

# Why Geographic Analysis

HES 505 Fall 2024: Session 2

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# Checking in

1. What are some advantages and disadvantages of using R for spatial analysis
2. What can I clarify about the course?
3. How do you feel about git and github classroom? How can I make that easier for you?

# Today's Plan

- What can we do with geographic information?
- Conceptual challenges
- Analytical challenges
- Critiques of quantitative geography



A wide-angle photograph of a glacial lake, likely Jökulsárlón in Iceland. The foreground is filled with numerous icebergs of different shapes and sizes, ranging from small chunks to larger, more complex formations. The water is a deep, pale blue. In the background, a range of mountains is visible under a sky filled with large, white, billowing clouds. The overall scene is one of a natural, cold environment.

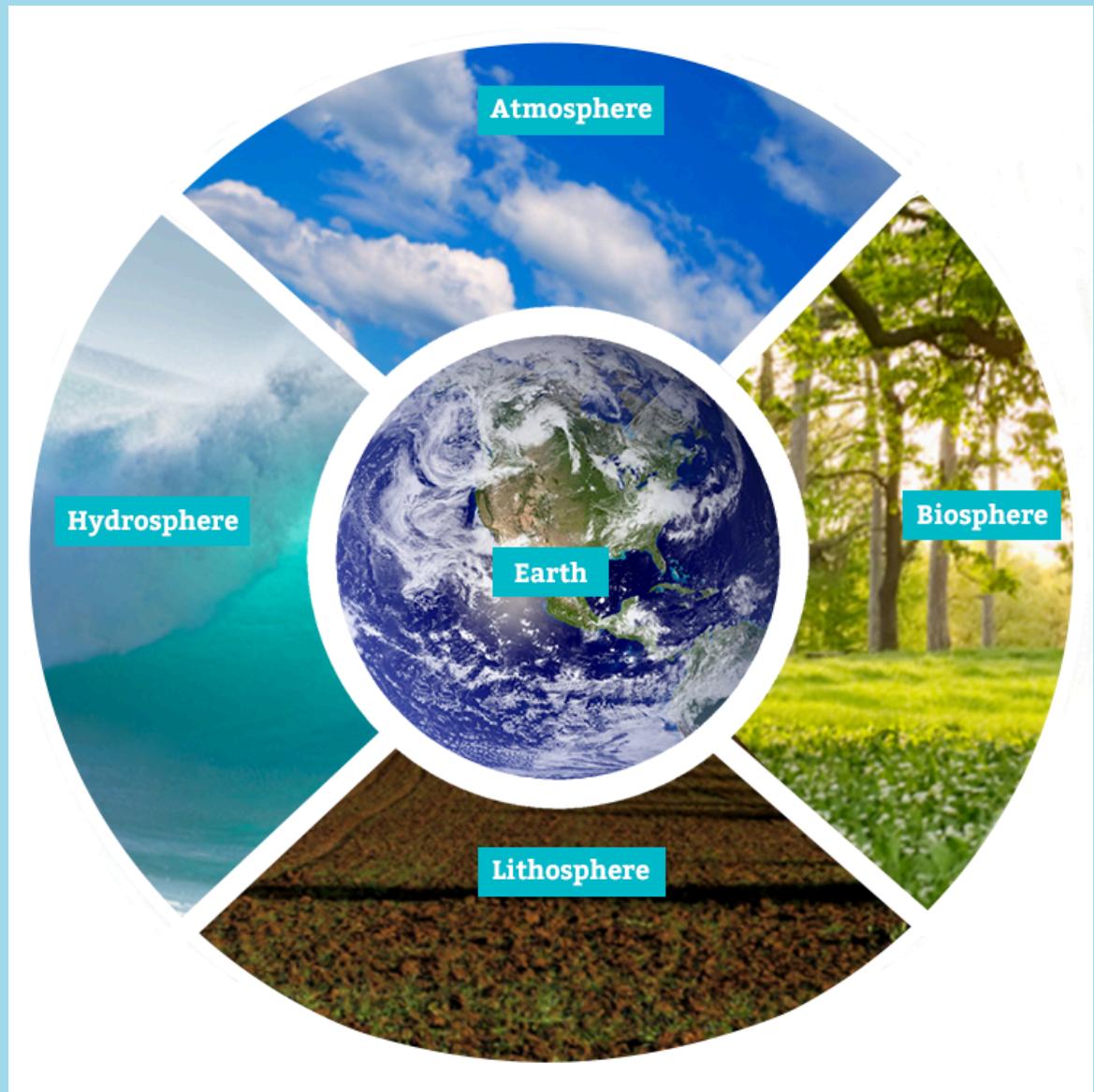
What can we do with  
spatial data?

# What is geography

- **Geo:** land, earth, terrain
- **Graph:** writing, discourse
- Tuan: **Space** (extent) and **Place** (location)
- Analysis of the effects of extent and location on events or features

# Five Themes in Geography

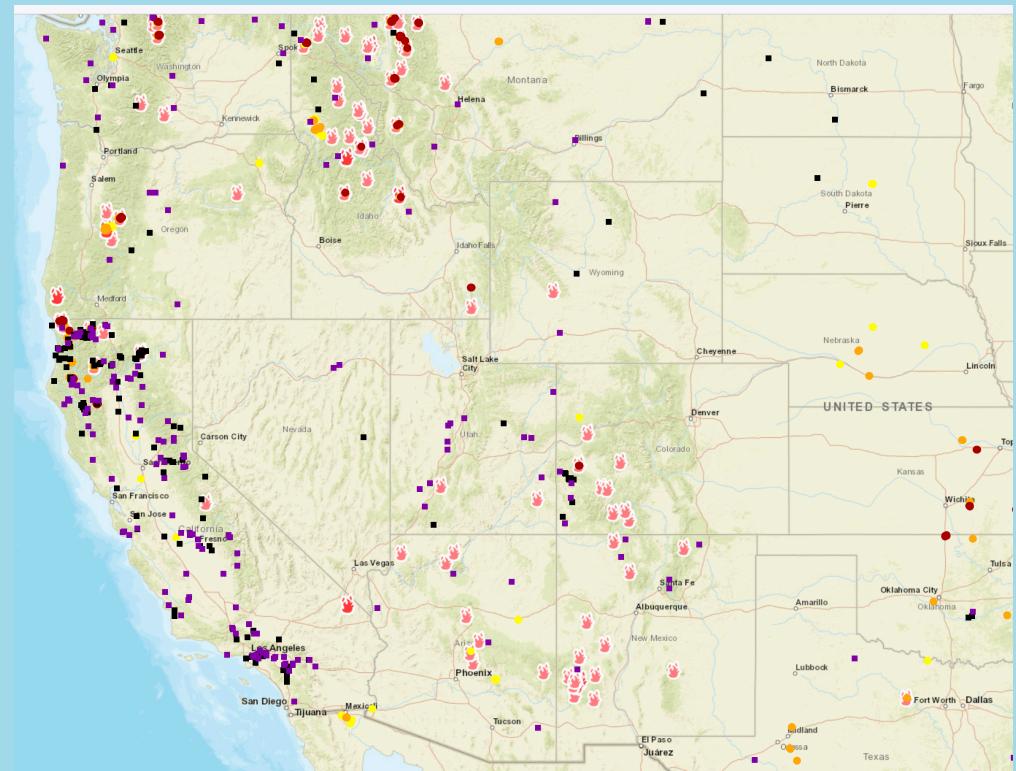
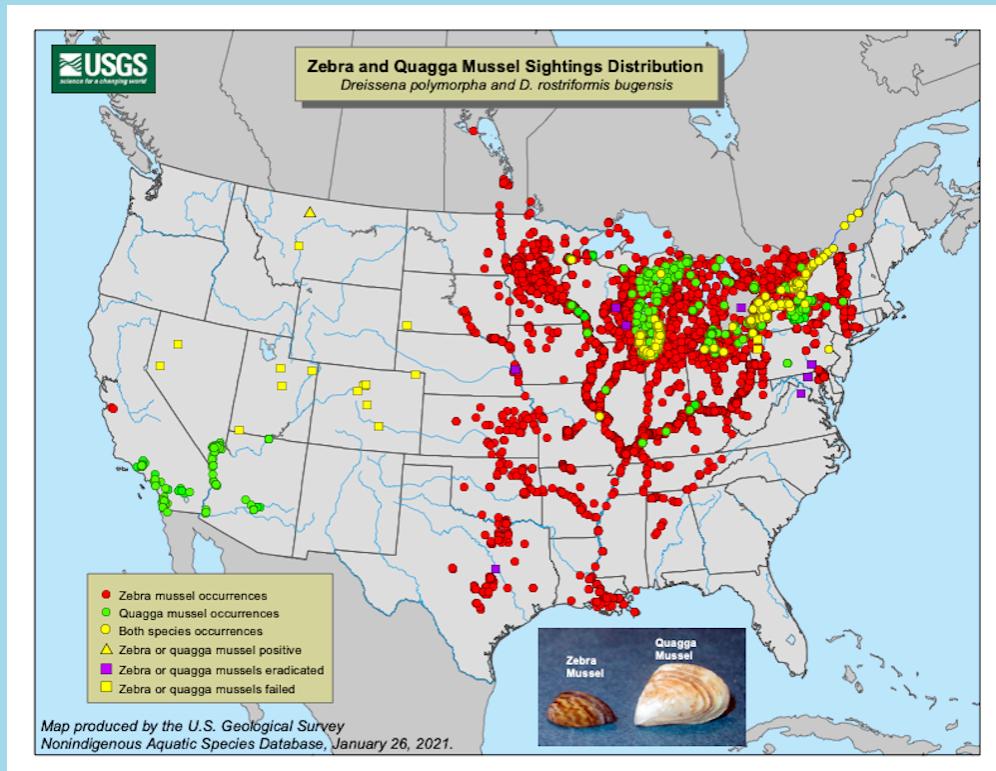
- Location
- Place
- Region
- Movement
- Human-Environment Interaction



WGBH Educational Foundation

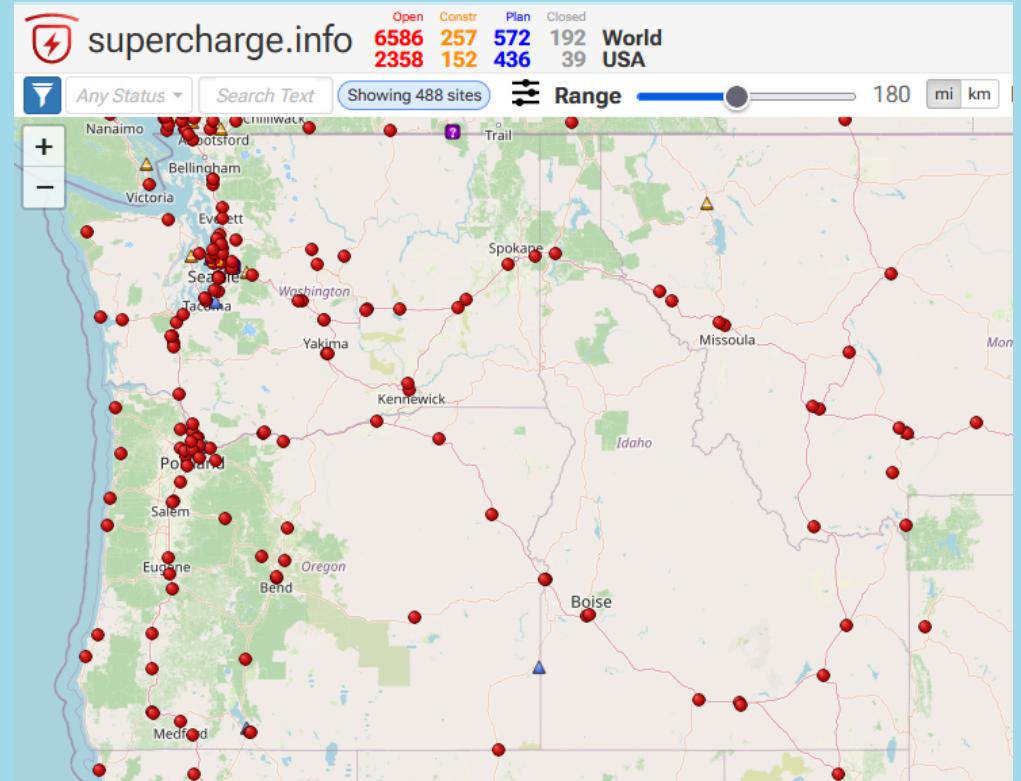
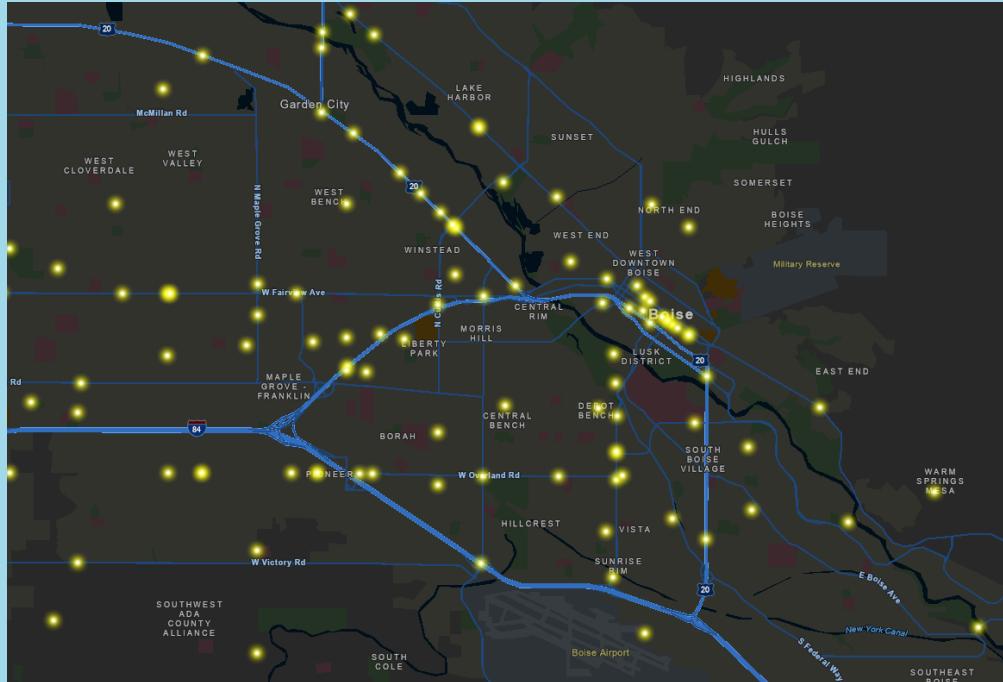
# Location

The place (on Earth) of a particular geographic feature



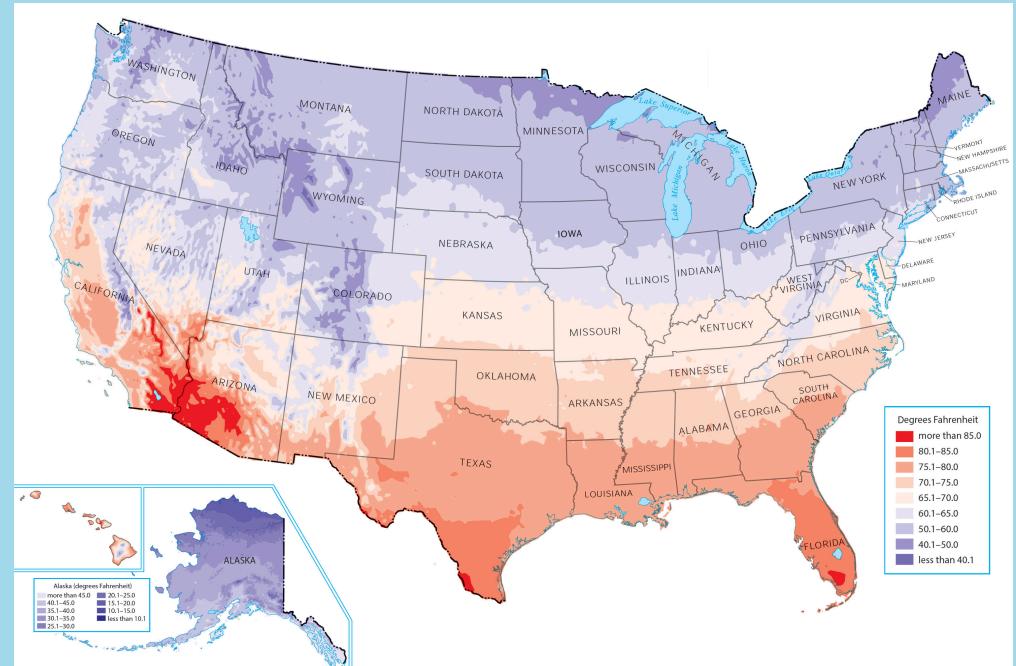
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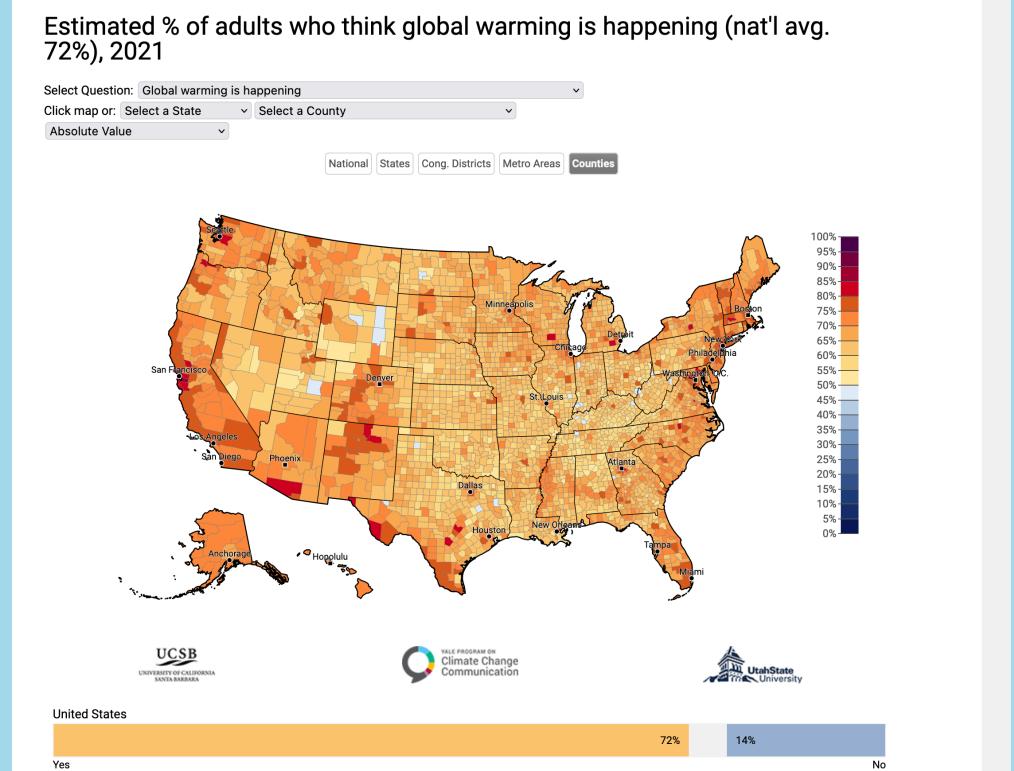
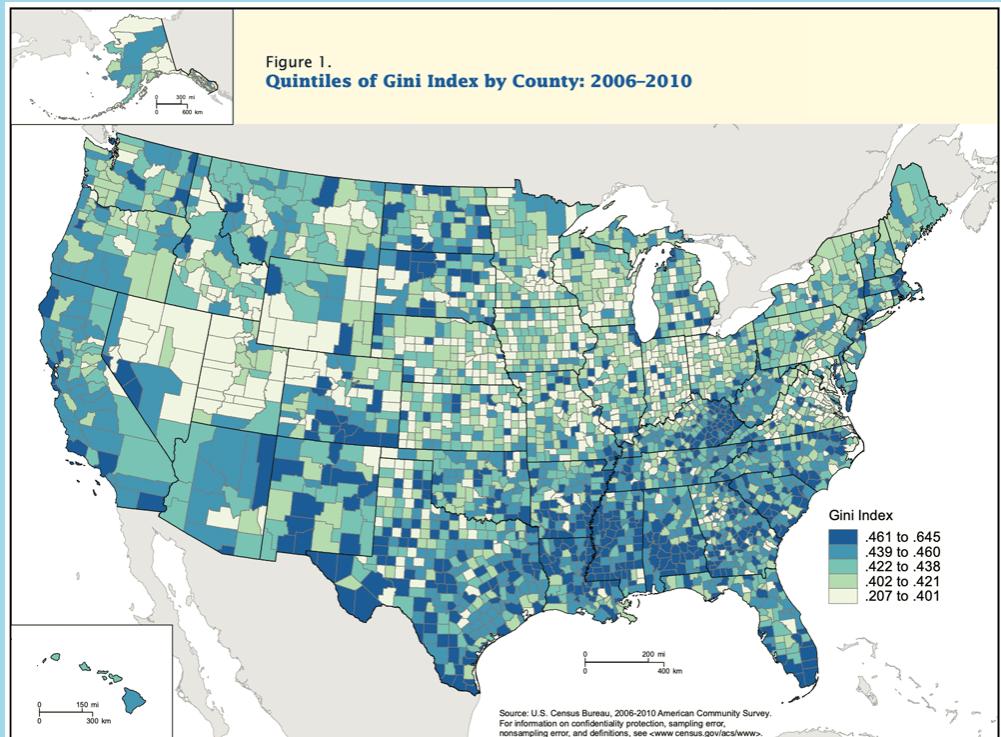
# Place

What is a location *like*?



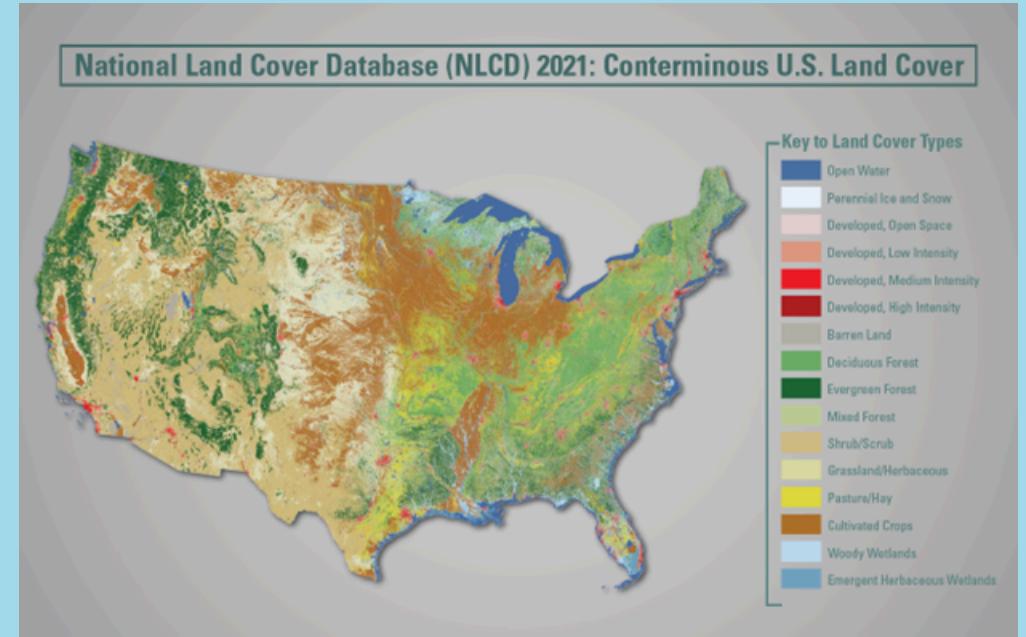
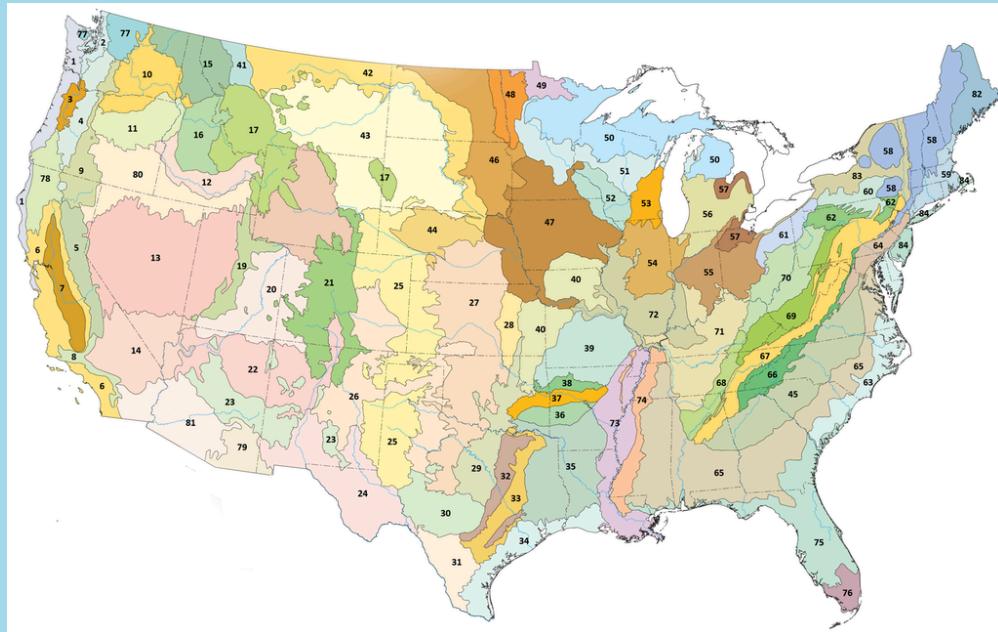
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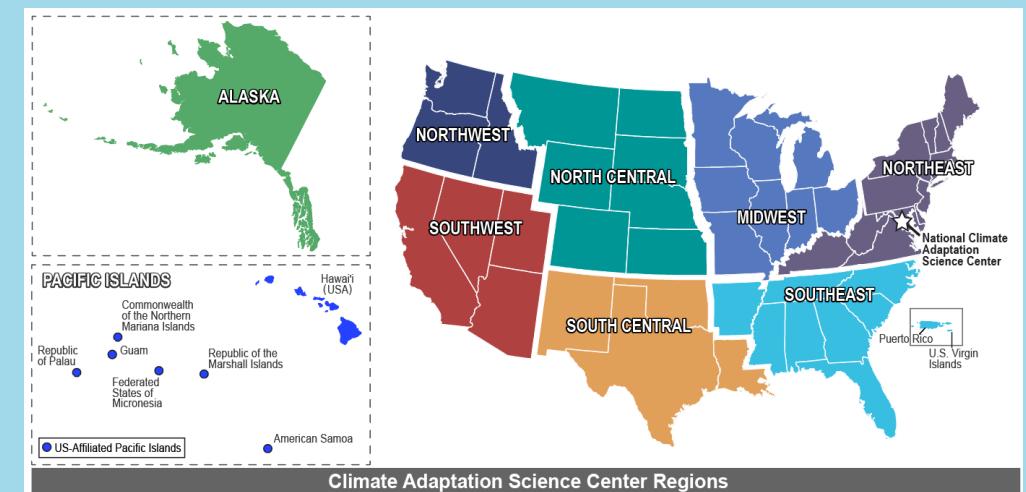
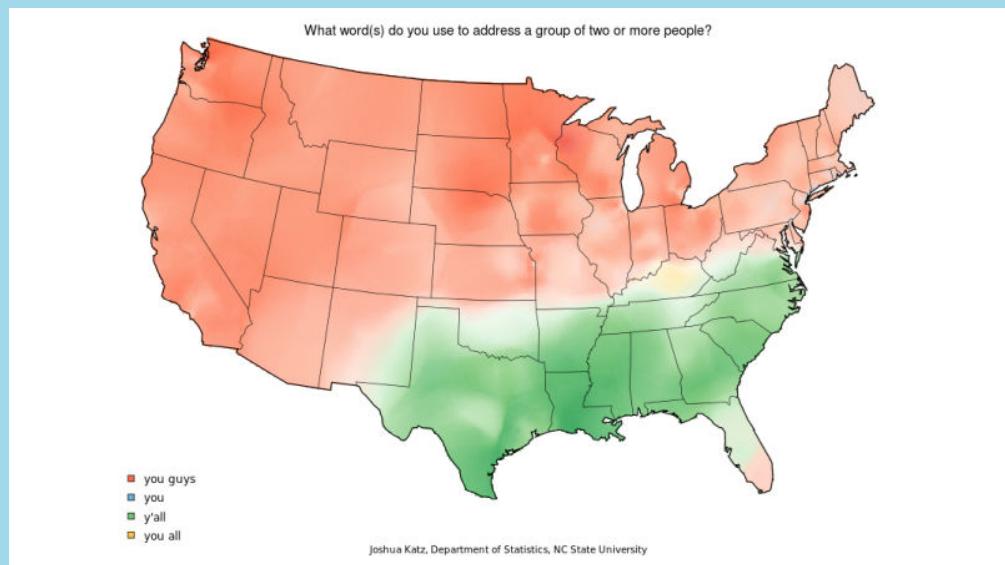
# Region

How are different areas similar or different?



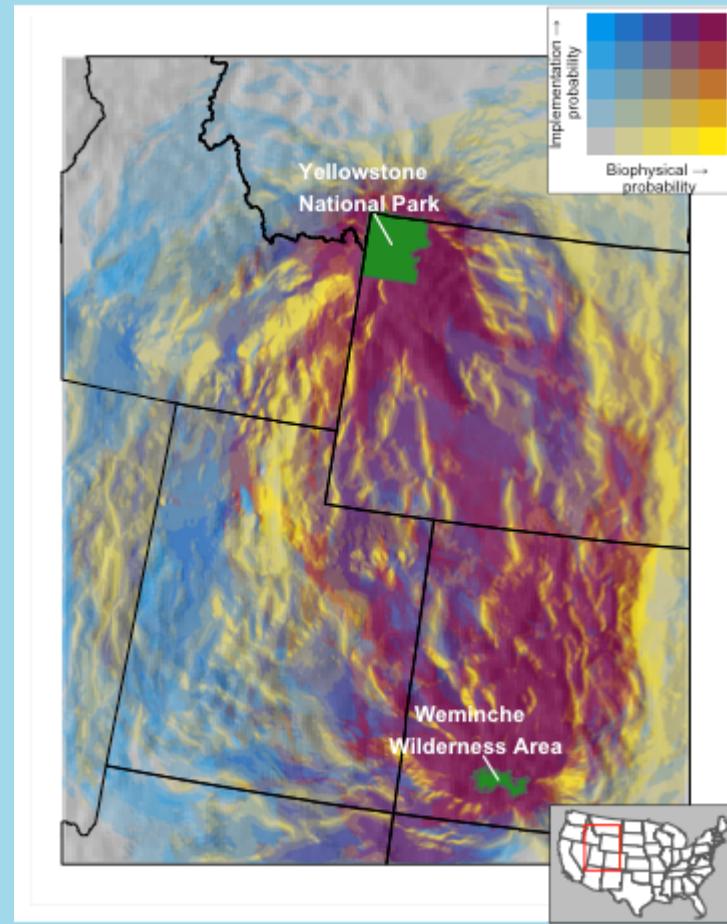
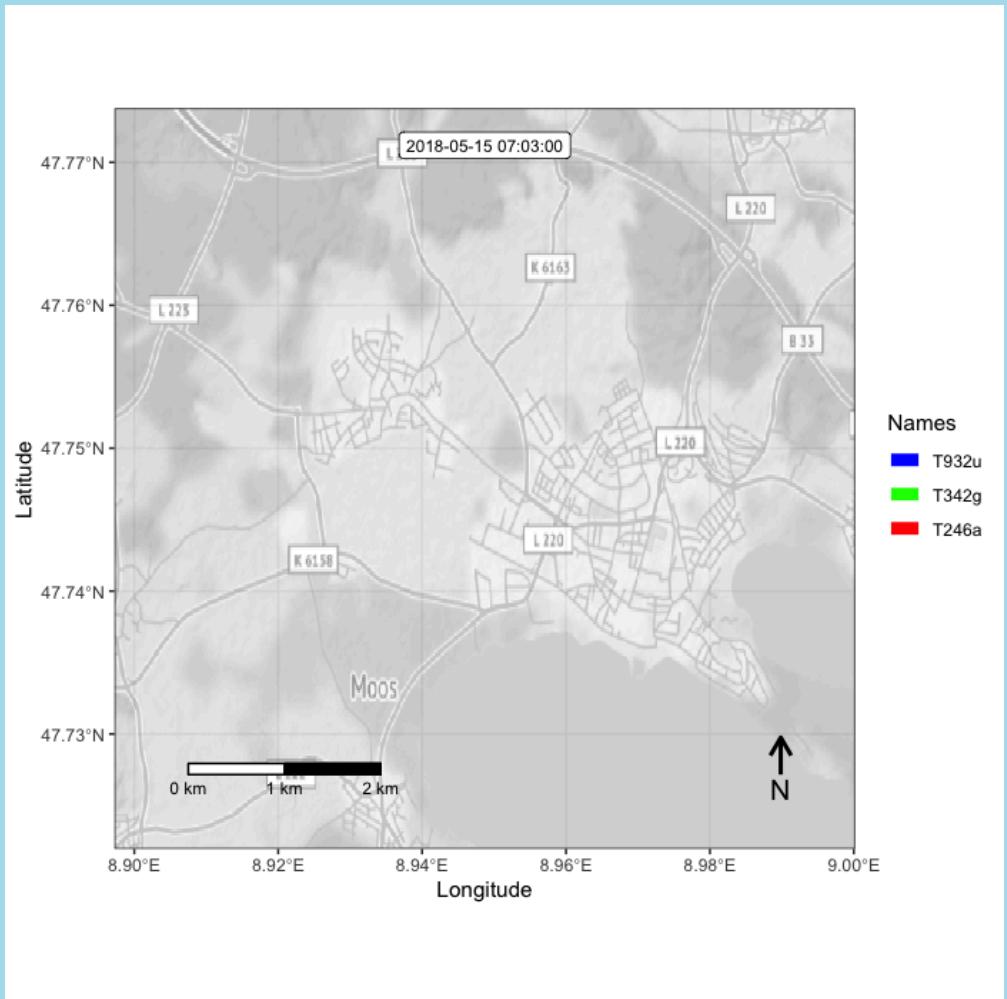
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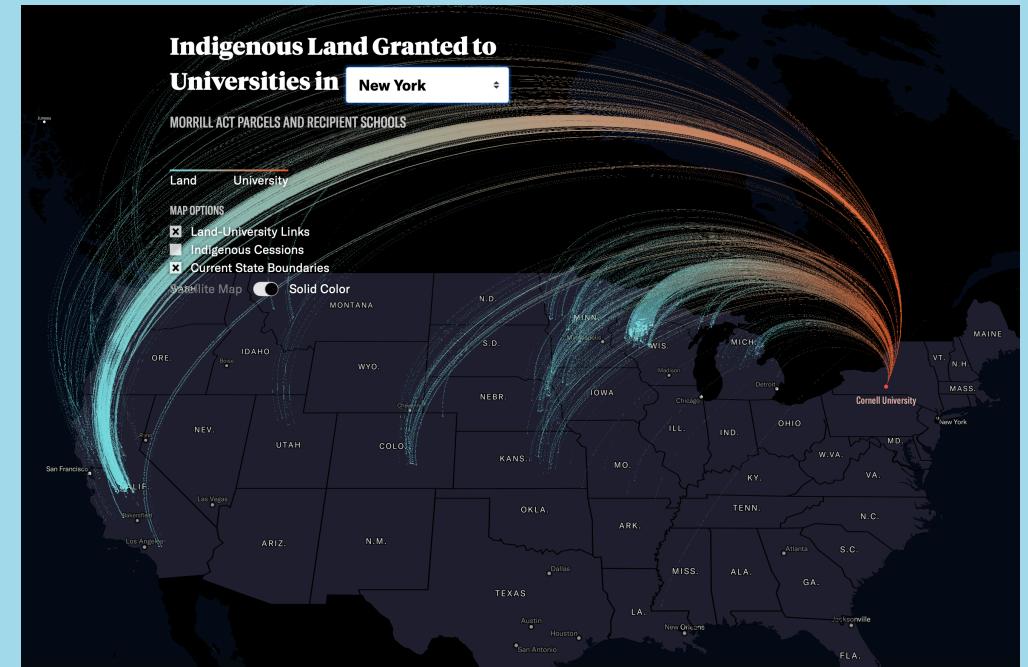
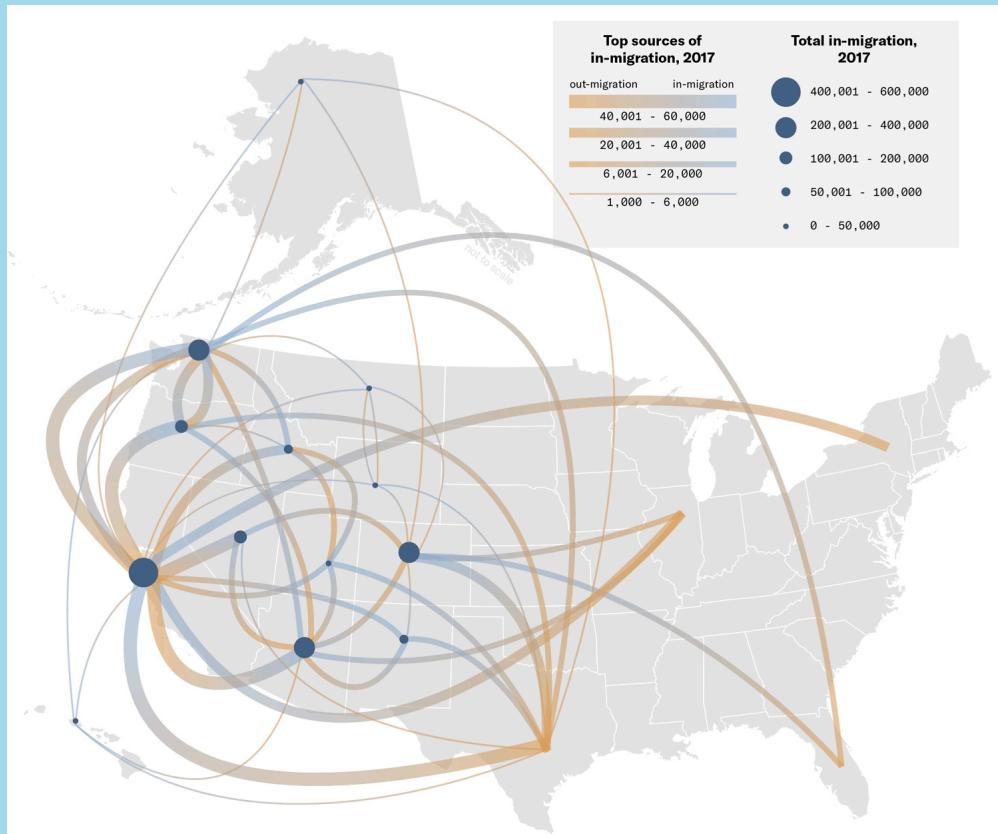
# Movement

How do genes, individuals, populations, ideas, goods, etc traverse the landscape.



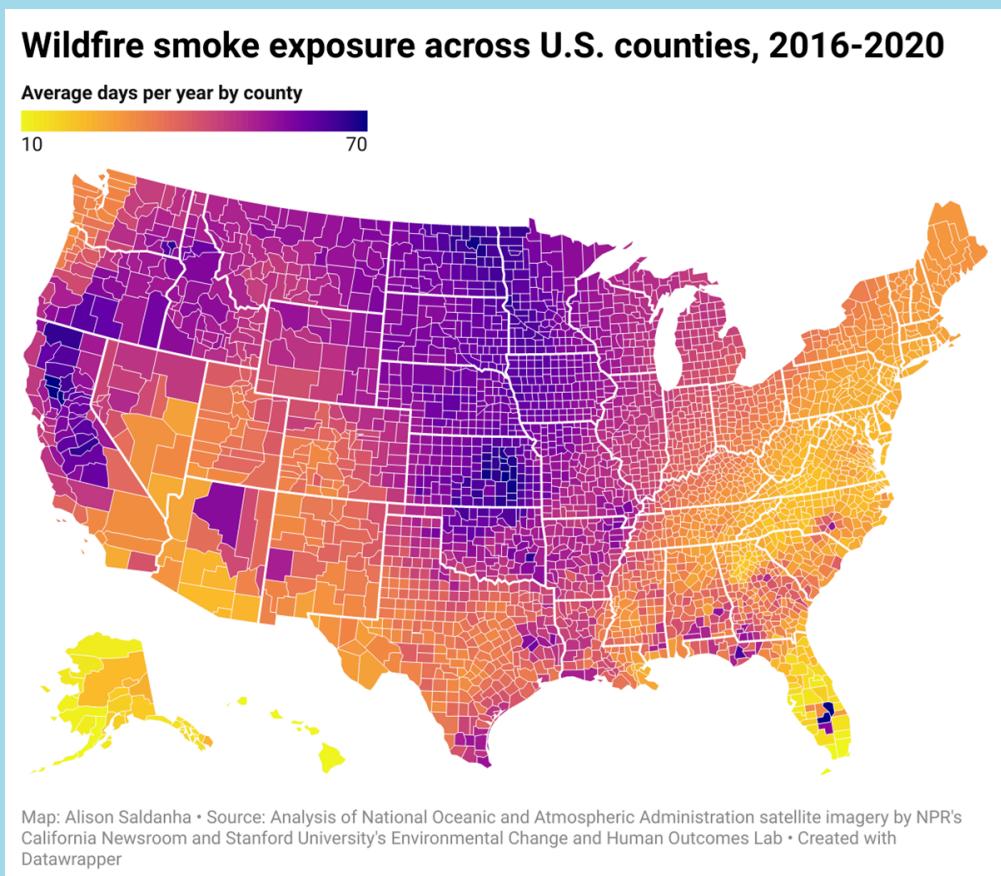
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# Human-Environment Interactions

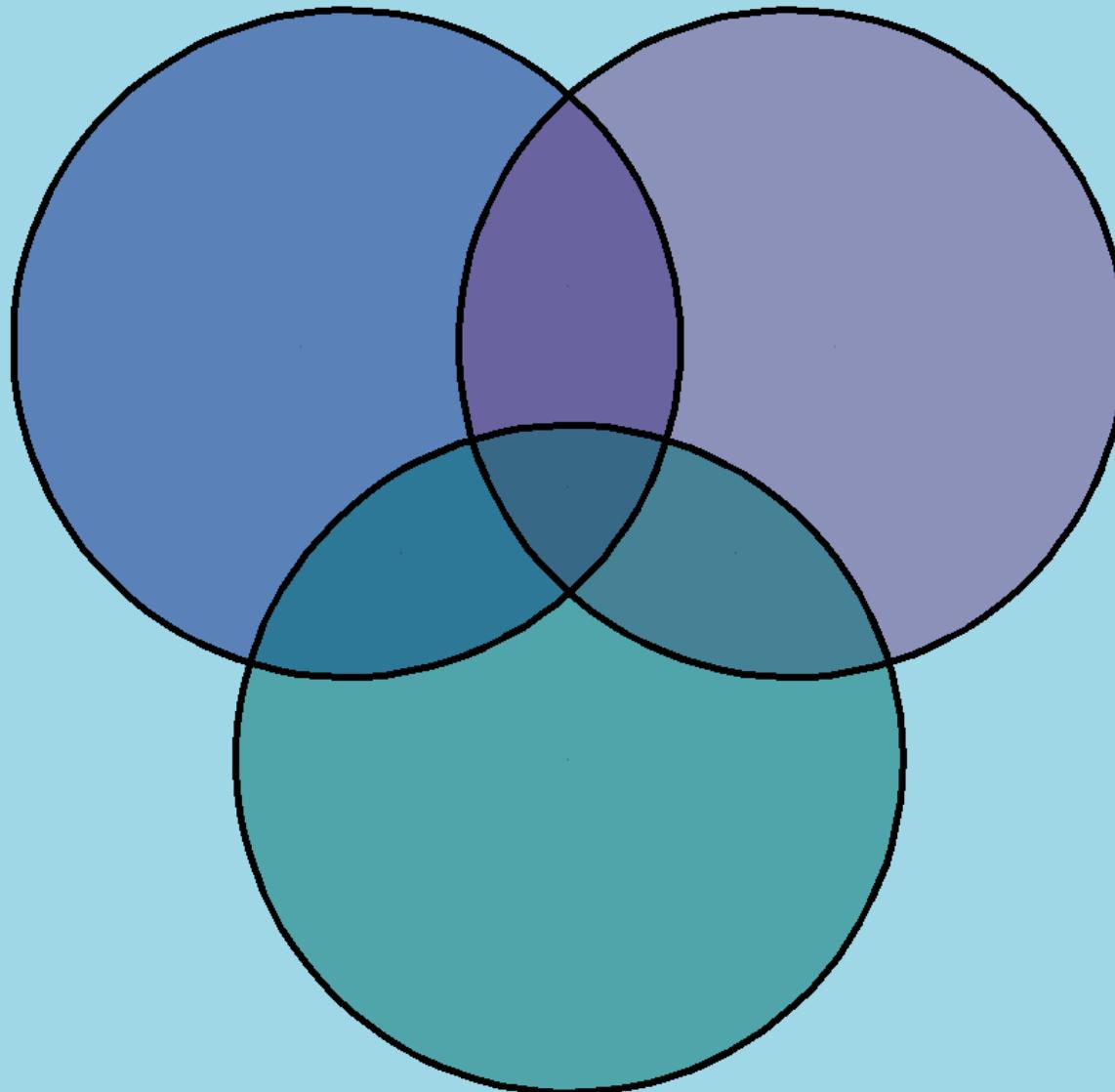
How do people relate to and change the physical world to meet their needs?



Towards *quantitative* spatial analysis

Description

Explanation

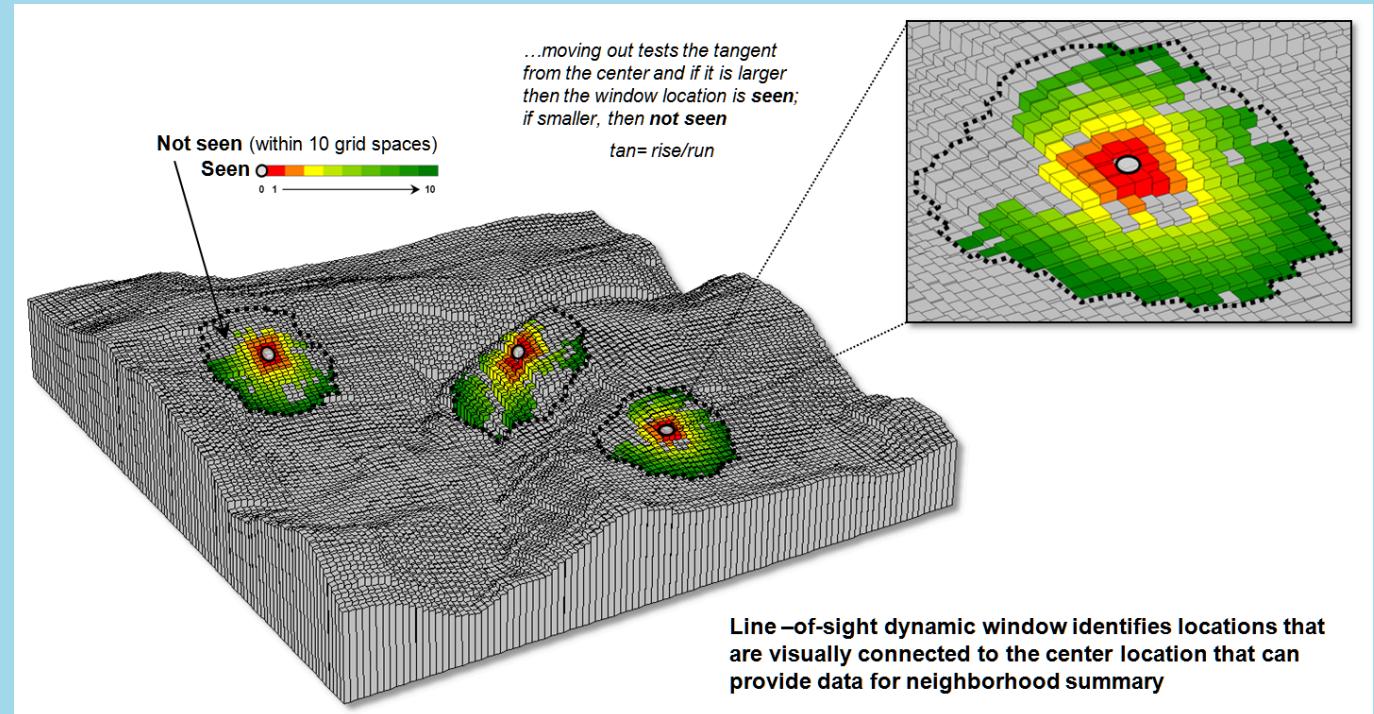


Prediction

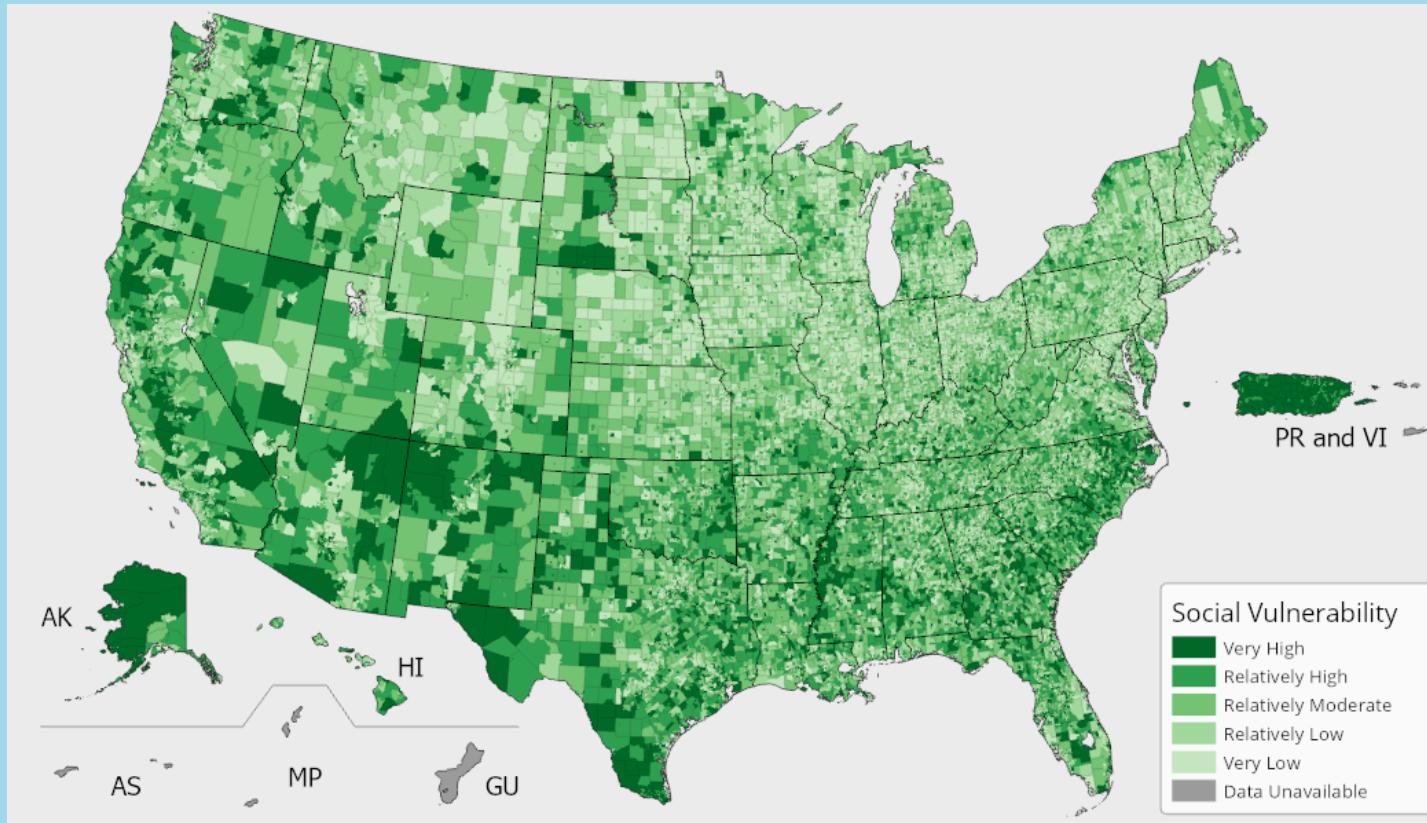


# Description

- Coordinates
- Distances
- Neighbors
- Summary statistics



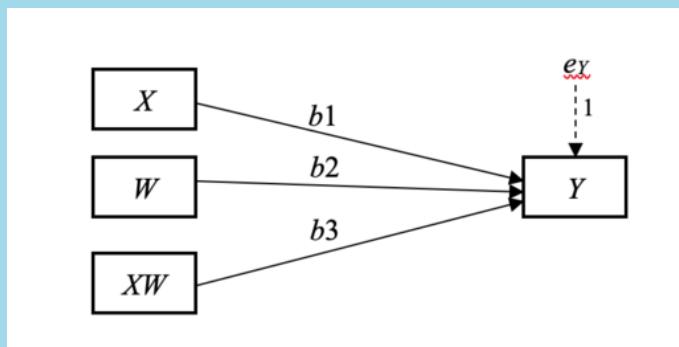
# Description



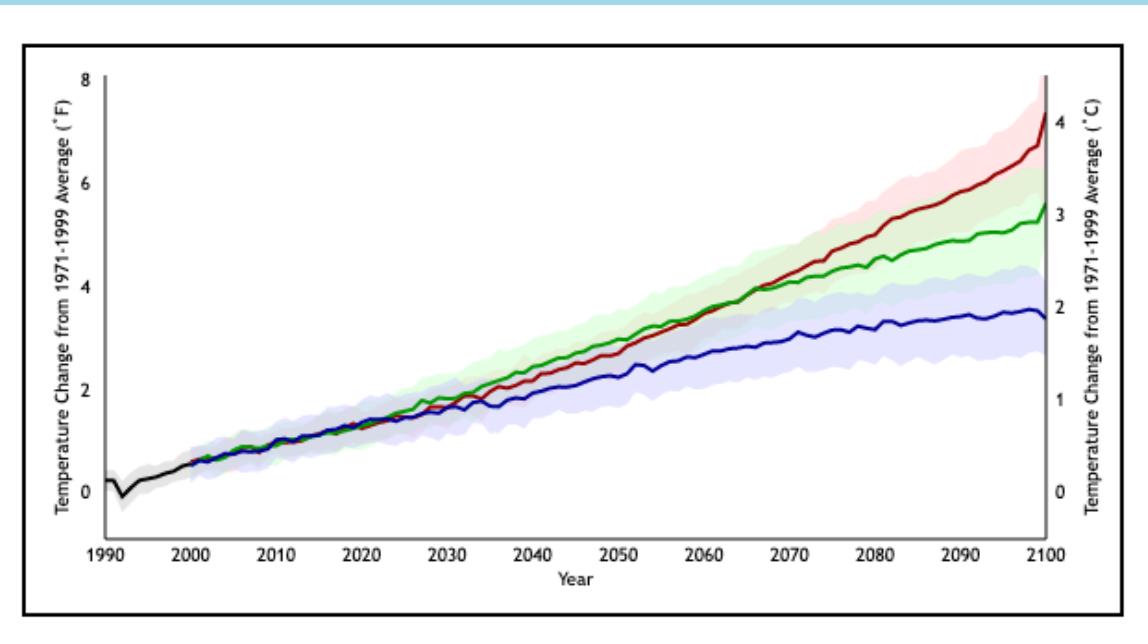
- Range Maps
- Hotspots
- Indices

# Explanation and Inference

- **Cognitive Description:** collection ordering and classification of data
- **Cause and Effect:** design-based or model-based testing of the factors that give rise to geographic distributions
- **Systems Analysis:** describes the entire complex set of interactions that structure an activity



# Prediction

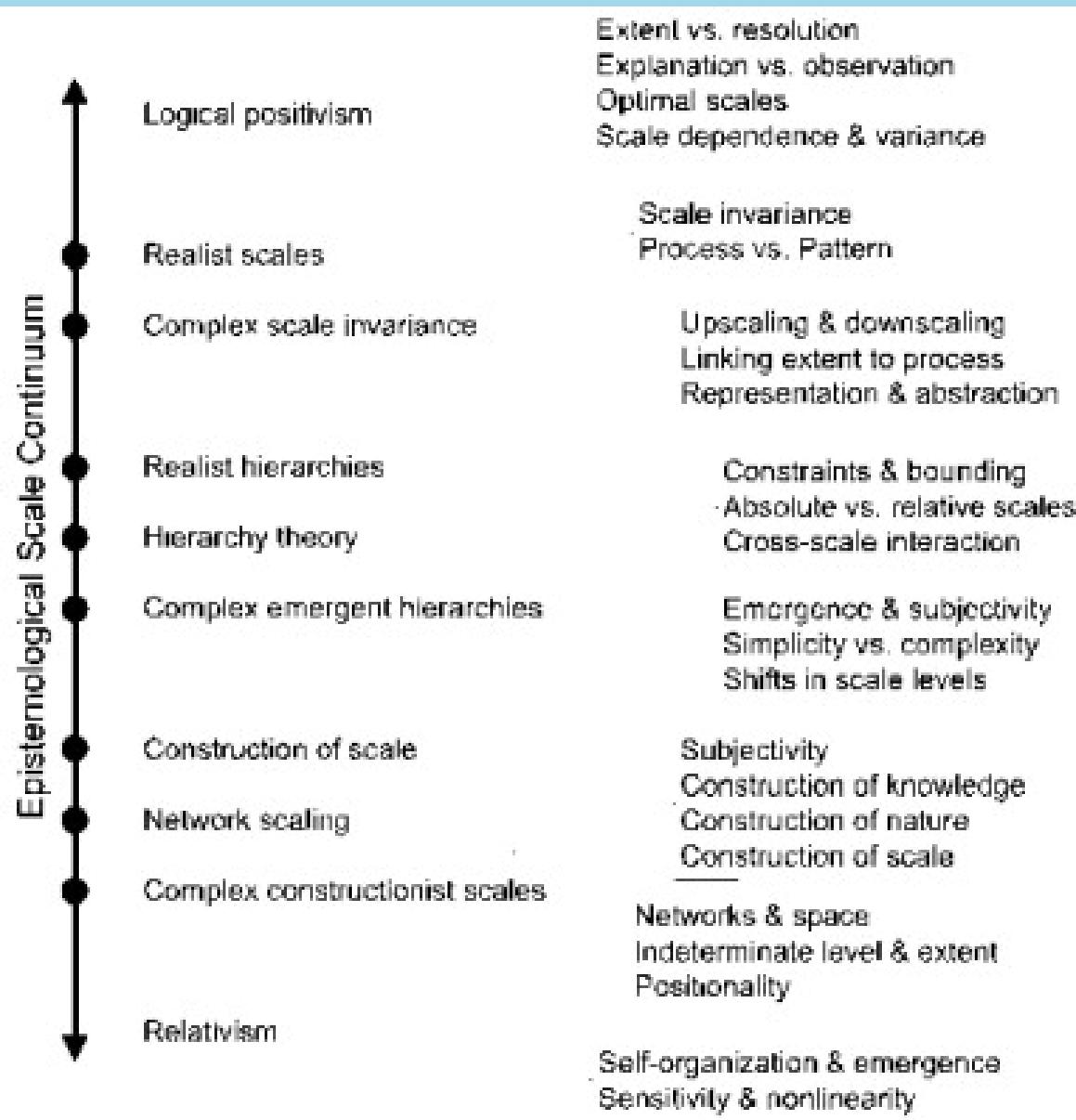


- Extend description or explanation into unmeasured space
- Stationarity: the rules governing a process do not *drift* over space-time

# Conceptual challenges

# Scale

What do we even mean?

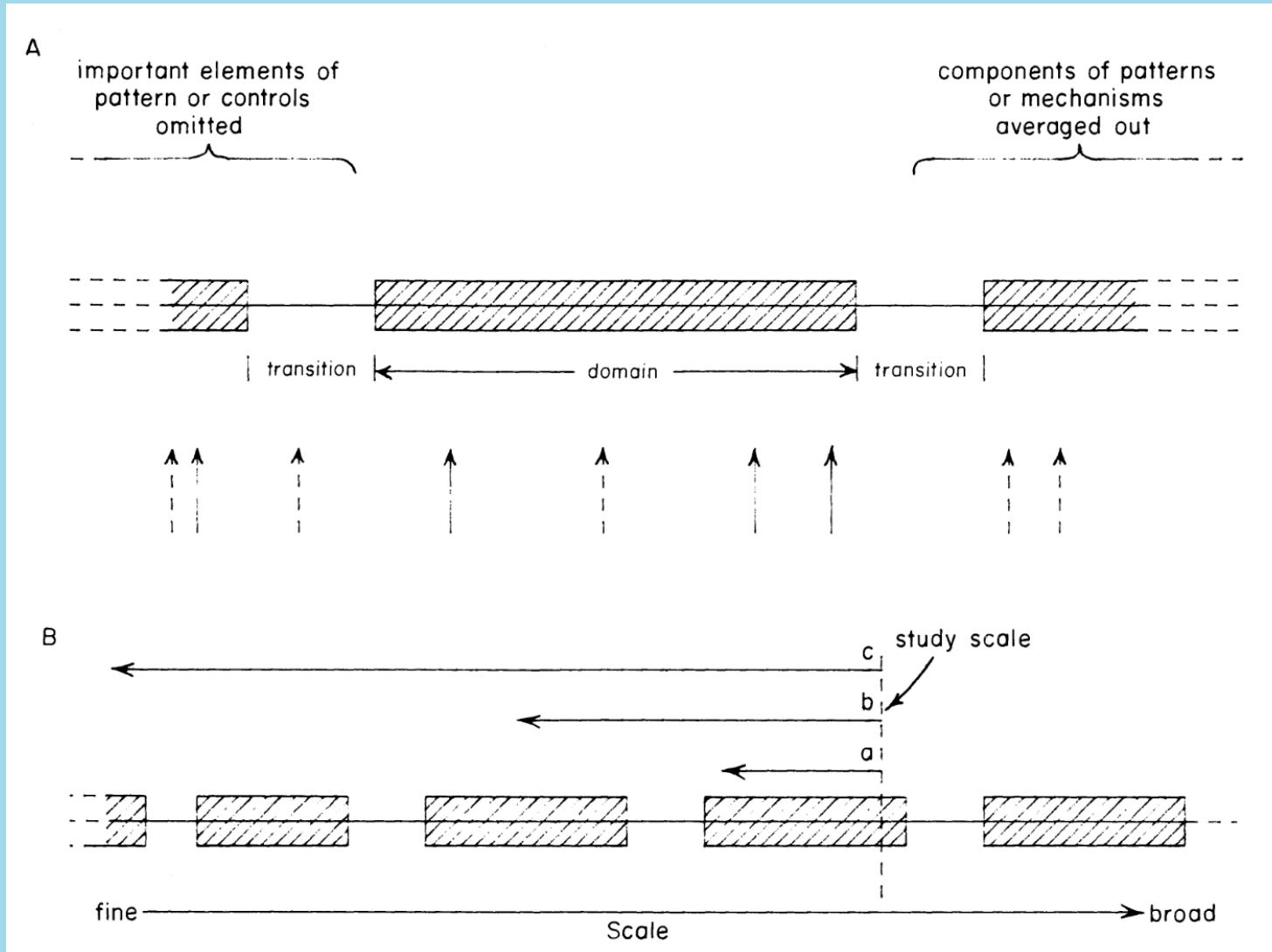


- **Grain:** the smallest unit of measurement
- **Extent:** the areal coverage of the measurement

From Manson 2008

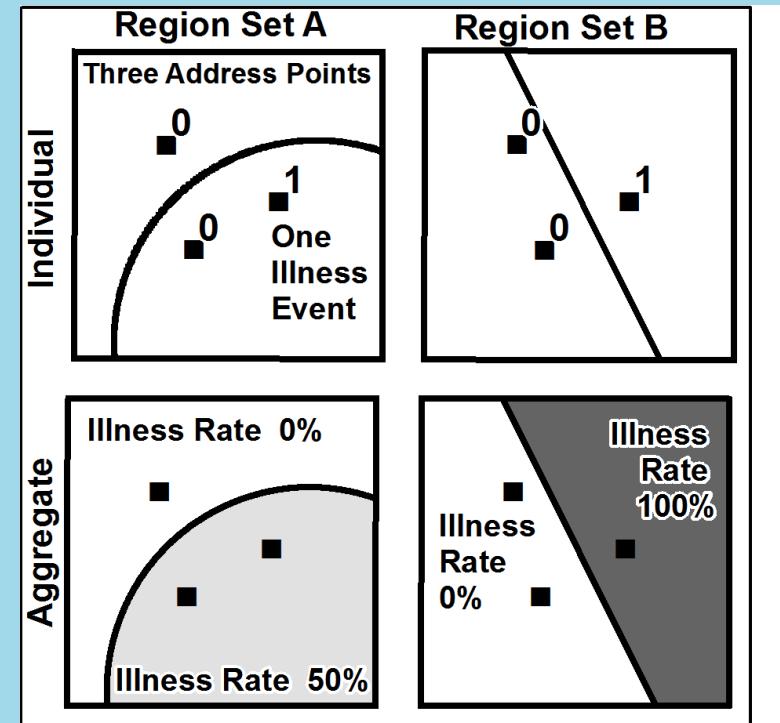
# Scale

Even if it exists, how do we know we are measuring at the *right* scale?

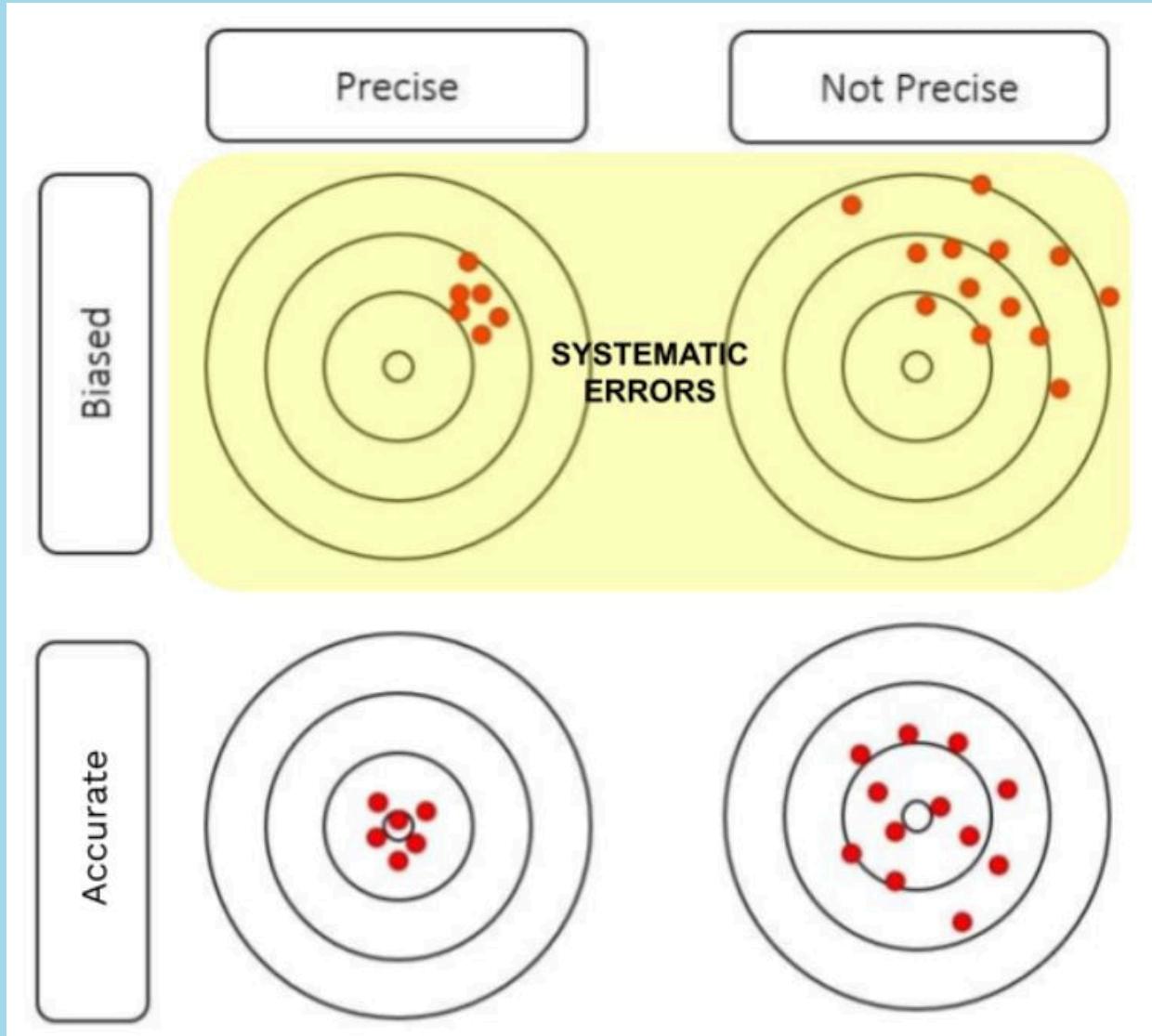


# Fallacies

- **Locational Fallacy:** Error due to the spatial characterization chosen for elements of study
- **Atomic Fallacy:** Applying conclusions from individuals to entire spatial units
- **Ecological Fallacy:** Applying conclusions from aggregated information to individuals



# Measurement Error and Mismatch



# Spatial Autocorrelation

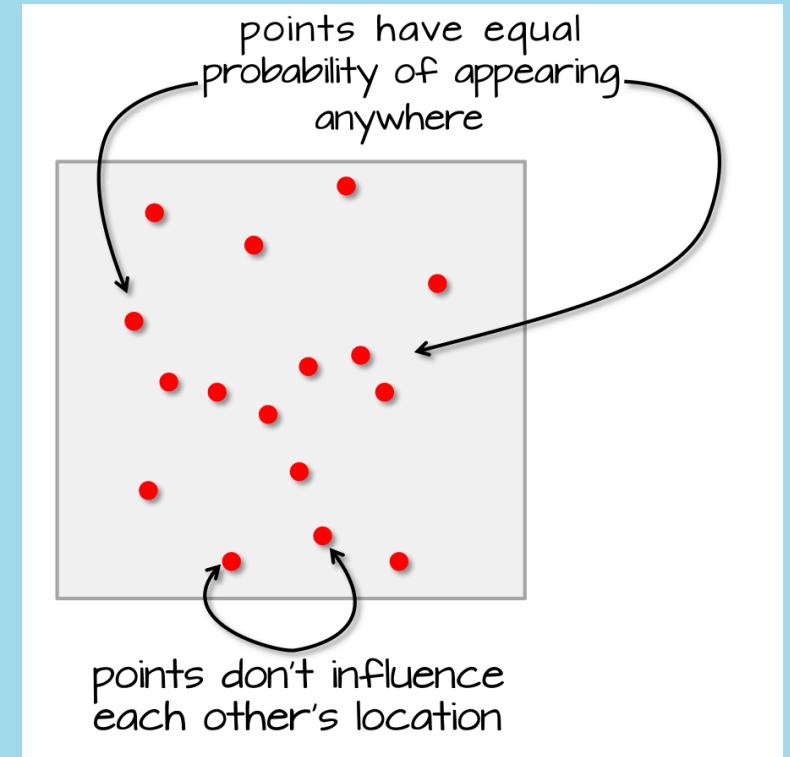


From Manuel Gimond

# Stationarity

The rules governing a process do not *drift* over space-time

- **First Order** effects: any event has an equal probability of occurring in a location
- **Second Order** effects: the location of one event is independent of the other events



From Manuel Gimond

# Key Critiques

# Not all geography needs to be quantitative

1. Abstraction removes the interesting part
2. What “is” may require assumptions we don’t want to accept
3. Wholly dependent on the military-industrial complex

# Wrapping Up

1. Themes in geography
2. Description, explanation, prediction
3. Key challenges and critiques