Group 1 - (e)mission impossible

Status quo

- Data ✓
- Model OLS ✓
- Model GWR ✓ (some puzzling results)

ToDos

- Robustness checks: spatial tests (Moran's I) - what W matrix, vary number of neighbours

- Extension 1: variability over time? (maybe consider only specific region, data availability)

- (Extension 2: add other greenhouse gases?)

- Preparation of slides for final presentation

- Paper $\rightarrow$ any specific requirements? (theory?, literature review?)

Specific questions

1. Is the selection of regions OK? (see plot on next slide)

2. Median GDP/cap coef negative and $(GDP/cap)^2$ positive?
   Have we reached the Kutznetz turning point already? (median
   turning point at 0.0001€, OLS point at 28800€ (median and
   mean gdppc below that) - driven by outliers?)

3. Density positive vs Videras negative?

4. Inference of coefficients in GWR model

Output of our GWR

```
## Call:
## gwr(formula = model_base, data = spdf, gweight = gwr.bisquare,
##     adapt = bw, hatmatrix = TRUE, longlat = TRUE, se.fit = TRUE)
## Kernel function: gwr.bisquare
## Adaptive quantile: 0.2032 (about 227 of 1122 data points)
## Summary of GWR coefficient estimates at data points:
##                       Min.     1st Qu.     Median     3rd Qu.        Max.   Global
## X.Intercept.    -108.890089   -7.779865  19.549505   65.273123  125.304565 -34.8058
## log.pop.          -0.205861   -0.026484   0.076575    0.188132    0.442802  -0.0102
## log.density.       0.440375    0.573117   0.667205    0.812736    1.029219   0.8277
## log.gdppc.       -17.557400   -8.082665  -1.577058    4.066565   23.669381   8.4216
## I.log.gdppc..2.   -1.194137   -0.192717   0.091736    0.370472    0.807275  -0.4065
## gwa_share_BE      -0.258979    0.602148   1.087187    1.467210    2.420621   1.0136
## log.hdd.          -5.624822   -1.650415  -0.485196    0.052474    2.680767   0.4221
## log.cdd_fix.      -0.195276   -0.012625   0.089720    0.235506    0.562301   0.1509
## Number of data points: 1122
## Effective number of parameters (residual: 2traceS - traceS'S): 119.0558
## Effective degrees of freedom (residual: 2traceS - traceS'S): 1002.944
## Sigma (residual: 2traceS - traceS'S): 0.6262616
## Effective number of parameters (model: traceS): 90.54696
## Effective degrees of freedom (model: traceS): 1031.453
## Sigma (model: traceS): 0.6175462
## Sigma (ML): 0.5921036
## AICc (GWR p. 61, eq 2.33; p. 96, eq. 4.21): 2207.631
## AIC (GWR p. 96, eq. 4.22): 2098.624
## Residual sum of squares: 393.3583
## Quasi-global R2: 0.8020095
```
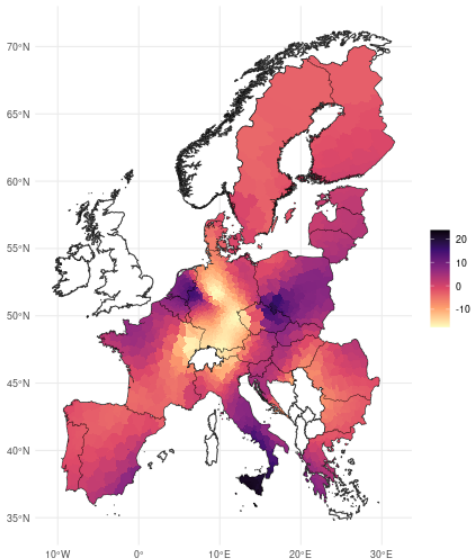
GDP/capita

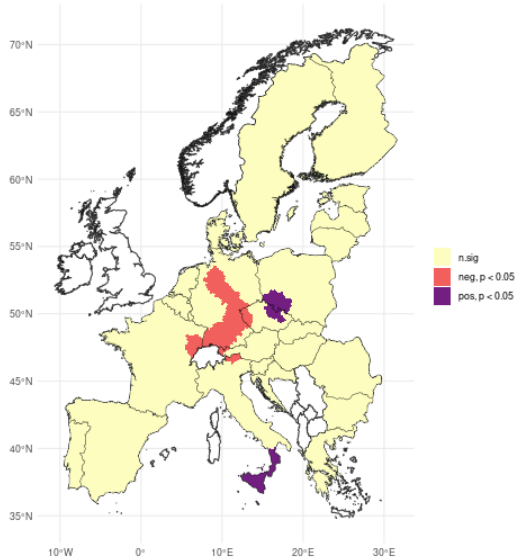Figure 1: Elasticity of emissions with respect to GDP/capita

Significance Level

Figure 2: Significance level of coef on GDP/capita