

Introduction to GIS

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December 7, 2015

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- 2) Mapping and visualization
- 3) Analysis

GIS Software

ArcGIS

- Most popular
- Online and desktop versions
- Probably use this in professional contexts

Quantum GIS

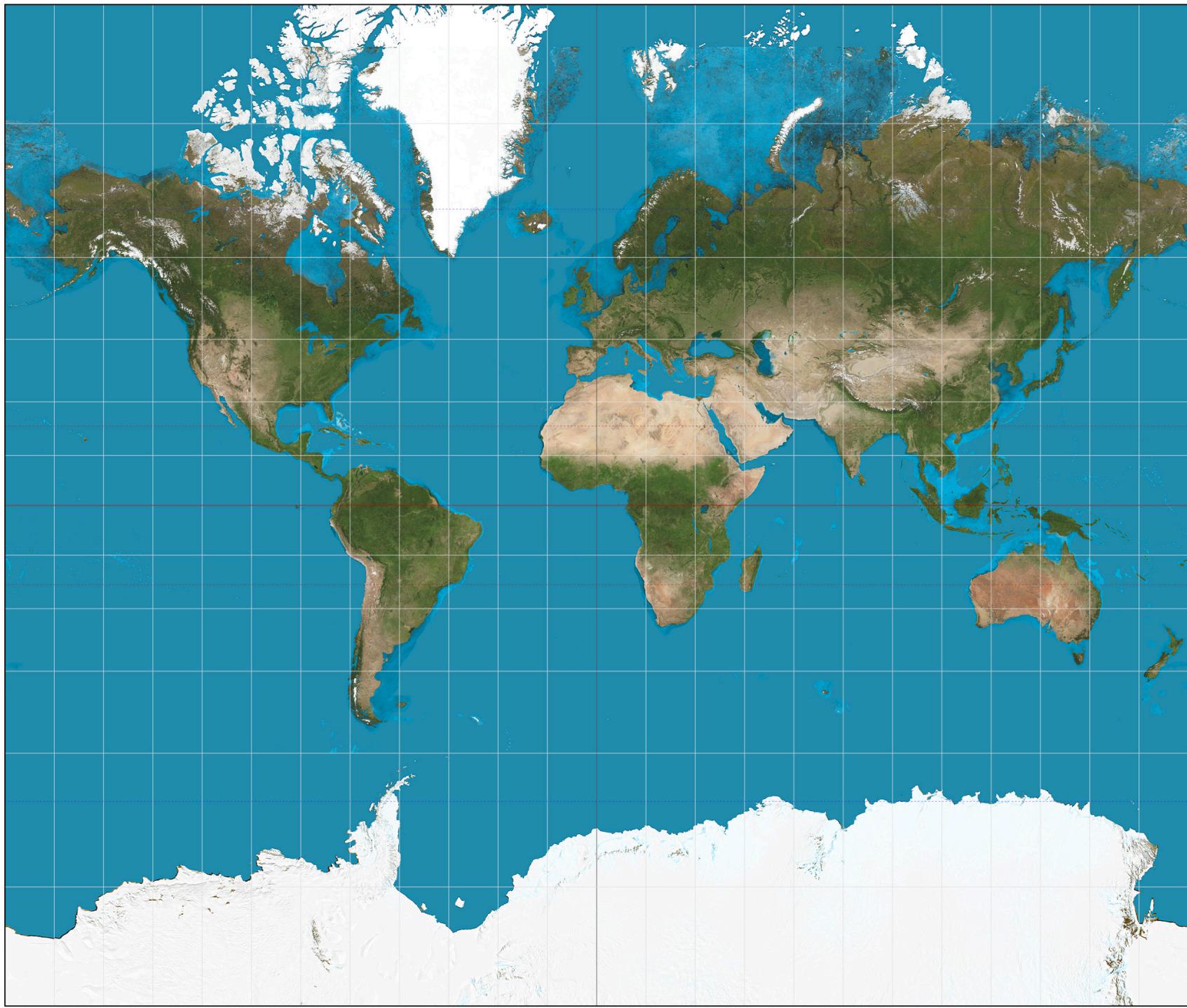
- Free and open source
- Robust user community

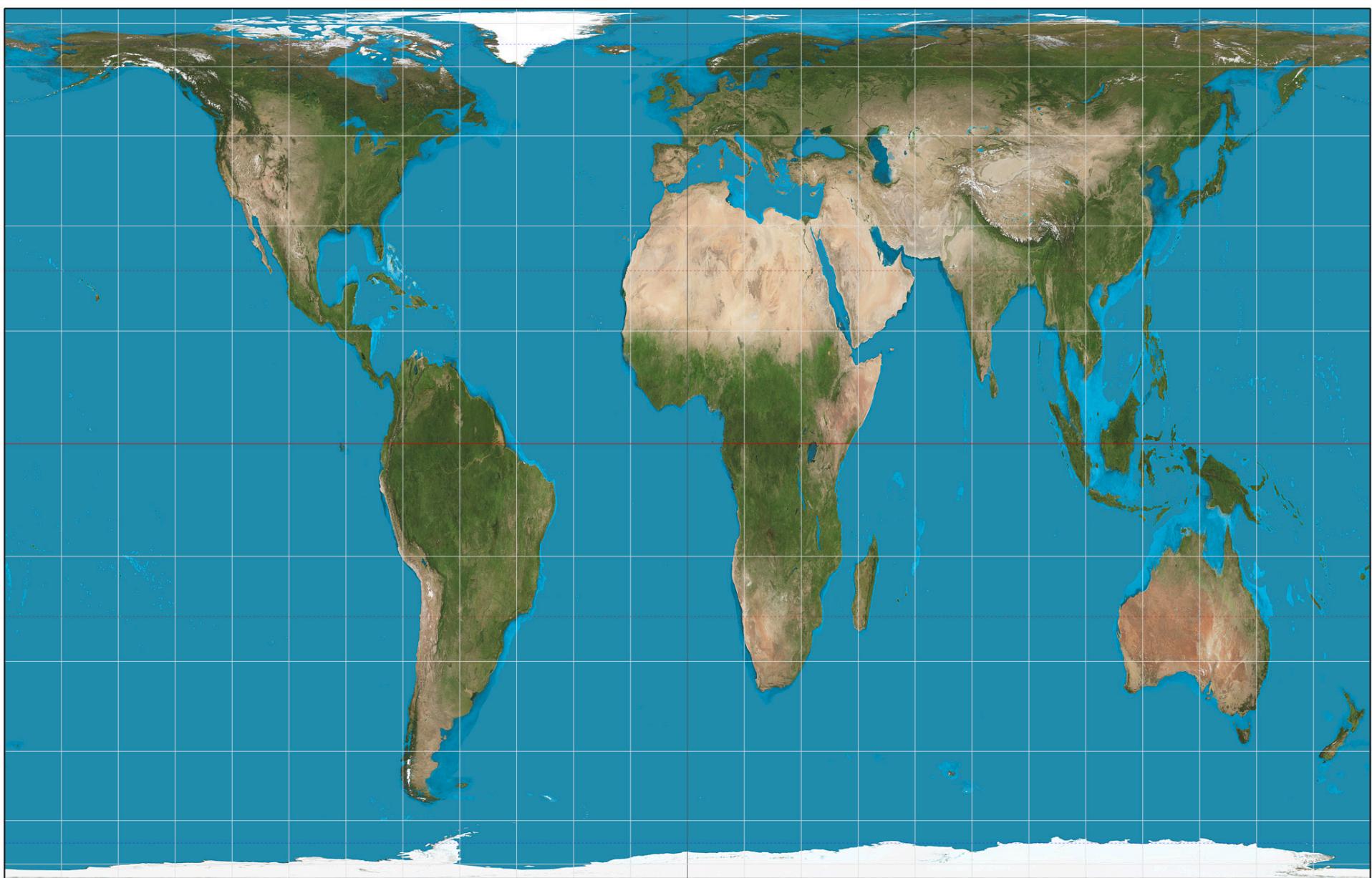
Map Projections

Earth is an oblate spheriod.

Computer screens and maps are flat.

Map projections represent spheriods on flat surface. However, often a trade-off between distance, direction, scale, and area.





Spatial Data Types

Raster

- Grid cells (rows, columns)
- Each cell contains data

Example: Satellite image of Kitchener, each cell contains colour / temperature / elevation

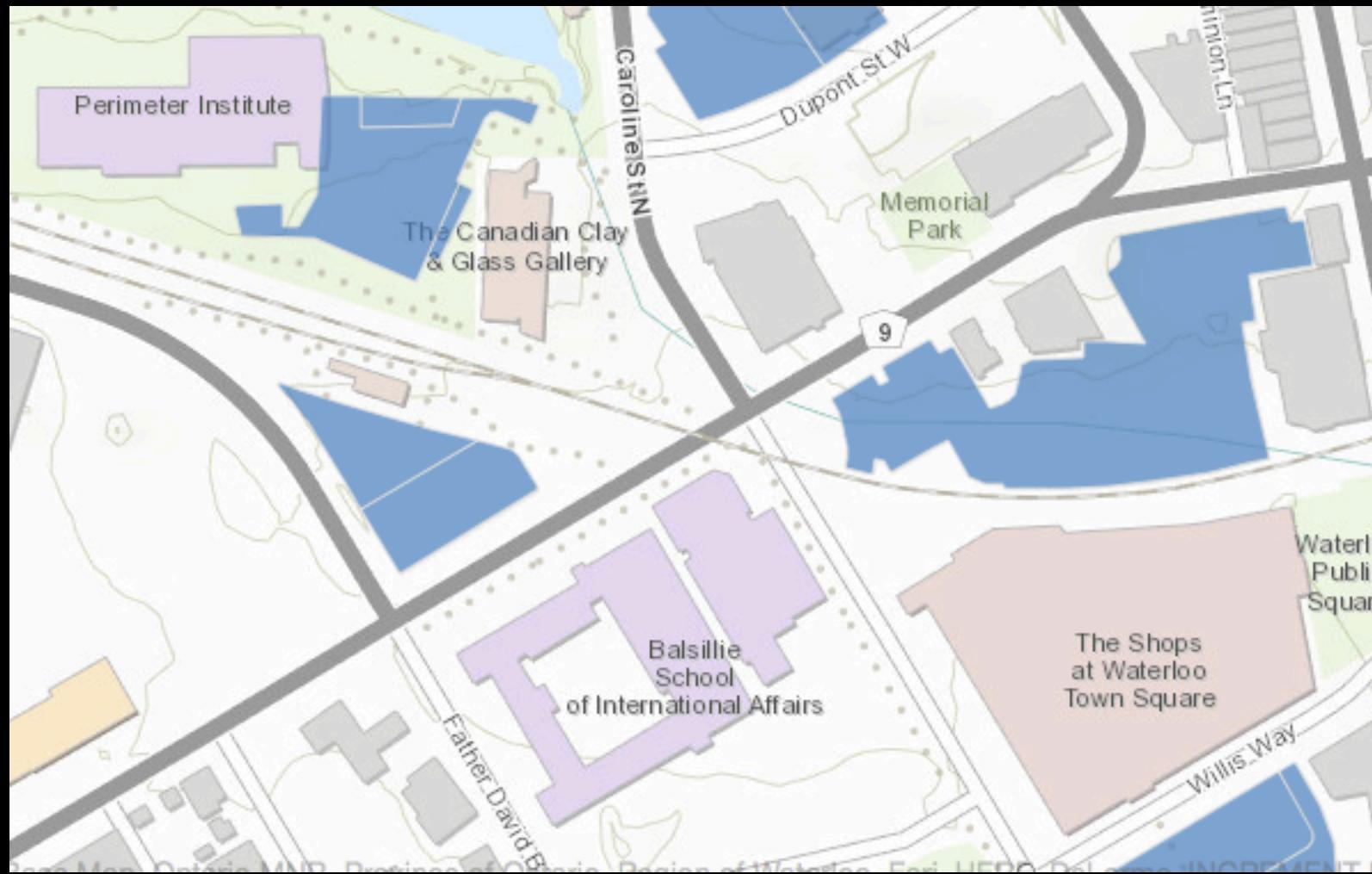


Spatial Data Types

Vector

- Coordinate-based (x,y)
- Points, lines, polygons
- Each point / line / polygon contains data

Example: Hospital with number of beds / doctors.



File types

Today, we'll be dealing with shapefiles (.shp) and comma-separated values (.csv).

Shapefiles store geographic data.

Comma-separated value files stores tabular data.

GIS: Getting Started

Create a folder (\Desktop)

This is where we will store our files today.

Waterloo Region Census Tracts

Download Census Tract shapefile. On USB key.

Waterloo Region Census Tracts

Or Google Search:

Census Canada Shapefile > 2006

Census geographic boundary files

Census Tracts > Cartographic
boundary files > ArcInfo

Waterloo Region Census Tracts

Right-click shapefile > Attribute table > Query > Select CMAUID = 541

Right-click shapefile > Save as [selected] > (/Desktop...)

That's Kitchener CMA.

Waterloo Region Census Tracts

Add shapefile to ArcGIS:

File > Add data > ...

Examine properties:

Right-click shapefile > Properties

Examine attribute table:

Right-click shapefile > Attribute Table

Income Data

Canadian Census Analyzer:

UWaterloo Library > Find & Use
Resources > Statistics &
Numerical Data > Canadian Census
Analyzer

Income Data

We want 2006 Median Income for Census Tracts in Waterloo Region.

Census Tract > 2006 (Cumulative)
> Income and Earnings > Kitchener
> Median Income (\$)

Include CTUID > Download to a file > CSV > Submit Query

Income Data

Download `_data.csv` and `_header.txt` to
`(/Desktop/...)`

Open in Excel and rename columns according to
`_header.txt`

Delete CTUID = 0 (this is average for CMA)

We need to alter CTUID to have 2 decimal places:

Right-click column > Format Cells >
Number > 2 decimals

Income Data

Add to GIS:

File > Add Data > ...

Investigate income data:

Right-click .csv > Attribute Table

What column is shared between income data
and shapefile?

Joining Data

We need to join the shapefile and income so we can map income.

Right-click shapefile >
Properties > Join

Join based on CTUID > Check Join

Joining Data

Check that the join worked:

Right-click shapefile > Attribute Table

Is median income there?

Mapping Median Income

Now we want to map median income:

Right-click shapefile >
Properties > Symbology

Select Attribute to Map (Median Income)

Select breakpoints

Select colour scheme

Get Data: Transit Routes

Waterloo Region Open Data:

[http://www.regionofwaterloo.ca/
en/regionalgovernment/
OpenDataHome.asp](http://www.regionofwaterloo.ca/en/regionalgovernment/OpenDataHome.asp)

Download data:

Transit – GRT Routes > .shp

Transit Route Data

Add transit data to GIS

Open properties and check projection

Open attribute table

Interactive Map Data - Table

Map Data -> Table

Select tool > click on route (on map) > Open attribute table

Table -> Map Data

Click row in attribute table > view map data

Creating a map

Layout View is used to create final map products.

Supplement data with north arrows, legends, scales.

Add text, lines, description, etc.

Creating a map

Bottom left corner > Layout View

Add North Arrow

Add Legend

Add Scalebar

To edit data (colour scheme) go back to Data View