Datos espaciales y mapeo en R.

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Establecer directorio e instalar los paquetes necesarios.

```
setwd("C:/Users/ldani/OneDrive/Escritorio/R/Siste/DATA _ R SISTES")
library(ggplot2)
library(dplyr)
library(rgdal)
library(raster)
library(ggsn)
library(rworldmap)
library(ggsci)
library(gridExtra)
```

Definir archivos con datos de ocurrencia por especie.

```
Fpendul <- read.csv("F.pendul.csv", sep = ",",row.names = NULL)
Pcarinat <- read.csv("P.carinat.csv", sep = ",")
Pfelic <- read.csv("P.felic.csv", sep = ",")
vars <- c("scientificName", "decimalLongitude",
          "decimalLatitude")
Pcarinat_trim <- Pcarinat %>% dplyr::select(one_of(vars))
Pfelic_trim <- Pfelic %>% dplyr::select(one_of(vars))
Fpendul_trim <- Fpendul %>% dplyr::select(one_of(vars))
```

Establecer archivos shape para cada país.

```
Bra_shp <- shapefile("C:/Users/ldani/OneDrive/Escritorio/R/Siste/DATA _ R
SISTES/BRA_adm1.shp")
Bol_shp <- shapefile("C:/Users/ldani/OneDrive/Escritorio/R/Siste/DATA _ R
SISTES/BOL_adm1.shp")
```

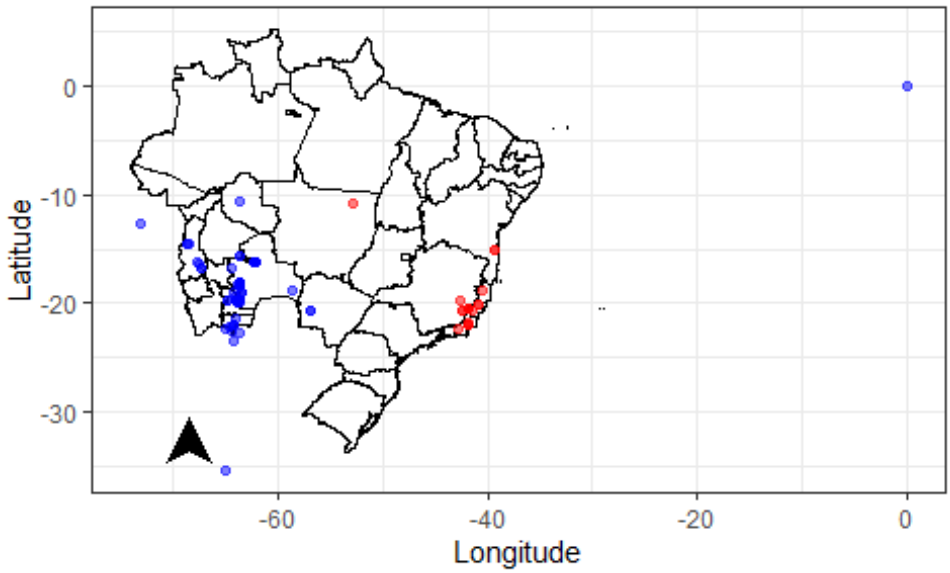
Generar mapa a partir de archivos shape y ocurrencia de especies.

```
(sp_map <- ggplot() +
    geom_polygon(data = Bra_shp,
                 aes(x = long, y = lat, group = group),
                 fill = NA, colour = "black") +
    geom_polygon(data = Bol_shp,
                     aes(x = long, y = lat, group = group),
                     fill = NA, colour = "black") +
    geom_point(colour = "blue", alpha = 0.5,
               aes(x = decimalLongitude, y = decimalLatitude),
               data = Fpendul_trim) +
    geom_point(colour = "red", alpha = 0.5,
                   aes(x = decimalLongitude, y = decimalLatitude),
```

```
                  data = Pcarinat_trim) +
    theme_bw() +
    xlab("Longitude") +
    ylab("Latitude") +
    coord_quickmap())
```

- Plotear incluyendo flecha al norte.

```
north2(sp_map, x = 0.2, y = 0.3, scale = 0.1, symbol = 10)
```



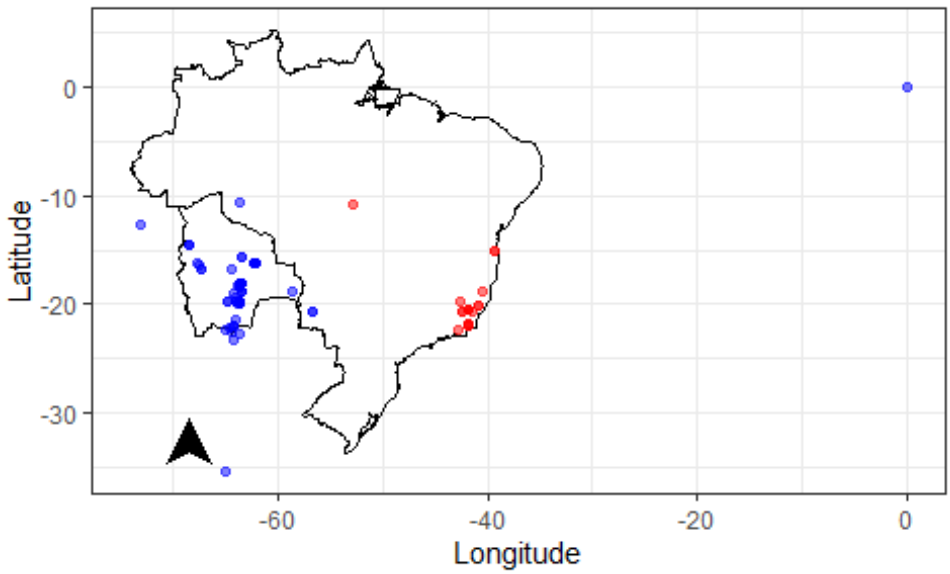
Generar mapa en R con ocurrencia de especies a partir del paquete “rworldmap”.

```
world <- getMap(resolution = "low")
saf_countries <- c("Brazil","Bolivia")
world_saf <- world[world@data$ADMIN %in% saf_countries, ]
(sp_map <- ggplot() +
        geom_polygon(data = world_saf,
                     aes(x = long, y = lat, group = group),
                     fill = NA, colour = "black") +
        geom_point(colour = "blue", alpha = 0.5,
                   aes(x = decimalLongitude, y = decimalLatitude),
                   data = Fpendul_trim) +
        geom_point(colour = "red", alpha = 0.5,
                   aes(x = decimalLongitude, y = decimalLatitude),
                   data = Pcarinat_trim) +
        theme_bw() +
        xlab("Longitude") +
```

```
        ylab("Latitude") +
        coord_quickmap())
```

- Plotear incluyendo flecha al norte.

```
north2(sp_map, x = 0.2, y = 0.3, scale = 0.1, symbol = 10)
```



Generar mapa a partir de archivo shape con ecoregiones de Morrone y ocurrencia de especies.

```
Morrone_shp <- shapefile("C:/Users/ldani/OneDrive/Escritorio/R/Siste/DATA
_ R SISTES/Lowenberg_Neto_2014.shp")
Morrone <- fortify(Morrone_shp, region = "Subregio_1")
(map_Morrone <- ggplot() +
        geom_polygon(data = Morrone,
                     aes(x = long, y = lat, group = group, fill = id),
                     color = "black", size = 0.5) +
        geom_point(colour = "blue", alpha = 0.5,
                   aes(x = decimalLongitude, y = decimalLatitude),
                   data = Fpendul_trim) +
        geom_point(colour = "red", alpha = 0.5,
                   aes(x = decimalLongitude, y = decimalLatitude),
                   data = Pcarinat_trim) +
        theme_classic() +
        theme(legend.position="bottom") +
        theme(legend.title=element_blank()) +
        xlab("Longitude") +
```

```
        ylab("Latitude") +
        coord_quickmap())
```

- Editar escala de colores en el mapa y plotear incluyendo flecha al norte .

```
map_Morrone1 = map_Morrone + scale_fill_startrek() +
scale_color_simpsons()
north2(map_Morrone1, x = 0.2, y = 0.3, scale = 0.1, symbol = 10)
```