Al-Mustaqbal University
College of Sciences
Intelligent Medical System Department

جامعة المستقبل
AL MUSTAQBAL UNIVERSITY

كلية العلوم
قسم الانظمة الطبية الذكية

Lecture: (2)

Geographic Information Systems (GIS)

Subject: Map Anatomy
Level: Third
Lecturer: MS.C Ali Haider Alazam

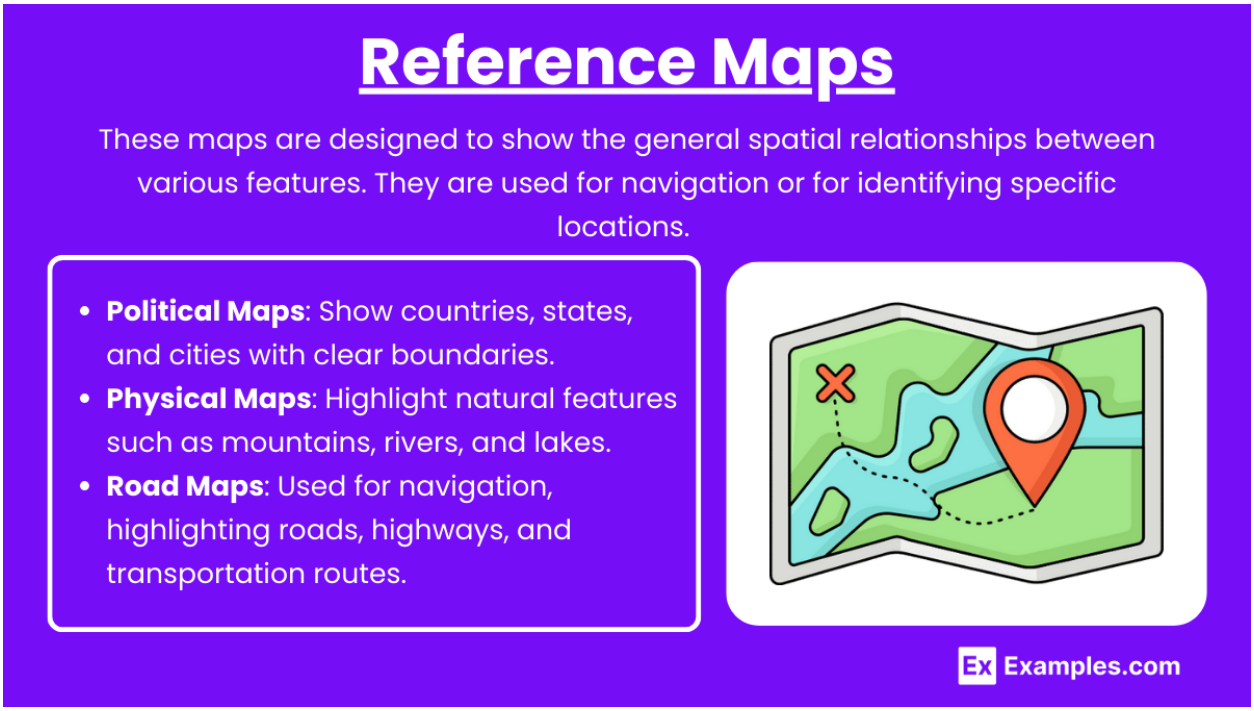
Types of Maps and Their Characteristics

1. Reference Maps

Reference maps are designed to show the general spatial relationships between various features.

They are used for navigation or for identifying specific locations. Examples include:

- **Political Maps**: Show countries, states, and cities with clear boundaries.
- **Physical Maps**: Highlight natural features such as mountains, rivers, and lakes.
- **Road Maps**: Used for navigation, highlighting roads, highways, and transportation routes.



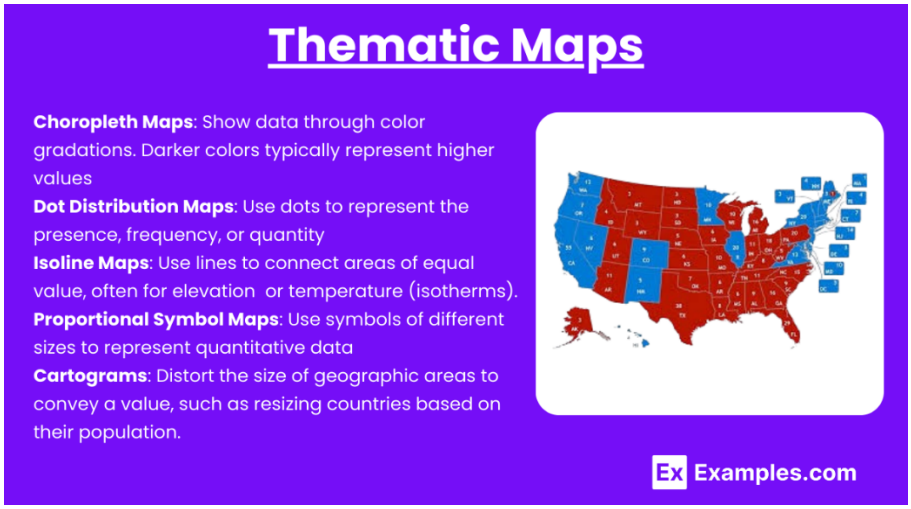
2. Thematic Maps

Thematic maps focus on a specific theme or subject area, such as population density, climate, or economic activities.

They emphasize spatial variation of one or a few geographic distributions.

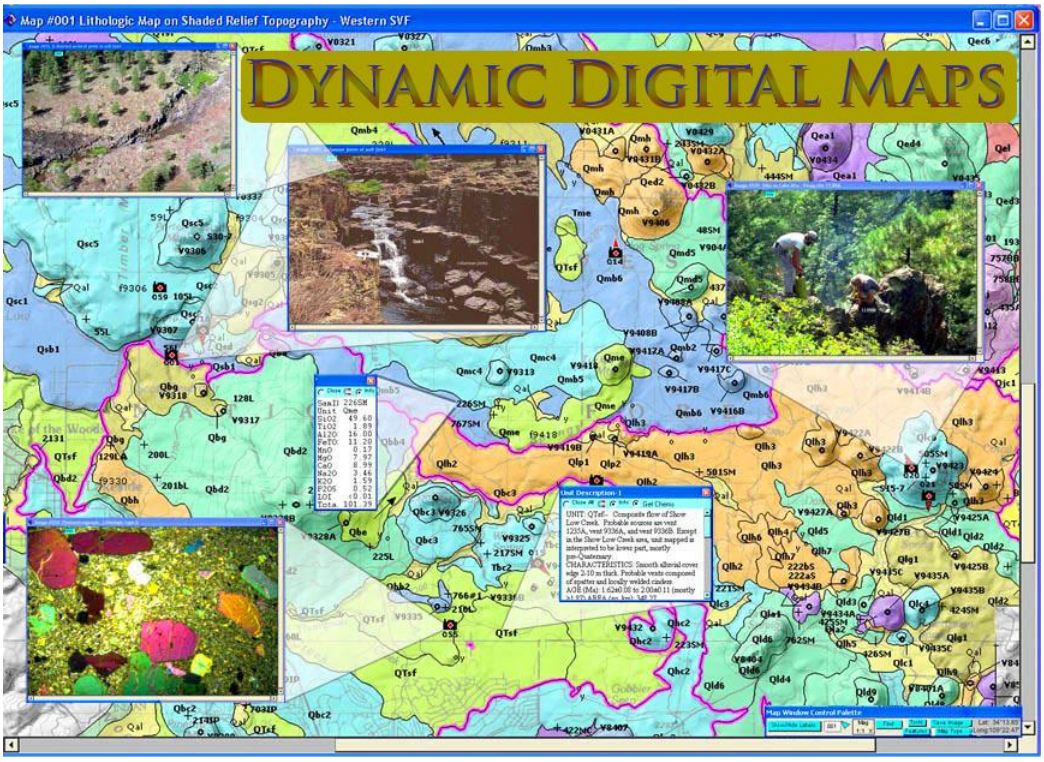
Types of Thematic Maps:

- **Choropleth Maps**: Show data through color gradations. Darker colors typically represent higher values, such as population density or income levels.
- **Dot Distribution Maps**: Use dots to represent the presence, frequency, or quantity of a phenomenon, such as the distribution of farms.
- **Isoline Maps**: Use lines to connect areas of equal value, often for elevation (topographic maps) or temperature (isotherms).
- **Proportional Symbol Maps**: Use symbols of different sizes to represent quantitative data, like city populations or economic output.
- Cartograms: Distort the size of geographic areas to convey a value, such as resizing countries based on their population.



3. Dynamic Maps

Dynamic maps are computer programs that provide a framework for displaying high-quality color maps of an area in a way that is intimately linked to images, movies, analytical data, and text.



4. Interactive Maps

Interactive maps allow users to engage actively with the map. Users can manipulate and customize the information displayed on the map according to their needs and interests.

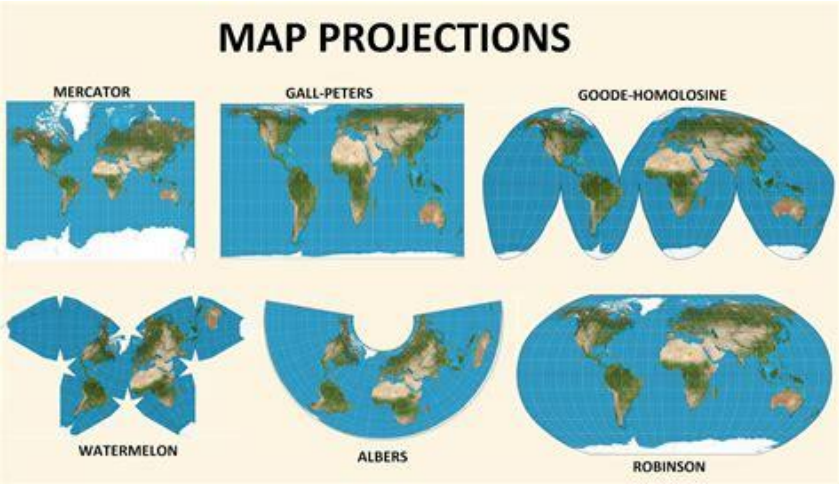
5. Map Projections

Map projection is a technique of flattening the spherical surface of the earth into a 2D map surface.

Since the earth is spherical, it is impossible to flatten it out perfectly without causing some distortions to either its shape, distance, size, or direction.

Types of Map Projections:

- **Conformal Projections**: Preserve angles, making them useful for navigation.
- **Equal Area Projections**: Preserve area, making them useful for showing the relative size of geographic areas.
- **Equidistant Projections**: Preserve distances from the center of the projection or along given lines.
- **Azimuthal Projections**: Preserve directions from a central point.

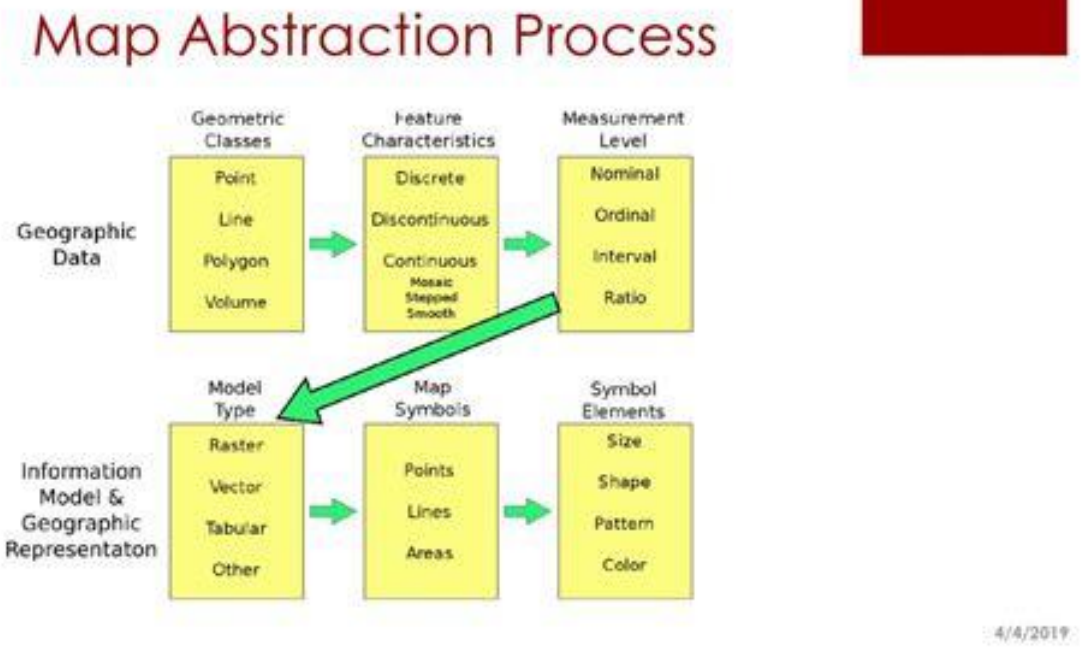


6. Map Abstraction

Map abstraction refers to the process of simplifying complex real-world features into a map-friendly format.

Features can be categorized into two types:

- **Discrete Features**: Well-defined and easy to locate, measure, and count, such as buildings, roads, and parks.
- **Continuous Features**: Less well-defined and exist across space, such as temperature and elevation.



7. Map Generalization

Map generalization is the process of resolving conflicts related to excessive detail.

For example, when mapping a large area, some features must be simplified to avoid overcrowding the map and to maintain clarity.