Some new geoplot features

Ben Jann

University of Bern

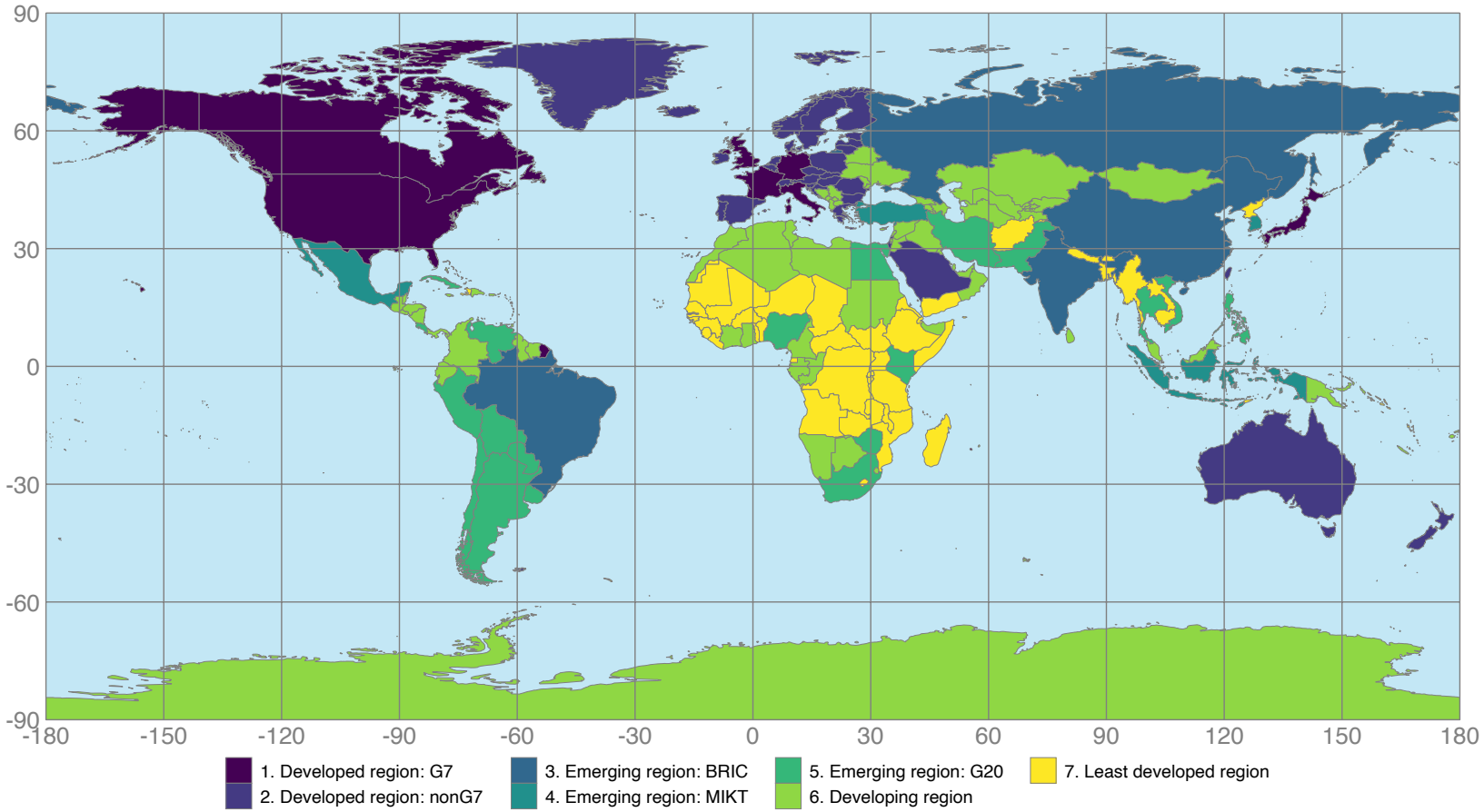
2024 UK Stata Conference
London, September 12–13, 2024

Some new features since last year's presentation

- Projections
- Insets
- Grids and rasters
- Spatial smoothing
- Clipping
- Simplification (generalization)
- More symbols
- New powerful legend options
- Support for GeoJSON

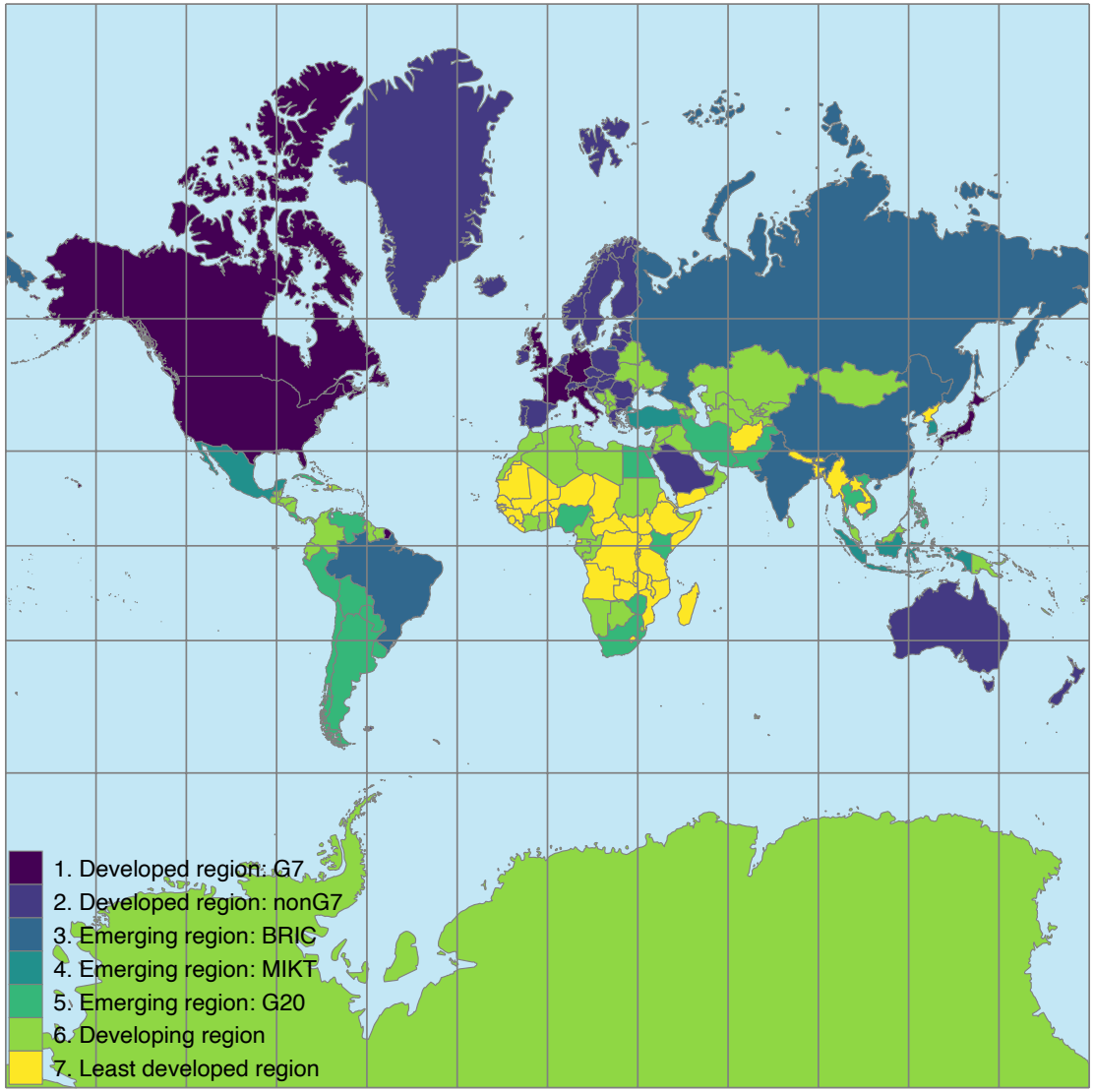
Raw data (longitude and latitude in degrees)

```
geoframe create world ne_50m_admin_0_countries.zip // (from www.naturalearthdata.com)
geoplot (area world ECONOMY, color(viridis) lc(gray) lw(.1)), tight ///
    background(water) grid(label) legend(position(s) rows(2) outside)
```



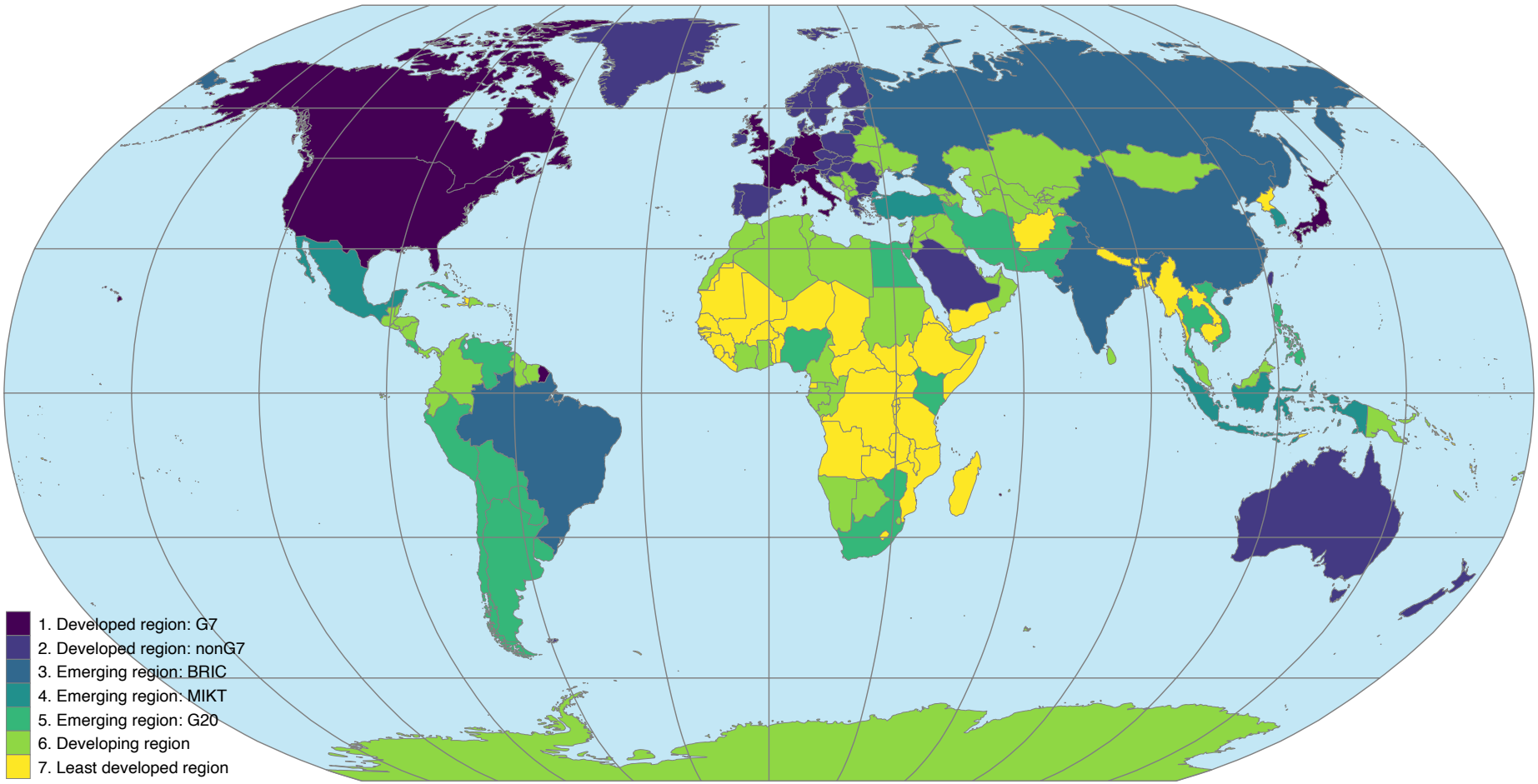
Mercator projection (used, e.g., by Google maps) (cylindrical)

```
geoplot (area world ECONOMY, color(viridis) lc(gray) lw(.1)), tight ///
    background(water) grid legend(position(sw)) project
```



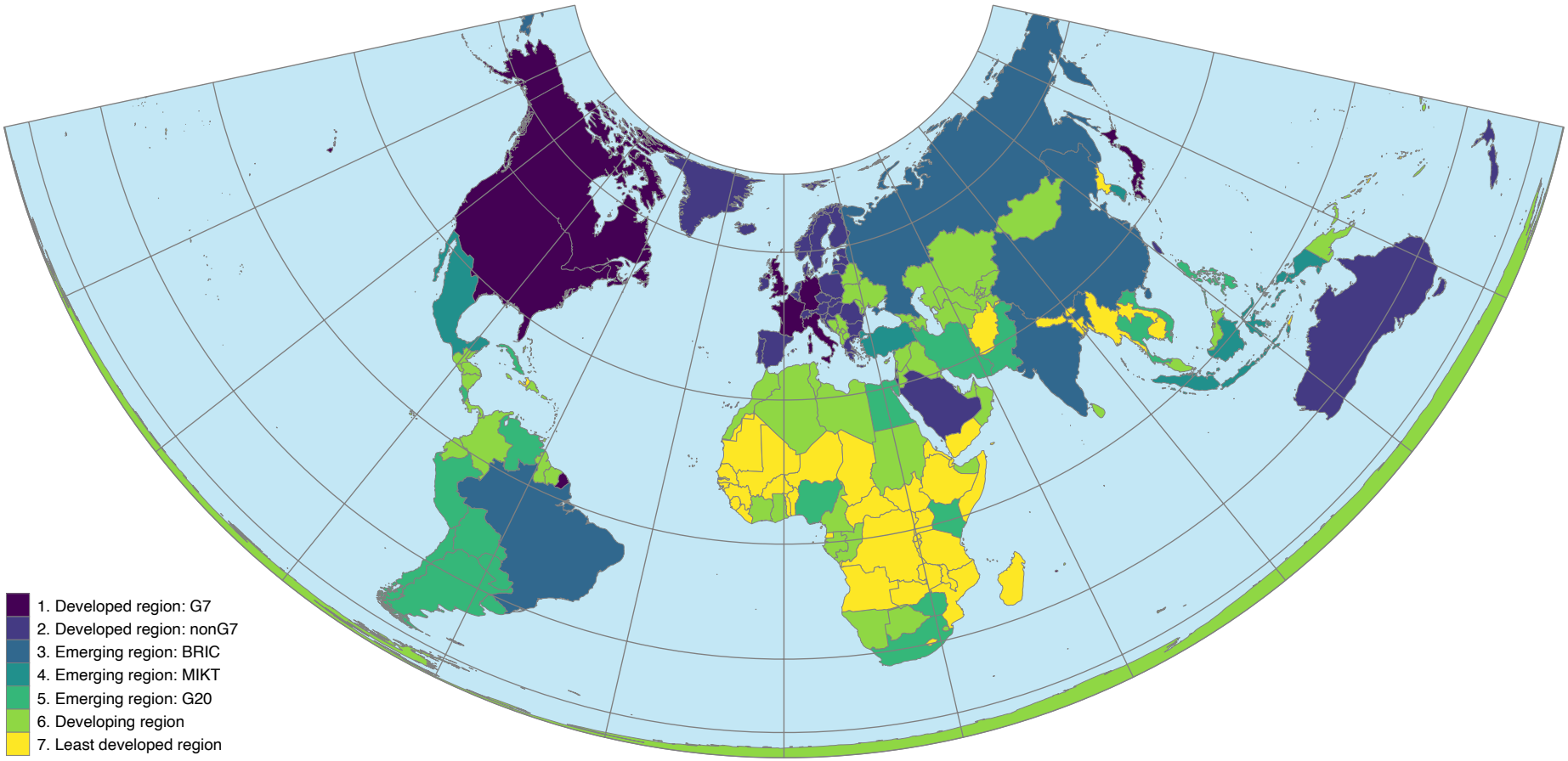
Robinson projection (pseudocylindrical)

```
geoplot (area world ECONOMY, color(viridis) lc(gray) lw(.1)), tight ///
    background(water) grid(y(-90(30)90)) legend(position(sw)) ///
    project(robinson)
```



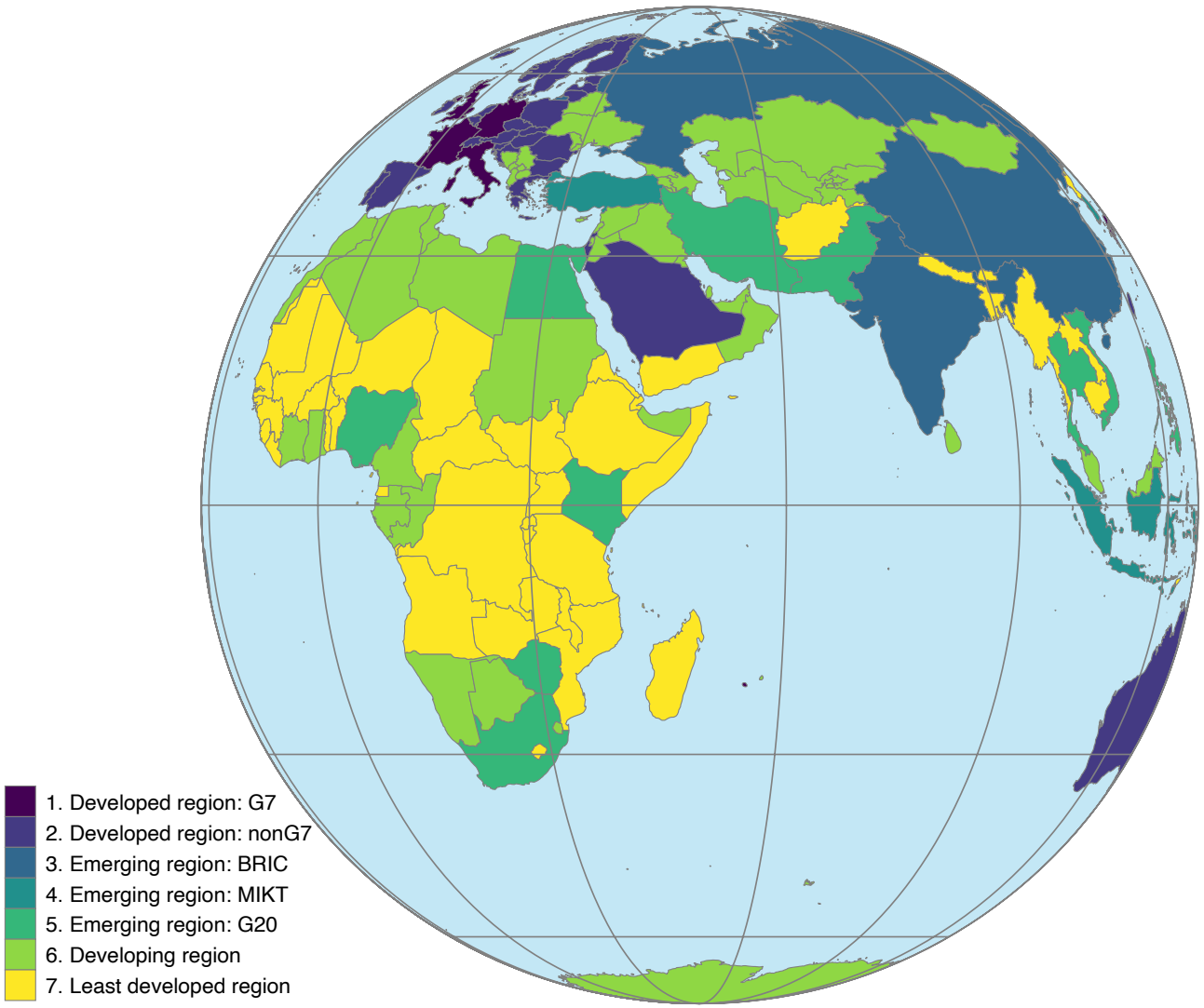
Albers projection (conic)

```
geoplot (area world ECONOMY, color(viridis) lc(gray) lw(.1)), tight ///
    background(water) grid(y(-90(30)90)) legend(position(sw)) ///
    project(albers)
```



Orthographic projection (azimuthal)

```
geoplot (area world ECONOMY, color(viridis) lc(gray) lw(.1)), tight ///
    background(water) grid(y(-90(30)90)) legend(position(sw)) ///
    margin(l=20) project(orthographic 1 50)
```



Data on Mexico from www.gits.igg.unam.mx/idea/descarga:

```
. geoframe create Estatal "Shapefile - Censo 2010 (Estatal).zip"
(translating Shapefile - Censo 2010 (Estatal).zip/inegi_refcenesta_2010.shp)
(importing shp file) (5 vars, 659,531 obs)
(importing dbf file) (190 vars, 32 obs)
(creating frame Estatal)
(creating frame Estatal_shp)
            Frame name: Estatal [make current]
            Frame type: attribute
          Feature type: <none>
         Number of obs: 32
               Unit ID: _ID
           Coordinates: _CX _CY
    Linked shape frame: Estatal_shp
. frame Estatal: geoframe simplify
(simplification threshold = .0000721)
(simplifying 312 shape items)
(0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%)
(refinement threshold = .1827136)
(refining 85 shape items)
(0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%)
(dropped 644,157 observations in frame Estatal_shp)
(added 196 observations in frame Estatal_shp)
```

Illustration of `inset()` option (can be repeated):

```
geoplot (area Estatal i._ID), nolegend ///
    inset(area world, lw(.1) color(sand) || area world if _ID==110, color(stc2) || ///
        , nobox size(40) pos(ne) title(Mexico is here) project(orthographic 1 -70) ///
           background(water lc(gray) limits(-180 180 -90 90)))
```

More data on Mexico from www.gits.igg.unam.mx/idea/descarga:

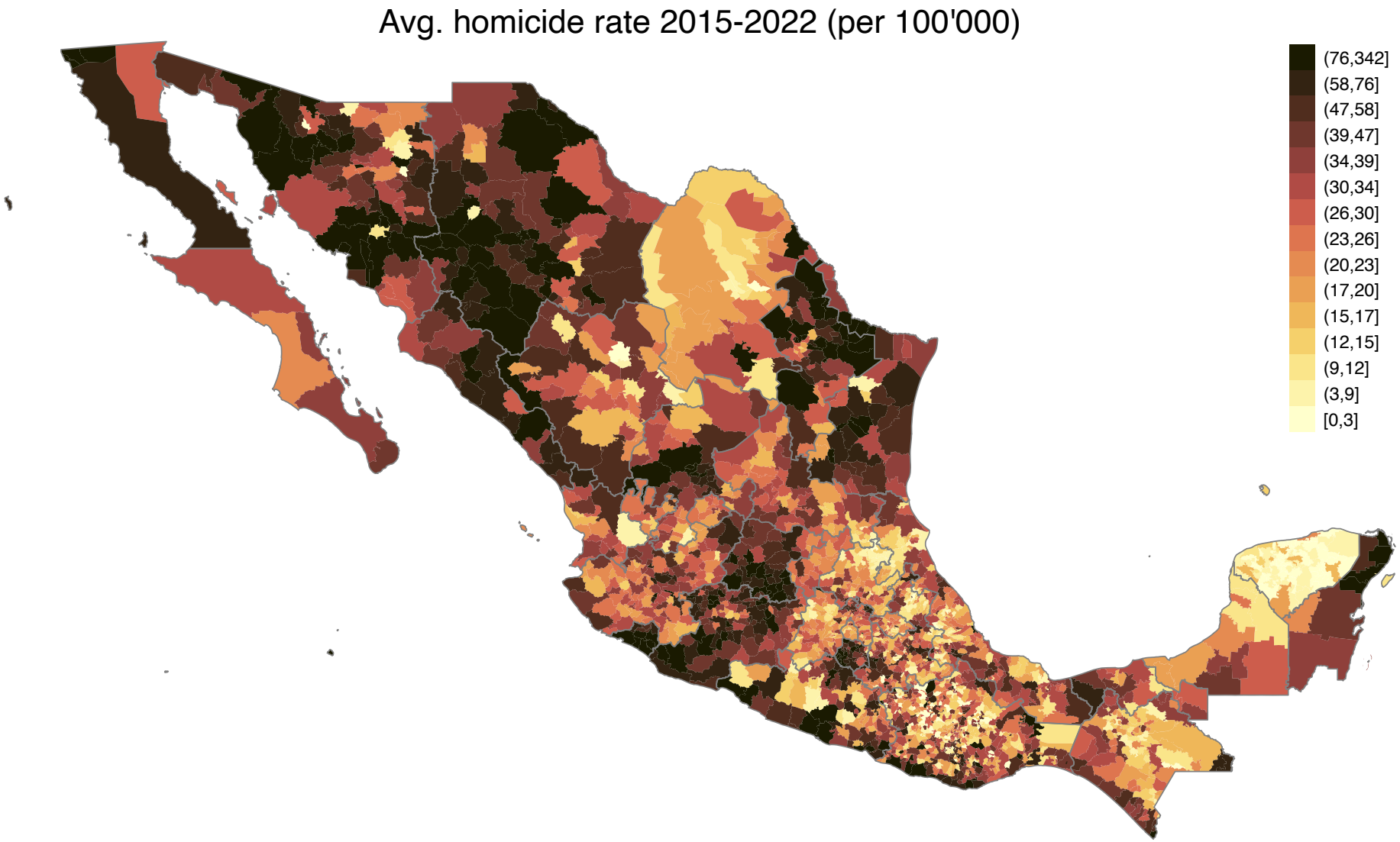
```
. geoframe create Municipal "Shapefile - Censo 2010 (Municipal).zip"
(translating Shapefile - Censo 2010 (Municipal).zip/inegi_refcenmuni_2010.shp)
(importing shp file) (5 vars, 3,283,138 obs)
(importing dbf file) (192 vars, 2,456 obs)
(creating frame Municipal)
(creating frame Municipal_shp)
            Frame name: Municipal [make current]
            Frame type: attribute
          Feature type: <none>
         Number of obs: 2,456
               Unit ID: _ID
           Coordinates: _CX _CY
    Linked shape frame: Municipal_shp
. frame Municipal: geoframe simplify
(simplification threshold = .0000721)
(simplifying 2862 shape items)
(0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%)
(refinement threshold = .1827136)
(refining 2567 shape items)
(0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%)
(dropped 3178096 observations in frame Municipal_shp)
(added 341 observations in frame Municipal_shp)
```

Add homicide data obtained from www.gob.mx:

```
. use Homicides, clear // (number of homicides and femicides in 2015-2022)
. frame Municipal {
.     destring cve_umun, replace
cve_umun: all characters numeric; replaced as int
.     geoframe copy default Homicides, id(cve_umun cvemunicipio)
(all units in frame Municipal matched)
(1 variable copied from frame default)
.     generate double hrate = Homicides/8 / (p_total/100000)
.     format %9.0f hrate
. }
```

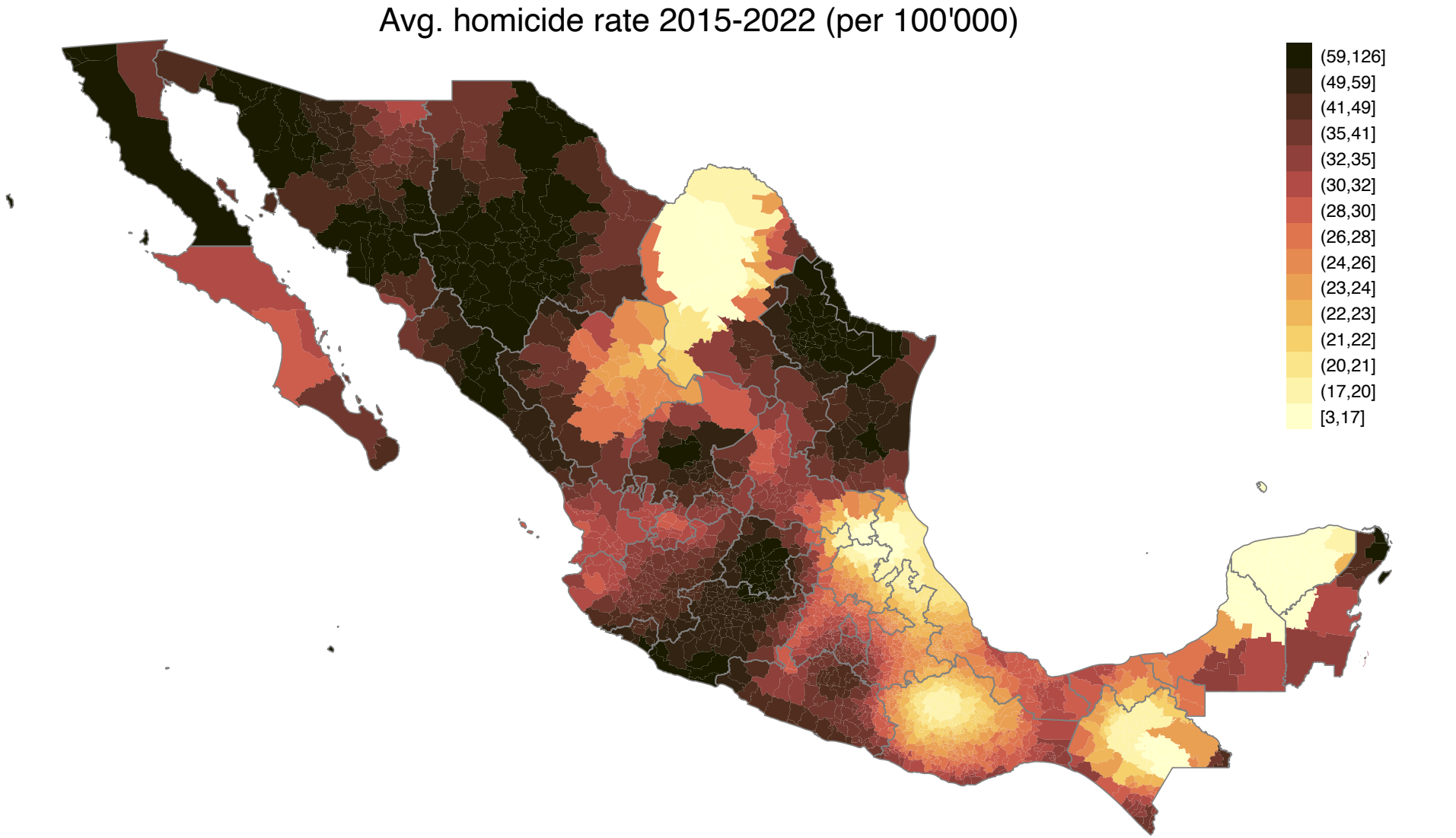
Homicide rate by municipality:

```
geoplot ///
    (area Municipal hrate, levels(15, quantile) color(scico lajolla)) ///
    (area Estatal), subtitle("Avg. homicide rate 2015-2022 (per 100'000)")
```



Apply smoothing:

```
frame Municipal: geoframe spsmooth hrate, generate(shrate)
geoplot ///
    (area Municipal shrate, levels(15, quantile) lab(, format(%9.0f)) color(scico lajolla)) ///
    (area Estatal), subtitle("Avg. homicide rate 2015-2022 (per 100'000)")
```

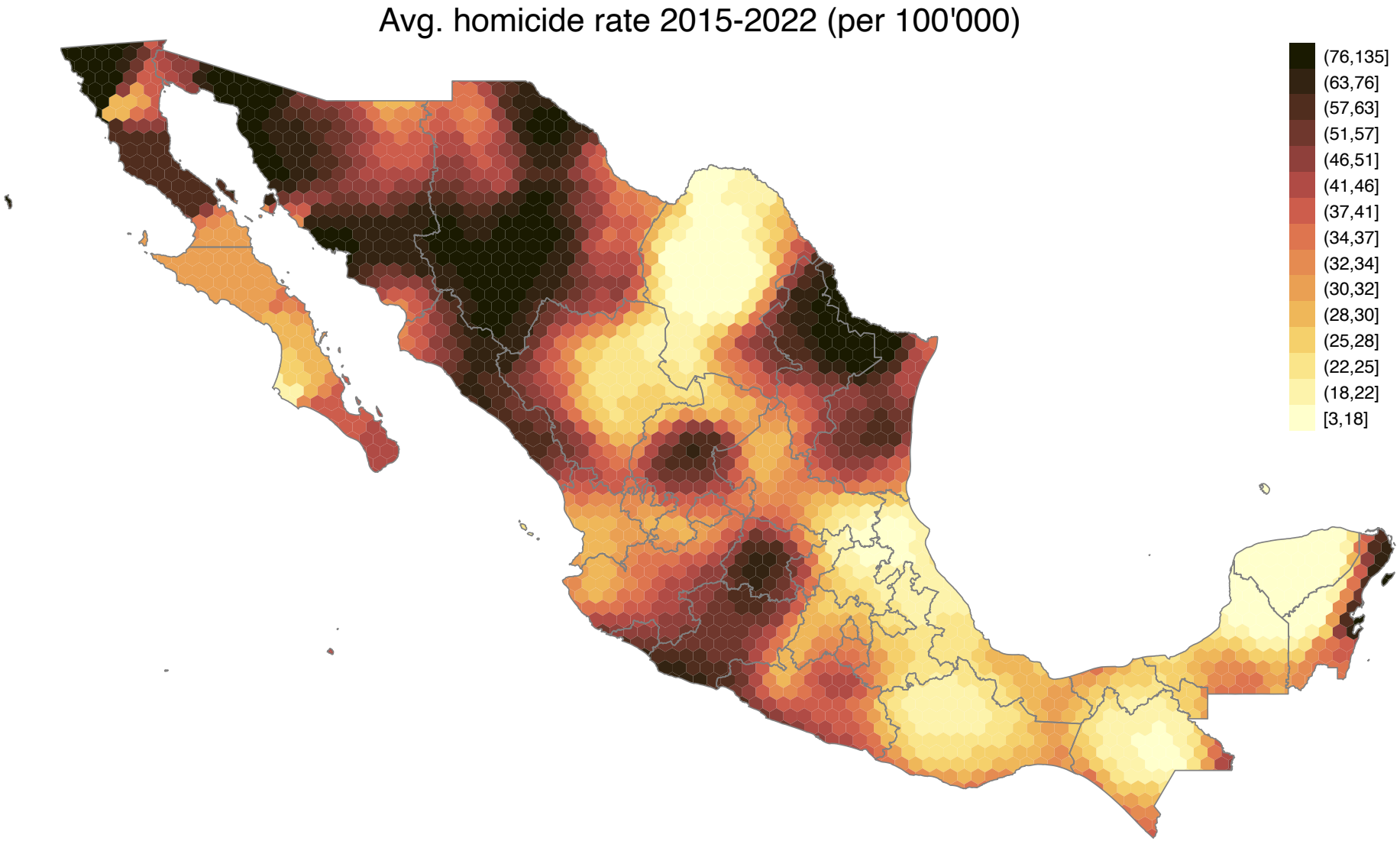


Generate raster:

```
frame Estatal: geoframe raster R, n(100) hex
geoplot (area R i.ID, fcolor(*.5)) (area Estatal), nolegend
```

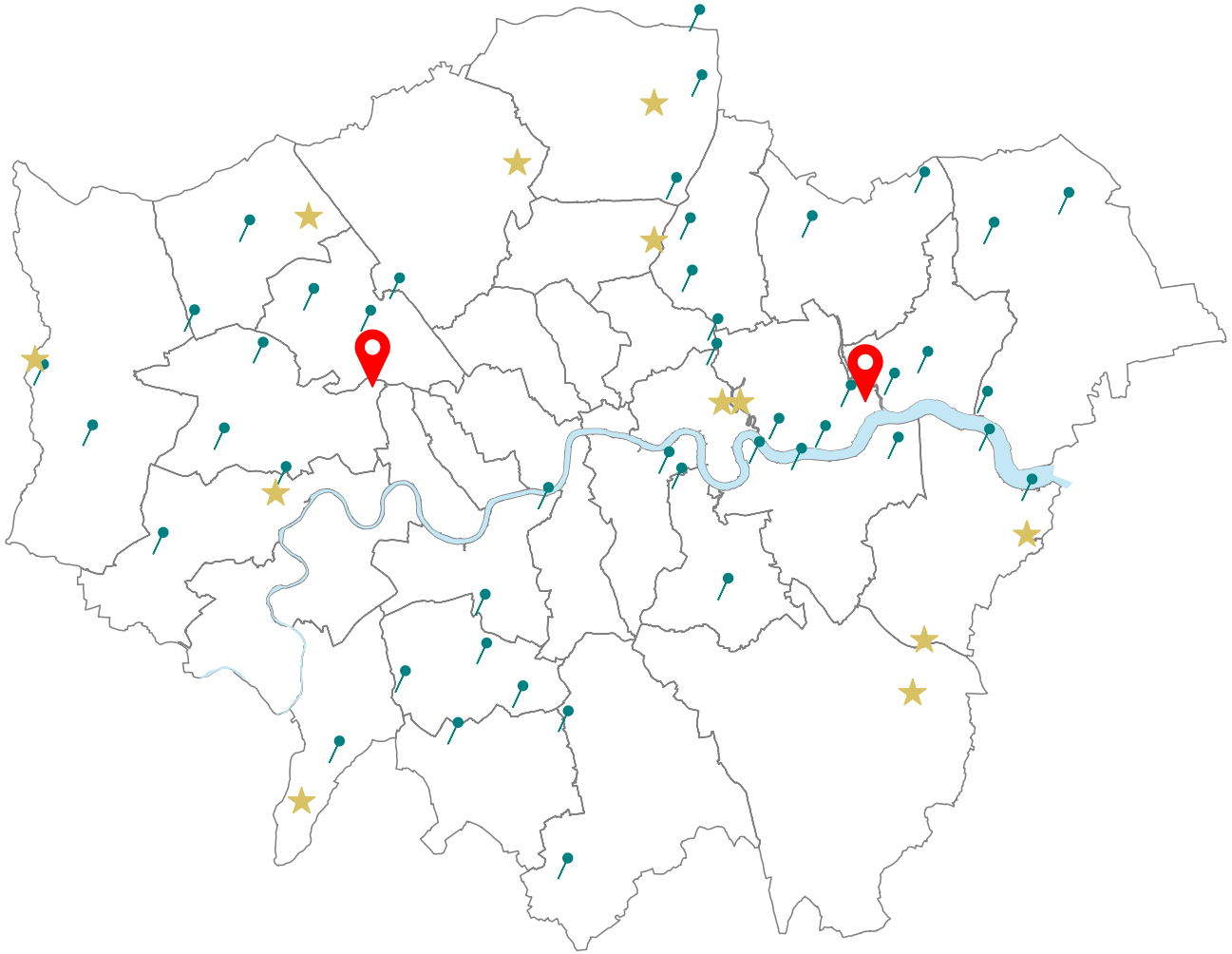
Smooth to raster:

```
frame Municipal: geoframe spsmooth hrate, at(R, fill)
geoplot ///
    (area R hrate, levels(15, quantile) lab(, format(%9.0f)) color(scico lajolla)) ///
    (area Estatal), subtitle("Avg. homicide rate 2015-2022 (per 100'000)")
```



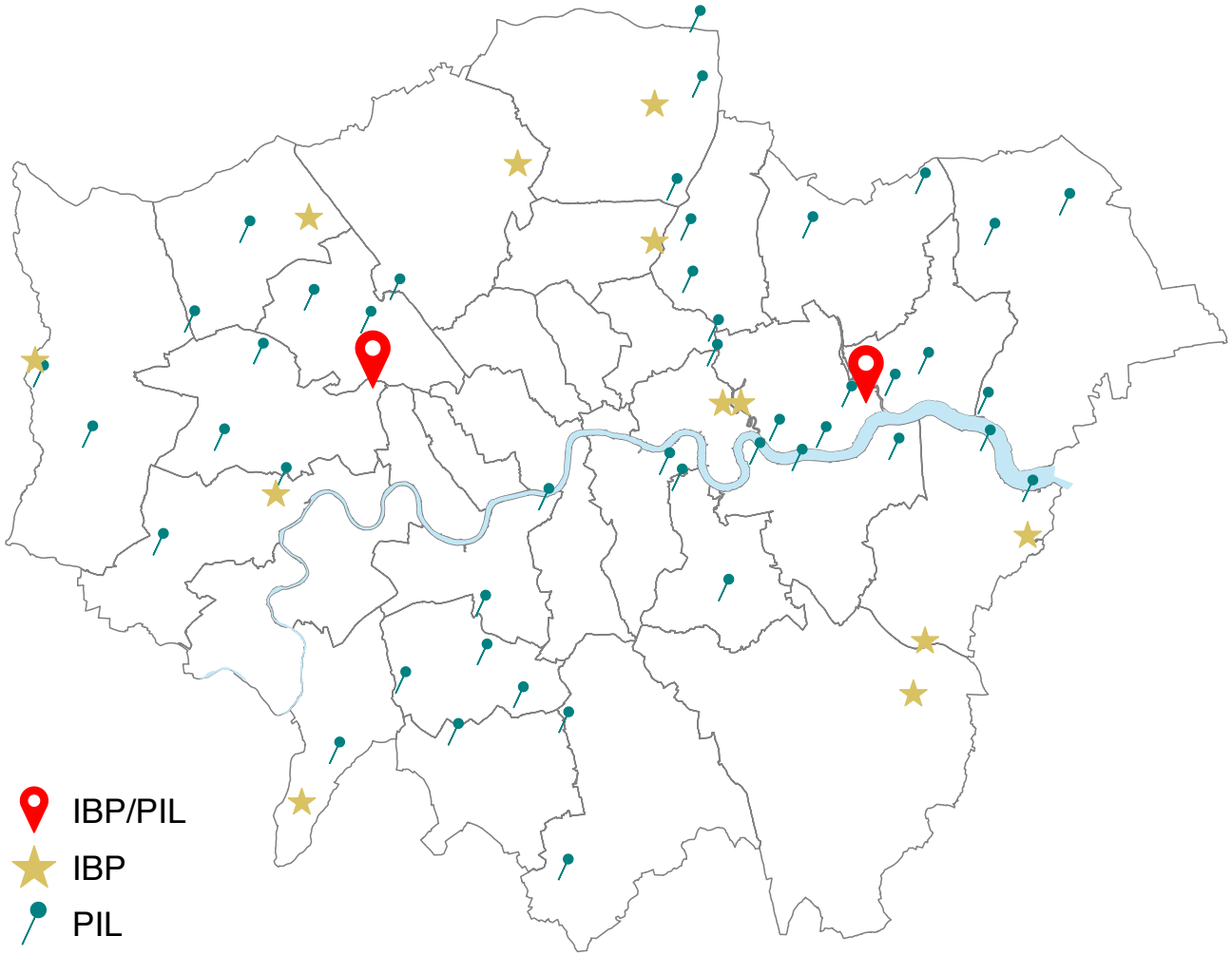
Last year I showed the following map of Greater London:

```
geoplot (line Borough) (area Thames) ///
    (symbol SIL if Type==3, shape(pin) angle(-25) color(Teal)) ///
    (symbol SIL if Type==2, shape(star) color(sand)) ///
    (symbol SIL if Type==1, shape(pin2) color(red) size(*2)), tight
```

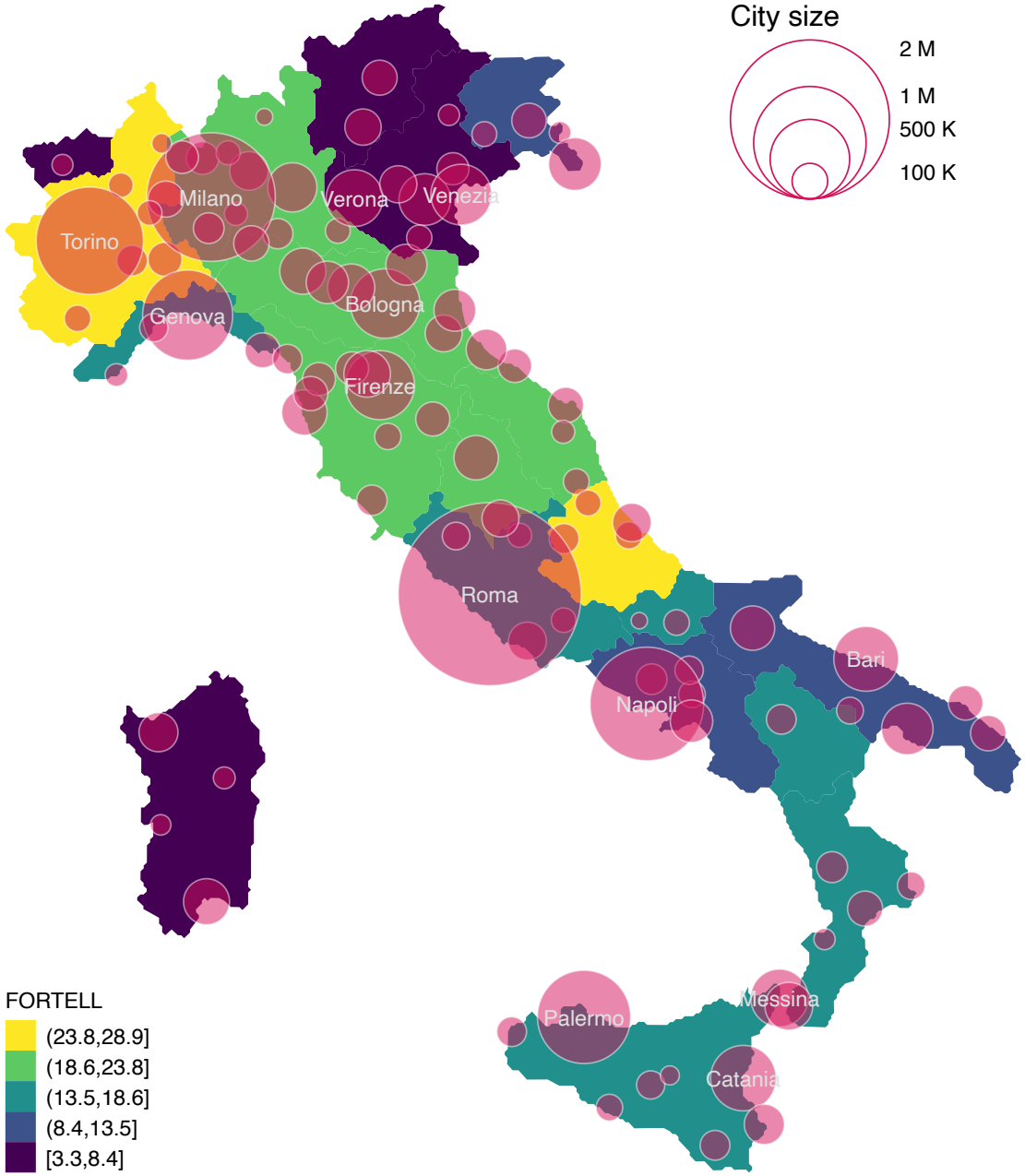


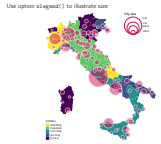
Option `glegend()` can create a legend including the custom symbols:

```
geoplot (line Borough) (area Thames) ///
    (symbol SIL if Type==3, label(PIL)     shape(pin) angle(-25) color(Teal)) ///
    (symbol SIL if Type==2, label(IBP)     shape(star) color(sand)) ///
    (symbol SIL if Type==1, label(IBP/PIL) shape(pin2) color(red) size(*2)), tight ///
    glegend(layout(5 4 3) symsize(6) tsize(medsmall) pos(sw))
```



Use option `slegend()` to illustrate size:





```
geoplot (area regions fortell) ///
    (symbol capitals [w=pop98], color(stc2%50) lcolor(white) size(*6)) ///
    (label capitals city if pop98>250000, color(gs14) size(vsmall)) ///
    , glegend(layout(- "FORTELL" 1) position(sw)) ///
      slegend(100000 "100 K" 5e5 "500 K" 1e6 "1 M" 2e6 "2 M", position(ne) ///
        overlay lcolor(stc2) heading("City size") hsize(small)) tight
```

`glegend()` can display composite symbols:


```
. geoplot (area regions) ///
>    (symbol capitals (star) if pop>5e5, color(hotpink) size(*2)) ///
>    (symbol capitals ("`=uchar(9749)'")) ///
>    , glegend(layers(3 "coffee" 2&3 "great coffee") symsize(8) ///
>        symscale(1.4, common) box tsize(small) textwidth(17)) tight
```