENT", tmp); length(Names)  
  
## [1] 128
```

```

# Read the file
test = read.fwf(file,widths = c(11, 4, 2, 4, rep(c(5, 1, 1, 1),31)))

## Warning in file(file, "rt"): cannot open file 'C:\workspace\GitHub\RTricks\Climate_Chang
No such file or directory
## Error in file(file, "rt"): cannot open the connection

str(test)

## Error in str(test): object 'test' not found

names(test)= Names; test

## Error in names(test) = Names: object 'test' not found
## Error in eval(expr, envir, enclos): object 'test' not found

head(test)

## Error in head(test): object 'test' not found

```

```

setwd("C:
workspace
GitHub
RTricks
300GlobalWarming
ghcn_d_11")
temp = list.files(pattern="*.dly"); head(temp) for (i in 1:length(temp)) for
(i in 1:2) tmp i- read.fwf(temp[i], widths = c(11, 4, 2, 4, rep(c(5, 1, 1, 1),31)))
names(tmp) i- Names assign(temp[i], subset(tmp, ELEMENT=="TMAX", se-
lect=c(1:4, seq(5, by = 4, length.out=31))))
library(tidyr) library(dplyr) library(stringr) str(AGM00060515.dly) gather(AGM00060515.dly,
"Temp", VALUE1)
library(reshape) tmp1 = melt(AGM00060515.dly, id=c("ID", "YEAR", "MONTH",
"ELEMENT")) head(tmp1) tmp1Day = as.numeric(str_sub(tmp1$variable,6,7));
head(tmp1) tmp1$value[tmp1$value==-9999] = NA; head(tmp1) tmp1$Temperature =
tmp1$value/10
drops i- c("variable","value") tmp1[ , !(names(tmp1) %in% tmp1$DECADE) =
round(tmp1$YEAR, -1)
test1 = aggregate(Temperature ~ DECADE, tmp1, sd) test2 = aggregate(Temperature
~ DECADE, tmp1, mean) head(test2) names(test2[,2]) = "Mean"
test2$Range = test1$Mean + test2$Temperature
plot(test2$DECADE, test1$Temperature)
points(test1$DECADE, test1$Temperature)
full_join(test1, test2, by = list("MONTH", "DECADE"))
New NOAA Directory - ftp://ftp.ncdc.noaa.gov/pub/data/noaa/
library(raster) library(XML)
coords.fwt i- read.fwf("ftp://ftp.ncdc.noaa.gov/pub/data/noaa/isd-history.txt",widths=c(6,1,5,1,38,7,1,8,9,
Names = c("USAF", "X1", "WBAN", "X2", "STATION_NAME", "X3", "CTRY", "X4", "ST", "X5", "CALL

```

```

c(6, 1, 5, 1, 29, 1, 2, 3, 2, 1, 4, 1, 8, 1, 8, 1, 7, 1, 8, 1, 8)
  coords.fwt[- read.fwf("ftp://ftp.ncdc.noaa.gov/pub/data/noaa/isd-history.txt",widths=Widths,sep=";",skip=
names(coords.fwt)=Names; coords.fwt[c(30,4000,20000),]
  coords[- data.frame(ID=paste(as.factor(coords.fwt[,1])),WBAN=paste(as.factor(coords.fwt[,3])),Lat=as.nu
as.numeric(paste(coords.fwtLON))); coords[c(30,4000,20000),]
  plot()

```