Coral Reef Bleaching

2022-09-29

```
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.2 --
## v ggplot2 3.3.6     v purrr   0.3.4
## v tibble  3.1.8     v dplyr   1.0.9
## v tidyr   1.2.0     v stringr 1.4.0
## v readr   2.1.2     v forcats 0.5.1
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(reshape2)
```

```
##
## Attaching package: 'reshape2'
##
## The following object is masked from 'package:tidyr':
##
##     smiths
```

```
library(stringr)
library(maptools)
```

```
## Loading required package: sp
## Checking rgeos availability: TRUE
## Please note that 'maptools' will be retired by the end of 2023,
## plan transition at your earliest convenience;
## some functionality will be moved to 'sp'.
```

```
library(maps)
```

```
##
## Attaching package: 'maps'
##
## The following object is masked from 'package:purrr':
##
##     map
```

```
library(lubridate)
```

```
##
## Attaching package: 'lubridate'
##
## The following objects are masked from 'package:base':
##
##     date, intersect, setdiff, union
```

```r
df <- read_csv("bcodmo_dataset_773466_712b_5843_9069.csv")
```

```
## Rows: 9666 Columns: 48
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (48): ID, latitude, longitude, Ocean, Realm, Ecoregion, Country_Name, St...
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```r
df <- df[-1, ]
head(df)
```

```
## # A tibble: 6 x 48
##   ID    latitude     longi~1 Ocean Realm Ecore~2 Count~3 State~4 City_~5 City_~6
##   <chr> <chr>        <chr>   <chr> <chr> <chr>   <chr>   <chr>   <chr>   <chr>
## 1 97    -20.89983333 149.40~ Paci~ Cent~ Southe~ Austra~ Queens~ Keswic~ <NA>
## 2 98    -20.89305556 149.421 Paci~ Cent~ Southe~ Austra~ Queens~ Keswic~ <NA>
## 3 116   -20.74580556 149.47~ Paci~ Cent~ Southe~ Austra~ Queens~ Wigton~ Wigton~
## 4 117   -20.73769444 149.46~ Paci~ Cent~ Southe~ Austra~ Queens~ Wigton~ Wigton~
## 5 142   -20.25936111 148.81~ Paci~ Cent~ Centra~ Austra~ Queens~ Mount ~ Daydre~
## 6 145   -20.25255556 148.81~ Paci~ Cent~ Centra~ Austra~ Queens~ Mount ~ Daydre~
## # ... with 38 more variables: City_Town_3 <chr>, Date <chr>, Date2 <chr>,
## #   depth <chr>, Average_Bleaching <chr>, ClimSST <chr>,
## #   Temperature_Kelvin <chr>, Temperature_Mean <chr>,
## #   Temperature_Minimum <chr>, Temperature_Maximum <chr>,
## #   Temperature_Kelvin_Standard_Deviation <chr>, Windspeed <chr>, SSTA <chr>,
## #   SSTA_Standard_Deviation <chr>, SSTA_Mean <chr>, SSTA_Minimum <chr>,
## #   SSTA_Maximum <chr>, SSTA_Frequency <chr>, ...
## # i Use `colnames()` to see all variable names
```

```r
# data$ClimSST

month <- c()
for (x in df$Date) {
  # print(substr(x, 1, 1))
  month = c(month, strsplit(x, split="/")[[1]][1])
}
# month
month <- as.integer(month)
head(month)
```

```
## [1] 3 3 3 3 8 8
```

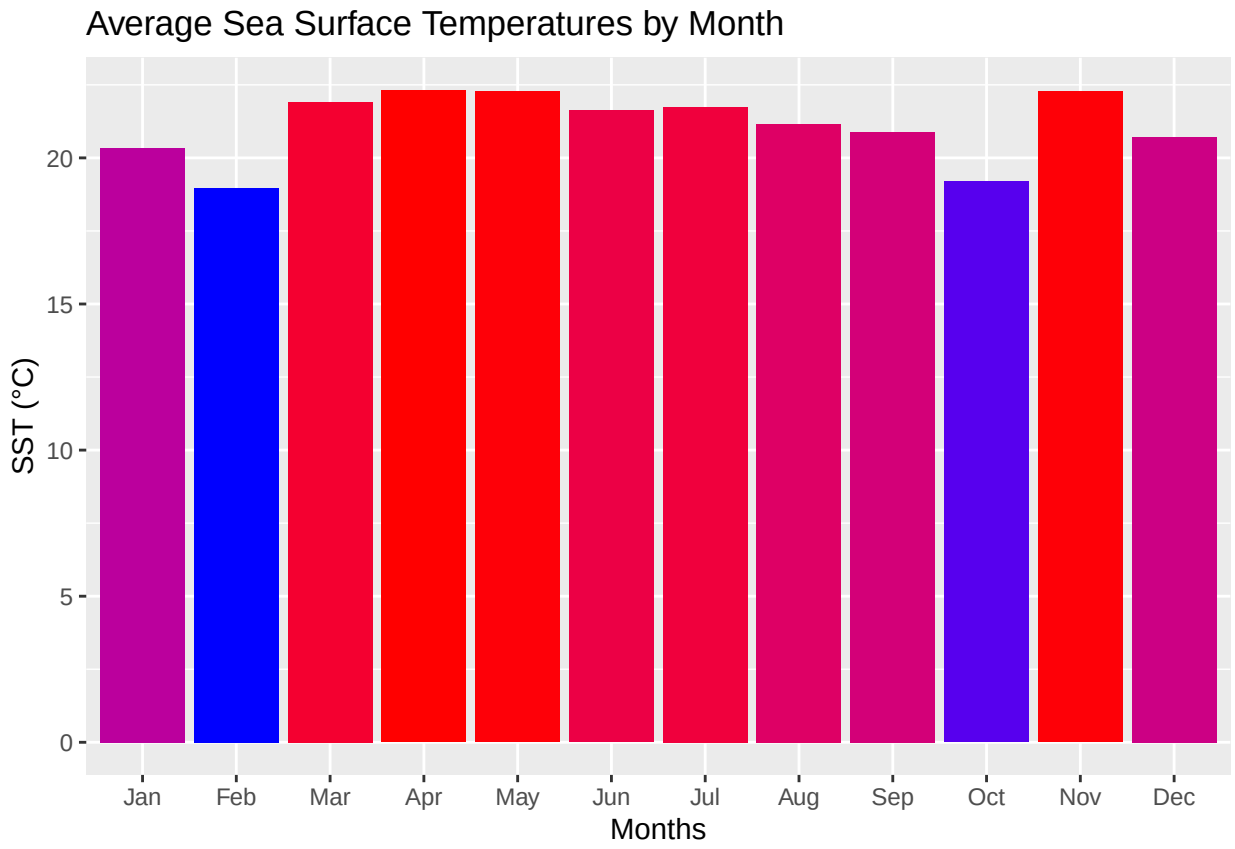
```r
df$month <- month

# head(data$month)


# data$month
```

```r
df$ClimSST <- as.double(df$ClimSST) - 273
```

```r
df %>% mutate(month2 = recode(month,"Jan","Feb", "Mar","Apr","May","Jun","Jul","Aug","Sep","Oct","Nov",
  geom_bar(stat="identity") + theme(legend.position = 'none') +
  scale_fill_gradientn(colors=c("blue", "red")) + xlab("Months") + ylab("SST (°C)") + ggtitle("Average
```




```
df$longitude <- round(as.double(df$longitude), 0)
df$latitude <- round(as.double(df$latitude), 0)
```

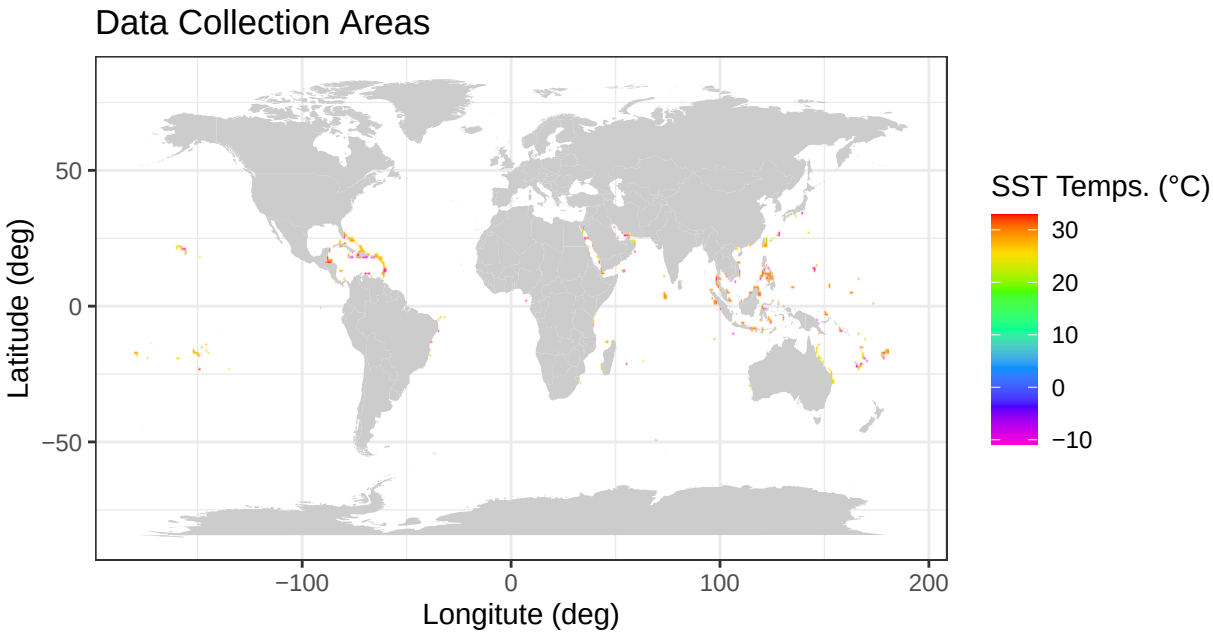
```
world <- map_data("world")

ggplot(df) + geom_raster(aes(x = longitude, y = latitude, fill=ClimSST), interpolate=T) + geom_polygon(a
```

```
## Warning: Raster pixels are placed at uneven horizontal intervals and will be
## shifted. Consider using geom_tile() instead.
```

```
## Warning: Raster pixels are placed at uneven vertical intervals and will be
## shifted. Consider using geom_tile() instead.
```

```
## Warning: Removed 3 rows containing missing values (geom_raster).
```




```
df2 <- df %>% group_by(City_Town) %>% filter(substr(Date2, 1, 4)=="2016") %>% summarize(Mean_Average_Bl
df2
```

```
## # A tibble: 131 x 2
##    City_Town          Mean_Average_Bleaching
##    <chr>                               <dbl>
##  1 Abu Musa Island                      0
##  2 Aklan                                0
##  3 Alice Town                           5.5
##  4 Alifu Alifu Atoll                   67.8
##  5 Alifu Dhaalu Atoll                  23.2
##  6 Amity Point                          0
##  7 Anse a Veaux                        11.2
##  8 Auchindown                           0
##  9 Bait Reef                           14.2
## 10 Banda Naira                          5.75
## # ... with 121 more rows
## # i Use `print(n = ...)` to see more rows
```

```
df <- df %>% group_by(City_Town) %>% arrange(Date2)
df
```

```
## # A tibble: 9,665 x 49
## # Groups:   City_Town [691]
##    ID    latitude longitude Ocean  Realm Ecore~1 Count~2 State~3 City_~4 City_~5
##    <chr>    <dbl>     <dbl> <chr>  <chr> <chr>   <chr>   <chr>   <chr>   <chr>
##  1 4512       -12        97 Indian Cent~ Cocos ~ Austra~ Cocos ~ Horsbu~ <NA>
```

```
##  2 11424       11       119 Pacif~ Cent~ Sulu S~ Philip~ Mimaro~ Palawan Albgua~
##  3 5044        11       103 Pacif~ Cent~ Gulf o~ Cambod~ Sihano~ Koh Ro~ <NA>
##  4 7683        11        73 Pacif~ West~ Laksha~ India   Laksha~ Garden~ <NA>
##  5 7684        11        73 Pacif~ West~ Laksha~ India   Laksha~ Garden~ <NA>
##  6 6852       -17      -150 Pacif~ East~ Societ~ French~ Societ~ Moorea  <NA>
##  7 6830       -17      -150 Pacif~ East~ Societ~ French~ Societ~ Moorea  <NA>
##  8 7182       -17      -152 Pacif~ East~ Societ~ French~ Societ~ Bora B~ <NA>
##  9 6970       -17      -152 Pacif~ East~ Societ~ French~ Societ~ Bora B~ <NA>
## 10 6853       -17      -150 Pacif~ East~ Societ~ French~ Societ~ Moorea  <NA>
## # ... with 9,655 more rows, 39 more variables: City_Town_3 <chr>, Date <chr>,
## #   Date2 <chr>, depth <chr>, Average_Bleaching <chr>, ClimSST <dbl>,
## #   Temperature_Kelvin <chr>, Temperature_Mean <chr>,
## #   Temperature_Minimum <chr>, Temperature_Maximum <chr>,
## #   Temperature_Kelvin_Standard_Deviation <chr>, Windspeed <chr>, SSTA <chr>,
## #   SSTA_Standard_Deviation <chr>, SSTA_Mean <chr>, SSTA_Minimum <chr>,
## #   SSTA_Maximum <chr>, SSTA_Frequency <chr>, ...
## # i Use `print(n = ...)` to see more rows, and `colnames()` to see all variable names
```

```
# num_ble <- as.numeric(df$Average_Bleaching)
# city_town_vect <- df$City_Town
#
# tot_inc_ble <- c()
#
# for (i in 2:length(num_ble)-1) {
#   if (city_town_vect[i]==city_town_vect[i+1] & !is.na(city_town_vect[i]) & !is.na(city_town_vect[i+1])
#      tot_inc_ble <- c(tot_inc_ble, num_ble[i] + num_ble[i+1])
#   }
#   else {
#     tot_inc_ble <- c(tot_inc_ble, num_ble[i])
#   }
# }
#
# df$Compound_Average_Bleaching <- tot_inc_ble
# df %>% filter(City_Town == "Magnetic Island")
```

```
# df %>% filter(City_Town=="Magnetic Island") %>% ggplot(aes(Date2, Compound_Average_Bleaching)) + geom
```