Rasters and Images

VIS 2128

Fall 2022

Vector data

Coordinates describe locations in space and connections among them.

Type	Examples	

Point		<pre>{
		  "type": "Point",
		  "coordinates": [30.0, 10.0]
		}</pre>

LineString		<pre>{
		  "type": "LineString",
		  "coordinates": [
		  [30.0, 10.0], [10.0, 30.0], [40.0, 40.0]
		  ]
		}</pre>

Polygon		<pre>{
		  "type": "Polygon",
		  "coordinates": [
		  [[30.0, 10.0], [40.0, 40.0], [20.0, 40.0], [10.0, 20.0], [30.0, 10.0]]
		  ]
		}</pre>

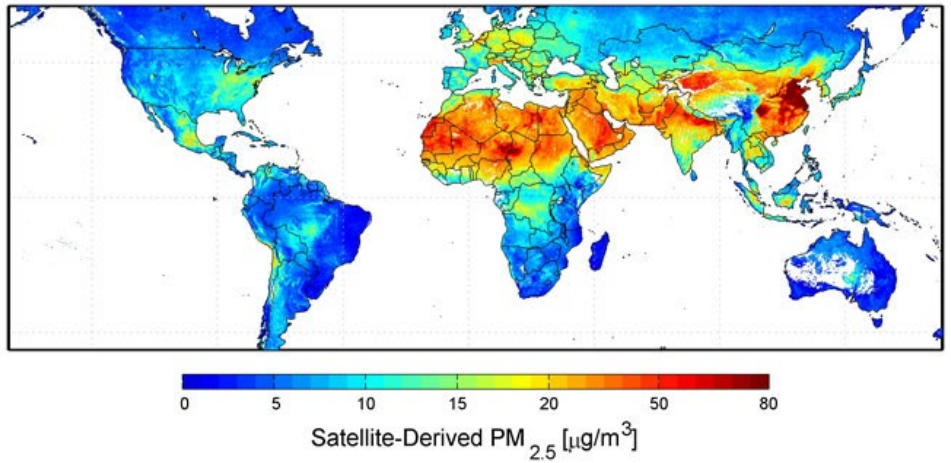
		<pre>{
		  "type": "Polygon",
		  "coordinates": [
		  [[35.0, 10.0], [45.0, 45.0], [15.0, 40.0], [10.0, 20.0], [35.0, 10.0]],
		  [[20.0, 30.0], [35.0, 35.0], [30.0, 20.0], [20.0, 30.0]]
		  ]
		}</pre>

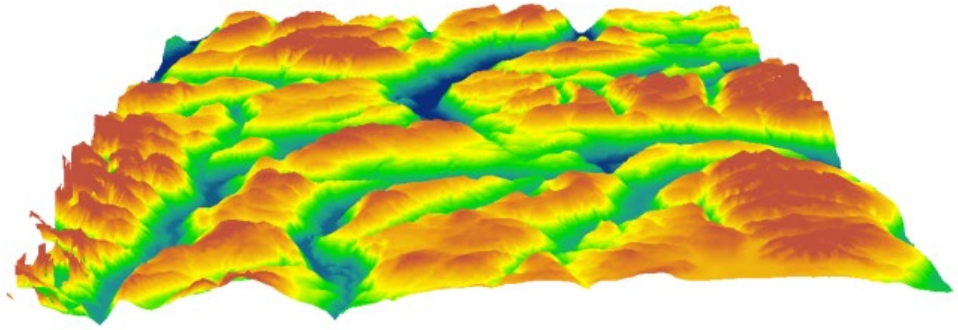
Raster data

A grid covers the full extent of an area, with a single value for each cell

Examples:

- Elevation data
- Air pollution
- Values that vary continuously across space

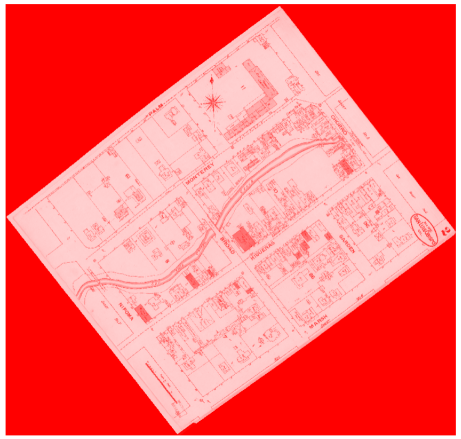


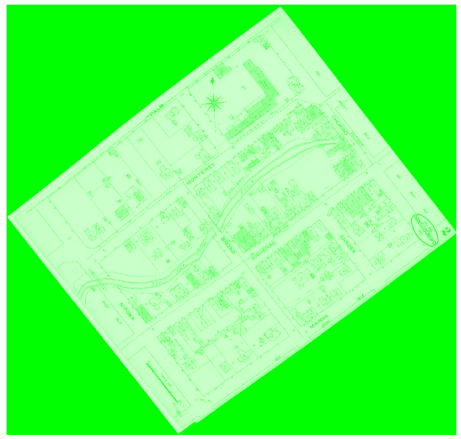


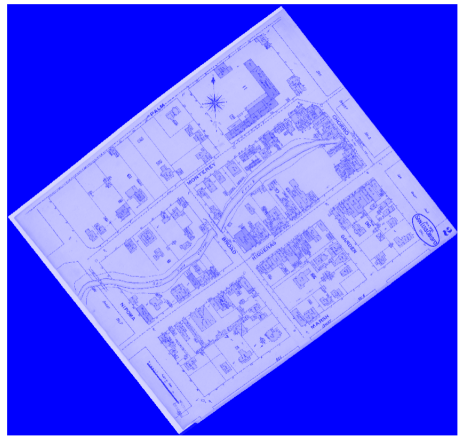
Raster images

Three rasters:

- Red intensity
- Green intensity
- Blue intensity





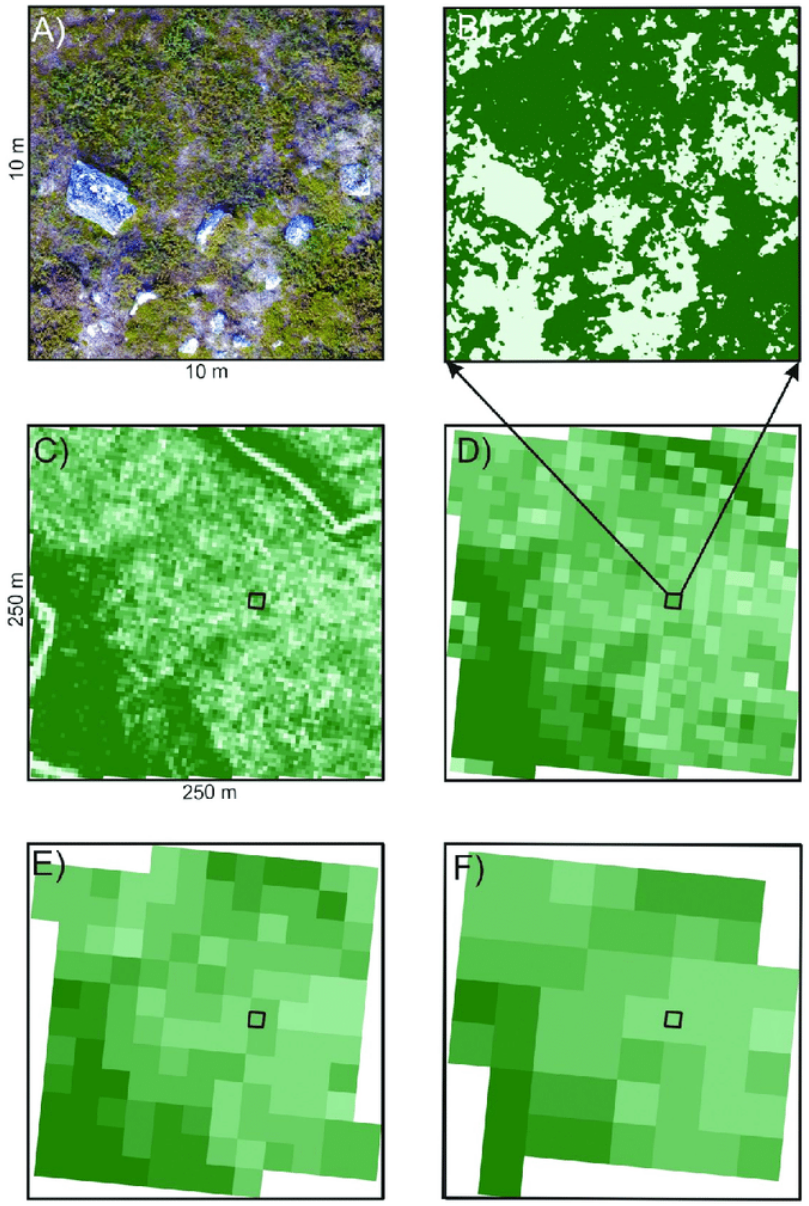


Resolution

The number of grid cells per unit of distance (in real space or on the page).

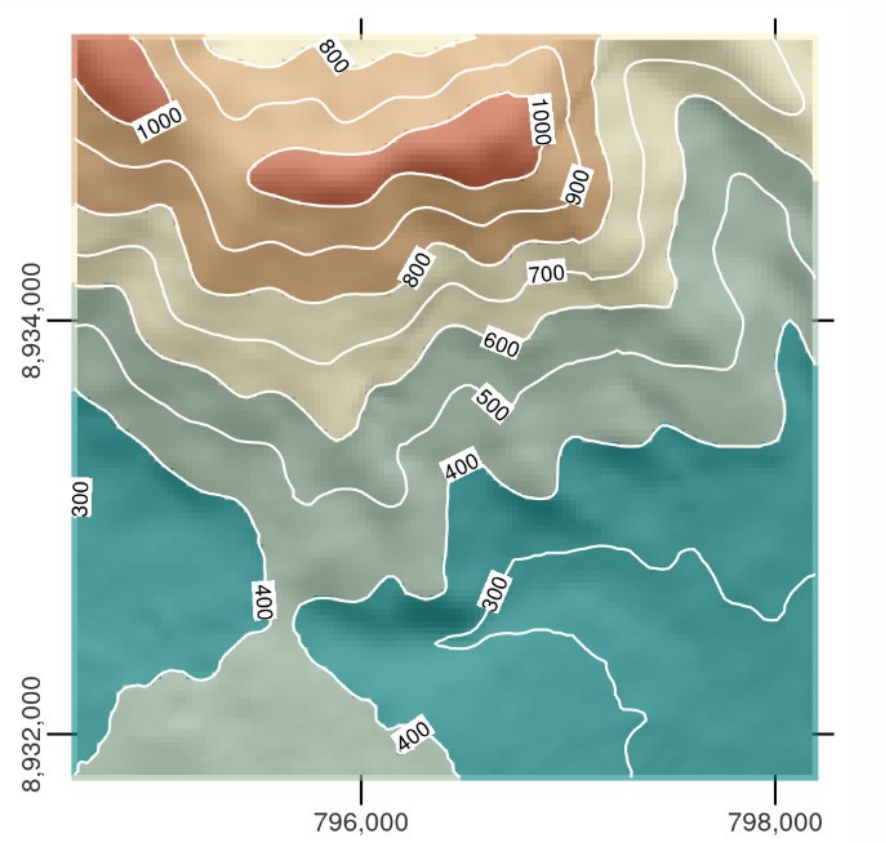
Vector data isn't based on a grid, so there's no such thing as resolution.

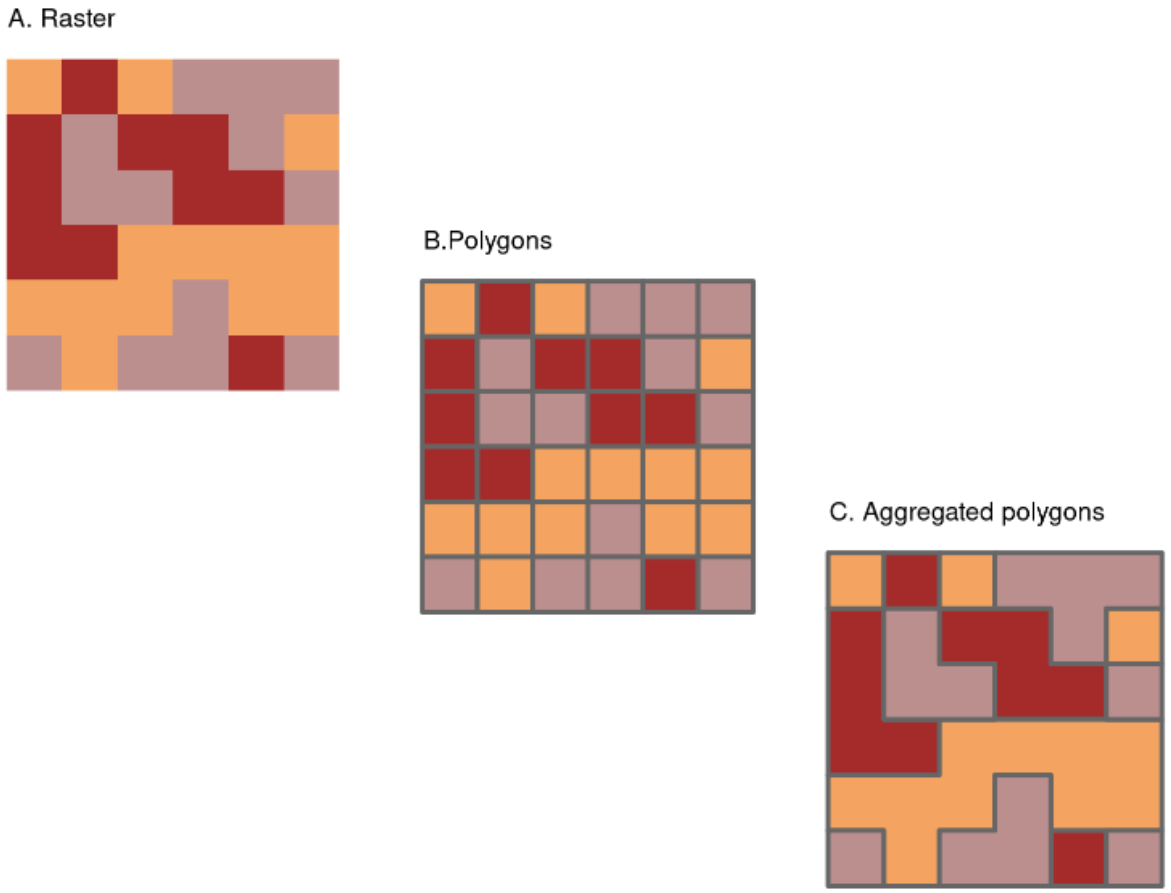
*PDFs are vector data, most other image file formats are raster data.



Rasters to vectors (vectorization)

Contours

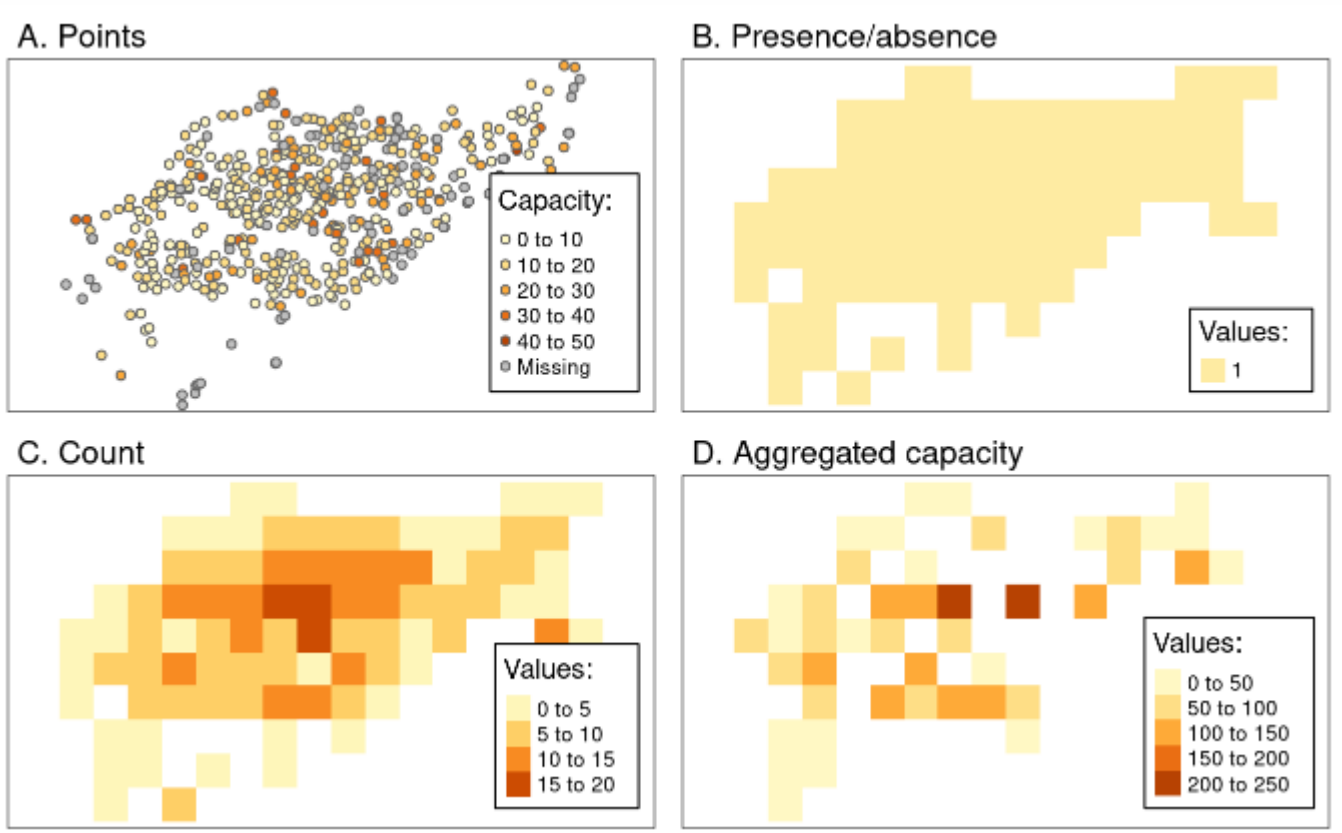




Source: Geocomputation with R (https://geocompr.robinlovelace.net/raster-vector.html)

Vectors to rasters (rasterization)

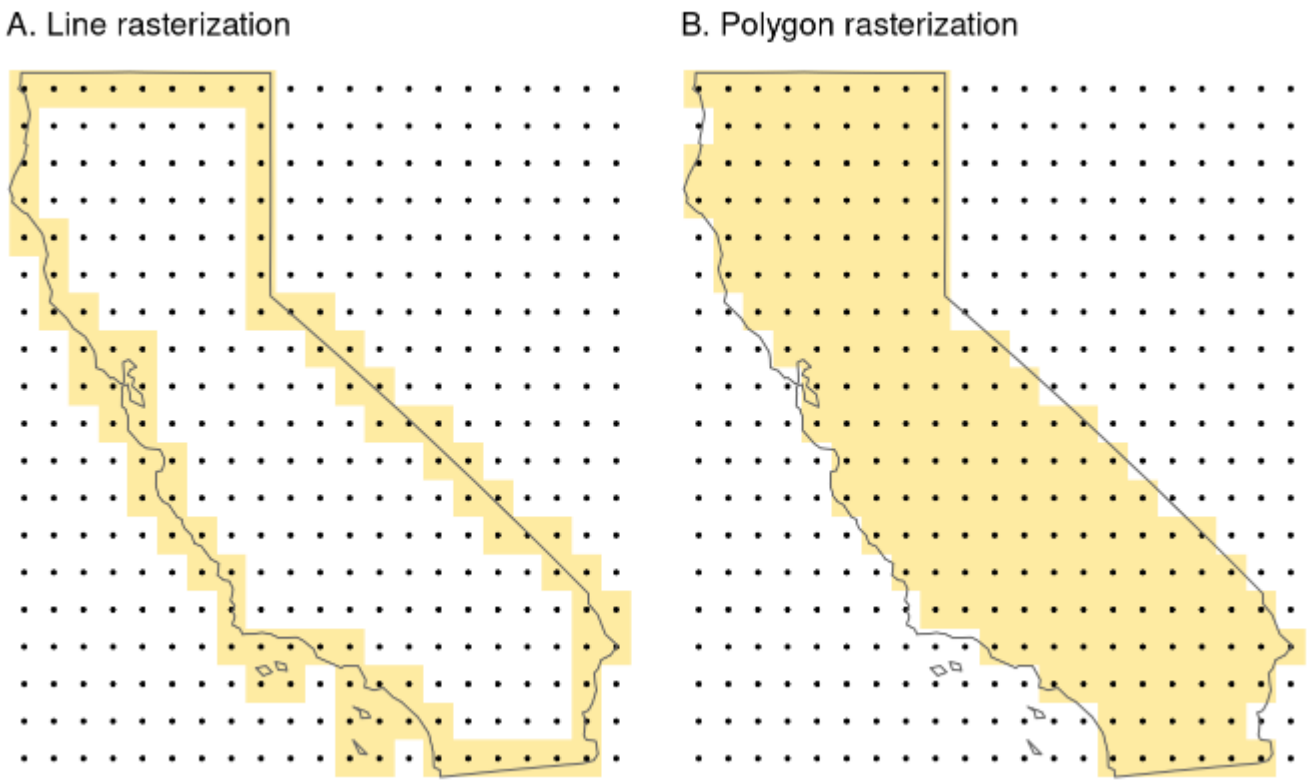
Point rasterization



Source: Geocomputation with R (https://geocompr.robinlovelace.net/raster-vector.html)

Vectors to rasters (rasterization)

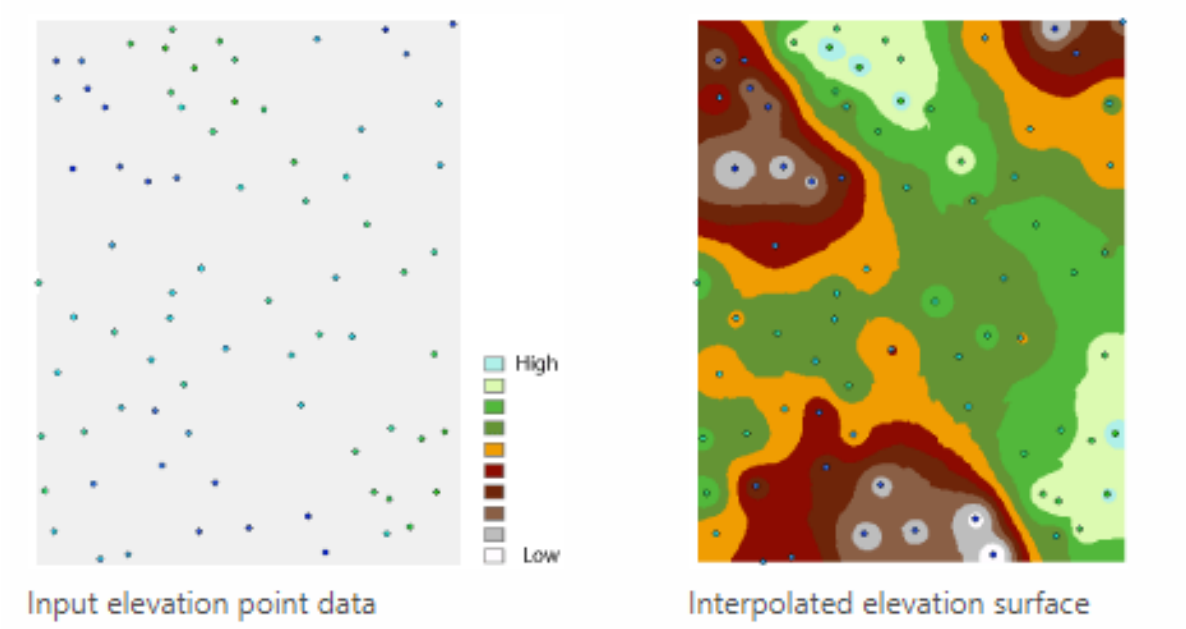
Line and polygon rasterization



Source: Geocomputation with R (https://geocompr.robinlovelace.net/raster-vector.html)

Vectors to rasters (interpolation)

Estimate values between point measurements.



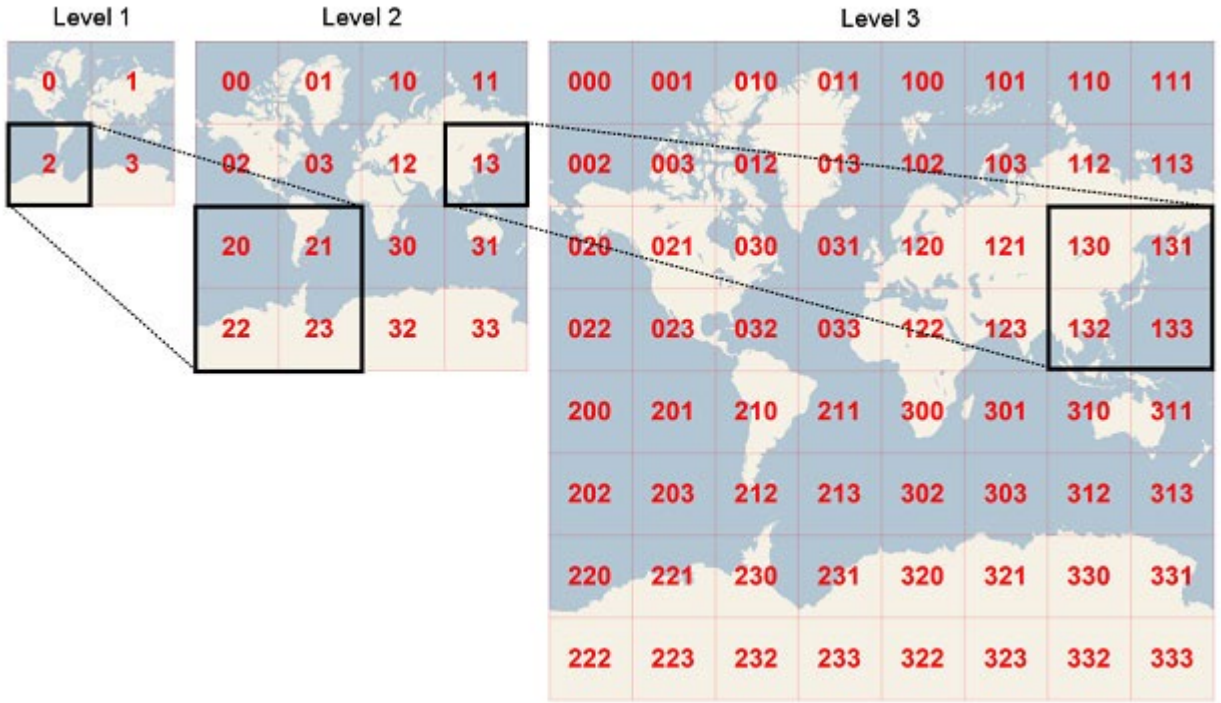
Source: https://desktop.arcgis.com/en/arcmap/10.3/tools/spatial-analyst-toolbox/understanding-interpolation-analysis.htm

Reasons to use raster data

- **Your variable of interest really does vary across space**
  - But is probably measured at specific points and requires interpolation
- **Aggregation is necessary**
  - To reduce the size of the dataset
  - To protect privacy
- **Your layer is an image (which you might need to vectorize for analysis)**
  - Aerial photography
  - Historic maps
  - Field notes

Map Tiles

For interactive, web-based maps



https://docs.microsoft.com/en-us/bingmaps/articles/bing-maps-tile-system

Referenced from a url template like:
https://example.com/{z}/{x}/{y}.png

z = zoom level
x, y = reference the specific tile