AMERICAN MUSEUM OF NATURAL HISTORY
CENTER FOR BIODIVERSITY AND CONSERVATION

Vector and raster data

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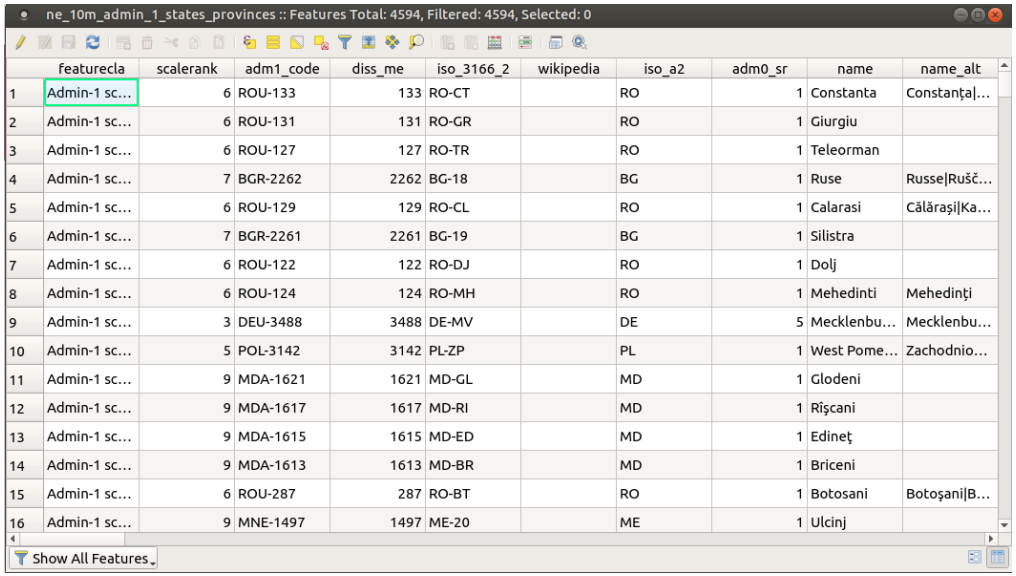
American Museum of Natural History

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



	featurecla	scalerank	adm1_code	diss_me	iso_3166_2	wikipedia	iso_a2	adm0_sr	name	name_alt
1	Admin-1 sc…	6	ROU-133	133	RO-CT		RO	1	Constanta	Constanţa|…
2	Admin-1 sc…	6	ROU-131	131	RO-GR		RO	1	Giurgiu	
3	Admin-1 sc…	6	ROU-127	127	RO-TR		RO	1	Teleorman	
4	Admin-1 sc…	7	BGR-2262	2262	BG-18		BG	1	Ruse	Russe|Rušč…
5	Admin-1 sc…	6	ROU-129	129	RO-CL		RO	1	Calarasi	Călăraşi|Ka…
6	Admin-1 sc…	7	BGR-2261	2261	BG-19		BG	1	Silistra	
7	Admin-1 sc…	6	ROU-122	122	RO-DJ		RO	1	Dolj	
8	Admin-1 sc…	6	ROU-124	124	RO-MH		RO	1	Mehedinti	Mehedinţi
9	Admin-1 sc…	3	DEU-3488	3488	DE-MV		DE	5	Mecklenbu…	Mecklenbu…
10	Admin-1 sc…	5	POL-3142	3142	PL-ZP		PL	1	West Pome…	Zachodnio…
11	Admin-1 sc…	9	MDA-1621	1621	MD-GL		MD	1	Glodeni	
12	Admin-1 sc…	9	MDA-1617	1617	MD-RI		MD	1	Rîşcani	
13	Admin-1 sc…	9	MDA-1615	1615	MD-ED		MD	1	Edineţ	
14	Admin-1 sc…	9	MDA-1613	1613	MD-BR		MD	1	Briceni	
15	Admin-1 sc…	6	ROU-287	287	RO-BT		RO	1	Botosani	Botoşani|B…
16	Admin-1 sc…	9	MNE-1497	1497	ME-20		ME	1	Ulcinj	

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ne_10m_admin_1_states_provinces :: Features Total: 4594, Filtered: 4594, Selected: 0

	featurecla	scalerank	adm1_code	diss_me	iso_3166_2	wikipedia	iso_a2	adm0_sr	name	nam
1	Admin-1 sc...	6	ROU-133	133	RO-CT		RO	1	Constanta	Consta
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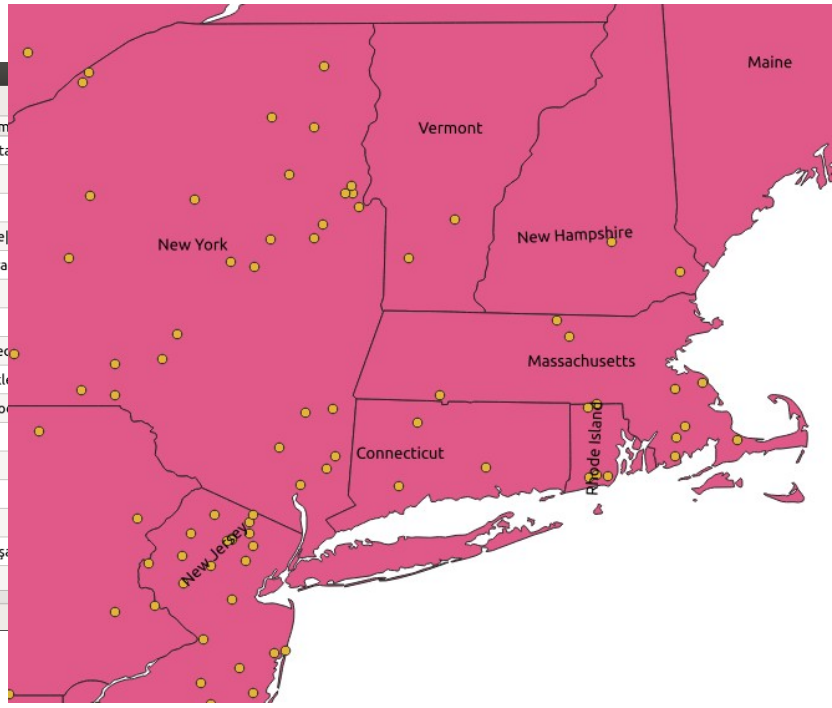
Show All Features



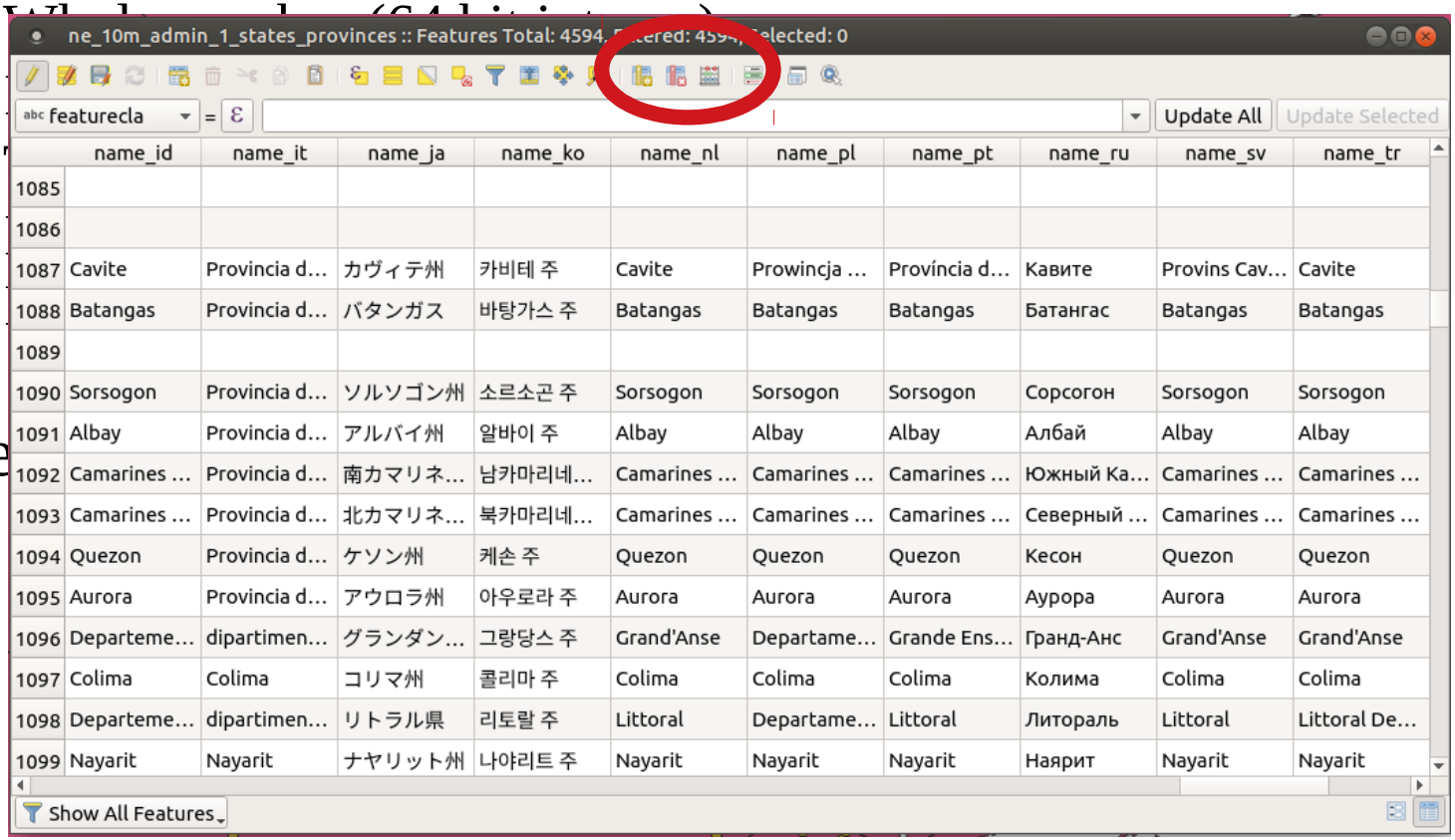
Vector data

- 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

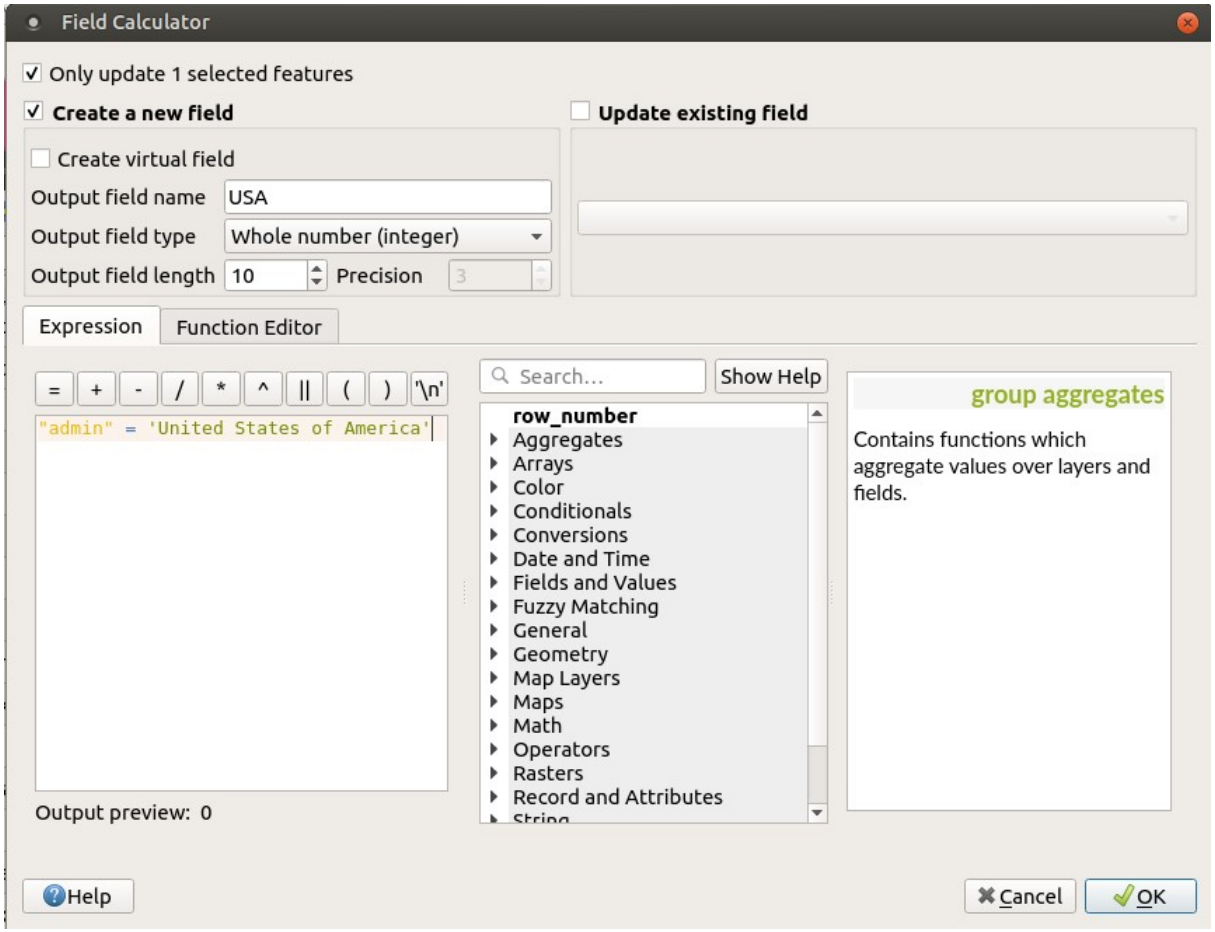
- Vector data types:
  - 1. Whole number (integer)
  - 2.
  - 3.
  - 4.
  - 5.
  - 6.
- Se



	name_id	name_it	name_ja	name_ko	name_nl	name_pl	name_pt	name_ru	name_sv	name_tr
1085										
1086										
1087	Cavite	Provincia d...	カヴィテ州	카비테 주	Cavite	Prowincja ...	Província d...	Кавите	Provins Cav...	Cavite
1088	Batangas	Provincia d...	バタンガス	바탕가스 주	Batangas	Batangas	Batangas	Батангас	Batangas	Batangas
1089										
1090	Sorsogon	Provincia d...	ソルソゴン州	소르소곤 주	Sorsogon	Sorsogon	Sorsogon	Сорсогон	Sorsogon	Sorsogon
1091	Albay	Provincia d...	アルバイ州	알바이 주	Albay	Albay	Albay	Албай	Albay	Albay
1092	Camarines ...	Provincia d...	南カマリネ...	남카마리네...	Camarines ...	Camarines ...	Camarines ...	Южный Ка...	Camarines ...	Camarines ...
1093	Camarines ...	Provincia d...	北カマリネ...	북카마리네...	Camarines ...	Camarines ...	Camarines ...	Северный ...	Camarines ...	Camarines ...
1094	Quezon	Provincia d...	ケソン州	케손 주	Quezon	Quezon	Quezon	Кесон	Quezon	Quezon
1095	Aurora	Provincia d...	アウロラ州	아우로라 주	Aurora	Aurora	Aurora	Аурора	Aurora	Aurora
1096	Departeme...	dipartimen...	グランダン...	그랑당스 주	Grand'Anse	Departame...	Grande Ens...	Гранд-Анс	Grand'Anse	Grand'Anse
1097	Colima	Colima	コリマ州	콜리마 주	Colima	Colima	Colima	Колима	Colima	Colima
1098	Departeme...	dipartimen...	リトラル県	리토랄 주	Littoral	Departame...	Littoral	Литораль	Littoral	Littoral De...
1099	Nayarit	Nayarit	ナヤリット州	나야리트 주	Nayarit	Nayarit	Nayarit	Наярит	Nayarit	Nayarit

Vector data

- Field calculator
  - Create/ edit fields using SQL (or the GUI)



Vector data – follow along

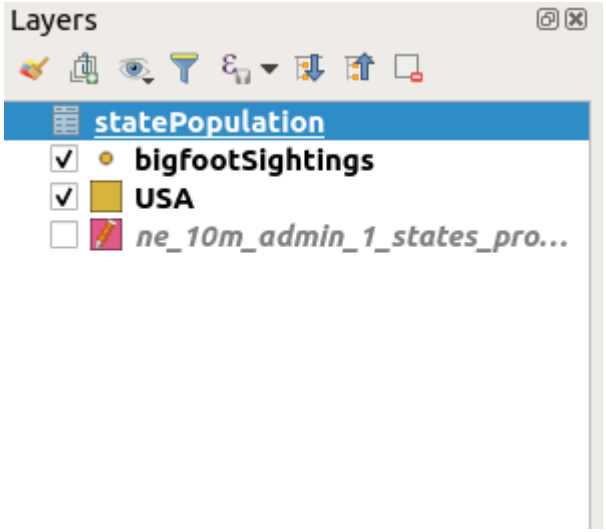
- Joining Tables
  - The United States shapefile does not have an attribute for population
  - Download the population data from the website. Data is from Wikipedia

Vector data – follow along

- Joining Tables
  - The United States shapefile does not have an attribute for population

Open the population data that you downloaded from the website as a spreadsheet.

  - Add population file as layer to QGIS

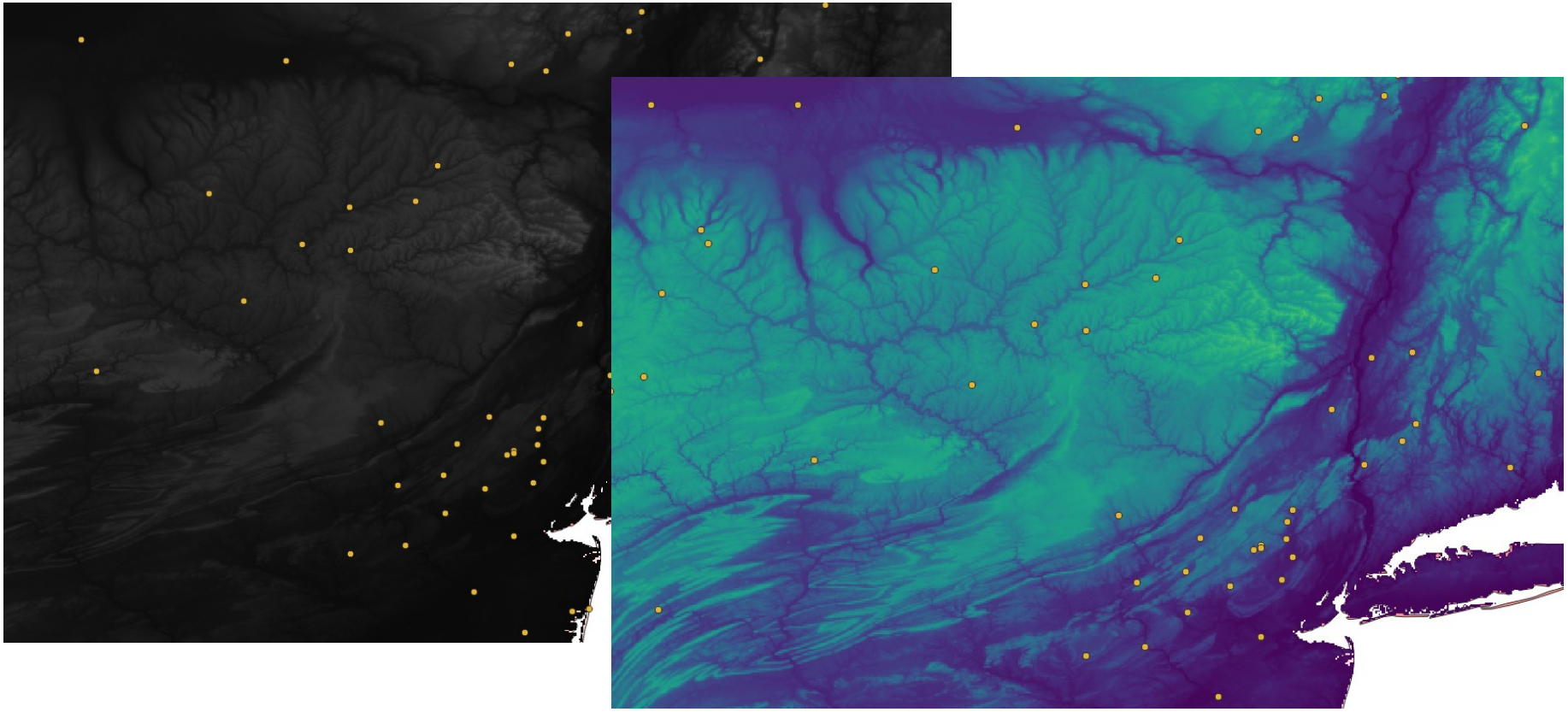


Vector data – follow along

- 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

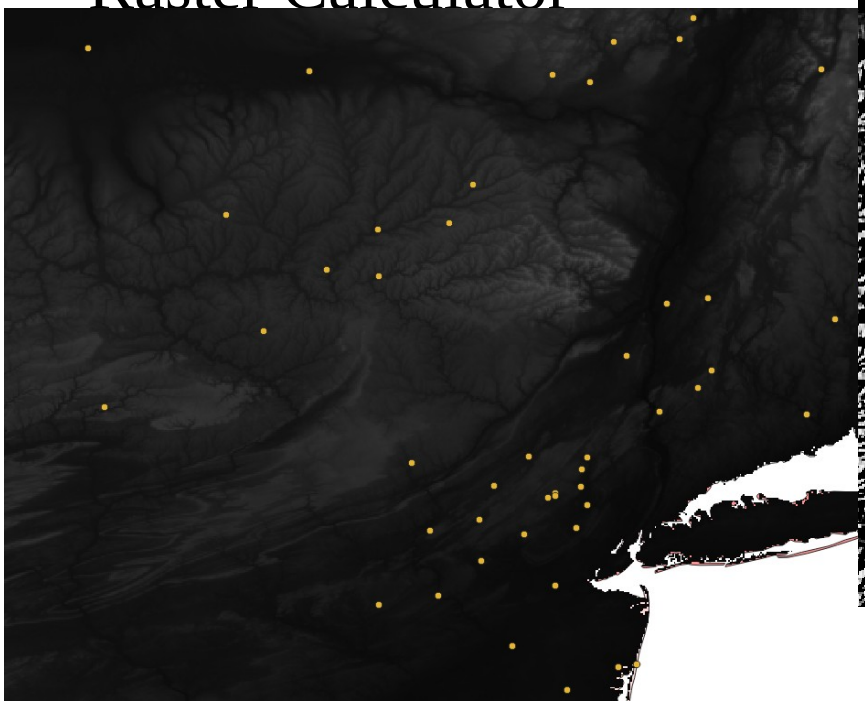
Raster data

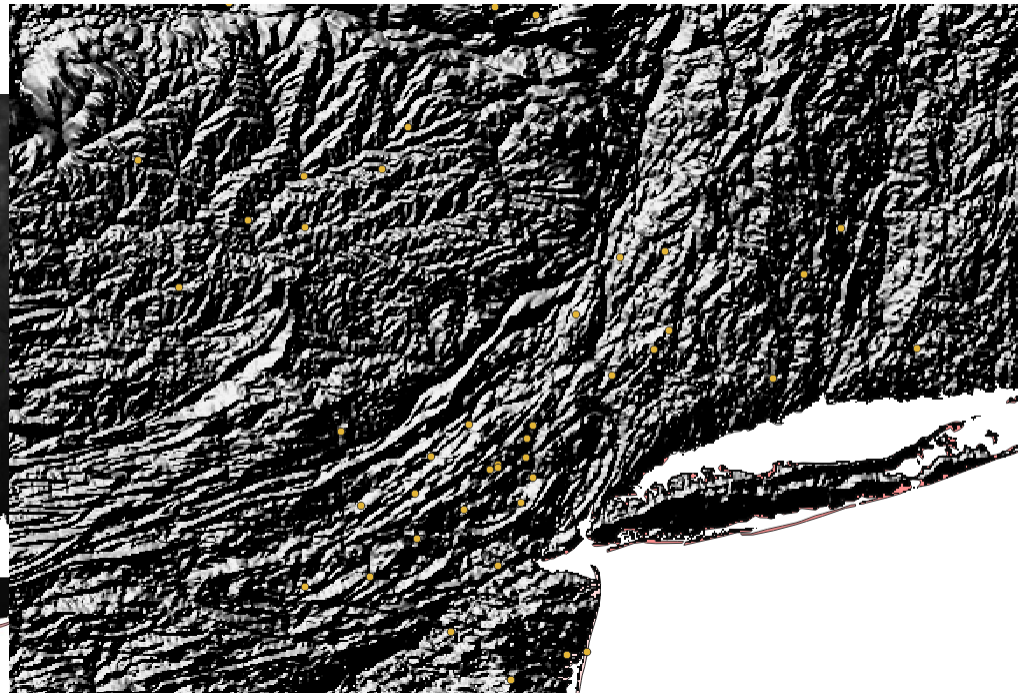
- Rasters can be rendered to have custom colors
- No attribute table



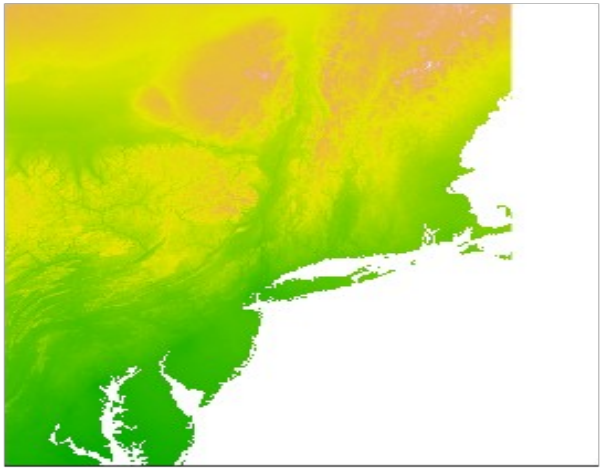
Raster data

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

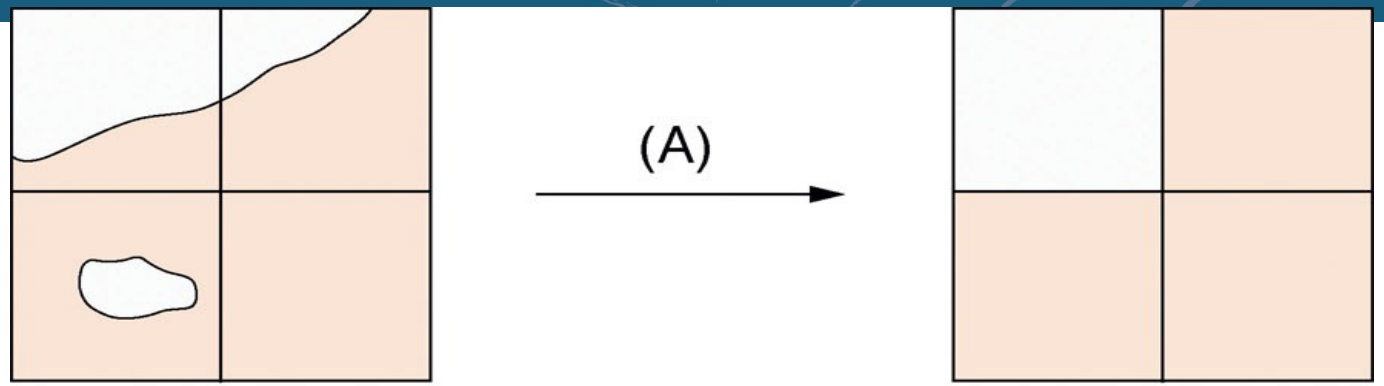


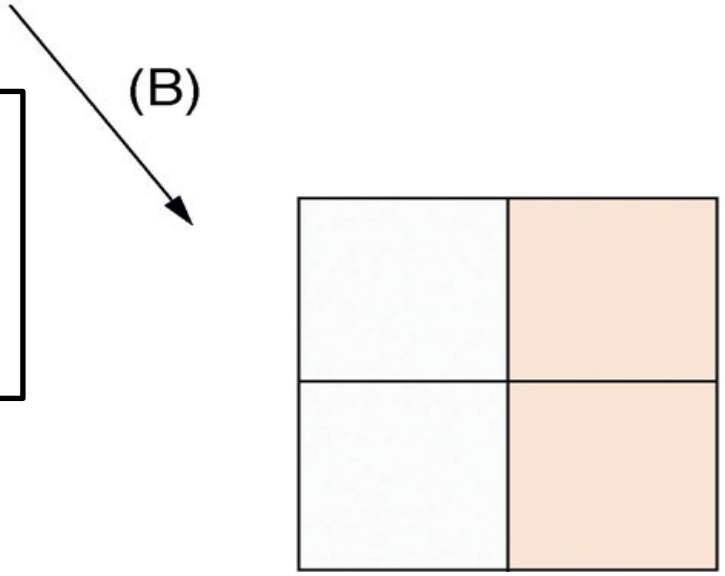


RASTER	VECTOR
Resolution is explicit in the size of the grid cells / pixels	Resolution is difficult to define and therefore typically poorly defined (not rigorous)



Conversion from vector to raster data





A) 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

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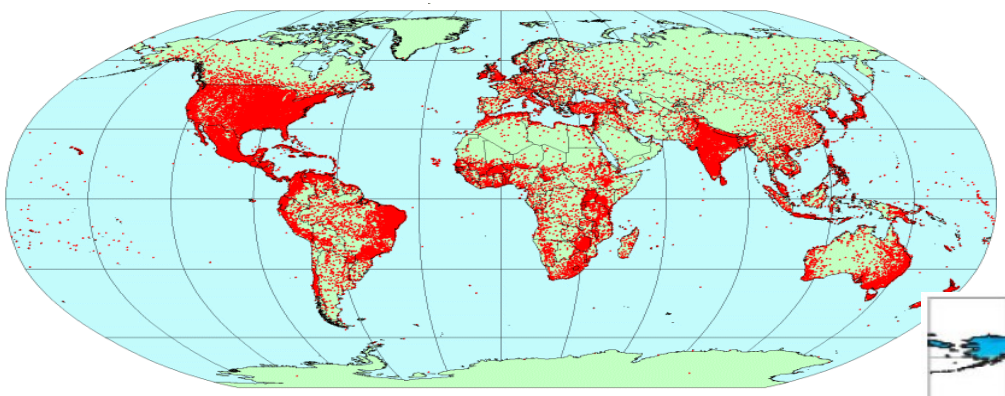
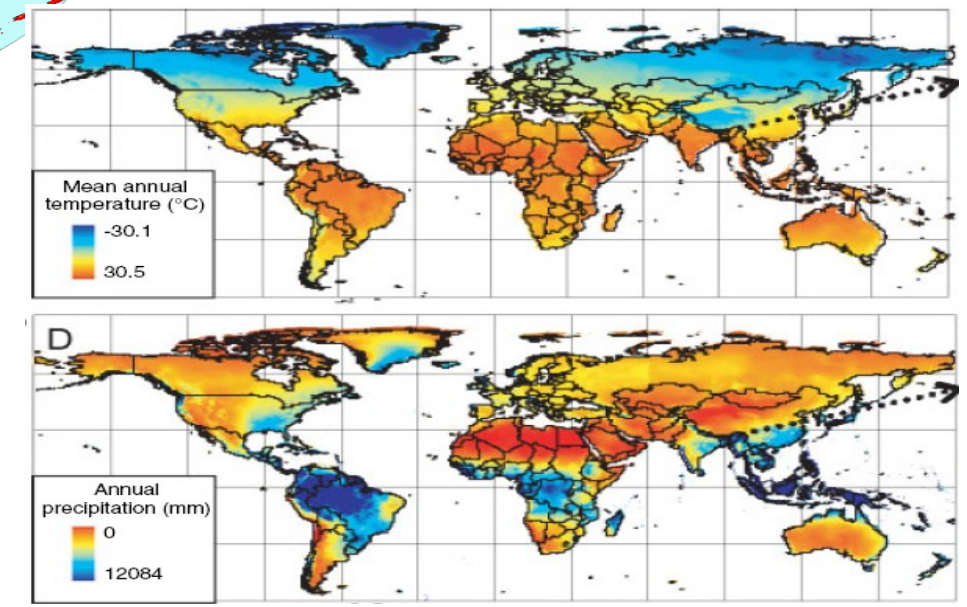


Weather station records
(vector point data;
Hijmans et al. 2005)



Interpolated raster climate surfaces (WorldClim)