

# Mine and Flow and Nothing Grow

Spatial Economics Project Pitch

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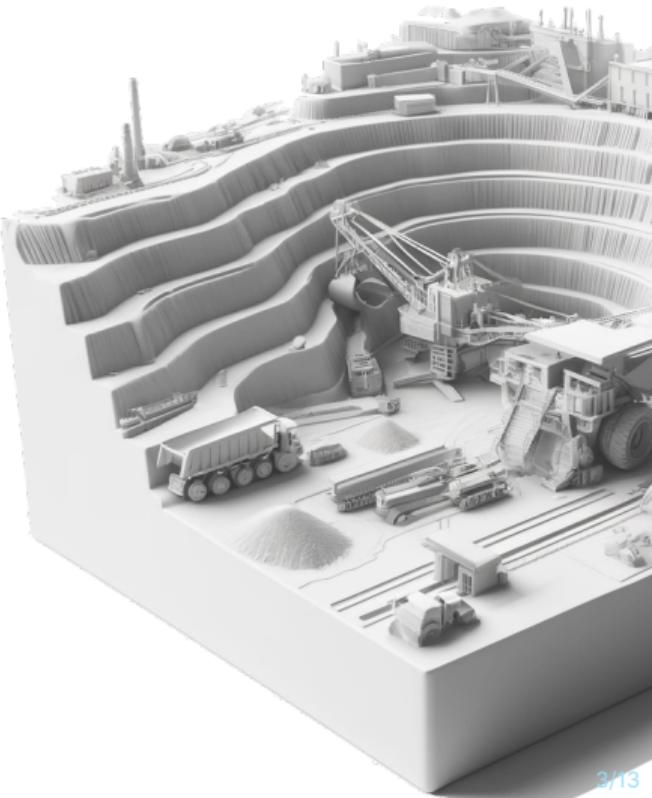
# What Do We Want to Find Out?

Data

Empirical Framework

# Metals Be Mine, Problems Be Thine

- There are **benefits** from mining activity.
- There are also **negative externalities**.
- Mining activity creates **pollution** as a byproduct.
- We hypothesize that this pollution makes **land<sup>1</sup>** less fertile.

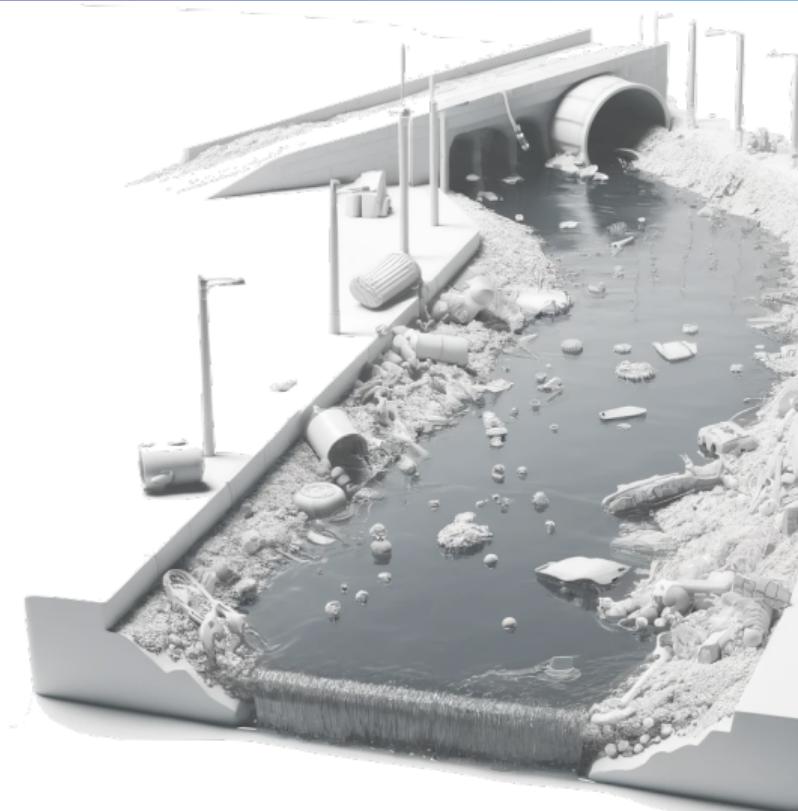


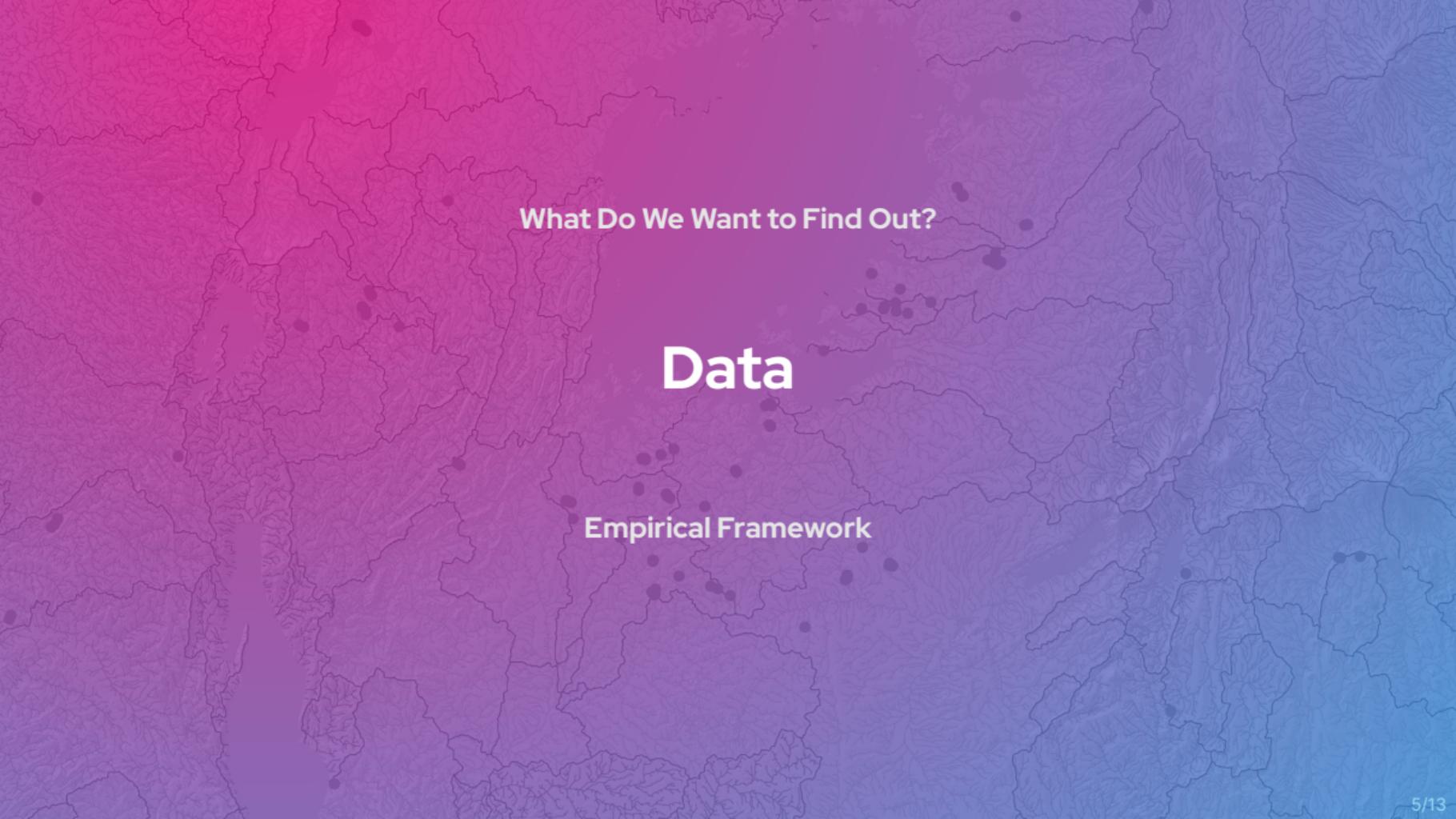
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<sup>1</sup>Say hello to the often-overlooked third factor of production!

# How Does Pollution Travel?

- Mines pollute both the air in their surroundings and adjacent **water flows**.
- The pollutants enter the river at the mining site and **travel with the water**.
- What is the reason that you should not swim in the Danube *downstream* of Belgrade, the largest European city without wastewater treatment?
- Areas **downstream** are affected by pollution, but areas **upstream** should not!
- This gives us **treated** and **control** areas.





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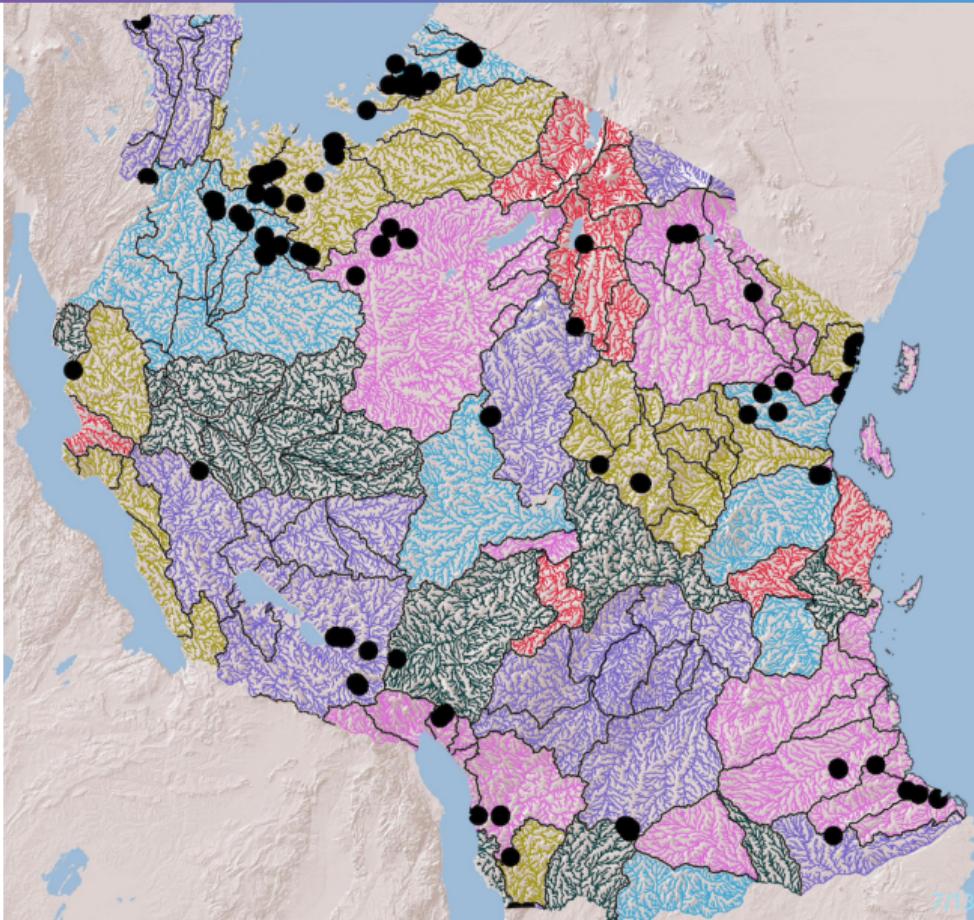
# Highs, Lows, and Water Flows

- The **HydroBASINS** dataset from Lehner and Grill (2013) gives us information on where the water drains into in a given region.
- How ~~on earth~~ **in space** do those people know where water from any point on earth flows to?
- Water flows are predicted from **elevation data**, which stems from the Shuttle Radar Topography Mission.
- This map shows two different levels of **basins** along with **water flows** in them.



# Excuse Me, Do You Know Where the Next Mine Is?

- We can now overlay **centroids of mines**, taken e.g. from Maus et al. (2022) or Kuschnig et al. (2024), over the river basin map.<sup>2</sup>
- How can we relate the basin data with mine locations?
- At the **lowest level**, basins are very granular.
- Basins are labeled according to a **coding system** which allows identification of **up-** and **downstream** basins.

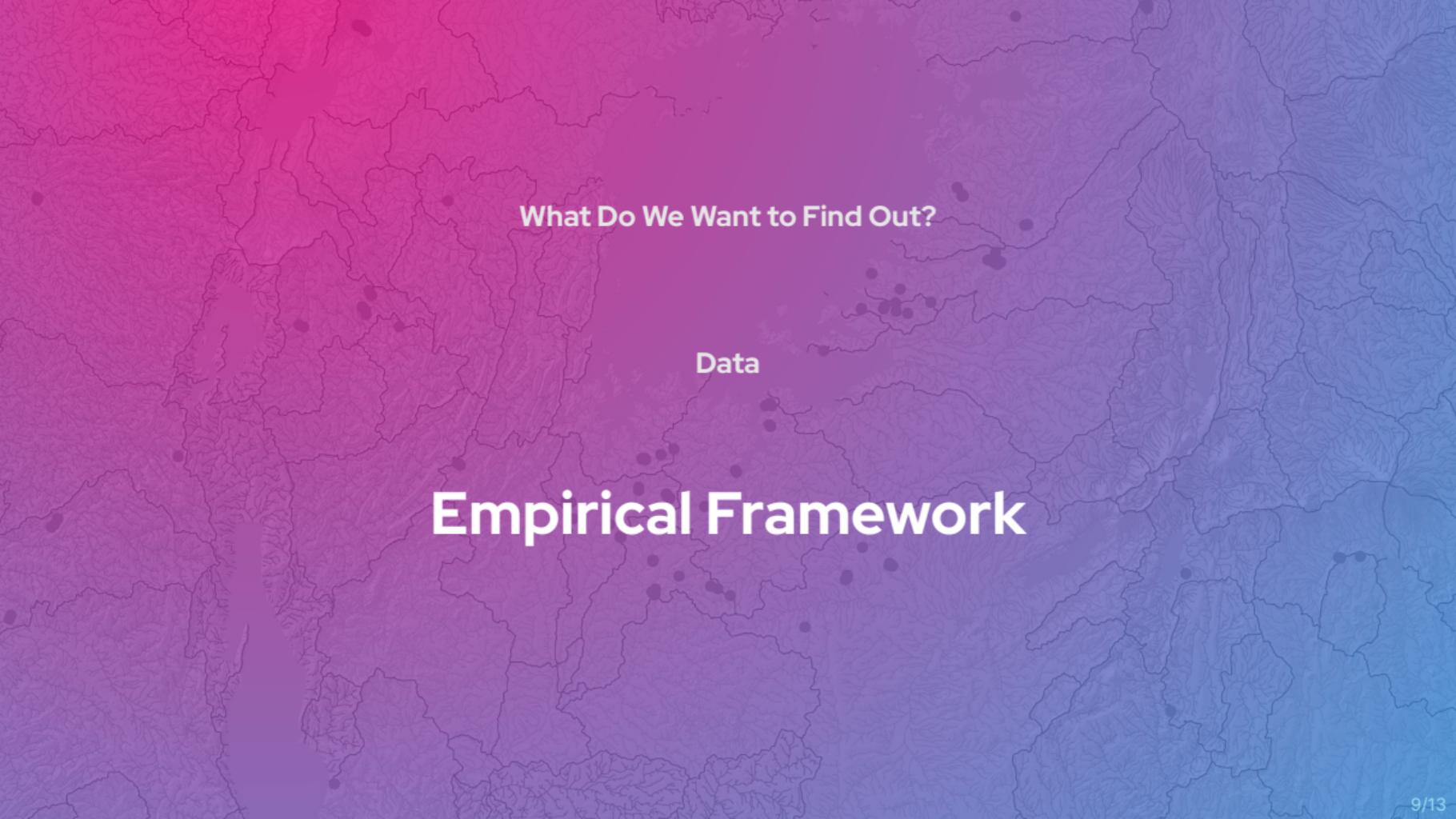


<sup>2</sup>This map uses Kuschnig et al. (2024).

# Crop yields from Space



- Remember the Google Earth Engine Workshop? To proxy **agricultural productivity** we use:
  - maximum EVI during the growing season
  - Copernicus Crop Yields



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## A Difference-In-Discontinuities Design

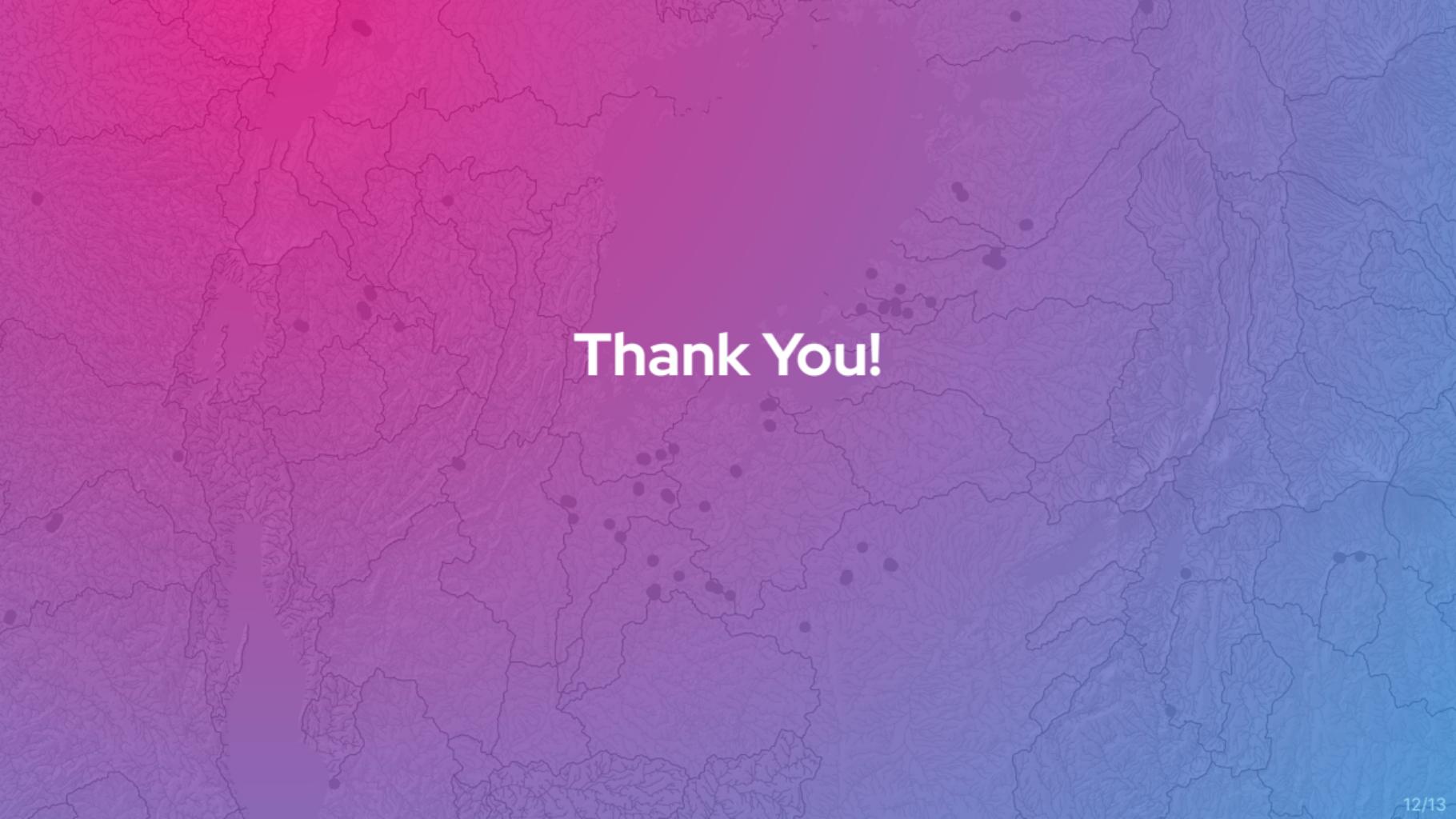
$$Y_{mdt} = \beta_1 \text{NearMine}_{mdt} + \beta_2 \text{Downstream}_{mdt} + X_{mdt} + \varepsilon_{mdt} \quad (1)$$

- $m$  is the basin,  $d$  the district, and  $t$  the year
- $Y_{mdt}$  measures agricultural productivity
- $\text{NearMine}_{mdt}$  is an indicator if a basin is in proximity to a mine
- $\text{Downstream}_{mdt}$  is an indicator if a basin is downstream
- $X_{mdt}$  are a set of geographic and socioeconomic controls

## A (Spatial) Regression Discontinuity Approach

$$Y_{mdt} = f(\text{distance}_{mdt}) + \text{Downstream}_{mdt} + f(\text{distance}_{mdt}) \times \text{Downstream}_{mdt} + X_{mdt} + \varepsilon_{mdt} \quad (2)$$

- $m$  is the basin,  $d$  the district, and  $t$  the year
- $Y_{mdt}$  measures agricultural productivity
- $f(\text{distance}_{mdt})$  measures the distance of the basin's centroid to the mine
- $\text{Downstream}_{mdt}$  is an indicator if a basin is downstream of a mine
- $X_{mdt}$  are a set of geographic and socioeconomic controls at the district level



**Thank You!**

## References I

- Kuschnig, N., Sepin, P., & Vashold, L. (2024). *Global mapping and delineation of mining areas*. [Unpublished Manuscript].
- Lehner, B., & Grill, G. (2013). Global river hydrography and network routing: baseline data and new approaches to study the world's large river systems. *Hydrological Processes*, 27(15), 2171–2186.  
<https://doi.org/10.1002/hyp.9740>
- Maus, V., da Silva, D. M., Gutschhofer, J., da Rosa, R., Giljum, S., Gass, S. L. B., Luckeneder, S., Lieber, M., & McCallum, I. (2022). *Global-scale mining polygons (Version 2)* (Dataset). PANGAEA.  
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