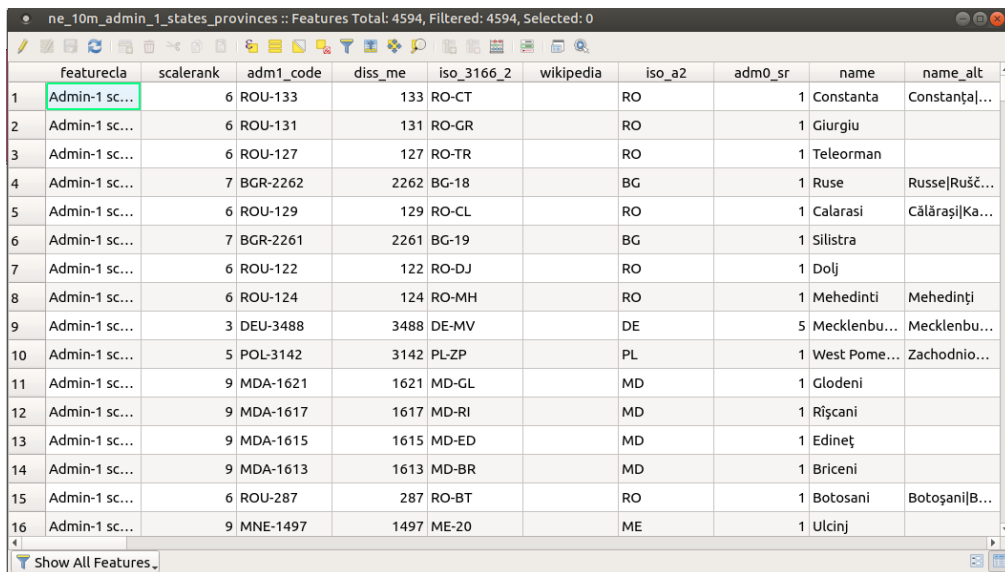# Vector and raster data

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Vector data

- Classifying vector data by attributes
  - Attribute tables show categories of values (usually)
  - Some columns are necessary for making useful maps

- Attribute data can also be used for labeling
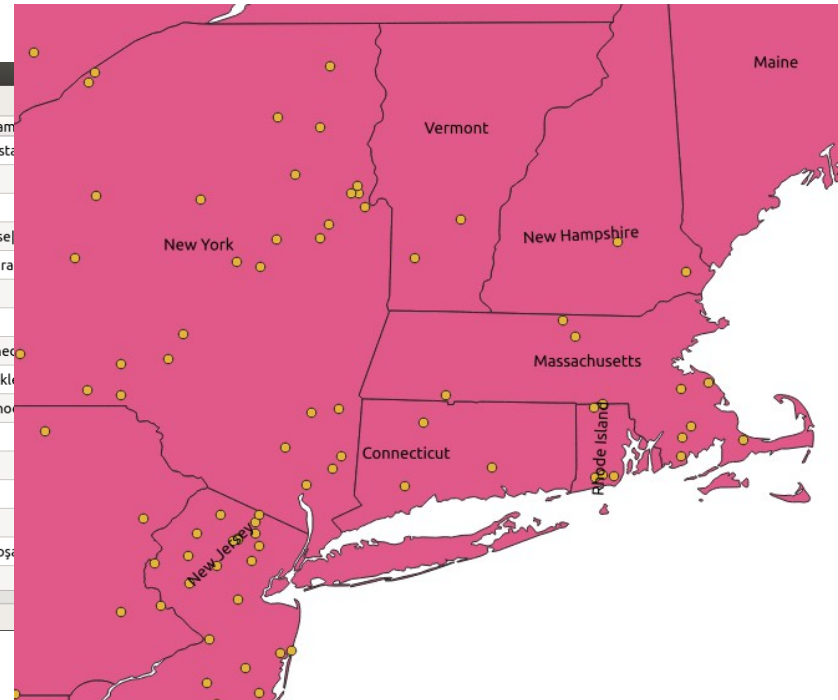 - Many artistic options for adding labels

Vector data

- Classifying vector data by attributes
    - Attribute tables show categories of values (usually)
    - Some columns are necessary for making useful maps

- Attribute data can also be used for labeling
    - Many artistic options for adding labels

Vector data

- Vector data types:
  - 1. Whole number (integer)
  - 2. Whole number (64 bit integer)
  - 3. Decimal number (real)
  - 4. Text (string)
  - 5. Date
  - 6. Date & Time

- Set the length (number of significant digits, etc.)

Vector data

- Vector data types:
  - 1. Whole number (integer)
  - 2.
  - 3.
  - 4.
  - 5.
  - 6.

- Se

Vector data

- Field calculator
  - Create/ edit fields using SQL (or the GUI)
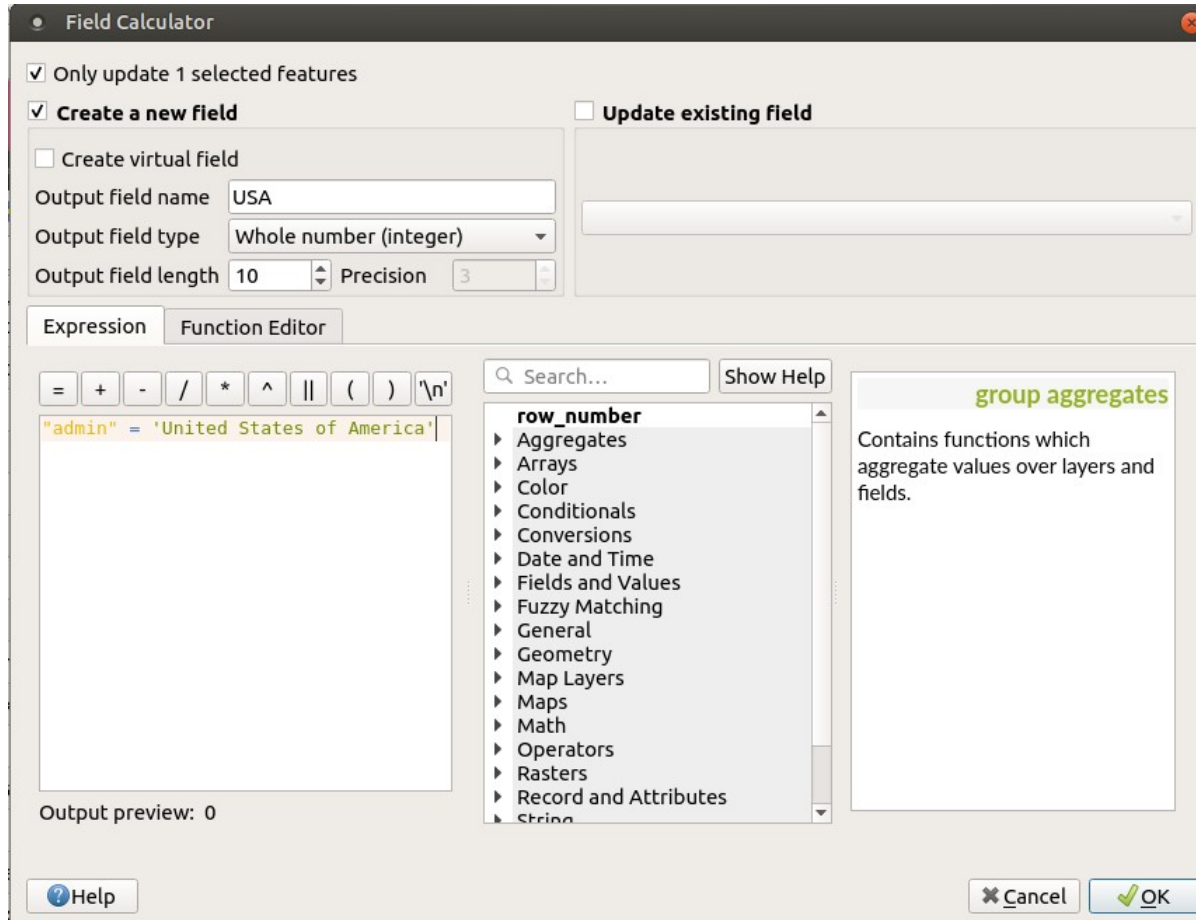
Vector data – follow along

- Joining Tables
  - The United States shapefile does not have an attribute for population
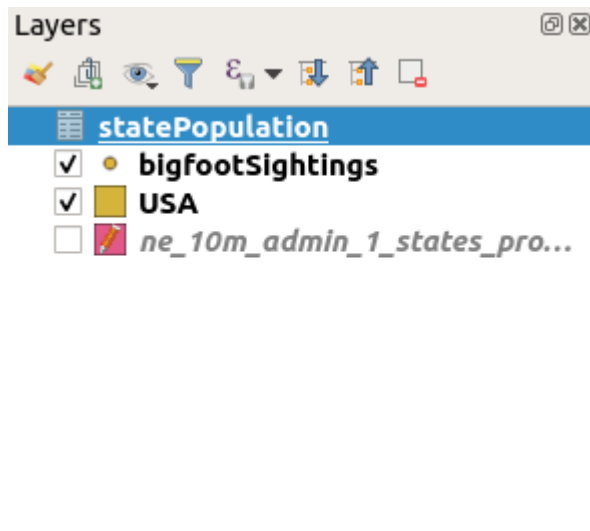 - Download the [population data](#) from the website. Data is from [Wikipedia](#)

Vector data – follow along

- Joining Tables
  - The United States shapefile does not have an attribute for population
  - Download the population data from the website. Data is from Wikipedia
  - Add population file as layer to QGIS

Vector data – follow along

- Joining Tables
  - In the layer properties of USA layer, go to Joins
  - + sign
  - Select layer, Join field (State), and target field (name)
    - VERY important to have exactly the same strings
  - Create new integer field based on new joined field
    - Joined as string instead of integer without .csvt file
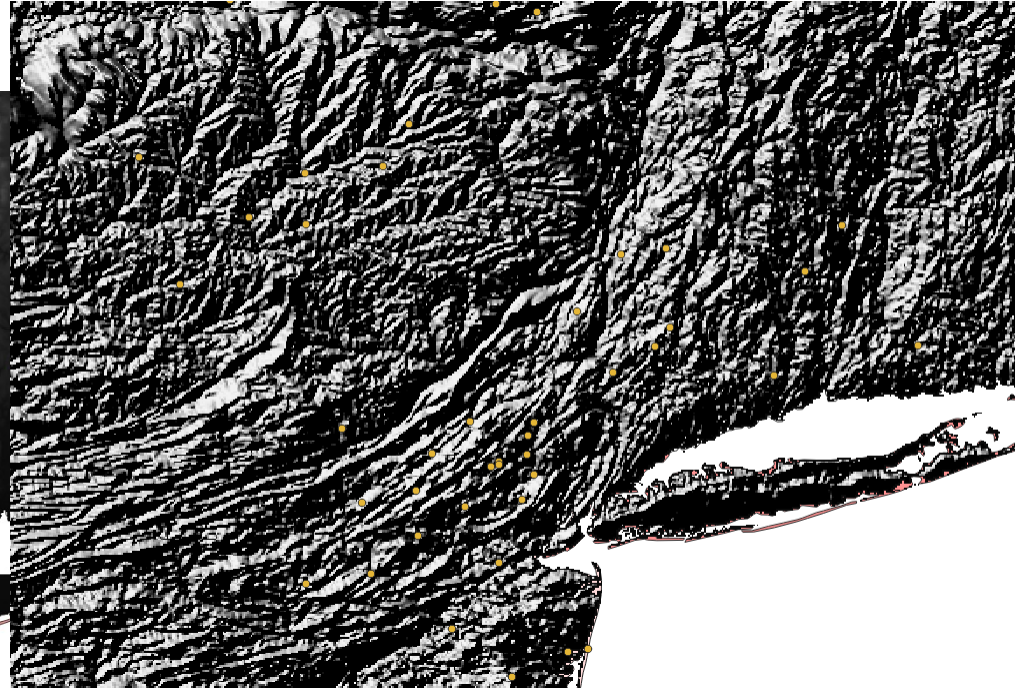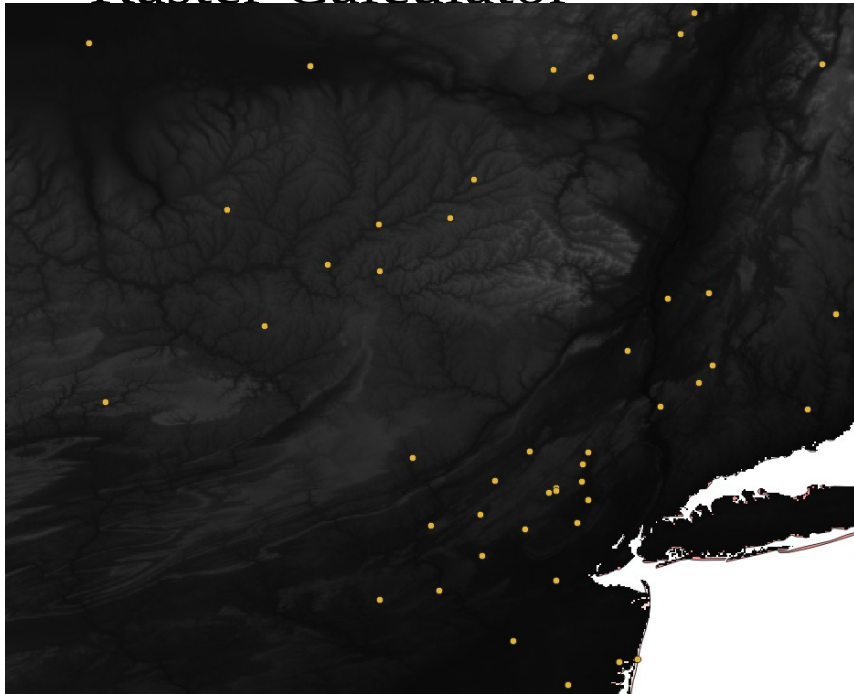 - Edit state colors showing population

Raster data

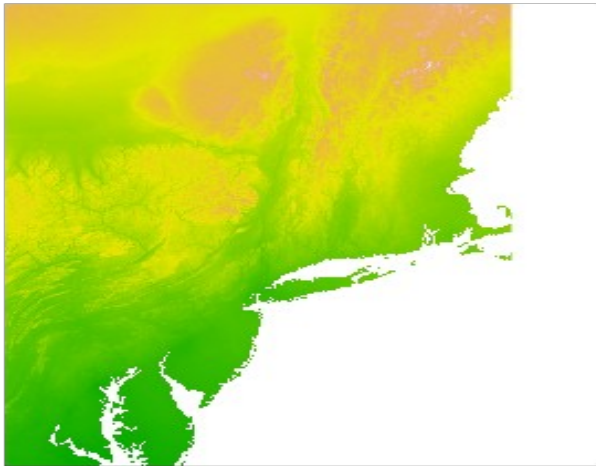- Rasters can be rendered to have custom colors
- No attribute table
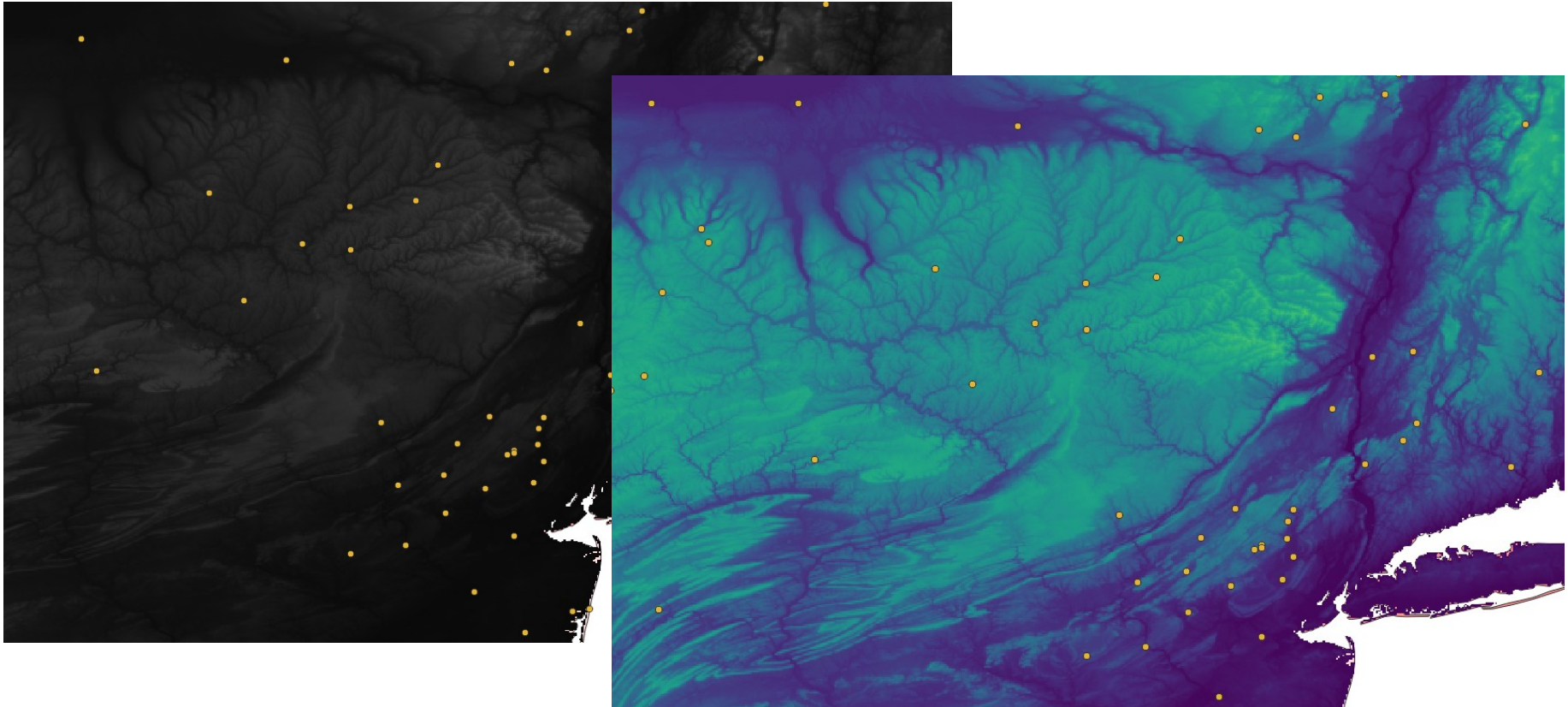
Raster data

- Elevation rasters can be used to create hillshade layers
- Viewshed analyses
- Slope
- Aspect
- Raster Calculator

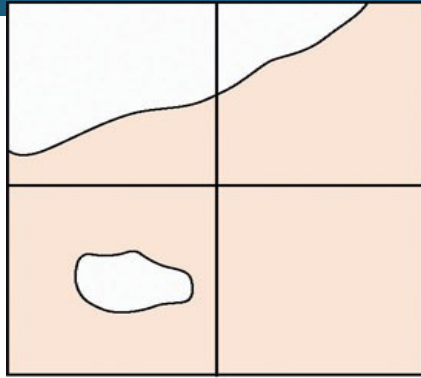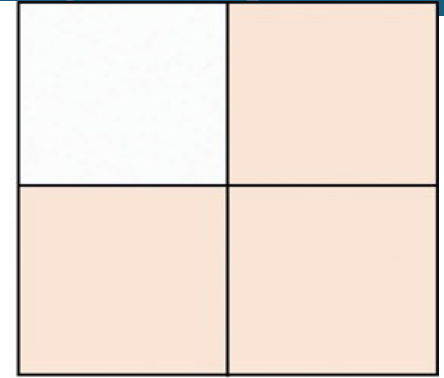| RASTER	VECTOR
Resolution is explicit in the size of the grid cells / pixels	Resolution is difficult to define and therefore typically poorly defined (not rigorous)

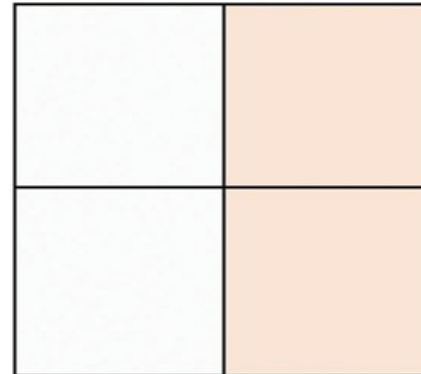Conversion from vector to raster data

(A)

(B)

A) the largest share rule

(B) the central point rule

The nature of spatial data
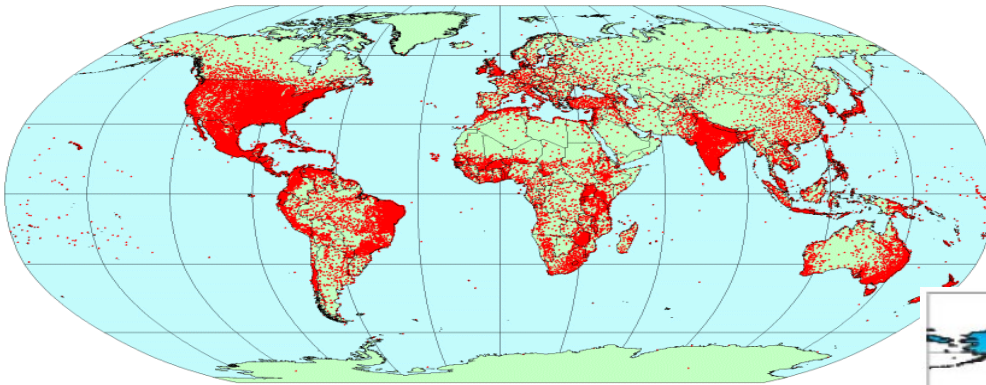
Tobler's First Law of Geography:
Everything is related to everything else, but near things are more related than distant things.

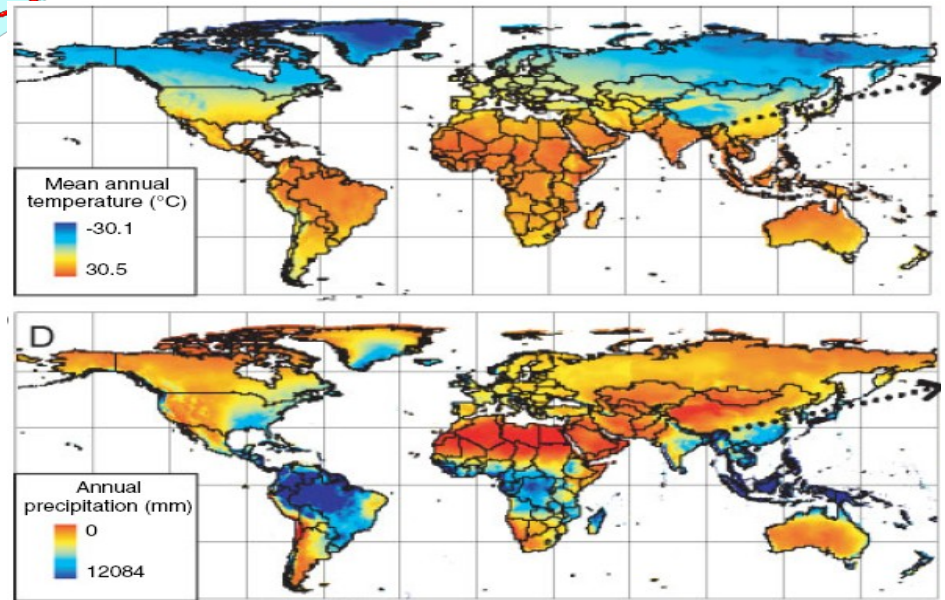Most of the things we are interested in are not randomly distributed in space.
Con: Need to correct for spatial autocorrelation and bias in analyses
Pro: Allows for interpolation

Conversion from vector to raster data

Weather station records
(vector point data;
Hijmans et al. 2005)

Mean annual
temperature (°C)
-30.1
30.5

D

Annual
precipitation (mm)
0
12084

Interpolated raster climate surfaces (WorldClim)