

Why Geographic Analysis

HES 505 Fall 2024: Session 2

Carolyn Koehn

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 scenic view of a glacier lagoon, likely in Iceland, with numerous icebergs of various sizes floating in the water. The sky is filled with large, white, fluffy clouds, and the water is a calm, light blue-grey color. In the background, a range of mountains is visible under the overcast sky.

What can we do with spatial data?

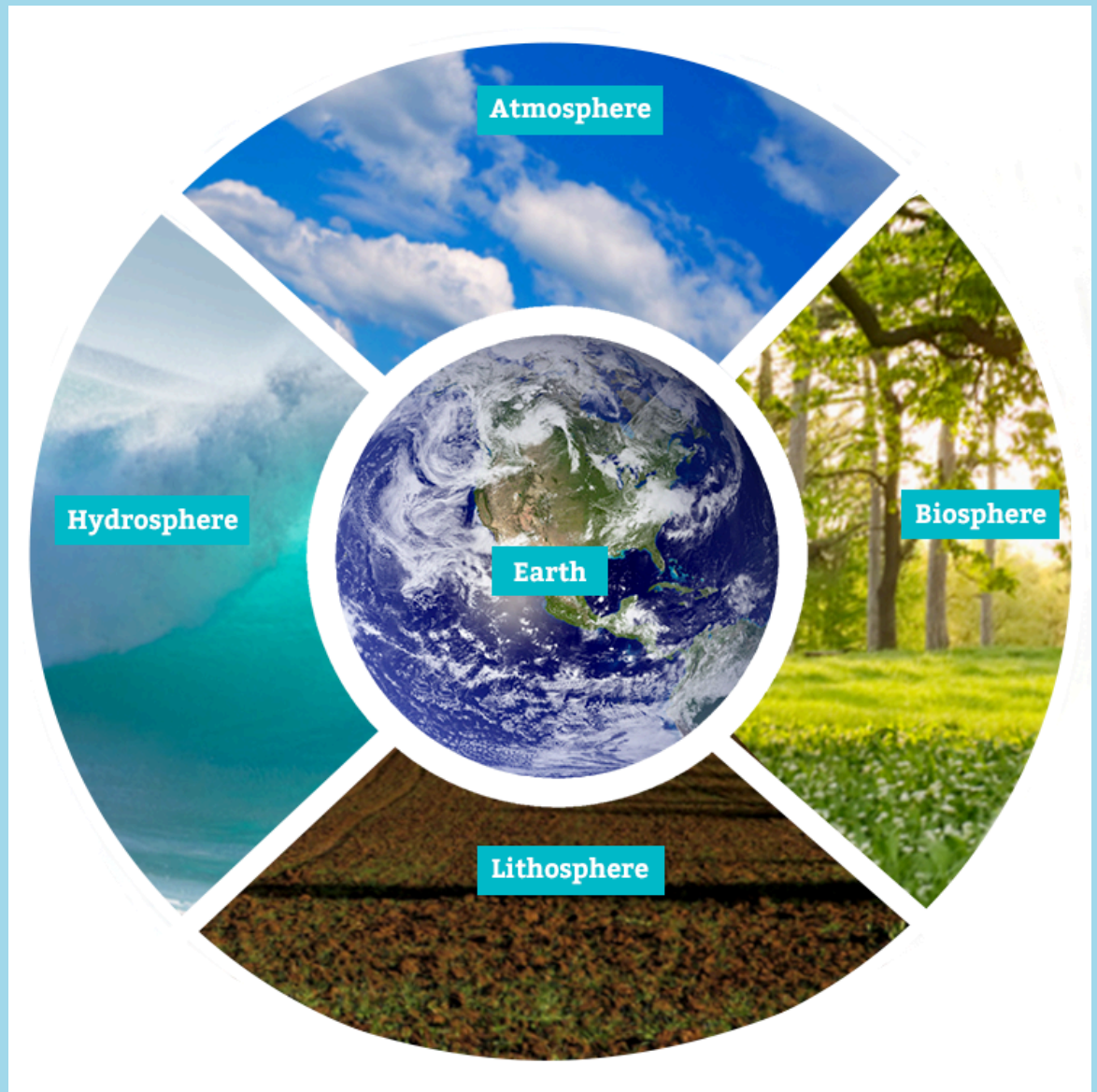
What is geography

- **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

- 1. **Location**
 - Where is it?
 - Absolute location: latitude and longitude
 - Relative location: in relation to other places
- 2. **Place**
 - What is it like?
 - Physical features: land, water, climate, etc.
 - Human features: buildings, roads, etc.
- 3. **Human-Environment Interaction**
 - How do humans and the environment interact?
 - Humans adapt to the environment
 - Humans modify the environment
- 4. **Movement**
 - How do people and goods move?
 - Migration: moving from one place to another
 - Trade: exchanging goods and services
- 5. **Region**
 - What area are we studying?
 - Formal regions: defined by boundaries
 - Functional regions: defined by a common function
 - Vernacular regions: defined by a common identity

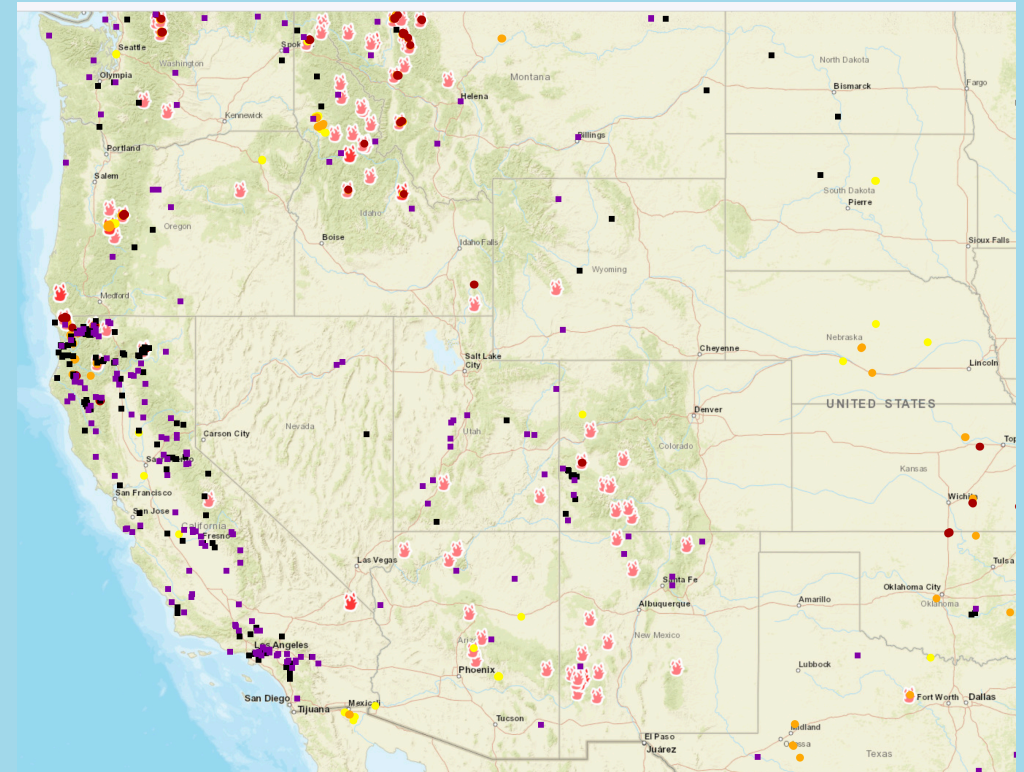
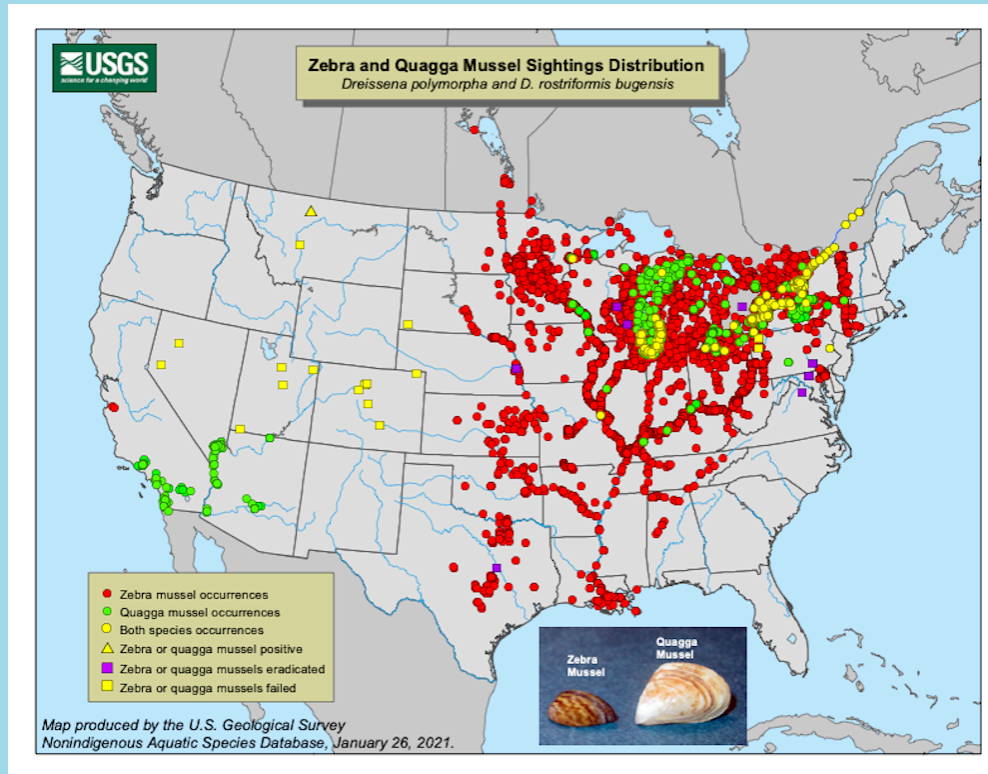
- Location
- Place
- Region
- Movement
- Human-
Environment
Interaction



WGBH Educational Foundation

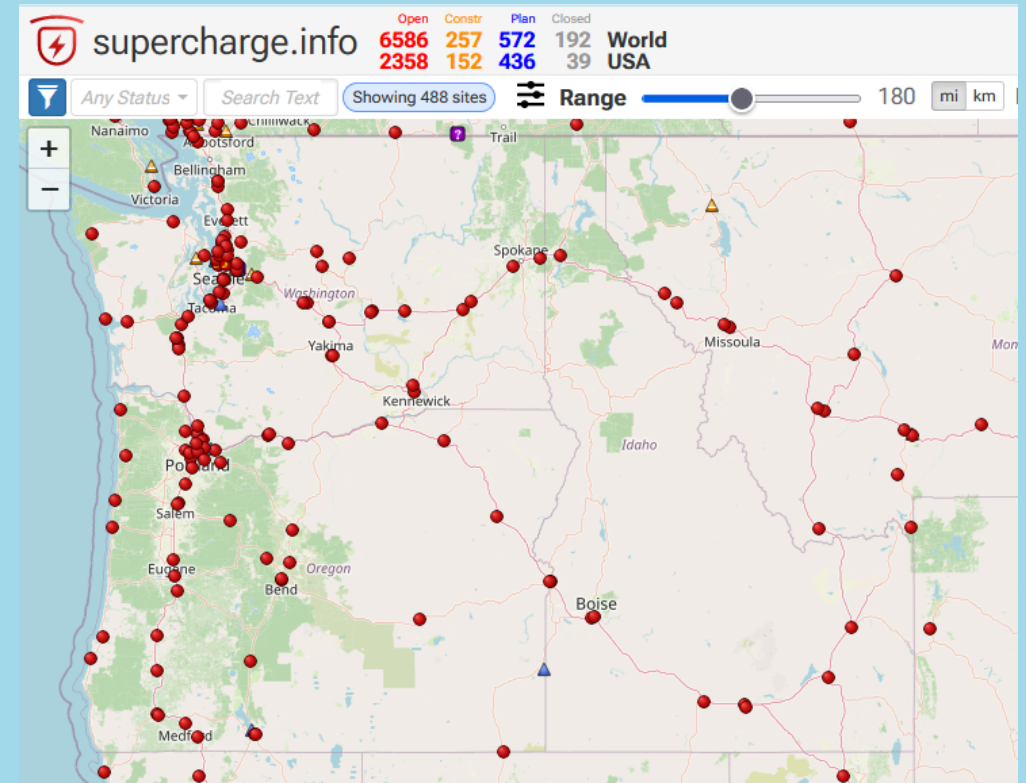
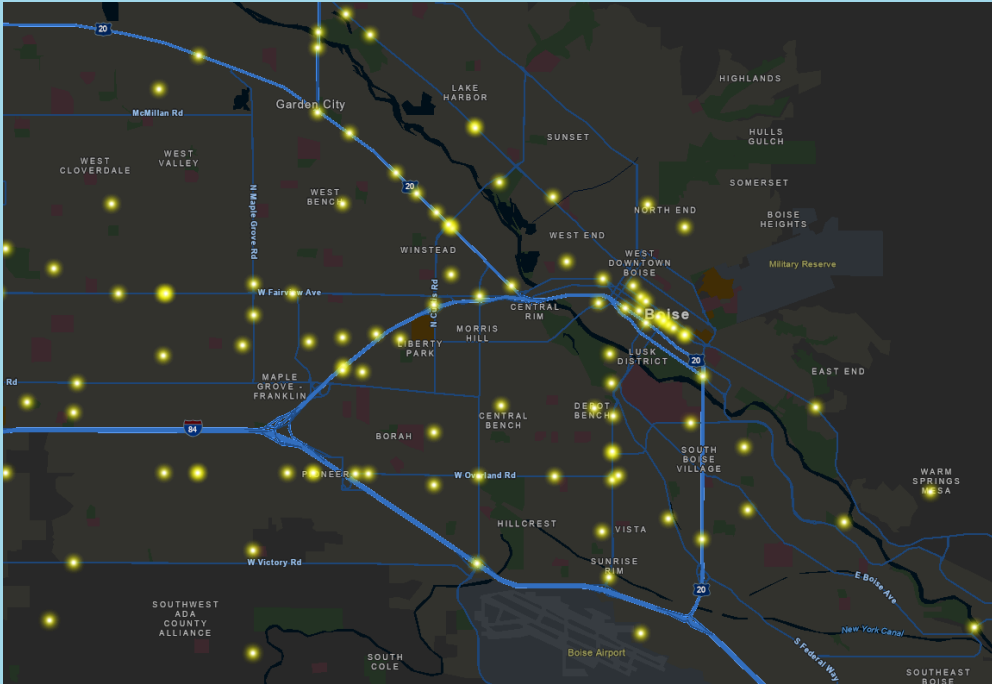
Location

The place (on Earth) of a particular geographic feature



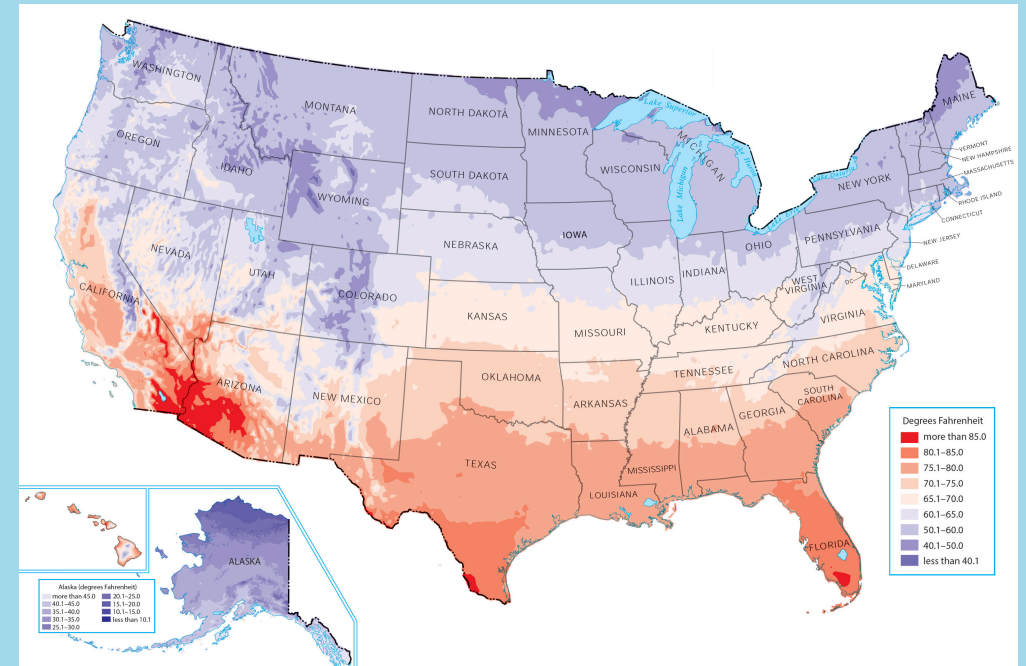
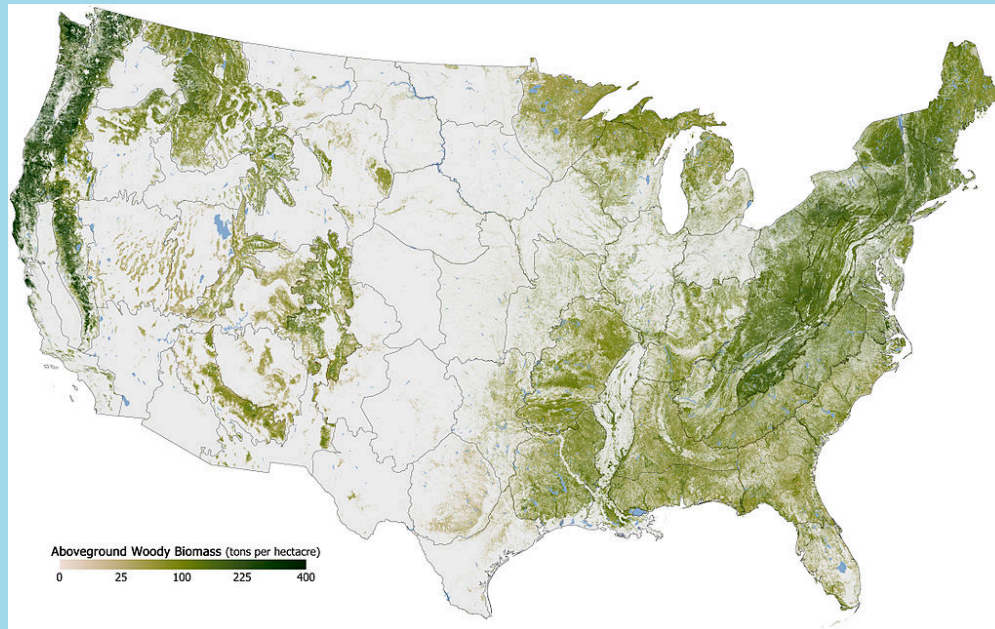
Location

The place (on Earth) of a particular geographic feature



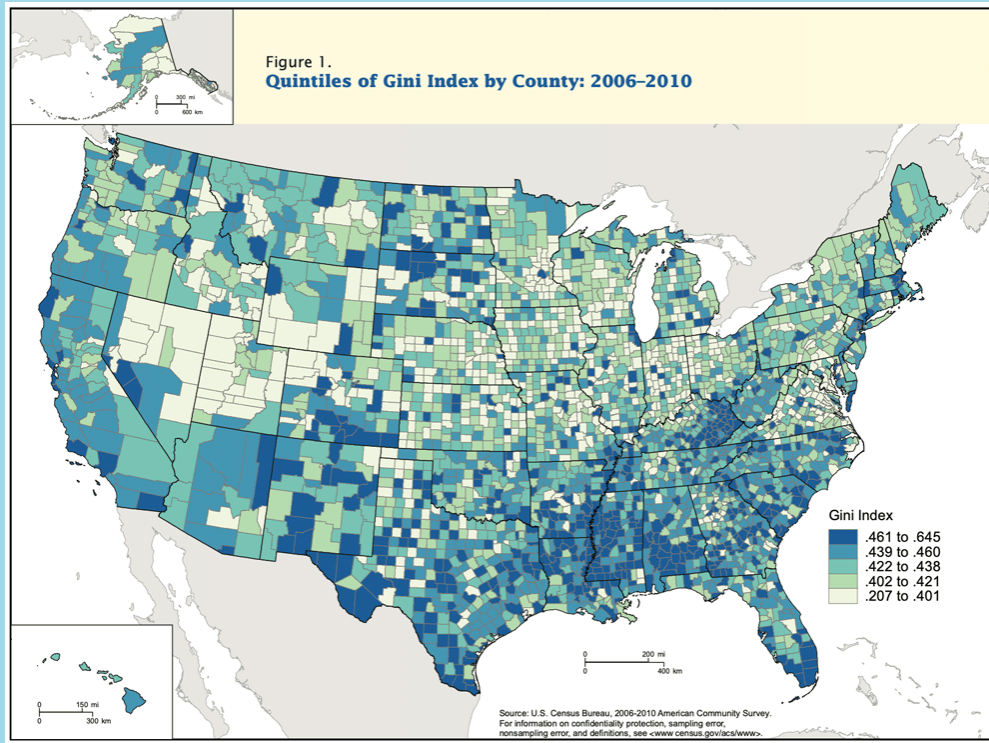
Place

What is a location *like*?



Place

What is a location *like*?



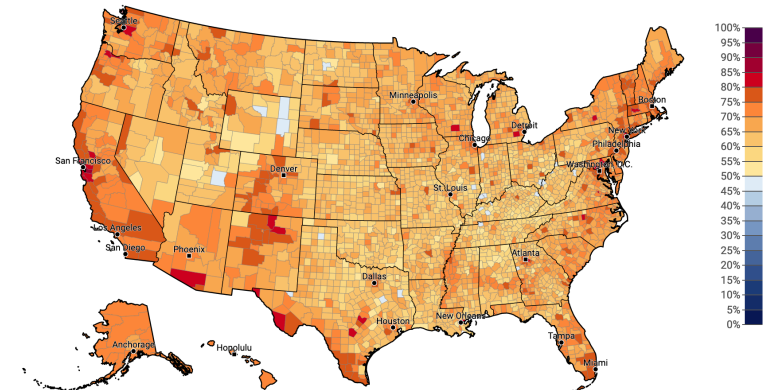
Estimated % of adults who think global warming is happening (nat'l avg. 72%), 2021

Select Question: Global warming is happening

Click map or: Select a State Select a County

Absolute Value

National States Cong. Districts Metro Areas Counties

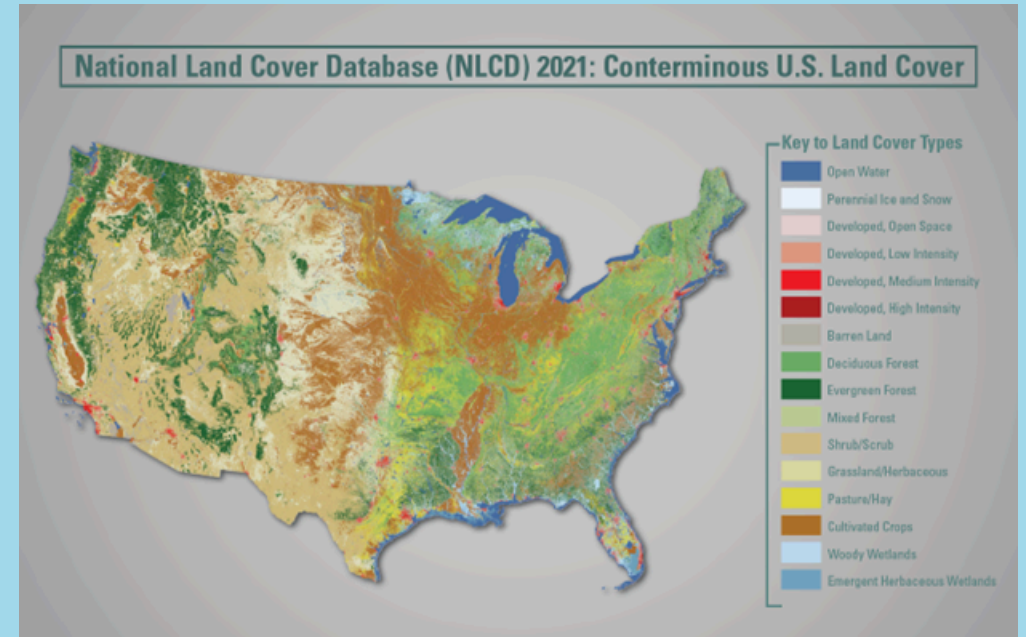
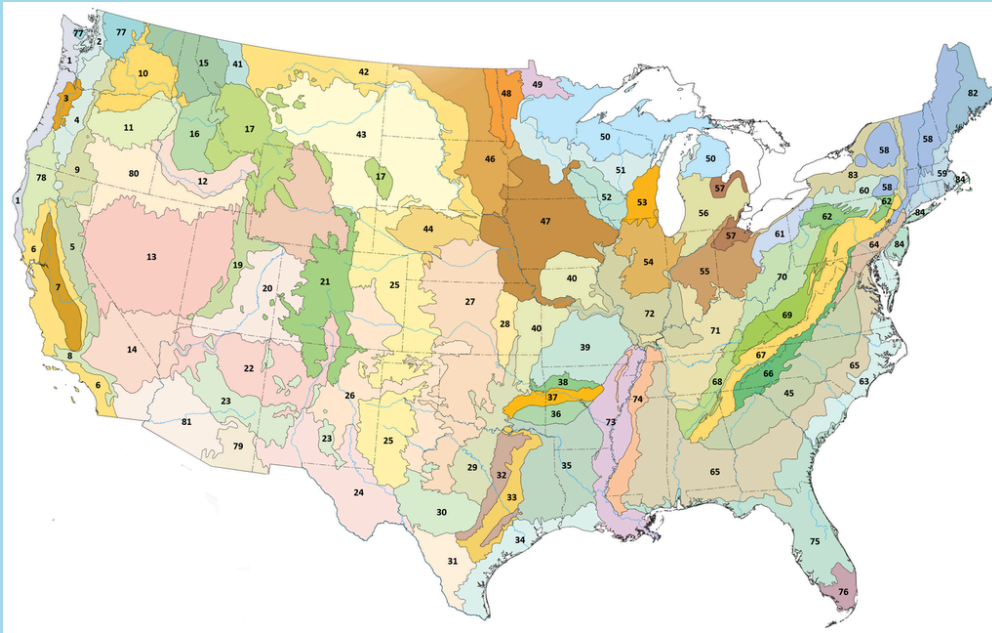


United States



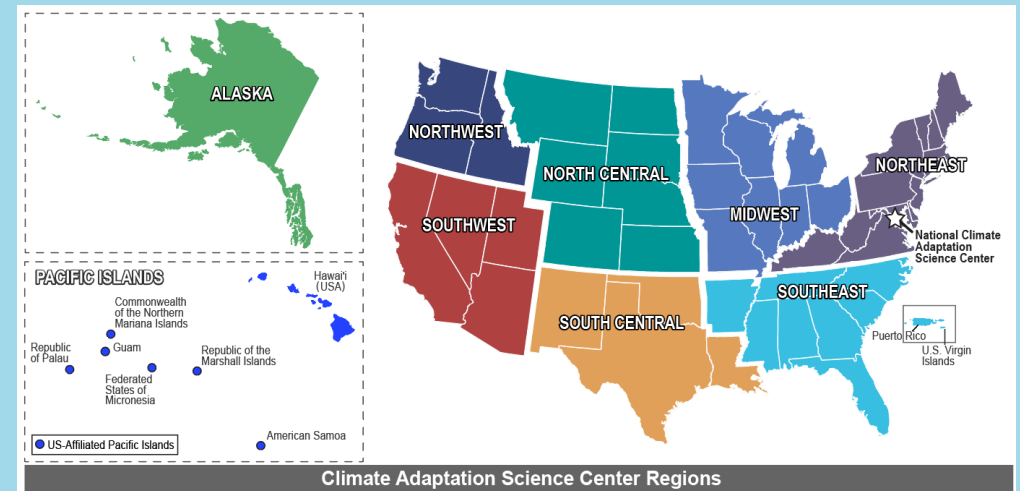
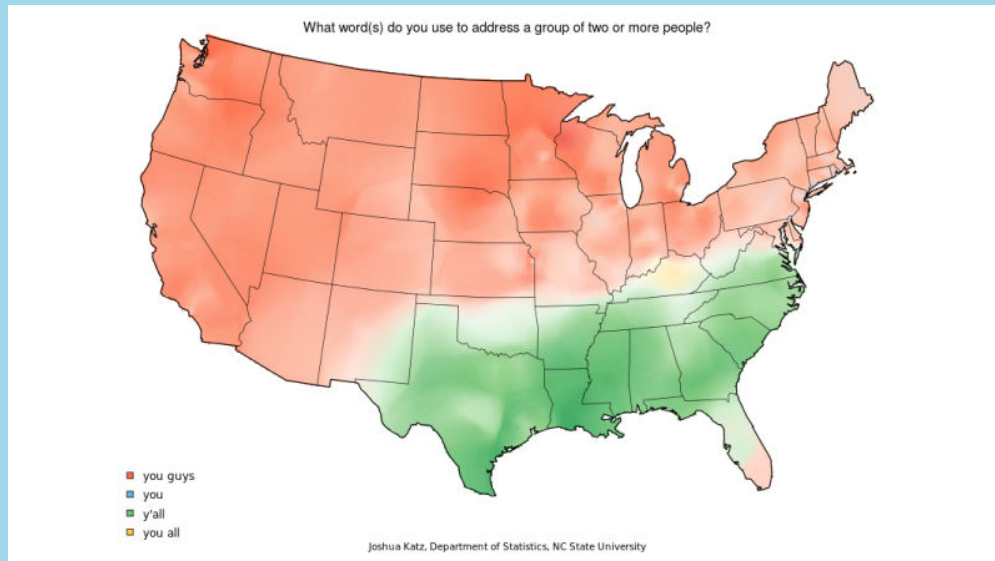
Region

How are different areas similar or different?



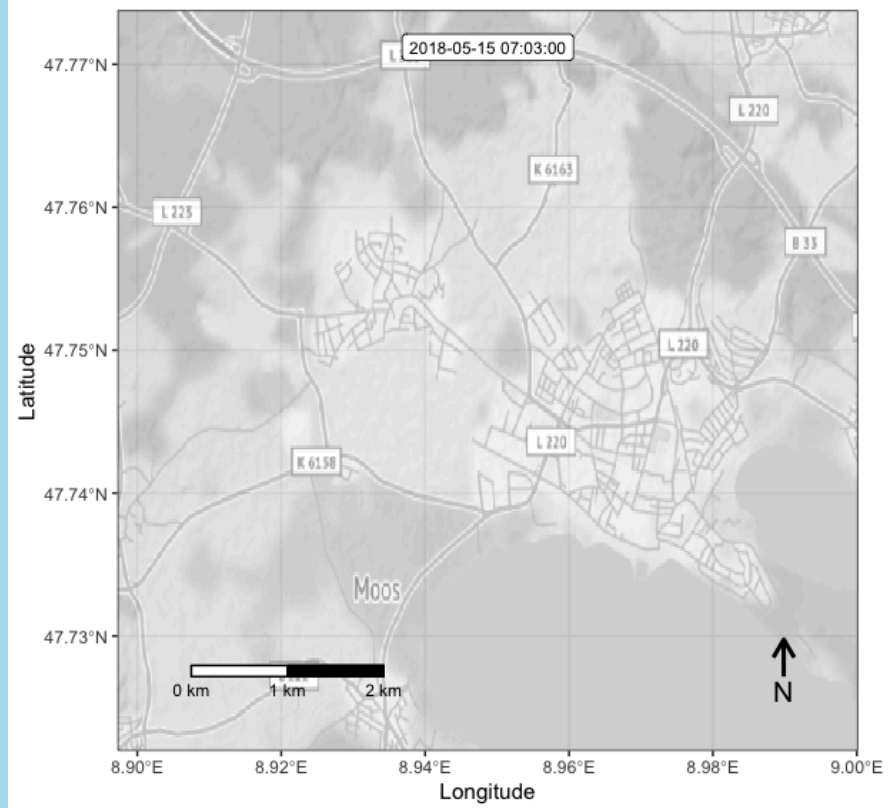
Region

How are different areas similar or different?



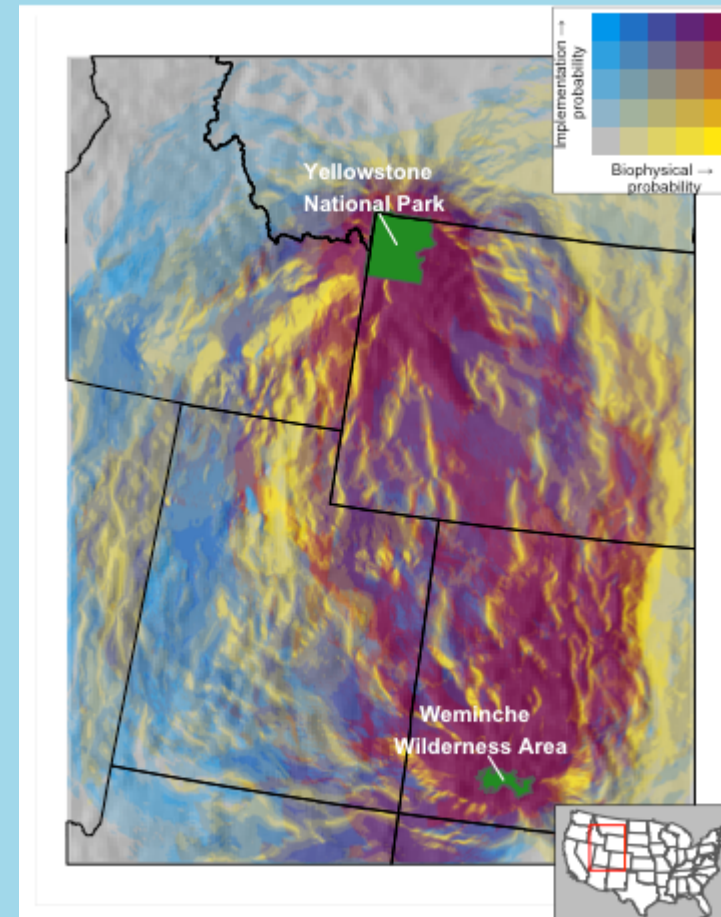
Movement

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



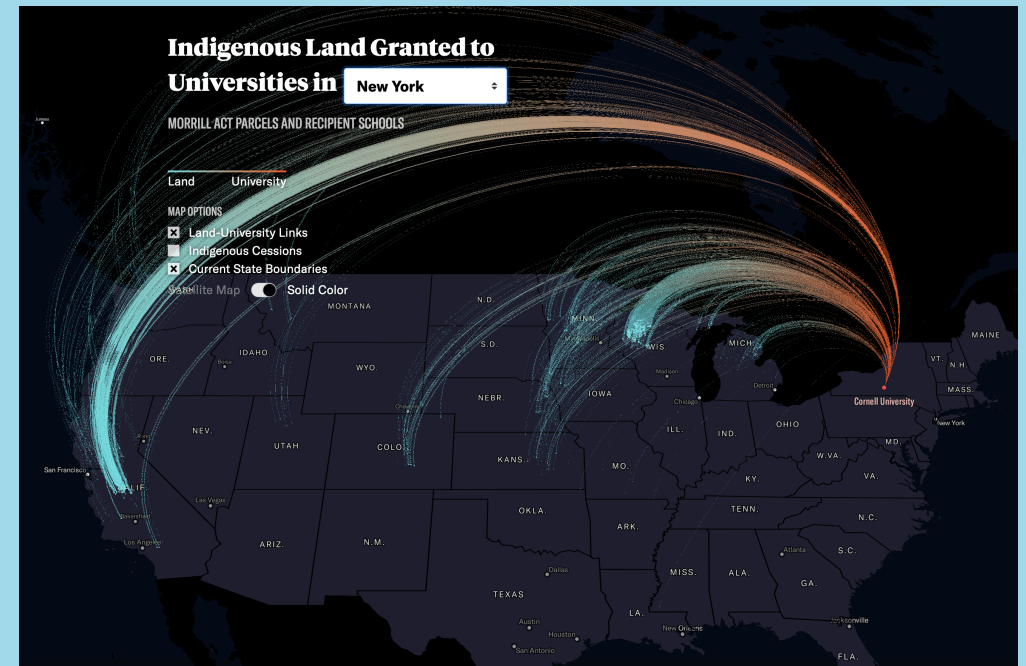
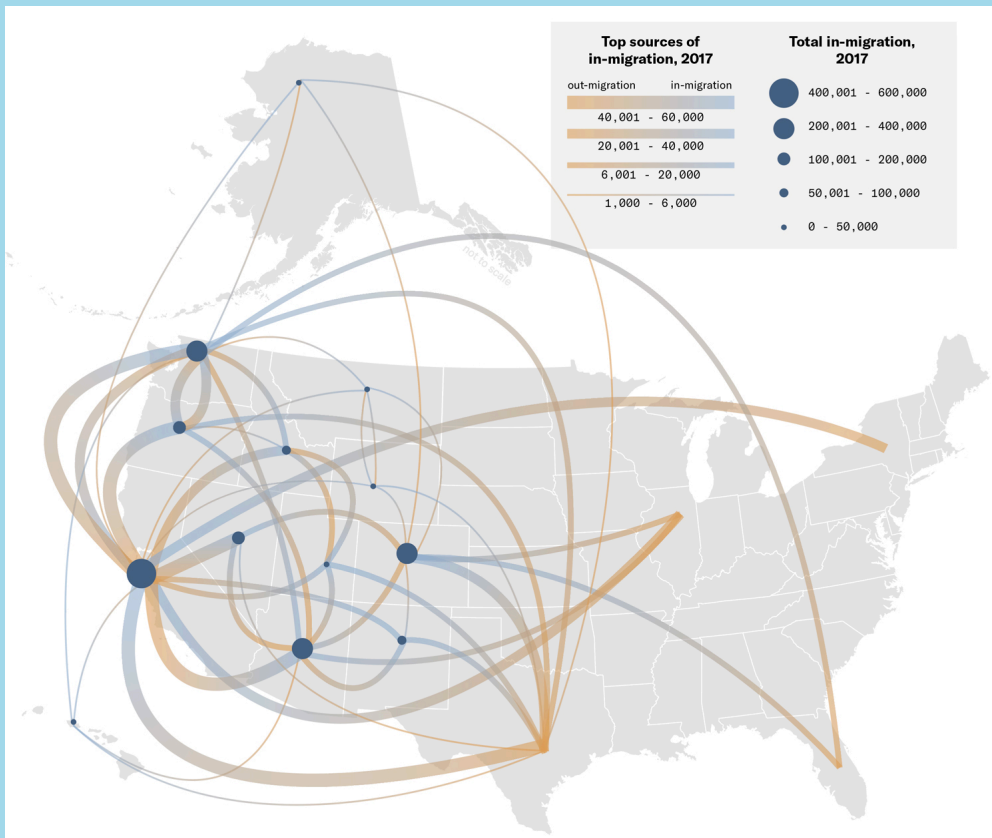
Names

- T932u
- T342g
- T246a



Movement

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

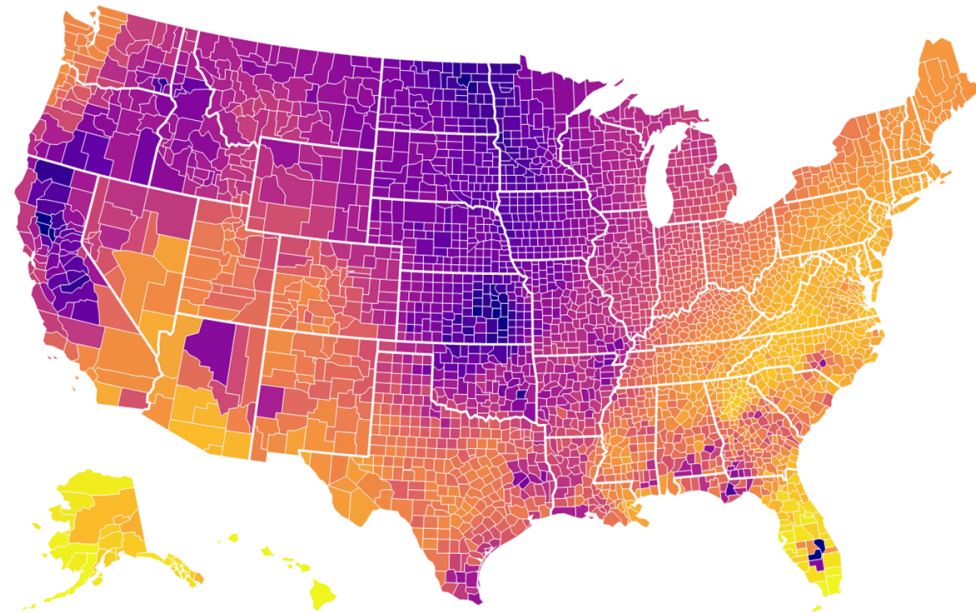


Human-Environment Interactions

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

Wildfire smoke exposure across U.S. counties, 2016-2020

Average days per year by county



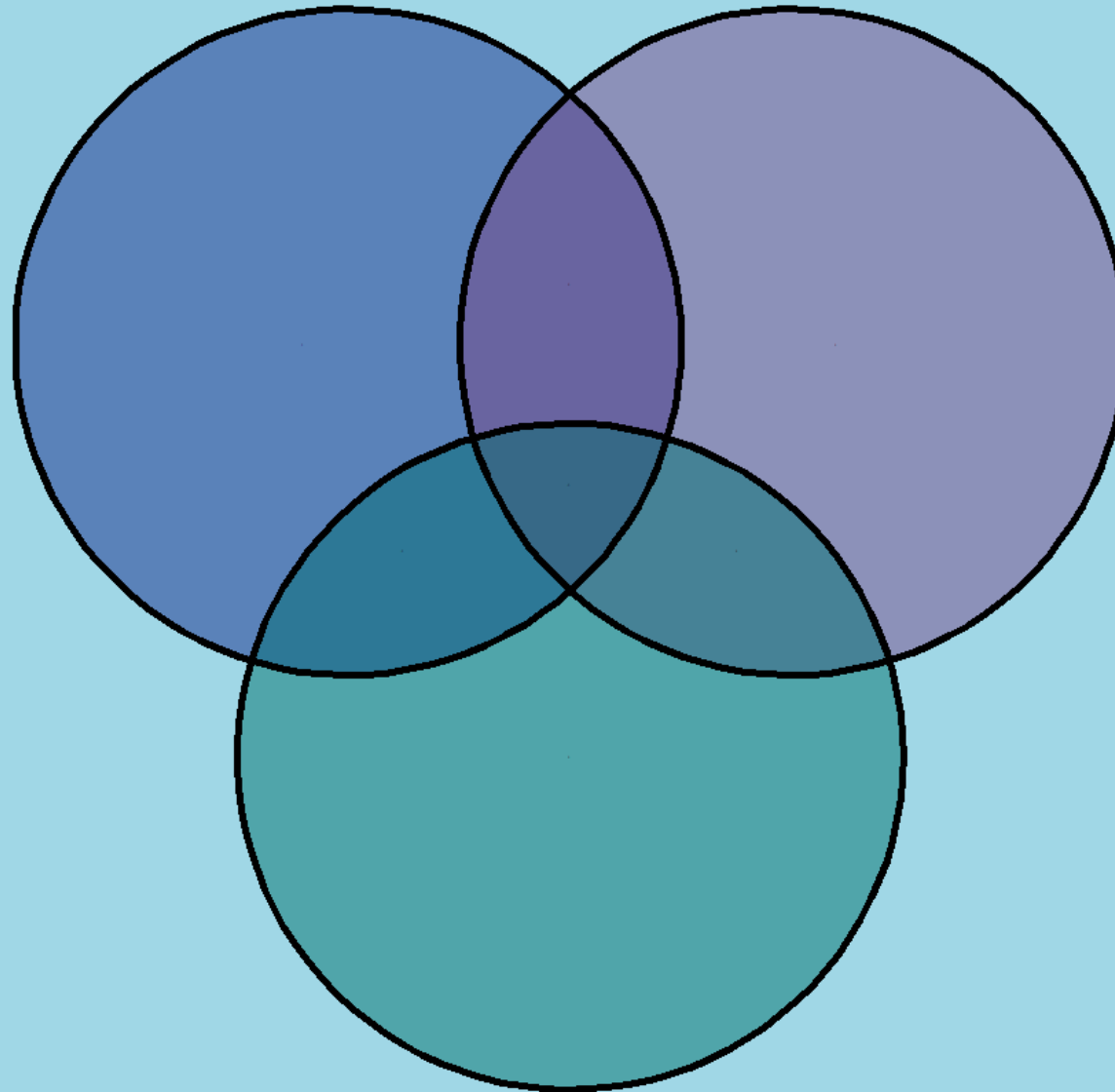
Map: Alison Saldanha • Source: Analysis of National Oceanic and Atmospheric Administration satellite imagery by NPR's California Newsroom and Stanford University's Environmental Change and Human Outcomes Lab • Created with Datawrapper



Towards *quantitative* spatial analysis

Description

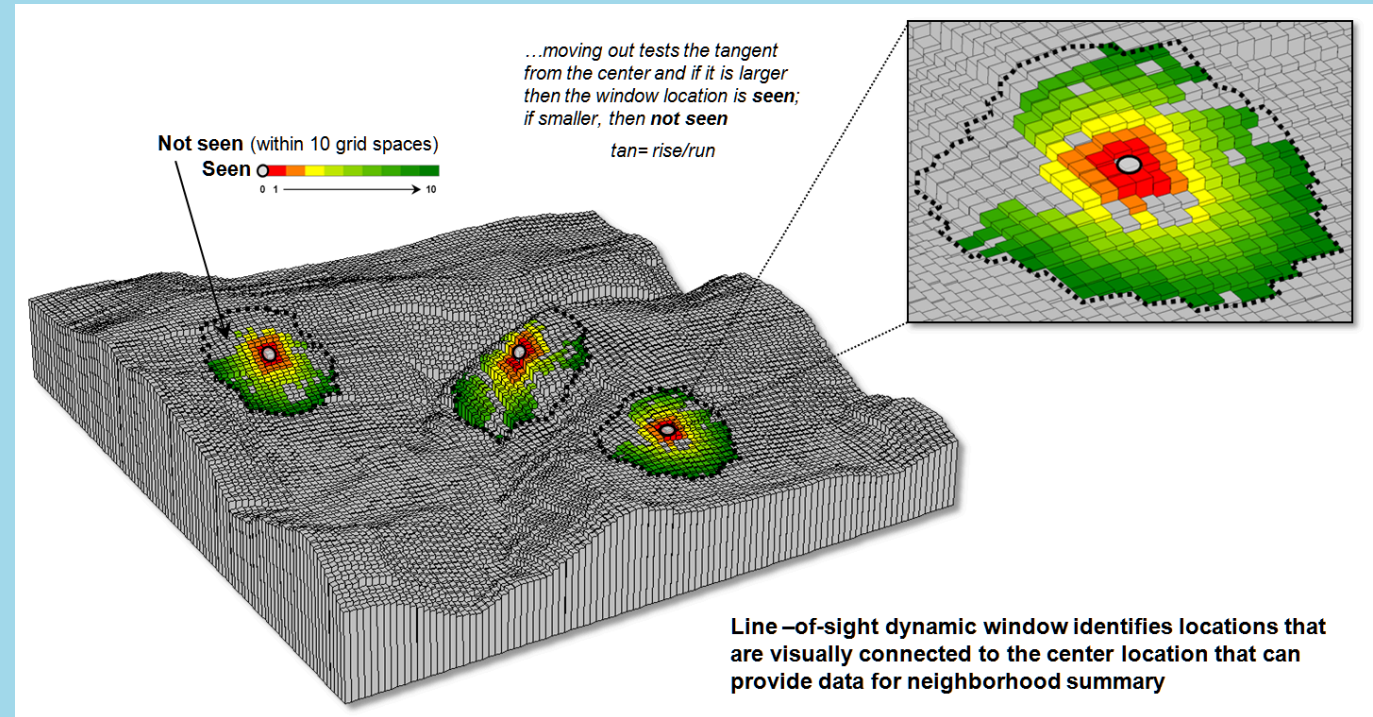
Explanation



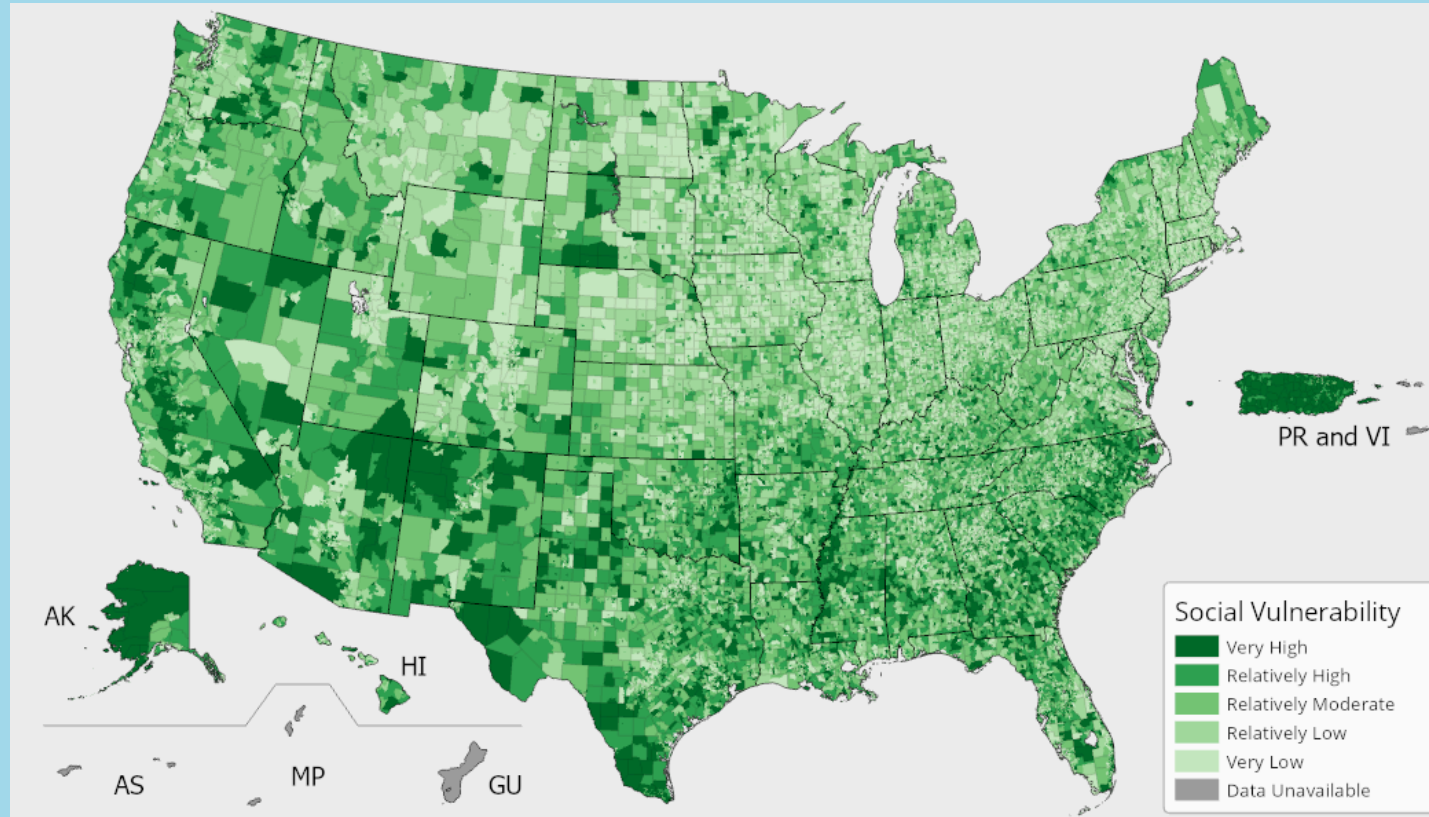
Prediction

Description

- Coordinates
- Distances
- Neighbors
- Summary statistics



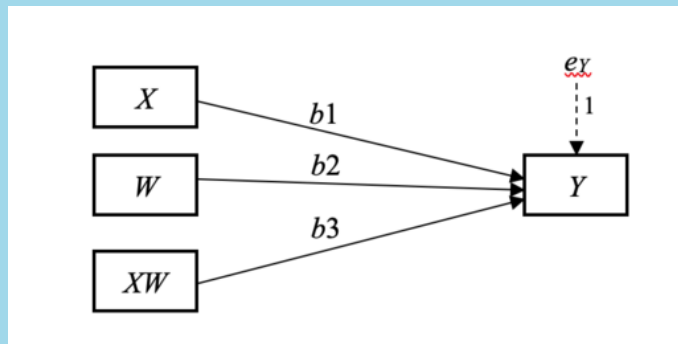
Description



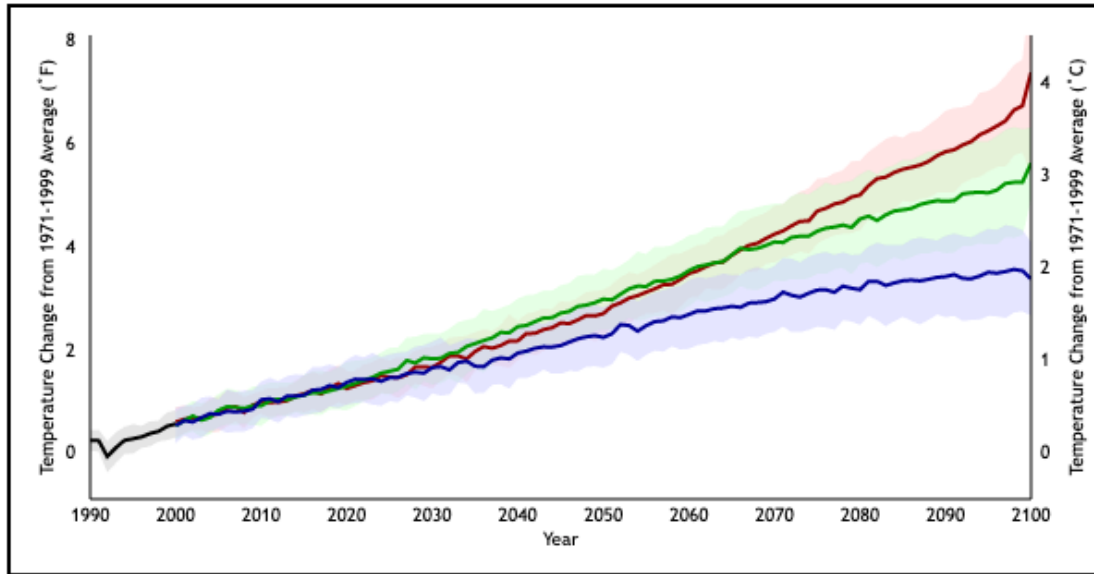
- Range Maps
- Hotspots
- Indices

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



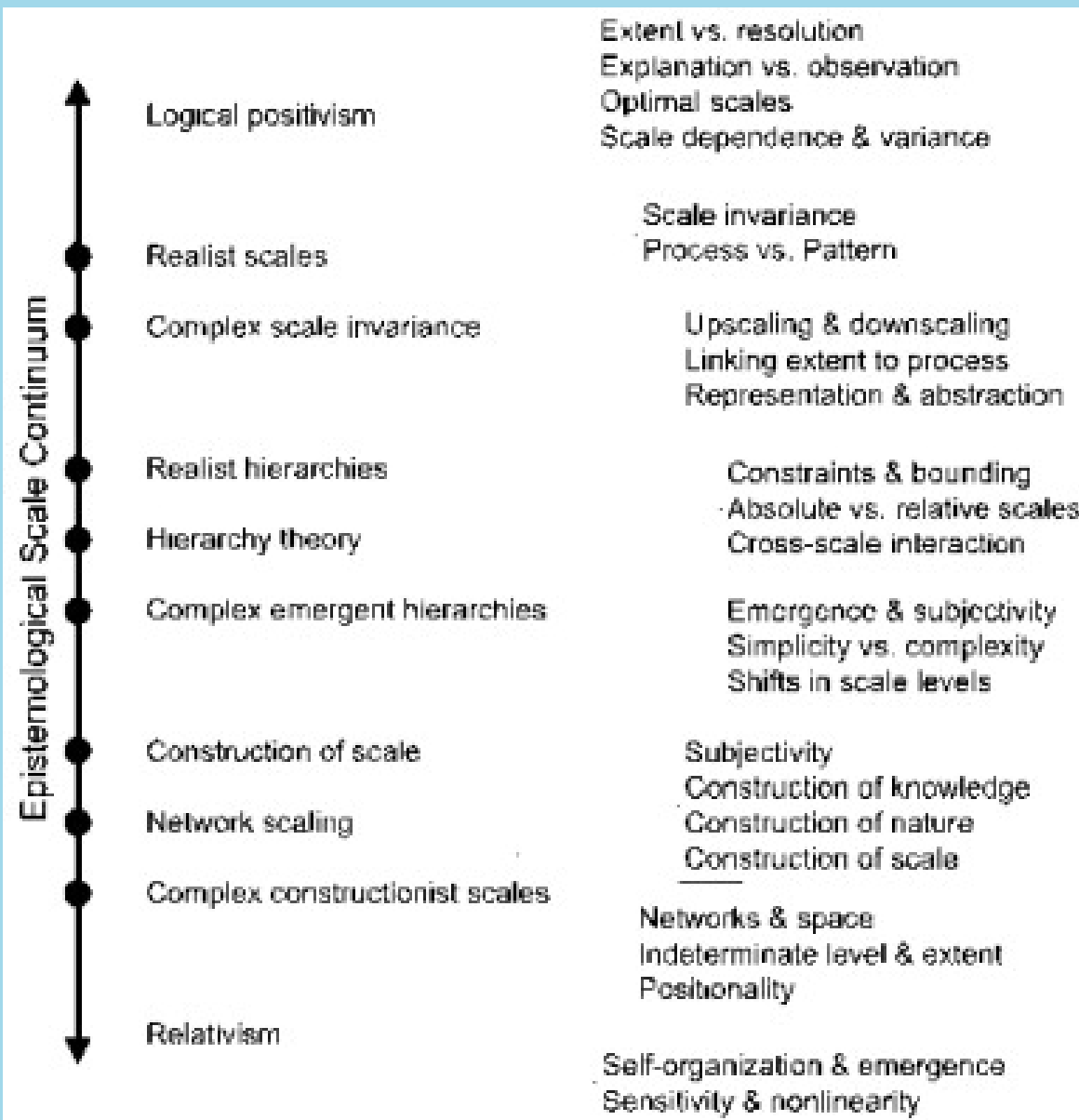
- Extend description or explanation into unmeasured space
- Stationarity: the rules governing a process do not *drift* over space-time



Conceptual challenges

Scale

What do we even mean?

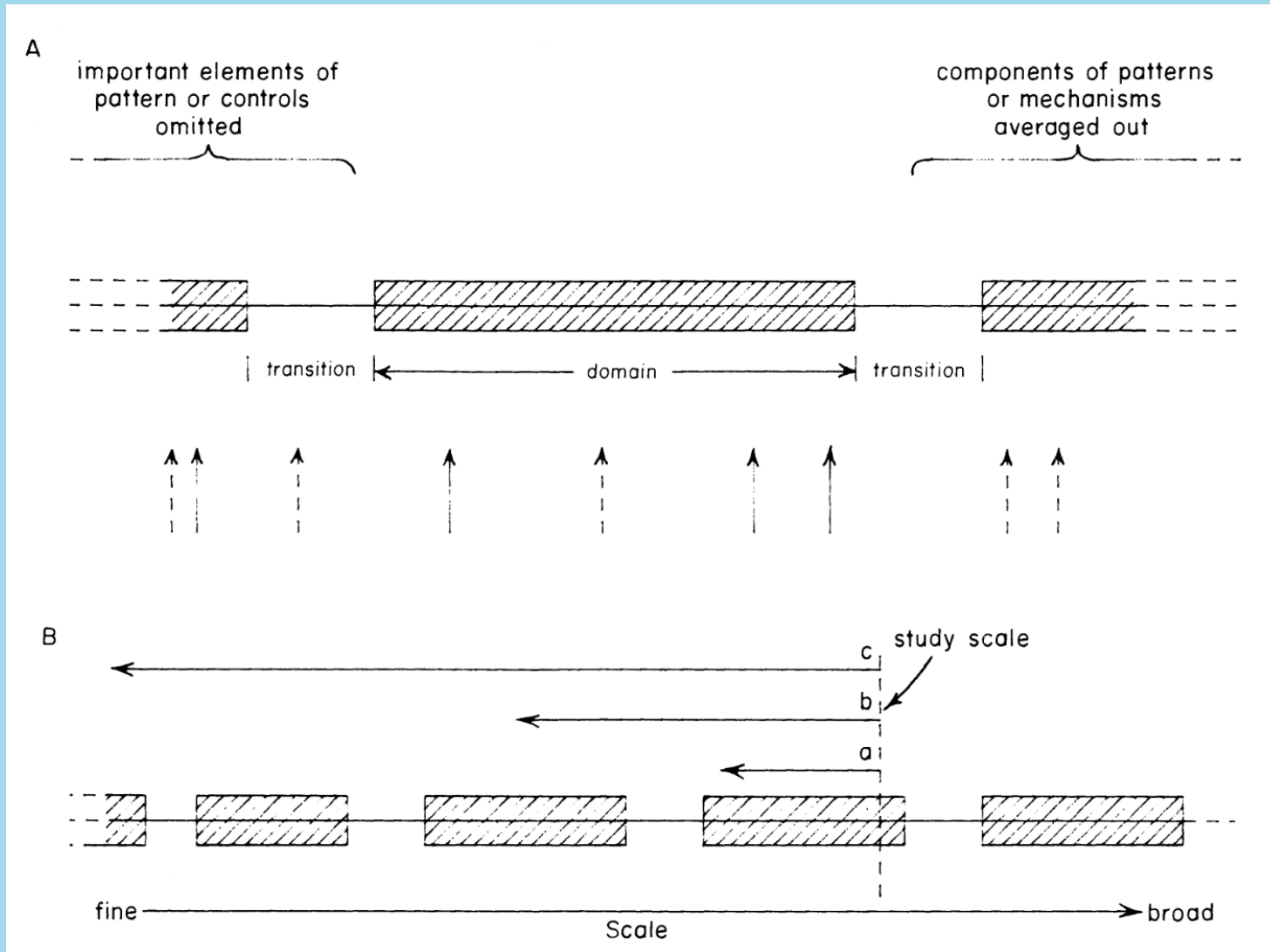


- **Grain:** the smallest unit of measurement
- **Extent:** the areal coverage of the measurement

From Manson 2008

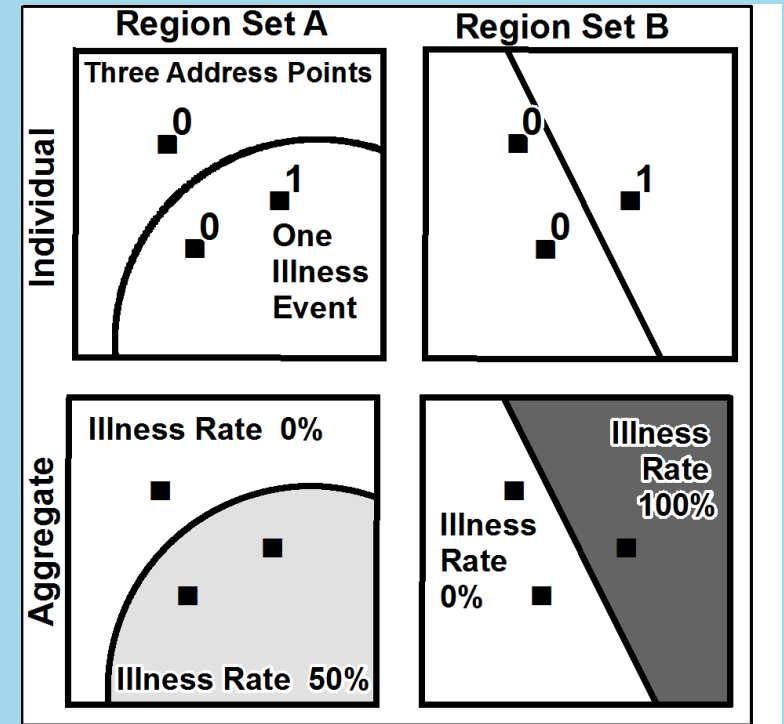
Scale

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

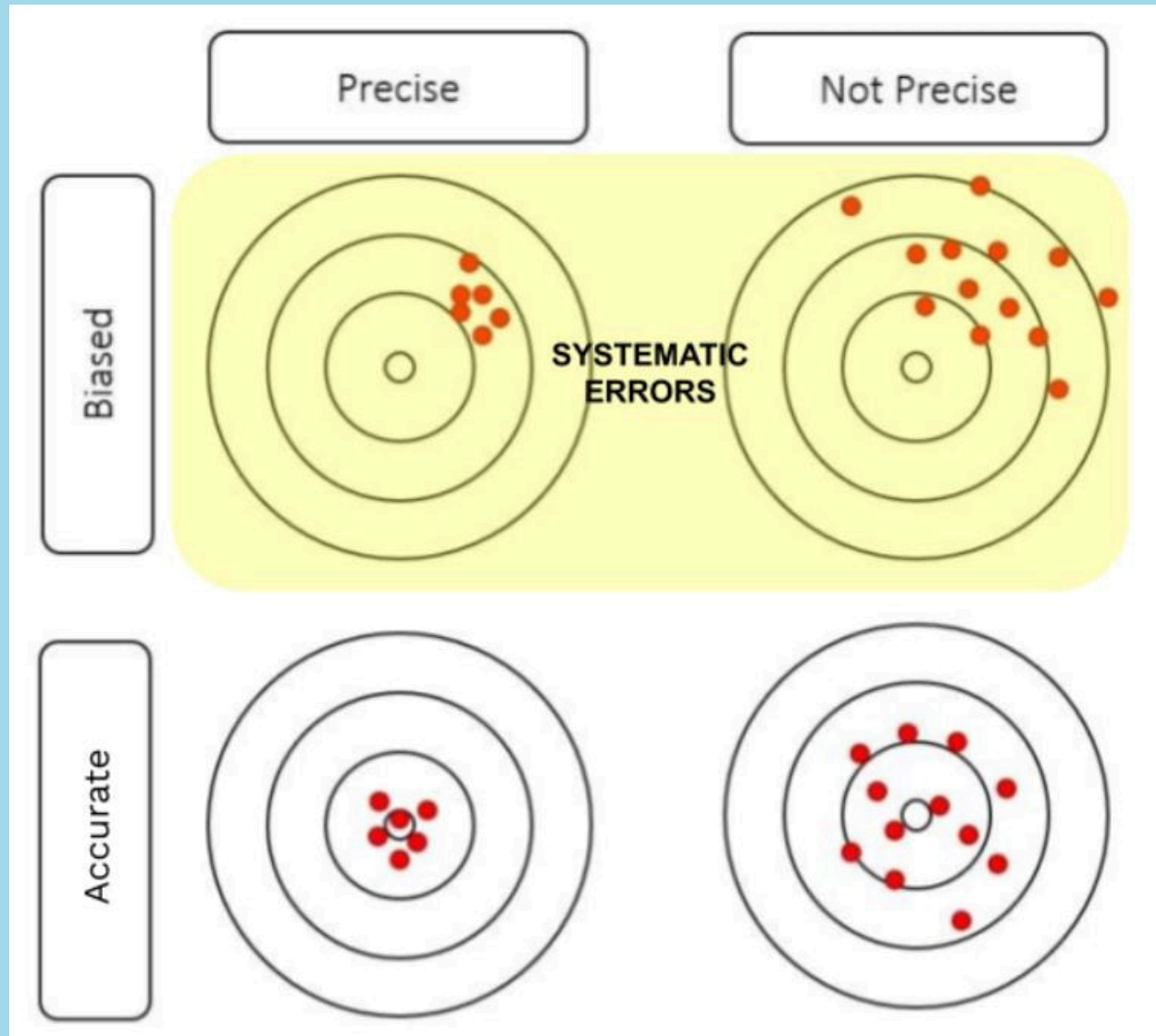


Fallacies

- **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

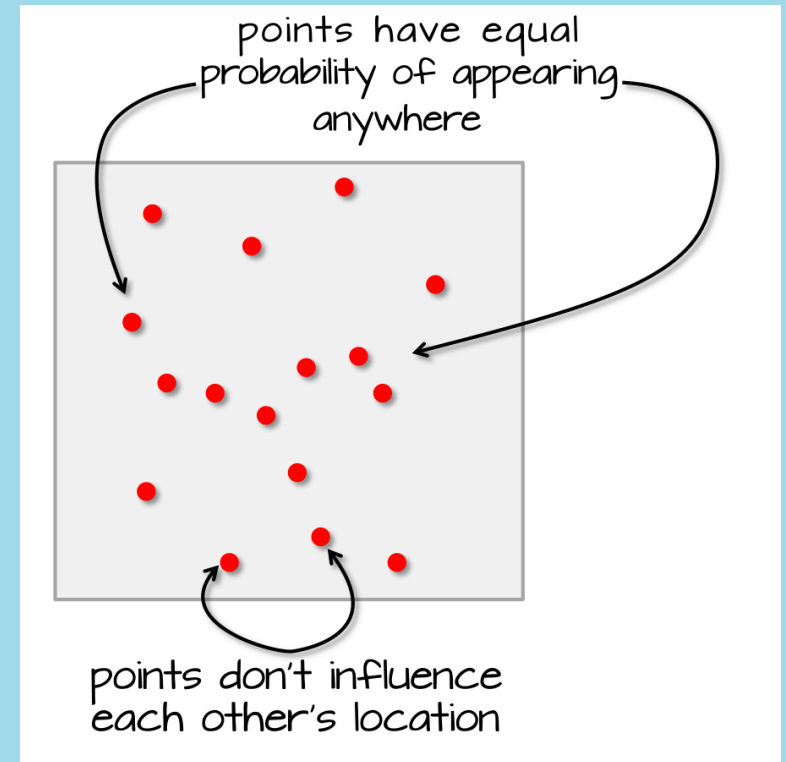


From Manuel Gimond

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