

# **Introduction to GIS**

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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

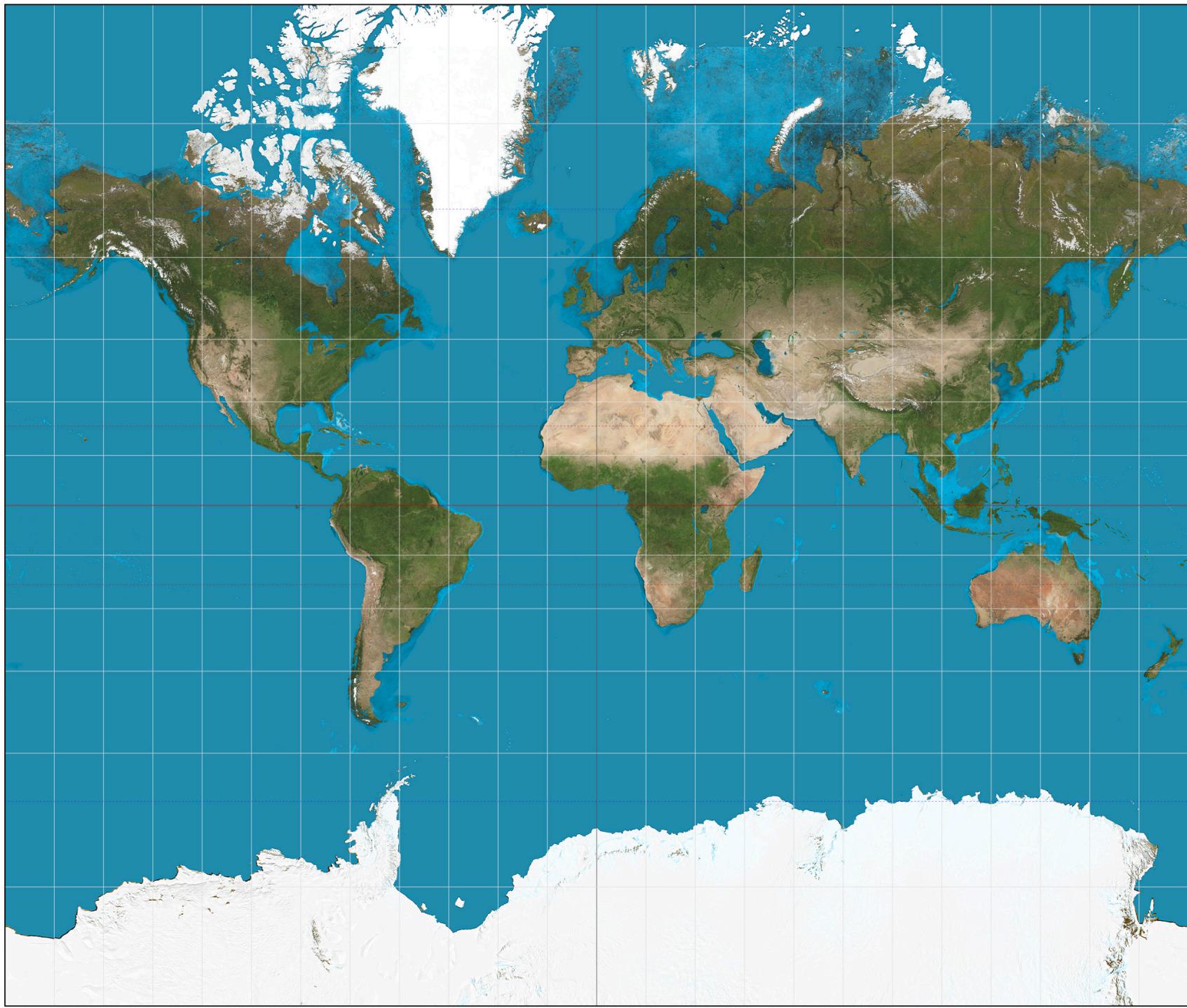
- Free and open source
- Robust user community

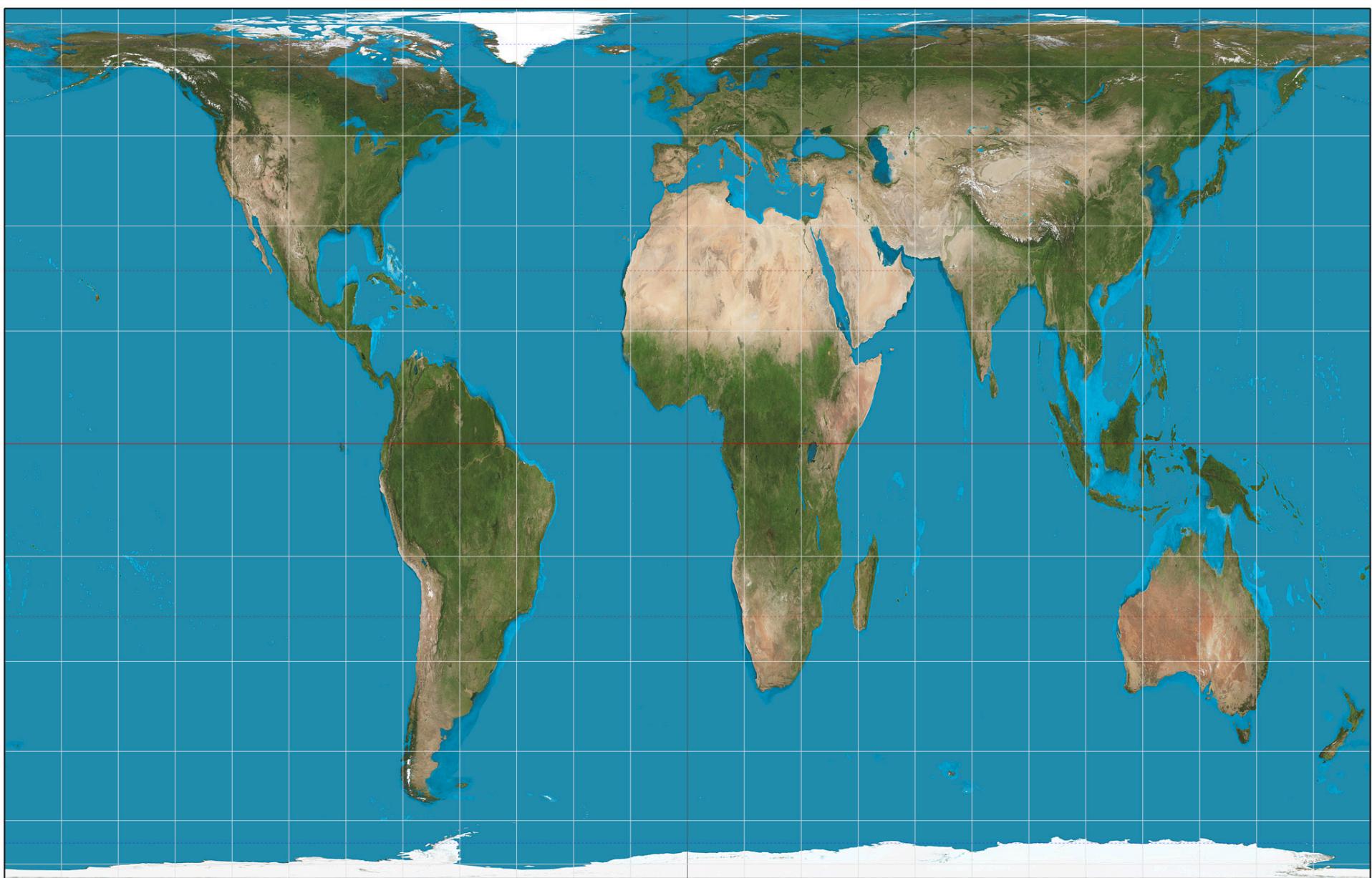
# Map Projections

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

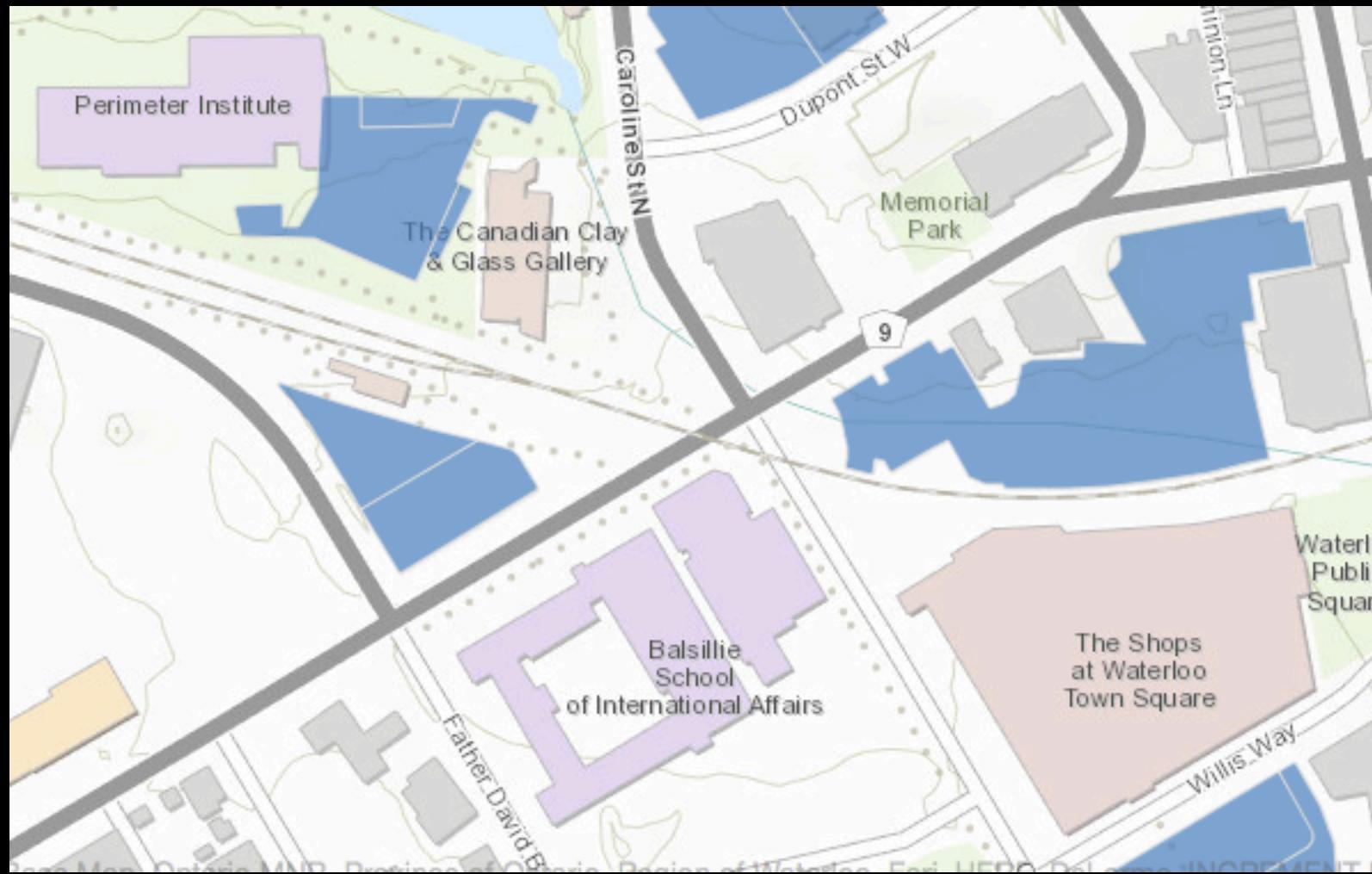


# Spatial Data Types

## 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 at:

[https://github.com/matthewquick/introGIS/tree/master/\\_data](https://github.com/matthewquick/introGIS/tree/master/_data)

Also being passed around on USB key

# 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