Cartography versus GIS under the 'Geomatics' umbrella

Cartography

Input -> map design -> Output

GIS

Input -> Database -> <u>Analysis</u> -> Output

Map Basics lecture - summary

- The nature of mapping
- Maps and data layers
- Types of maps /data
- Uses of maps / data
- Map Scales
- Coordinates

The nature of mapping:

1a. Mapping is never finished (especially here)



1b. There are multiple types of map products for the same area







2. Maps and data layers

Maps and datasets are composed of layers or themes – 'feature' types are organised in **layers** e.g. roads, rivers etc.. **There are three (<u>vector</u>) types: points, lines** and **areas** (polygons-GIS)



Raster (grid) layers

In addition to the 3 'feature' types, there are continuous grids (rasters) e.g. for air photos, images, relief models









3. Types of Maps and data



Figure 1. Geomatics (After Konecny, 2002)

KONECNY, G. (2002). Recent Global Changes in Geomatics Education, Proceedings of 22nd FIG Congress 2002, Washington, D.C.

a. General purpose (topographic) - 'base layers'

These show the **visible features of the landscape** e.g. relief, water, and roads - base maps, relief maps, city maps (and nautical charts)



b. Special purpose (thematic) Emphasis is placed on a particular element

e.g. climate, geology, population density, industry.



Global coffee consumption

Canada: #12

http://www.theguardian.com/news/datablog/interactive/2011/dec/01/world-corruption-index-transparency-international-map

4. Purpose of Maps / spatial data

A. Display and store of spatial information (space)



4. Purpose of Maps & Spatial data

B. Historical record of spatial features (time)



Purpose of Maps & Spatial data

- A. Display and store of spatial information
- B. Historical record of spatial features



Kakwa Park, BC 1920

2010 (Google maps)

Purpose of maps: C. Communication tool



What is the red line at ~ 46°N?



General Uses of Maps & Spatial data

C: Communication tool e.g. propaganda





German map, world war II

Image screen captured from Route Flyover Ad at duration point 0:39:

Map image implies supertanker safety (by omitting islands) accidentally or not

Critical Cartography .. differs from academic **cartography** in that it links geographic knowledge with political power.



Image above adjusted to include representations of the islands that lie within the waterway (islands added by Lori Waters)



Communication propaganda: Promoting BC during the Gold Rush, 1858



D. Maps as works of art

http://www.antonthomasart.co



https://www.youtube.com/watch?v=B20WKWnDmRQ https://www.youtube.com/watch?v=4HpmWkBCFOE



Maps as works of art (and functional)

Maps of Whistler Blackcomb, Grouse Mountain and Sun Peaks among James Niehues many paintings.

CBC News · Posted: Mar 31, 2019 6:00 PM PT | Last Updated: March 31, 2019



https://www.outsideonline.com/2376261/man-behind-ski-maps

E. 'Vicarious' travel



5. Map Scales

The concept of scale is fundamental to mapping ...

Scale represents the reduction compared to the distances on the earth's surface.

Without a scale, it is more a 'diagram', (not a map)

Scale can be given in 3 ways:

a. <u>Verbal statement</u>

- For example, 1 cm to 10 km, 1 inch to 1 mile
- Verbal statements are simple to understand
- They are 'unit-dependent'

<u>b.</u> Ratio or 'representative fraction (RF)'

• This states the reduction as a ratio of fraction e.g. 1:100,000 or 1/100,000

- It is free of specific units (metric or imperial)
- It can describe map series and datasets e.g. 1:50,000
- 1:20,000 is a <u>larger</u> scale than 1:50,000 (reduced less) (1/20,000 <u>IS</u> a bigger fraction than 1/50,000)

<u>c. Scale bar</u>

- Graphic, units are stated e.g. kilometres or miles
- Scale bar adapts in size with zoom to match display



common world scales / map series / data 1:1,000,000 (world) Small 1:500,000

1:250,000 (federal/provincial) Medium (1:125,000)

1:50,000 (federal) 1:20,000 (provincial)

Large

>1:10,000 (municipal)

Cadastral (civic)

common world scales / imperial series Canada converted to metric post world war II

1: 506,880 1" = 8 miles -> 1:500,000 1cm:5km

The world is wholly metric except for Liberia, Myanmar and USA



6. Coordinates - global: N-S relative to the equator in degrees E-W relative to the Greenwich (prime) meridian

- The graticule is the imaginary grid of lines east-west lines of latitude (parallels) and north-south lines of longitude (meridians)
- The system was first devised by Hipparchus (190-120 BC)



The Greenwich Meridian

Location

...where east meets west

Home
Interactive UK map
Interactive World map
Visit
Royal Observatory Greenwie
Latitude and Longitude
Airy Transit Circle (ATC)
WGS84 and the Greenwich Meridian

The Greenwich Meridian before the ATC

The Quest for Longitude

International Meridian Conference (1884)

Meridian Day (1984)

The Millennium

Millennium Tree Line (MTL)

Meridian Laser

Astronomers Royal

Telescopes used with Meridian Marks

England
West Sussex

East Grinstead S side of: B2110 (Lewes Road) Distance (S) from 39.39 Km: 24.48 miles Greenwich OS map details OS Explorer: 135 OS grid ref TQ 39945.37948 (539945,137948)

WGS84 lat/long 51

Type Marking date Access OS Explorer: 135 TQ 39945.37948 (539945,137948) 51.123729, -0.001647 Click here for images Marker 'stone' 2000 Unrestricted

Show satellite view





A. 'Geographic Referencing' We identify locations by latitude, longitude (degrees)

e.g. UNBC campus agora In decimal degrees: 53.892381, -122.813699 (N, W)

See: http://maps.google.ca (right-click)

In degrees, minutes, seconds: or degrees / decimal minutes 53 ° 53' 33" (N) 122° 48' 50" (W) 53° 53.543' N 122° 48.822' W

B. Local and regional coordinates: UTM

In metres north relative to the equator (N-S) and east relative to a (local) 'central meridian' (E-W)

PGMap viewer



https://pgmap.princegeorge.ca/Html5Viewer/index.html?viewer=PGMap