**CODE for SILO data extraction from Website**

**FIRST ATTEMP (07.09.2018)**

setwd("C:/Users/rver4657/Dropbox (Sydney Uni)/Farzina\_paper")

require(tidyverse)

require(lubridate)

# ----rcurl---------------------------------------------------------------

require(curl)

# ----raster ncdf4 packages ---------------------------------------------

require(raster)

require(ncdf4)

require(rasterVis)

## ----extract\_Silo data--------------------------------------------------------

years <- seq(1950,2016,by=1) # full series

#years <- seq(2006,2010, by=1) # test

# run a loop

for (i in 1:length(years)) {

url <- paste("https://s3-ap-southeast-2.amazonaws.com/silo-open-data/annual/monthly\_rain/",

years[i],

".monthly\_rain.nc",sep="")

curl\_download(url,

paste("data/monthly\_rainfall\_",years[i],".nc",sep=""))

}

## This creates a set of files in your "data" sub directory for each year

# read in the Muttama shape file

Muttama\_sh <- shapefile("data/shapefiles/Muttama catchment.shp")

plot(Muttama\_sh)

crs(Muttama\_sh)

# correct projection to WGS84

crs(Muttama\_sh) <- CRS("+proj=longlat +ellps=WGS84 +no\_defs")

plot(Muttama\_sh)

# SILO

# Reading in the data

# downloaded earlier from https://silo.longpaddock.qld.gov.au/gridded-data)

# use stack

# example for only a few years

SILOdata <- stack("data/monthly\_rainfall\_2006.nc",varname="monthly\_rain")

SILOdata1 <- stack("data/monthly\_rainfall\_2007.nc",varname="monthly\_rain")

SILOdata2 <- stack("data/monthly\_rainfall\_2008.nc",varname="monthly\_rain")

SILOdata3 <- stack("data/monthly\_rainfall\_2009.nc",varname="monthly\_rain")

SILOdata4 <- stack("data/monthly\_rainfall\_2010.nc",varname="monthly\_rain")

SILOdata\_all <- stack(SILOdata,SILOdata1,SILOdata2,SILOdata3,SILOdata4)

rm(SILOdata1,SILOdata2,SILOdata3,SILOdata4)

# gplot(SILOdata[[1]]) + geom\_tile(aes(fill = value)) + coord\_equal() +

# facet\_wrap(~variable)

#crop to Muttama (just for 2006)

SILOdata.Mut <- crop(SILOdata, extent(Muttama\_sh))

SILOdata.Mut <- mask(SILOdata.Mut, Muttama\_sh)

rm(SILOdata)

# change names (just for plotting)

month <- c("01","02","03","04","05","06","07","08","09","10","11","12")

names(SILOdata.Mut)[1:12] <- paste("months", month, "2006", sep="-")

# make a spatial plot, really not needed, just to check

gplot(SILOdata.Mut[[1:12]]) + geom\_tile(aes(fill = value)) + coord\_equal() +

facet\_wrap(~variable) + scale\_fill\_gradient(low="darksalmon", high="blue",

guide="colorbar",na.value="white") +

xlab("Longitude") + ylab("Latitude")

# not quite sure how to extract the data out now

# will have to work that out

str(SILOdata.Mut)

## ----summary Muttama----

# print a summary

summary(SILOdata.Mut)

# make some plots of the median and maximum

par(mfrow=c(2,1))

barplot(summary(SILOdata.Mut)["Max.",],

main = "Maximum monthly rainfall for 2006",

ylab = "monthly maximum rainfall", xlab = "Month",

col="blue")

barplot(summary(SILOdata.Mut)["Median",],

main = "Median monthly rainfall for 2006",

ylab = "monthly median rainfall", xlab = "Month",

col="blue")

par(mfrow=c(1,1))

**Update version (14.09.2018)**

setwd("C:/Users/rver4657/Dropbox (Sydney Uni)/Farzina\_paper")

require(tidyverse)

require(lubridate)

# ----rcurl---------------------------------------------------------------

require(curl)

# ----raster ncdf4 packages ---------------------------------------------

require(raster)

require(ncdf4)

require(rasterVis)

## ----extract\_Silo data--------------------------------------------------------

years <- seq(1950,2016,by=1) # full series

#years <- seq(2006,2010, by=1) # test

# run a loop

for (i in 1:length(years)) {

url <- paste("https://s3-ap-southeast-2.amazonaws.com/silo-open-data/annual/monthly\_rain/",

years[i],

".monthly\_rain.nc",sep="")

curl\_download(url,

paste("data/monthly\_rainfall\_",years[i],".nc",sep=""))

}

## This creates a set of files in your "data" sub directory for each year

# read in the Muttama shape file

Muttama\_sh <- shapefile("data/shapefiles/Muttama catchment.shp")

plot(Muttama\_sh)

crs(Muttama\_sh)

# correct projection to WGS84

crs(Muttama\_sh) <- CRS("+proj=longlat +ellps=WGS84 +no\_defs")

plot(Muttama\_sh)

# SILO

# Reading in the data

# downloaded earlier from https://silo.longpaddock.qld.gov.au/gridded-data)

# use stack

# This needs to go in a loop

#--------------Start loop-----------------

# example for only a few years

SILOdata <- stack("data/monthly\_rainfall\_2006.nc",varname="monthly\_rain")

#crop to Muttama (example just for 2006)

SILOdata.Mut <- crop(SILOdata, extent(Muttama\_sh))

SILOdata.Mut <- mask(SILOdata.Mut, Muttama\_sh)

# ++++++++++++++++++++++

# Then stack all together

# +++++++++++++++++++++++++

if (i == 1) {

SILOdata\_all <- SILOdata.Mut

} else {

SILOdata\_all <- stack(SILOdata\_all,SILOdata.Mut)

}

#-------------------END loop----------------

# Write SILOdata\_all to a file with only the raster stack for Muttama catchment

# Delete all the Australia files

# PLOTTING EXAMPLE

# change names (just for plotting)

month <- c("01","02","03","04","05","06","07","08","09","10","11","12")

names(SILOdata.Mut)[1:12] <- paste("months", month, "2006", sep="-")

# make a spatial plot, really not needed, just to check

gplot(SILOdata.Mut[[1:12]]) + geom\_tile(aes(fill = value)) + coord\_equal() +

facet\_wrap(~variable) + scale\_fill\_gradient(low="darksalmon", high="blue",

guide="colorbar",na.value="white") +

xlab("Longitude") + ylab("Latitude")

# not quite sure how to extract the data out now

# will have to work that out

str(SILOdata.Mut)

## ----summary Muttama----

# print a summary

summary(SILOdata.Mut)

# make some plots of the median and maximum

par(mfrow=c(2,1))

barplot(summary(SILOdata.Mut)["Max.",],

main = "Maximum monthly rainfall for 2006",

ylab = "monthly maximum rainfall", xlab = "Month",

col="blue")

barplot(summary(SILOdata.Mut)["Median",],

main = "Median monthly rainfall for 2006",

ylab = "monthly median rainfall", xlab = "Month",

col="blue")

par(mfrow=c(1,1))