# Introduccion manejo de Datos Geoespaciales con R

Luis E. Ascencio G.

CIMAT

luis.ascencio@cimat.mx

**Abstract**     En este NoteBook encontraras codigo para manejar Datos Geoespaciales con R

```r
# Install the package if you haven't already
# install.packages("sf")
# install.packages("sf", dependencies = TRUE)
```

```r
# Load the library
library(sp)
library(sf)
library(readxl)
```

```
Linking to GEOS 3.12.1, GDAL 3.8.4, PROJ 9.4.0; sf_use_s2() is TRUE
```

https://klaothongchan.medium.com/getting-r-into-vscode-5d1c8bf7f745

```r
municipi<-read_sf("../mg_2025_integrado/conjunto_de_datos/00mun.shp")
```

```r
install.packages("geojsonio")
```

```
Installing package into '/home/leag555/R/x86_64-pc-linux-gnu-library/4.5'
(as 'lib' is unspecified)

also installing the dependencies 'protolite', 'geojson', 'jqr'


Warning message in install.packages("geojsonio"):
"installation of package 'protolite' had non-zero exit status"
Warning message in install.packages("geojsonio"):
"installation of package 'jqr' had non-zero exit status"
Warning message in install.packages("geojsonio"):
```

```
"installation of package 'geojson' had non-zero exit status"
Warning message in install.packages("geojsonio"):
"installation of package 'geojsonio' had non-zero exit status"
```

```
municipi$geometry
```

```
MULTIPOLYGON (((2488980 1117358, 2489013 111666...

MULTIPOLYGON (((2453327 1143576, 2453363 114357...

MULTIPOLYGON (((2483638 1120034, 2483946 111990...

MULTIPOLYGON (((2481826 1149055, 2481589 114814...

MULTIPOLYGON (((2476760 1150329, 2476784 115031...

ERROR while rich displaying an object: Error in loadNamespace(x): no hay
paquete llamado 'geojsonio'

Traceback:
1. sapply(x, f, simplify = simplify)
2. lapply(X = X, FUN = FUN, ...)
3. FUN(X[[i]], ...)
4. tryCatch(withCallingHandlers({
.      if (!mime %in% names(repr::mime2repr))
.          stop("No repr_* for mimetype ", mime, " in repr::mime2repr")
.      rpr <- repr::mime2repr[[mime]](obj)
.      if (is.null(rpr))
.          return(NULL)
.      prepare_content(is.raw(rpr), rpr)
. }, error = error_handler), error = outer_handler)
5. tryCatchList(expr, classes, parentenv, handlers)
6. tryCatchOne(expr, names, parentenv, handlers[[1L]])
7. doTryCatch(return(expr), name, parentenv, handler)
8. withCallingHandlers({
.      if (!mime %in% names(repr::mime2repr))
.          stop("No repr_* for mimetype ", mime, " in repr::mime2repr")
.      rpr <- repr::mime2repr[[mime]](obj)
.      if (is.null(rpr))
.          return(NULL)
.      prepare_content(is.raw(rpr), rpr)
. }, error = error_handler)
9. repr::mime2repr[[mime]](obj)
10. repr_geojson.sfc(obj)
11. repr_geojson(geojsonio::geojson_list(obj), ...)
12. loadNamespace(x)
```

```
13. withRestarts(stop(cond), retry_loadNamespace = function() NULL)
14. withOneRestart(expr, restarts[[1L]])
15. doWithOneRestart(return(expr), restart)
```

```
Geometry set for 2478 features
Geometry type: MULTIPOLYGON
Dimension:     XY
Bounding box:  xmin: 911292 ymin: 319149.1 xmax: 4083063 ymax: 2349615
Projected CRS: MEXICO_ITRF_2008_LCC
First 5 geometries:
```

```r
municipi[1:3,]
```

```
ERROR while rich displaying an object: Error in loadNamespace(x): no hay
paquete llamado 'geojsonio'

Traceback:
1. sapply(x, f, simplify = simplify)
2. lapply(X = X, FUN = FUN, ...)
3. FUN(X[[i]], ...)
4. tryCatch(withCallingHandlers({
   .     if (!mime %in% names(repr::mime2repr))
   .         stop("No repr_* for mimetype ", mime, " in repr::mime2repr")
   .     rpr <- repr::mime2repr[[mime]](obj)
   .     if (is.null(rpr))
   .         return(NULL)
   .     prepare_content(is.raw(rpr), rpr)
   . }, error = error_handler), error = outer_handler)
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   .     if (!mime %in% names(repr::mime2repr))
   .         stop("No repr_* for mimetype ", mime, " in repr::mime2repr")
   .     rpr <- repr::mime2repr[[mime]](obj)
   .     if (is.null(rpr))
   .         return(NULL)
   .     prepare_content(is.raw(rpr), rpr)
   . }, error = error_handler)
9. repr::mime2repr[[mime]](obj)
10. repr_geojson.sf(obj)
11. repr_geojson(geojsonio::geojson_list(obj), ...)
12. loadNamespace(x)
13. withRestarts(stop(cond), retry_loadNamespace = function() NULL)
14. withOneRestart(expr, restarts[[1L]])
15. doWithOneRestart(return(expr), restart)
```
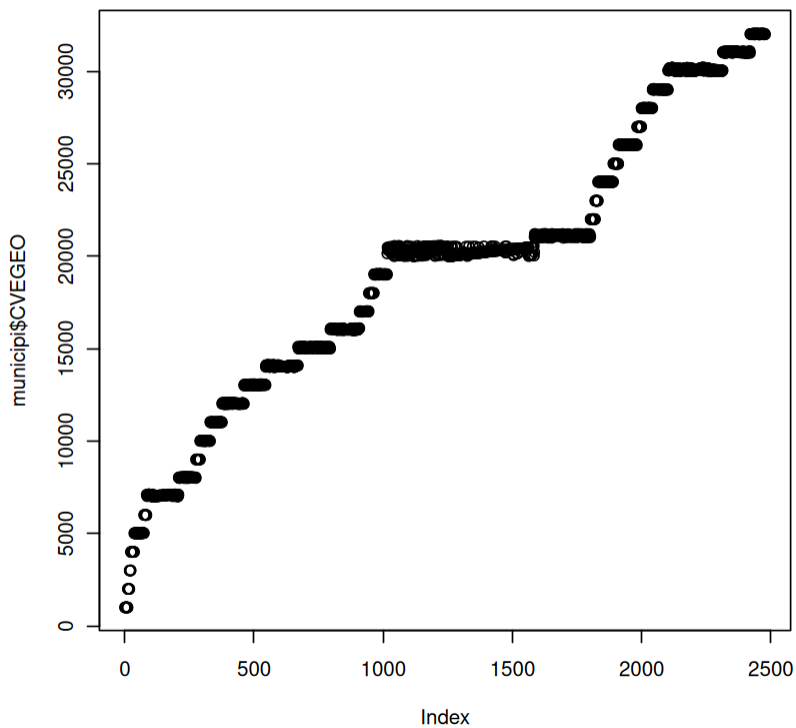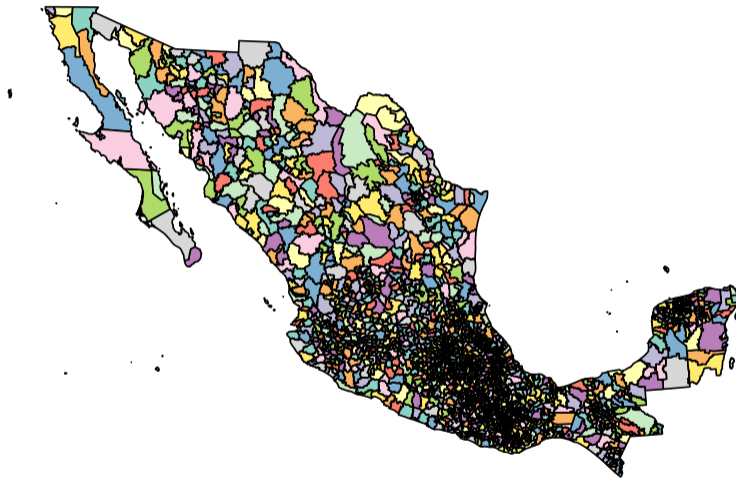
A sf: 3 × 5

| CVEGEO <chr> | CVE_ENT <chr> | CVE_MUN <chr> | NOMGEO <chr> | geometry <MULTIPOLY-GON [m]> |
|---|---|---|---|---|
| 01001 | 01 | 001 | Aguascalientes | MULTIPOLY-GON (((2488980 111... |
| 01008 | 01 | 008 | San José de Gra-cia | MULTIPOLY-GON (((2453327 114... |
| 01011 | 01 | 011 | San Francisco de los Romo | MULTIPOLY-GON (((2483638 112... |

```
plot(municipi$CVEGEO)
```
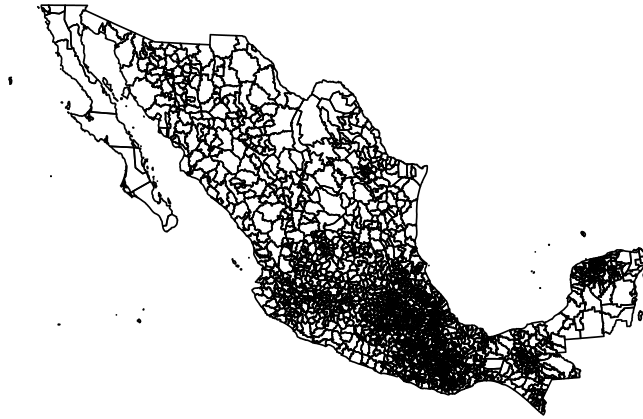
```
plot(municipi["CVEGEO"])
```
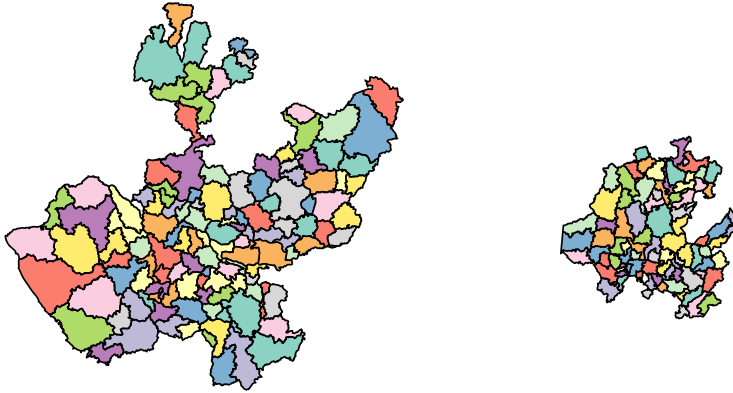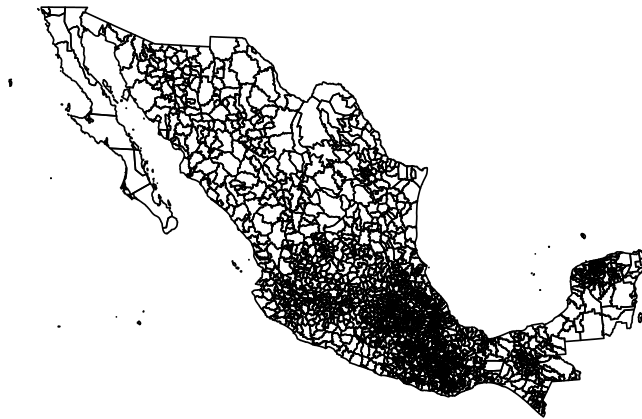
**CVEGEO**



```
plot(municipi$geometry)
```

```
Jal_hid<-municipi[municipi$CVE_ENT%in%c(13,14),"CVEGEO"]
```

```
plot(Jal_hid)
```

**CVEGEO**



```
plot(st_geometry(municipi))
```

```
imm<-read_excel("IMM_2020.xlsx",sheet = "IMM_2020")
```

```
summary(imm)
```

```
   CVE_ENT            NOM_ENT            CVE_MUN            NOM_MUN
 Length:2469        Length:2469        Length:2469        Length:2469
 Class :character   Class :character   Class :character   Class :character
 Mode  :character   Mode  :character   Mode  :character   Mode  :character




    POB_TOT            ANALF             SBASC             OVSDE
 Min.   :     81   Min.   : 0.3534   Min.   : 5.535   Min.   : 0.0000
 1st Qu.:   4489   1st Qu.: 4.4278   1st Qu.:35.738   1st Qu.: 0.6519
 Median :  13552   Median : 8.2028   Median :46.339   Median : 1.4283
 Mean   :  51038   Mean   :10.1645   Mean   :45.853   Mean   : 3.1600
 3rd Qu.:  35284   3rd Qu.:13.7873   3rd Qu.:55.856   3rd Qu.: 3.3426
 Max.   :1922523   Max.   :53.0713   Max.   :88.328   Max.   :64.4504
     OVSEE              OVSAE             OVPT              VHAC
 Min.   : 0.0000   Min.   : 0.0000   Min.   : 0.000   Min.   : 3.95
```

```
1st Qu.: 0.3661   1st Qu.: 0.8785   1st Qu.: 1.655   1st Qu.:18.73
Median : 0.8282   Median : 2.4523   Median : 4.714   Median :25.00
Mean   : 1.5008   Mean   : 6.1181   Mean   : 7.987   Mean   :26.57
3rd Qu.: 1.6783   3rd Qu.: 7.2859   3rd Qu.:11.030   3rd Qu.:32.82
Max.   :53.0655   Max.   :81.7884   Max.   :68.150   Max.   :69.56
    PL.5000           PO2SM             IM_2020           GM_2020
Min.   :  0.00    Min.   : 28.45    Min.   :21.41    Length:2469
1st Qu.: 40.13    1st Qu.: 74.62    1st Qu.:51.84    Class :character
Median :100.00    Median : 84.64    Median :54.42    Mode  :character
Mean   : 69.90    Mean   : 82.14    Mean   :53.96
3rd Qu.:100.00    3rd Qu.: 91.62    3rd Qu.:56.70
Max.   :100.00    Max.   :100.00    Max.   :62.40
    IMN_2020
Min.   :0.3352
1st Qu.:0.8118
Median :0.8522
Mean   :0.8449
3rd Qu.:0.8878
Max.   :0.9771
```

```r
mun <- sp::merge(municipi,imm,by.x ="CVEGEO",by.y = "CVE_MUN")
```

```r
summary(mun)
```

```
   CVEGEO            CVE_ENT.x          CVE_MUN            NOMGEO
Length:2469        Length:2469        Length:2469        Length:2469
Class :character   Class :character   Class :character   Class :character
Mode  :character   Mode  :character   Mode  :character   Mode  :character




  CVE_ENT.y           NOM_ENT            NOM_MUN            POB_TOT
Length:2469        Length:2469        Length:2469        Min.   :      81
Class :character   Class :character   Class :character   1st Qu.:    4489
Mode  :character   Mode  :character   Mode  :character   Median :   13552
                                                         Mean   :   51038
                                                         3rd Qu.:   35284
                                                         Max.   :1922523
    ANALF             SBASC             OVSDE             OVSEE
Min.   : 0.3534   Min.   : 5.535   Min.   : 0.0000   Min.   : 0.0000
1st Qu.: 4.4278   1st Qu.:35.738   1st Qu.: 0.6519   1st Qu.: 0.3661
Median : 8.2028   Median :46.339   Median : 1.4283   Median : 0.8282
Mean   :10.1645   Mean   :45.853   Mean   : 3.1600   Mean   : 1.5008
3rd Qu.:13.7873   3rd Qu.:55.856   3rd Qu.: 3.3426   3rd Qu.: 1.6783
Max.   :53.0713   Max.   :88.328   Max.   :64.4504   Max.   :53.0655
    OVSAE             OVPT              VHAC             PL.5000
```

```
 Min.    : 0.0000    Min.    : 0.000    Min.    : 3.95    Min.    :   0.00
 1st Qu.: 0.8785    1st Qu.: 1.655    1st Qu.:18.73    1st Qu.: 40.13
 Median : 2.4523    Median : 4.714    Median :25.00    Median :100.00
 Mean    : 6.1181    Mean    : 7.987    Mean    :26.57    Mean    : 69.90
 3rd Qu.: 7.2859    3rd Qu.:11.030    3rd Qu.:32.82    3rd Qu.:100.00
 Max.    :81.7884    Max.    :68.150    Max.    :69.56    Max.    :100.00
      PO2SM              IM_2020            GM_2020              IMN_2020
 Min.    : 28.45    Min.    :21.41    Length:2469        Min.    :0.3352
 1st Qu.: 74.62    1st Qu.:51.84    Class :character    1st Qu.:0.8118
 Median : 84.64    Median :54.42    Mode  :character    Median :0.8522
 Mean    : 82.14    Mean    :53.96                        Mean    :0.8449
 3rd Qu.: 91.62    3rd Qu.:56.70                        3rd Qu.:0.8878
 Max.    :100.00    Max.    :62.40                        Max.    :0.9771
          geometry
 MULTIPOLYGON :2469
 epsg:NA      :    0
 +proj=lcc ...:    0
```

```r
Jal_hid_2<-mun[mun$CVE_ENT.x%in%c(13,14),]
```

```r
plot(Jal_hid_2["GM_2020"])
```

**GM_2020**



Alto · Bajo · Medio · Muy alto · Muy bajo