Using OpenStreetMap Data

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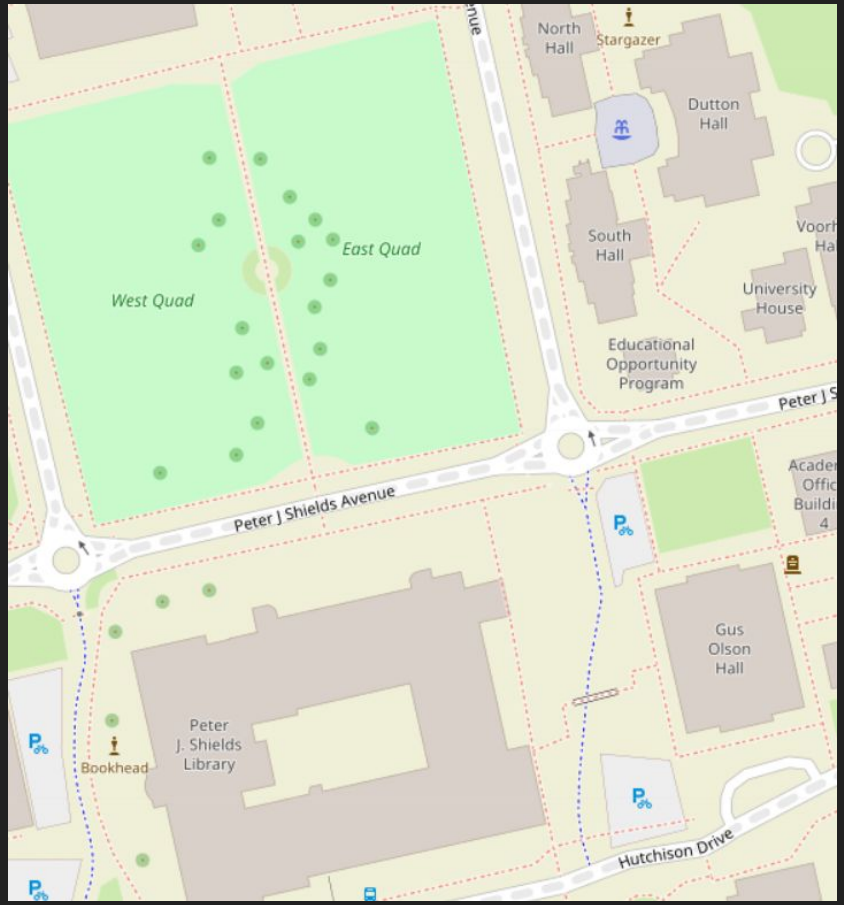
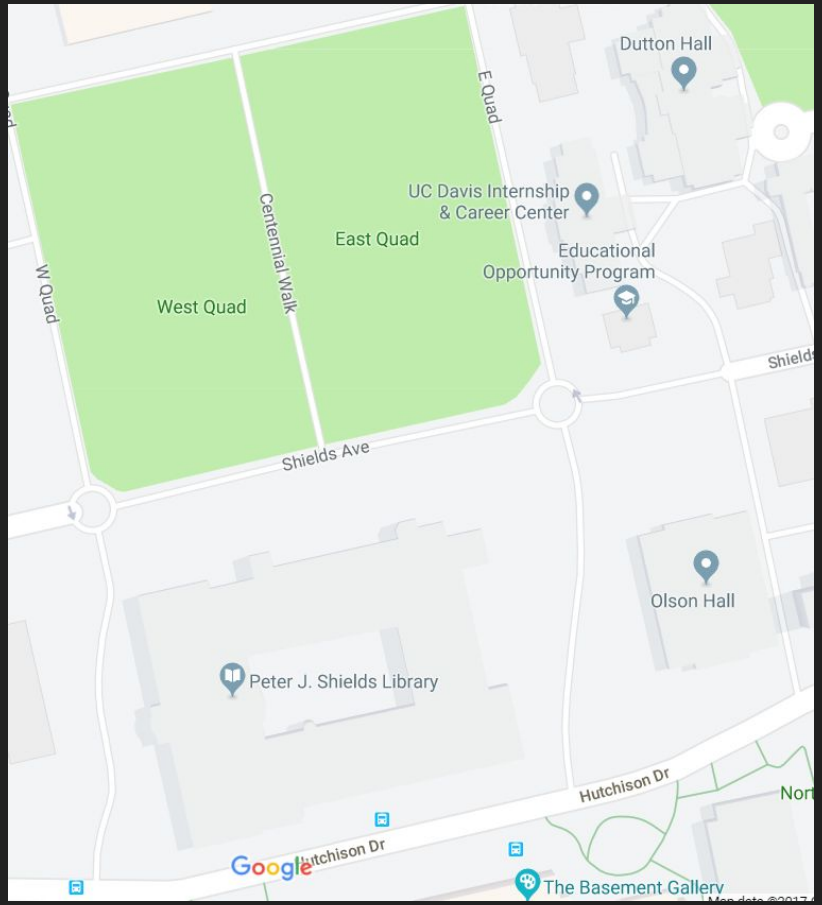
OSM vs Google Map

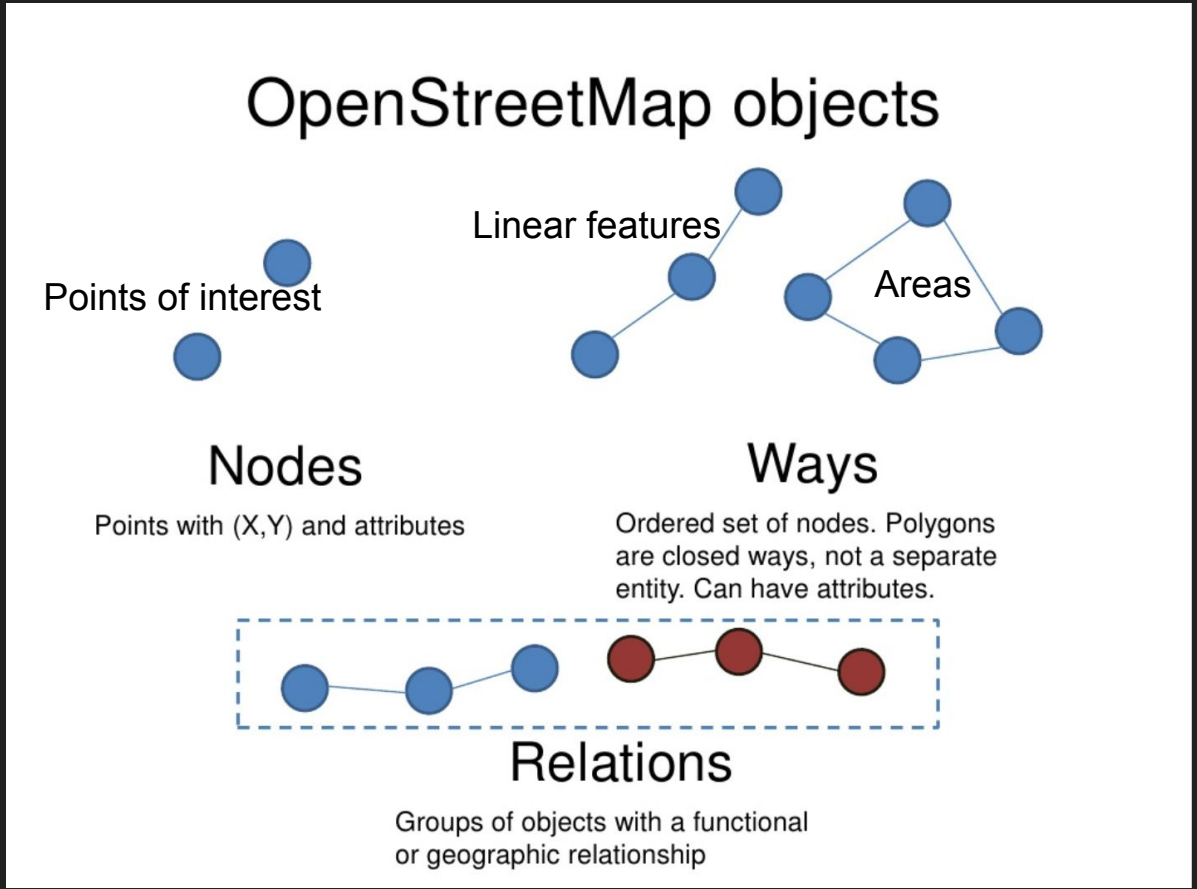




Understanding OSM data

OSM data model

Nodes, ways and relations are tagged with a key/value pair



OSM object and GIS objects

Nodes → **Points**

Ways → **Lines**

Ways → **Polygons**

Relations → (role = unique) → **Multilines**

Relations → (role = outer / inner) → **Multipolygons**

OSM tags

Links features on the ground to OSM basic structures: attributes

Multiple tagging allowed with key=value pair

Key	Value	Element	Comment	Photo
Accommodation				
building	apartments		A building arranged into individual dwellings, often on separate floors. May also have retail outlets on the ground floor.	
building	farm		A residential building on a farm (farmhouse). For other buildings see below `building=farm_auxiliary`, `building=barn`, … If in your country farmhouse looks same as general residential house then you can tag as `building=house` as well. See also `landuse=farmyard`	

Key = “building”, value = “library”; case insensitive?

Go to http://wiki.openstreetmap.org/wiki/Map_Features

OSM file formats

- OSM XML – xml-format provided by the API
- PBF Format – highly compressed, optimized binary format similar to the API
- o5m – for high-speed processing, uses PBF coding, has same structure as XML format
- Overpass JSON – JSON variant of OSM XML
- Level0L - more human readable OSM XML without <> and lowered redundancy

Source: http://wiki.openstreetmap.org/wiki/OSM_file_formats

OSM file formats

```
<osm version="0.6" generator="CGImap 0.6.0 (31756 thorn-03.openstreetmap.org)" copyright="OpenStreetMap and contributors" attribution="http://www.openstreetmap.org/copyright"
 license="http://opendatacommons.org/licenses/odbl/1-0/">
  <relation id="18189" visible="true" version="9" changeset="29524501" timestamp="2015-03-16T18:42:58Z" user="MattSidor" uid="1490939">
    <member type="way" ref="25055432" role="outer"/>
    <member type="way" ref="25055441" role="inner"/>
    <tag k="addr:city" v="Davis"/>
    <tag k="addr:housenumber" v="100"/>
    <tag k="addr:postcode" v="95616"/>
    <tag k="addr:state" v="CA"/>
    <tag k="addr:street" v="West Quad Avenue"/>
    <tag k="building" v="university"/>
    <tag k="name" v="Peter J. Shields Library"/>
    <tag k="type" v="multipolygon"/>
  </relation>
</osm>
```

Shields Library

```
<node id="568127838" visible="true" version="3" changeset="19203936" timestamp="2013-12-01T02:55:30Z" user="jraller" uid="46789" lat="38.5397258" lon="-121.7499180">
    <tag k="artwork_type" v="sculpture"/>
    <tag k="name" v="Bookhead"/>
    <tag k="start_date" v="1989"/>
    <tag k="tourism" v="artwork"/>
  </node>
</osm>
```

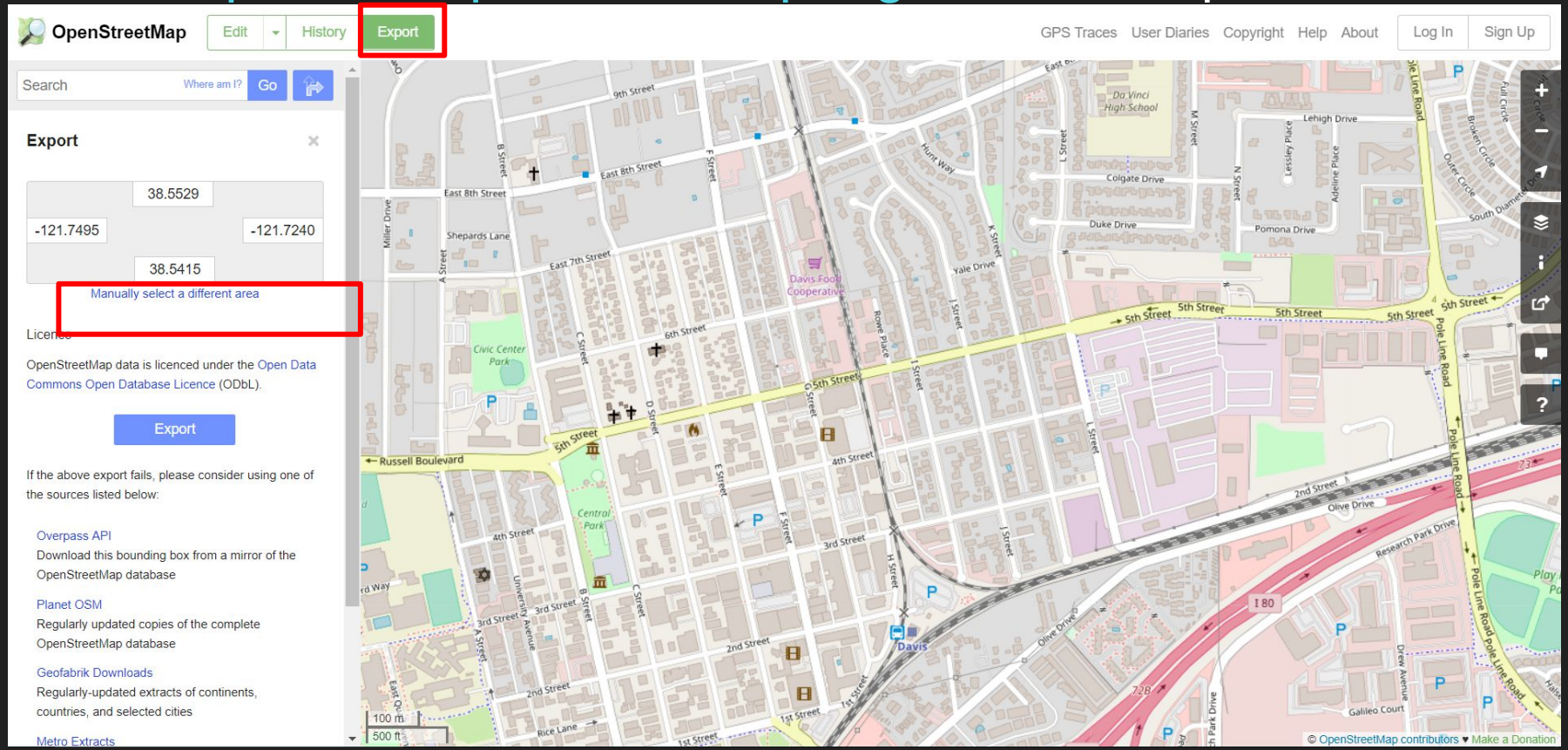
Bookhead in front of Shields Library

```
<way id="10746426" visible="true" version="12" changeset="36541198" timestamp="2016-01-13T00:18:32Z" user="jraller" uid="46789">
    <nd ref="95716931"/>
    <nd ref="559373141"/>
    <nd ref="3942688440"/>
    <tag k="access" v="private"/>
    <tag k="highway" v="residential"/>
    <tag k="name" v="Peter J Shields Avenue"/>
    <tag k="tiger:cfcc" v="A41"/>
    <tag k="tiger:county" v="Yolo, CA"/>
    <tag k="tiger:name_base" v="Peter J Shields"/>
    <tag k="tiger:name_type" v="Ave"/>
  </way>
</osm>
```

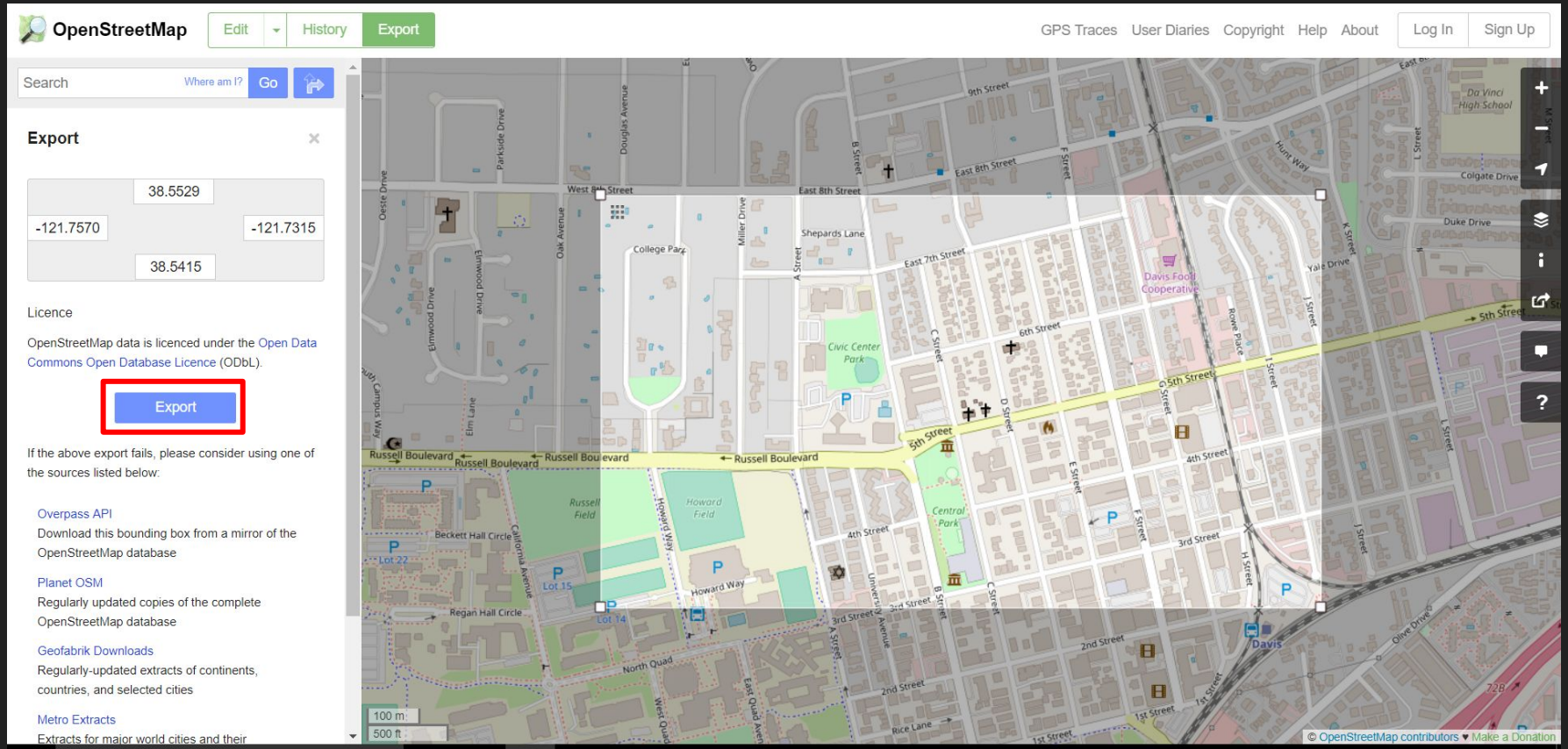
Shields Avenue

Export OSM data: osm website

Go to http://www.openstreetmap.org and use Export tab



Export OSM data: osm website



This will download an ‘.osm’ file with ‘everything’ in it

Export OSM data: APIs and services

If you need large (world) areas, use Planet OSM

Planet OSM

The files found here are regularly-updated, complete copies of the OpenStreetMap.org database, and those published before the 12 September 2012 are distributed under a Creative Commons Attribution-ShareAlike 2.0 license, those published after are Open Data Commons Open Database License 1.0 licensed. For more information, see the project wiki.

Complete OSM Data

Latest Weekly Planet XML File
62 GB, created 4 days ago.
md5: 70d54f5210093232325c953e77bcbf41.

Latest Weekly Changesets
2.0 GB, created 4 days ago.
md5: 7470fb0977c48347ac54d7178bbcf7c1.

Latest Weekly Planet PBF File
38 GB, created 4 days ago.
md5: eb62463b69eb92ba6d66c7d0d77dcdc7.

Using The Data

You are granted permission to use OpenStreetMap data by the OpenStreetMap License, which also describes your obligations.

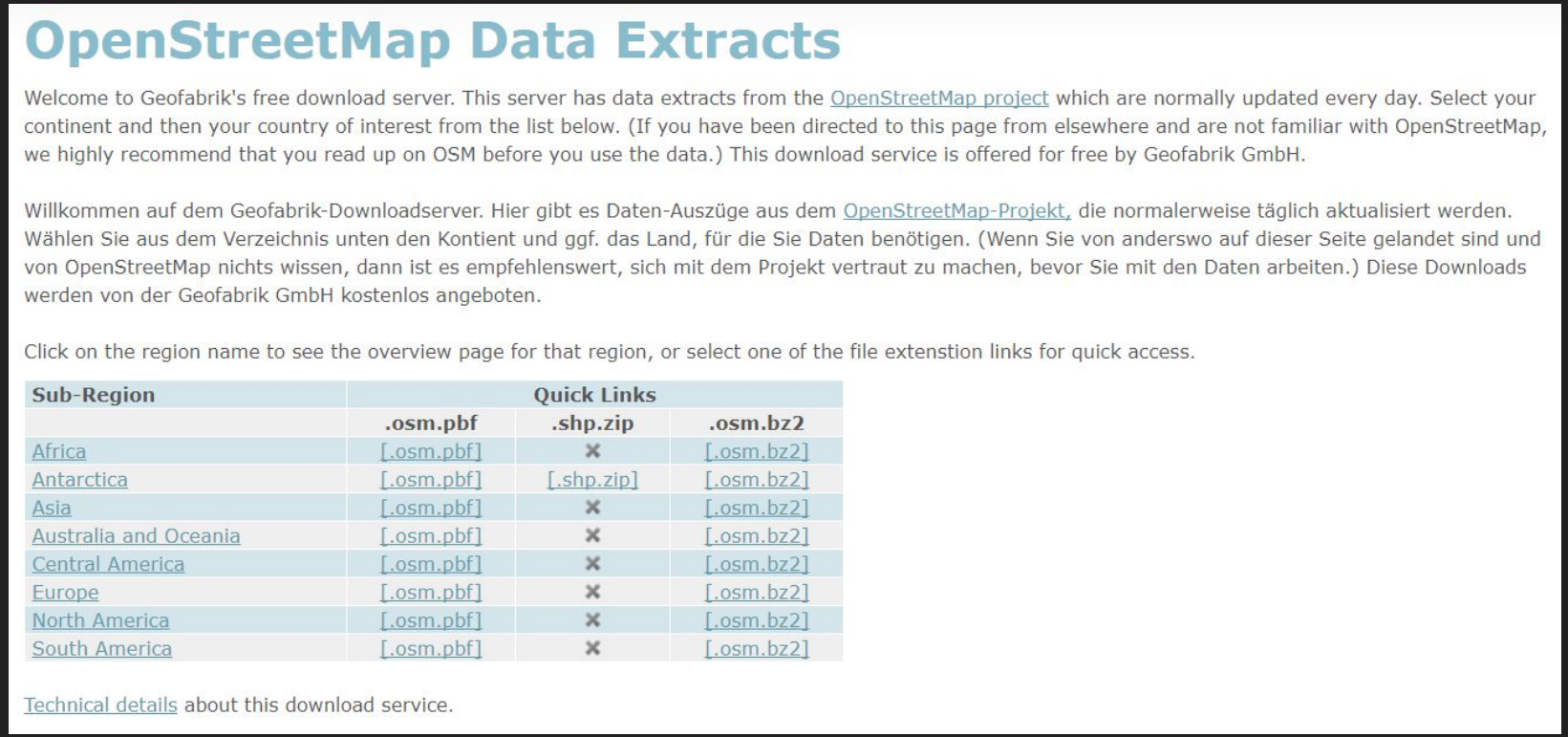
You can process the file or extracts with a variety of tools. Osmosis is a general-purpose command-line tool for converting the data among different formats and databases, and Osm2pgsql is a tool for importing the data into a Postgis database

Extracts & Mirrors

The complete planet is very large, so you may prefer to use one of several periodic extracts (individual countries or states) from third parties. GeoFabrik.de and BBBike.org are two providers of extracts with up-to-date worldwide coverage.

Export OSM data: APIs and services

If you need large (regions/countries) areas, use Geofabrics



OpenStreetMap Data Extracts

Welcome to Geofabrik's free download server. This server has data extracts from the OpenStreetMap project which are normally updated every day. Select your continent and then your country of interest from the list below. (If you have been directed to this page from elsewhere and are not familiar with OpenStreetMap, we highly recommend that you read up on OSM before you use the data.) This download service is offered for free by Geofabrik GmbH.

Willkommen auf dem Geofabrik-Downloadserver. Hier gibt es Daten-Auszüge aus dem OpenStreetMap-Projekt, die normalerweise täglich aktualisiert werden. Wählen Sie aus dem Verzeichnis unten den Kontient und ggf. das Land, für die Sie Daten benötigen. (Wenn Sie von anderswo auf dieser Seite gelandet sind und von OpenStreetMap nichts wissen, dann ist es empfehlenswert, sich mit dem Projekt vertraut zu machen, bevor Sie mit den Daten arbeiten.) Diese Downloads werden von der Geofabrik GmbH kostenlos angeboten.

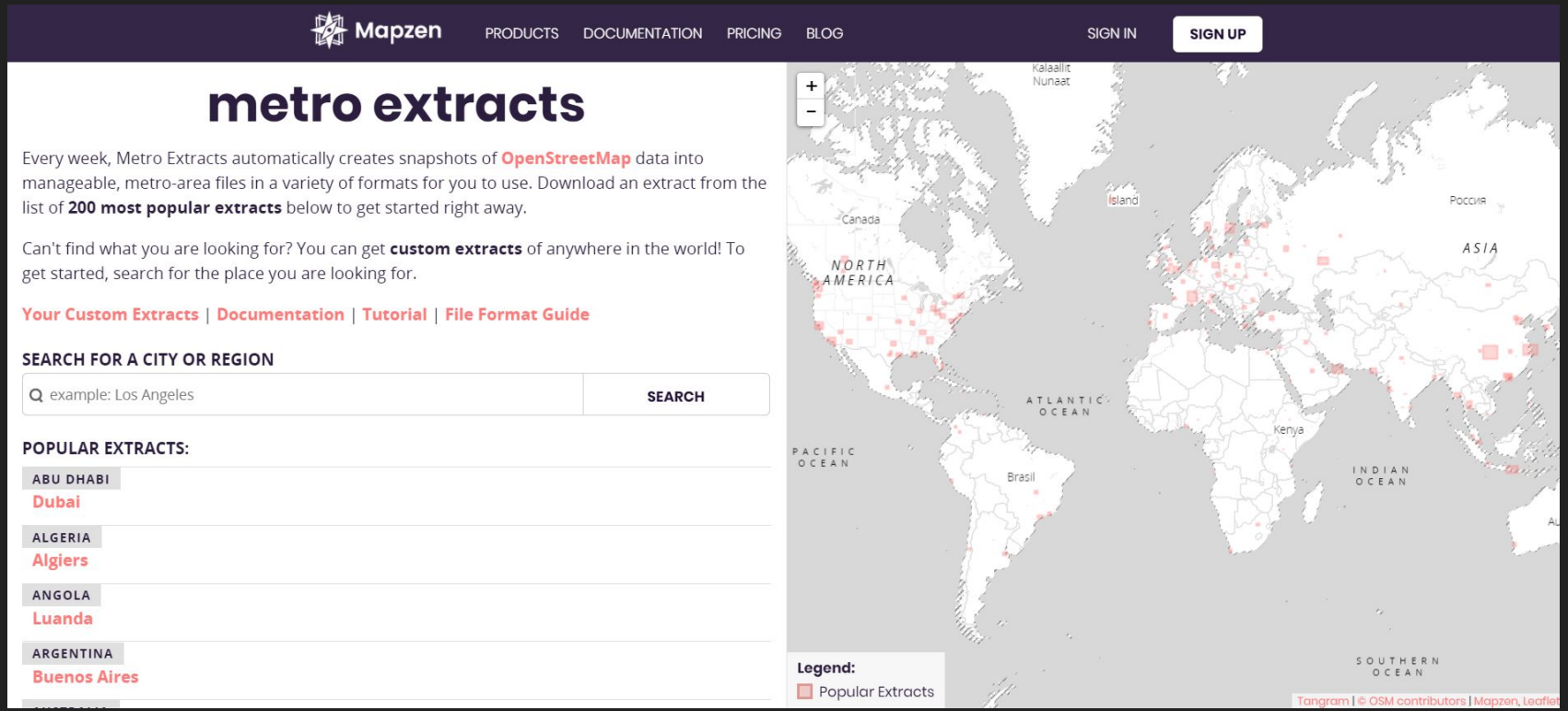
Click on the region name to see the overview page for that region, or select one of the file extenstion links for quick access.

Sub-Region	Quick Links		
	.osm.pbf	.shp.zip	.osm.bz2
Africa	[.osm.pbf]	✖	[.osm.bz2]
Antarctica	[.osm.pbf]	[.shp.zip]	[.osm.bz2]
Asia	[.osm.pbf]	✖	[.osm.bz2]
Australia and Oceania	[.osm.pbf]	✖	[.osm.bz2]
Central America	[.osm.pbf]	✖	[.osm.bz2]
Europe	[.osm.pbf]	✖	[.osm.bz2]
North America	[.osm.pbf]	✖	[.osm.bz2]
South America	[.osm.pbf]	✖	[.osm.bz2]

Technical details about this download service.

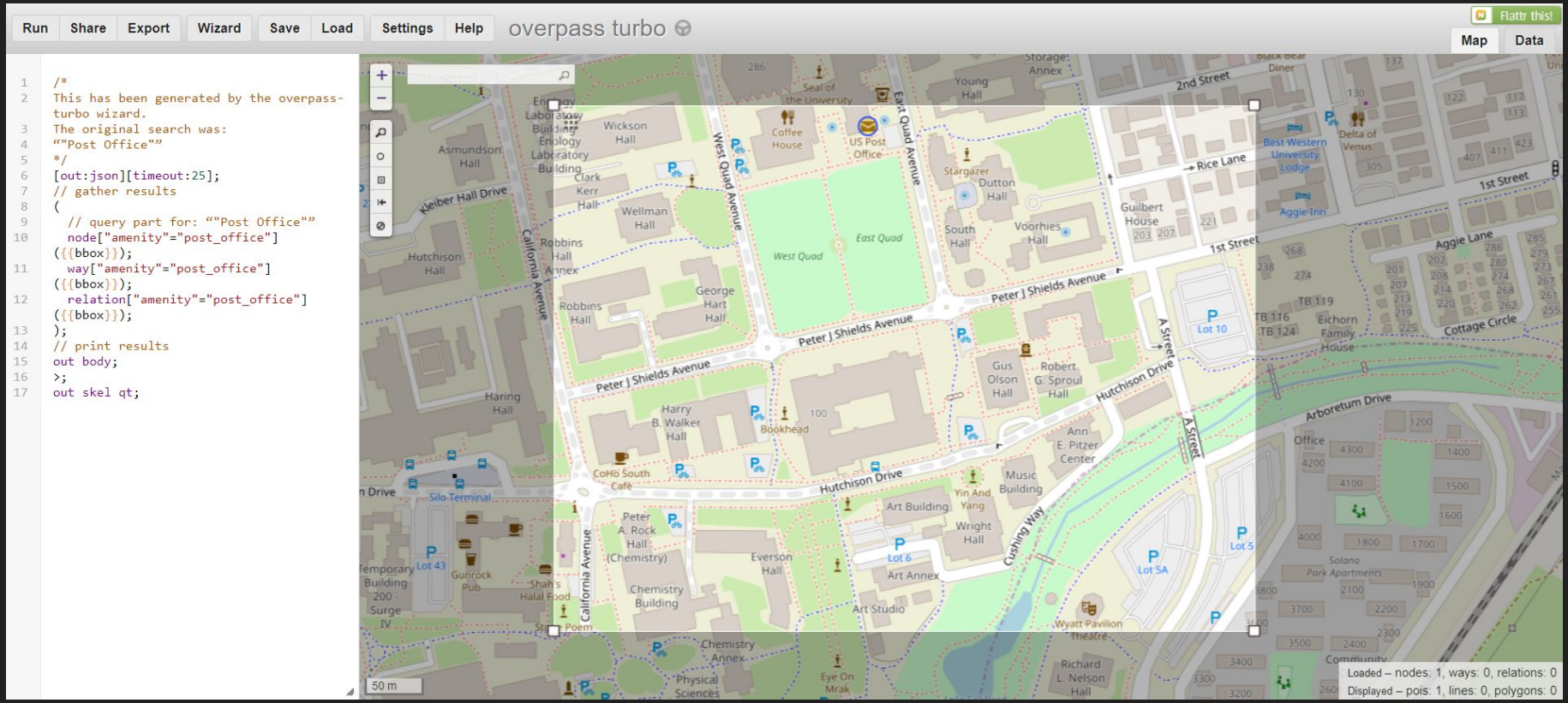
Export OSM data: APIs and services

If you need cities, use [Metro Extracts]



Export OSM data: APIs and services

For more custom controls, use [Overpass turbo]



More freedom? Query OSM data using R

Few packages available: osmdata, osmplotr, osmar

gdal can be used to read the xml & pbf files

osmdata is the most complete package available now

Allows downloading (using overpass API) and exporting to other spatial formats

OSM data in R: get OSM data

Getting started:

```
> install.packages(c('osmdata','sf'),
 +  dependencies = TRUE)
# will install lot of packages
> library(osmdata)

# supply the bounding box or specify the names
> bb <- getbb('Davis')
> q0 <- opq(bb)
```

Bicycle parkings in Davis from OSM

```
# Construct an Overapss query object
> q1 <- add_osm_feature(q0,key = 'amenity', value =
+ 'bicycle_parking')
# Return the result of the query as sf object
> osmd <- osmdata_sf(q1)


# or combine by pipe
> osmd <- opq(bbox = 'Davis') %>%
  add_osm_feature(key = 'amenity', value = 'bicycle_parking') %>%
  osmdata_sf()
```

Inspect osmdata object for parkings

```
> osmd
```

```
Object of class 'osmdata' with:
                  $bbox : 38.5348626,-121.7940664,38.5755912,-121.6754999
         $overpass_call : The call submitted to the overpass API
             $timestamp : [ Mon 2 Dec 2017 01:58:28 ]
            $osm_points : 'sf' Simple Features Collection with 314 points
             $osm_lines : 'sf' Simple Features Collection with 0 linestrings
          $osm_polygons : 'sf' Simple Features Collection with 54 polygons
        $osm_multilines : 'sf' Simple Features Collection with 0 multilinestrings
     $osm_multipolygons : 'sf' Simple Features Collection with 0 multipolygons
```

Plot the parkings

```
# plot the polygons; we will use the mapview
# package, should be installed now with osmdata
> library(mapview)
> mapview(bikepark)

# this will create an interactive map window
# browse the map to check the accuracy of the
# osm tagging
```

Now let's find the dog parks

```
# Use the key/value pairs from OSM map features
# to download and plot the dog parks in Davis


# Are all the dog parks
  in Davis mapped?
```

Read ‘.osm’ files

```
# You have exported the ‘.osm’ file from the OSM
# website. We can read that file in R with
# sf/gdal routines

> testdata <- sf::st_read('map.osm', layer =
+ 'multipolygons', quiet = TRUE)
> mapview(testdata)
```