

# Introduction to Neogeography

By Andrew J. Turner

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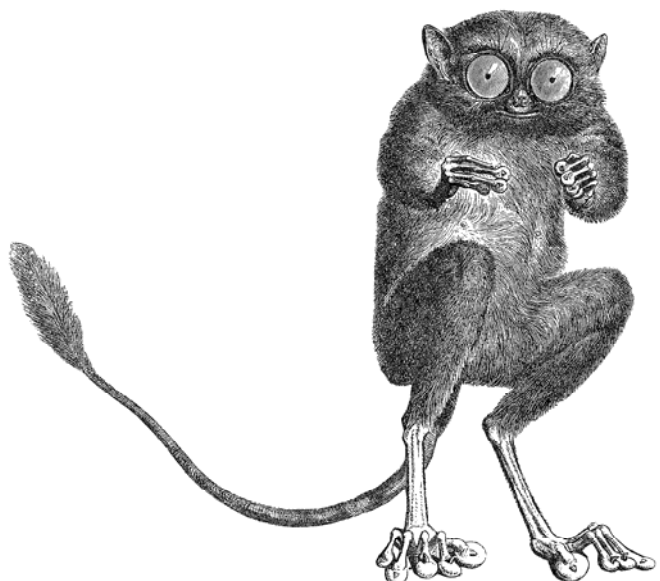
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*Neogeography combines the complex techniques of cartography and GIS and places them within reach of users and developers.*

*This Short Cut introduces you to the growing number of tools, frameworks, and resources available that make it easy to create maps and share the locations of your interests and history. Learn what existing and emerging standards such as GeoRSS, KML, and Microformats mean; how to add dynamic maps and locations to your web site; how to pinpoint the locations of your online visitors; how to create genealogical maps and Google Earth animations of your family's ancestry; or how to geotag and share your travel photographs.*

## Contents

What is Neogeography? .....	2
Where Are You? .....	15
Making Some Maps .....	24
Adding Location to Your Web Site.....	31
GeoStack.....	36
Licensing.....	38
Neogeography Projects.....	39
Where To Next? .....	52



# Introduction to Neogeography

This Short Cut introduces current techniques of online mapping and neogeography. It covers the basic tools for finding out where you are, creating your own maps, and several illustrative projects to get you started and hopefully inspire your own projects.

The code and software examples from this book are available online at <http://mapsomething.com>. This includes a complete listing of the links to sites and resources listed here for easy bookmarking. Feel free to let me know if you have any questions, or want to show off any neat ideas you put together, directly at [shortcut@highearthorbit.com](mailto:shortcut@highearthorbit.com).

## What Is Neogeography?

Cartography enabled and recorded exploration and discovery for ages. It guided sailors across oceans and helped make sense of the wilderness. Like the transformation of paper to hypertext, maps have evolved from arcane lines and arcs on parchment to dynamic displays of remote geographic information. While geographic information systems (GIS) remained expensive programs, restricted to the use of highly-trained specialists, tools like MapQuest and Yahoo! Maps brought easy-to-use mapping tools to the public. More recently, the release of Google Maps demonstrated to web developers and users the possibilities of navigation and opened a floodgate of interest in online mapping.

Google Maps was not released with an *application programming interface* (API), but developers slowly figured out how to use the maps for their own uses, and eventually Google released a public API. The release of the API allowed developers and users to quickly and easily show geographically based data on shareable maps. Once the primary domain of GIS systems and operators, these new maps, or “mashups,” led to a massive increase in their propagation. The very term *mashup* can trace its lineage to the first mapping mashups like Housing Maps and ChicagoCrime. What is it about maps that both fascinates and educates people? Why in the online world of instantaneous global communication and anonymity has “location” become such an important theme?

Neogeography means “new geography” and consists of a set of techniques and tools that fall outside the realm of traditional GIS, Geographic Information Systems. Where historically a professional cartographer might use ArcGIS, talk of Mercator versus Mollweide projections, and resolve land area disputes, a neogeographer uses a mapping API like Google Maps, talks about GPX versus KML, and geotags his photos to make a map of his summer vacation.

Essentially, Neogeography is about people using and creating their own maps, on their own terms and by combining elements of an existing toolset. Neogeography is about sharing location information with friends and visitors, helping shape context, and conveying understanding through knowledge of place.

Lastly, neogeography is fun. Why else would people create a map of the locations of the television show *24*, or share the location of their first kiss? Never again will you struggle to recall “Where was that photo taken?”

## Basic Terminology

Several useful terms are essential to discussing neogeography. Some are familiar, while others have specific contexts within a broader meaning. They are presented here for later referral as you progress through the book and are listed in a logical order so that terms build upon one another:

### *Coordinates*

The geographic coordinates are the absolute position on the Earth (or any body). Typically these are Latitude and Longitude referenced to the WGS84 ellipsoid. Sometimes they will be referred to as “lat” and “lon.” Latitude varies North-South, with 0 degrees at the Equator, varies from 90 to –90 degrees towards the poles, and is positive North. Longitude varies East-West, with 0 degrees at the Prime Meridian, varies from 180 to –180 degrees and is positive to East.

Coordinates can be represented in several formats:

- Decimal degrees (DD): 29.975
- Degrees-Minutes-Seconds (DMS): N29° 58' 30"
- Degrees-Minutes (DM): 29° 58.8'

The conversion is straightforward. There are 60 seconds in a minute, and 60 minutes in a degree.

### *Projection*

A projection is required in order to display the three-dimensional Earth, which isn't a sphere but actually an oblate spheroid bulging in the center, onto any other shape. Typically, this is projection onto a two-dimensional map display, where Mercator and Rectangular (i.e., no transformation) projections are the most common. For example, Google Maps uses the Mercator Projection, which is good for zoomed-in viewing, but causes distortions when zoomed out. It is important to understand the implication of various projections depending on application and also when mixing together mapping providers.

### *POI (Points of Interest)*

Points Of Interest, frequently abbreviated as POI, represents any significant locations such as public buildings, traveler's services, or user-defined waypoints. These may be categorized: restaurant, trail head, friend's house, scenic overlook, or scuba diving site. There is also AOI, Areas of Interest, which may include multiple POI or just a geographic area instead of a single point.

### *Extents*

The bounding box, or farthest latitude and longitude of an AOI. This may also be referred to as just *bbox*. The extents define the Northern and Southern latitude, and the Eastern and Western longitude. Extents are the simplest means of specifying the area of interest and are usually used for web service queries.

### *Tiles*

Dynamic, or *slippy* maps, are composed of a set of individual square images. Each image is a tile. Together, these tiles are placed next to one another, or stitched, to give the impression of a large, sliding map.

### *Geolocation*

The technique of automatically determining the position of something based on measured data. For example, it is possible to locate a computer given its IP address, or a mobile phone based on the observed cell towers. Geolocation is useful for determining where a user or device is without the user having to manually enter this information. GPS is a specific implementation of a geolocation technology.

### *GPS*

GPS (Global Positioning System) really refers to the U.S. military owned and operated satellite network that provides three-dimensional location. GPS is also sometimes used to refer to any means of geolocation that provides geographic coordinates.

Simply put, GPS operates by a network of high-altitude space satellite broadcasting their position and time. Receivers use several of these observed broadcasts to determine its current position and time.

The European operated GPS system, Galileo, is currently expected to be operational by 2010 and will provide similar, but alternate, functionality to the current GPS.

### *Geotag*

Adding location information to a document, photograph, audio sample, or some other type of data is an example of geotagging. Geotagging formats are not uniform and vary based on the type of document they modify. For example, a photograph can embed location information in the EXIF header of the file itself,

or in many web applications the location information can be stored as triple-tags in the user specified tags.

### *Web Service*

A web service is a resource that allows access to data or functionality from a provider—for example, a geocoder that takes an address and returns latitude and longitude is a web service, or a service to ask for all photos within 50 miles of a location. Web services typically use REST (Representational State Transfer) or SOAP (Simple Object Access Protocol) to allow programs and other sites to access the data.

## **Data Formats**

Location can be stored in many formats. With roots in programming, neogeography pushes data to be stored in a clear and readable “plain language” format. Because broadband allows data to be conveyed quickly, more geographic information can be added to a greater variety of files.

While these formats have adopted a more human-friendly format, they can quickly become large and complex to write by hand. Therefore, in future sections we’ll discuss tools that make it easy to add and read these formats to your projects. For now, this section will introduce you to the overall concepts of the data formats, when it’s appropriate to use them, and what their capabilities are.

### **GPX**

Vendors and tools use several standards to describe geographic information. The most common file format standard is GPX, or the GPS Exchange Format. This standard uses an XML file definition to store waypoints and tracks from GPS units. Most GPS receivers internally use their own proprietary file format. Therefore, GPX is a common protocol that allows developers to write tools to convert from and to an application’s or device’s specific format.

The header of a GPX file stores general information such as the GPX version, the application or device that created the file, and various other XML namespace information:

```
<?xml version="1.0" encoding="UTF-8"?>
<gpx version="1.0"
  creator="GPSBabel - http://www.gpsbabel.org"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns="http://www.topografix.com/GPX/1/0"
  xsi:schemaLocation="http://www.topografix.com/GPX/1/0
  http://www.topografix.com/GPX/1/0/gpx.xsd">
```

Below that, there are lists of waypoints, tracks, or routes.

A *waypoint* (wpt in the file example below) stores the latitude, longitude and optionally the altitude of the location. The body of the waypoint then includes the name, comment, and symbol:

```

<wpt lat ="42.277881" lon ="-83.740791">
  <name>01WiFi</name>
  <cmt>ESPRESSO ROYAL</cmt>
  <sym>Tall Tower</sym>
</wpt>

```

A *track* (trk in the file example below) is a successive list of waypoints and usually include a time element. This is useful later for geotagging photos or videos, as well as for creating animations of your tracks by providing a time to synchronize with the camera or recording device:

```

<bounds minlat="42.423656691" minlon ="-83.493977330"
  maxlat="42.502436669" maxlon="-83.144850082" />
<trk>
  <trkseg>
    <trkpt lat="42.500937812" lon="-83.147198063">
      <ele>-0.846357</ele>
      <time>2006-06-26T21:42:38Z</time>
    </trkpt>
    <trkpt lat="42.500988805" lon="-83.147192333">
      <ele>-1.071942</ele>
      <time>2006-06-26T21:42:40Z</time>
    </trkpt>
    <trkpt lat="42.500985367" lon="-83.147242180">
      <ele>-0.691822</ele>
      <time>2006-06-26T21:42:42Z</time>
    </trkpt>
  </trkseg>
</trk>

```

The Topografix GPX site ([http://www.topografix.com/gpx\\_resources.asp](http://www.topografix.com/gpx_resources.asp)) has a list of GPX data as well as additional resources and utilities.

## GeoRSS

GeoRSS (<http://georss.org>) is an extension to the common RSS (Really Simple Syndication) used on web sites to notify readers of new articles or updates. GeoRSS adds geographic coordinates and features to RSS and Atom items.

GeoRSS comes in several flavors: W3C Geo, Simple, and GML. Simple was developed to speed the adoption and use of GeoRSS by providing an uncomplicated format that is sufficient for making points, lines, and polygons. W3C Geo exists based on historical use and is limited to just describing single points. As the need for complex geometry become necessary, GML (Geographic Markup Language) provides the ability to describe complex geographic geometry.

To add GeoRSS Simple to your RSS, you need to first add the GeoRSS namespace reference to your feed definition:

```

<?xml version="1.0" encoding="UTF-8"?>
<rss version="2.0"
  xmlns:content="http://purl.org/rss/1.0/modules/content/"
  xmlns:wfw="http://wellformedweb.org/CommentAPI/"
  xmlns:dc="http://purl.org/dc/elements/1.1/"

```