Geographic information systems

Collecting data,
positional integration of data

(Lesson 3)

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Overview

- layers by the form of representation:
  - vector
  - raster

- layers in local disk files

  - on the computer

- layers in database (with extension for spatial objects)

  - i.e. PostgreSQL with PostGIS, Oracle with Spatial extension etc.

  - database can be located on remote computer

- web map services (WMS, WFS, WCS)

  - through the http protocol

Web map services

- WMS, WFS, WCS layers

- **WMS** (Web Map Service) – raster image (layer, map) with coordinates

- **WFS** (Web Feature Service) – geographic objects, which the queries or spatial analyses can be applied to

- **WFS-T** (transaction WFS) – allow for creating, updating and deleting objects

- **WCS** (Web Coverage Service) – raster layers with coordinates (images etc.)

CSV – delimited text file

- text file (**C**omma **S**eparated **V**alues)
  - we can create it in text editors such as **Notepad** (Windows)
  - we can also save table editor (such as MS Excel) sheet as CSV file

- properties:
  - each row represents record for 1 point
  - such record consists of x and y coordinates and other (non-geometric) attributes
  - attributes are separated by a delimiter, i.e. comma, semicolon, tab, space and other

CSV – delimited text file

- we can import CSV file into QGIS as a point layer via **Layer → Add Layer → Add Delimited Text Layer**

```
x y skratka nazov

19.164 48.717 BB Banskobystrický

17.587 48.396 TT Trnavský

18.098 48.316 NR Nitriansky

18.063 48.882 TN Trenčiansky

18.734 49.219 ZA Žilinský

21.242 48.994 PO Prešovský

21.261 48.711 KE Košický

17.124 48.146 BA Bratislavský
```
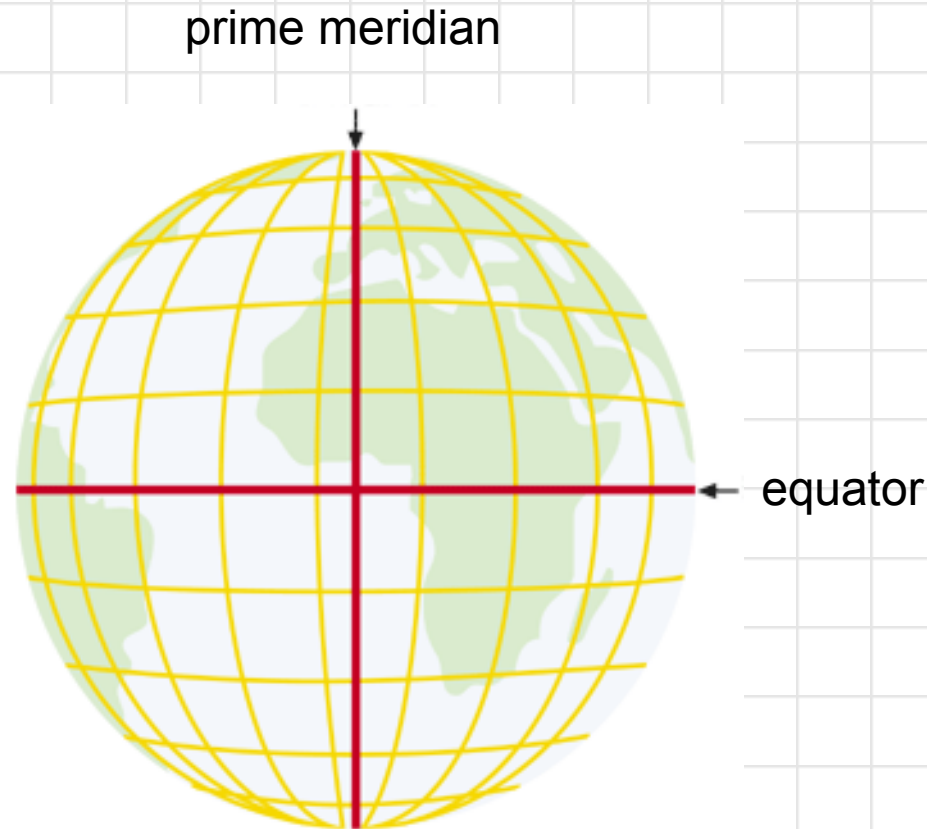
CSV – delimited text file

Homework no.2

- find GIS data (vector, raster, WMS ...) on the internet

- create the list of resources with the description of content, format, accessibility (charged/free of charge), ...

- send it as text document to stankova@fns.uniba.sk

- deadline: until the next lesson

Cartographic aspect of GIS

prime meridian

equator

Mitchel (2005)

- each point position is defined by the coordinates – **latitude**, **longitude** – which are <u>always</u> related to the reference ellipsoid or sphere called **datum**
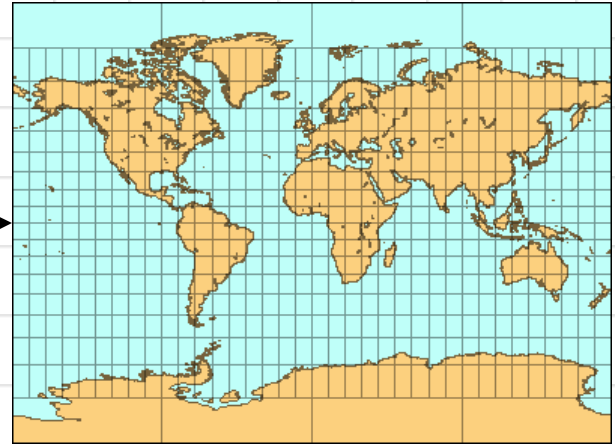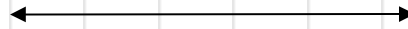
- units: **degrees**

Most widely used datums

- WGS84 – global (used in GPS)

- Krassovsky – used in Czech, Slovak republic …

- Bessel – used in Czech, Slovak republic …

- ETRS99 – used in European Union

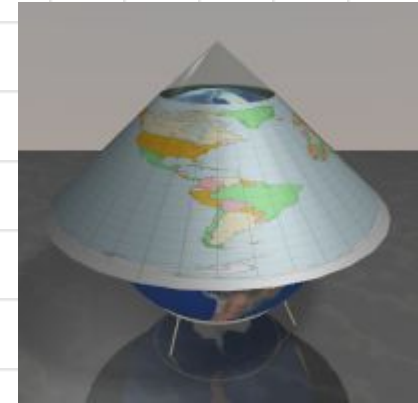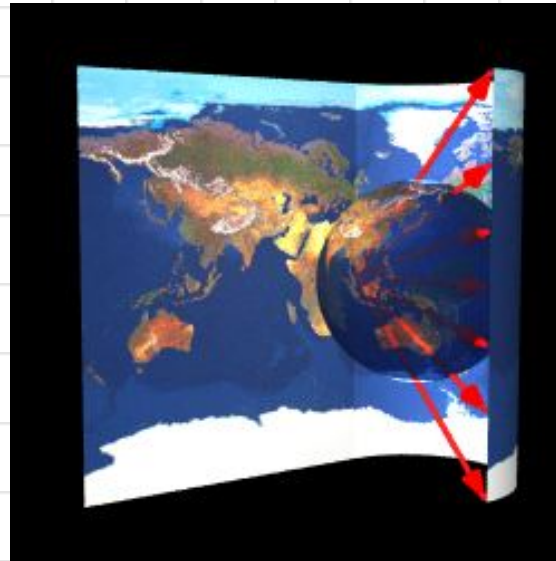- datum transformation is realized by conversion of the coordinates (lat, long)
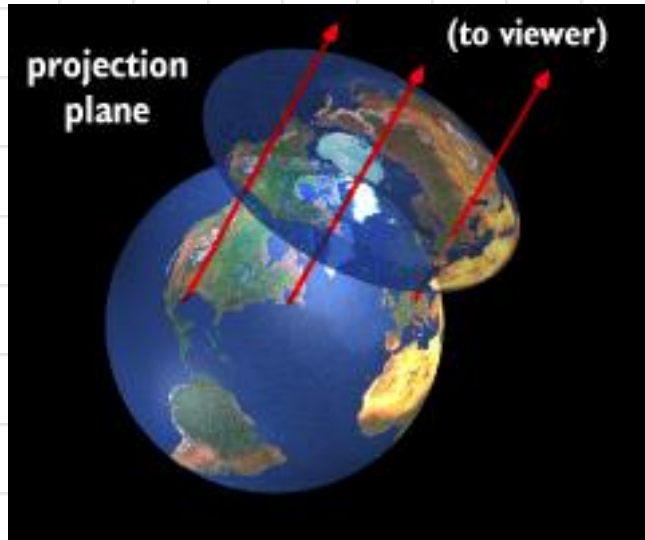
Map projections

?

- projection of the globe to the plane
- projection on the **plane**, **cylinder**, **cone**
- units: **linear units** (i.e. meters)

Map projections (projection planes)

- projection on the plane (geometrical):
  - planar, cylindrical, conical
- mathematical projection

Most widely used projections

- S-JTSK Krovak
  - all base maps in Slovak & Czech republic
  - all cadastral maps
  - most widely used in Slovak & Czech republic
  - not used elsewhere
- Gauss-Krueger
  - military maps (used in SR, CR and outside)
- UTM (Universal Transverse Mercator)
  - global (widely used in USA and other countries)

Map projections in GIS

- fundamentals:
    - we can only work with layers in the same coordinate reference system (CRS)
    - layers in different CRS we have to transform into one CRS

- positional integration of map layers in QGIS:

  - set up the layer coordinate system:

Layer Properties → General → Coordinate reference system → Select CRS

  - set up the project coordinate system:

Settings → Project → CRS → Enable 'on the fly' CRS transformation

Map projections in QGIS

- **WGS84**

  EPSG: 4326

  (Geographic Coordinate Systems)

- **SJTSK (Greenwich) / Krovak East North**

  EPSG: 5514

  EPSG: 102067

  (Projected Coordinate Systems - Krovak)

The End

Thank you for attention!