Visualizations for EVI

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2022-06-27

```
library(readxl)
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 4.1.2
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

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

```
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.1 --
```

```
## v ggplot2 3.3.6     v purrr   0.3.4
## v tibble  3.1.4     v stringr 1.4.0
## v tidyr   1.1.3     v forcats 0.5.1
## v readr   2.0.1
```

```
## Warning: package 'ggplot2' was built under R version 4.1.2
```

```
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(sf)
```

```
## Linking to GEOS 3.8.1, GDAL 3.2.1, PROJ 7.2.1
```

```
library(ggplot2)
library(rgdal)
```

```
## Loading required package: sp

## Please note that rgdal will be retired by the end of 2023,
## plan transition to sf/stars/terra functions using GDAL and PROJ
## at your earliest convenience.
##
## rgdal: version: 1.5-27, (SVN revision 1148)
## Geospatial Data Abstraction Library extensions to R successfully loaded
## Loaded GDAL runtime: GDAL 3.2.1, released 2020/12/29
## Path to GDAL shared files: /Library/Frameworks/R.framework/Versions/4.1/Resources/library/rgdal/gdal
## GDAL binary built with GEOS: TRUE
## Loaded PROJ runtime: Rel. 7.2.1, January 1st, 2021, [PJ_VERSION: 721]
## Path to PROJ shared files: /Library/Frameworks/R.framework/Versions/4.1/Resources/library/rgdal/proj
## PROJ CDN enabled: FALSE
## Linking to sp version:1.4-5
## To mute warnings of possible GDAL/OSR exportToProj4() degradation,
## use options("rgdal_show_exportToProj4_warnings"="none") before loading sp or rgdal.
## Overwritten PROJ_LIB was /Library/Frameworks/R.framework/Versions/4.1/Resources/library/rgdal/proj
```

```
library(ggsn)
```

```
## Loading required package: grid
```

```
library(ggspatial)
```

read in the files

```
`EVI_monthly` <- read_csv("./Data/EVI_monthly.csv")
```

```
## Rows: 12120 Columns: 7
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (2): District, Month
## dbl (5): Year, AverageEVI, MaxEVI, MinEVI, MedianEVI
##
## 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.
```

```
AnnualEVI <- read_csv("./Data/EVI_annual.csv")
```

```
## Rows: 1020 Columns: 6
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (1): District
## dbl (5): Year, AverageEVI, MaxEVI, MinEVI, MedianEVI
##
## 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.
```

```
zim_district <- st_read("./Shapefiles/Zim_D60.shp")
```

```
## Reading layer ‘Zim_D60’ from data source
##   ‘/Users/frankief/Desktop/DSPG 2022/Zimbabwe Project/2022_DSPG_Zimbabwe/Shapefiles/Zim_D60.shp’
##   using driver ‘ESRI Shapefile’
## Simple feature collection with 60 features and 13 fields
## Geometry type: POLYGON
## Dimension:     XY
## Bounding box:  xmin: 25.23703 ymin: -22.42028 xmax: 33.0563 ymax: -15.60884
## CRS:           NA
```

```
EVI_long <- read_csv("./Data/EVI_long.csv")
```

```
## Rows: 368220 Columns: 5
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (3): District, Month, Day
## dbl (2): Year, EVI
##
## 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.
```

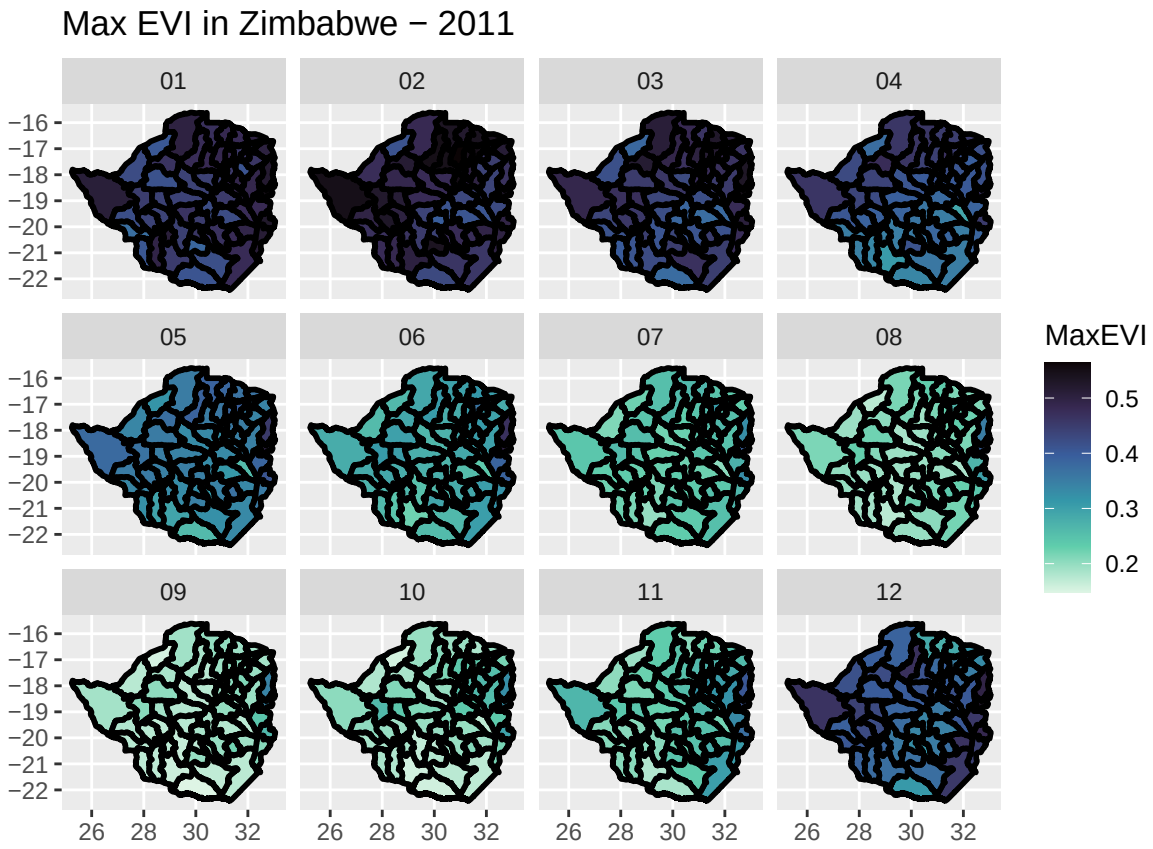
Rename cols to match

```
zim_district <- rename(zim_district, District = NAME_2)
```

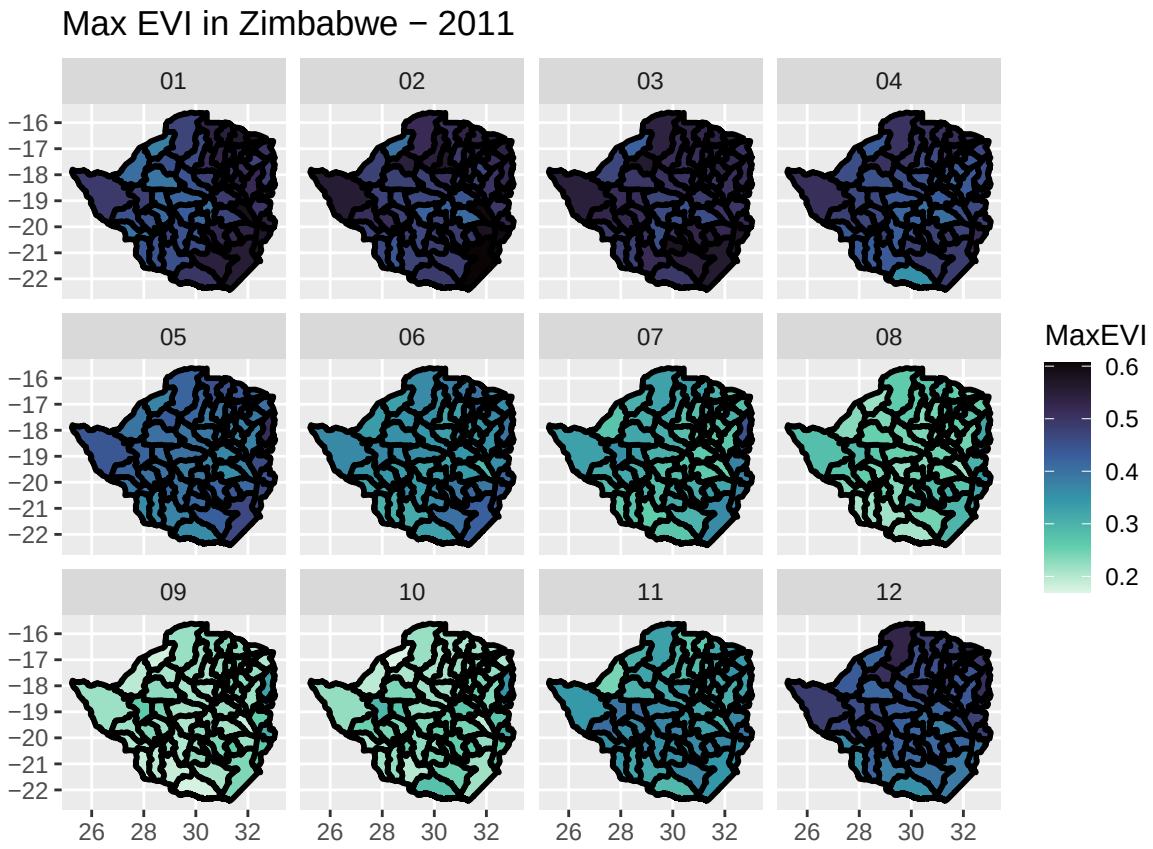
```
zim_district <- zim_district %>%
  select(District)

MonthlyEVIbyDis <-full_join (zim_district, `EVI_monthly`, by = "District")
```

1. Monthly map for Year 2011 and 2017

```
# Maximum evi by month
MaxMonthlyEVI2011 <- MonthlyEVIbyDis %>%
  filter(Year == 2011) %>%
  arrange(Month) %>%
  ggplot() +
  geom_sf(size = 1, color = "black", aes(fill = MaxEVI)) +
  coord_sf() +
  scale_fill_viridis_c(option = "G", direction = -1) +
  facet_wrap(~Month) +
  ggtitle("Max EVI in Zimbabwe - 2011")
MaxMonthlyEVI2011
```




```
MaxMonthlyEVI2017 <- MonthlyEVIbyDis %>%
  filter(Year == 2017) %>%
  arrange(Month) %>%
  ggplot() +
  geom_sf(size = 1, color = "black", aes(fill = MaxEVI)) +
  coord_sf() +
  scale_fill_viridis_c(option = "G", direction = -1) +
  facet_wrap(~Month) +
  ggtitle("Max EVI in Zimbabwe - 2011")
MaxMonthlyEVI2017
```



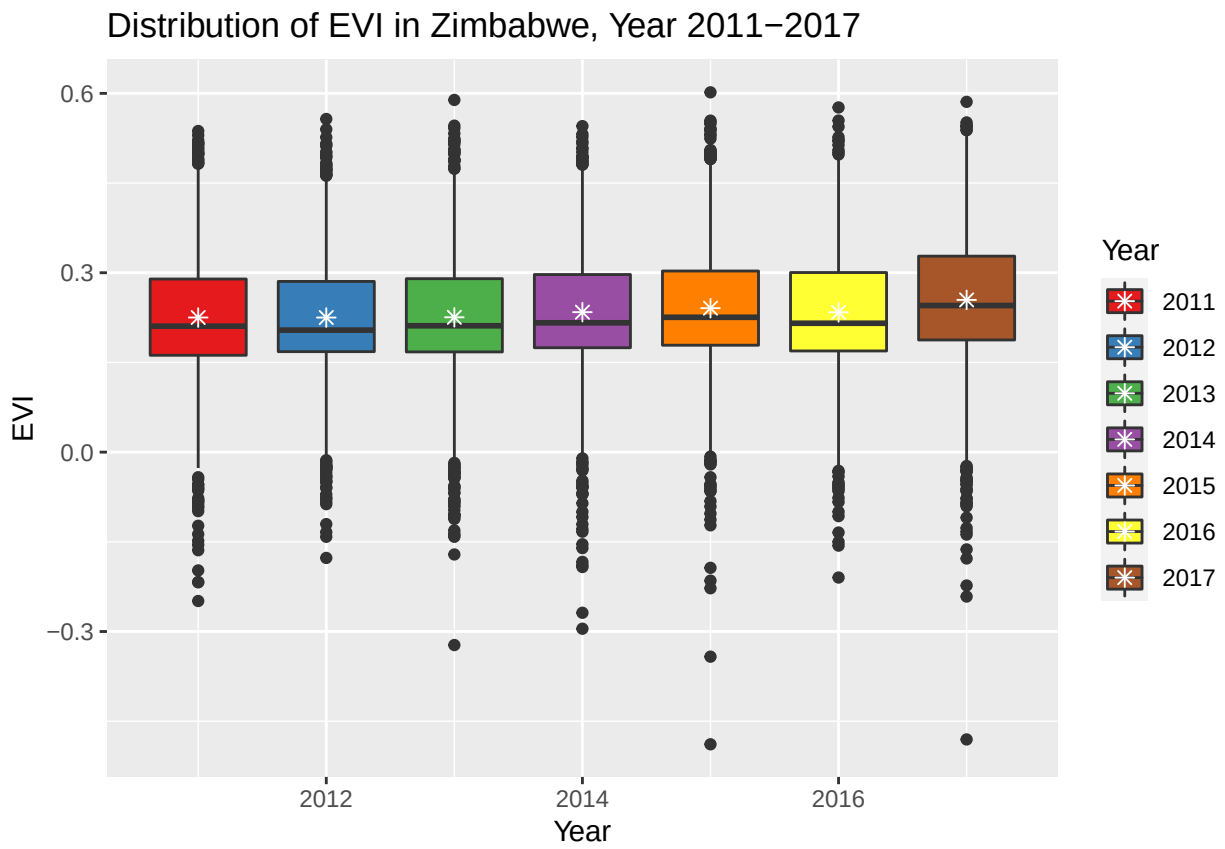
2a. Distribution of EVI from 2011-2017

```
EVI_long %>%
  filter(Year == 2011:2017) %>%
  ggplot(aes(x = Year, y = EVI, fill = as.factor(Year))) +
  geom_boxplot() +
  stat_summary(fun = "mean", geom = "point", shape = 8,
               size = 2, color = "white") +
  scale_fill_brewer(palette="Set1", name = "Year") +
  labs(title = "Distribution of EVI in Zimbabwe, Year 2011-2017")
```

```
## Warning in Year == 2011:2017: longer object length is not a multiple of shorter
## object length
```

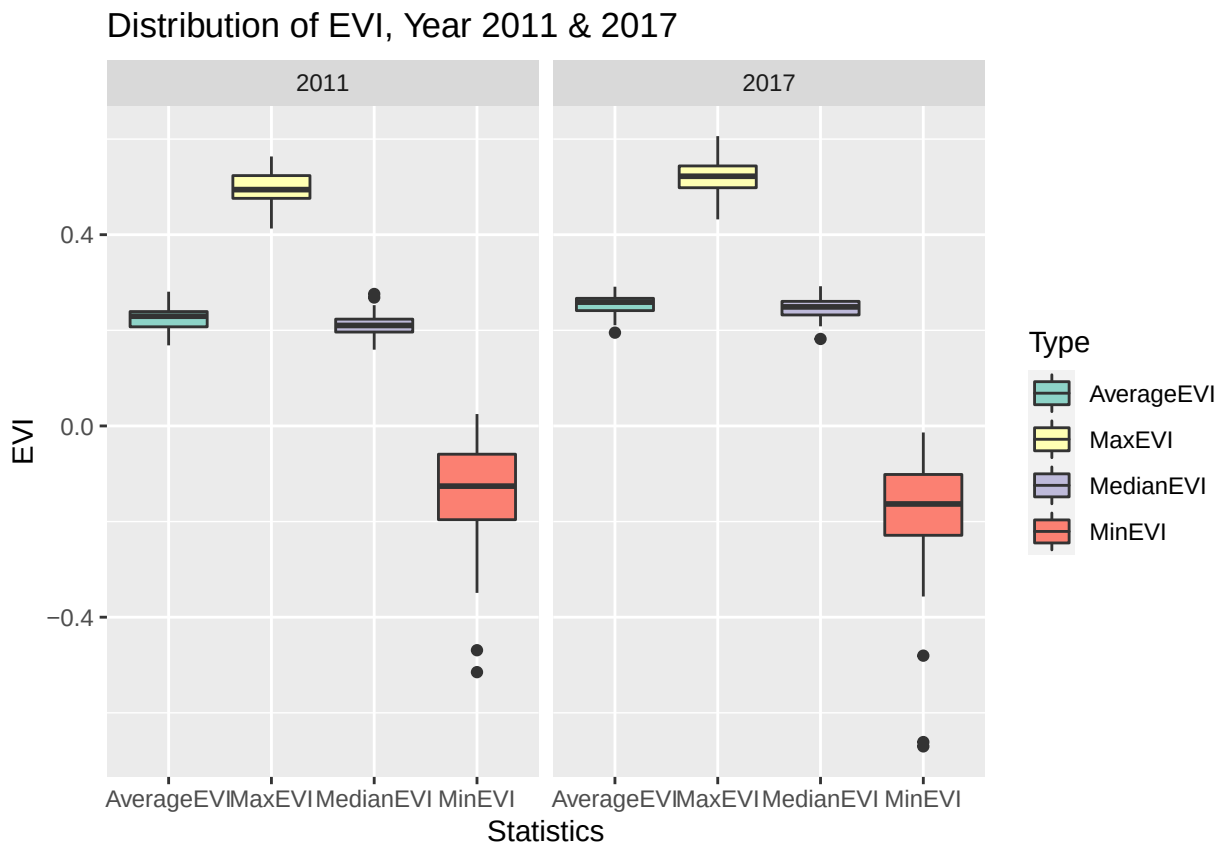
```
## Warning: Removed 890 rows containing non-finite values (stat_boxplot).
```

```
## Warning: Removed 890 rows containing non-finite values (stat_summary).
```



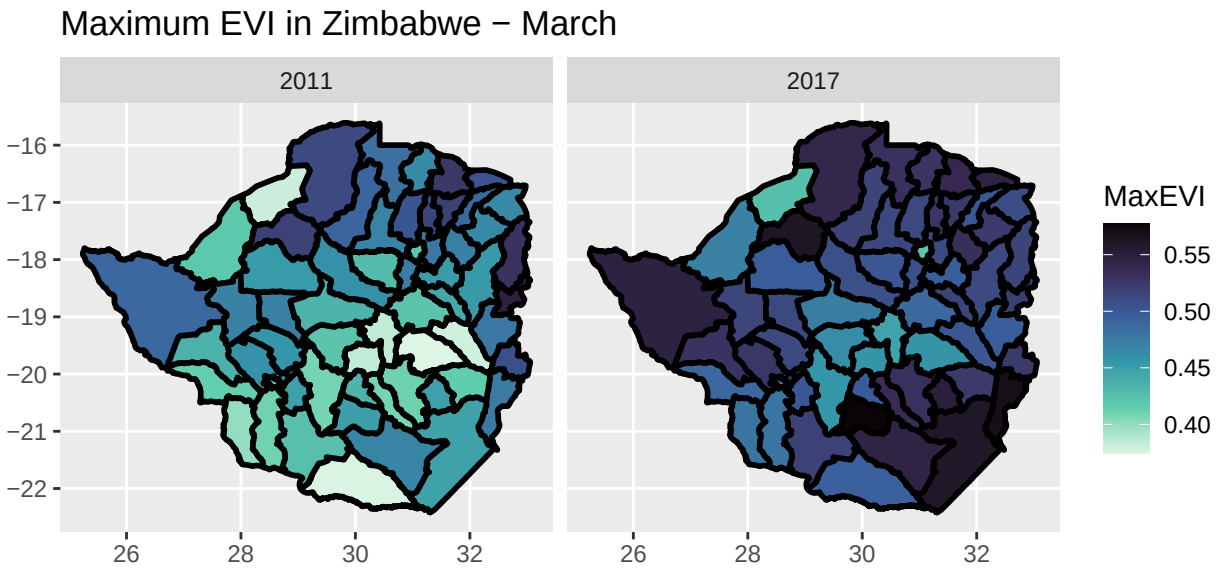
2b. Distribution of NDVI in 2011 and 2017

```
AnnualEVI %>%
  filter( Year == 2011|Year == 2017) %>%
  gather(Type, EVI, AverageEVI:MedianEVI) %>%
  ggplot(aes(x = Type, y = EVI, fill = Type)) +
  scale_fill_brewer(palette="Set3", name = "Type") +
  facet_wrap(~Year)+
  geom_boxplot() +
  labs(title = "Distribution of EVI, Year 2011 & 2017") +
    xlab("Statistics") +
    ylab("EVI")
```



3. map for EVI in March in 2011 and 2017

```
MaxMarch <- MonthlyEVIbyDis %>%
  filter(Year == 2011|Year == 2017, Month == "03") %>%
  ggplot() +
  geom_sf(size = 1, color = "black", aes(fill = MaxEVI)) +
  facet_wrap(~Year) +
  coord_sf() +
  scale_fill_viridis_c(option = "G", direction = -1) +
  ggtitle("Maximum EVI in Zimbabwe - March")
MaxMarch
```


Maximum EVI in Zimbabwe − March
2011
2017
−16
−17
−18
−19
−20
−21
−22
26
28
30
32
MaxEVI
0.55
0.50
0.45
0.40