

2020 Census Urban Areas: Considerations, Delineations, and Trends



Urban Areas Team
Geography Division
U.S. Census Bureau

What are Census UAs?

- Census Bureau UAs:
 - Represent densely developed territory.
 - Encompass residential, commercial, and other non-residential urban land uses.



Why does the Census Bureau delineate UAs?



The Census Bureau delineates UAs for statistical data tabulation, publication, and analysis.

However, the Census Bureau recognizes that many tribal, federal, state, and local governments define their program requirements based on the urban and rural delineation.

For this reason, the Census Bureau:

- Invites all stakeholders to actively participate in reviewing and commenting on proposed updates to the UA criteria via the *Federal Register* Notice leading up to the Decennial Census.
- Invites all stakeholders to ask questions. The Census Bureau works with tribal, federal, state, and local agencies as well as other stakeholders to ensure understanding of our classification.

2020 Census UA Delineation Key Criteria Changes

1. Minimum threshold for qualification as urban raised from at least 2,500 people in 2010 to [at least 2,000 housing units](#) or [at least 5,000 people](#) in 2020.
2. Delineation based primarily on [housing unit data](#) at only the census block level instead of only population data at various geographic levels.
3. Maximum jump distance reduced from 2.5 miles to [1.5 miles](#).
4. Introduced the use of [commuter data](#) to determine where to split large urban agglomerations.
5. No longer distinguish “[urban areas](#)” as “urbanized areas” or “urban clusters”.



2020 Census UA Products

Urban and Rural Classification website:

Urban and Rural (census.gov)

TIGER/Line Shapefiles:

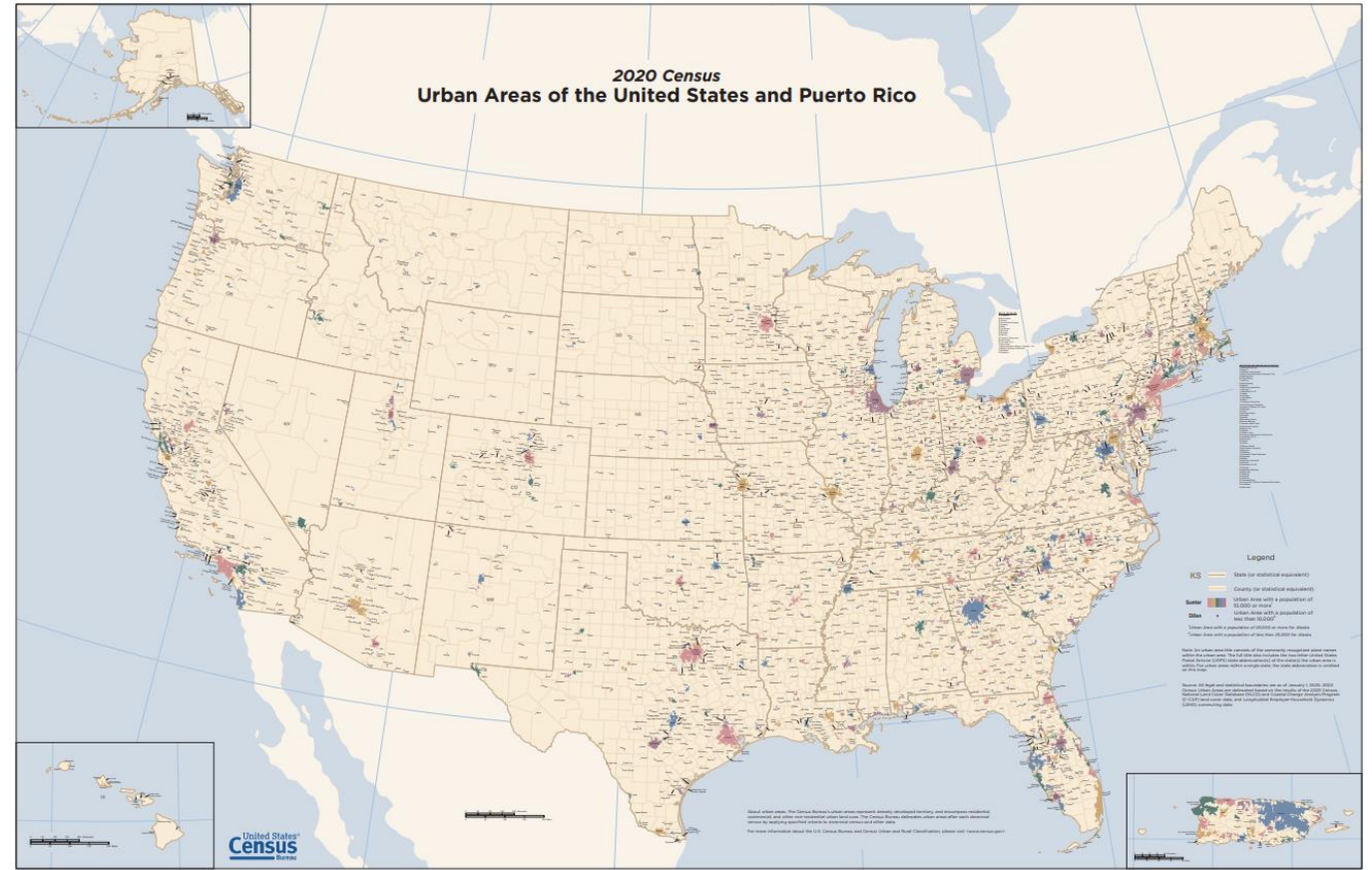
TIGER/Line Shapefiles (census.gov)

TIGERweb:

TIGERweb (census.gov)

Census Geocoder:

Census Geocoder



Beyond 2020: Investigating Urban-Rural Continuum

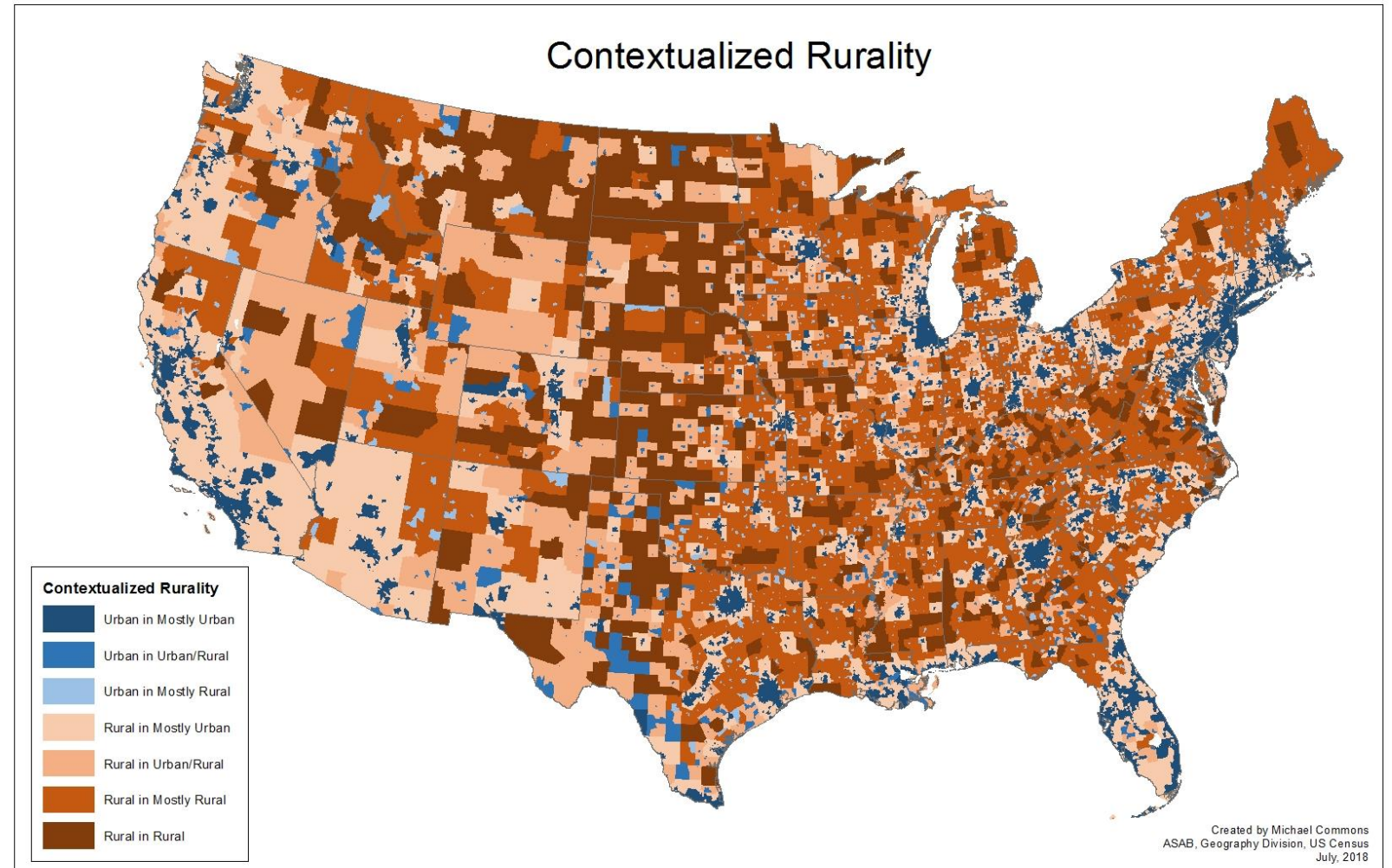
Urban/Rural or Settlement Intensity?

- Changes in settlement patterns on the periphery of urban areas have raised questions about the appropriateness of the urban-rural dichotomy, the need for a continuum of categories, and different levels of rurality.
- What do we mean by terms like “urban,” “suburban,” “exurban,” and “rural?”
- When measuring, analyzing, and reporting on human interactions and impacts on the environment, does it matter whether population is urban, suburban, or rural?
- Should we focus instead on measures of population size, density, settlement intensity, and proximity to/isolation from other settlements?

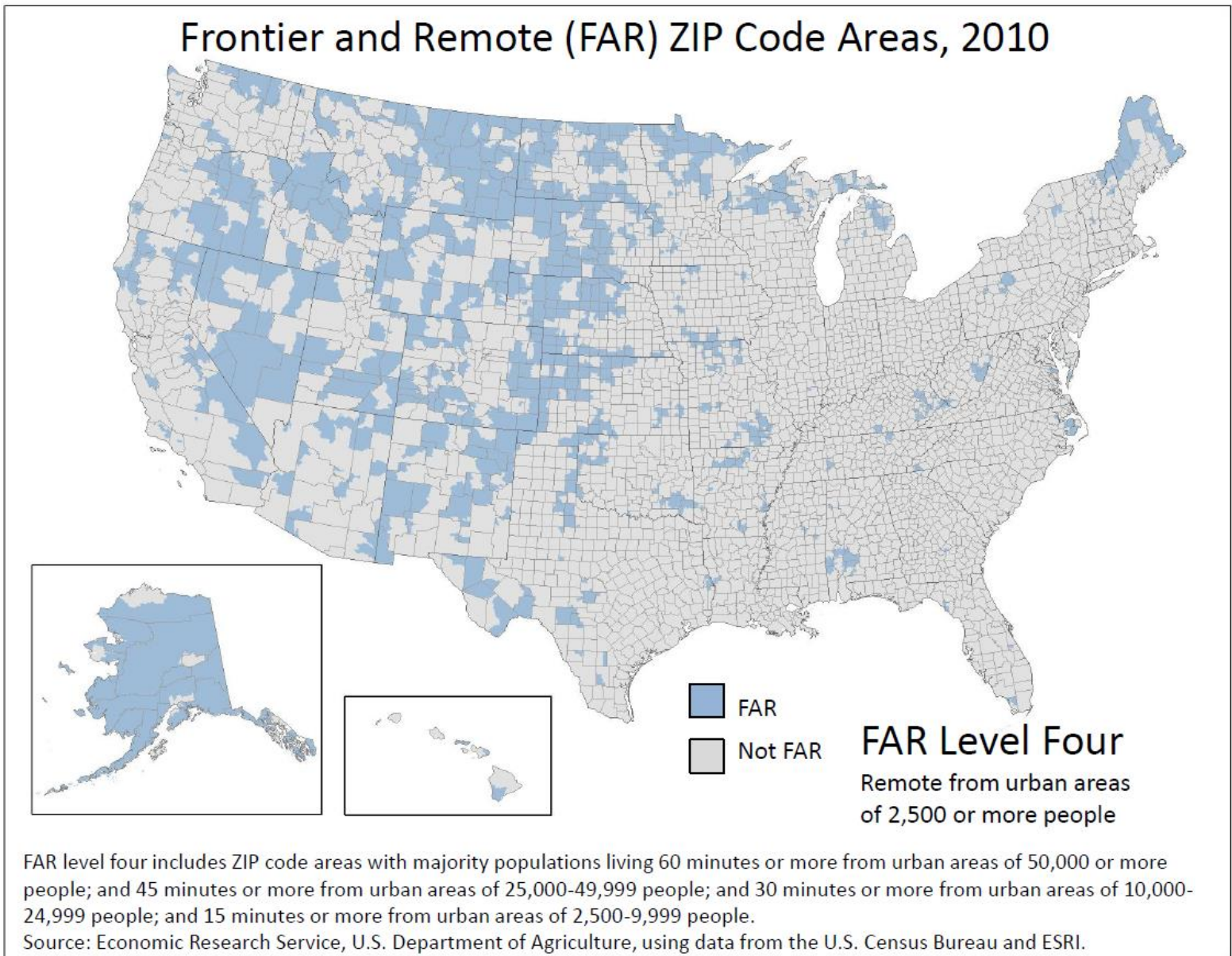
Considering New Approaches to Defining Urban and Rural Areas

Contextualized Rurality

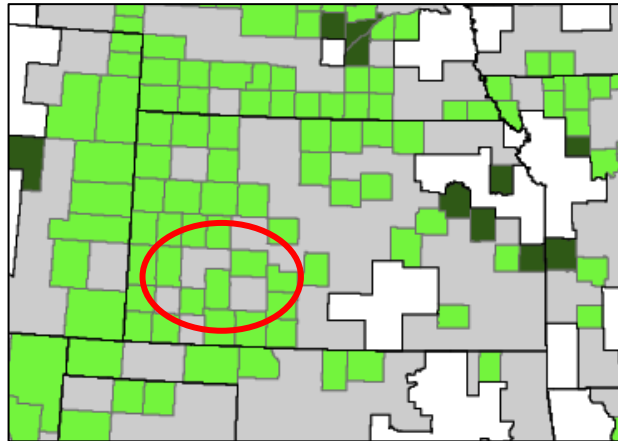
- Incorporates the Tract-Level Urban/Rural classification into the Proportional Rurality classification
 - Examples:
 - Rural Tracts within Mostly Rural Counties
 - Rural Tracts within Mostly Urban Counties
 - Urban Tracts within Mostly Rural Counties



Frontier and Remote Areas Measuring Distance and Isolation



Urban-Rural Economic Interdependencies: Southwestern Kansas



Farming dependent

Nonmetro

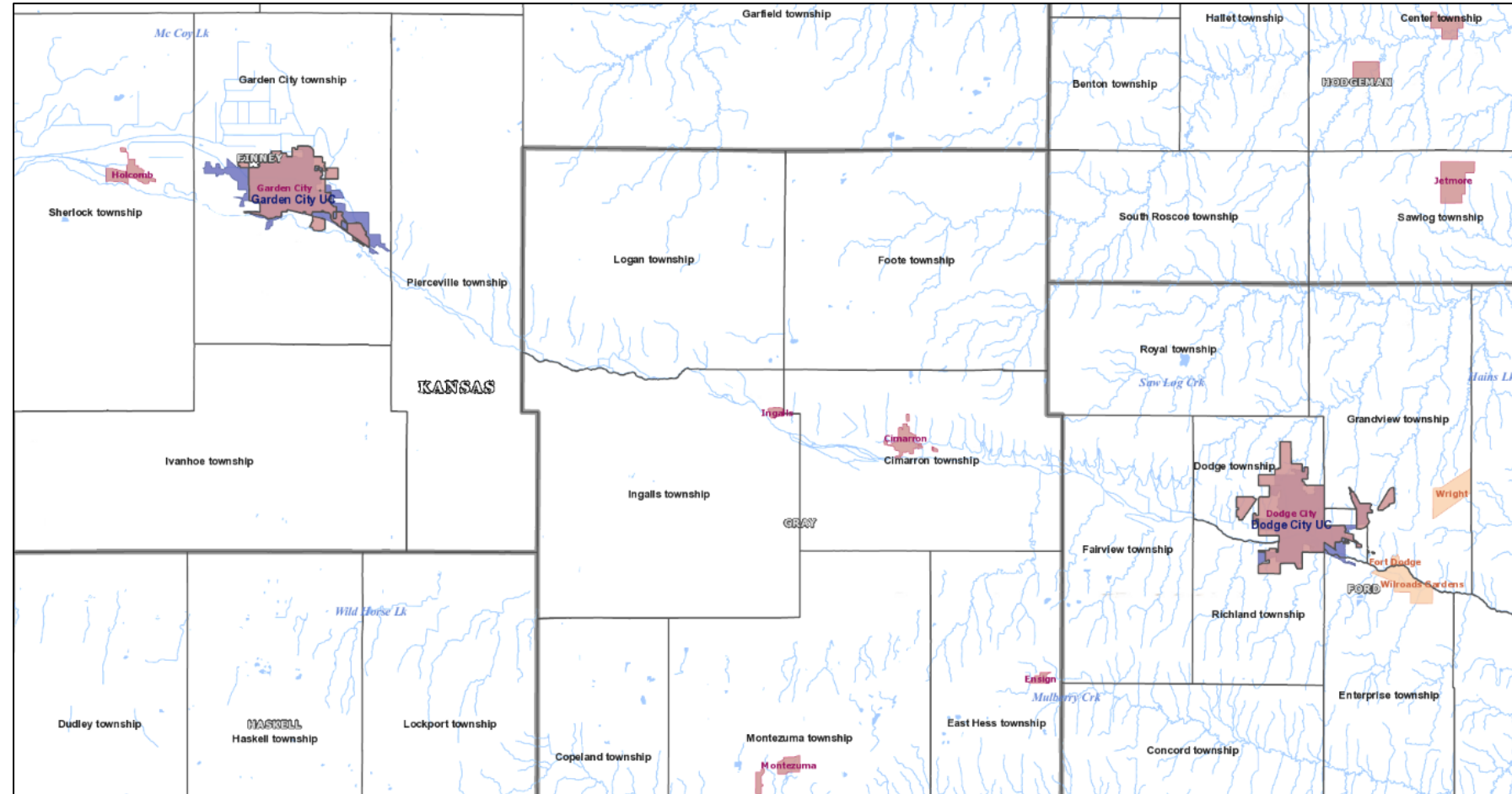
Metro

Other

Nonmetro

Metro

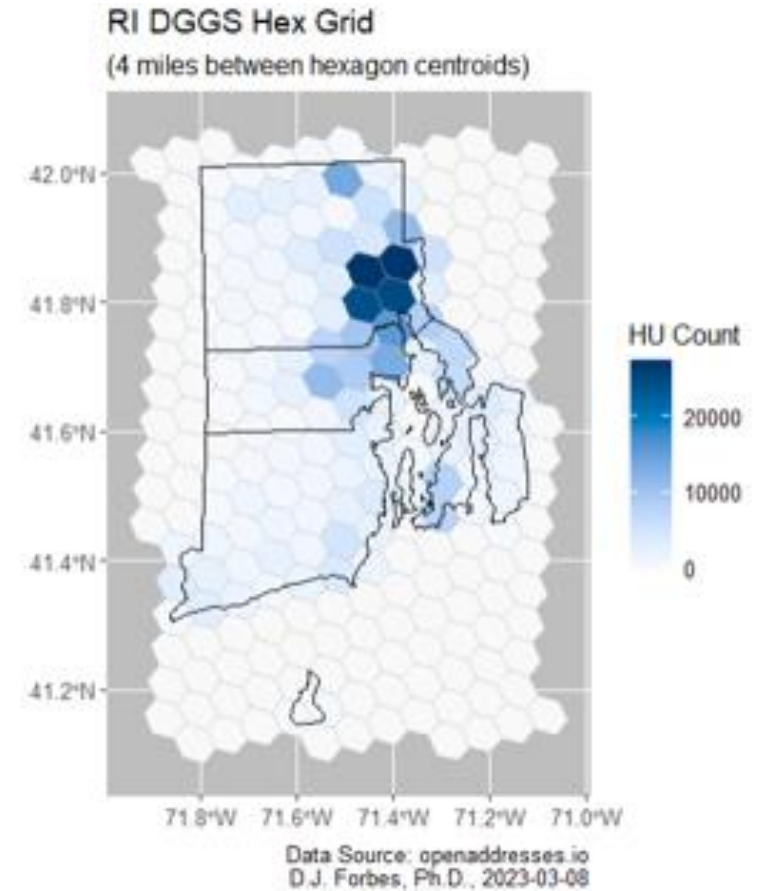
Source: Economic Research Service,
County Typology Codes, 2015



Source: US Census Bureau, TIGERWeb

Beyond 2020: Investigating Grids

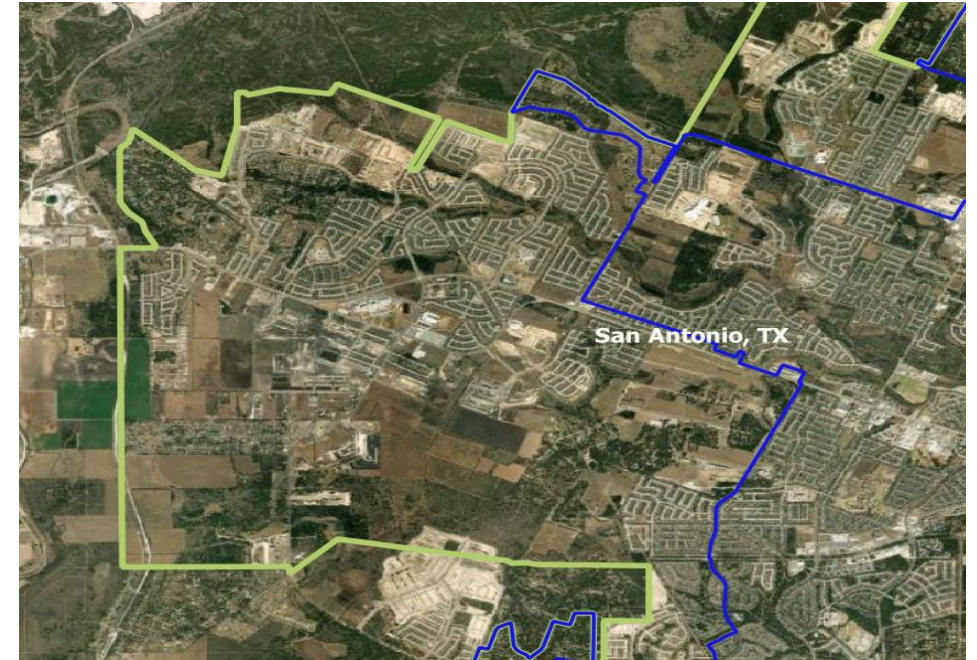
- Investigating UA delineation via grids:
 - Census blocks and other census geographies vary in size.
 - Possibility of a more uniform, close to equal geographic unit with less bias.





Beyond 2020: Additional Considerations

- Continuum and grid-based delineation in addition to “traditional” UA delineation?
 - Historical comparability.
 - Agency reliance on Census Bureau UAs for programmatic uses.
- Intercensal updates
 - Possibility post-2020 delineation since 2020 UAs are housing unit-based.
 - Options:
 - Additive update (most likely), e.g., “add urban” to the current delineation where development occurs.
 - Complete re-delineation.

Post-2010 development on the west side of the San Antonio, TX UA.



Legend:

-  2020 UA Boundary
-  2010 UA Boundary

Questions?

U.S. Census Bureau
Geography Division

<https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html>

2020 Census UA Team: geo.urban@census.gov

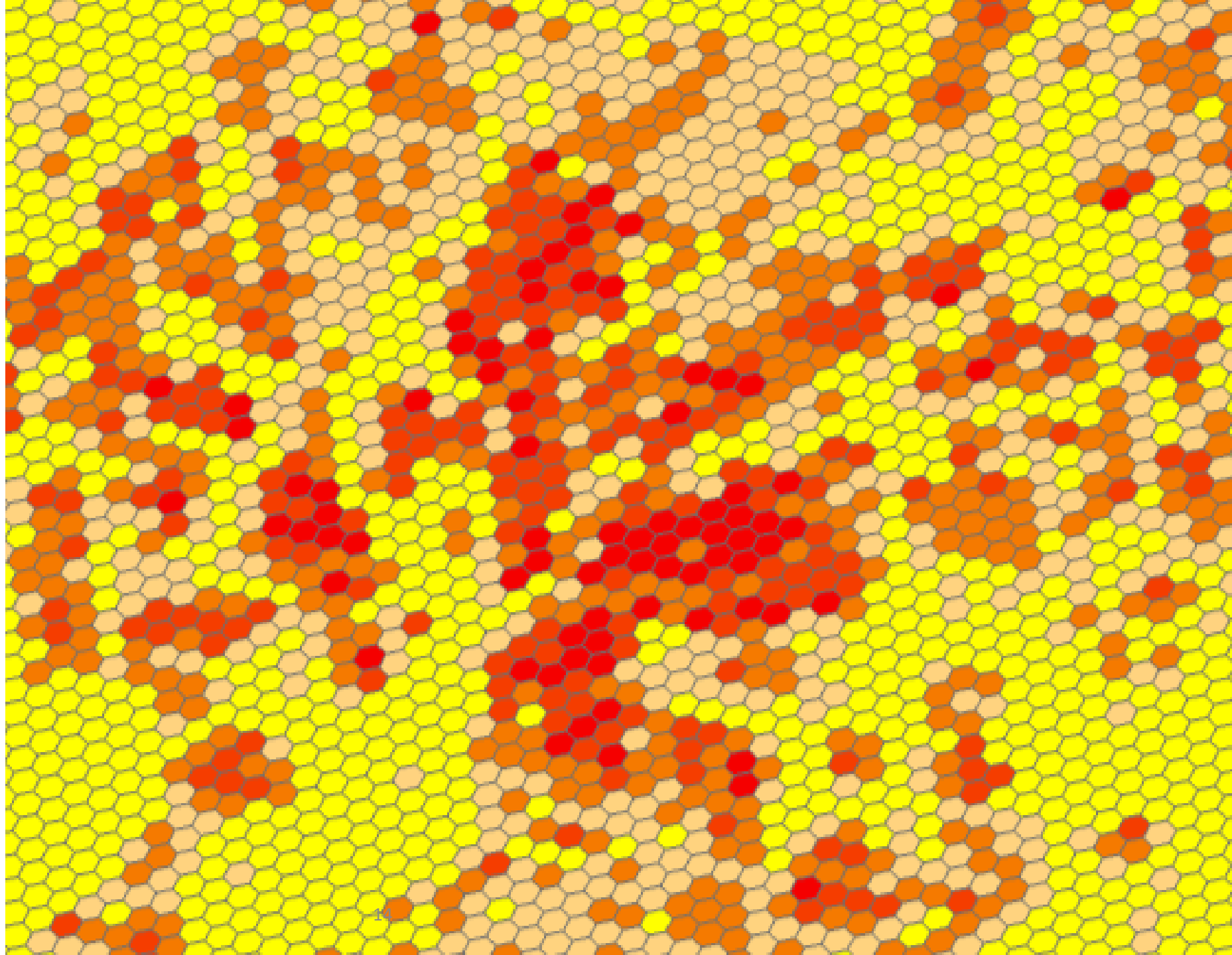
What are Grids?

A discussion on grids and gridded census data.

Annual State Data Center meeting July 26, 2023

Gridded Census Datasets

- Researching a new data product.
- Initial development stage.
- Gathering data user input.



Project Overview

Purpose:

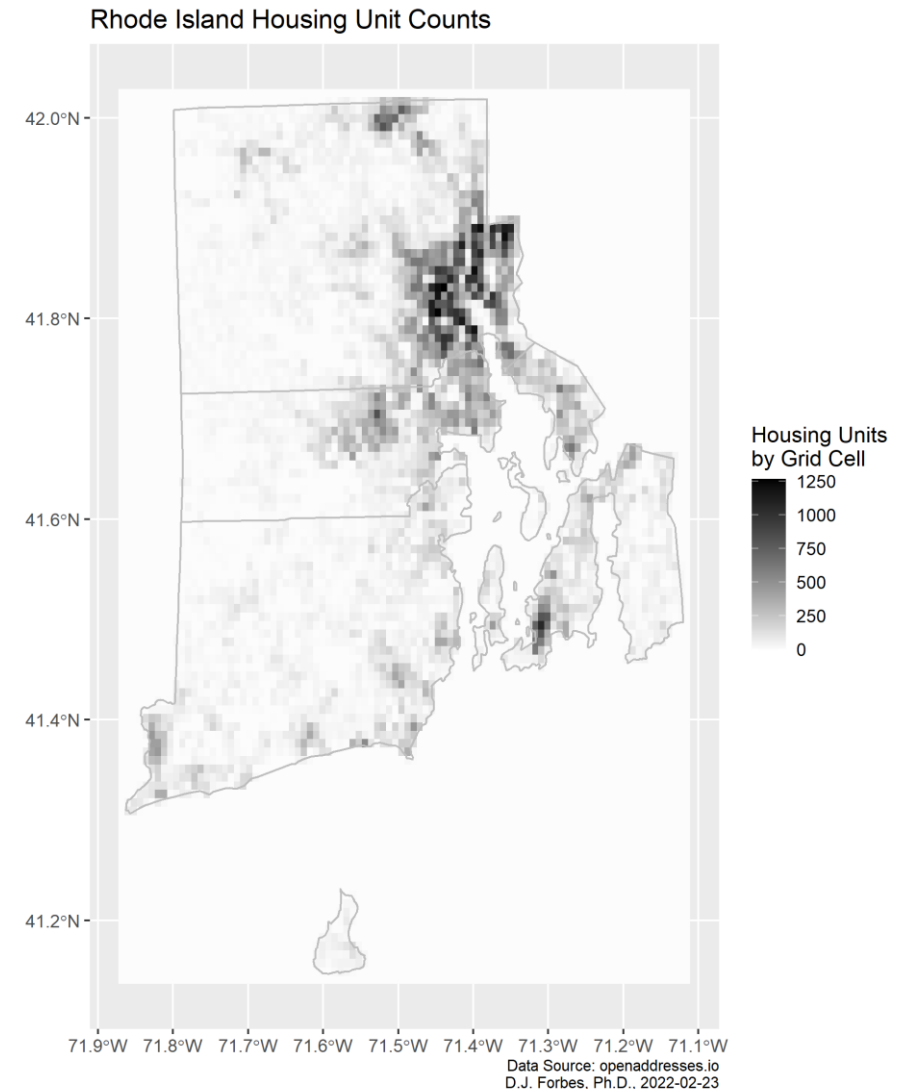
- Expand our available product portfolio to **meet changing demands**.
- More accessible, interoperable, and relevant data.
- Producing **new and innovative** Census data products.
- Fulfillment of mission needs and **meeting stakeholder requests**.
- **Creating quality products** to ensure we meet today's data demands.
- Providing tools to **support informed, timely decisions**.

Expectations:

- Gridded data products will be **in addition to** current administrative/statistical units.
- We will produce gridded data products as a **standard annual public delivery**.

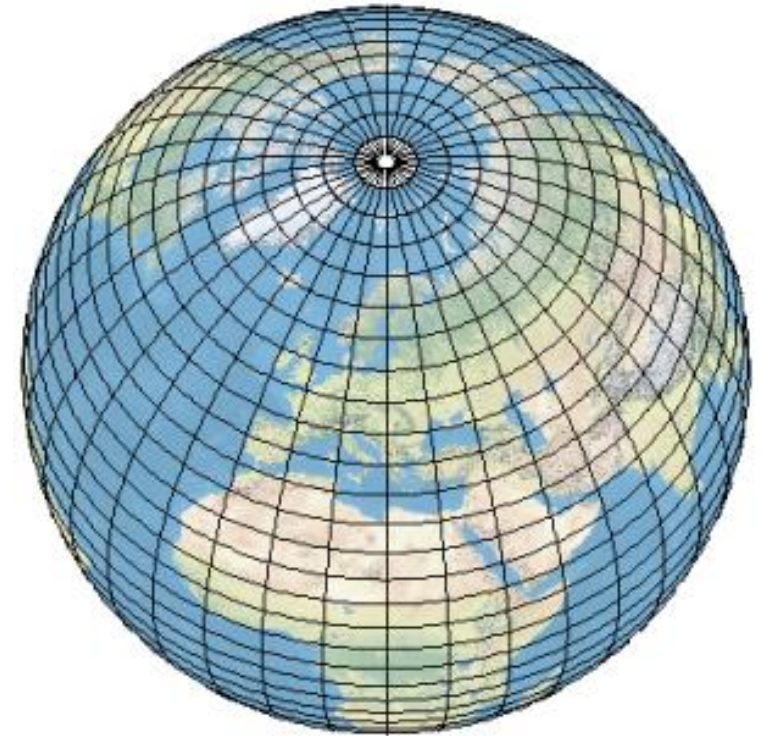
What are grids?

- Grids are characterized by a **pattern of regular repeated shapes** that fit together without gaps or overlaps.
- Can be any shape that **does not create gaps or overlaps**, such as squares, rectangles, triangles, quadrilaterals, or hexagons.
- **GEO has received inquiries** from external partners for Census data provided in a gridded format.
- **Grids have several advantages** in comparison to administrative units.



What are grids?

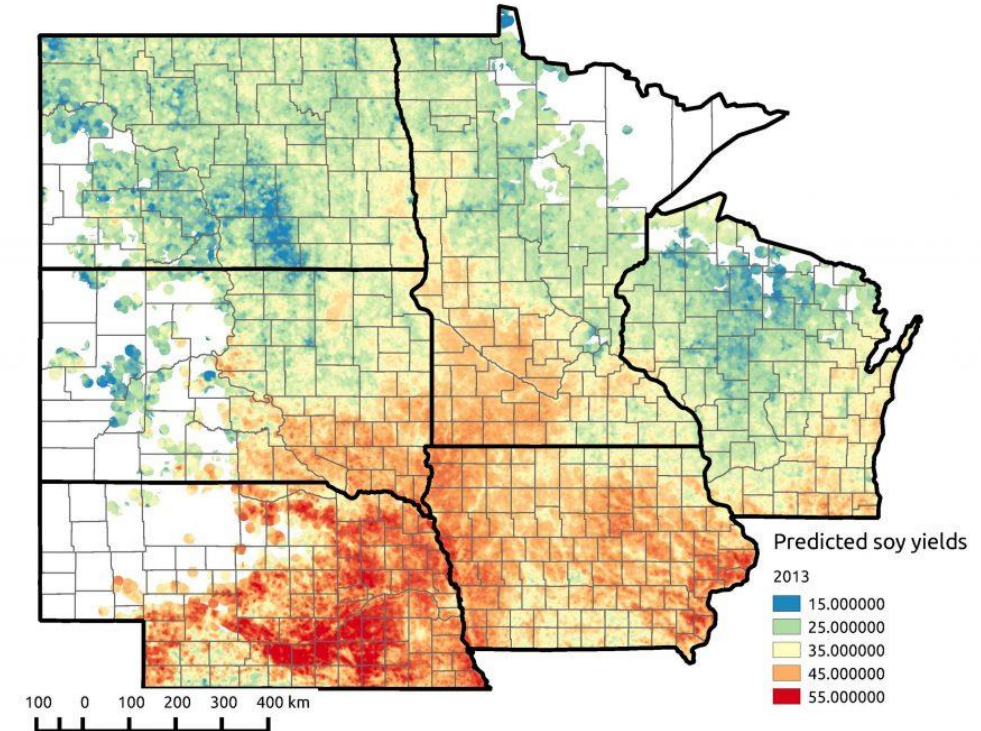
- A grid is a network of either parallel lines (*e.g.*, lat/lon) or shapes (squares, triangles, hexagons, quadrilaterals) to identify, describe, or discretize locations on the Earth's surface.
- One example are the graticules showing lines of latitude (horizontal parallel lines) and lines of longitude (vertical lines or meridians that meet at the poles) on the Earth's surface.
- Maps made with straight lines.
- "A grid is a regular tessellation of a 2-D surface that divides it into a series of contiguous cells."
 - Each cell is assigned a unique identifier which is used for spatial indexing.
 - Each cell contains a value that represents something over that cell's footprint.



<https://desktop.arcgis.com/en/arcmap/latest/map/page-layouts/what-are-grids-and-graticules-.htm>

What are gridded data?

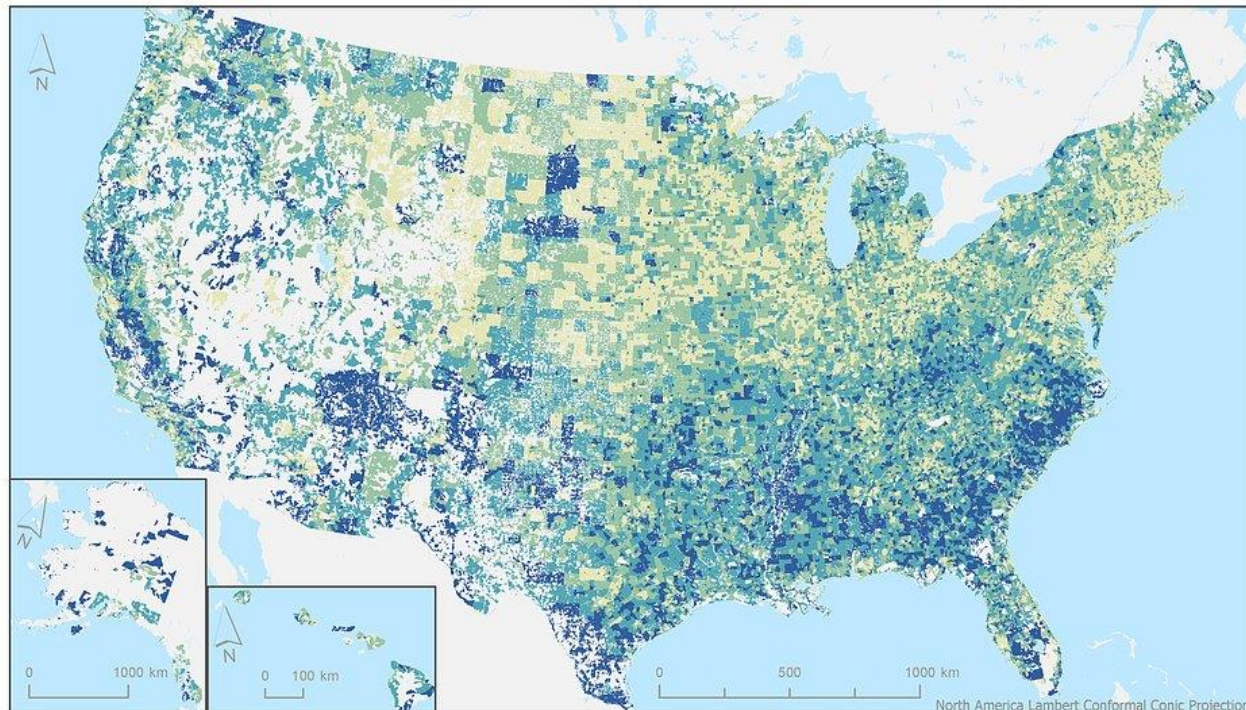
- Gridding data is to assign data values to grid cells.
- Grids are always aggregates because they use single values to describe (represent) a two-dimensional area of the Earth's surface.
- Examples:
 - Counts (number of housing units)
 - Sums (economic output in dollars, expected crop yield)
 - Averages (temperature, rainfall)



Examples – Domestic Grids

U.S. Social Vulnerability Index Grids (2018): Overall Score

U.S. Census Grids



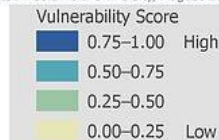
The U.S. Social Vulnerability Index Grids are part of the U.S. Census Grids collection. This map displays the overall score for the Centers for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI) gridded at a spatial resolution of 1 km with a mask for no population for the year 2018.

Center for International Earth
Science Information Network
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Data Source: Center for International Earth Science Information Network - CIESIN - Columbia University, 2021. U.S. Social Vulnerability Index Grids. Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDAC). <https://doi.org/10.7927/6s2a-9r49>.

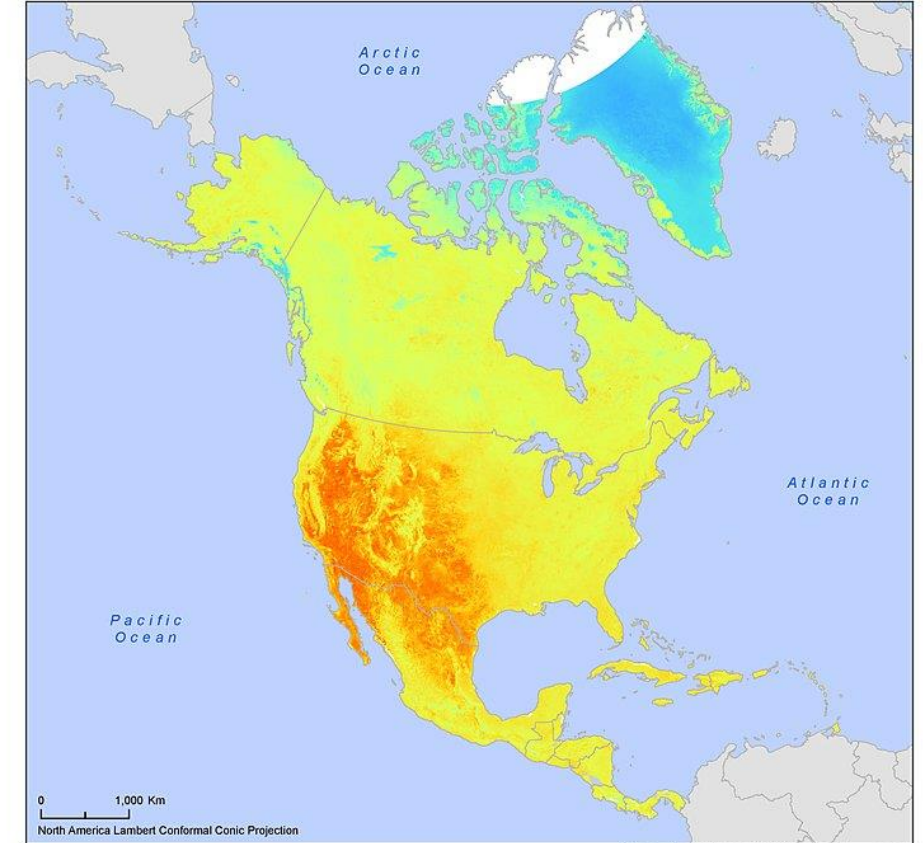
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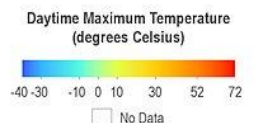


Summer Daytime Maximum Land Surface Temperature (LST), 2013: North America

Satellite-Derived Environmental Indicators



The Global Summer Land Surface Temperature (LST) Grids, 2013, part of the Satellite-Derived Environmental Indicators collection, estimate daytime (1:30 p.m.) maximum temperature and nighttime (1:30 a.m.) minimum temperature in degrees Celsius at a spatial resolution of ~1km during summer months of the northern and southern hemispheres for the year 2013. The LST grids are produced using the Aqua Level-3 Moderate Resolution Imaging Spectroradiometer (MODIS) Version 5 global daytime and nighttime LST 8-day composite data product (MYD11A2).



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Data Source: Center for International Earth Science Information Network - CIESIN - Columbia University, 2016. Global Summer Land Surface Temperature (LST) Grids, 2013. Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDAC). <http://dx.doi.org/10.7927/H4086387>.

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Grids Advantages

- **Uniform area** (densities).
 - Uniform area supports comparative analysis.
- **Consistent** and unchanging.
 - Supports change detection and time series analyses.
- **Easily integrated** with other gridded data.
 - Provide better support for disaster response.
- Provide an alternative to (but **do not replace**) administrative/statistical boundaries.
- May assist in **small area analysis** and estimation.
 - Regions of interest are more easily defined and remain consistent.
- Potential to serve as **consistent work units** for internal data processing or sampling.

Where is “Here”? Part 1

- Sometimes this question can be meaningfully answered with a word linked to an administrative or statistical boundary (e.g. “here in Maryland”, “here in Philadelphia”, “here in Census tract 7”).
- But sometimes those units aren’t appropriate because:
 - boundaries may have changed (illusory stability—in fact change is the norm for administrative units);
 - comparisons are difficult or hard to intuitively grasp owing to units radically different physical areas;
 - these units do not actually encapsulate the spatial extent of many important events and phenomena.



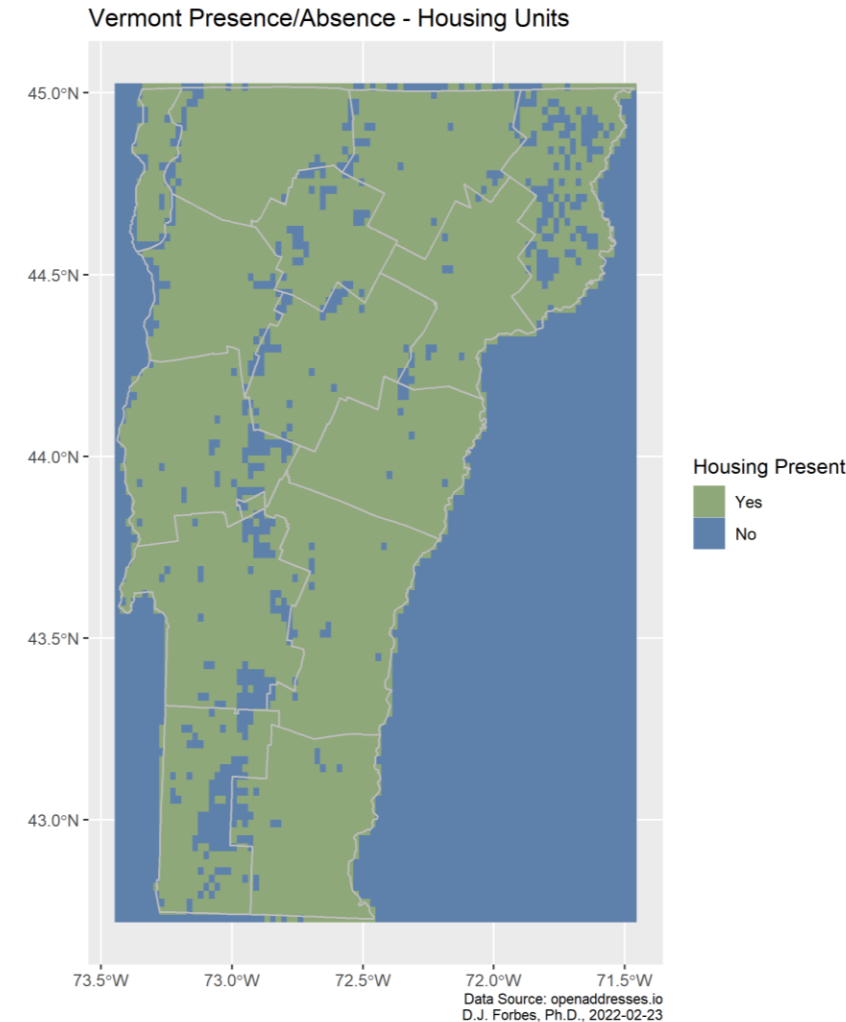
Where is “Here”? Part 2

- Sometimes this question can meaningfully be answered by referring to a coordinate or location.
- But sometimes coordinates are not appropriate or workable because:
 - Continuous nature of coordinate data can make for expensive computation.
 - Integration of different datasets in this format can be difficult.
 - Coordinates are in essence an analog format.
 - It is much easier to find patterns and meaning (defining “here”) at the human scale by treating events as impacting small areas such as grid cells.



Current Work

- Engaging with the statistical community.
 - Disclosure avoidance planning.
 - Statistical content discussions.
- Integrating grids into existing production processes.
- Developing testing and quality control procedures.
 - Identify best practices for process and product metrics.
- Planning for storage and serving grids to the public.
 - Formats (geopackage, shps, raster vs. vector, etc.)
 - Have yet to prototype/test raster formats in MTDB.
 - Tiling.
 - How many versions of grids do we support?
- Staffing and resource planning.
 - How many staff are required for these activities?



Key Questions for our data partners!

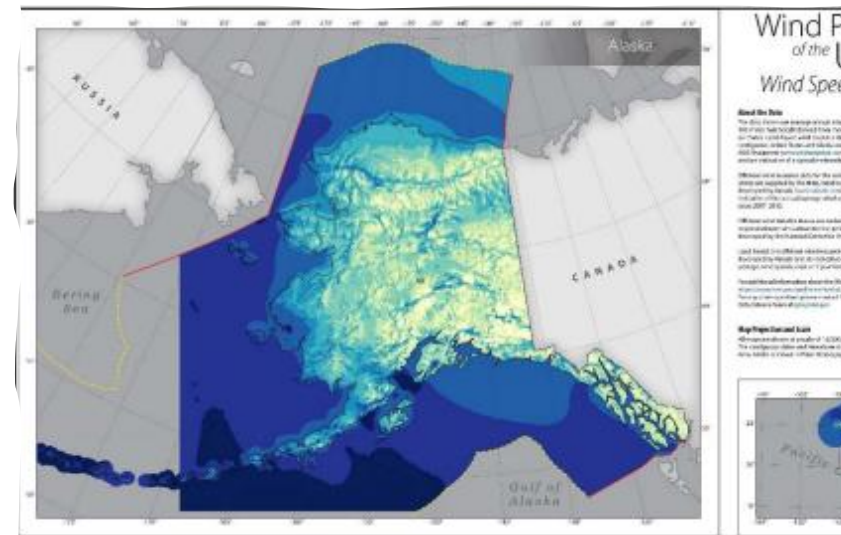
- How should we communicate with YOU, our data users to solicit input?
- We want your feedback on data use-cases and requirements:
 - Statistical data -
 - What census and survey data should be disseminated?
 - Decennial Census Data? American Community Survey data? Economic data?
 - Minimal vs. maximal datasets –
 - What’s does the “minimum viable dataset” look like for your needs?
 - Integration of other datasets – what would you “mashup” with census data?
 - Geospatial formats and preferences -
 - Raster vs Vector.
 - Shape and Size(s) of Grid Cells.
 - Equal area vs equal dimensions.

Discussion



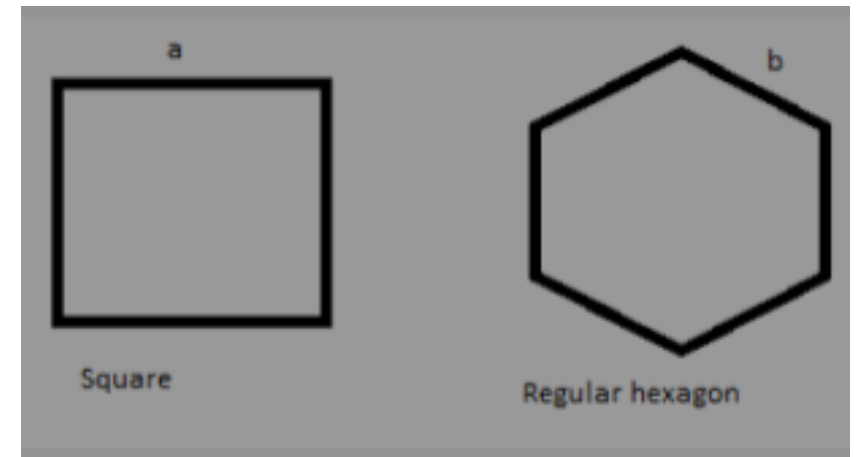
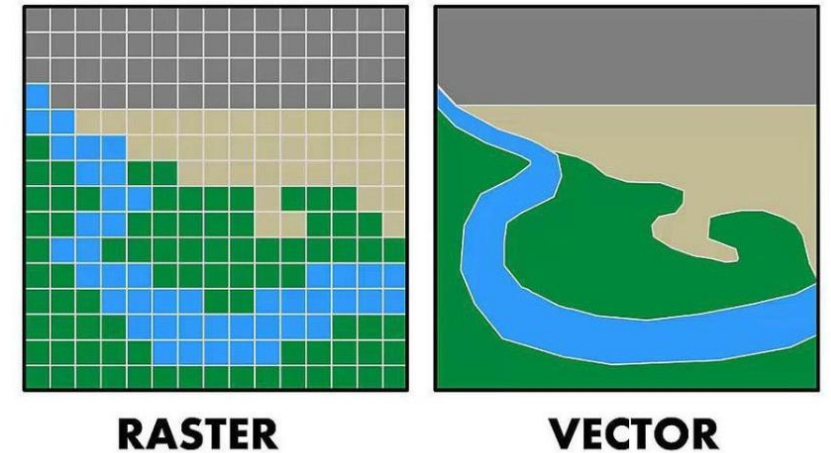
Current grids

- Do agencies in your state use gridded data?
- If yes, what kind of gridded data?
 - Earth Observation/Remotely Sensed/Satellite Imagery
 - Elevation data
 - Land Use/Land Cover data
 - Transportation/Traffic
 - Population/Housing/Demographics



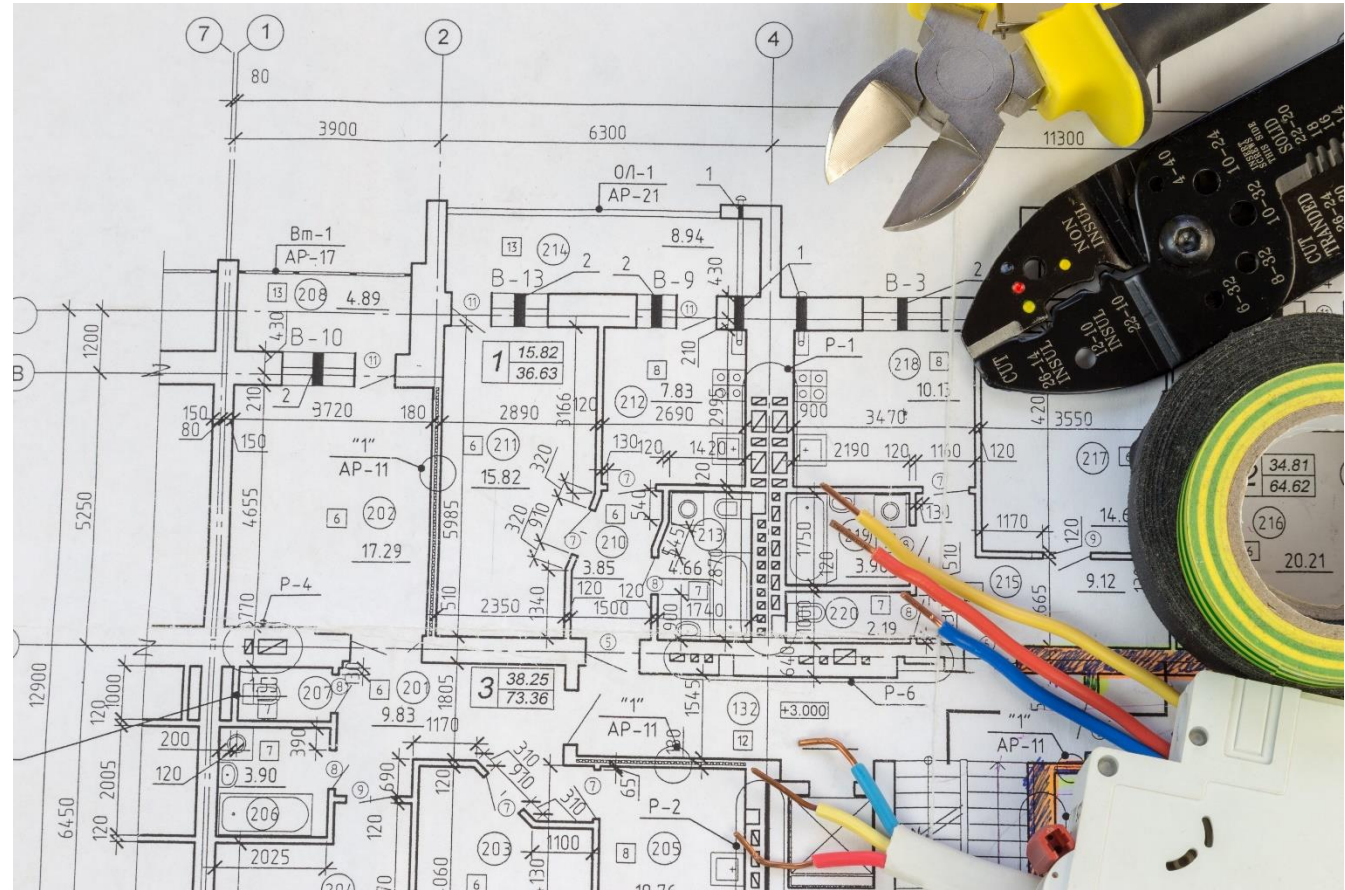
Grids – geospatial

- For those that use grids, what type of grid are you using?
 - Raster data?
 - Shape
 - Rectangle/quadrilateral? Hexagonal?
 - Size?
 - 1km? 5km?
 - Existing standard (e.g. DGGs or National Grid) or self-generated grid?



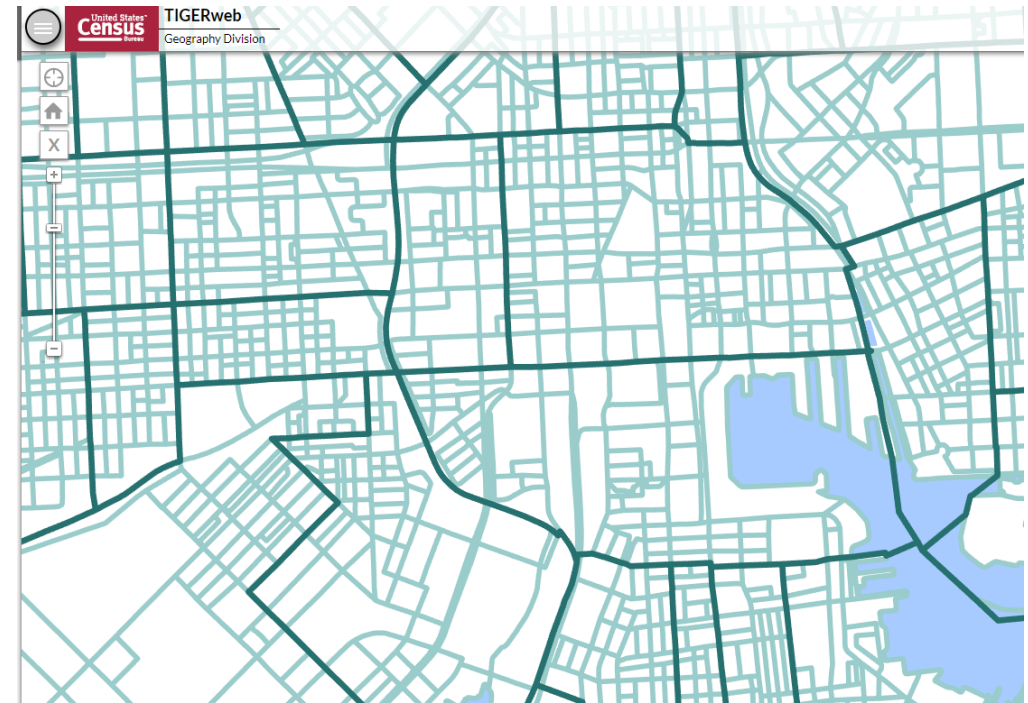
Grids – use-cases

- If we produced grids, how would you use them?
- What use cases do you have for grids?
- What statistical data might be useful in a grid?



Grids – comparative geographies

- What is the smallest geography you frequently use?
 - Tracts? Block groups? Blocks? Other?
- What statistical data do you use with these geographies?
 - Demographic/Housing characteristics or counts.
 - Business, Jobs, Employment characteristics or counts.
 - Socio-economic characteristics or counts.
 - Other?
- What drawbacks or limitations do you find with these geographic units?

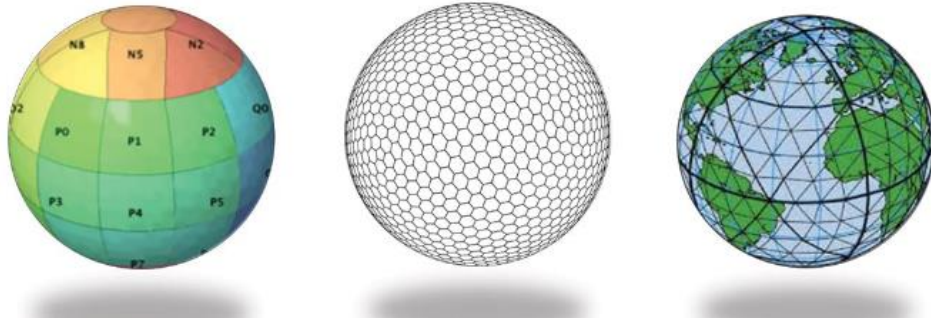




Final Discussion

- What final thoughts do you have about grids?
- What are your gridded data needs?
- What requirements would you like to communicate to us?
- Please share any final thoughts with us at **geo.grids@census.gov**

DGGS Advantages



- Each cell has unique address (vs continuous coordinate systems).
- Greatly simplifies the definition of “here” in studies.
- Data of any type can be held in these cells.
- Integration of data is on-demand and virtually free (computationally).
- Cells are hierarchically organized allowing for rapid aggregation and decomposition.
- Works at every latitude including polar regions.
- OGC DGGS suite is leading candidate for adoption as global standard.