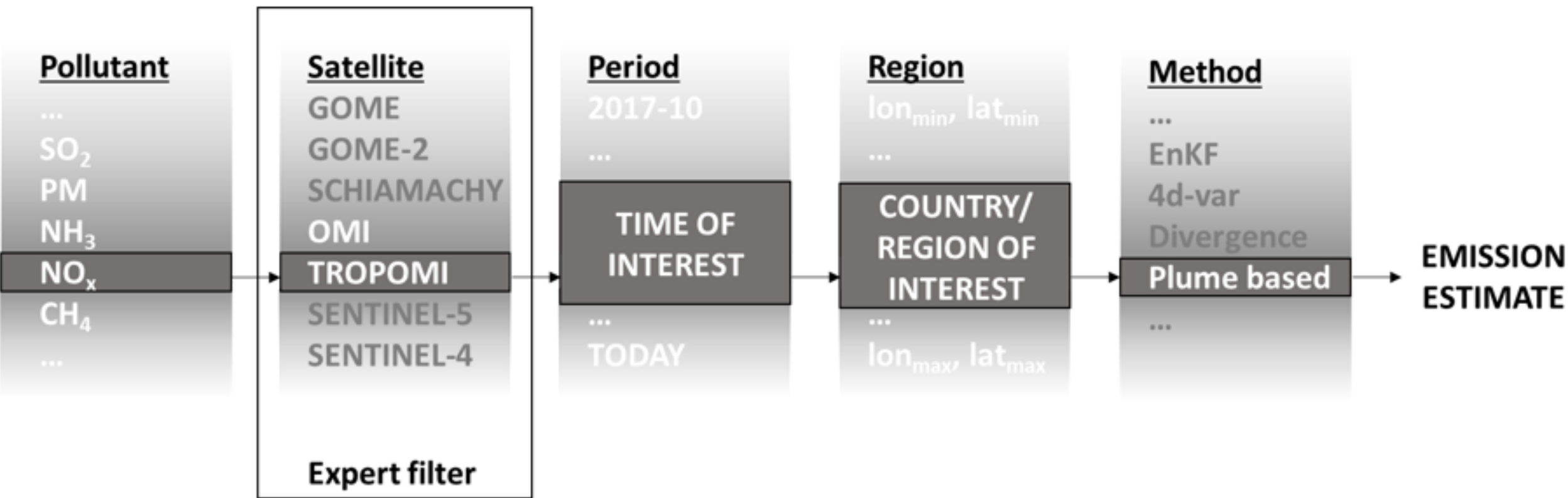
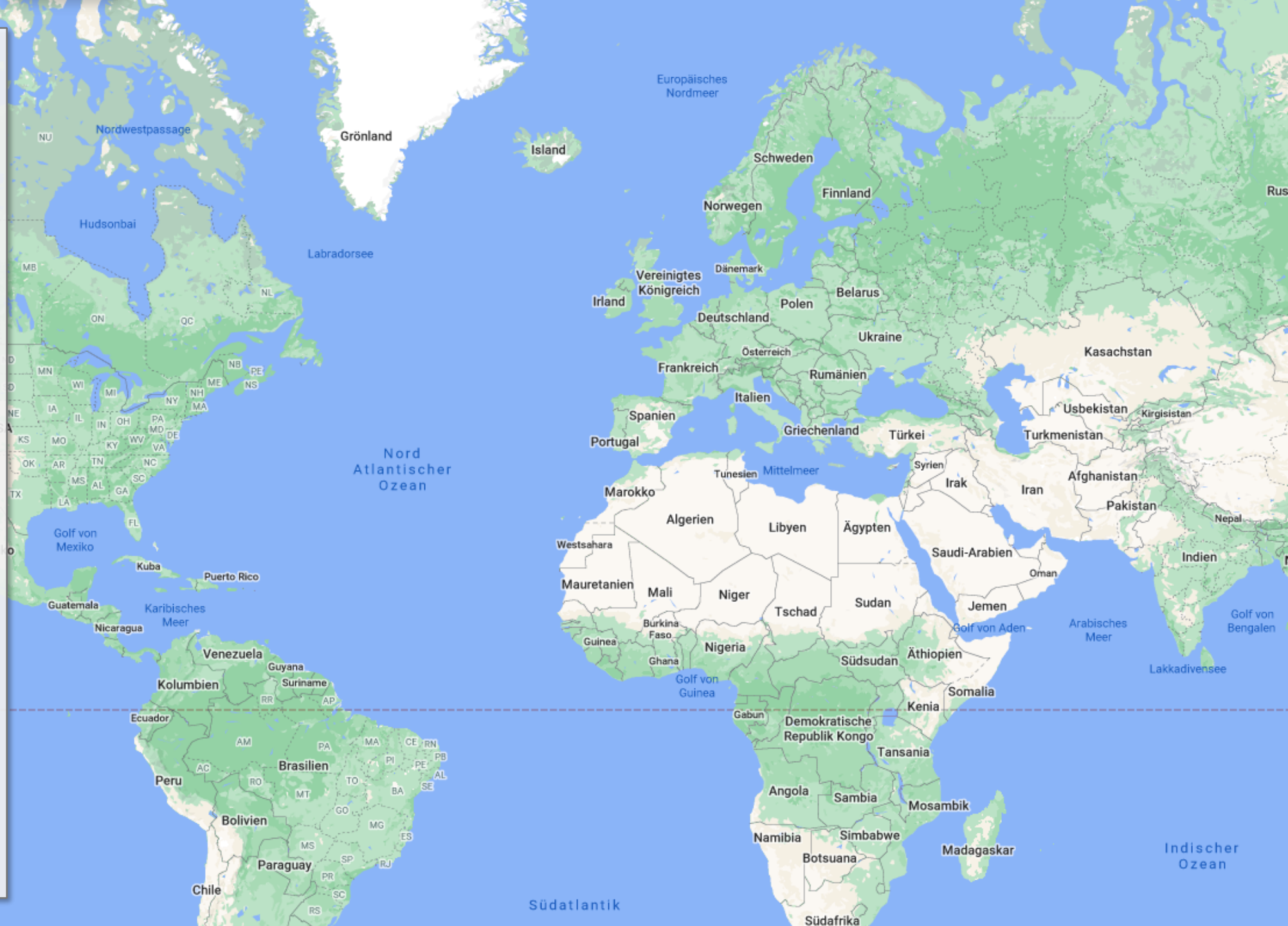


Method	Species for which applications have been demonstrated	Seminal publication(s)	CTM usage required	Required input data	Computational burden	Uncertainty*** and accuracy****	Source-category distinction
Mass Balance	<u>SO<sub>x</sub></u> , NO <sub>x</sub> , NH <sub>3</sub>	(Beirle <i>et al.</i> , 2003, 2019)**	no	VCD, Windspeed, species lifetime	Low (~ <u>hour</u> , <u>several</u> CPU cores)	High uncertainty and very accurate (~40-65%, (Beirle <i>et al.</i> , 2019))	Limited
Gaussian plume	CO <sub>2</sub> , <u>SO<sub>x</sub></u> , NO <sub>x</sub> , NH <sub>3</sub>	(Fioletov <i>et al.</i> , 2011, 2020)	no	VCD, Windspeed, species lifetime	Moderate (~ <u>hours</u> , <u>several</u> CPU cores)	Medium uncertainty and accuracy (~30-40%, (Dammers <i>et al.</i> , 2019))	Limited
(Ensemble / Adjustment) Kalman Filter	Chlorofluorocarbons, isoprene, O <sub>3</sub> , CO, CO <sub>2</sub> , <u>SO<sub>x</sub></u> , <u>PM<sub>(2.5)</sub></u> , NO <sub>x</sub> , NH <sub>3</sub> .	(Mijling and Van Der A, 2012; Ding <i>et al.</i> , 2020)	yes	VCD, CTM input*	<u>High</u> (~days to weeks using many CPU cores)	Low uncertainty and accurate (~20%, (Ding <i>et al.</i> , 2020))	Yes
Adjoint based methods	<u>PM<sub>(2.5)</sub></u> , CH <sub>4</sub> , O <sub>3</sub> , CO, CO <sub>2</sub> , <u>SO<sub>x</sub></u> , NO <sub>x</sub> , NH <sub>3</sub>	(Bergamaschi <i>et al.</i> , 2000, 2010)	yes	VCD, CTM input*	<u>High</u> (weeks using many CPU cores)	Low uncertainty (~10-15%, (Cooper <i>et al.</i> , 2017)) Highly accurate (~10-15%, (Cooper <i>et al.</i> , 2017))	Yes



# 1. Select region

From dropdown,  
GeoJSON or shape file,  
select on map



Südpazifik

Südatlantik

Indischer  
Ozean

# 1. Select region

Germany

# 2. Select timespan(s)

Select dates from  
calendar widgets

Vereinigtes  
Königreich

Great Britain  
Manchester  
Sheffield  
Nottingham  
ENGLAND  
Cambridge  
Norwich  
London  
Bristol  
Cardiff  
Southampton  
Brighton

Guernsey  
Jersey  
Caen  
Rouen  
Paris  
Rennes  
Vannes  
Nantes  
Angers  
Tours  
La Rochelle  
Frankreich

Amsterdam  
Den Haag  
Niederlande  
Antwerpen  
Brüssel  
Belgien



Dänemark  
Kopenhagen  
Fv  
Sjælland

Gdynia  
Danzig  
Bydgoszcz  
Polen  
Posen  
Wrocław  
Katowice  
Brünn  
Wien  
Bratislava  
Budapest  
Slovenien  
Zagreb

Map tiles by Stamen Design, CC BY 3.0. Map data (C) OpenStreetMap contributors

# 1. Select region

Germany

# 2. Select timespan(s)

I. Jan. 2018 - Dec. 2018

II. Jan. 2019 - Dec. 2019

III. Jan. 2020 - Dec. 2020

IV. Jan. 2021 - Dec. 2021

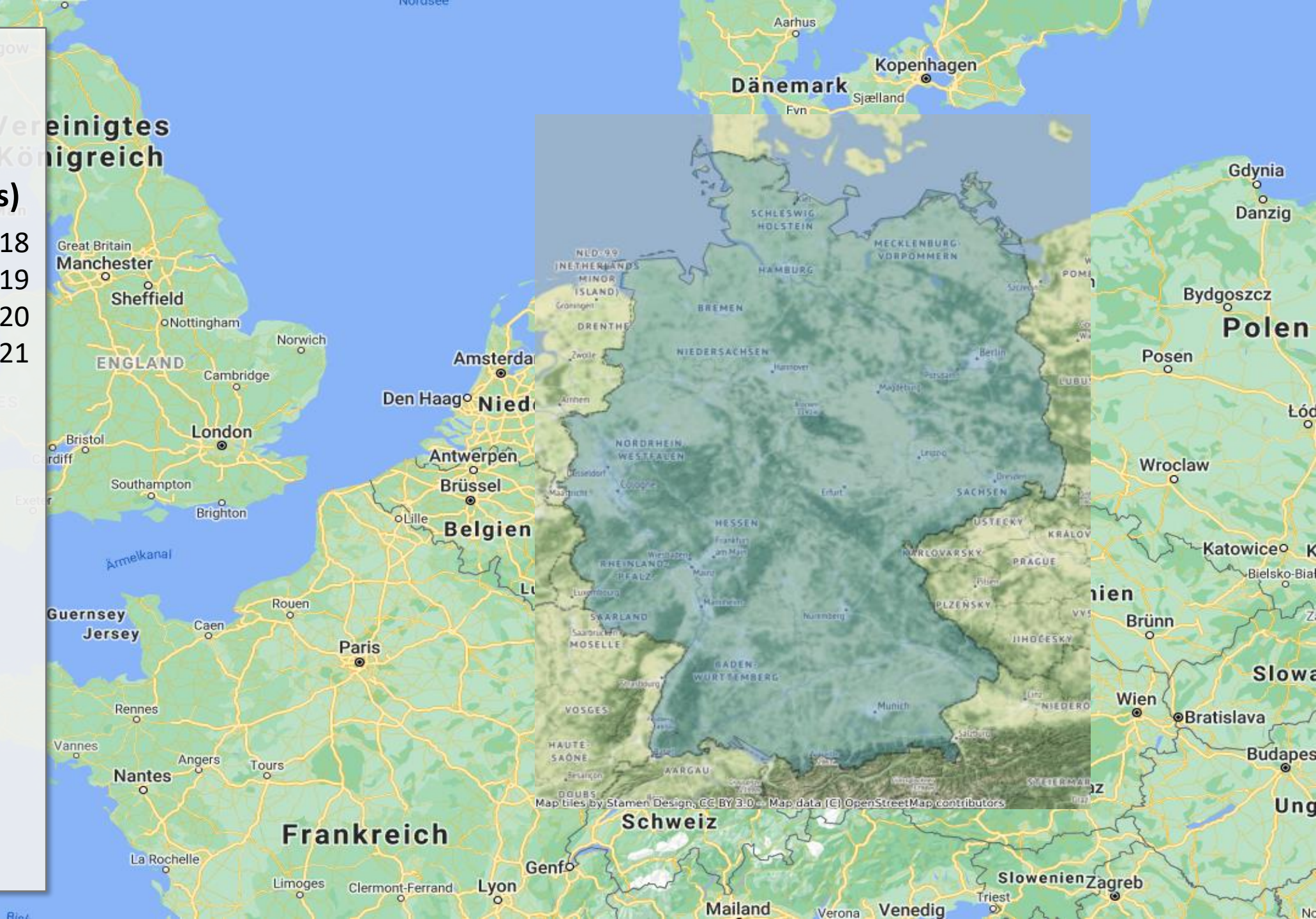
# 3. Select pollutant

NO2

# 4. Select method

Mass balance

# 5. Run



# 1. Select region

Germany

# 2. Select timespan(s)

I. Jan. 2018 - Dec. 2018

II. Jan. 2019 - Dec. 2019

III. Jan. 2020 - Dec. 2020

IV. Jan. 2021 - Dec. 2021

# 3. Select pollutant

NO2

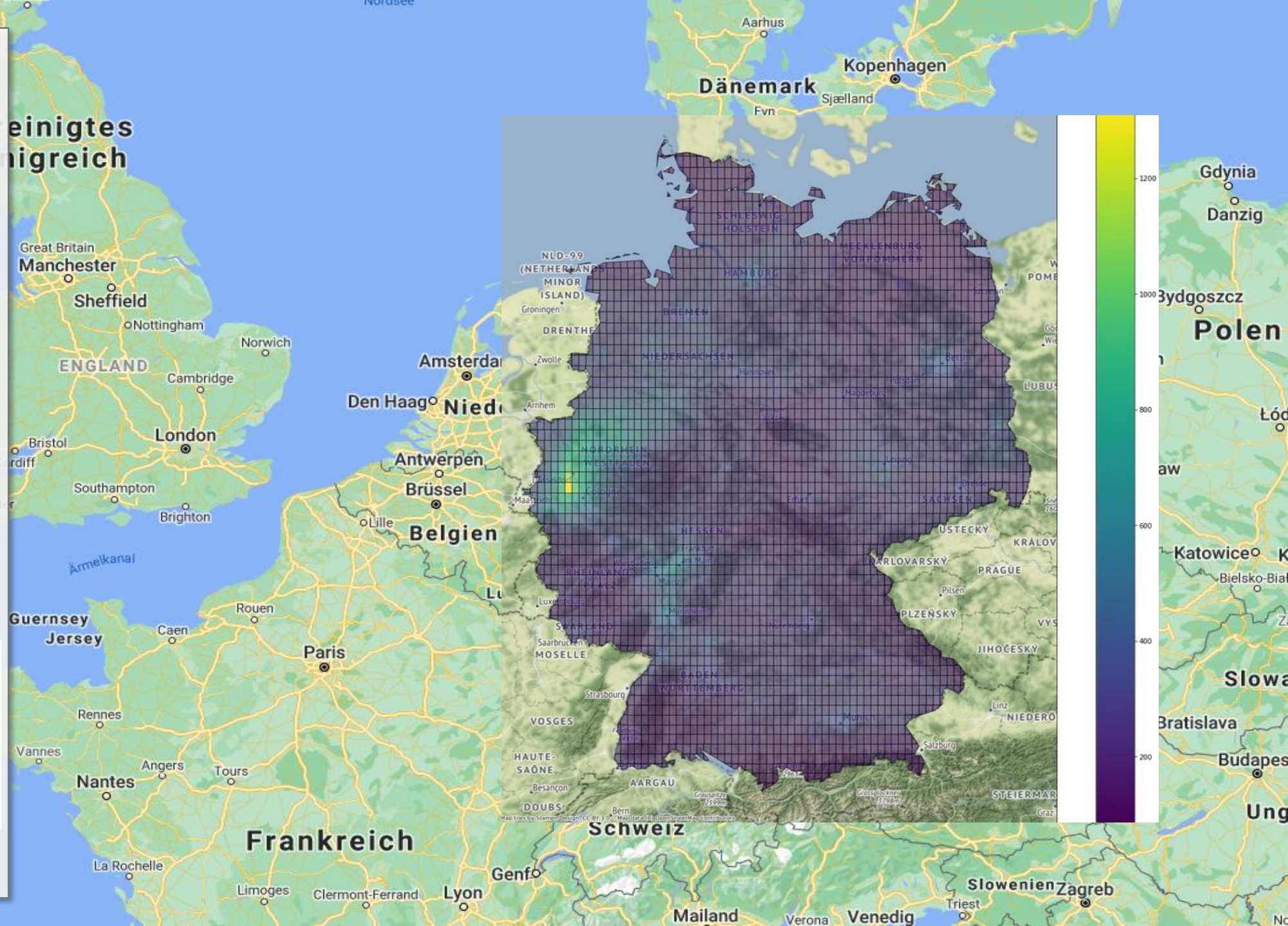
# 4. Select method

Mass balance

# 5. Run

	NOx [kt]	Umin [%]	Umax [%]
A_PublicPower	12	2	3
B_IndustrialComb	8	4	8
[...]			
N_WasteIncin	12	2	3
S_Natural	n/a	n/a	n/a
Total	42	4	6

# 6. Download





# 1. Select region

Germany

# 2. Select timespan(s)

- I. Jan. 2018 - Dec. 2018
- II. Jan. 2019 - Dec. 2019
- III. Jan. 2020 - Dec. 2020
- IV. Jan. 2021 - Dec. 2021

# 3. Select pollutant

NO2

# 4. Select method

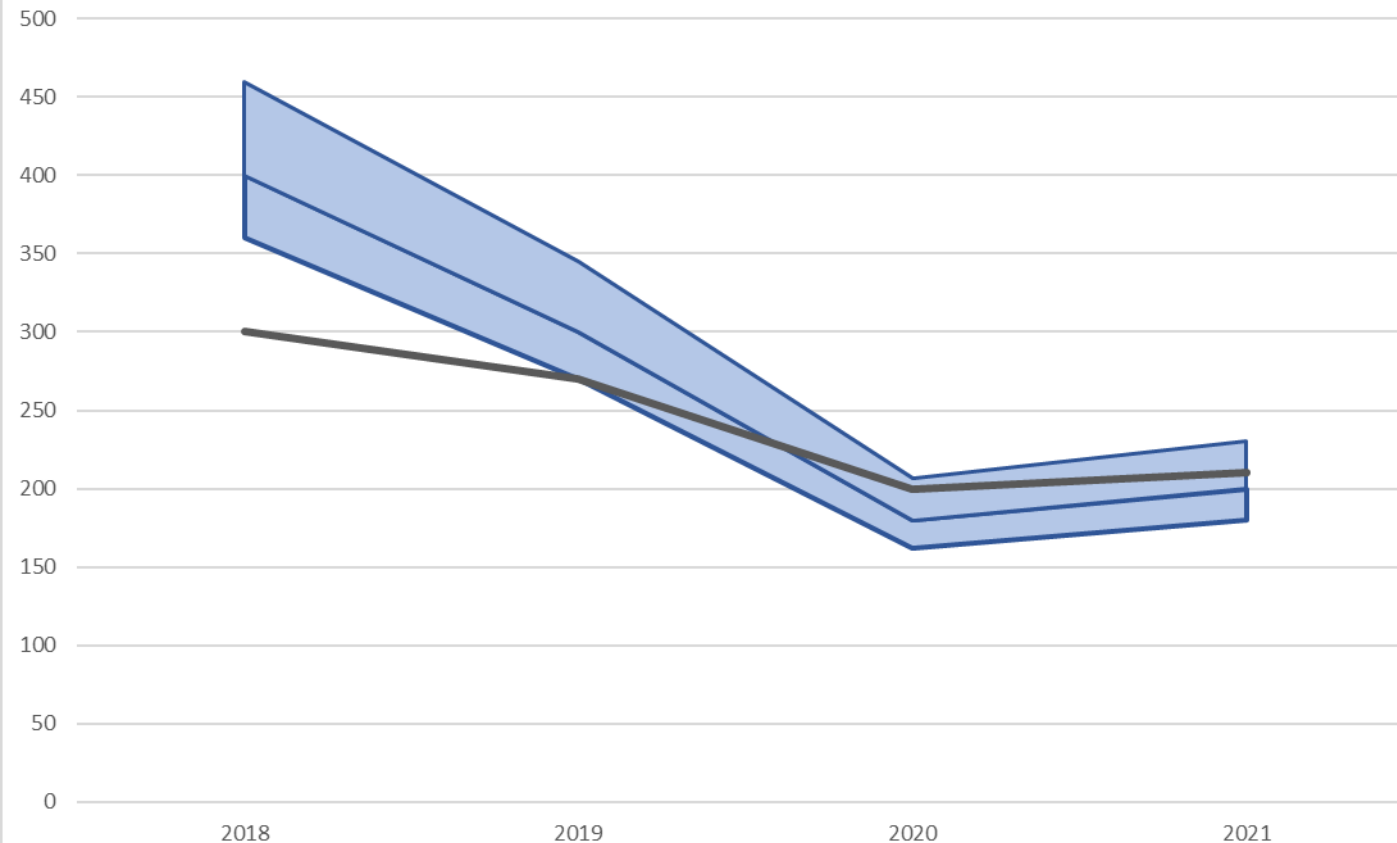
Mass balance

# 5. Run

	NOx [kt]	Umin [%]	Umax [%]
A_PublicPower	12	2	3
B_IndustrialComb	8	4	8
[...]			
N_WasteIncin	12	2	3
S_Natural	n/a	n/a	n/a
Total	42	4	6

# 6. Download

### National inventory vs. satellite data estimate



Sounds interesting?

Contact [kevin.hausmann@uba.de](mailto:kevin.hausmann@uba.de) for details.