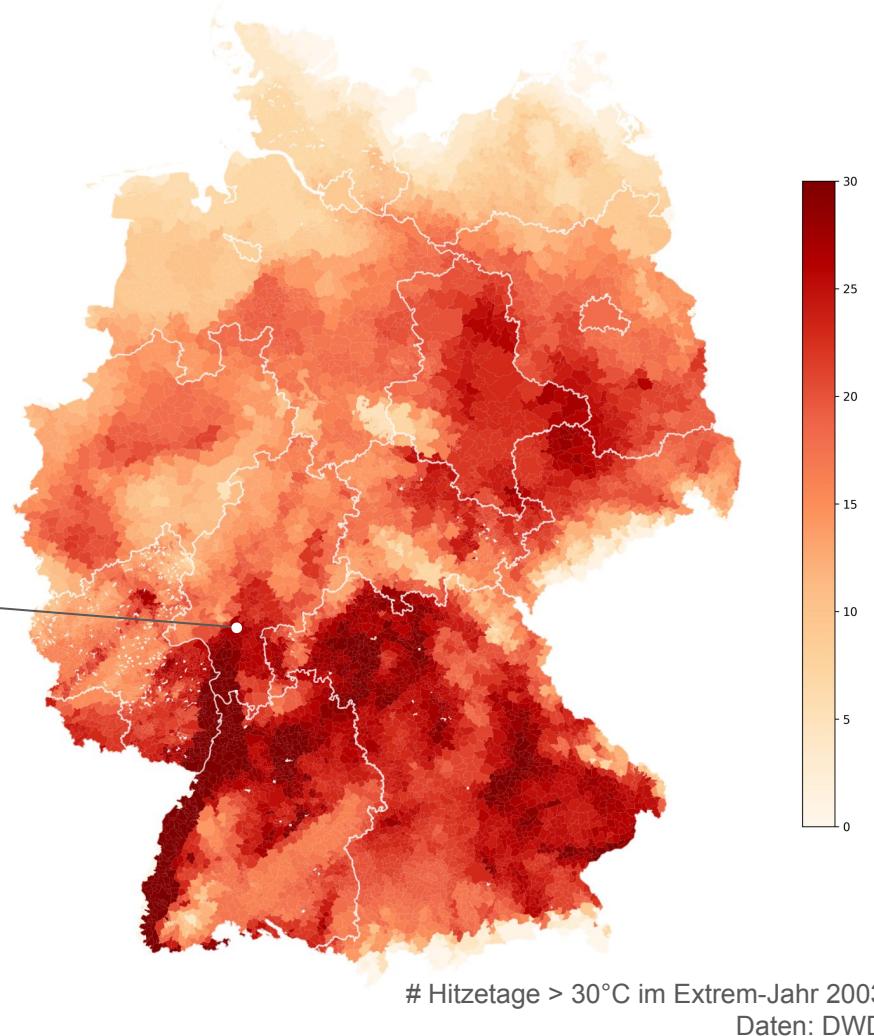


Wohnen in Deutschland unter Druck im Klimawandel

Klima-Exposition

Frankfurt am Main

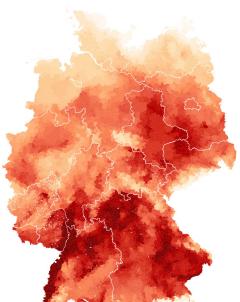


Wohnen in Deutschland unter Druck im Klimawandel

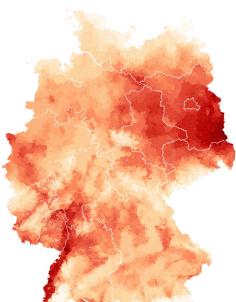
Klima-Exposition

Anzahl Hitzetage über 30°C

Auswahl der Extremsommer 2000-2024



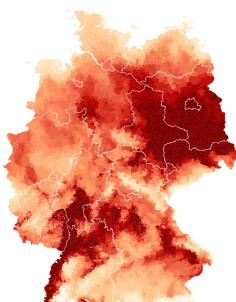
2003



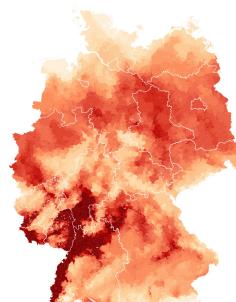
2006



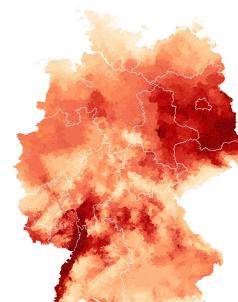
2015



2018



2022



2024

Auswertung Daten vom DWD

Relativer Klima-Expositions-Index (KEI) auf Gemeinde-Ebene (2023 ca. 10.700 Gemeinden)

Bestandteile:

- **Starkregen (SI)** (KOSTRA-DWD-2020, Raster)
- **Wind-Exposition (WEI)** (COPERNICUS, Raster, monthly, 2021-2023)
- **Hitze-Exposition (HEI)** (DWD, Raster stündlich, 2019-2023)
- **De Martonne Dürre-Index (DMI)** (DWD, Raster, 2019-2023)

Nicht einbezogen:

- Hochwassergefahrenflächen (HQ100, nur per Bundesland)

Methoden:

- Auswerten der Rasterdaten flächig über Gemeinde gemittelt
- Reduktion Wetter- und Extremjahr-Einfluß durch Mehrjahres-Mittel
- z-Transformation der Features und Kombination
- Choropleth mit GeoPandas mit Geometriedaten BKG



Modellierung des KEI

$$KEI = 0,4 \cdot SWS + 0,6 \cdot TI$$

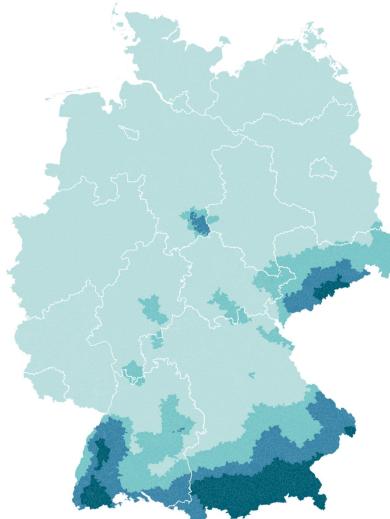
Starkregen / Wind

Hitze / Trockenheit

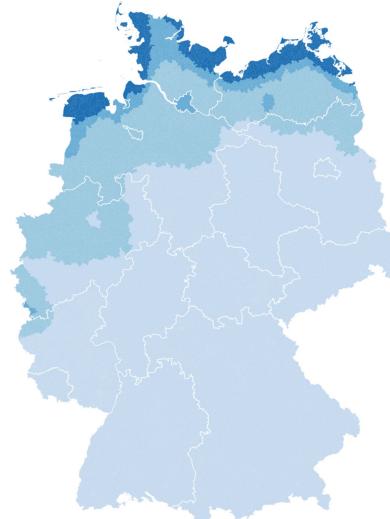


Komponenten des KEI im Überblick - 2023

Starkregen



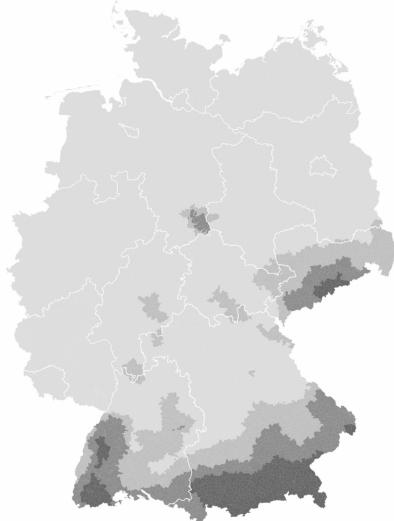
Wind



Mehrjährige Mittelwerte

Komponenten des KEI im Überblick - 2023

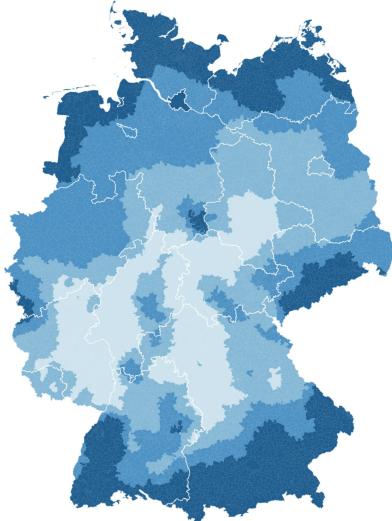
Starkregen



Wind

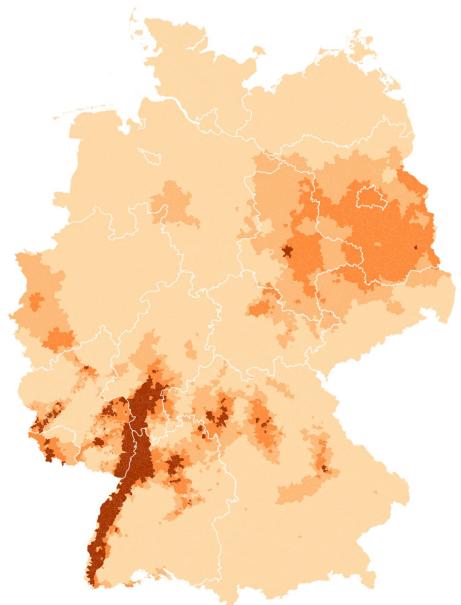


SW-score

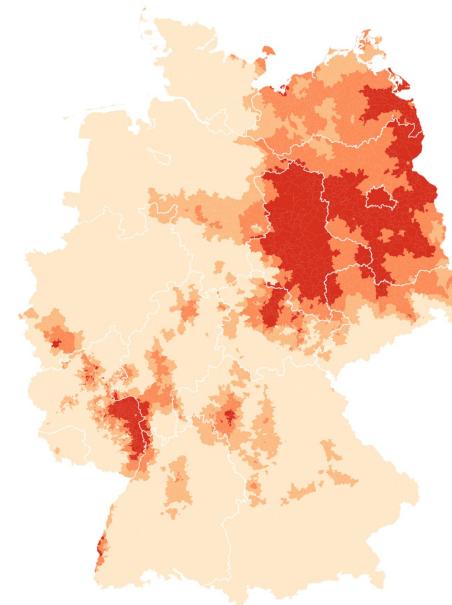


Komponenten des KEI im Überblick - 2023

Hitze



Trockenheit

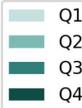
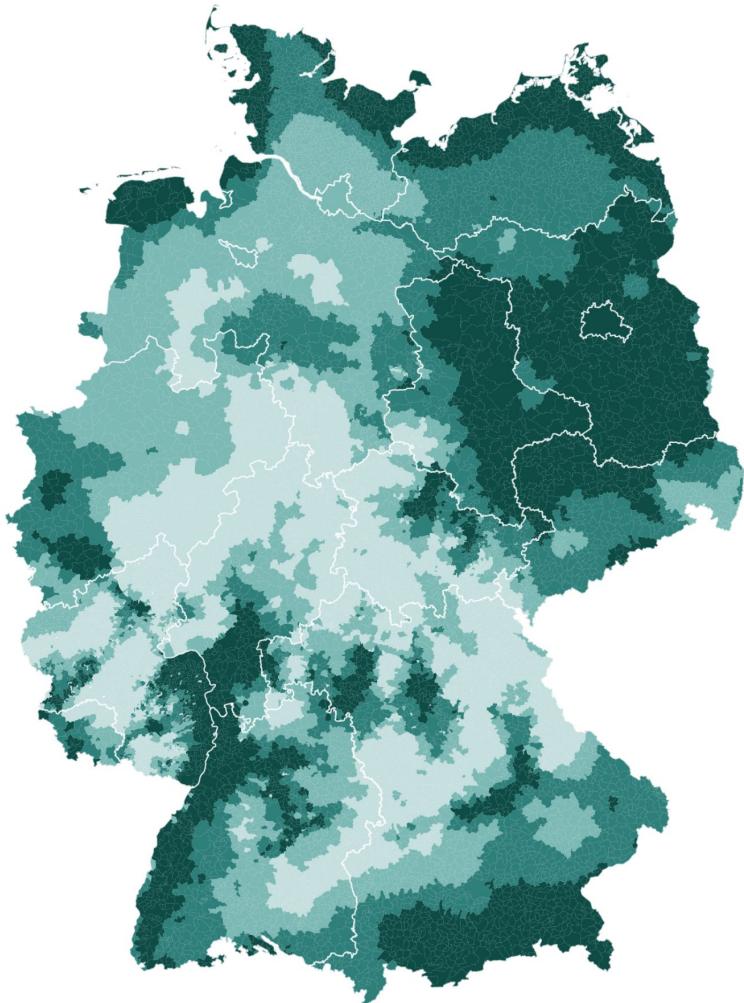
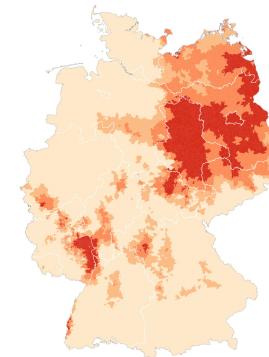
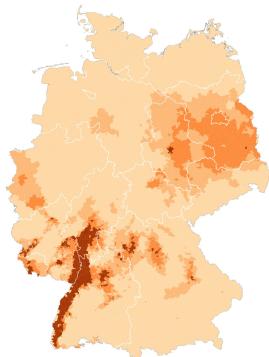
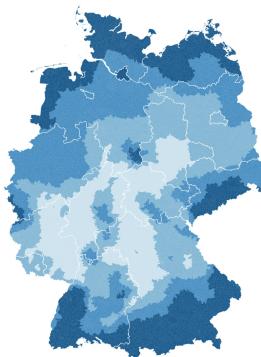


Mehrjährige Mittelwerte

Komponenten des KEI im Überblick - 2023

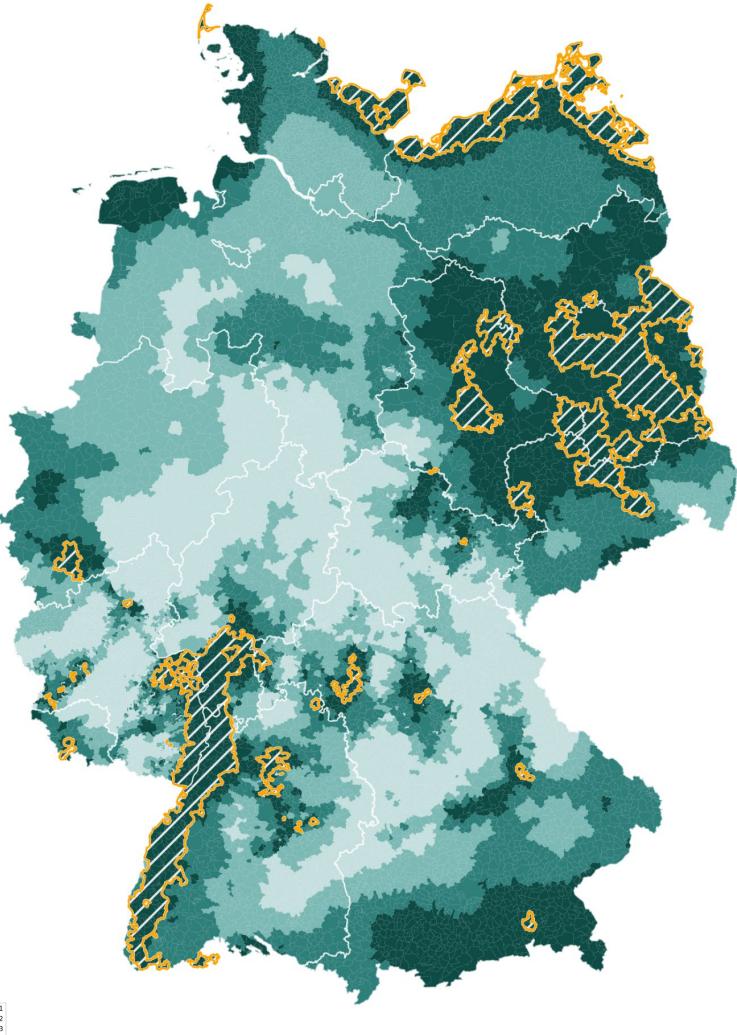
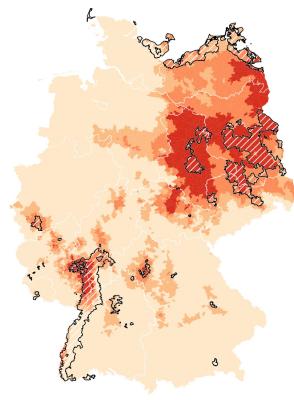
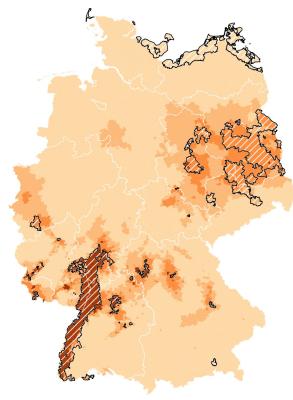
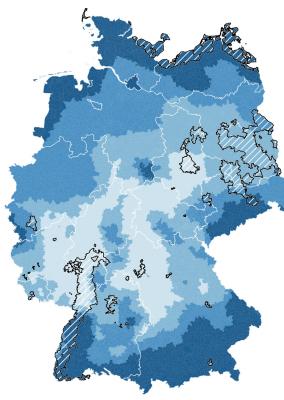
großflächig

- Q4 markiert großräumig den **ostdeutschen Binnenraum** sowie den **Oberrheingraben**
- Q1–Q2 dominieren West/Mitte
- Süden zeigt gemischte Muster
- Küsten und Alpen/Gebirgslagen durch Wind/Regen beeinflusst, weniger durch Hitze



Hot Spots des KEI - Überblick

Gebiet des 90% Quantil schraffiert

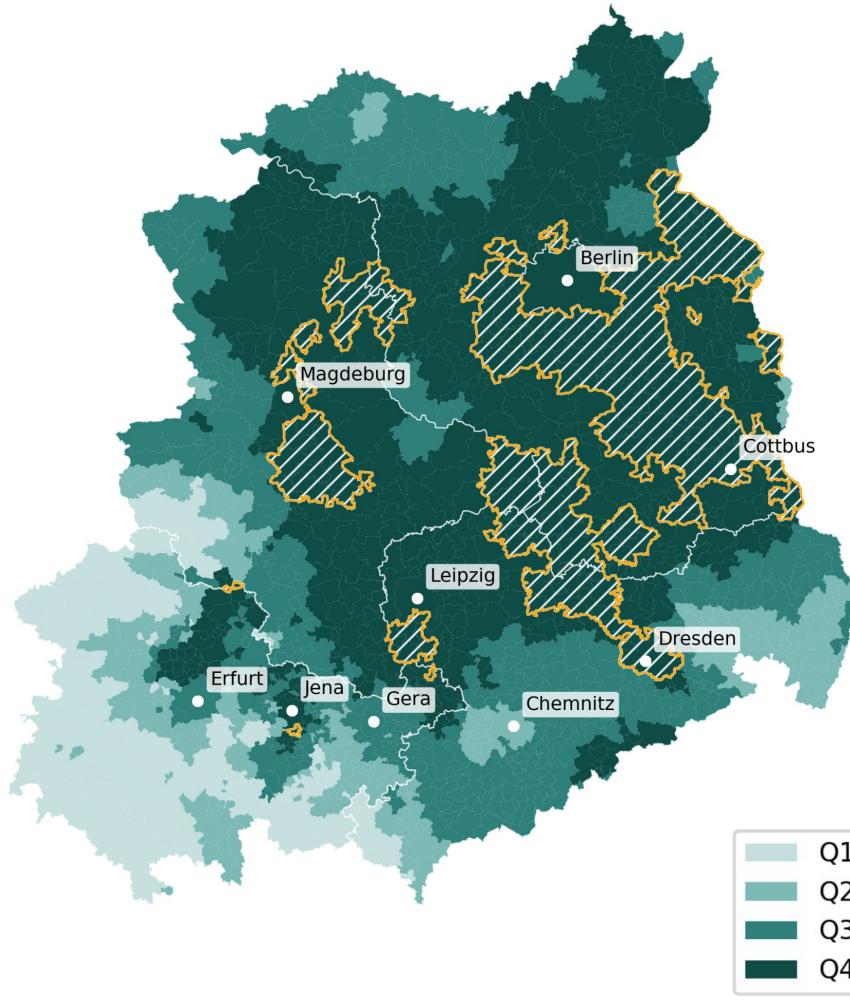
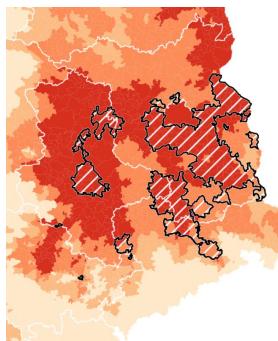
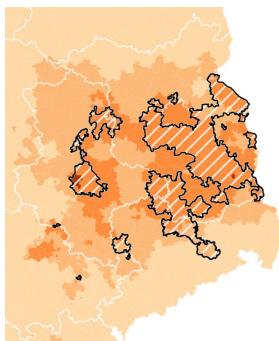
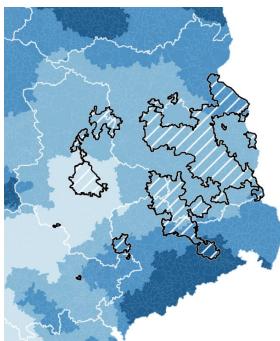


Hot Spots des KEI

Berlin | Brandenburg | Sachsen

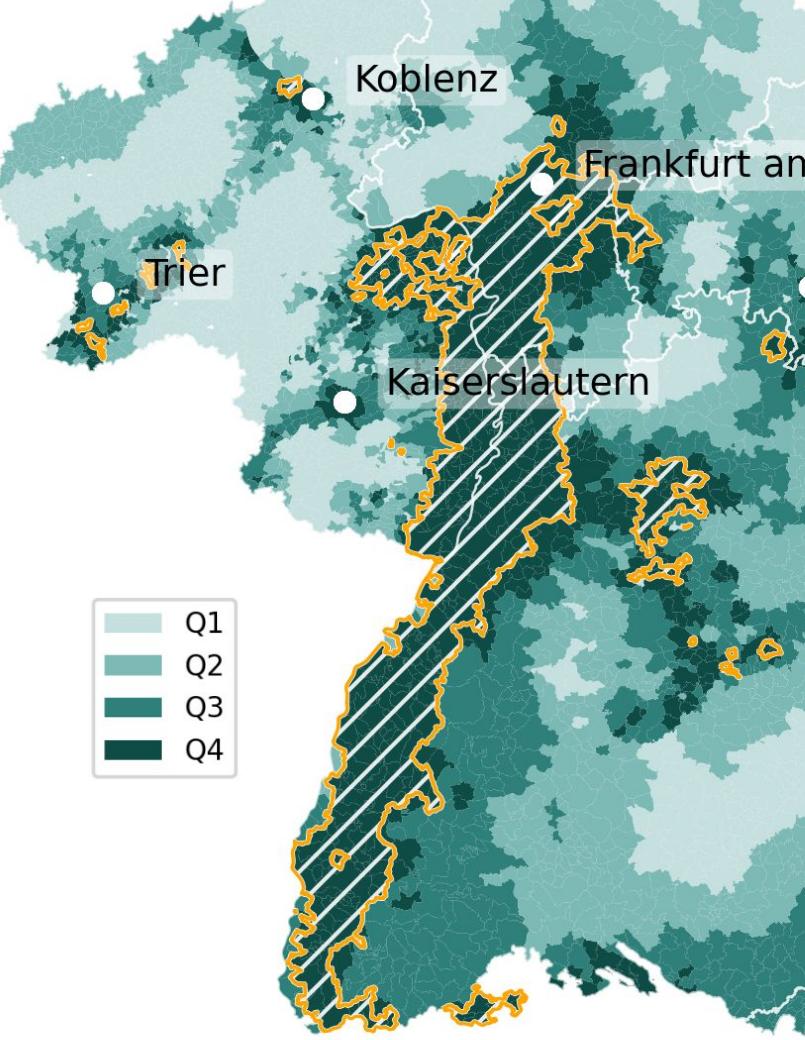
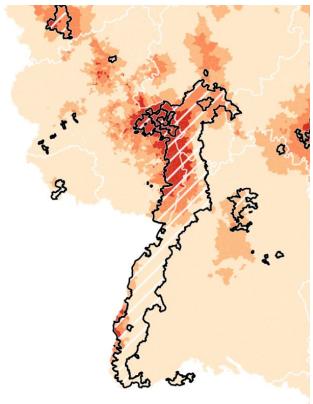
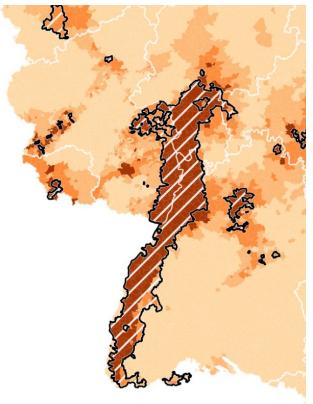
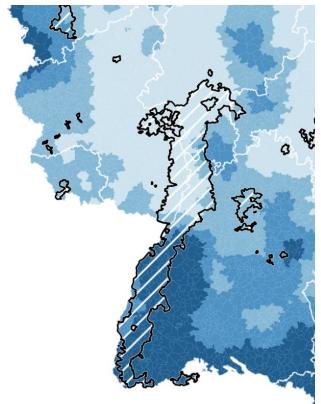
Thüringen | Sachsen-Anhalt

Gebiet des 90% Quantil schraffiert



Hot Spots des KEI Oberrheingraben

Rheinland Pfalz | Hessen | Baden Württemberg
Gebiet des 90% Quantil schraffiert



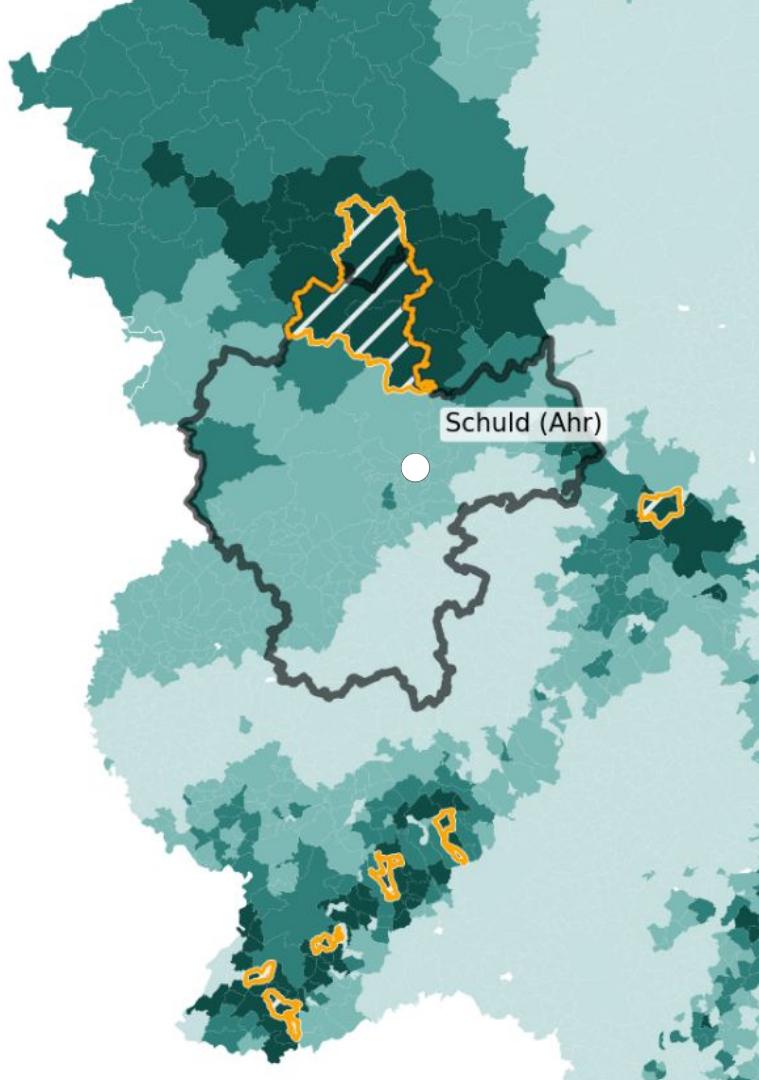
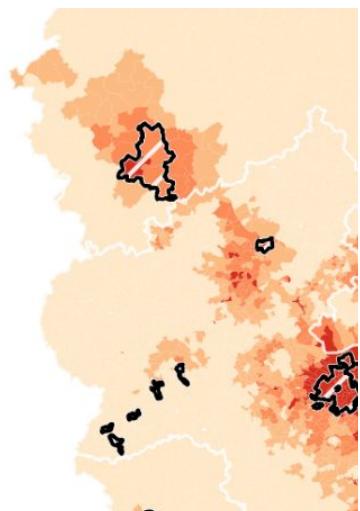
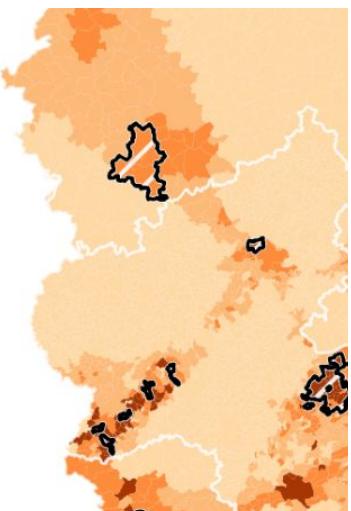
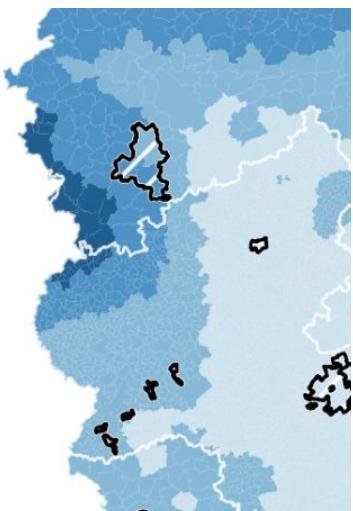
Appendix

Hot Spots des KEI

Ahrtal (Kreise Ahrweiler, Euskirchen, Vulkaneifel)

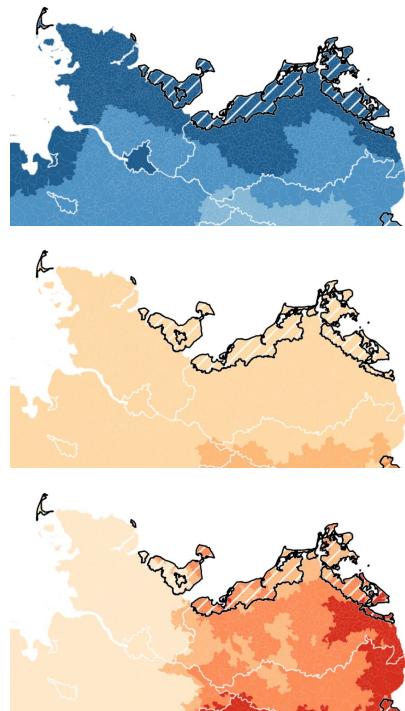
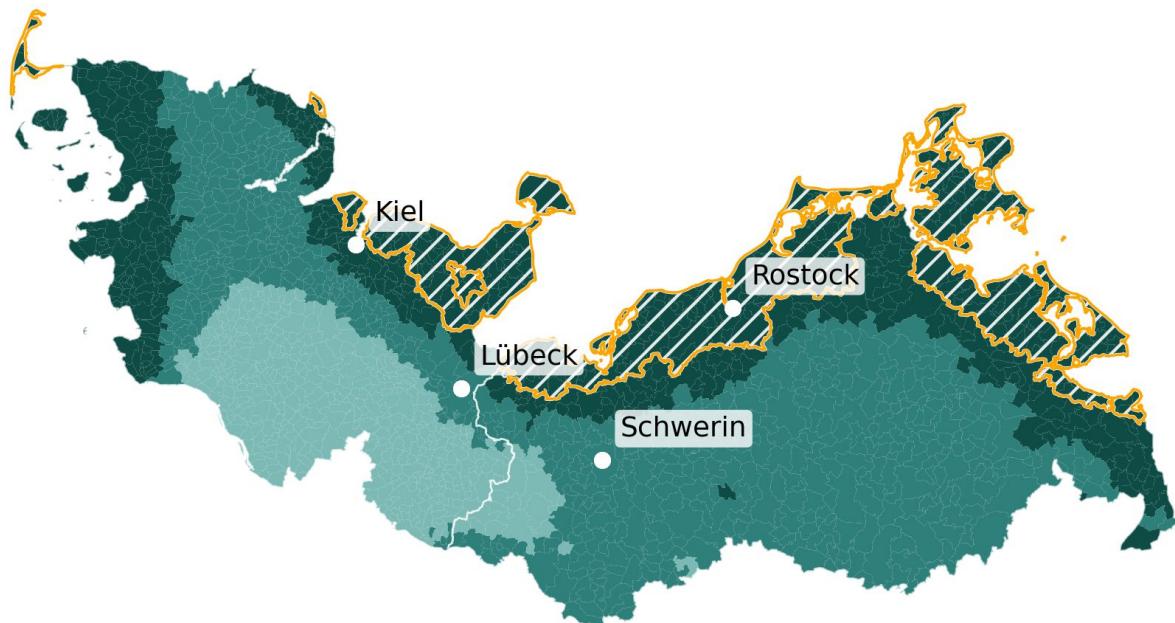
Rheinland-Pfalz | Nordrhein-Westfalen

Gebiet des 90% Quantil schraffiert



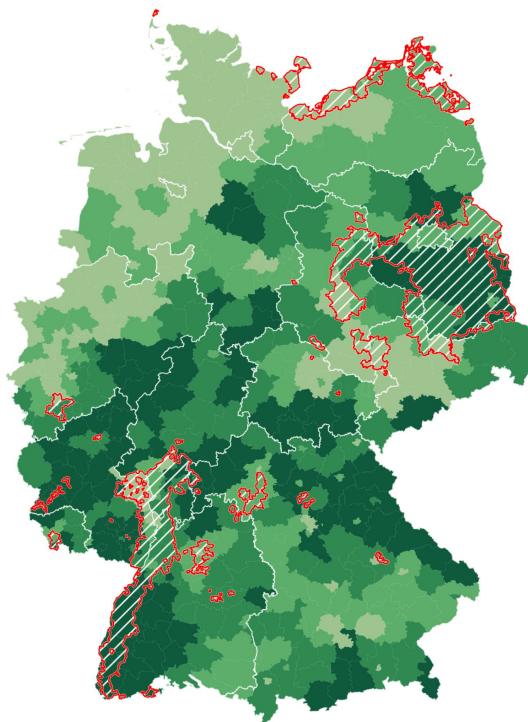
Hot Spots des KEI Ostsee-Küste

Schleswig Holstein | Mecklenburg Vorpommern
Gebiet des 90% Quantil schraffiert

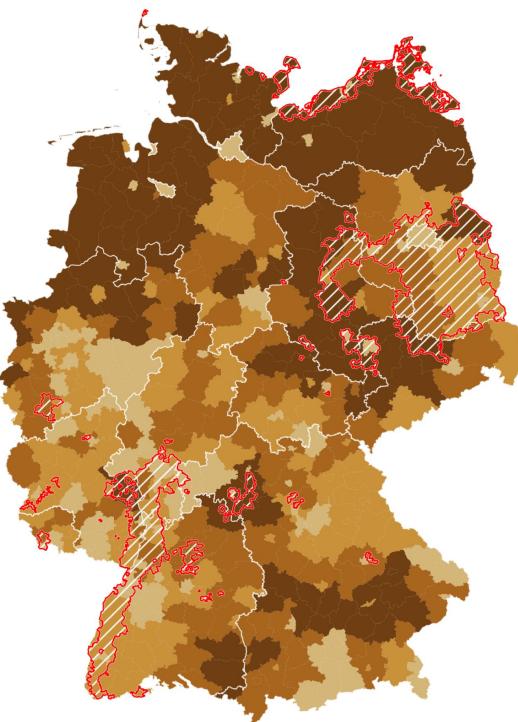


KEI - Flächenbezug

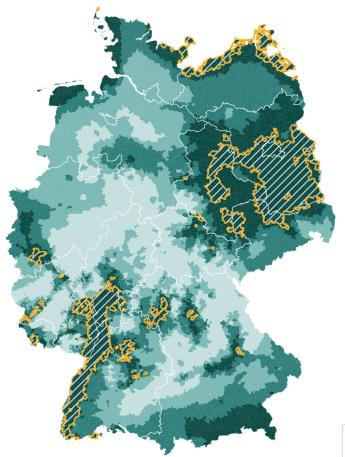
Wald-Anteil



Landwirtschaftliche Nutzung

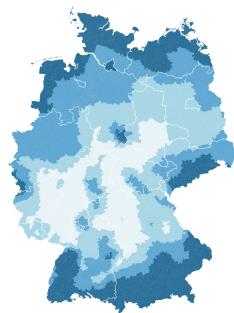


Q1
Q2
Q3
Q4

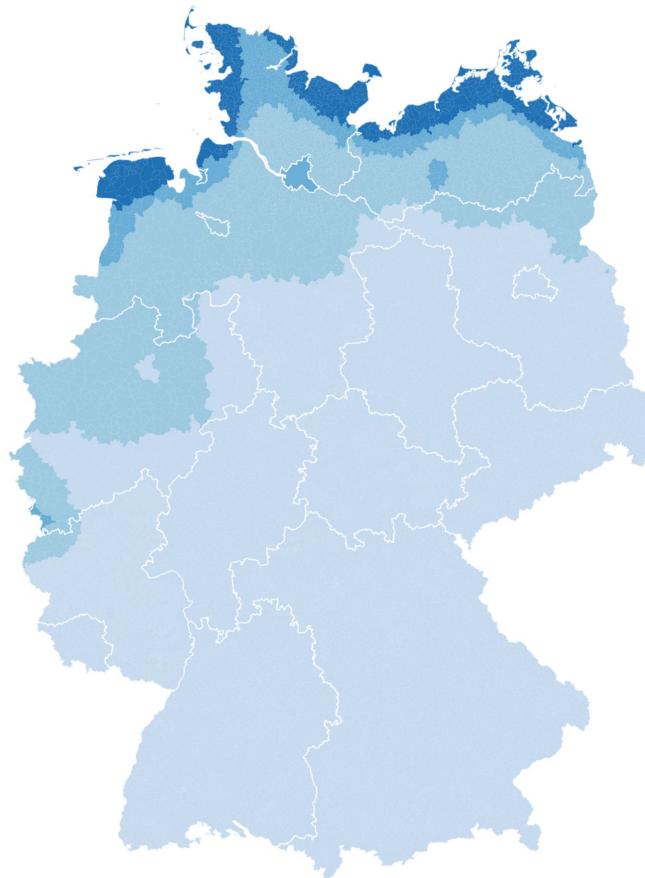


Q1
Q2
Q3
Q4

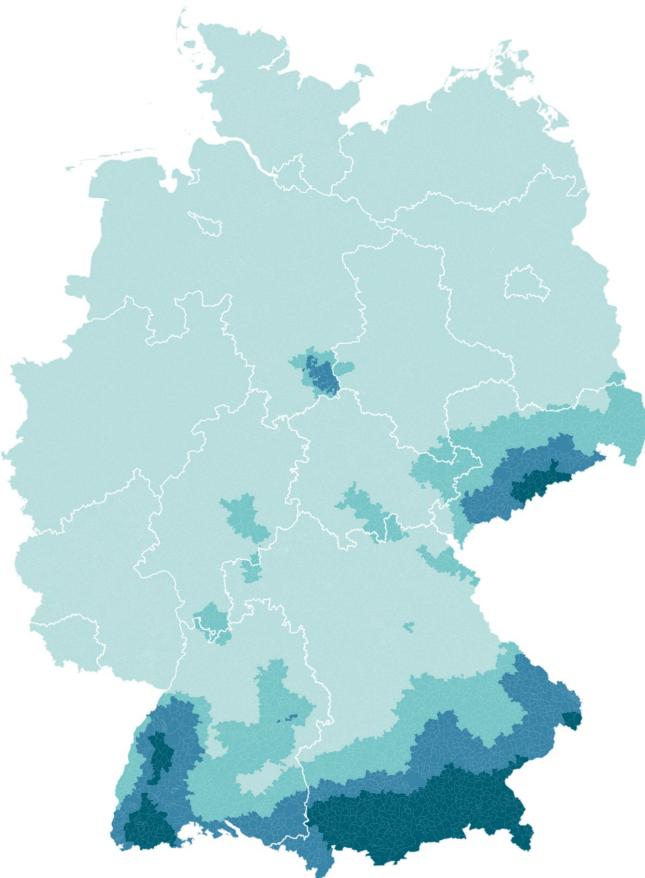
SWS - Quartile



WEI (Wind) - Quartile



SI (Starkregen) - Quartile

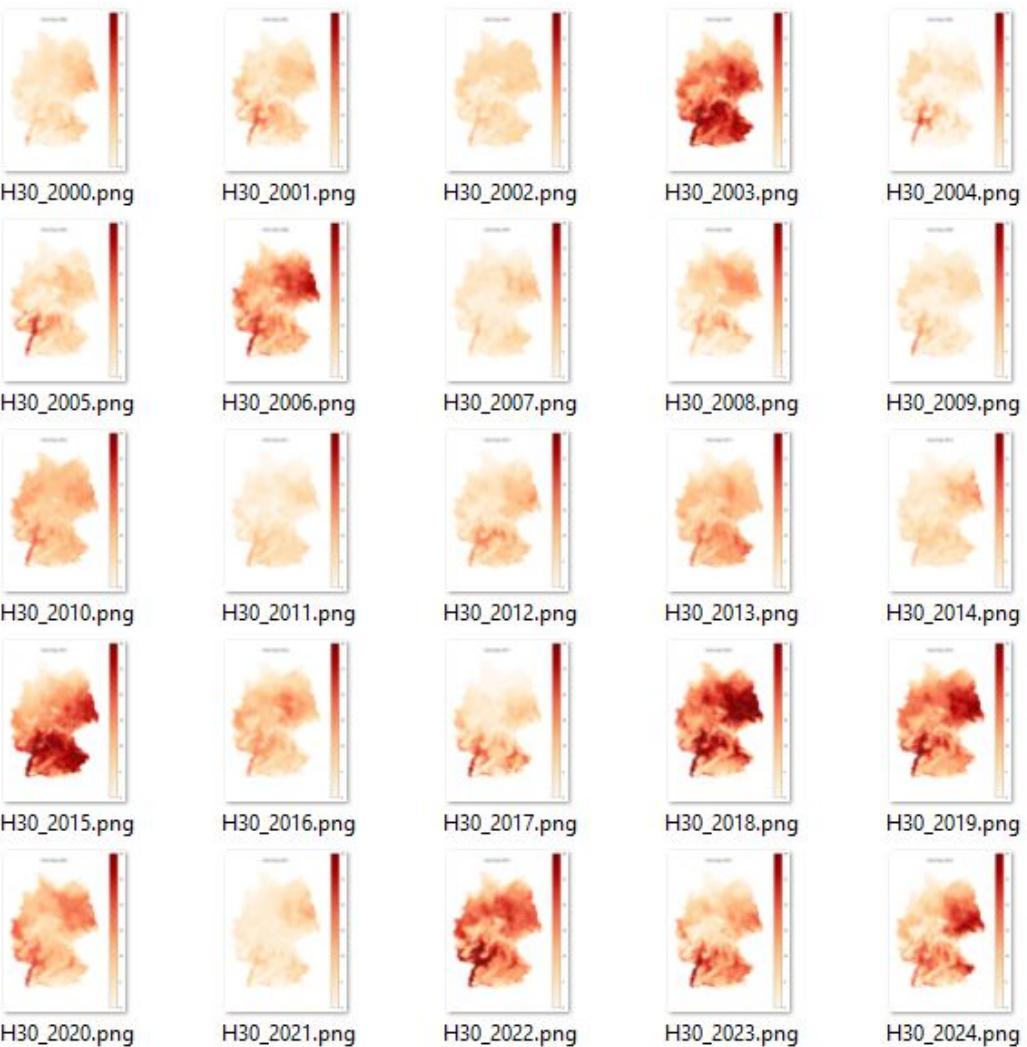


Q1
Q2
Q3
Q4

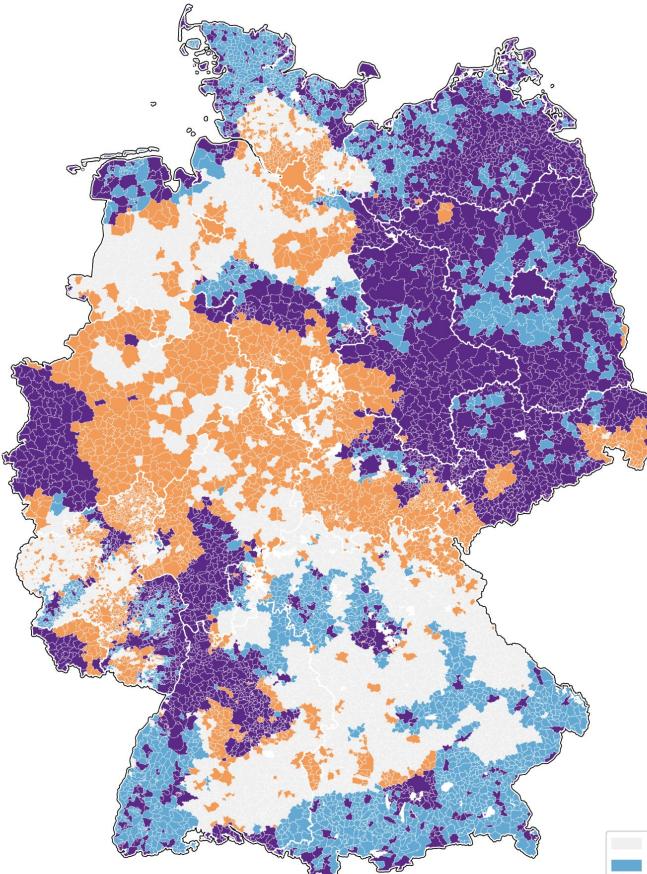
Q1
Q2
Q3
Q4

Hitzetage 2000-2024

(Tagesmaxtemp. > 30°C)



Bivariate Klassenkarte: VUL × KEI (LL/LH/HL/HH) mit RI-Q90-Kontur



	RI_Q90	Q90_nein	Q90_ja
VK_class			
LL	1.000000	0.000000	
LH	1.000000	0.000000	
HL	0.995409	0.004591	
HH	0.642785	0.357215	

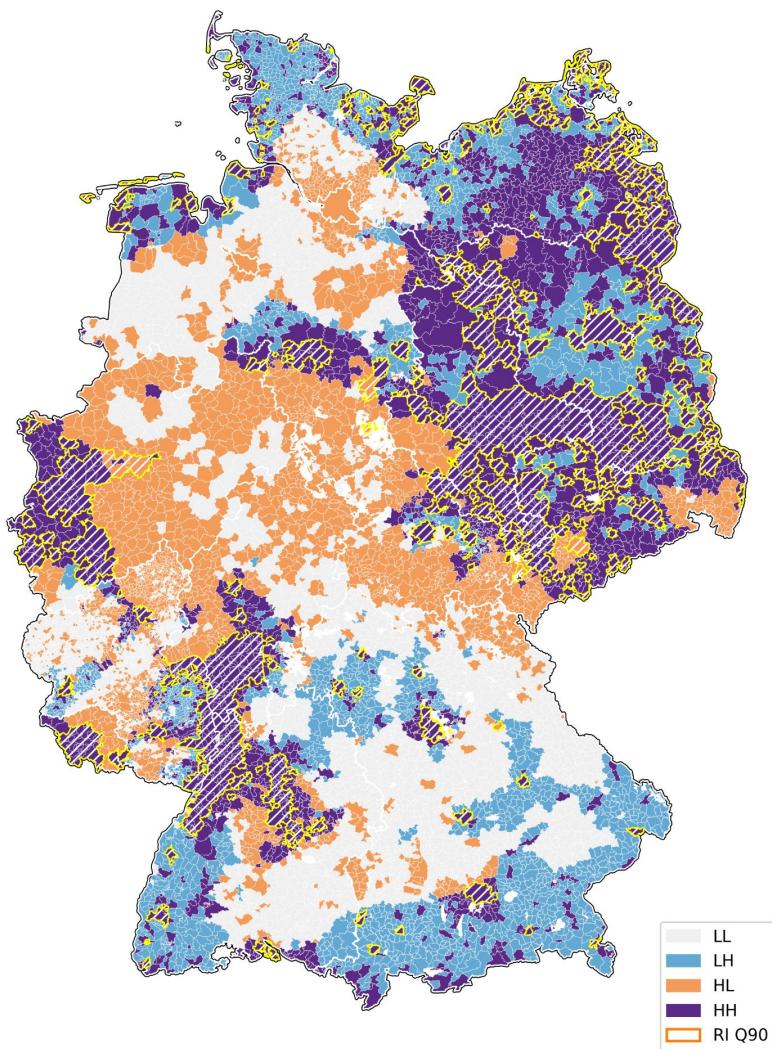
VUL klein, KEI klein ⇒ 0.0 % im Q90 von Kl

VUL klein, KEI gross ⇒ 0.0 % im Q90 von Kl

VUL gross, KEI klein ⇒ 0.5 % im Q90 von Kl (ohne Klimeexposition wird es selten extrem)

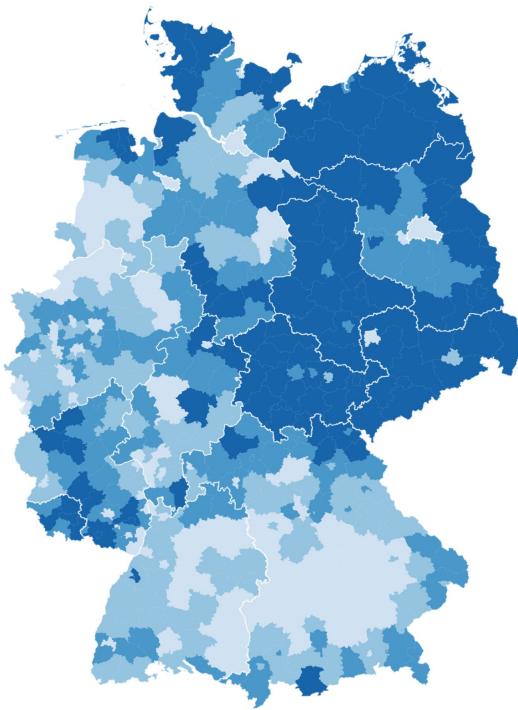
VUL gross, KEI gross ⇒ 35.7 % im Q90 von Kl (Bei hoher Vulnerabilität wirkt hohe Klimaexposition stark)

VUL x KEI

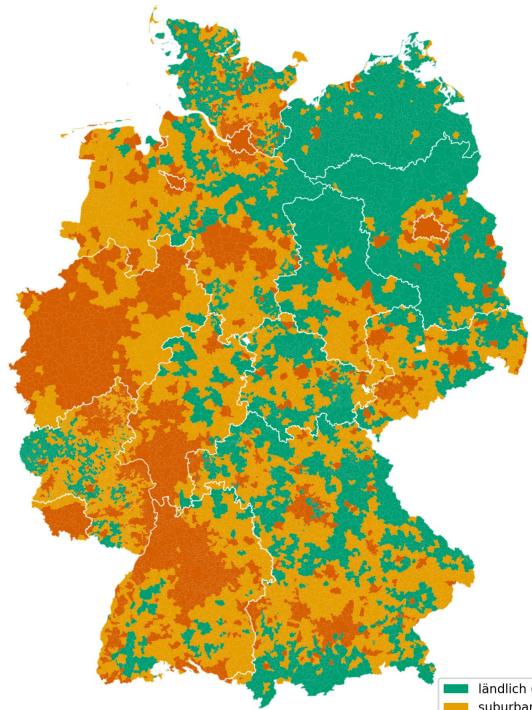


HH bedeutet, sowohl KEI als auch VUL sind über dem Median. Dann ist eine betroffene Gemeinde mit 36% Wahrscheinlichkeit in der q90-Kontur enthalten

Anteil Ü65 – Quartile



Urbanität – Quartile



Verfügbares Netto-Haushalts-Einkommen – Quartile

