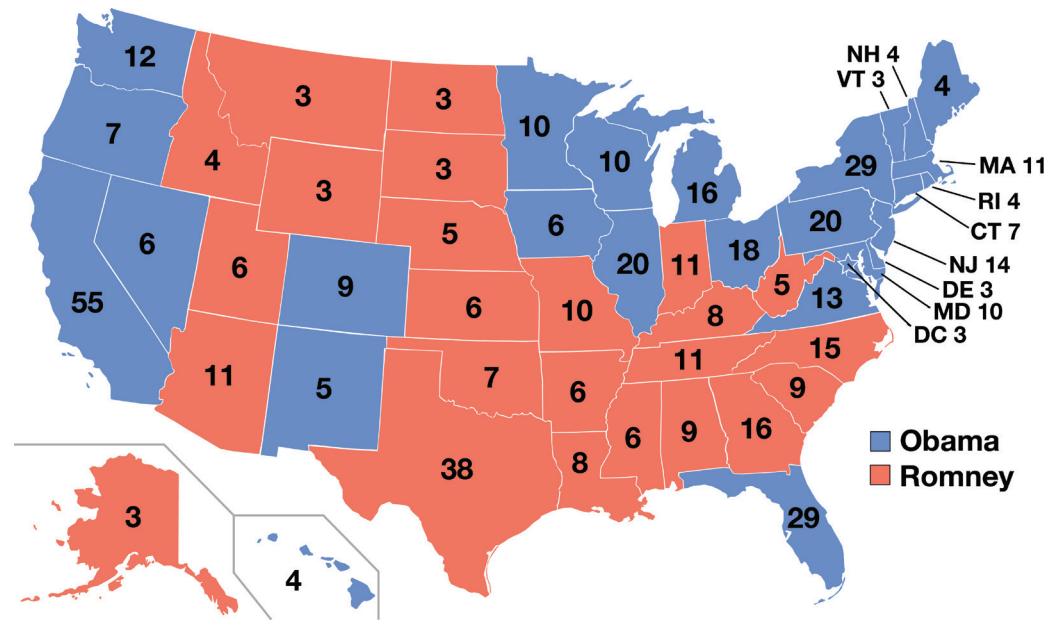
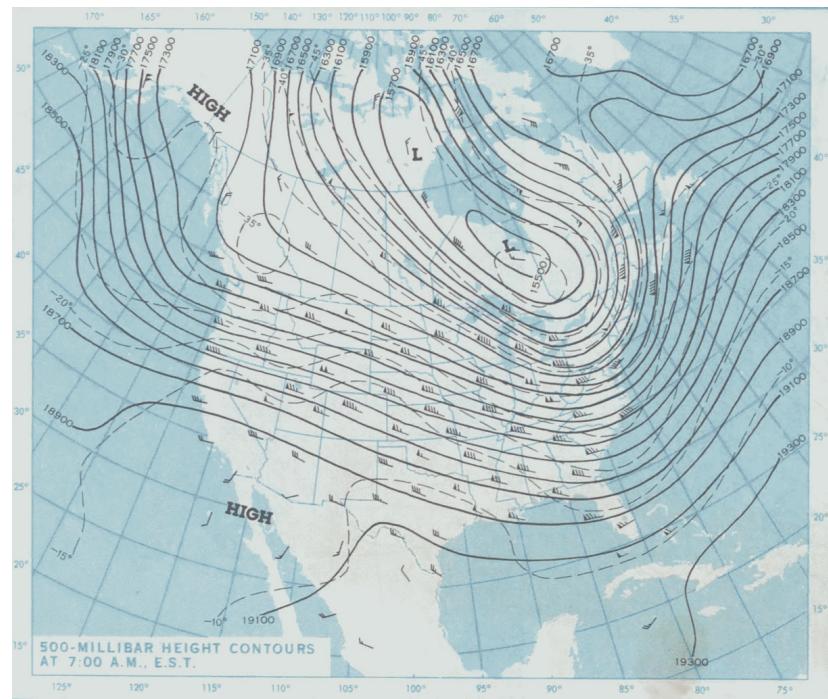
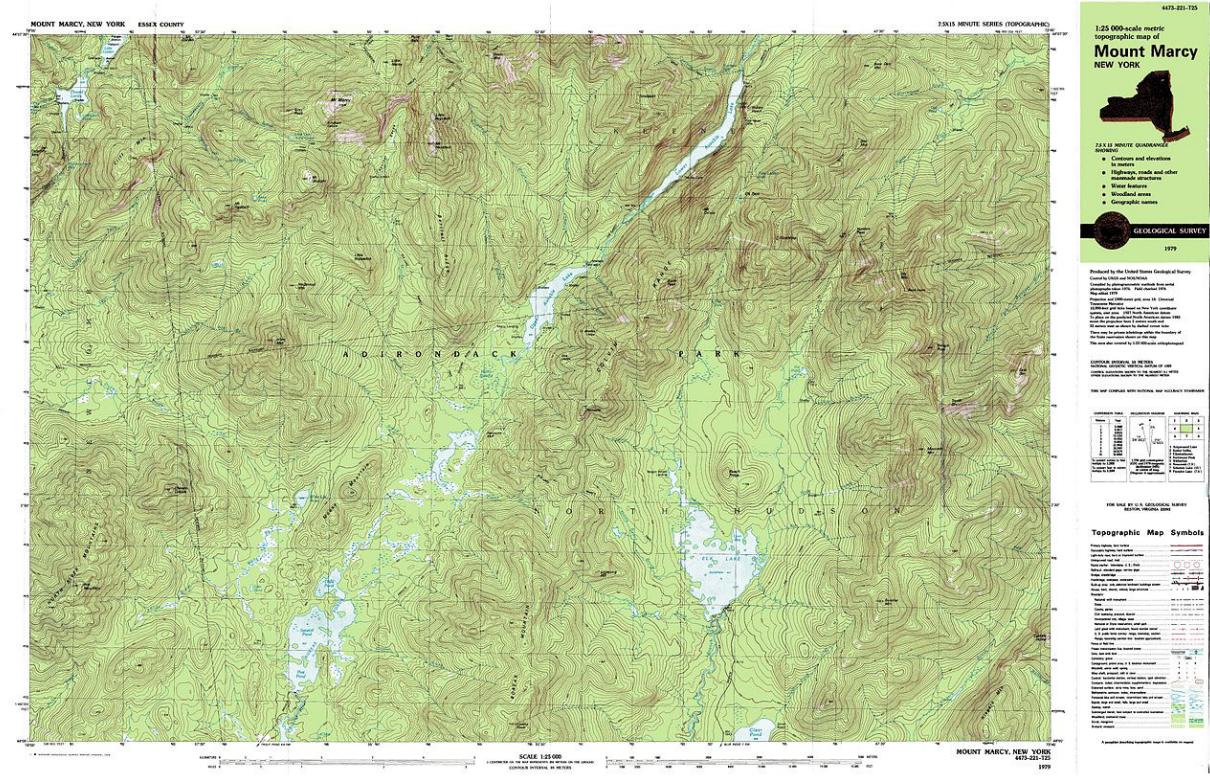
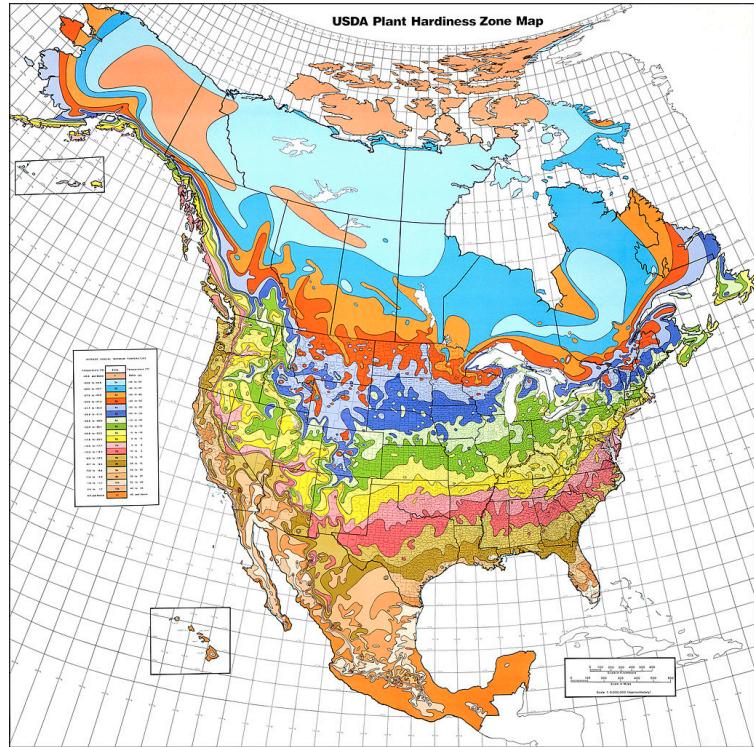
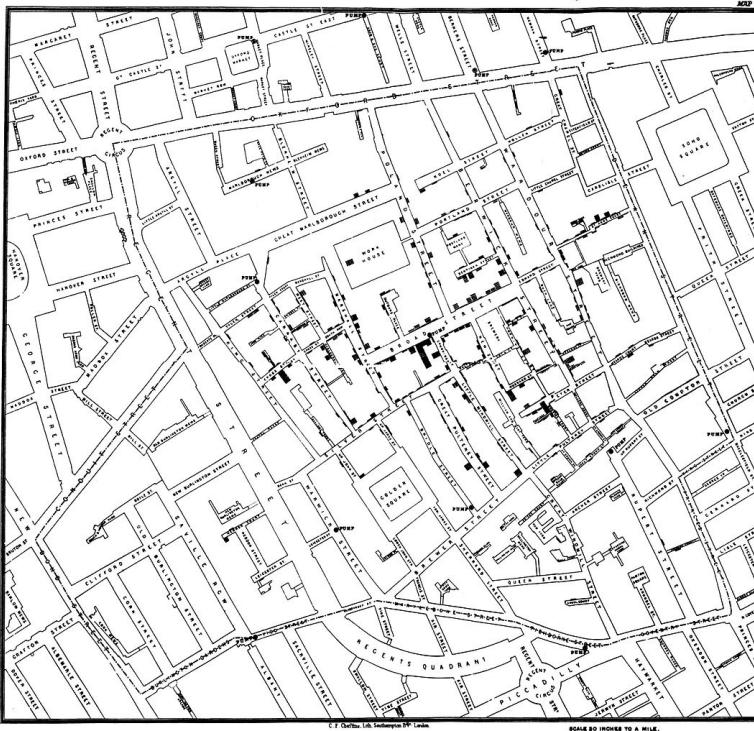


# **DORKSHOP: CARTOGRAPHY AND OPEN-SOURCE GIS**

**Chris Henrick  
Parsons MFA DT  
Fall 2013**

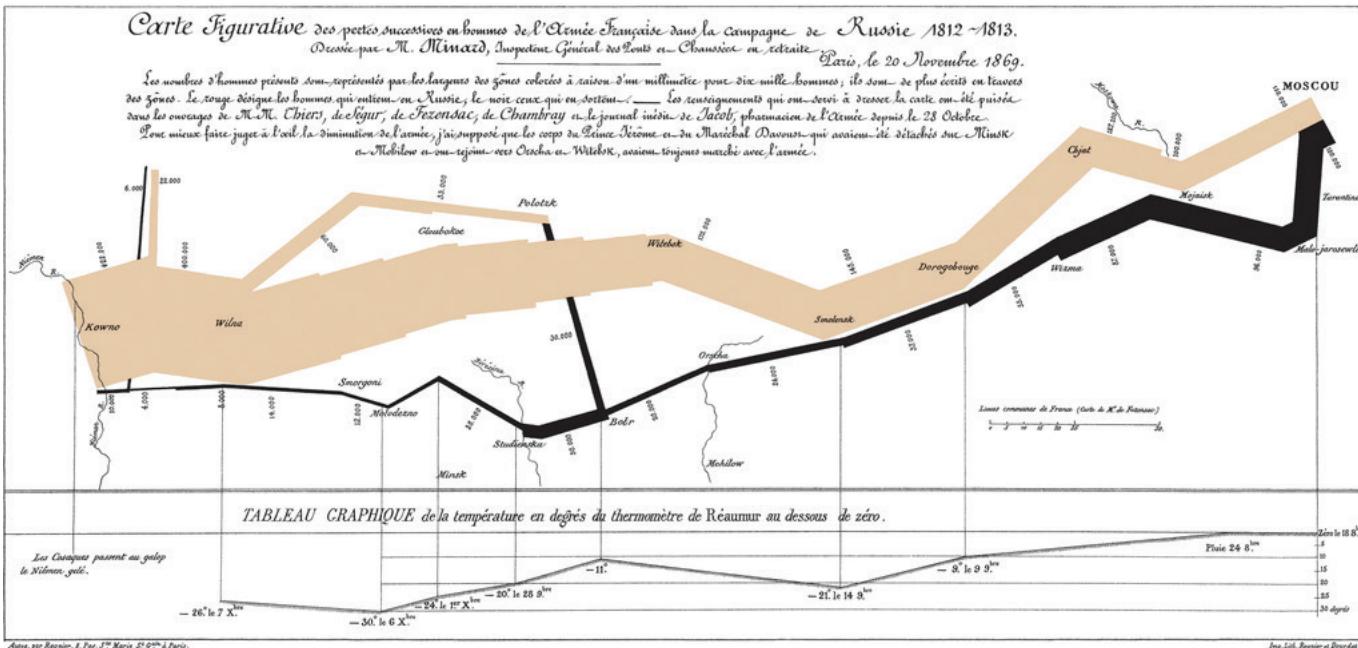


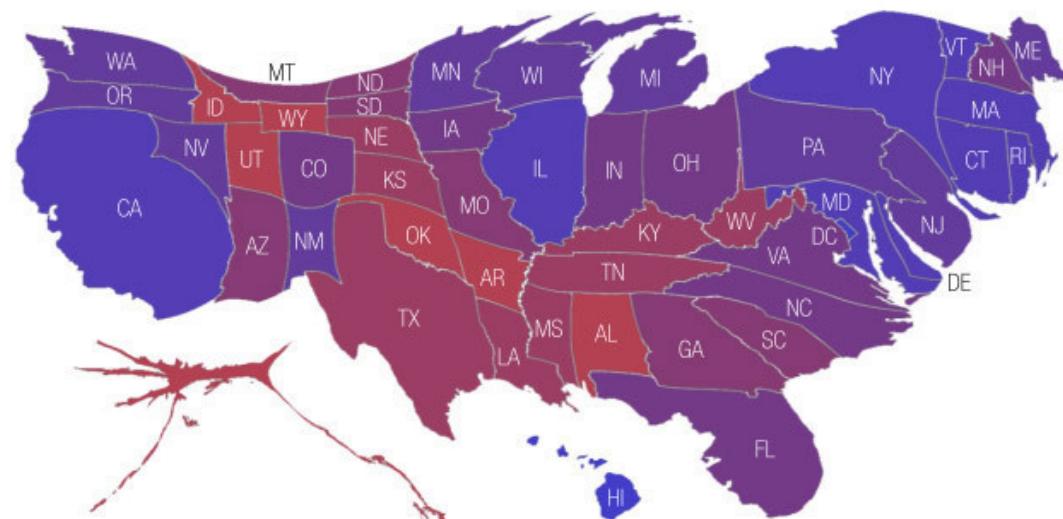
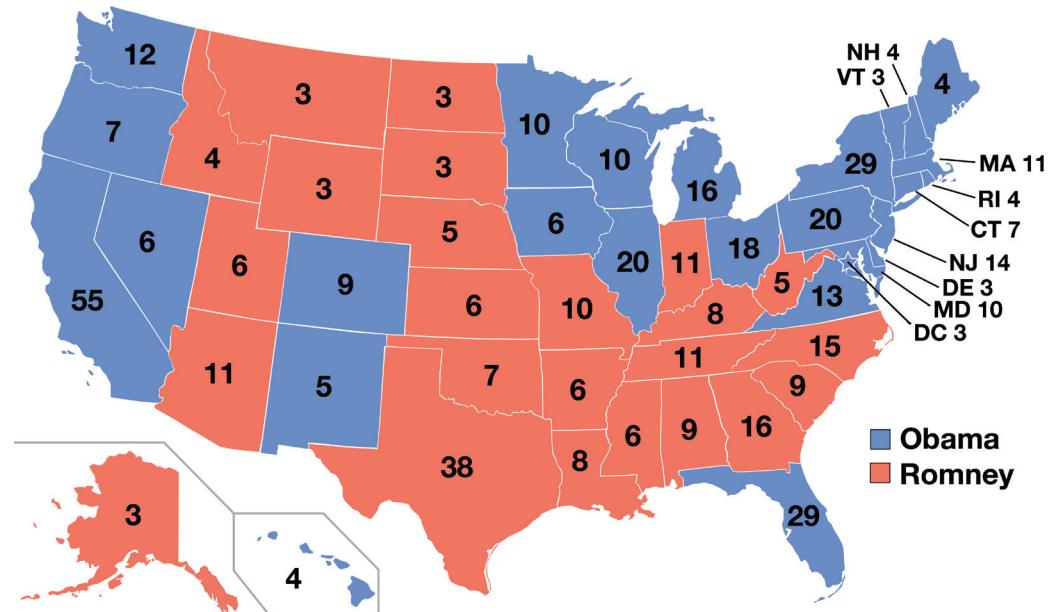


MAP 2.

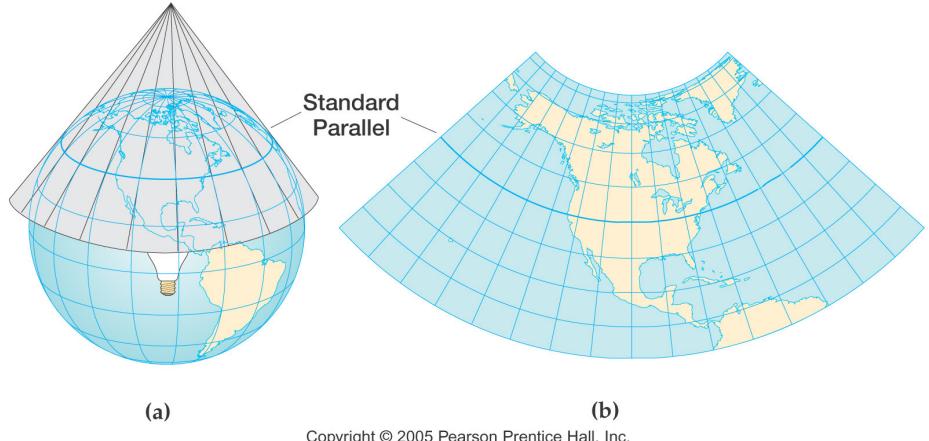
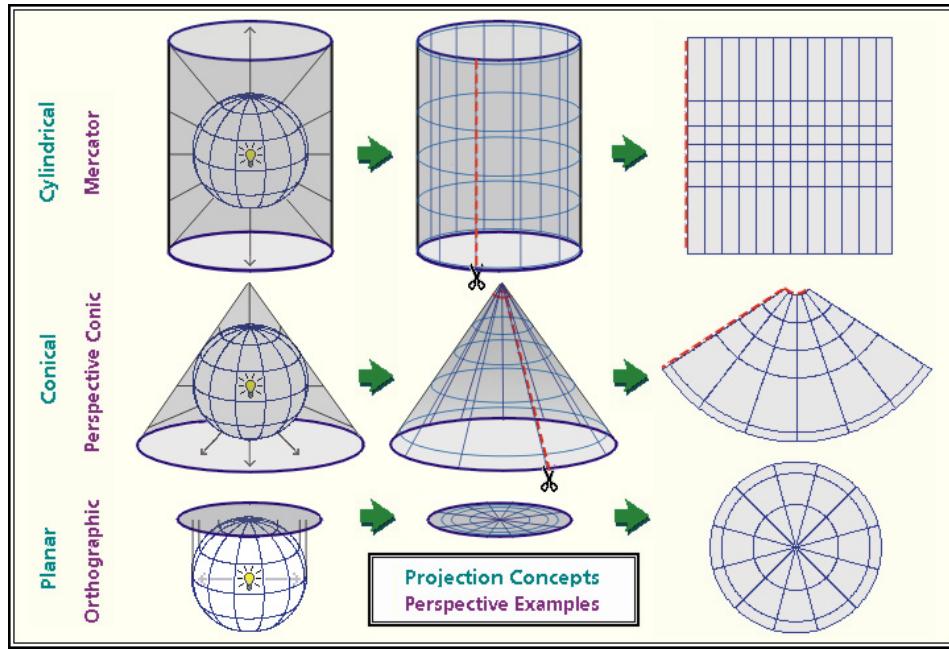
C. F. Carter. (See Titlepage for Date)

SCALE 80 INCHES TO A MILE.

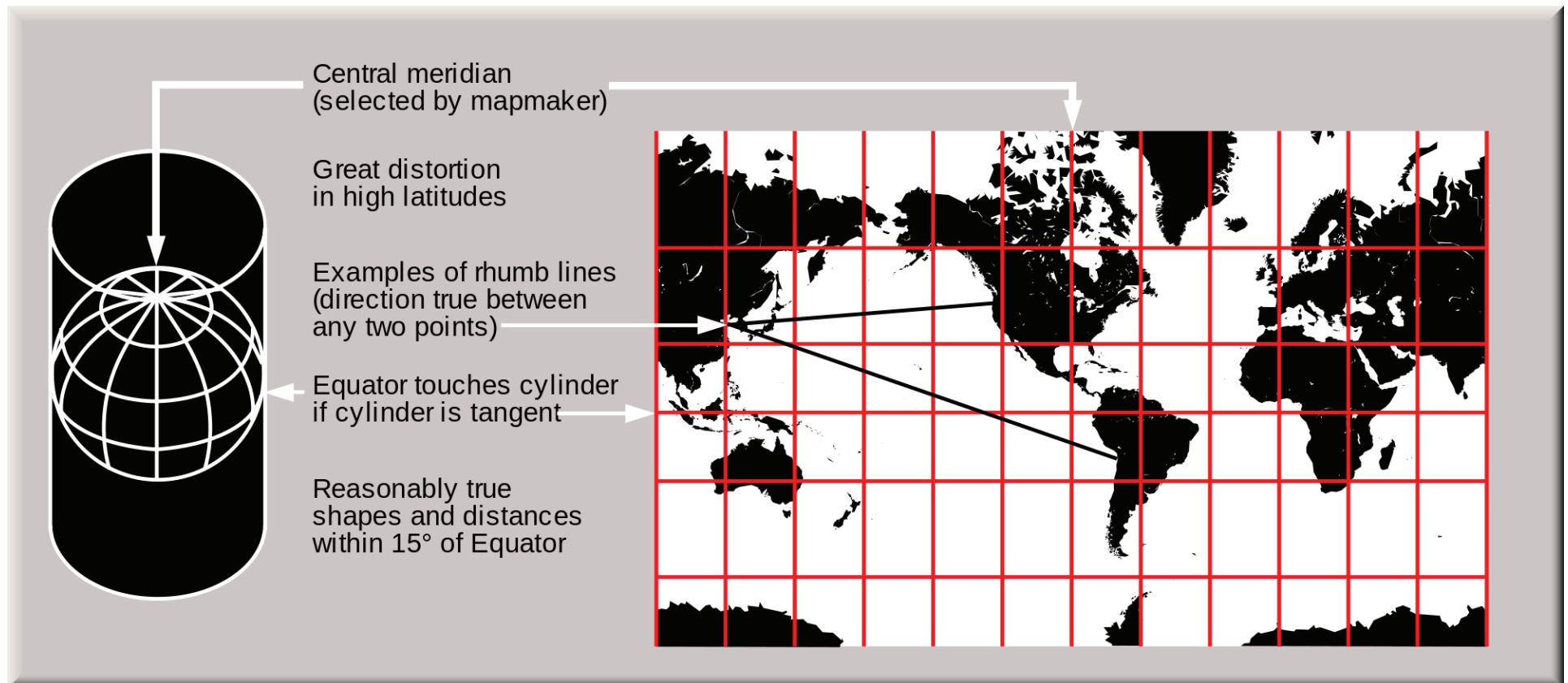


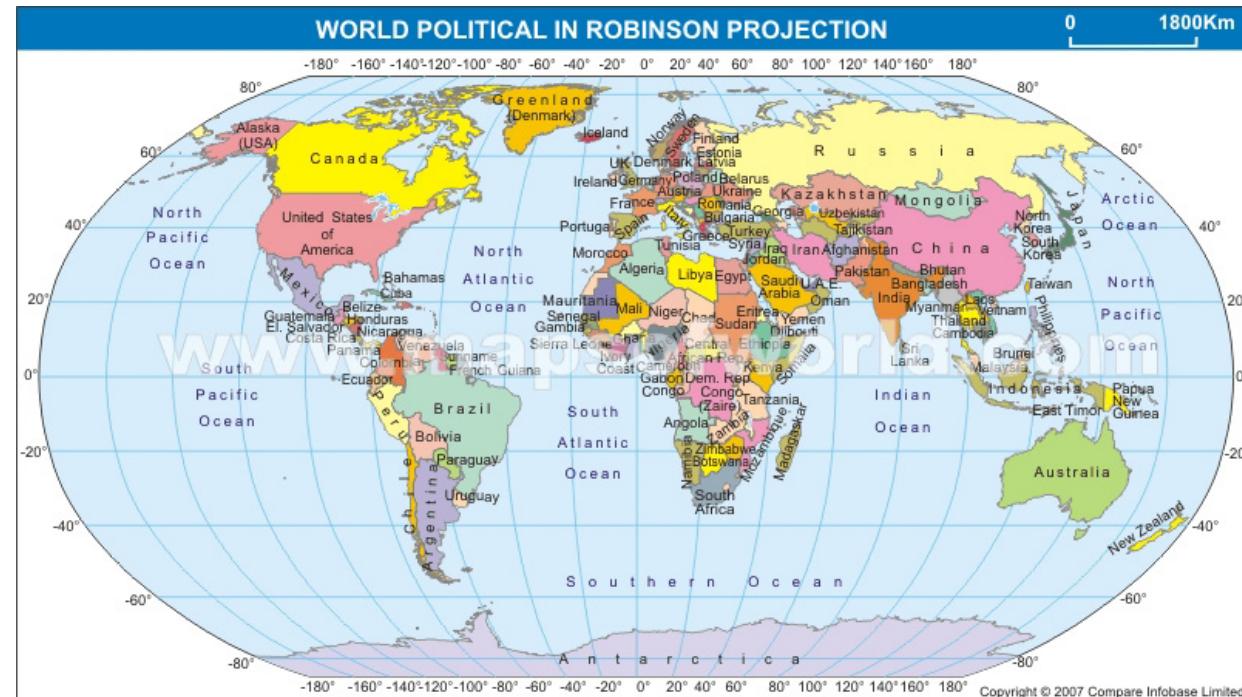




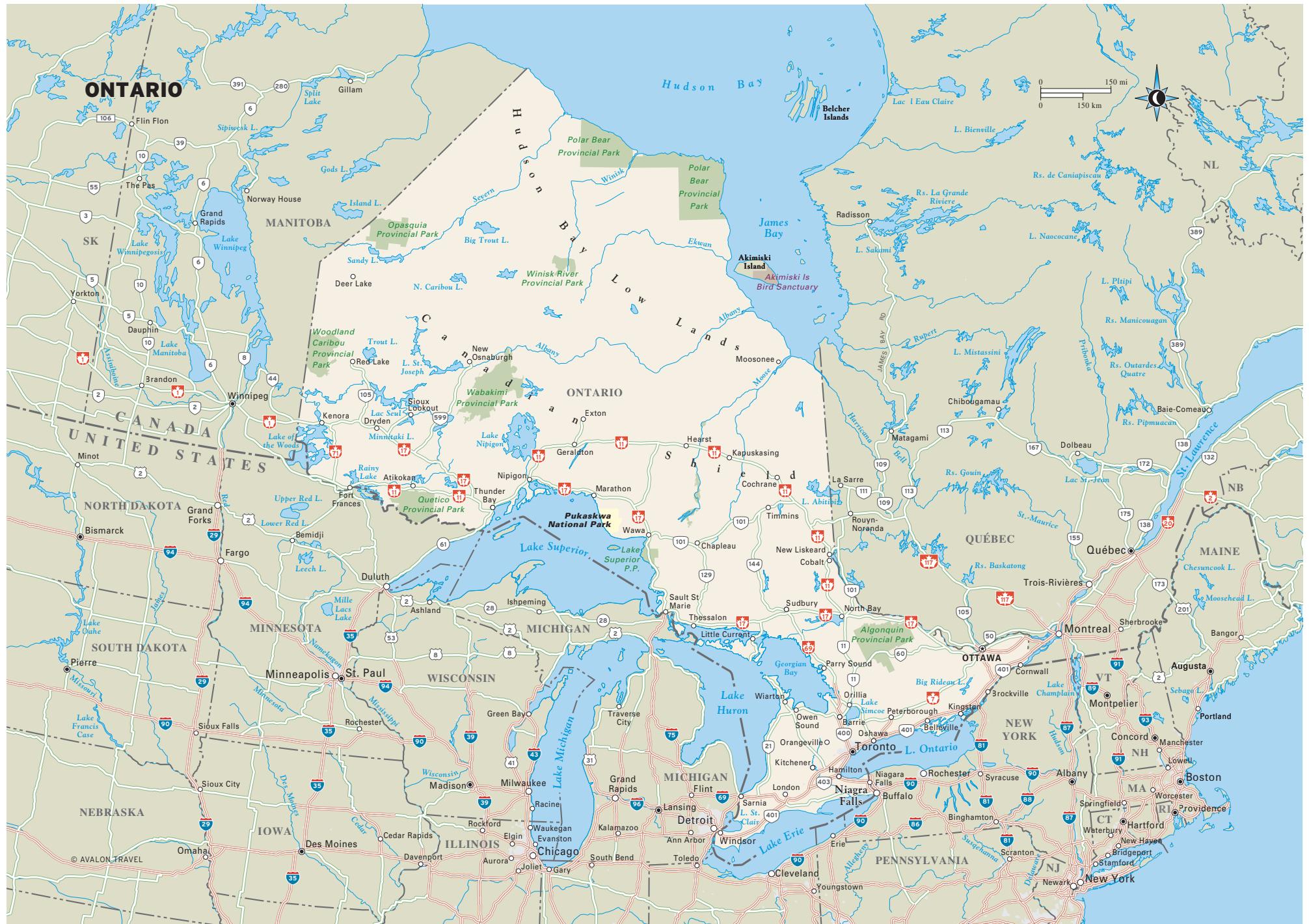


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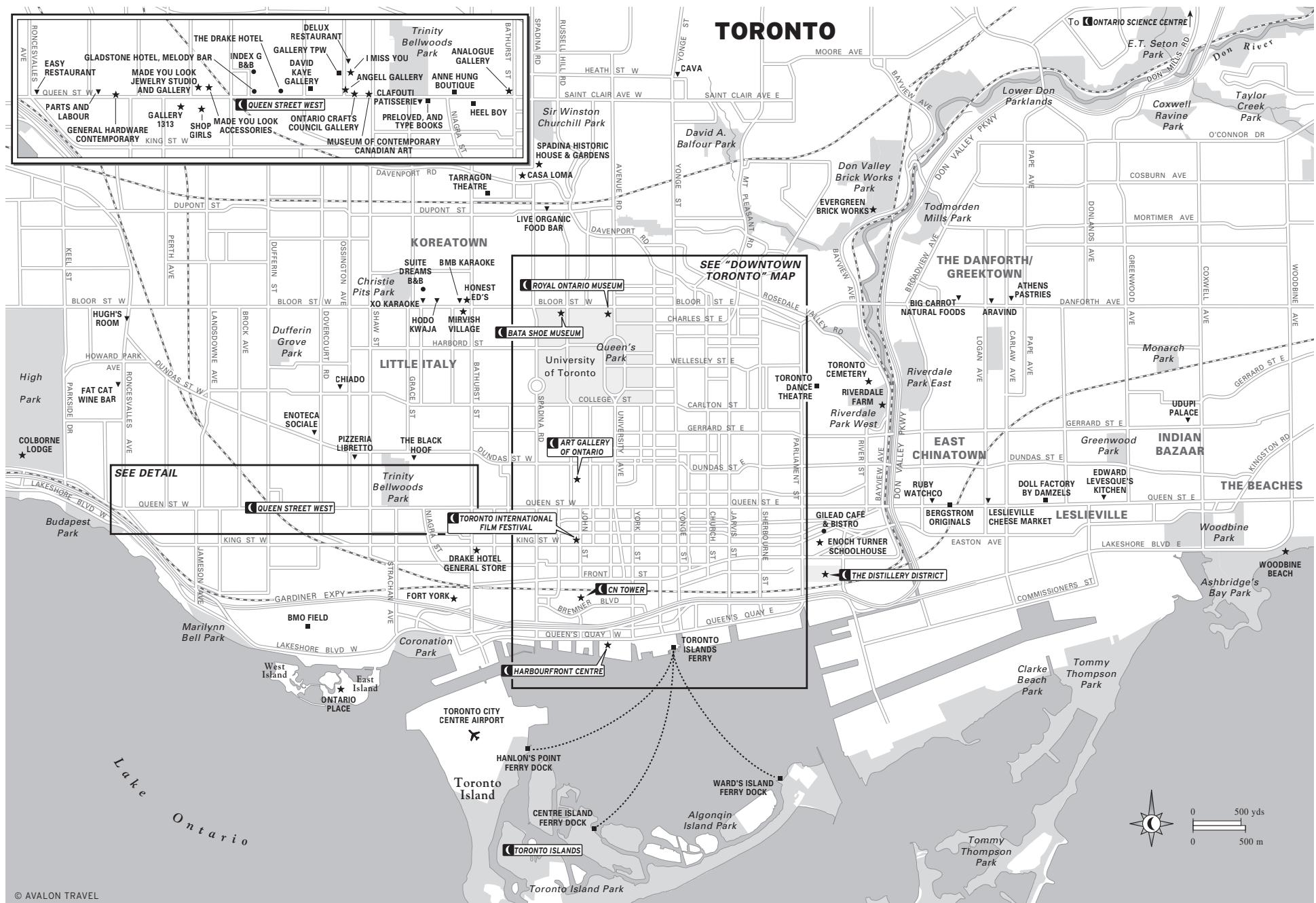




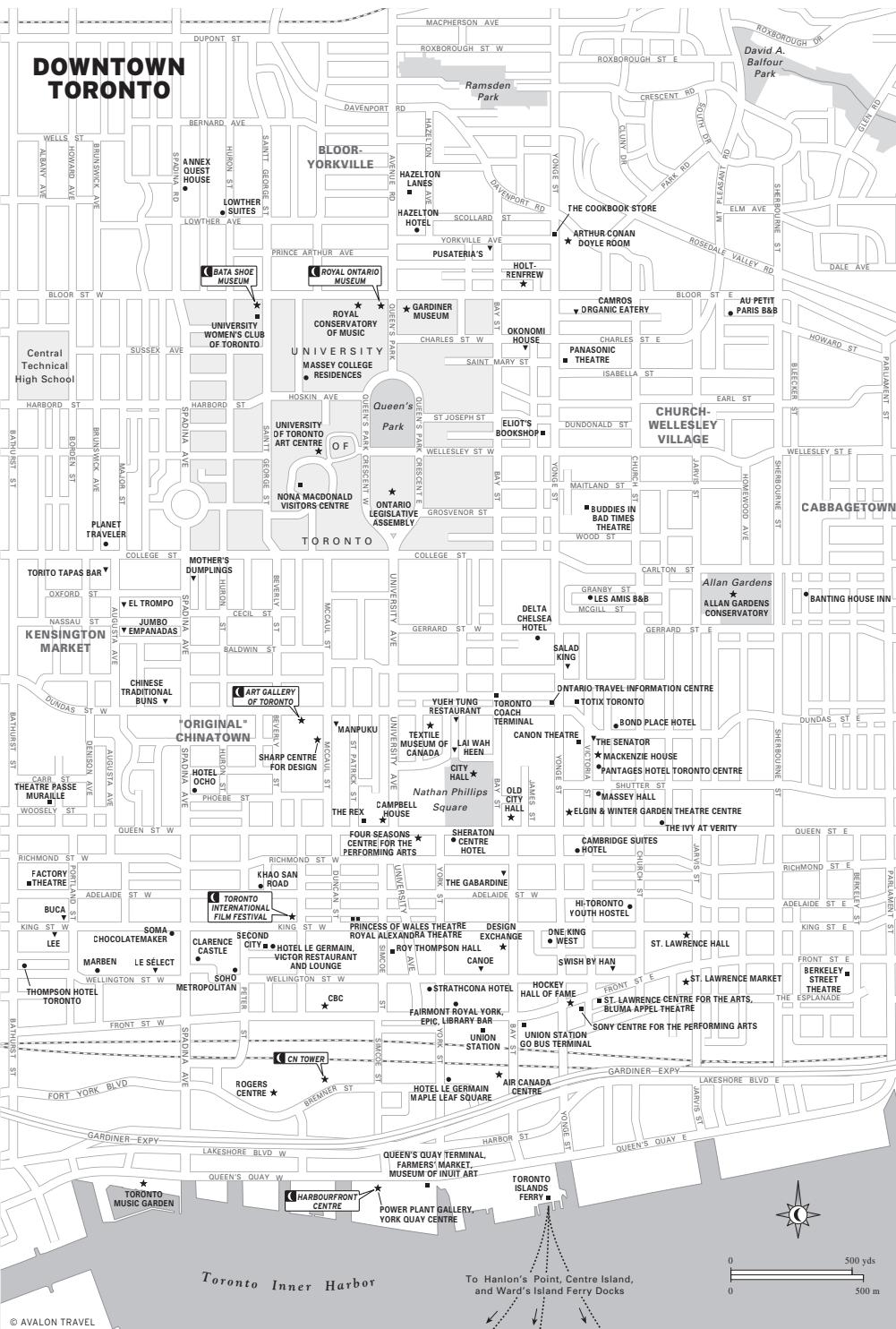


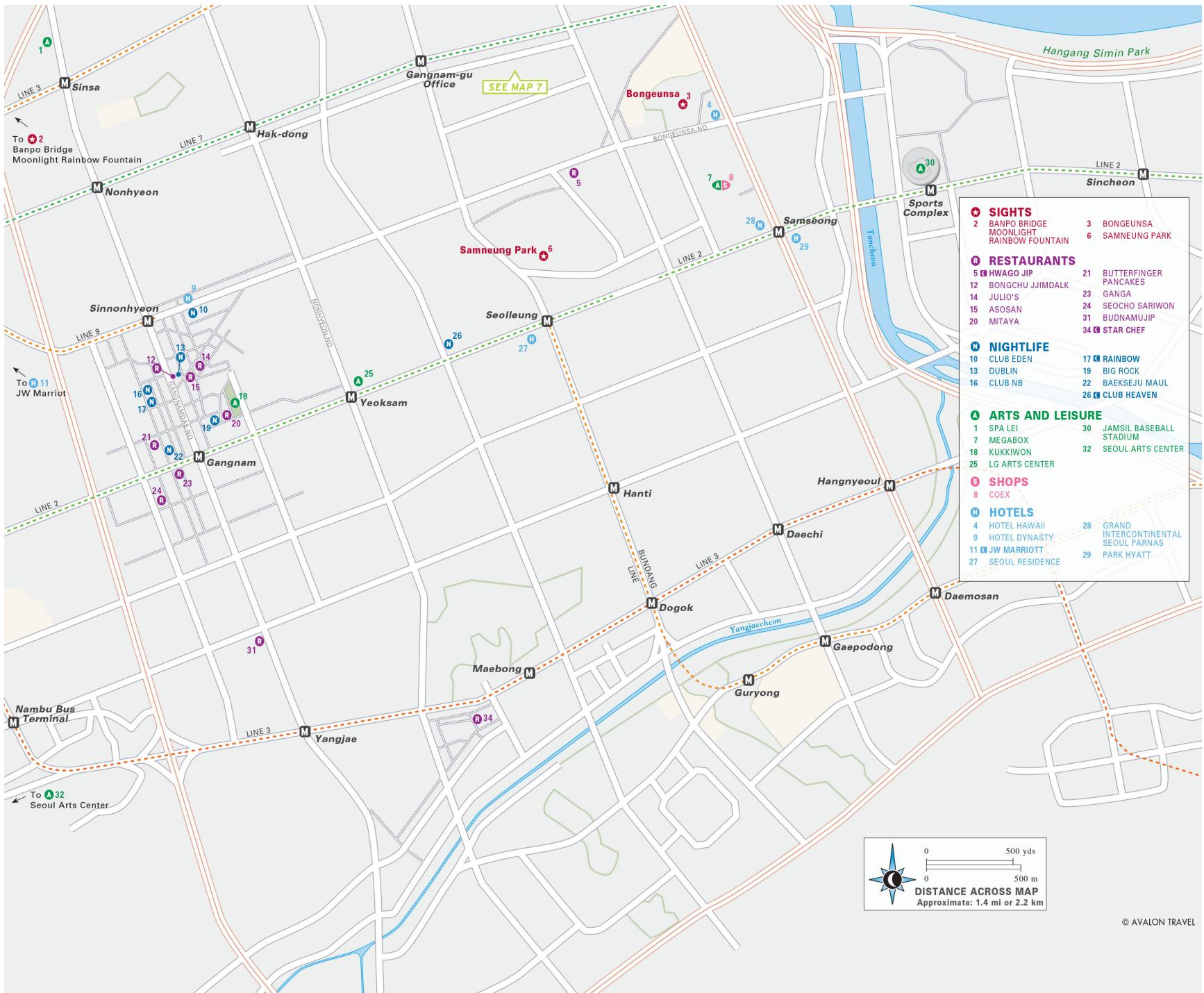


**TORONTO**

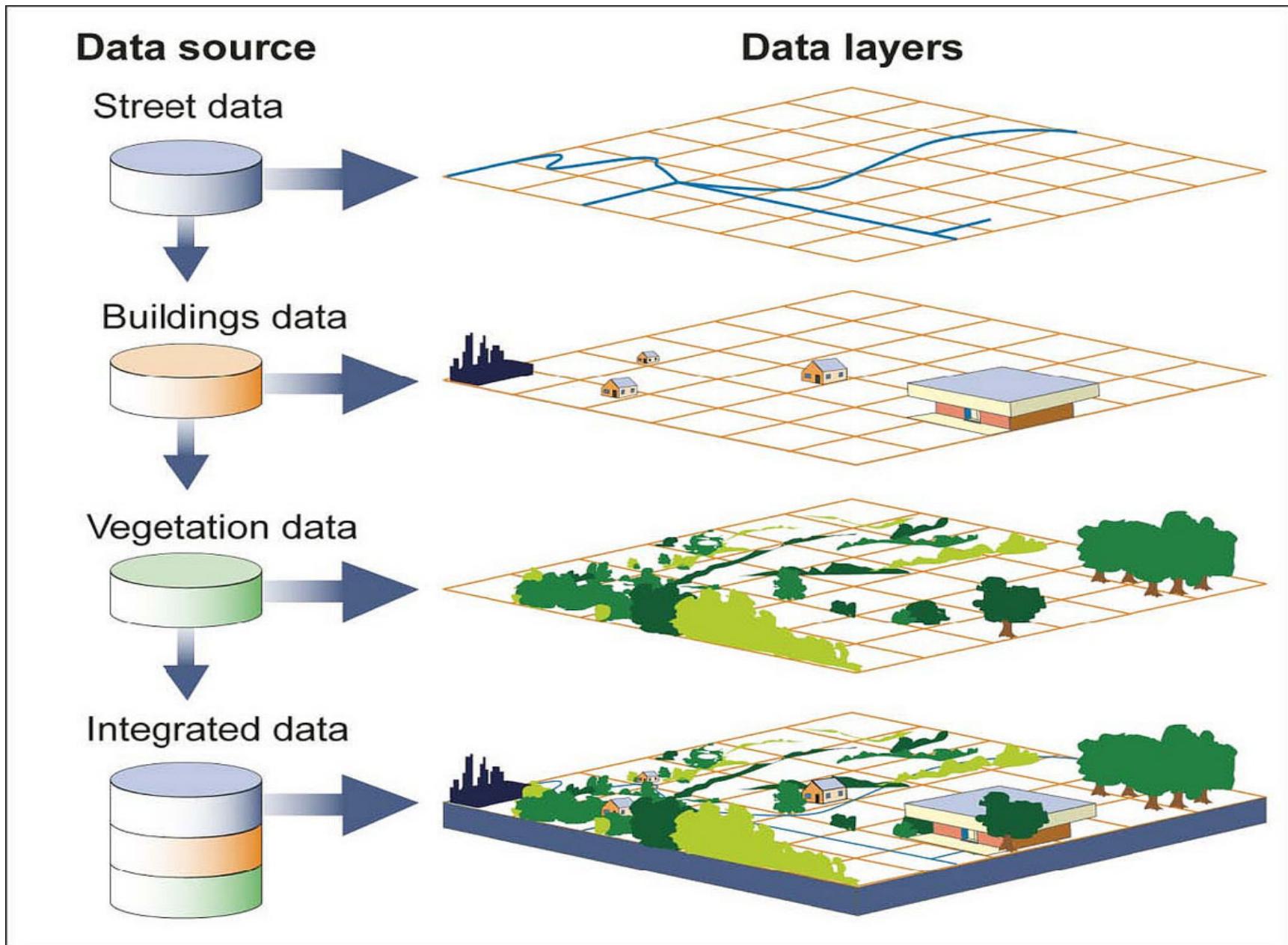


© AVALON TRAVEL





# Geographic Information Systems (GIS)





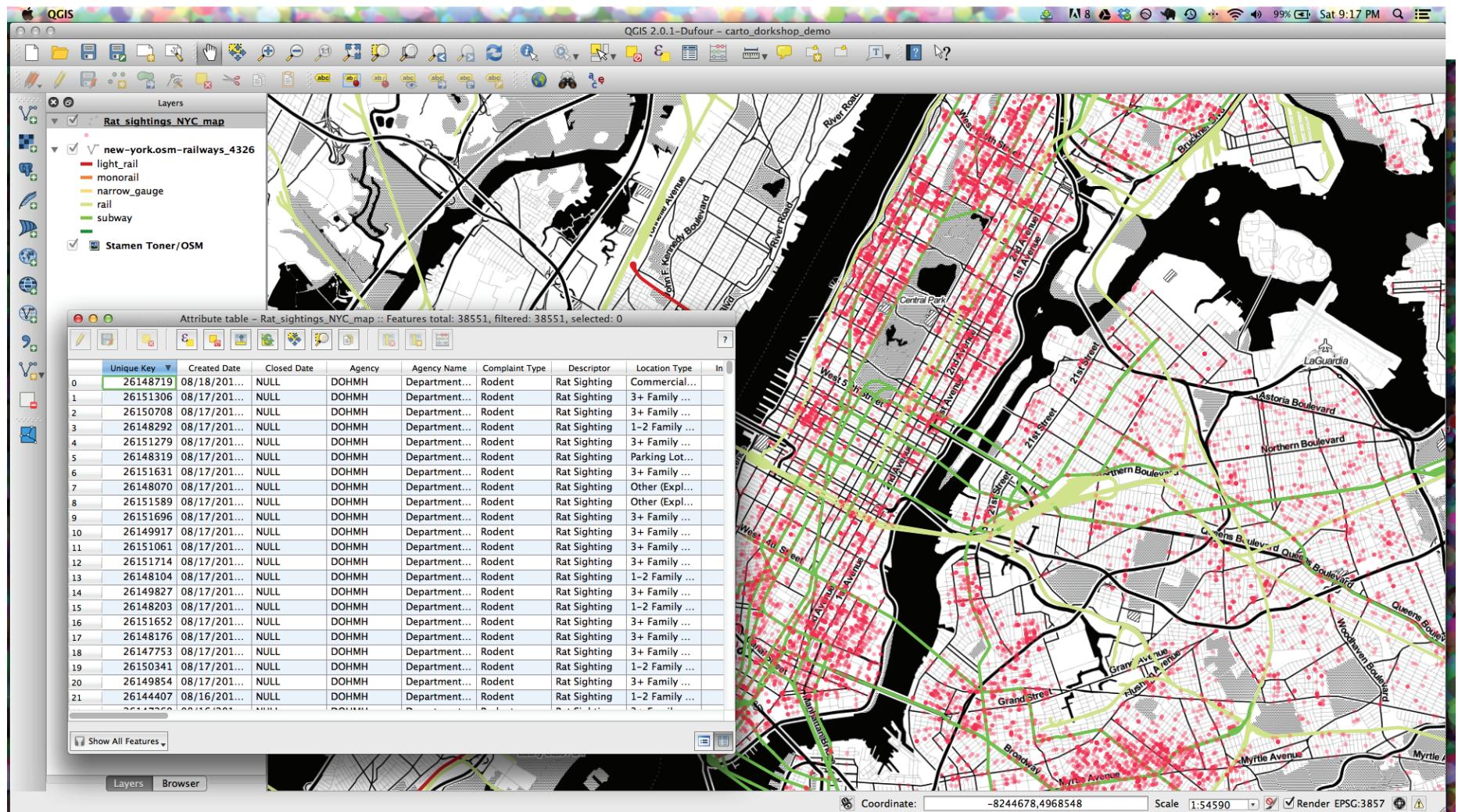
GDAL - Geospatial Data  
Abstraction Library



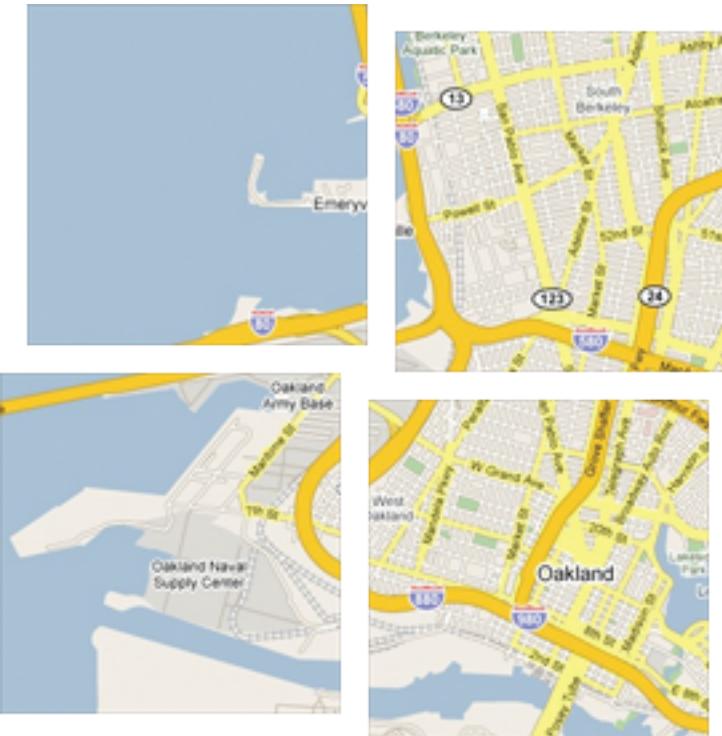
**esri**



# QGIS for Inspecting, Editing, & Analyzing Geospatial Data



# **“Slippy Maps” have two parts:**



**+ var map =**

**Tiles are generated “on the fly” from  
spatial data on a server**

# Why go open source?

-Google charges \$10,000-100,000 per year for over 25,000 map views when using their tiles.

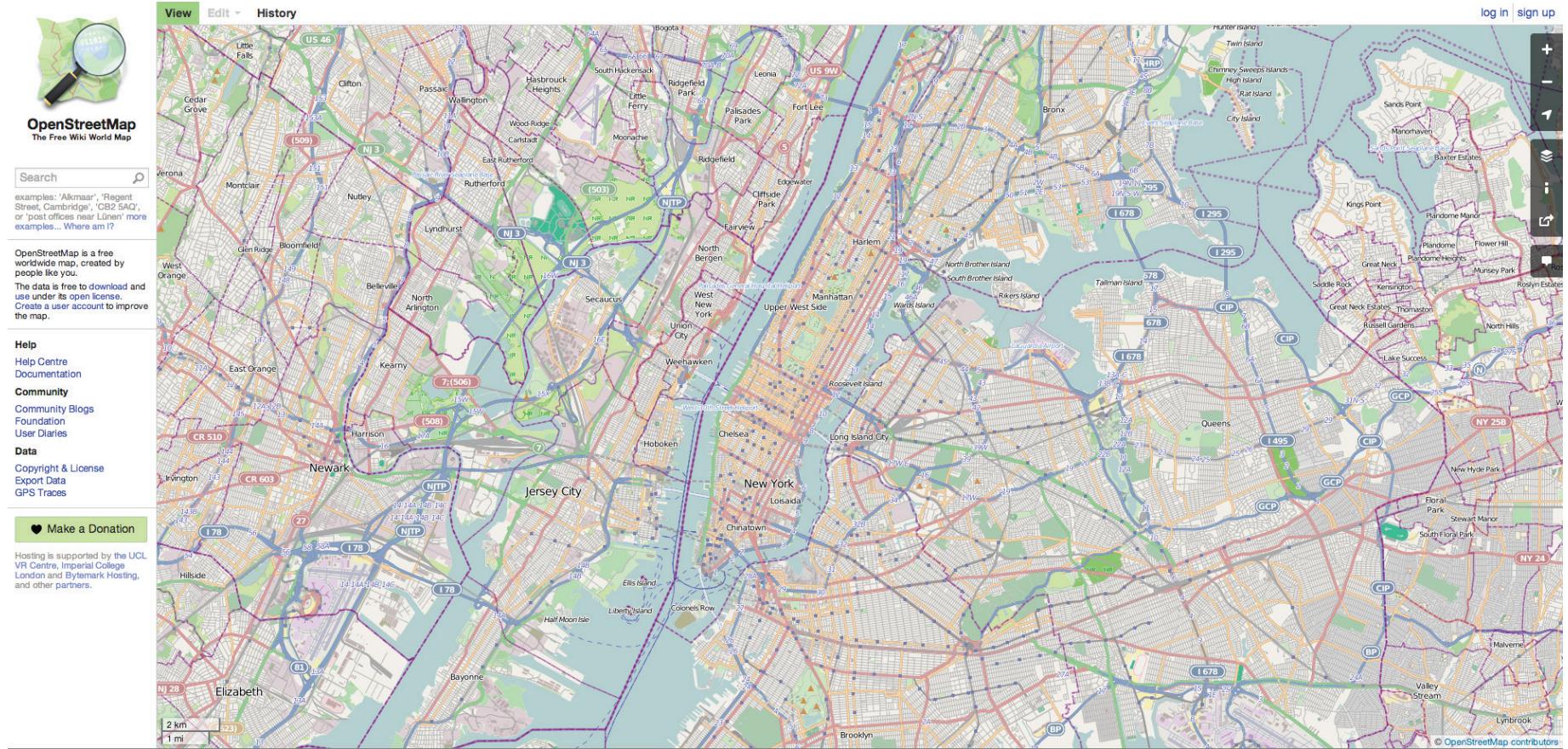
*"Ask yourself this question: why would you, as a website developer who controls all aspects of your site, from typography to layout, to color palette to photography, to UI functionality, allow a big, alien blob to be plopped down in the middle of your otherwise meticulously designed application? Think about it. You accept whatever colors, fonts, and map layers Google chooses for their map tiles. Sure, you try to rein it back in with custom markers and overlays, but at the root, the core component—the map itself—is out of your hands."*

-Paul Smith, *A List Apart*, April 8, 2008

# OpenStreetMap:

## *What it is and why you should care*

- Google keeps its data under lock and key,
- OSM users contribute and get back the data.



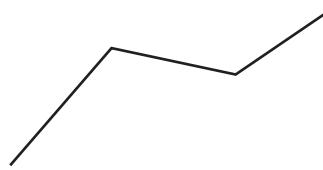
# WTF is Spatial Data?

*"Geospatial data is information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth, typically represented by points, lines, polygons, and/or complex geographic features. This includes original and interpreted geospatial data, such as those derived through remote sensing including, but not limited to, images and raster data sets, aerial photographs, and other forms of geospatial data or data sets in both digitized and non-digitized forms." (EPA)*

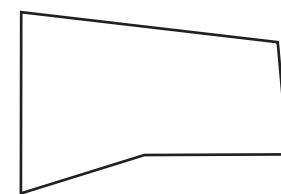
## Vector Data Geometry is mainly...



Points



Lines



Polygons

# Formats:

- Shapefiles** (really a group of 3+ files with same name and different extensions: .shp, .dbf, .prj, .shx)
- GeoJSON** (spatially aware JSON)
- CSV** (like a spreadsheet, typically used for point geometry eg: addresses mapped using Latitude & Longitude)
- Geospatial databases** (improves speed, the standard when using spatial data to render tiles for slippy maps)
- GeoTIFF** (most common *raster format* that is in the geo-open-data standard. Aerial Imagery, Land Cover, Elevation, etc.)

# TileMill to style map data for slippy mapping (with MapBox hosting)

The screenshot shows the TileMill interface with a map of Big Basin Redwoods State Park. The map features green terrain, red contour lines, and various trails and roads. A legend in the bottom right corner shows elevation levels from 0 to 4000 ft. The Layers panel on the left lists several styled layers:

- #trail\_label
- #bigbasinSP\_label
- #roads3857\_label
- #contour200label
- #contour50\_label
- #trailsz13
- #dirtdz13
- #roadsmotorways2227

The right side of the interface displays the `palette.mss` file for the map. The code defines styles for land, fonts, and various road and trail types, including colors and line weights.

```
palette.mss
=====
@land: #FFEED0;
/*
 */
/* FONTS
 */
/* directory to load fonts from in addition to the system directories */
Map { font-directory: url("./fonts"); }

/* set up font sets for various weights and styles */
@sans_lt: "Open Sans Regular", "DejaVu Sans Book", "unifont Medium";
@sans_lt_italic: "Open Sans Italic", "DejaVu Sans Italic", "unifont Medium";
@sans: "Open Sans Semibold", "DejaVu Sans Book", "unifont Medium";
@sans_italic: "Open Sans Semibold Italic", "DejaVu Sans Italic", "unifont Medium";
@sans_bold: "Open Sans Bold", "DejaVu Sans Bold", "unifont Medium";
@sans_bold_italic: "Open Sans Bold Italic", "DejaVu Sans Bold Italic", "unifont Medium";
/*
 * Some fonts are larger or smaller than others. Use this variable to
 * globally increase or decrease the font sizes. */
@text_adjust: 0;

/* CONTOUR COLORS
 */
@contour_line: lighten(@motorway_line, 7%);

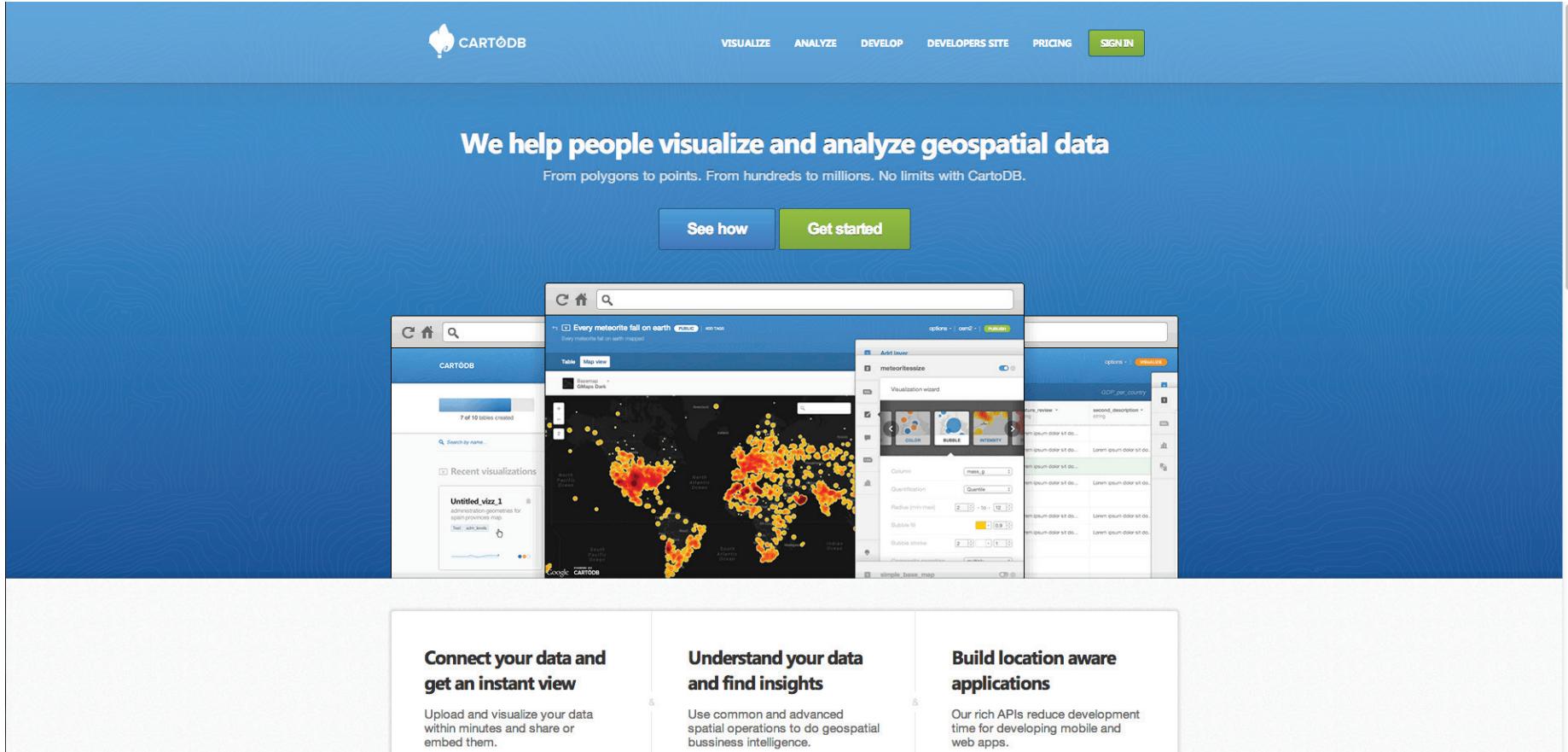
/* ROAD COLORS
 */
/*
 * For each class of road there are three color variables:
 * - line: for lower zoomlevels when the road is represented by a
 * single solid line.
 * - case: for higher zoomlevels, this color is for the road's
 * casing (outline).
 * - fill: for higher zoomlevels, this color is for the road's
 * inner fill (inline).
 */
@motorway_line: #E65C5C;
@motorway_fill: lighten(@motorway_line, 10%);
@motorway_case: @motorway_line * 0.9;

@trunk_line: #E68A5C;
@trunk_fill: lighten(@trunk_line, 10%);
@trunk_case: @trunk_line * 0.9;

@primary_line: #FFC859;
@primary_fill: lighten(@primary_line, 10%);
@primary_case: @primary_line * 0.9;
```

# **CartoDB: another great tool for visualization and analysis of geospatial data:**

**<http://cartodb.com/>**



The screenshot shows the CartoDB homepage with a blue header featuring the logo, navigation links (VISUALIZE, ANALYZE, DEVELOP, DEVELOPERS SITE, PRICING), and a SIGN IN button. The main section has a dark blue background with white text: "We help people visualize and analyze geospatial data" and "From polygons to points. From hundreds to millions. No limits with CartoDB." Below this are two buttons: "See how" (white) and "Get started" (green). A large central image displays a map of meteorite falls on Earth with a heatmap overlay, surrounded by various data visualization tools and interfaces.

**Connect your data and get an instant view**  
Upload and visualize your data within minutes and share or embed them.

**Understand your data and find insights**  
Use common and advanced spatial operations to do geospatial business intelligence.

**Build location aware applications**  
Our rich APIs reduce development time for developing mobile and web apps.

# Resources

1. **Github:** NVKelso's “*Geo-how-to*” *Wiki*  
<https://github.com/nvkelso/geo-how-to/>
2. **CartoTalk forums:** <http://www.cartotalk.com/>
3. **TileMill tutorials:** <http://www.mapbox.com/tilemill/docs/crashcourse/introduction/>
4. **Googling / YouTube searching QGIS tutorials**
5. **Leaflet API:** <http://leafletjs.com/reference.html>
6. **OSM Wiki:** [http://wiki.openstreetmap.org/wiki/Main\\_Page](http://wiki.openstreetmap.org/wiki/Main_Page)
7. **GeoNYC Meet-Up:** <http://www.meetup.com/geonyc/>  
(meets monthly, next one is October 7th)
8. **WTF is GIS:** <http://www.esri.com/what-is-gis>
9. **GIS Stackexchange:** <http://gis.stackexchange.com/>

# Data Sources

1. **Natural Earth Data:** (3 levels of small-scale, world coverage)

<http://www.naturalearthdata.com/>

2. **Metro Extracts:** (OSM extracts of urban areas converted to multiple formats)

<http://metro.teczno.com/>

3. **Open Data NYC:** <https://nycopendata.socrata.com/>

4. **US National Weather Service (NOAA):**

<http://www.nws.noaa.gov/geodata/>

5. **U.S. Census:** <http://www.census.gov/2010census/data/>