EDA SST

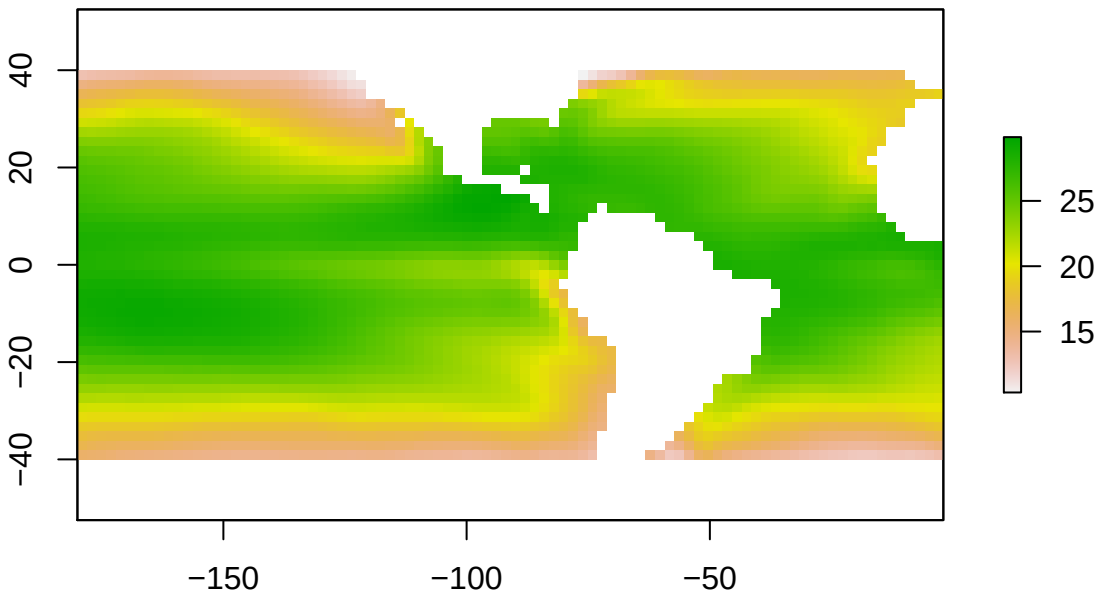
In this notebook we want to explore the sst data from https://www.ncdc.noaa.gov/data-access/marineocean-data/extended-reconstructed-sea-surface-temperature-ersst-v5. Preprocessing involved: - merging monthly files, into on large file. - restricting the geographical window (longitude and latitude)

```
library(ncdf4)
library(raster)
library(rgdal)
library(ggplot2)
library(assertthat)
```

```
# Note working directory is location of file
file <- nc_open("../../data/interim/sst-interim.nc")
data <- ncvar_get(file, "sst")
lon <- ncvar_get(file, "lon")
lat <- ncvar_get(file, "lat")
fill_val <- ncatt_get(file, "sst", "_FillValue")
nc_close(file)
data[data == fill_val$value] <- NA
```

The data contains 1212 months of Sea Surface Temperature data, in the geographical window from -180 to -2 longitude and -40 to 40 latitude respectively. On a resolution of a `ncatt_get(file,0)$spatial_resolution` The temperature is measured in celsius. Let's see how this looks like. We randomly choose one month to plot

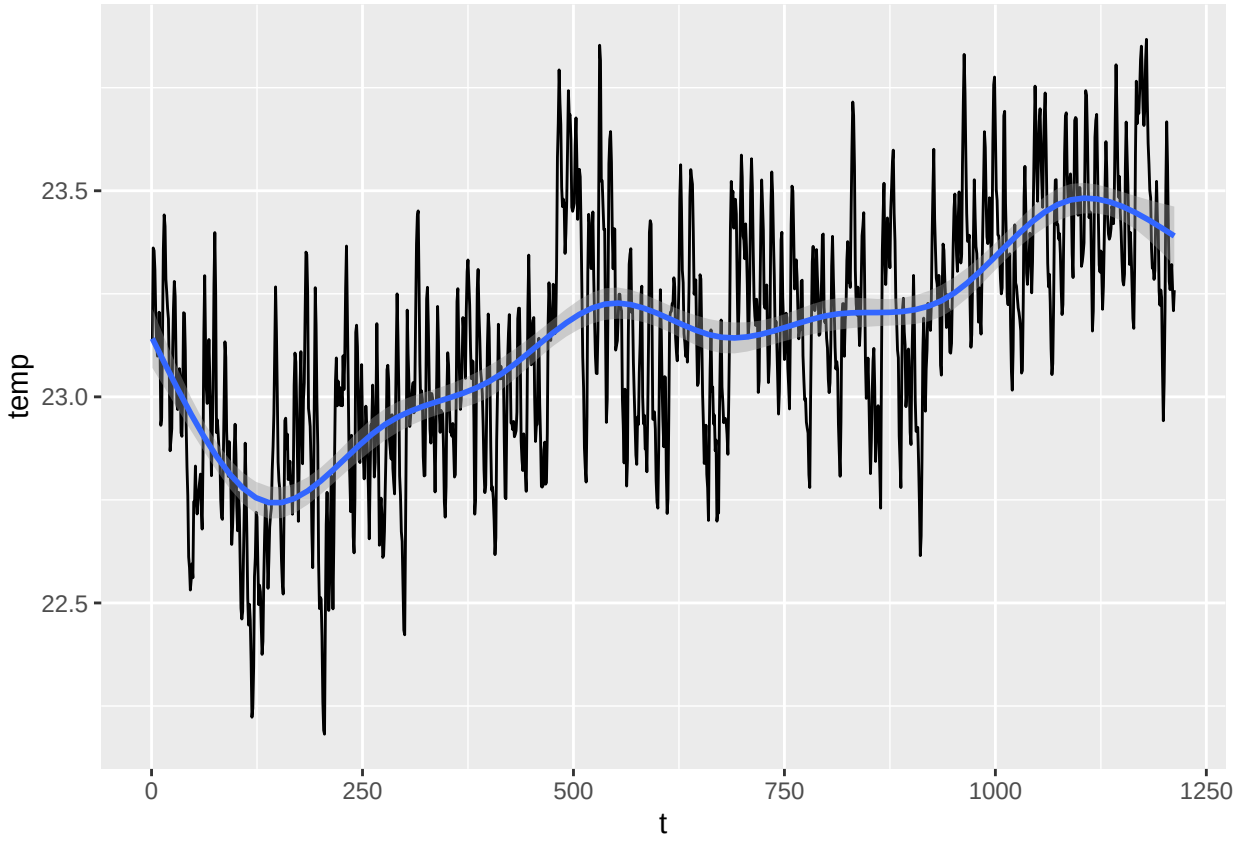
```
set.seed(420)
m <- sample(seq(dim(data)[3]), 1)
slice <- data[,,m]
r <- raster(t(slice), xmn = min(lon), xmx = max(lon), ymn = min(lat), ymx = max(lat),
            crs = CRS("+proj=longlat +ellps=WGS84 +datum=WGS84 +no_defs+ towgs84=0,0,0"))
r <- flip(r, direction = "y")
plot(r)
```



Next we inspect the development of the monthly mean temperatures over tim

```
monthly_mean <- apply(data, 3, function(x) mean(x, na.rm = TRUE))
df <- data.frame(t = seq(dim(data)[3]),temp =  monthly_mean)
lw <- loess(temp ~ t, data = df)
ggplot(data = df, aes(x = t, y = temp)) + geom_line() + geom_smooth(method = "auto")
```

```
## `geom_smooth()` using method = 'gam' and formula 'y ~ s(x, bs = "cs")'
```



The only NA's are the the grid points that refer to continental grid points.

```
# NA is alwyas th sane, since only land is NA
gap <- which(is.na(slice), arr.ind = TRUE)
find <- apply(data, 3, function(x) all(which(is.na(x), arr.ind = TRUE) == gap))
length(find) == sum(find)
```

```
## [1] TRUE
```