ie2miscdata: Map of USA Engineering Weather Sites

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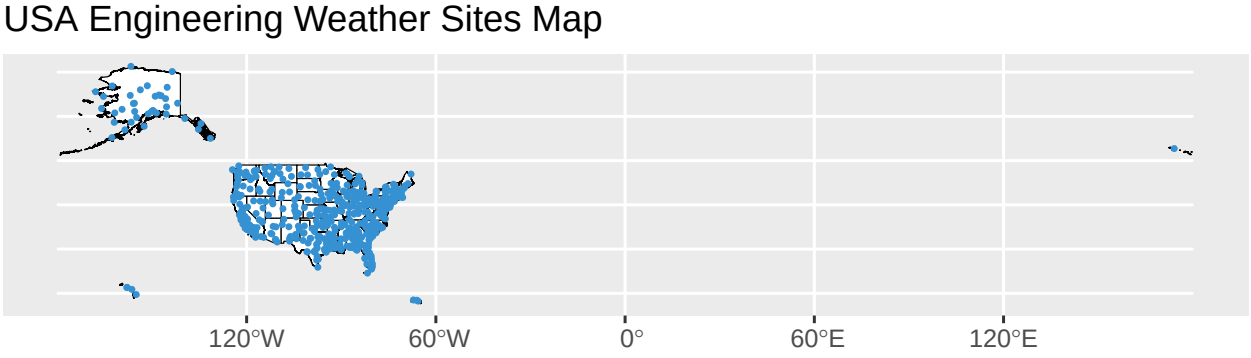
Creating a ggplot2 Map of the USA Engineering Weather Sites

```
install.load::load_package("ie2miscdata", "USA.state.boundaries", "data.table", "ggplot2", "sf", "spats
# load needed packages using the load_package function from the install.load package (it is assumed tha


data(weather_results)
# load the weather_results data (containing the site information for USA weather stations)

data(state_boundaries_wgs84)
# load the state_boundaries_wgs84 data from USA.state.boundaries (for the USA map)


## Weather Results

weather_results_map <- copy(weather_results)
# copy the weather_results using data.table

setnames(weather_results_map, 3:4, c("lat", "lon"))
# set the names of columns 3 and 4 using data.table

weather_results_map_sf <- st_as_sf(weather_results_map, coords = c("lon", "lat"), crs = "+proj=longlat +
# set the initial projection to longlat using sf

weather_results_map_sf_projected <- st_transform(weather_results_map_sf, "+proj=aea +lat_1=29.5 +lat_2=
# transform the coordinates to match those of the USA_state_boundaries_map data from USA.state.boundari


## USA
```

```r
USA <- state_boundaries_wgs84
# create the USA object with the same data as state_boundaries_wgs84

USA_projected <- st_transform(USA, "+proj=aea +lat_1=29.5 +lat_2=45.5 +lat_0=23 +lon_0=-96 +x_0=0 +y_0=0
# transform the coordinates to match those of the USA_state_boundaries_map data from USA.state.boundari


# As different methods using sf failed to subset the weather map points within the USA, the weather resu

weather_results_map_dt <- as.data.table(st_coordinates(weather_results_map_sf_projected))
# transform the coordinates only to a data.table

setnames(weather_results_map_dt, c("X", "Y"), c("lon", "lat"))
# set the names of columns X and Y using data.table


USA_owin <- spatstat.geom::as.owin(USA_projected)
# transform to Window


inside_USA <- which(spatstat.geom::inside.owin(weather_results_map_dt$lon, weather_results_map_dt$lat, U
# determine which locations are within the borders of the USA (including Alaska, Hawai'i, Puerto Rico, a
# Source 2


weather_results_keep <- weather_results[inside_USA, ]
# keep only the locations within the USA

weather_results_map_keep <- copy(weather_results_keep)
# create a data.table copy of the sites that are kept

setnames(weather_results_map_keep, 3:4, c("lat", "lon"))
# set the names of columns 3 and 4 using data.table

weather_results_map_keep_sf <- st_as_sf(weather_results_map_keep, coords = c("lon", "lat"), crs = "+proj
# set the projection to longlat using sf

# plot the map using ggplot2
p <- ggplot() + geom_sf(data = USA, colour = "black", fill = "white")
p <- p + geom_sf(data = weather_results_map_keep_sf, colour = "#3591d1", size = 0.5)
p <- p + labs(x = "", y = "", title = "USA Engineering Weather Sites Map")
print(p)
```



Sources

Latitude Longitude Coordinates to State Code in R - Stack Overflow answered by Josh O'Brien on Jan 6 2012 and edited by Josh O'Brien on Jun 18, 2020. See https://stackoverflow.com/questions/8751497/latitude-longitude-coordinates-to-state-code-in-r.

R-sig-geo - Problem in converting SpatialPolygonsDataFrame to owin object Answer by Roger Bivand on Sep 15, 2006. See https://stat.ethz.ch/pipermail/r-sig-geo/2006-September/001313.html.

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