

# More on Temporal Animation

GEOG 5201 – Spring 2022

# Outline

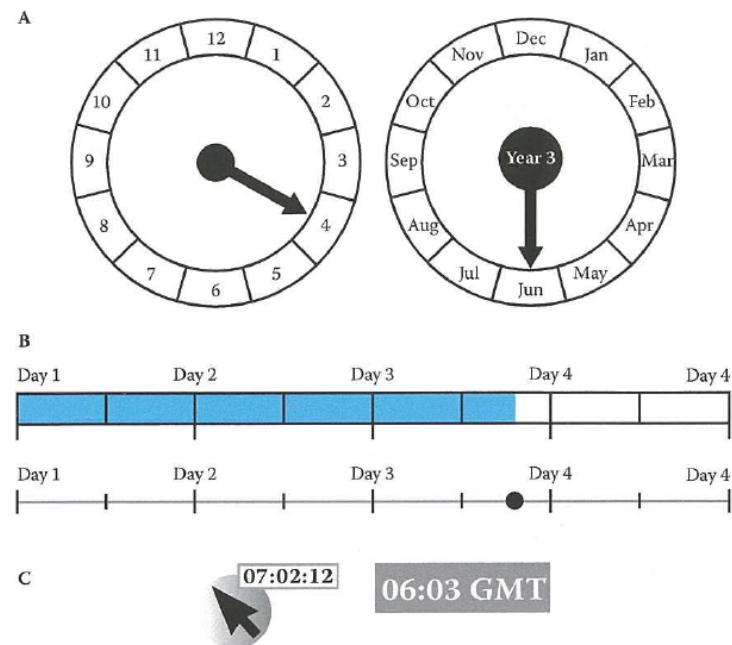
- Temporal scale
- Alternatives to temporal animations
- Effectiveness

# Recall Temporal Animations

- Animations emphasizing change over time
  - Change in position
  - Change in attribute
  - Change in shape and size

# Temporal Scale

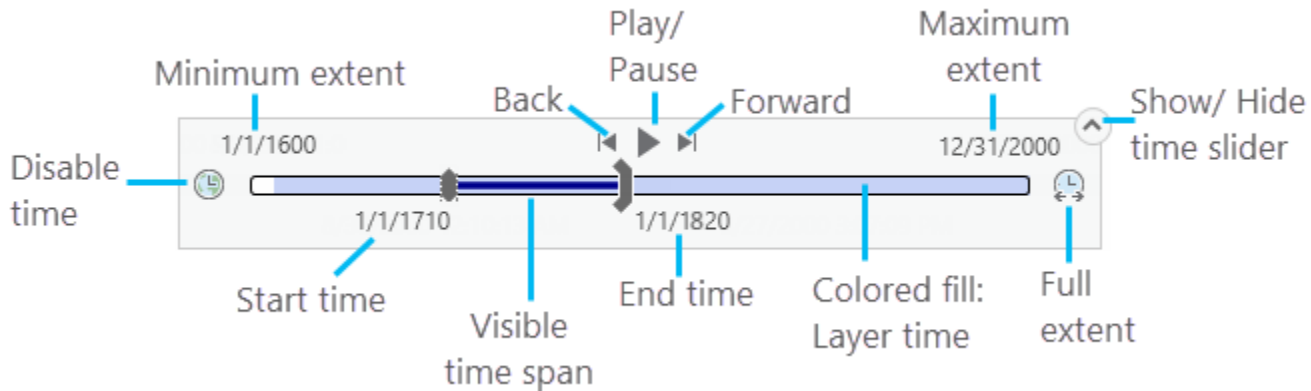
- Just as static maps have a spatial scale, temporal animated maps have a **temporal scale**
  - The ratio between real-world time and movie time
  - The passage of time or the temporal scale is typically visualized along side the map animation through a **temporal legend**
- Three types of temporal legend
  - Cyclical
  - Bar
  - Digital clock



# Question 5-2-1

The image below illustrates an ArcGIS Pro time slider that acts as a temporal legend for animated maps. Which type of temporal legend does it belong to?

- i. Cyclical
- ii. Bar
- iii. Digital clock



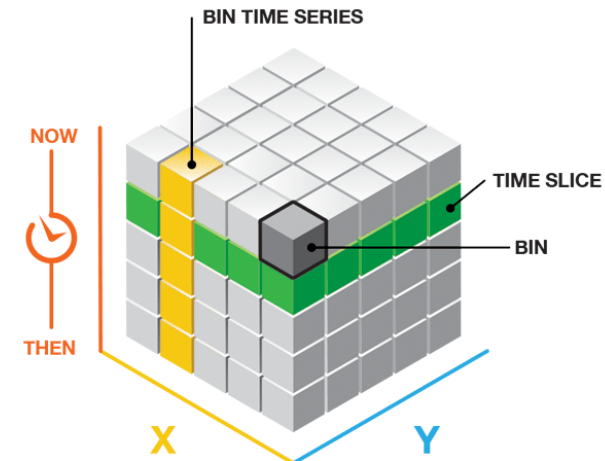
# Alternatives to Temporal Animations

- **Using 3-D space to display temporal data**
  - $x$  and  $y$  are reserved for space, and  $z$  is reserved for time
  - Why?
    - The bulk of the animations show spatial changes over time by varying images in two-dimensional space
    - A potential disadvantage of this is that at any instant, we can only see one point in time
    - With 3D visualizations, we can see not only spatial patterns for individual moments in time, but also changes over time



# Alternatives to Temporal Animations

- **Using 3-D space to display temporal data**
  - Emphasize change in attribute
    - [How Create Space Time Cube works](#) in ArcGIS Pro



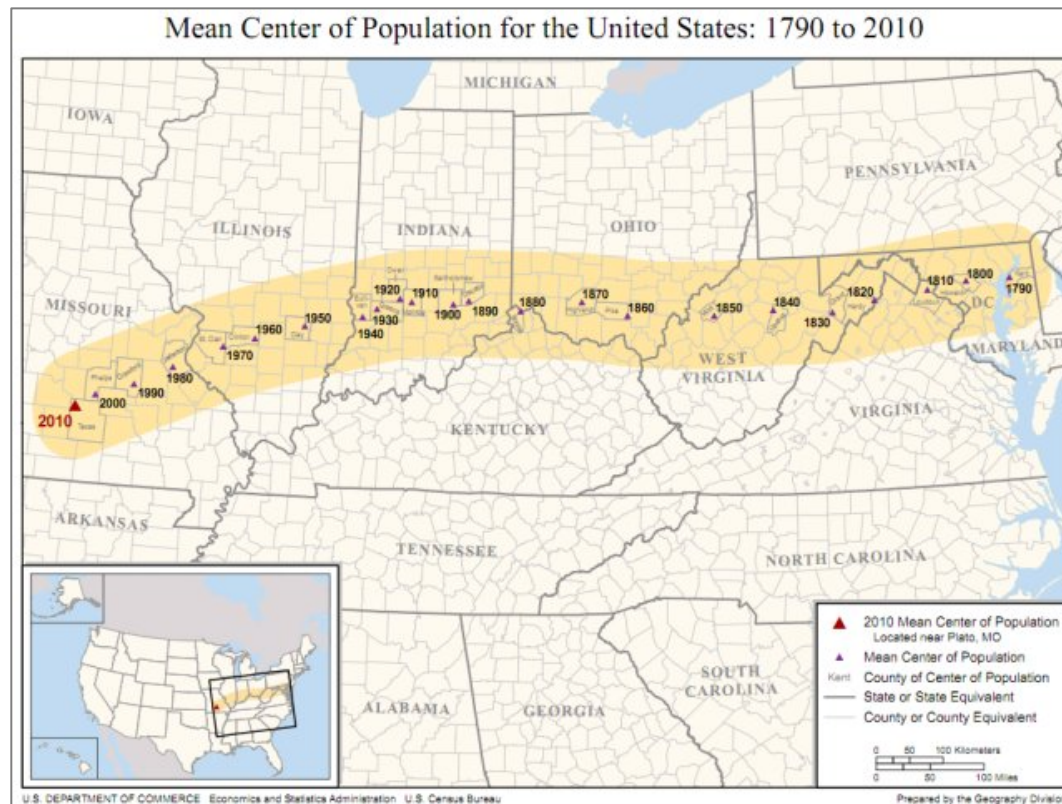


## Question 5-2-2

Reflect on our discussion about 3D visualization. What are the advantages and disadvantages of using 3D space to display temporal data versus temporal animations?

# Alternatives to Temporal Animations

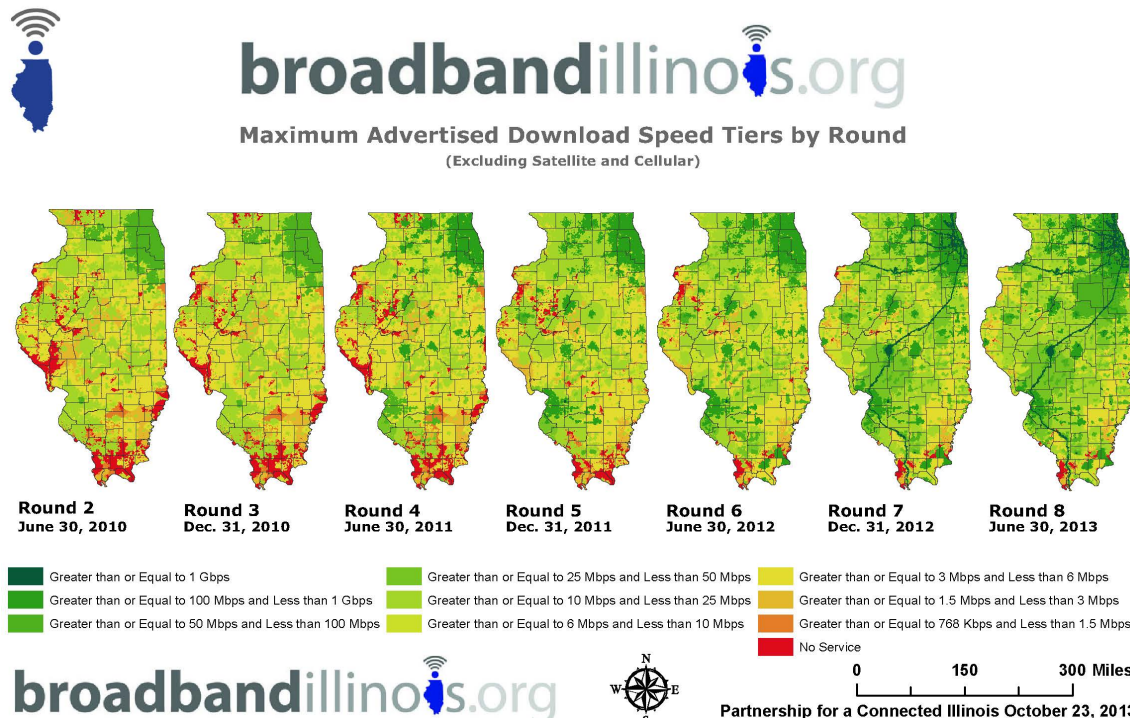
- **Using static maps to visualize change-over-time**
  - **One map** with multiple representations of a feature at different moments in time



# Alternatives to Temporal Animations

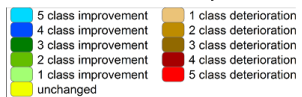
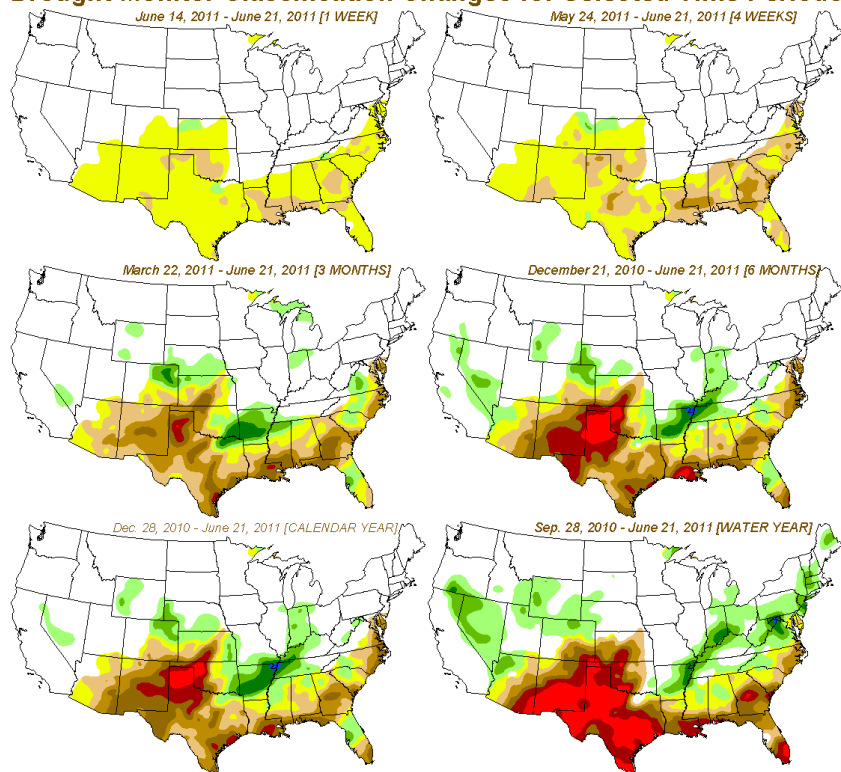
- **Using static maps to visualize change-over-time**

- Small multiples: **multiple maps** with a single representation of a feature at one moment in time

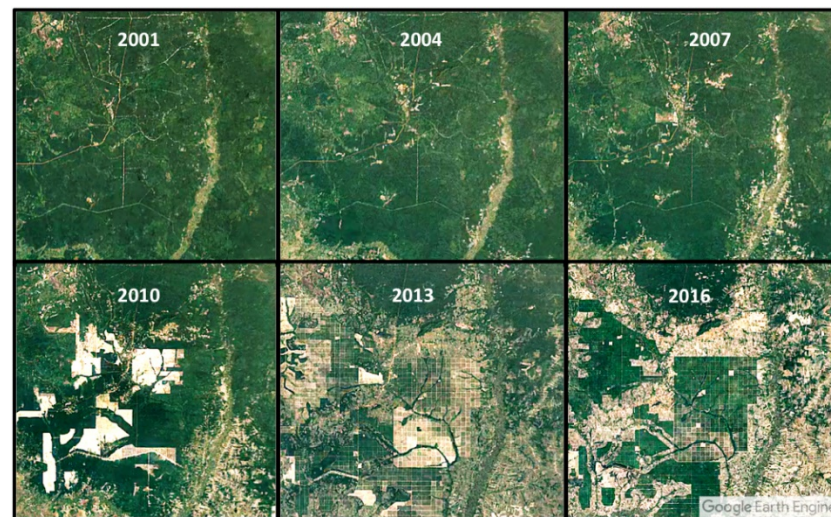


DISCLAIMER: This map is meant to be used for preliminary review purposes only. The information depicted on this map is based on a limited amount of available data, and thus there are inherent inaccuracies. As more complete data is collected, the map will be updated and will contain more accurate information. This map should not be used to make any decisions regarding the served, underserved, and not served areas. The NTIA definition of Broadband is greater than or equal to 768kbps at this time. (c) 2012 The Partnership for a Connected Illinois and/or the State of Illinois

## Drought Monitor Classification Changes for Selected Time Periods



These maps depict approximate changes in drought intensity from selected initial times to the current week, with no consideration given to intervening weeks. The difference calculations are based on interpolated 4 km grids of Drought Monitor classifications, and as a result, will be smoother than would similar products based directly on the published versions of the Drought Monitor.

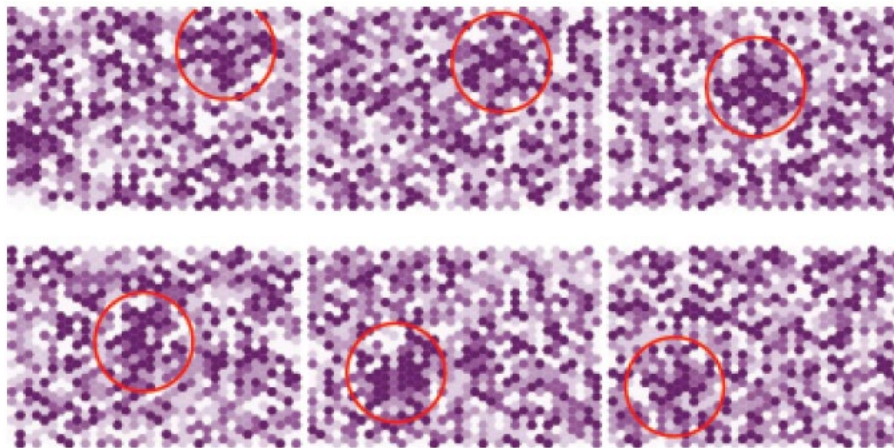


# Alternatives to Temporal Animations

- Are animated maps better than small multiples? Mixed results.

Griffin, A. L., MacEachren, A. M., Hardisty, F., Steiner, E., & Li, B. (2006). A comparison of animated maps with static small-multiple maps for visually identifying space-time clusters. *Annals of the Association of American Geographers*, 96(4), 740-753.

- Animated maps did enable users to more often correctly identify whether a particular type of pattern was present than do the static small-multiple representation
- An interesting finding of their study was that for animated spacetime clusters, males were significantly more likely to find patterns than were females

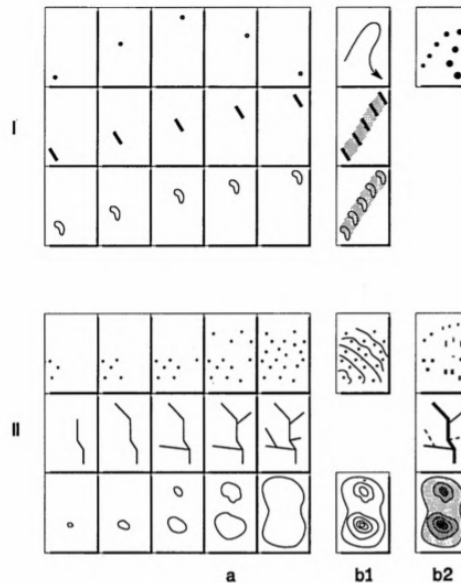


# Alternatives to Temporal Animations

- Are animated maps better than small multiples? Mixed results.

Koussoulakou, A., & Kraak, M. J. (1992). Spatia-temporal maps and cartographic communication. *The Cartographic Journal*, 29(2), 101-108.

- Although the percentage of correct answers did not differ, animated maps were processed significantly faster than static maps when depicted as a small multiple
- Users might have done even better if they could have interacted with the animated maps



# Alternatives to Temporal Animations

- Are animated maps better than small multiples? Mixed results.

Cutler, M. E. (1998). *The effects of prior knowledge on children's abilities to read static and animated maps* (Doctoral dissertation, University of South Carolina).

- The animated version of a shaded isarithmic map resulted in a significantly lower percentage of correct answers and a slightly slower processing time than the small multiple
- The strongest indicators of comprehension were not the type of map viewed, but the subjects' reading levels and their prior knowledge

# Effectiveness of Animations

- A function of numerous factors
  - The type of symbology used
    - Depicting temporal change on a proportional symbol map seems easier than depicting temporal change on a choropleth map
  - How the animation is viewed
    - A “movie” in which the user has no control is obviously quite different from an animation in which the user can move forward, backward, and jump to different frames
  - Whether the user has expertise in the domain being mapped
    - Animated maps created using Deep Thunder seem complex to us, but they might not be to the trained meteorologist
  - Experience with animation
    - Does one who uses animation on a regular basis become more adept at using it?



## Question 5-2-3

Combining the factors related to animation effectiveness with the tips introduced in lecture 5.1, what is your thought on how to make successful animations?