Working with OpenStreetMap data

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FOSS4VGI Summer School 2015

Como, Italy

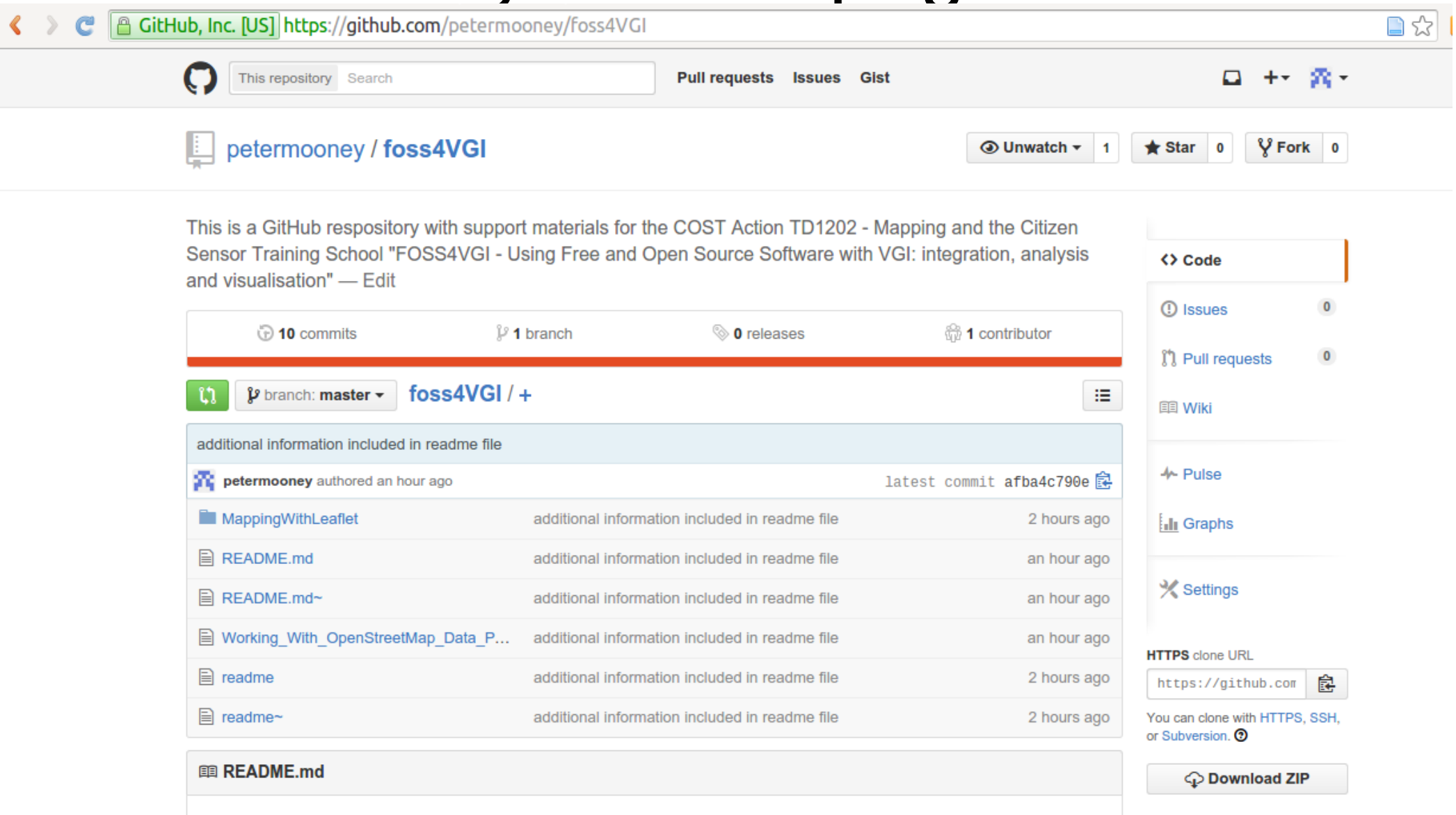
Some assumptions starting off..

- You have heard about OpenStreetMap
- You have seen an OpenStreetMap Map

This workshop lecture aims to provide a broad overview of working with OSM data

- Introduce OpenStreetMap
- Understand the OSM project, data model, contribution models, etc
- Access data – understand how data is stored, extracted, queried, etc
- **TAKE HOME – An understanding of how OSM could be used in your work, your leisure, your life**

All materials shall be available on my GitHub pages



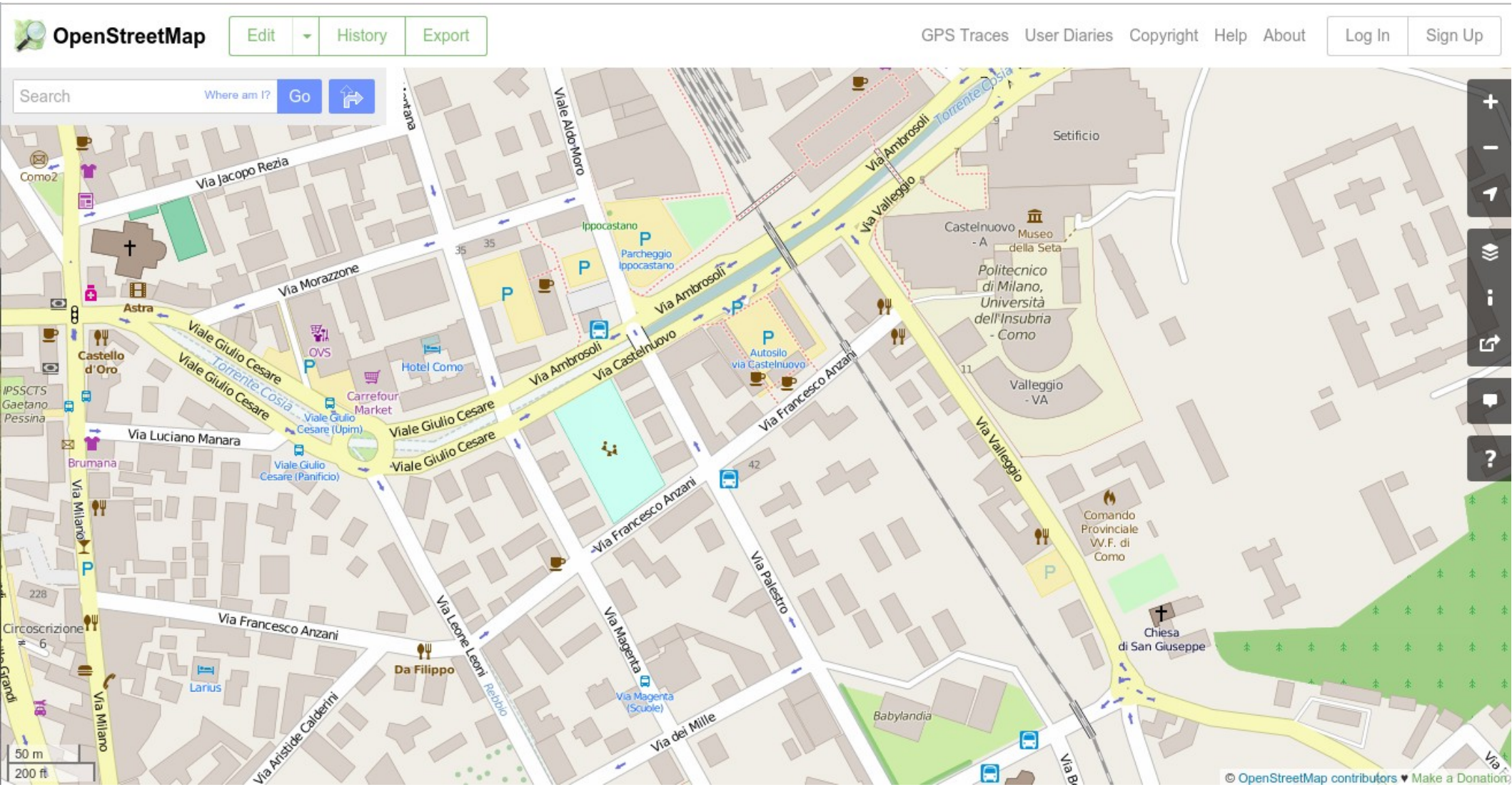
https://github.com/petermooney/foss4VGI

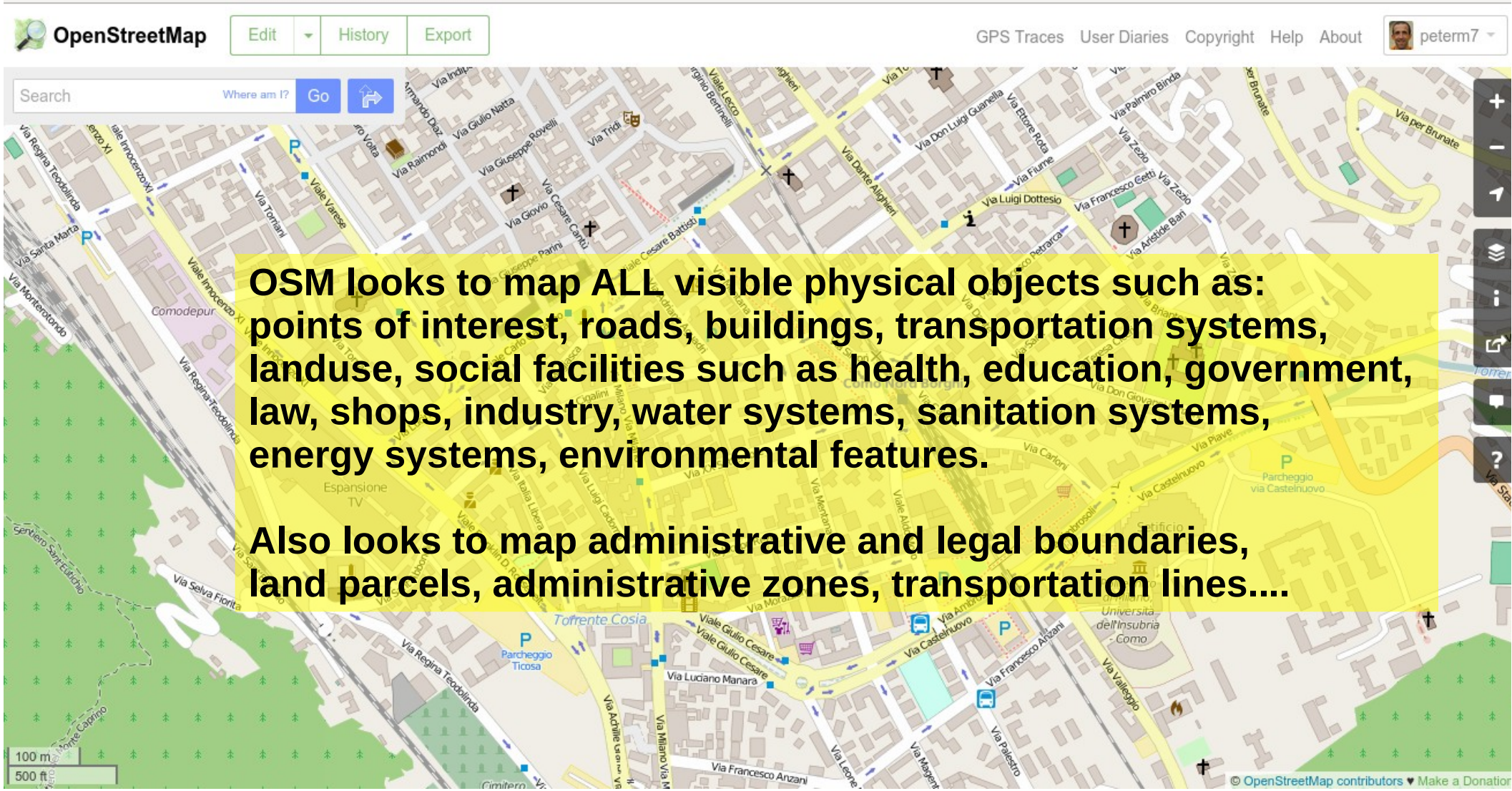
Wikipedia: OpenStreetMap

- OpenStreetMap (OSM) is a collaborative project to create a free editable map of the world. Two major driving forces behind the establishment and growth of OSM have been restrictions on use or availability of map information across much of the world and the advent of inexpensive portable satellite navigation devices.
- Created by Steve Coast in the UK in 2004, it was inspired by the success of Wikipedia and the preponderance of proprietary map data in the UK and elsewhere. Since then, it has grown to over 2 million registered users, who can collect data using manual survey, GPS devices, aerial photography, and other free sources. This crowdsourced data is then made available under the Open Database License.
- Rather than the map itself, the data generated by the OpenStreetMap project is considered its primary output. This data is then available for use in both traditional applications, like its usage by Craigslist, OsmAnd, Geocaching, MapQuest Open, JMP statistical software, and Foursquare to replace Google Maps, and more unusual roles, like replacing default data included with GPS receivers. This data has been favourably compared with proprietary datasources, though data quality varies worldwide.

https://en.wikipedia.org/wiki/OpenStreetMap

OpenStreetMap is more than just a map...



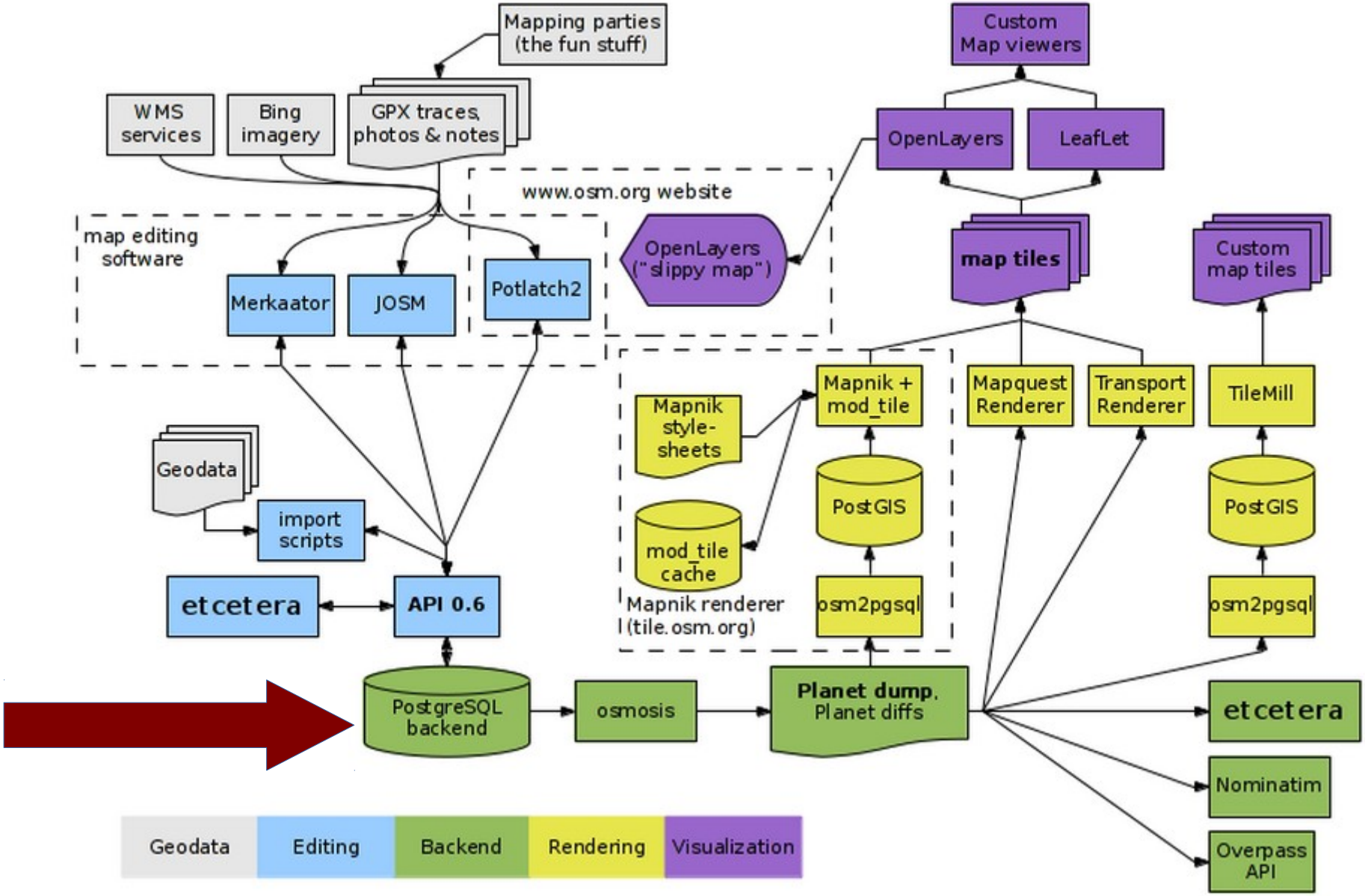


OSM looks to map ALL visible physical objects such as: points of interest, roads, buildings, transportation systems, landuse, social facilities such as health, education, government, law, shops, industry, water systems, sanitation systems, energy systems, environmental features.

Also looks to map administrative and legal boundaries, land parcels, administrative zones, transportation lines....

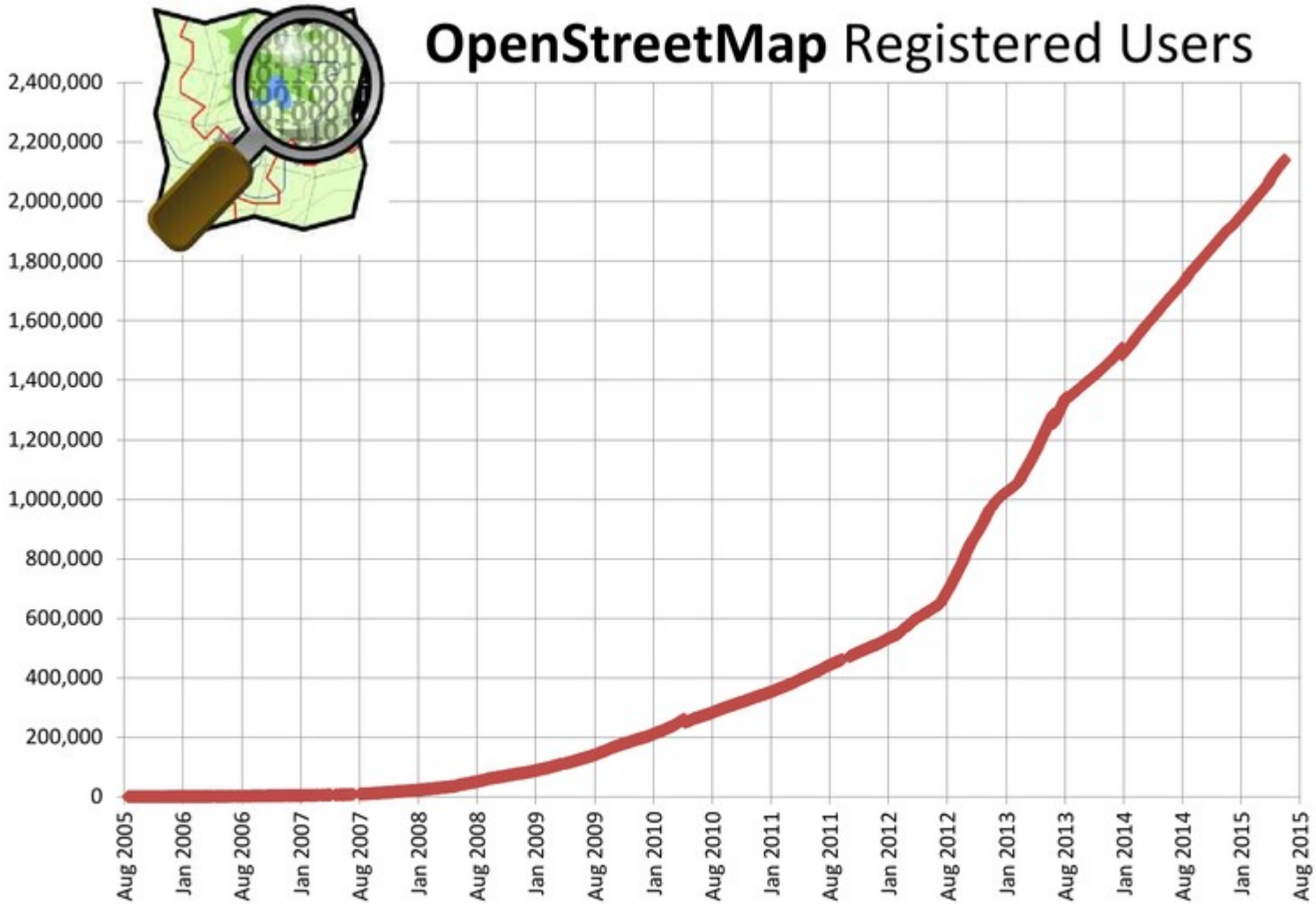
OpenStreetMap is actually a massive spatial database

In reality OpenStreetMap is a connected ecosystem of software and services



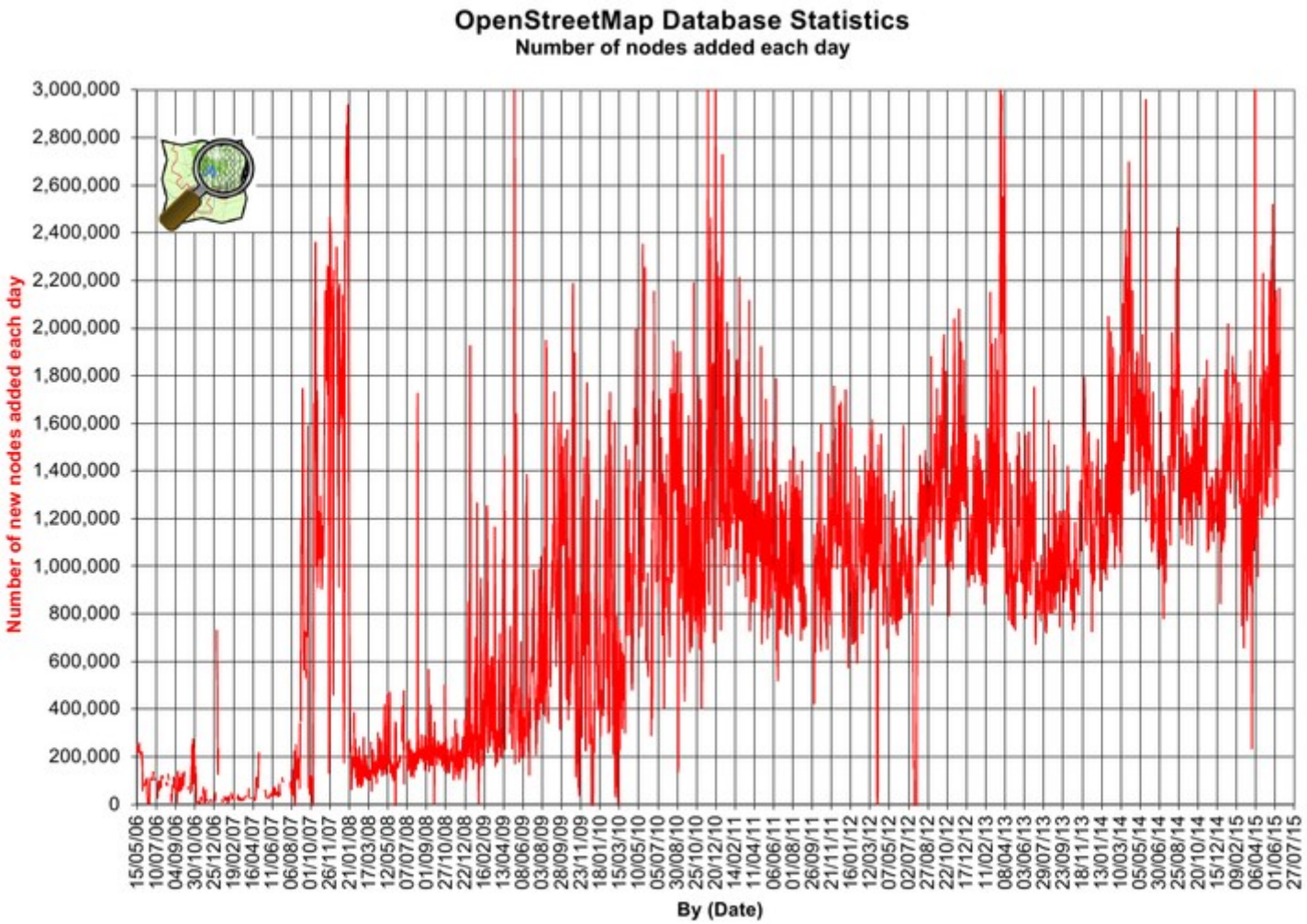
http://wiki.openstreetmap.org/wiki/Component_overview

OSM is probably the most famous example of VGI around today



http://wiki.openstreetmap.org/wiki/Stats

The amount of data added to OSM on a daily basis is staggering



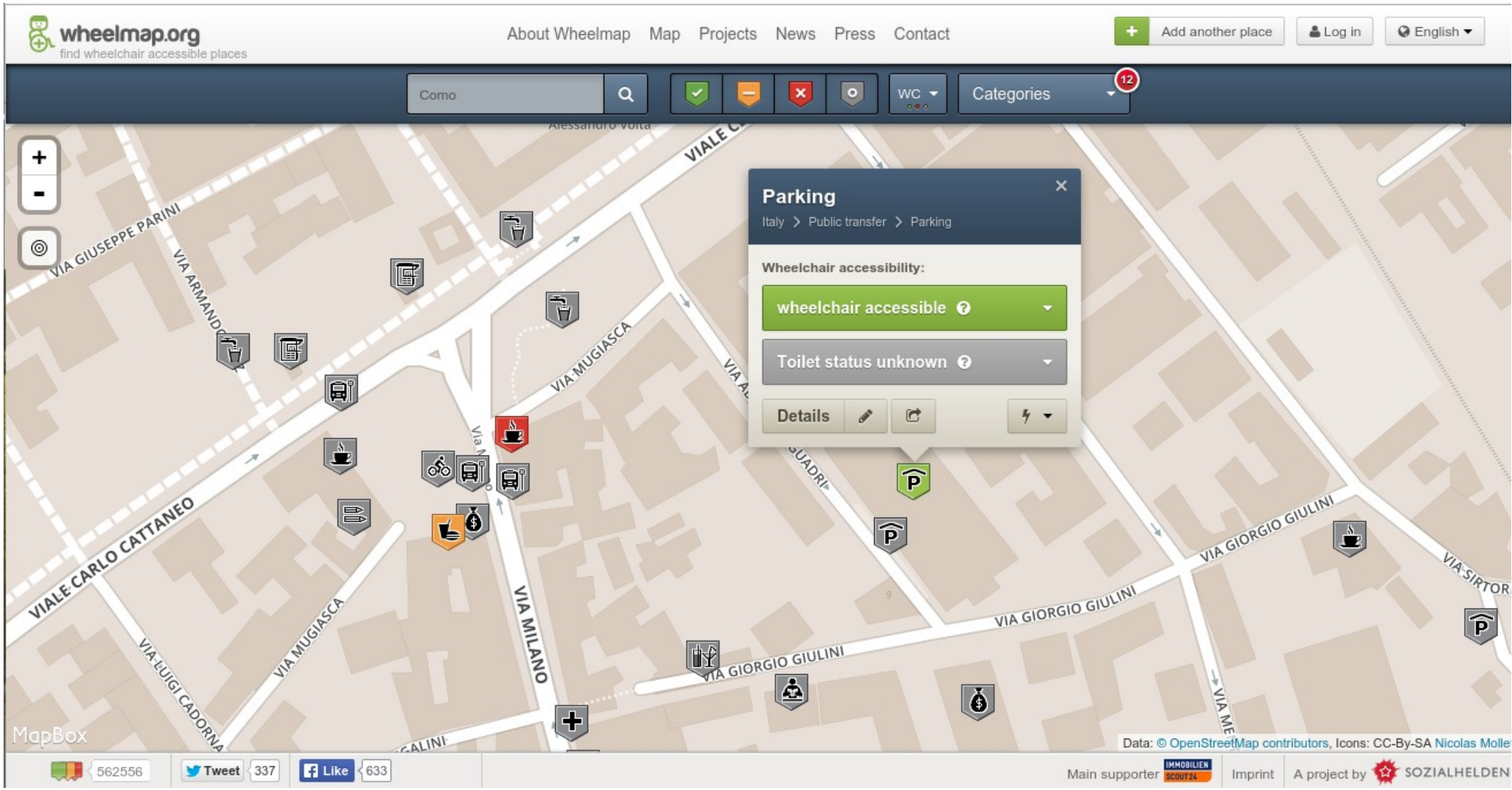
There are many many reasons why OpenStreetMap is very special

- Volunteered Geographic Information (VGI) and Citizen Sensors
- **ANYONE can contribute** – from people without any geo-training/skills to very highly skilled IT people and geo people
- It is an evolving ecosystem – there is new software, new techniques etc appearing all the time
- **It is democratic** – you can have your say, you can make a difference

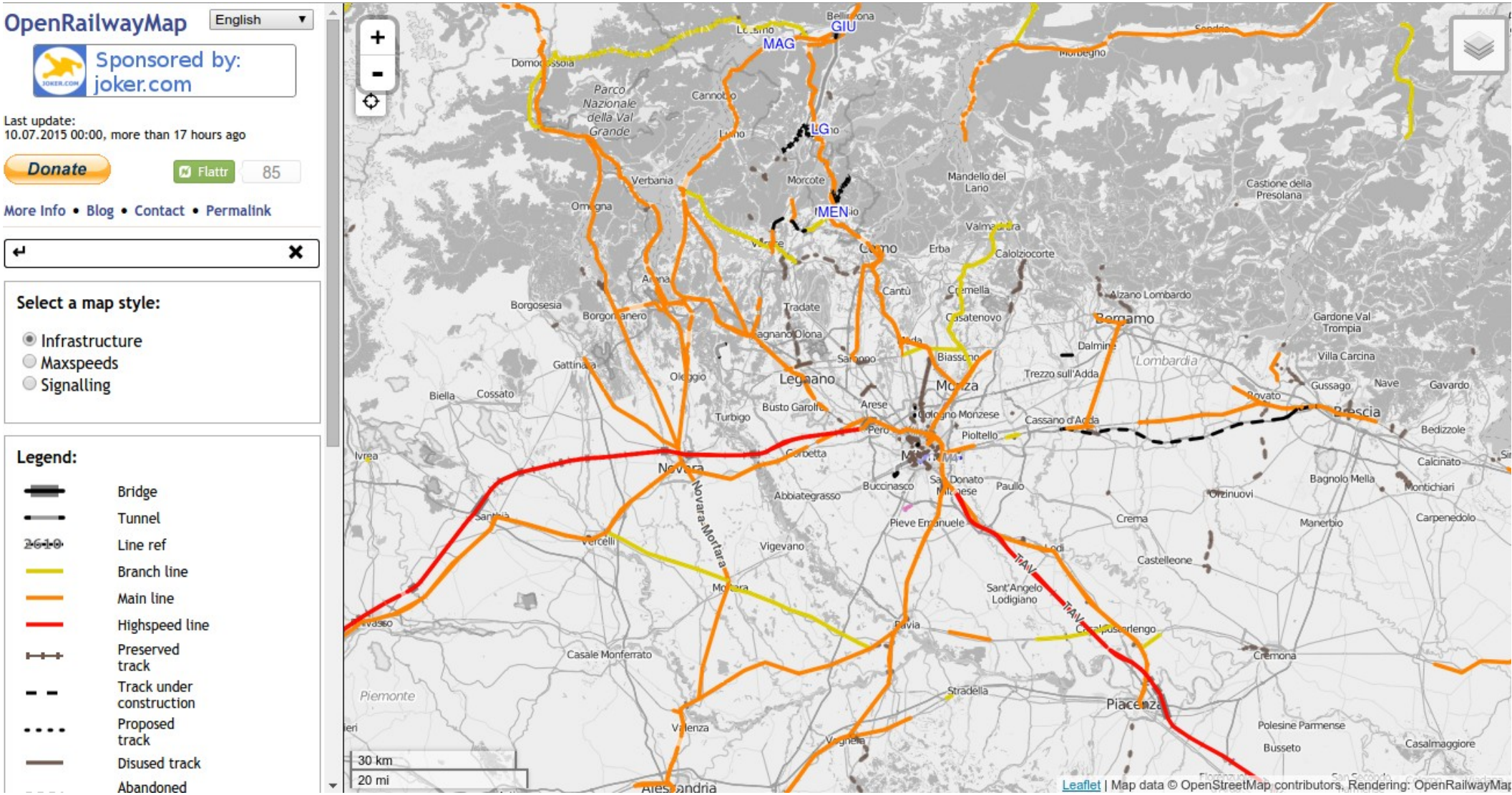
OSM data is used for thousands of different geodata services

http://wiki.openstreetmap.org/wiki/List_of_OSM-based_services

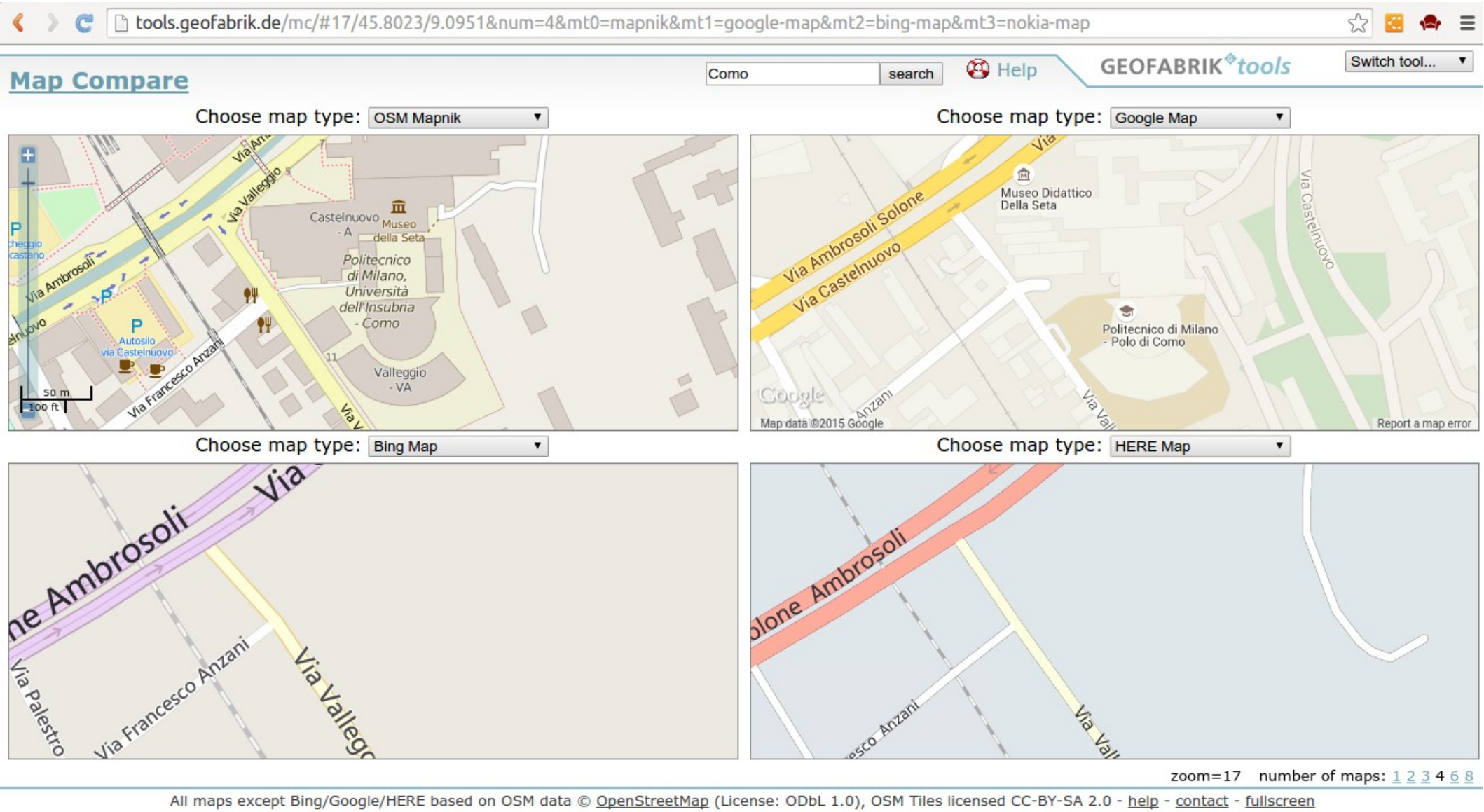
Wheelmap.org



OpenRailwayMap



Map Compare



http://tools.geofabrik.de/mc/

Exercise with Map Compare

- Let's look at Map Compare for an area which you are very familiar with – your home, your university, your favourite town, etc
- **Exercise and Discussion:** Use Map Compare to make a visual comparison of OSM in this area with Google Maps, Bing etc.
- Can you make some statements about: coverage, missing data, overall quality of the map data?

Contributing to OpenStreetMap

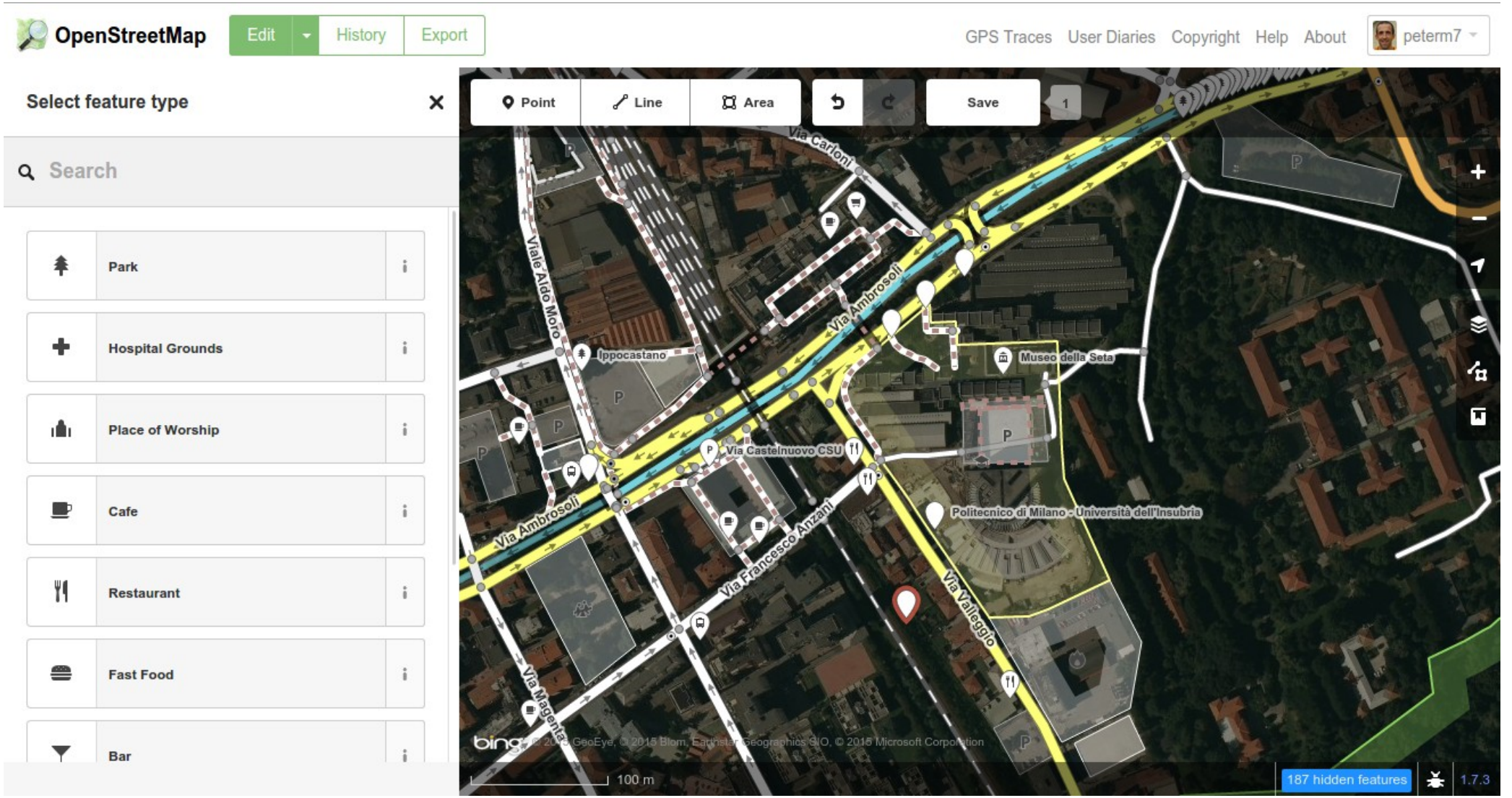
There are several different ways that people can contribute data to OpenStreetMap

- **FIELD COLLECTION:** By collecting data using GPS and GPS-enabled devices and uploading this data to OSM using special open source software
- **ARMCHAIR MAPPING:** By tracing out nodes, lines, polygons on specially designed web-based software
- **BULK IMPORT:** By taking open-license compatiable data and upload this data to OSM using special open source software

In OpenStreetMap '*the mapper on the street*' has precedence

- OSM guidance says that you should “*always map what is on the ground*”
- With ARMCHAIR MAPPING and BULK IMPORT there could be serious data quality issues introduced
- **DISCUSSION:** Why should there be precedence for the “mapper on the street”? What can those mappers bring to OSM which ARMCHAIR MAPPING and BULK IMPORT cannot bring? What are the data quality issues?

The iD OSM editor



There is huge emphasis on LOCAL KNOWLEDGE in OpenStreetMap

- Mappers or contributors to OpenStreetMap who have local knowledge of a particular area or region are considered very valuable sources of data and knowledge.
- **DISCUSSION:** What makes a mapper or contributor with local knowledge more valuable? What advantages do they have? Can you see any negative issues which might arise?

FIELD COLLECTION

labs.strava.com/heatmap/#14/9.06850/45.80970/yellow/both

STRAVA | LABS

My Location

Join Strava

Global Heatmap

Como

Heatmap Style

Gray | Blue | Yellow

Path Opacity

0% | 40% | 60% | 80% | 100%

Activity View

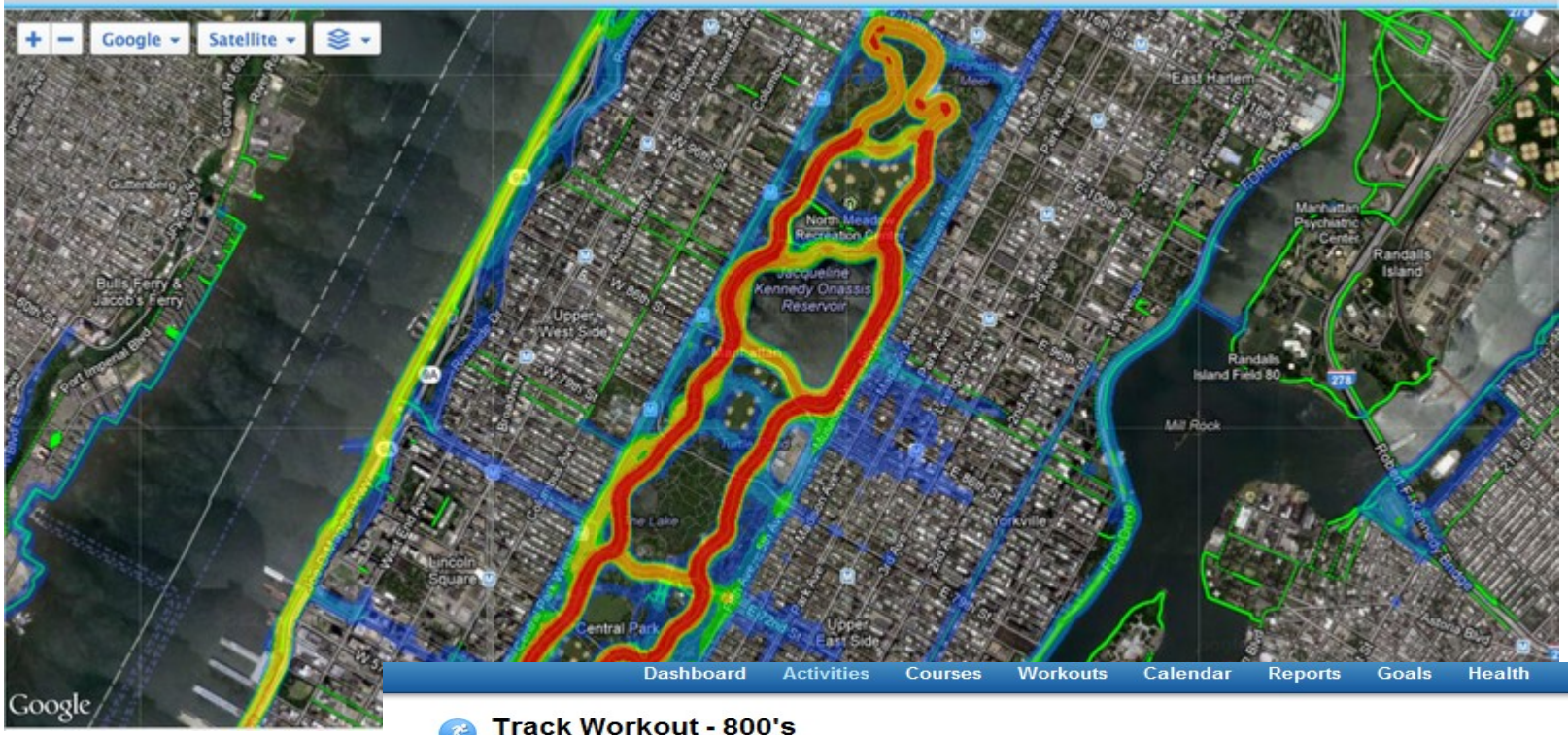
Bike | Run | Both

A total of 140 million rides and runs from Jan 2014 - May 2015, learn more.

Seeking deeper insight and analysis? See Strava Metro.

Activities | Courses

RSS | Link



Dashboard | Activities | Courses | Workouts | Calendar | Reports | Goals | Health

Track Workout - 800's

Previous | Next

Tue, Oct 25, 2011 6:10 PM Eastern Time (US & Canada) By wirebook
Activity Type: **Running** | Event Type: **Training**| Course: --

Like | Be the first of your friends to like this.

Share | Export | Send to Device | Compare | Save as Course | Print | Details | Splits | Player

Summary

Distance:	9.58 mi
Time:	1:13:32
Avg Pace:	7:41 min/mi
Elevation Gain:	237 ft
Calories:	662 C

Details

Timing

Pace | Speed

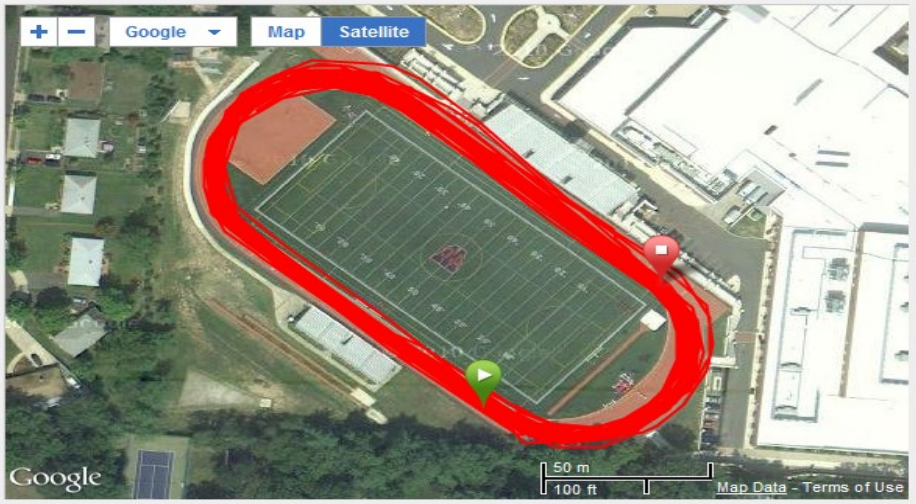
Time:	1:13:32
Moving Time:	1:11:22
Elapsed Time:	1:13:32
Avg Pace:	7:41 min/mi
Avg Moving Pace:	7:27 min/mi
Best Pace:	4:11 min/mi

Elevation

Elevation Gain:	237 ft
Elevation Loss:	240 ft

Map

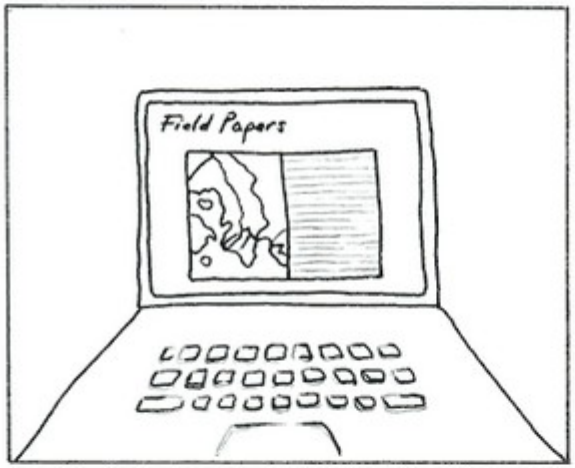
Laps



Field Papers

MAKE an atlas to print | **UPLOAD** pages you've marked | **WATCH** recent activity | **EXTEND** with advanced tools | **LOG IN** or create an account

Welcome to Field Papers

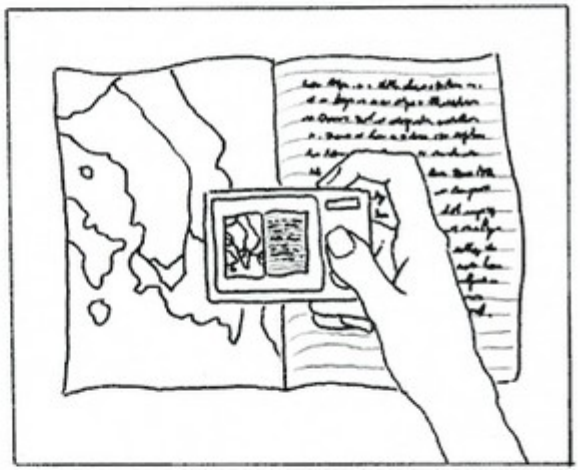


Make yourself an atlas

Print out anywhere in the world.

Take it into the field

Make your notes and observations.



Capture your notes

Upload pages you've photographed.

Field Papers is built by Stamen Design / About the Project / Help

Map data © OpenStreetMap contributors, Toner by Stamen, Bing by Microsoft, Mapbox, or a combination thereof.

Field Papers

http://fieldpapers.org/atlases/qzjmpye1/A1

Example: OpenStreetMap BULK IMPORT

- Many many examples of Bulk Import
- http://wiki.openstreetmap.org/wiki/Import/Catalogue
- **Bulk Import IS NOT A SIMPLE TASK**
- It can include: POI, placenames, legal boundaries, geographic features, road and transportation networks

Example: OpenStreetMap BULK IMPORT

- Bulk Import is also **a very controversial method** of contributing data to OpenStreetMap
- There are a number of reasons:
  - The data might not always “fit” into OSM directly and can require lots of manipulation
  - The data might be out of date or incorrect
  - The import can overwrite the hard work of many OSM contributors
  - Bulk import does not obey the “mapper on the ground” rule.

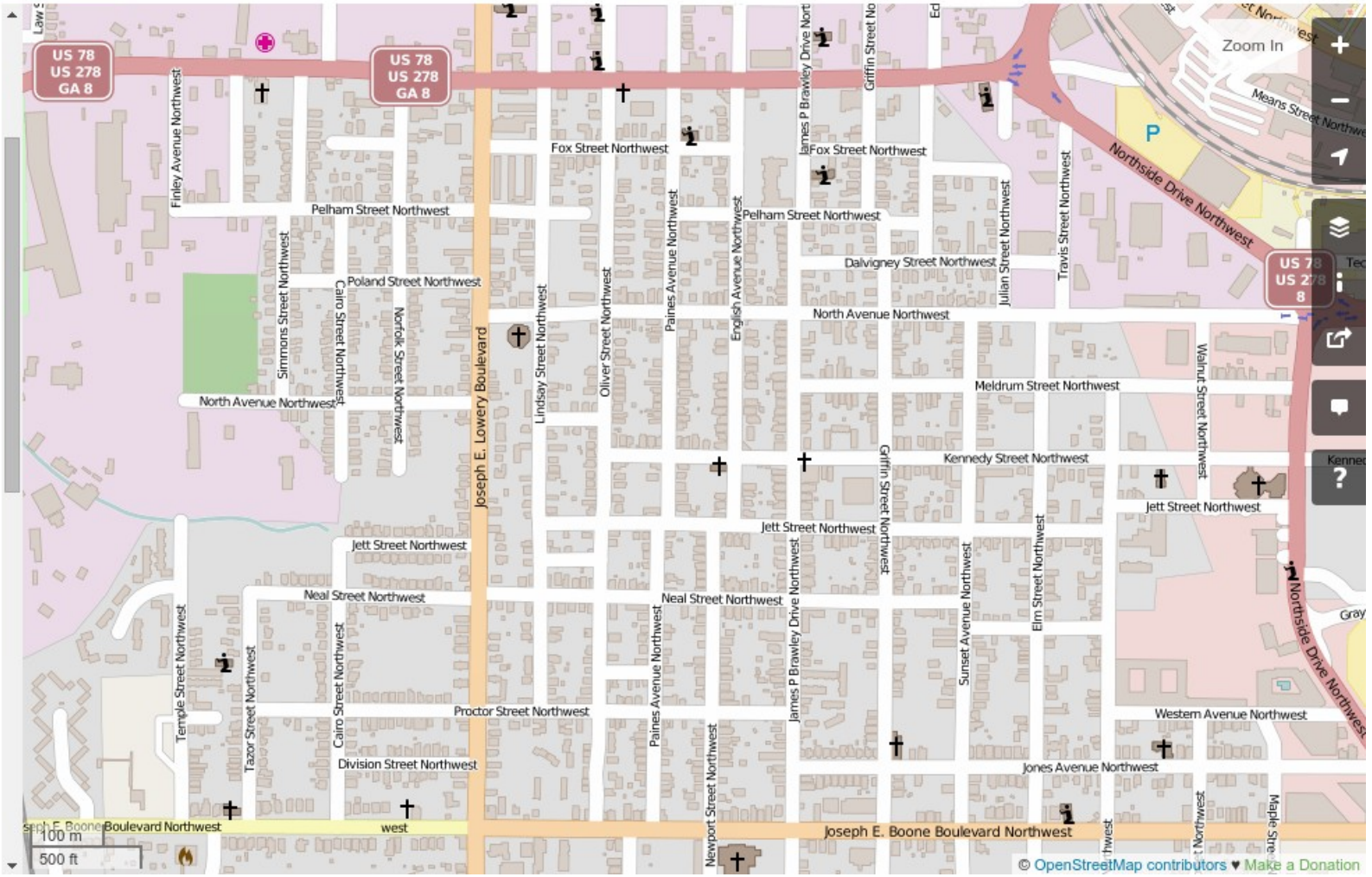
TIGER import in the USA

www.openstreetmap.org/relation/119557#map=16/33.7684/-84.4141

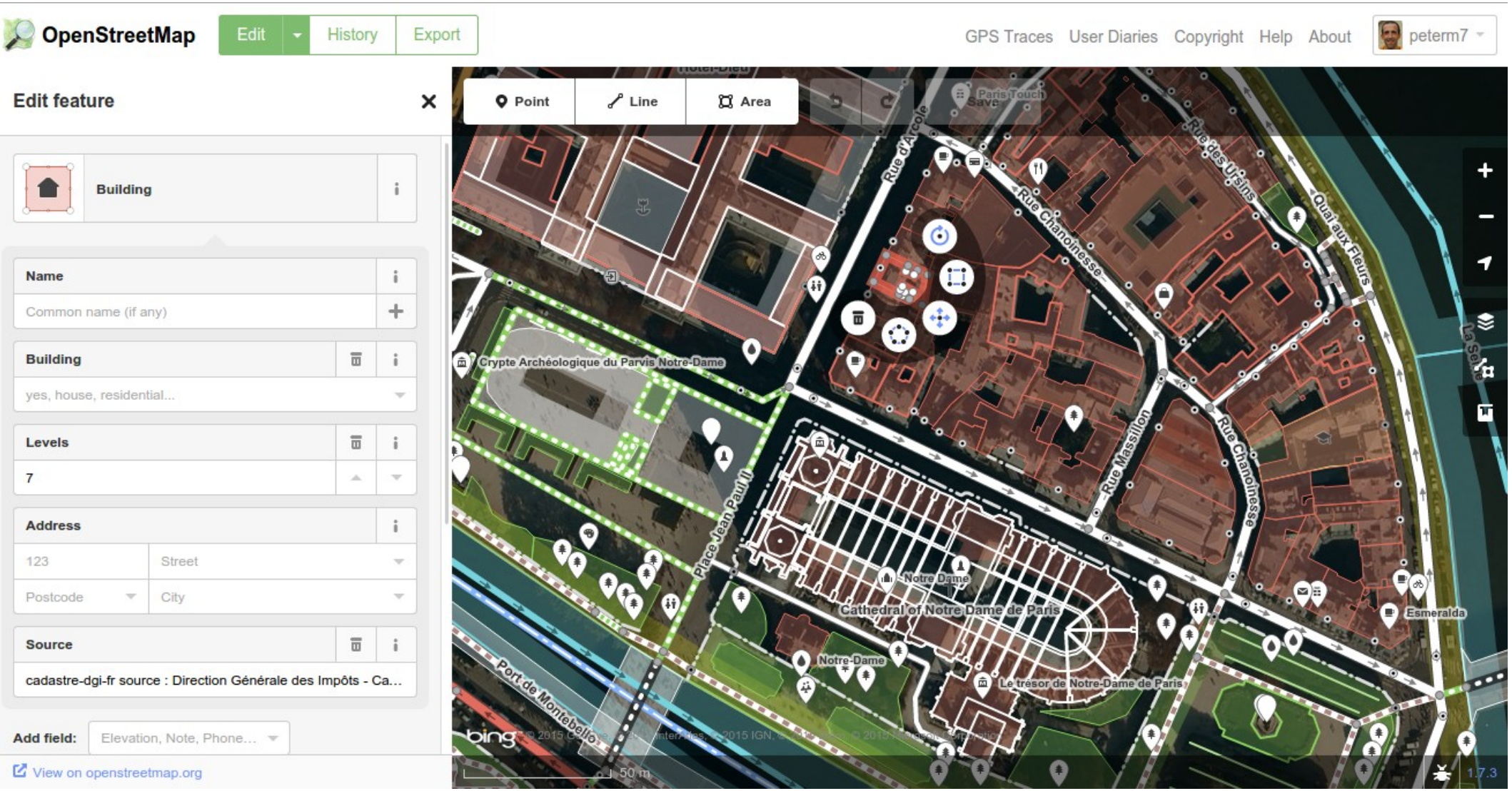
OpenStreetMap | Edit | History | Export | GPS Traces | User Diaries | Copyright | Help | About | peterm7

Tags

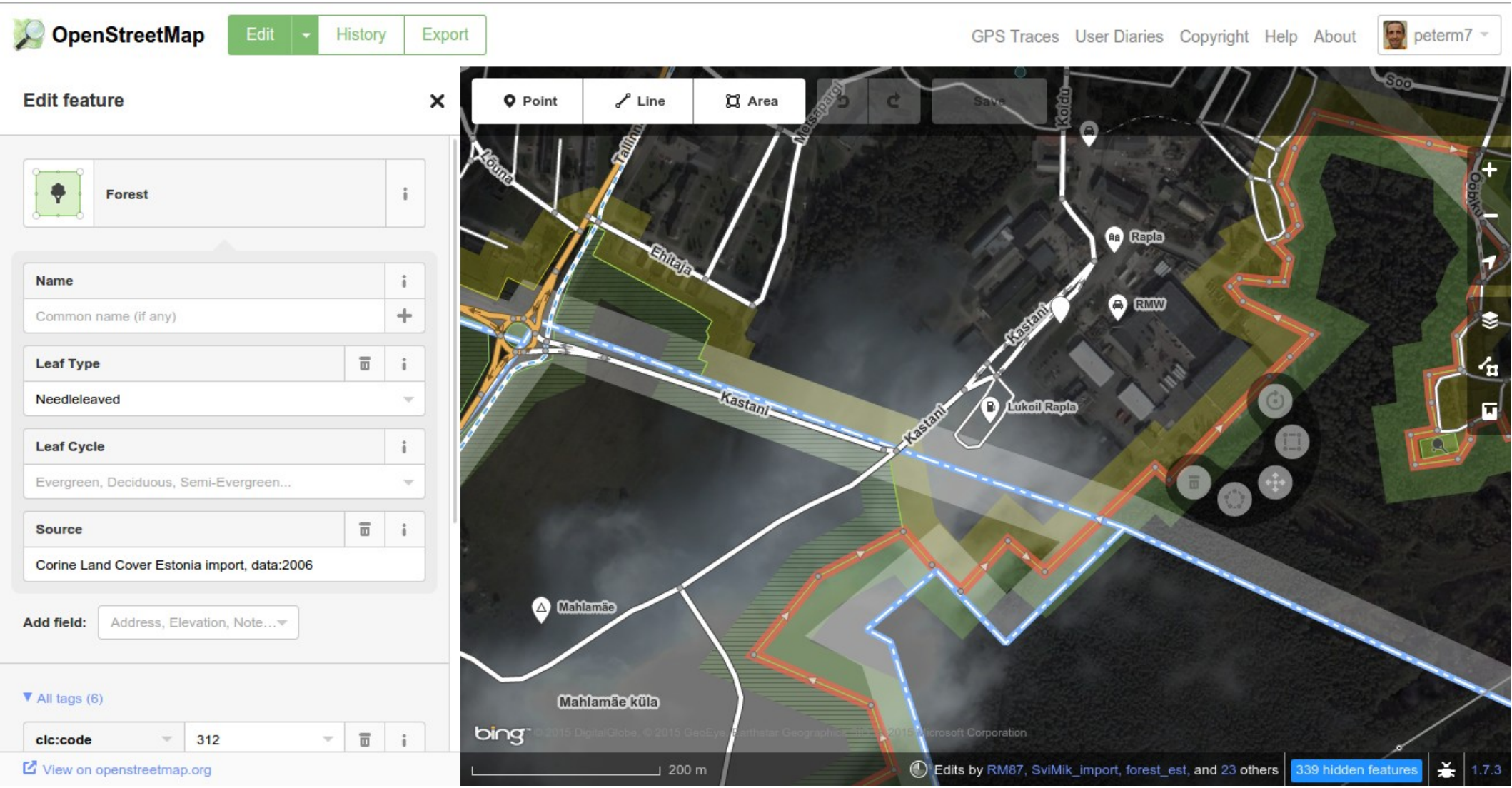
admin_level	8
border_type	city
boundary	administrative
is_in	USA, Georgia
is_in:country	USA
is_in:country_code	US
is_in:iso_3166_2	US:GA
is_in:state	Georgia
is_in:state_code	GA
name	Atlanta
place	city
source	TIGER/Line® 2008 Place Shapefiles (http://www.census.gov/geo/www/tiger/)
tiger:CLASSFP	C1
tiger:CPI	Y
tiger:FUNCSTAT	A
tiger:LSAD	25



French National Cadastre



Estonia – Corine Landcover Import



The OSM Data Model

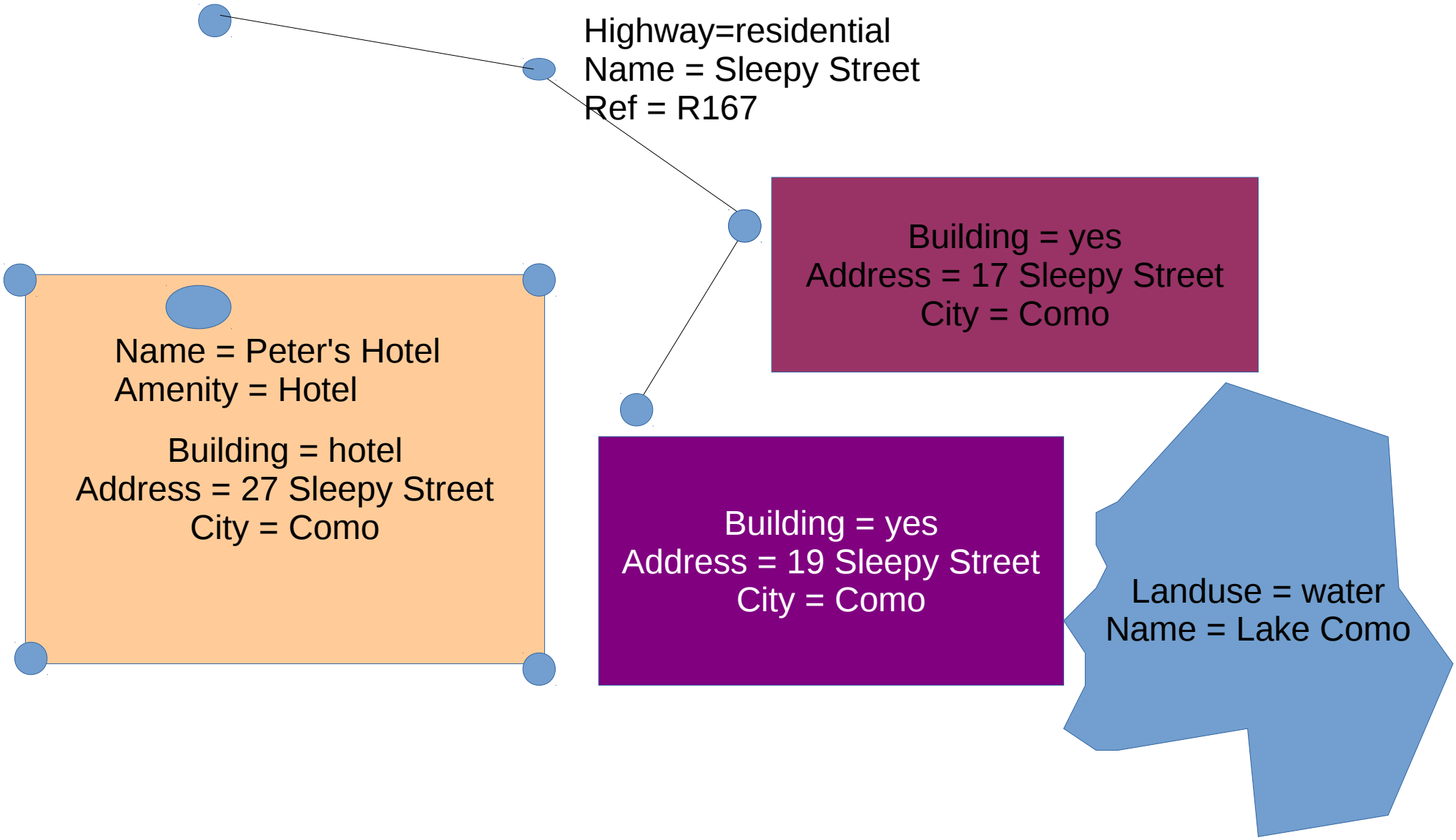
The conceptual model of OSM is easy to understand

- All features in OSM are either nodes, polylines, polygons or relations
- **Nodes** – single point -geo coordinate + tags
- **Polylines** – an ordered list of nodes + tags (start and end node are different)
- **Polygons** – an ordered lis of nodes + tags (start and end node are the same)
- **Relations** – a logical grouping of nodes, polylines and polygons + tags (example – country boundary)

The OpenStreetMap **WAY**

- In OSM terminology the term **WAY** is used to describe either polylines or polygons
- Usually tags are then used to distinguish between WAYS which represent polylines or polygons.
- We shall use the term WAY and polygon/polyline interchangeably during the lectures today

The OSM Data Structure relates the objects and tags



How are OSM objects created?

- In almost ALL cases OSM Objects (points, lines, polygons, relations) are created using the OSM Editing Software
- There is a wide range of OSM Editing Software and software means of contributing data
- However for today's class we'll restrict ourselves to the most popular methods (web-based editors)
- When we look at tagging we'll create some objects.

Tagging in OpenStreetMap

- Tagging is one of the most important aspects of OpenStreetMap
- It also provokes the most debate, conversation, chat, discussion, disagreement, etc
- Tagging in OpenStreetMap is very flexible
- It is very different to the type of tagging (or ontology) that one would find in databases such as those used by National Mapping Agencies

The “Map Features” Page – one of the cornerstones of OSM

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

English Create account Log in

Page Discussion Read View source View history Search

We hit our fundraising target. Thank you! (You can still donate)

Map Features

Available languages — *Map Features* Help

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OpenStreetMap represents physical features on the ground (e.g., roads or buildings) using tags attached to its basic data structures (its nodes, ways, and relations). Each tag describes a geographic attribute of the feature being shown by that specific node, way or relation.

OpenStreetMap's free tagging system allows the map to include an unlimited number of attributes describing each feature. The community agrees on certain key and value combinations for the most commonly used tags, which act as informal standards. However, users can create new tags to improve the style of the map or to support analyses that rely on previously unmapped attributes of the features. Short descriptions of tags that relate to particular topics or interests can be found using the feature pages.

Most features can be described using only a small number of tags, such as a path with a classification tag such as `highway=footway`, and perhaps also a name using `name=*`. But, since this is a worldwide, inclusive map, there can be many different feature types in OpenStreetMap, almost all of them

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Tags can be considered as the attributes of an object

- An object can have at minimum 1 attribute (tag) – and there is no upper limit.
- There are no strict rules on how many attributes any object should have
- This flexibility means that you must use your own judgement in regards to how many attributes you provide

Let's look at the OSM tag for restaurants

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Page Discussion Read View source View history Search

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Tag:amenity=restaurant

Available languages — *Tag:amenity=restaurant* Help

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Other languages — Help us translate this wiki show

`amenity=restaurant` is for a generally formal place with sit-down facilities selling full meals served by waiters and often licensed (where allowed) to sell alcoholic drinks.

amenity = restaurant v · d · e

Description

Is for a generally formal place with sit-down facilities selling full meals served by waiters and often licensed (where allowed) to sell alcoholic drinks.

Used on these elements

Contents [hide]

1 How to Map
2 Examples
3 Rendering
4 See Also

How to Map

Add a node at the centre of the building and add `amenity=restaurant` to it. You can name it with `name=*`. If the whole building is used for this feature and its footprint is present in OSM, you can apply the tags on the area if you prefer.

Optionally, you can further classify it using the `cuisine=*` tag with a value suitable for your nation's environment

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We use the amenity = restaurant tag and others where applicable

Amenity = restaurant
Name = Peter's Italian Place
Cuisine = Italian
Smoking = no
internet_access = wlan

In OSM we try to supply an appropriate number of tags to an object/feature

- We try to use the tags to supply as much accurate and timely attribute information about the object/feature as we can
- **ALWAYS USE MAP FEATURES FOR GUIDANCE WHEN USING TAGS**
- In the case of many tags there are suggested accompanying tags you should use

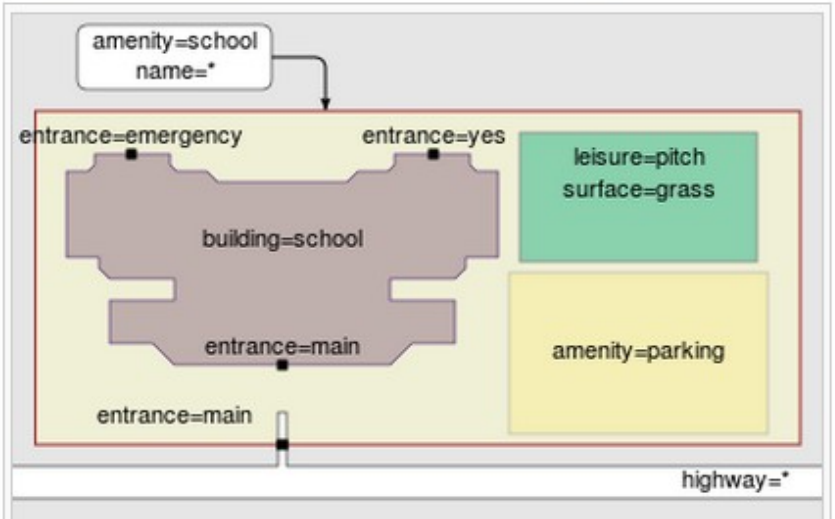
Example: Amenity = School

How to map

Mark the boundary of the school using an Area or place a Node in the middle of the site if you are in a hurry (or don't have access to information about the boundary and it is not obvious from aerial imagery).

This area should envelop the full grounds of the school including all the buildings, sports facilities and grounds. For schools with multiple sites the multipolygon relation can be used. Tag the element with `amenity=school` and `name=*` for the name of school. Suggested additional tags include:

- `operator=*` - Name of operator, often the local education authority.
- `addr=*` - Address details
- `capacity=*`, for the number of pupils taught at the school
- `isced:level=*`, for the educational level (proposed tags)
- `fee=yes` if the the school makes a direct charge for core services.
- `religion=*`, if the school is associated with a particular religion (also `denomination=*`)
- `wikipedia=*`, for a link to a Wikipedia article about the school
- `ref=*`, if schools are numbered
- `contact=*`, for contact details including the schools website, email and phone number



School buildings should be tagged with `building=school` where they are used generally, and optional also with details of use with appropriate additional tags, for example `amenity=swimming_pool`.

Consider adding `entrance=*` and if appropriate `barrier=gate` to the points where roads, paths or other access routes into the school grounds cross the boundary of the school (which is tagged with `amenity=school`.

Description

Institution designed for learning under the supervision of teachers.

Group: Education features

Used on these elements

Useful combination

- `name=*`
- `operator=*`
- `isced:level=*`

Status: Approved

taginfo [More...]

	334 305	6.60 %
	315 360	10.11 %
	8 017	21.19 %

Tools for this tag

- taginfo, fr, uk, ie, us
- overpass-turbo

Choosing the correct tags is not an easy task

- Choosing the correct tags requires you to think about the object/feature you are mapping
- As you get more experienced with mapping you will become more familiar with tagging
- **Remember** – you should always use tags which you can **VERIFY**
- **Remember** – you should use the Map Features guidance on the popular combinations of tags

Verifiability in OpenStreetMap

wiki.openstreetmap.org/wiki/Verifiability

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Verifiability

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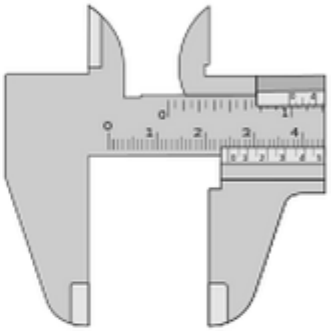
Verifiability is an important concept to OpenStreetMap. OSM data should, as far as is reasonably possible, be verifiable. This is a good practice guideline covering all mapping activity, and also by virtue of common sense, this has become a policy governing choices we make about tags to use (and which tags gain acceptance)



Contents [hide]

1 What is Verifiability?
2 Example
3 Improving Verifiability by Documenting Values
4 Problematic tags

What is Verifiability?

At the core, "verifiability" is that everything you do can be demonstrated to be true or false - the latter hopefully implying that there has been a change on the ground that needs mapping. We apply this not only to the mapping data itself, but also to the way in which we record it - the tags and values we use to describe the attributes of objects on the map. From a given scenario, a tag/value combination is verifiable **if and only if** independent users when observing the same feature would make the same observation every time. For a user's tagging to be verifiable, it is desirable to have objective criteria for tagging. This principle applies to any observable characteristic which is a matter of fact, be it numerical or

Verifiable Tagging

- “ *From a given scenario,* ***a tag/value combination is verifiable if and only if independent users when observing the same feature would make the same observation every time****. For a user's tagging to be verifiable, it is desirable to have objective criteria for tagging. This principle applies to any observable characteristic which is a matter of fact, be it numerical or descriptive - a concrete road surface, a red brick building, etc.*”

http://wiki.openstreetmap.org/wiki/Verifiability

The OpenStreetMap TagInfo Service

taginfo

Data from: 2015-07-07 23:58 UTC

English

KEYS

building • source • highway • name • amenity • addr:housenumber • addr:street • shop • landuse • surface • natural • ...

See all keys...

TAGS

building=yes • highway=residential • highway=service • building=house • wall=no • highway=track • waterway=stream • ...

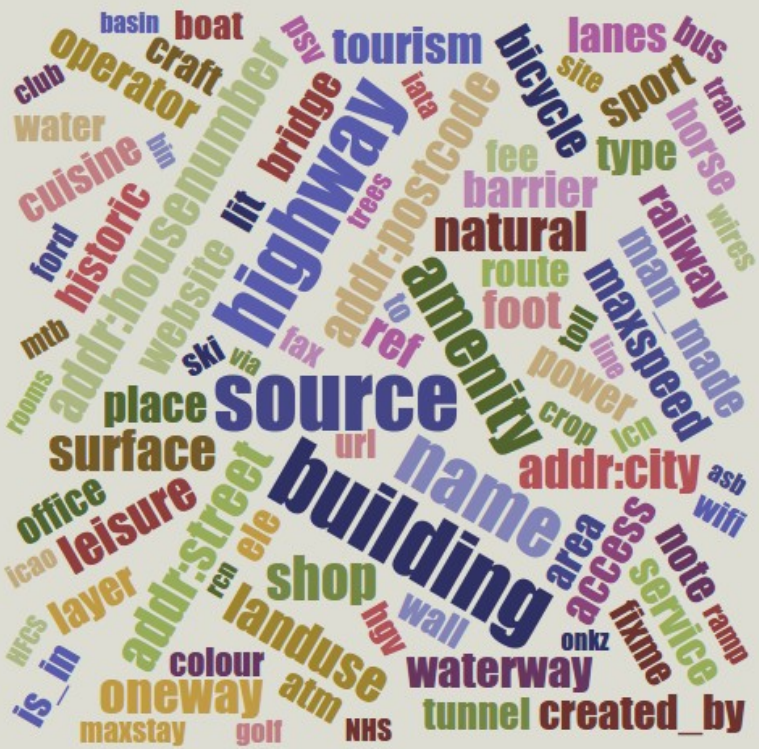
See most common tags...

RELATION TYPES

multipolygon • restriction • route • boundary • associatedStreet • site • public_transport • route_master • destination_sign • waterway • turnlanes:turns • ...

See all relation types...

SOME POPULAR KEYS



REPORTS

Reports show the tag data from different angles. They often bring together data from several sources in interesting ways. Some of the reports can help with finding specific errors.

- Characters in keys
- Database statistics
- Frequently used keys without wiki page
- Historic development
- Key lengths
- Language comparison table for keys in the wiki
- Languages
- Similar keys
- Wiki images
- Wiki pages about non-existing keys

See all reports...

ABOUT

OpenStreetMap uses **tags** of the form **key=value** to add meaning to geographic objects. Taginfo collects information about these tags from several sources to help you understand what they mean and how they are used.

More about taginfo...

INTERNATIONAL

This is the main taginfo site. It contains OSM data for the whole planet and is updated daily.

➔ See other taginfo sites...

➔ **OpenStreetMap** · Data © OSM contributors (ODbL)

Keys · Tags · Relations · Reports · Sources · Projects · Download · API · About · Help · ➔ taginfo wiki page

https://taginfo.openstreetmap.org/

TagInfo provides very useful statistical information on tag usage in OpenStreetMap globally

taginfo | KEYS

amenity

For describing useful and important facilities for visitors

Overview | Values | Combinations | Similar

Overview

Type	Number of objects		Number of values
All	8 219 964	0.25%	8 491
Node	5 062 354	4.95%	6 396
Way	3 119 775	1.05%	3 375
Relation	37 835	1.07%	263

Objects with this key were last edited by 188 454 different users.

Values used with this key

Page 1 of 654 JSON Displaying 1 to 13 of 8491 items

Value	Count			Description
parking	1 740 851	21.18%	✔	A place for parking cars
place_of_worship	687 707	8.37%	✔	A place where religious services are conducted
school	657 682	8.00%	✔	Institution designed for learning under the supervision of teachers.
bench	495 990	6.03%	✔	A place for people to sit; allows room for several people.
restaurant	490 941	5.97%	✔	Is for a generally formal place with sit-down facilities selling full meal
fuel	260 365	3.17%	✔	Used to mark filling stations

What we see here is that amenity=parking is the most popular tag for amenity in the global OpenStreetMap database – this tag has been used on over five million nodes

TagInfo Exercise

- Let's look at TagInfo in closer detail so we can understand how tagging is performed in OSM
- We'll need to look at OSM Map Features at the same time
- The aim of the exercise is to look at TagInfo and Map Features and see where there are issues related to the tags (tags formed incorrectly, incorrect spelling, etc, etc)

Looking at “raw” OpenStreetMap data for the first time

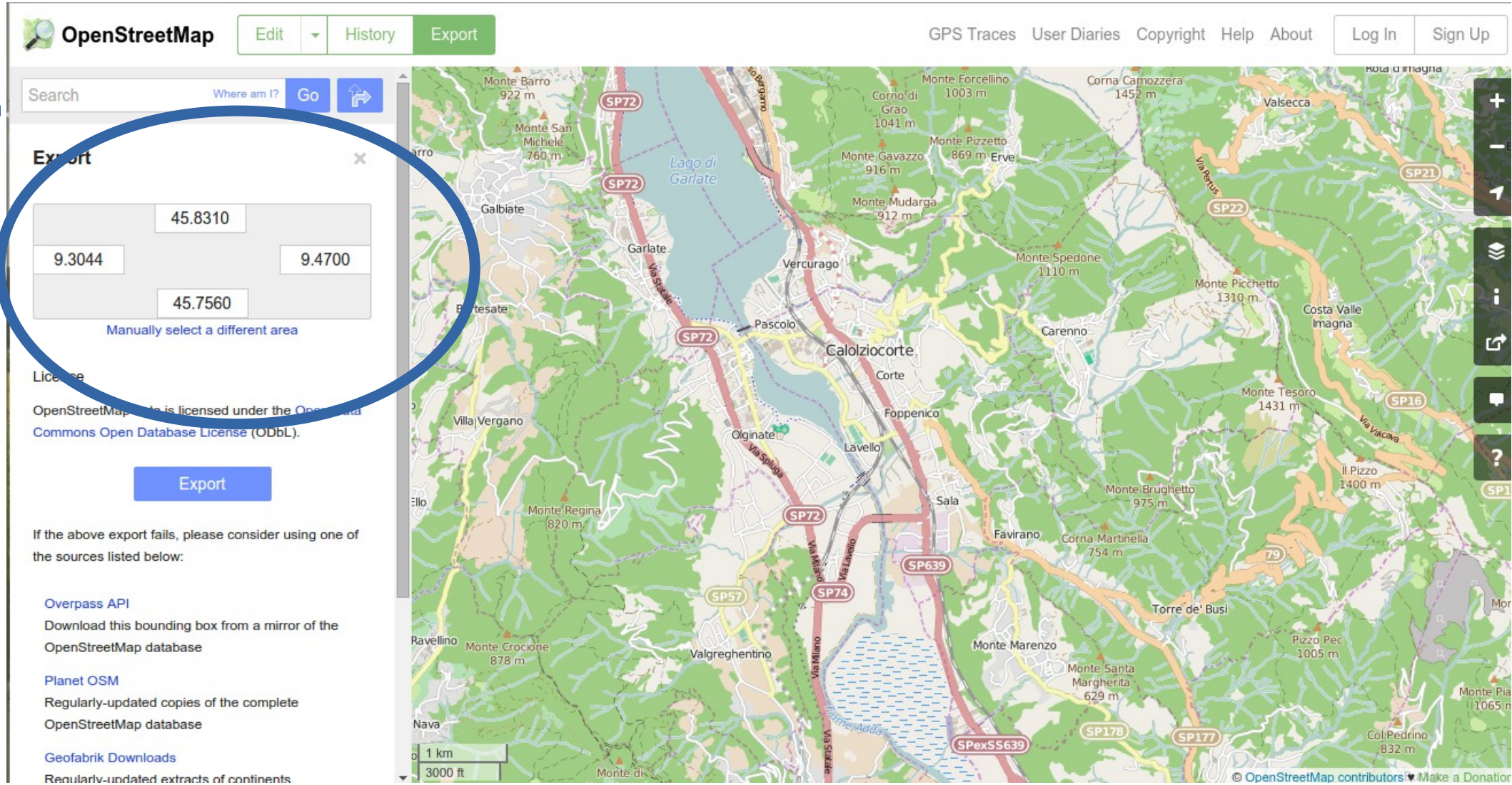
In the next few slides we are going to look at OpenStreetMap data

- We have mentioned that OSM is a very large spatial database.
- There are different ways in which we can extract or download the data within OSM for use in our own databases, applications or analysis.
- The most common format is the OpenStreetMap XML format
- Understanding OSM XML will give you a much deeper appreciation of the OSM data model including its flexibility and its drawbacks.

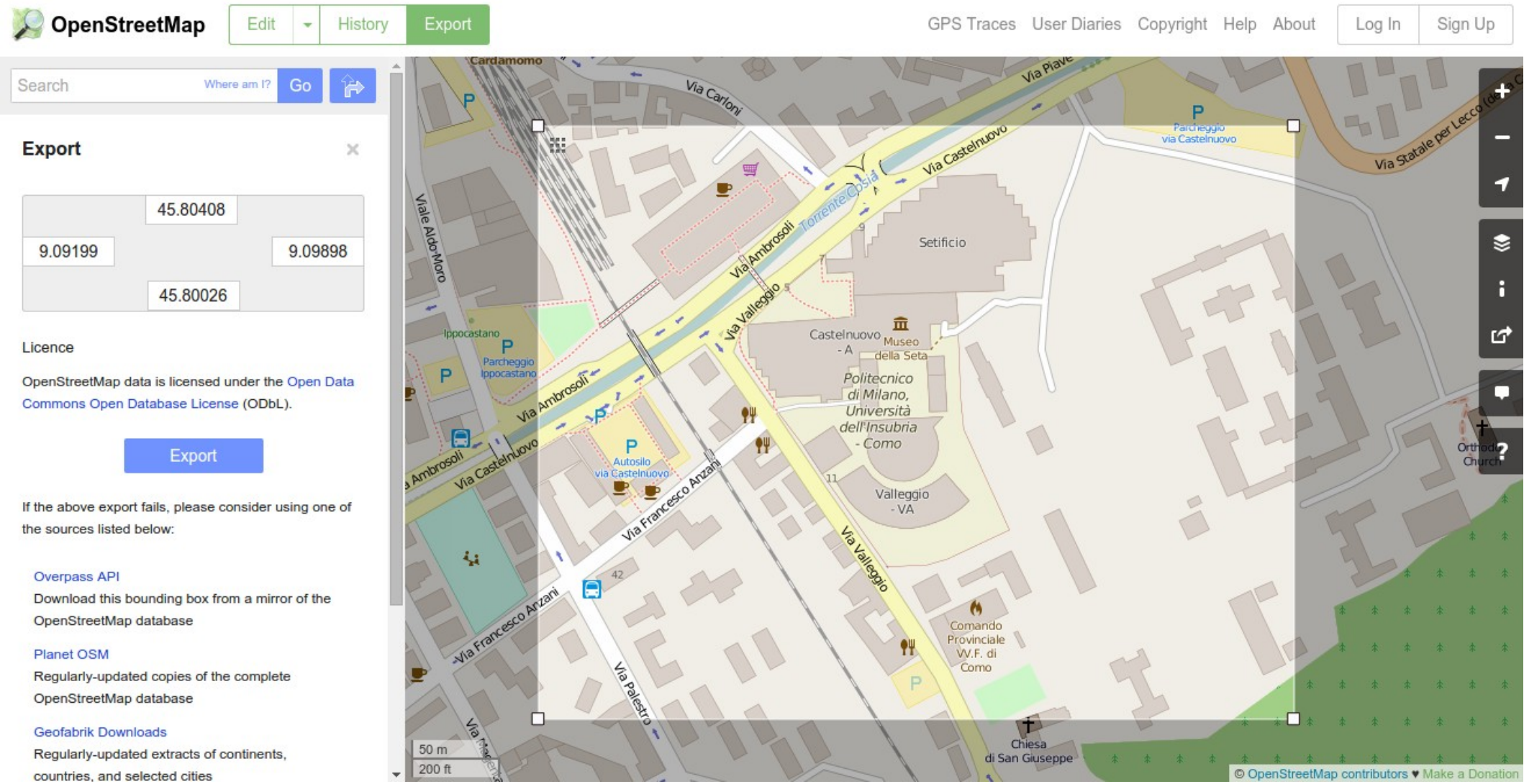
OSM XML is easy to understand

- During this summer school lecture we shall avoid going into the nuts and bolts of XML
- For the purposes of the following exercises you will not need any experience with XML
- Your web-browser will open and display OSM XML (any XML actually) – but we will use a text editor (Notepad ++) to open the data and inspect it ourselves

The OSM Website provides an 'Export' button for OSM XML

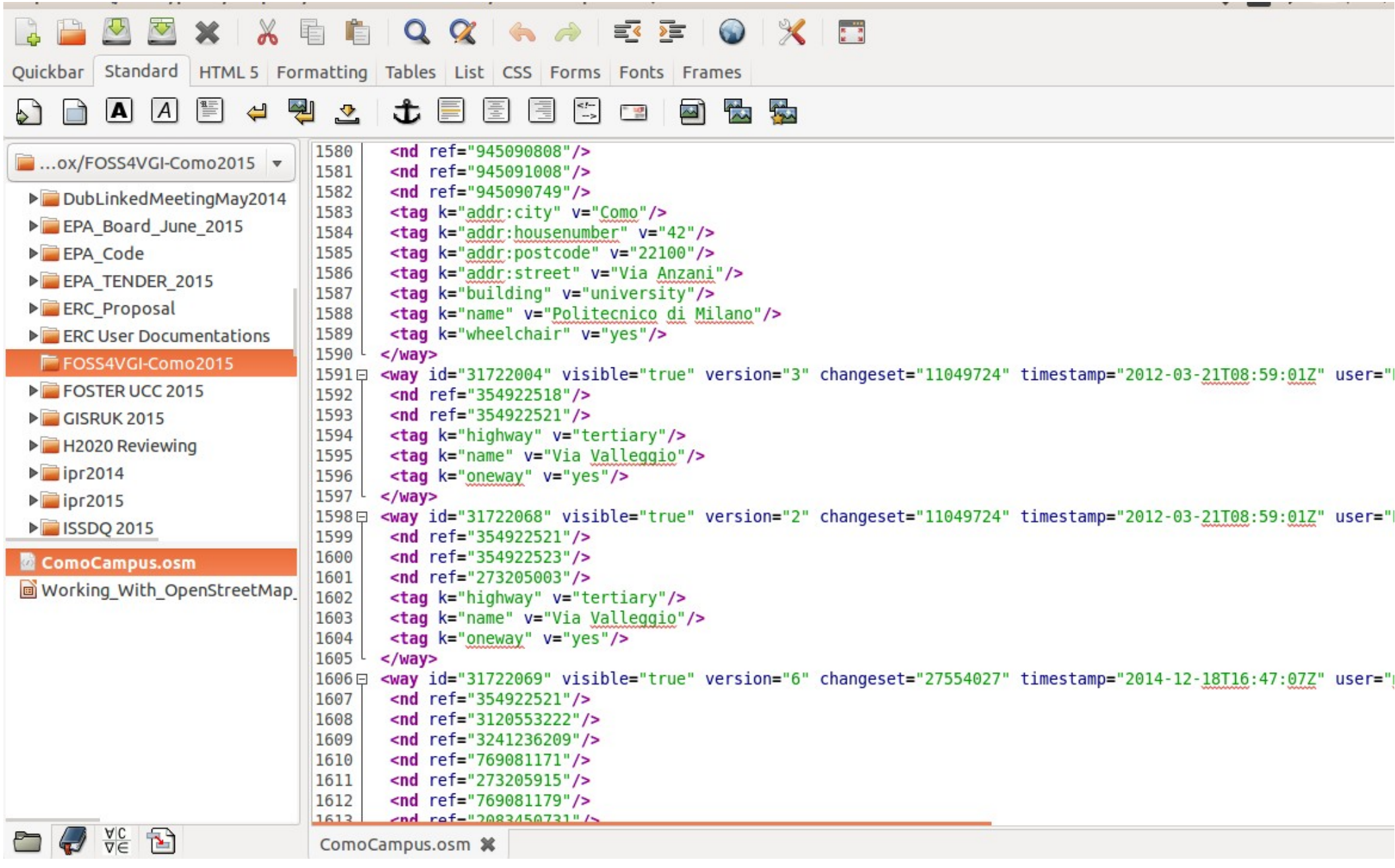


Excercise – download some OSM XML and inspect it



Go to anywhere in the world and create a bounding box like above – remember to keep the area of the bounding box small (or you'll end up with a very large XML file)

The OSM XML should look something like this in your text editor!



Exercise – Inspecting the XML

- Take a closer look at the XML. This is OSM data.
- Before we look at the XML in detail together – **write down at least 5 pieces of information about the spatial data contained in the OSM XML**.

While it might not appear very useful there is very rich spatial detail in the OSM XML

```
<way id="31722069" visible="true" version="6" changeset="27554027" timestamp="2014-12-18T16:47:07Z"
user="mingo23" uid="1902578">
 <nd ref="354922521"/>
 <nd ref="3120553222"/>
 <nd ref="3241236209"/>
 <nd ref="769081171"/>
 <nd ref="273205915"/>
 <nd ref="769081179"/>
 <nd ref="2083450731"/>
 <nd ref="354921780"/>
 <tag k="highway" v="tertiary"/>
 <tag k="name" v="Via Valleggio"/>
</way>
```

ID of the object
VERSION of the object
CHANGESET it is part of
TIMESTAMP of when it was created/edited
USER who created it
USER ID

The ordered list of NODES

The list of tags (no order)

One of the unique aspects of OSM is the ability to view the history of all edits to a particular object

We can type a special URL into our browser – once we know the ID of the object which we would like to view the history

NODES: https://www.openstreetmap.org/node/NODEID/history

WAYS: https://www.openstreetmap.org/way/WAYID/history

RELATIONS:
https://www.openstreetmap.org/relation/RELATIONID/history

YOU MUST KNOW THE CORRECT ID OF THE OBJECT YOU ARE ANALYSING

Let's take a look at Way: Via Castelnuovo (32223922) in Como

- To simply view the specific WAY we type
- **https://www.openstreetmap.org/way/32223922**
- To view the history of this specific WAY we type
- **https://www.openstreetmap.org/way/32223922/history**
- Notice that we can download the history of this object in OSM XML format (the link is at the bottom of the page)
- As an exercise – download the OSM XML format of the history and view it in Notepad++ ... can you understand it?

Via Castelnuovo (32223922) in Como

OpenStreetMap | Edit | History | Export | GPS Traces | User Diaries | Copyright | Help | About | Log In | Sign Up

Search | Where am I? | Go

Way History: Via Castelnuovo (32223922)

(no comment)

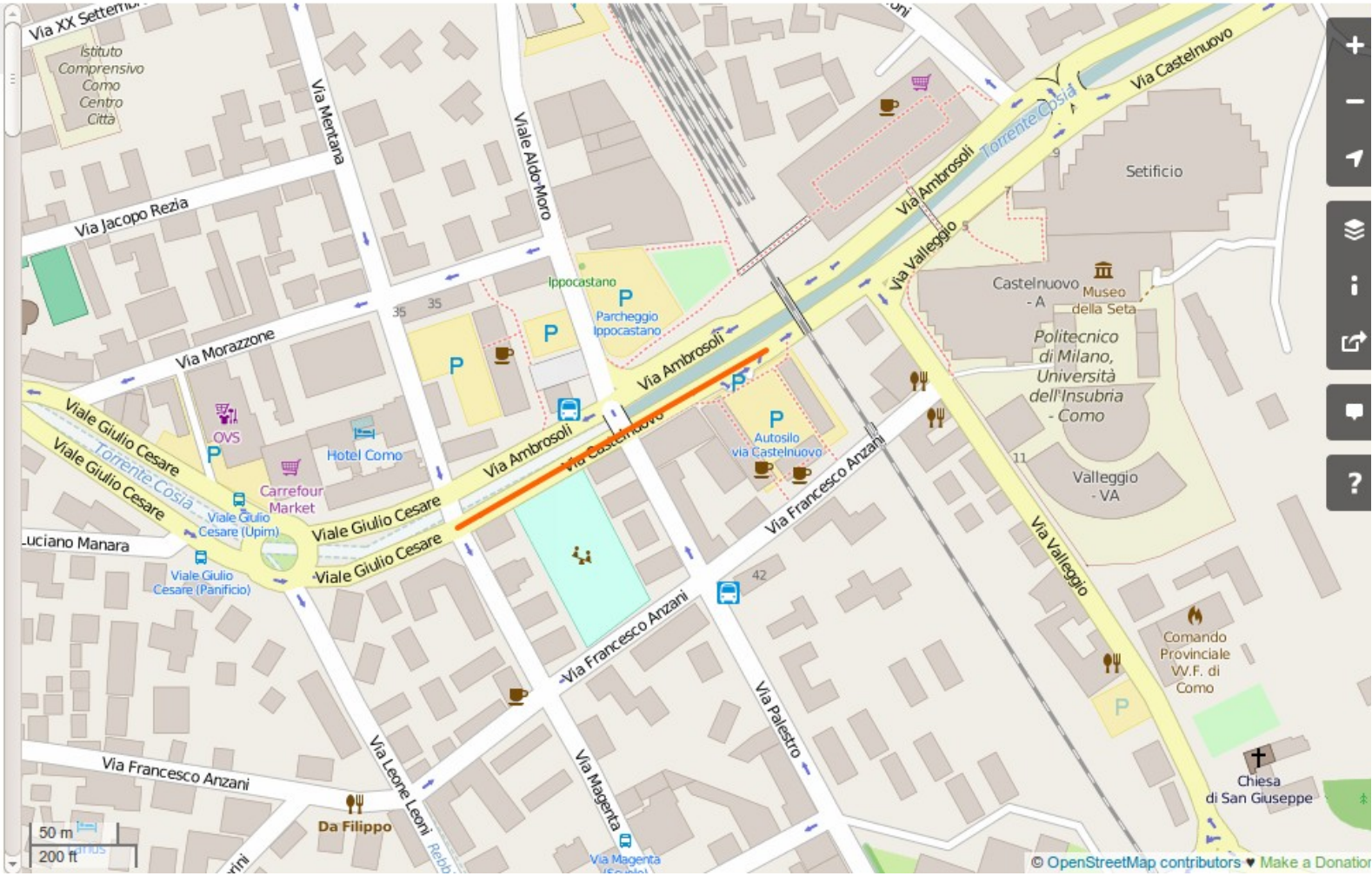
Edited 7 months ago by mingo23
Version #8 · Changeset #27558930

Tags

highway	tertiary
name	Via Castelnuovo
oneway	yes

Nodes

273204797 (part of ways Viale Giulio Cesare (338631154), Via Magenta (31722195), and Via Castelnuovo (25101250))
274259293 (part of ways 31722256 and Via Palestro (25101289))
2927387403 (part of way 289189948)
3241694920
1623989301 (part of way 120277783)
1349025185 (part of way 120277784)
273205002 (part of way Via Castelnuovo (31722212))



OSM History Exercise

- Go to any region of your choice and download some OSM XML for that region (keep the region size small)
- Inspect the OSM and pick out an 'interesting' object/feature (look for high version number)
- Download the OSM XML for the history of this specific object/feature
- **Make some general comments on the history of contributions to this object in OSM**

Downloading OSM XML in Bulk

There are many ways to access OSM XML in larger quantities

Planet.osm

Available languages — *Planet.osm* Help

• Deutsch • **English** • español • français • Nederlands • русский • 日本語

Other languages — Help us translate this wiki show

Planet.osm is the OpenStreetMap data in one file: all the nodes, ways and relations that make up our map. A new version is released every week. It's a big file (XML variant over 576.6GB uncompressed, 42GB bz2 compressed and 28.8GB PBF at 2015/05/19).

There are also files called **Extracts** which contain OpenstreetMap Data for individual continents, countries, and metropolitan areas.

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3.3 Additional technical notes
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5 License

OSM XML does have some drawbacks

- While OSM XML has many advantages (it is easy for humans to read, it is easy to write software to understand it....) it does have some drawbacks.
- As OSM grows in size so to does the size of the XML. As XML files get larger they become more difficult to process

There are services where you can download OSM data in different formats

- Geofabrik http://download.geofabrik.de/
  - Download in ESRI SHAPEFILE Format
- The OpenStreetMap Data (http://openstreetmapdata.com/) website provides access to OSM data in SHAPEFILE format.
- Other services are available to provide access to OSM data in other formats such as JSON and GPX

GeoFabrik Downloads

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.

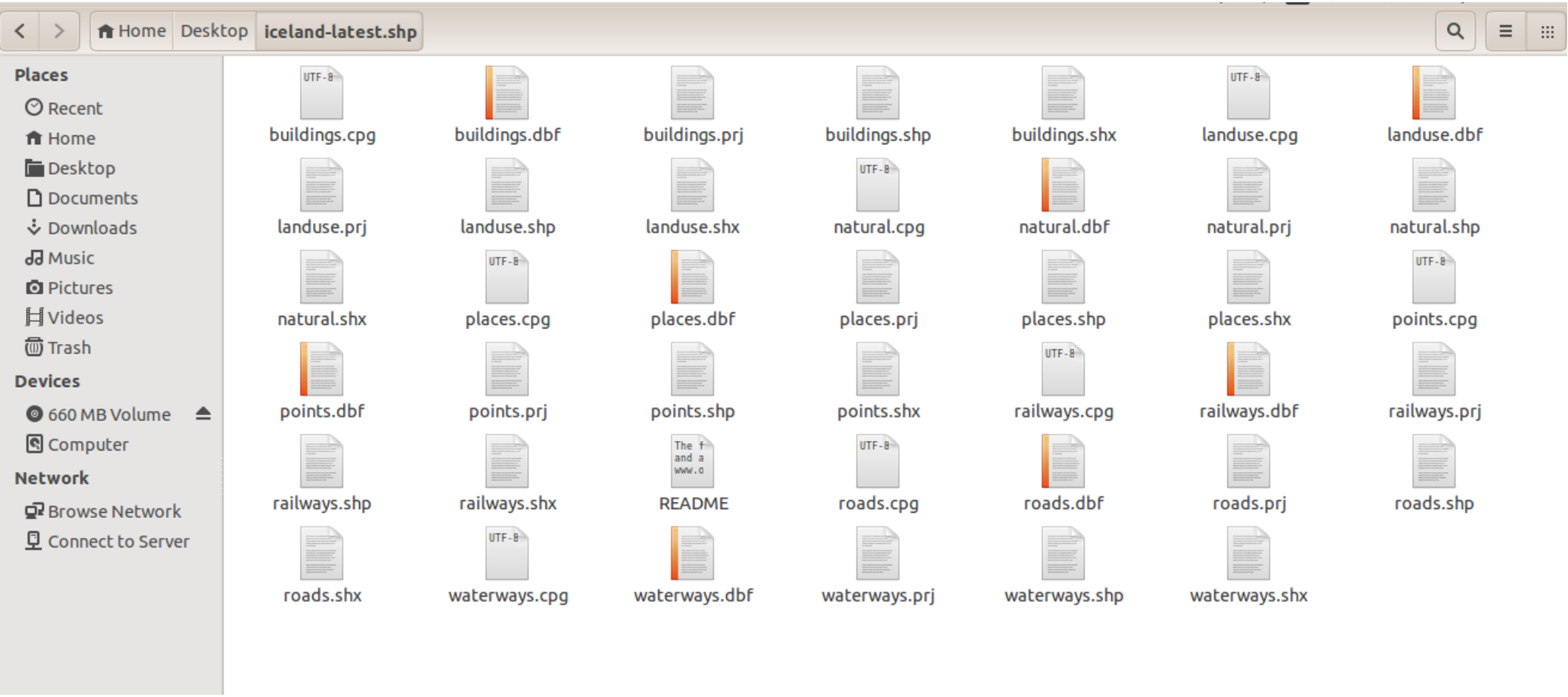
Click on the region name to see the overview page for that region, or select one of the file extenstion links for quick access.

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]

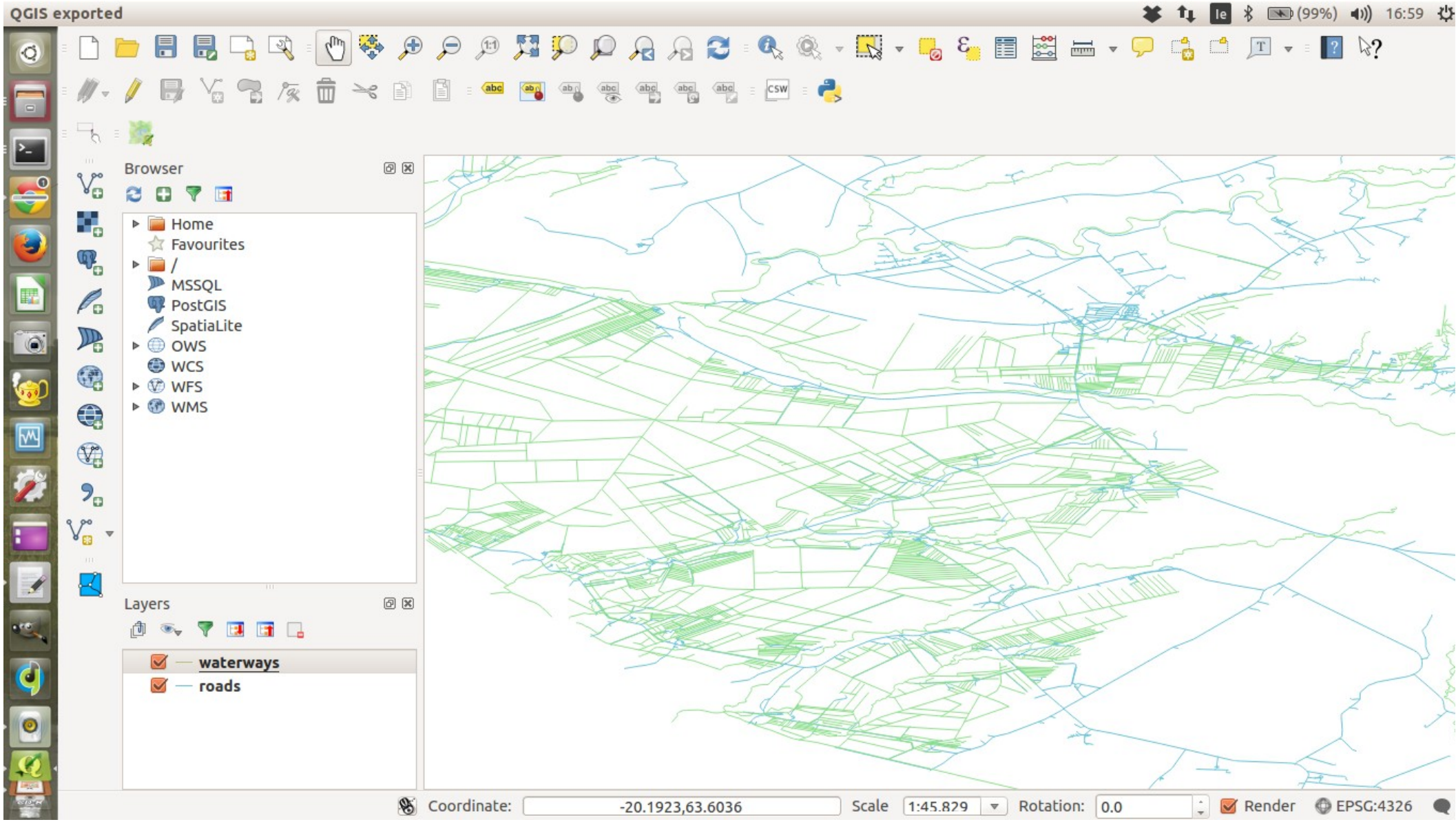
Technical details about this download service

Not what you were looking for? Geofabrik is a consulting and software development firm based in Karlsruhe, Germany specializing in OpenStreetMap services. We're happy to help you with data preparation, processing, server setup and the like. Check out our web site and contact us if we can be of service.

What a Shapefile looks like



Two layers from a Shapefile visualised within QGIS



OpenStreetMapData

Download OpenStreetMap-derived data

Info Data Processing Contact

Last data update: 06 Jul 2015 04:17

The OpenStreetMap project collects an amazing amount of geodata and makes it available to the world for free. But the raw OpenStreetMap data is hard to use. On this web site you'll find some of that data pre-processed and formatted for easier use.

Pre-processing includes removing or fixing of wrong data and assembling of different parts of the data into a usable whole. The data is formatted into Shapefiles for easy use in the usual GIS applications.

Coastline data processings

The most popular data sets of openstreetmapdata.com - used by most OpenStreetMap based maps in some form

Get coastline data

Generalized OpenStreetMap data

Special processings of OpenStreetMap geometries for better readable maps at coarse scales

Get generalized data

Other datasets

Browse the full list of available data sets on openstreetmapdata.com

Show all data

Not what you're looking for? There are other OpenStreetMap data sources where you might find what you need. Or you can commission us to develop new data processings.

Find out more

This service was created by *Jochen Topf* and *Christoph Hormann* for the OpenStreetMap community and the general public.

Jochen has been an active member of the OSM community since 2006. He works as a freelance consultant and software developer specializing in geodata and OpenStreetMap. More information about Jochen can be found on jochentopf.com

Christoph is working as a freelance geovisualization designer with focus on large area maps and 3d visualizations. You can find out more about Christoph on imagico.de.

© 2015 Jochen Topf & Christoph Hormann · Impressum

http://openstreetmapdata.com/

The OSM Point of Interest

WGS84 (EPSG 4326)

- OpenStreetMap uses the WGS-84 coordinate system, as do most GPS units.
- Every country tends to use its own standard or preferred coordinate system; so that the maps for that region are as undistorted as possible and the coordinates are reasonably simple to use. These coordinates need to be converted to WGS-84 before being used in OSM.

The Point of Interest (POI) is a fundamental building block of OSM

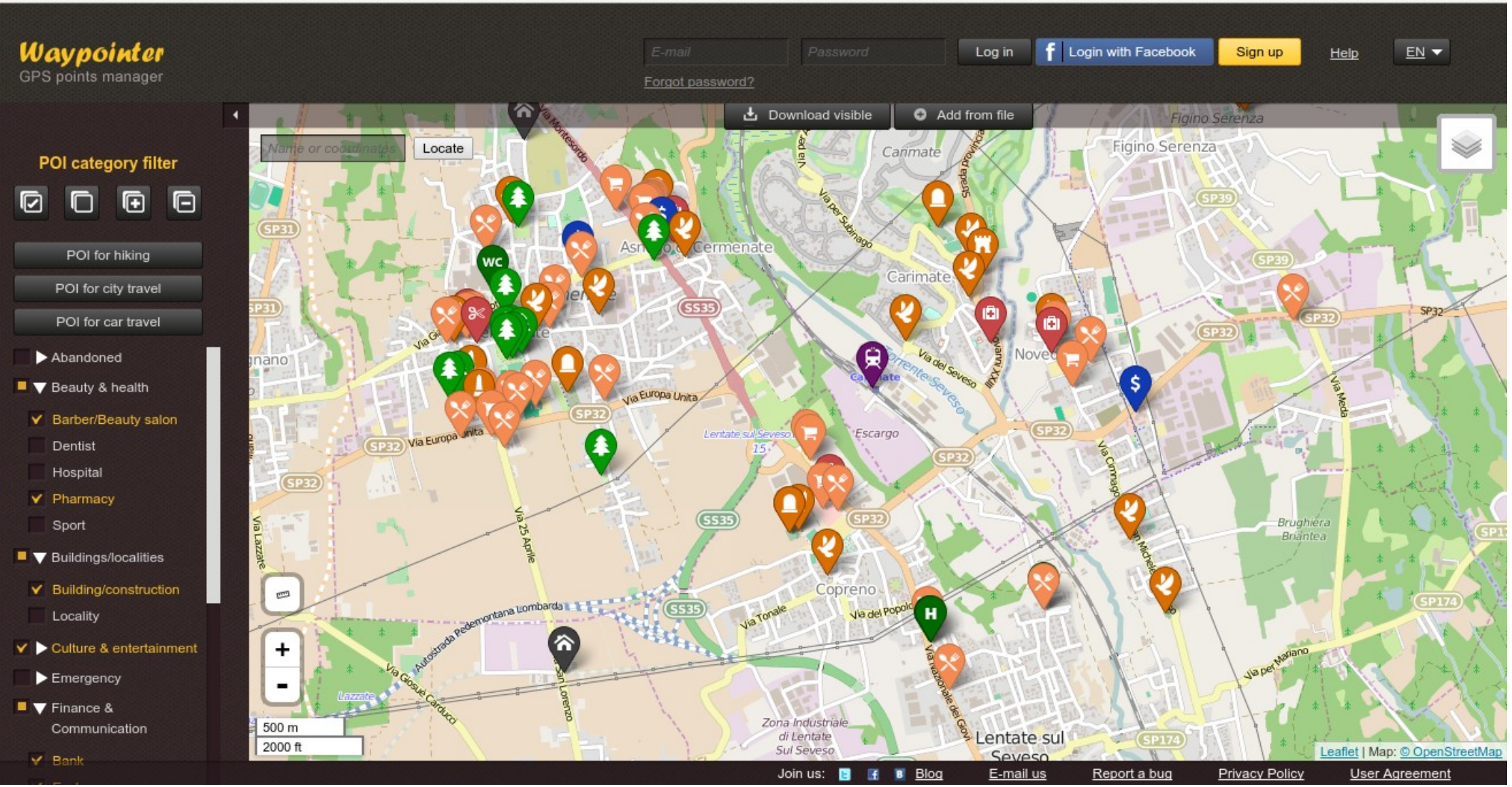
- **A POI is a NODE in OSM**
- It always (as a minimum) has a “name” tag attribute.
- http://wiki.openstreetmap.org/wiki/Points_of_interest
- Churches, schools, town halls, distinctive buildings, Post offices, shops, postboxes, telephone boxes, Pubs, Car parks and lay-bys (and whether free or not), statues, Speed cameras, tourist attractions, administrative buildings, etc

Sometimes POIs do not have name tags in OSM

- It's not always clear what a POI actually is.
- The examples on the previous slide are POI but there are other types of POI.
- For example – a node within a line feature representing a railway line can be (railway=crossing) to represent a railway crossing
- As you become more experienced with OSM you become better able to make these types of decisions in regards to your mapping data

http://www.osmquery.com/

https://waypointer.info/



The Overpass API Tool

Overpass
API

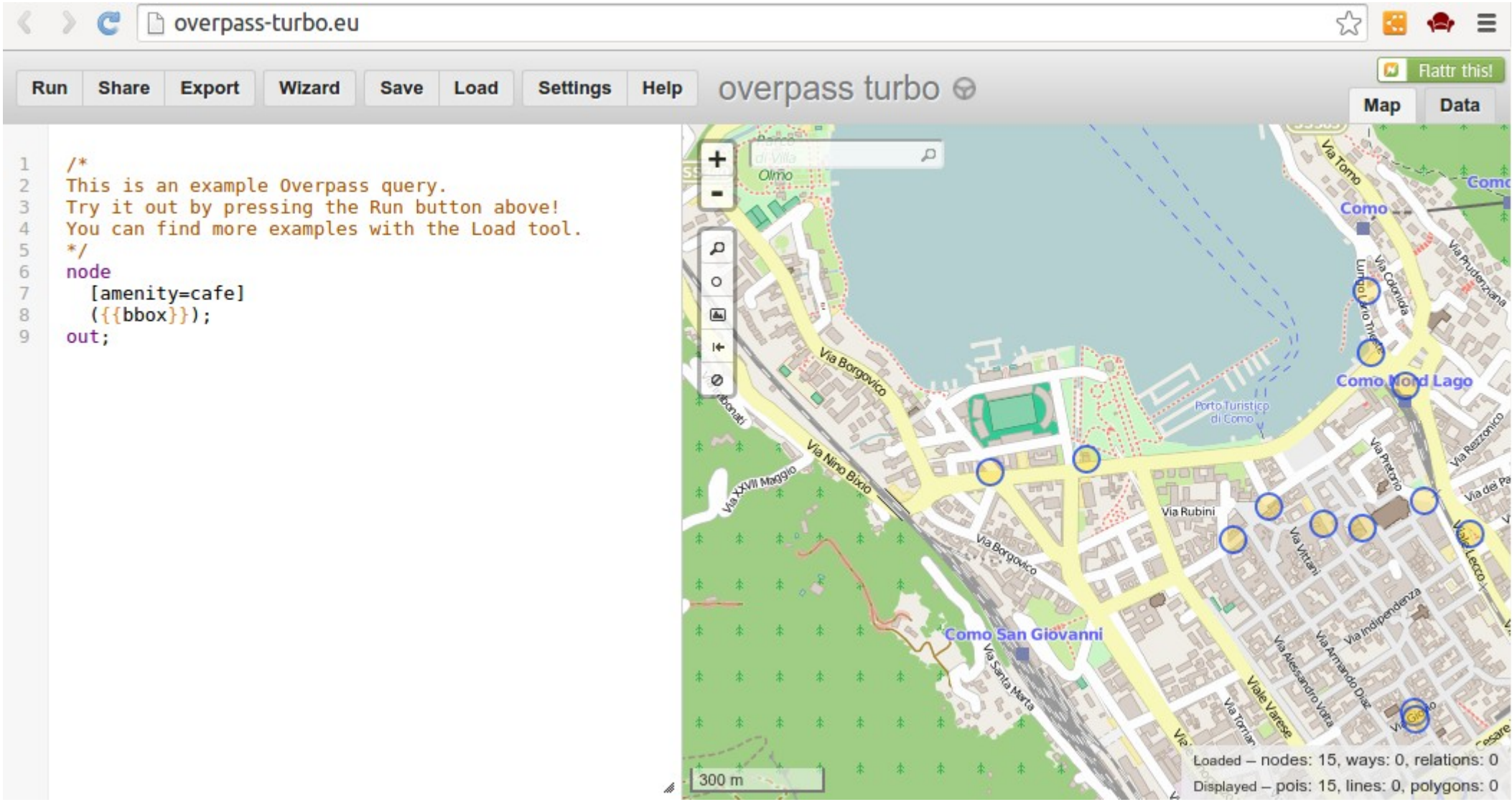
The Overpass API Tool

- The Overpass API (or OSM3S) is a read-only API that serves up custom selected parts of the OSM map data. It acts as a database over the web: the client sends a query to the API and gets back the data set that corresponds to the query.
- Overpass API is optimized for data consumers that need a few elements within a glimpse or up to roughly 100 million elements in some minutes
- We will use the Overpass API to get small specific samples of OSM data (in other formats to OSM XML)
- This will be very useful for our lecture on LEAFLET on Tuesday afternoon

The Overpass API has its own specific query language

- Again due to time limitations we do not have time to go very deeply into the Overpass Query Language
- However we are going to look at a few examples which will give you a flavour of what is possible.
- http://wiki.openstreetmap.org/wiki/Overpass_API/Language_Guide

Example 1: Overpass API – Accessing Nodes



Overpass: Accessing Nodes

- Zoom to an area of the map that you are interested in – do not make the area too large
- Overpass Query
- **node**
- **[amenity=cafe]**
- **({{bbox}});**
- **out;**

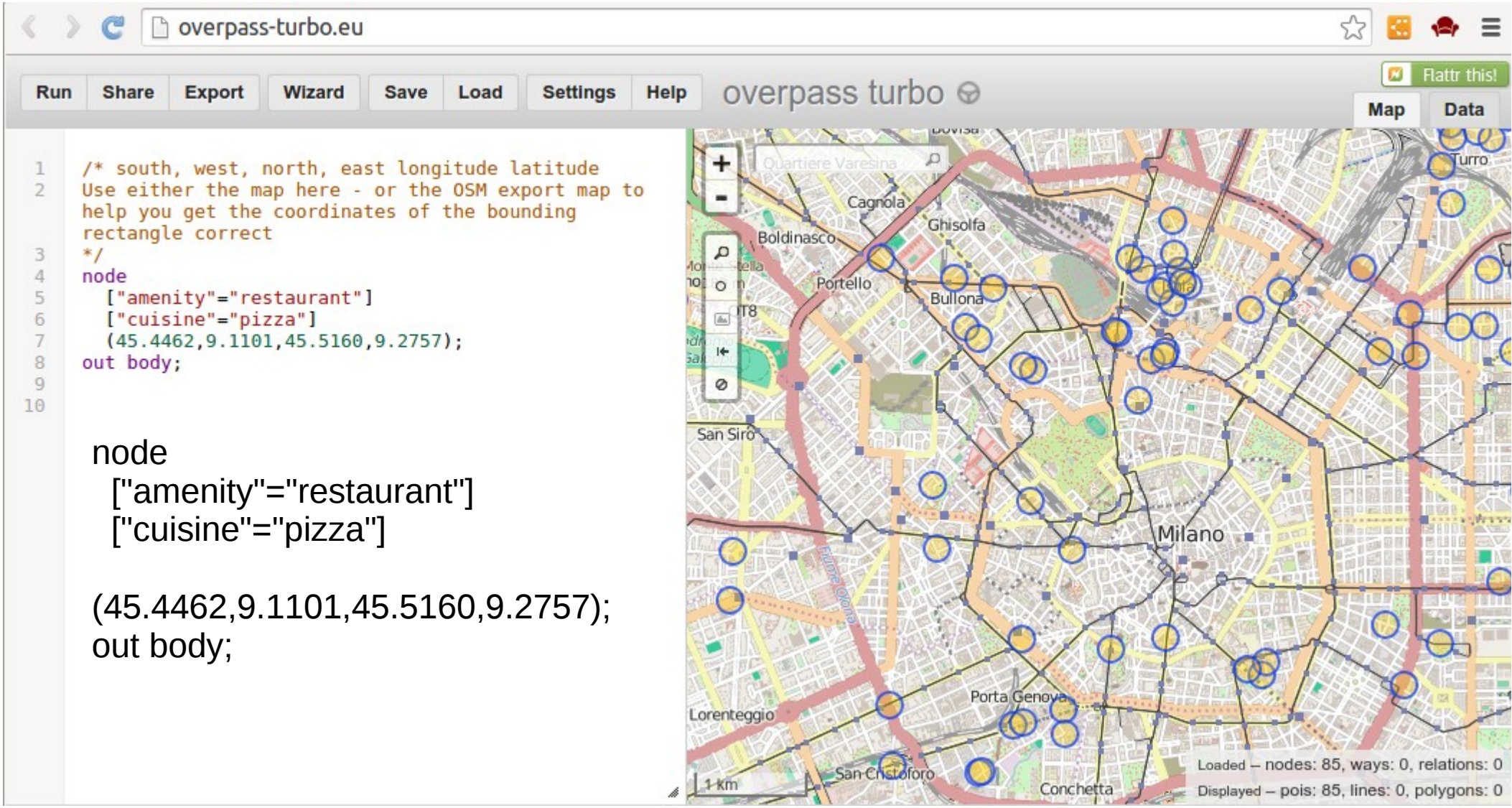
Change this to anything you wish – look up something you like on OSM Map Features

Overpass: Accessing WAYS

```
/* south, west, north, east longitude latitude
Use either the map here - or the OSM export map
to help you get the coordinates of the bounding
rectangle correct
*/
way
  [amenity=university]
  (45.4462,9.1101,45.5160,9.2757);
(._;>;);
out body;
```

UNIVERSITIES inside a bounding rectangle of MILANO

Overpass: Getting a pizza in Milano



node
["amenity"="restaurant"]
["cuisine"="pizza"]

(45.4462,9.1101,45.5160,9.2757);
out body;

NOTICE – the use of a combination of tags – and the bounding rectangle

Overpass: Cafe locations within 500m radius of the Politecnico in Como

Run | Share | Export | Wizard | Save | Load | Settings | Help | overpass turbo | Flattr this! | Map | Data

```
node
  (around:500,45.80264, 9.09477)
  ["amenity"="cafe"];
out body;
```

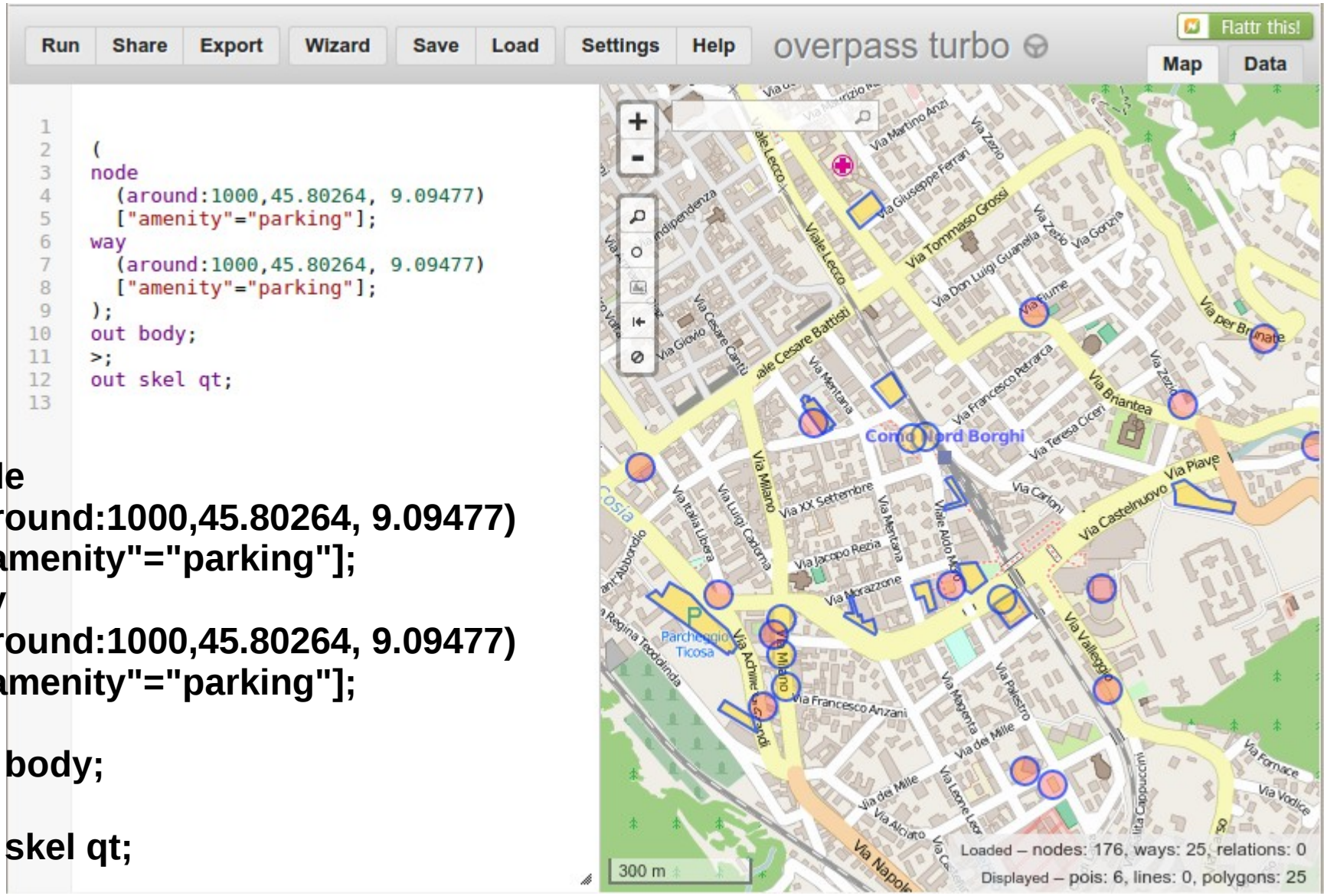
node
(around:500,45.80264, 9.09477)
["amenity"="cafe"];
out body;

Overpass API

- Find a cafe OR a restaurant within a specific radius of a point

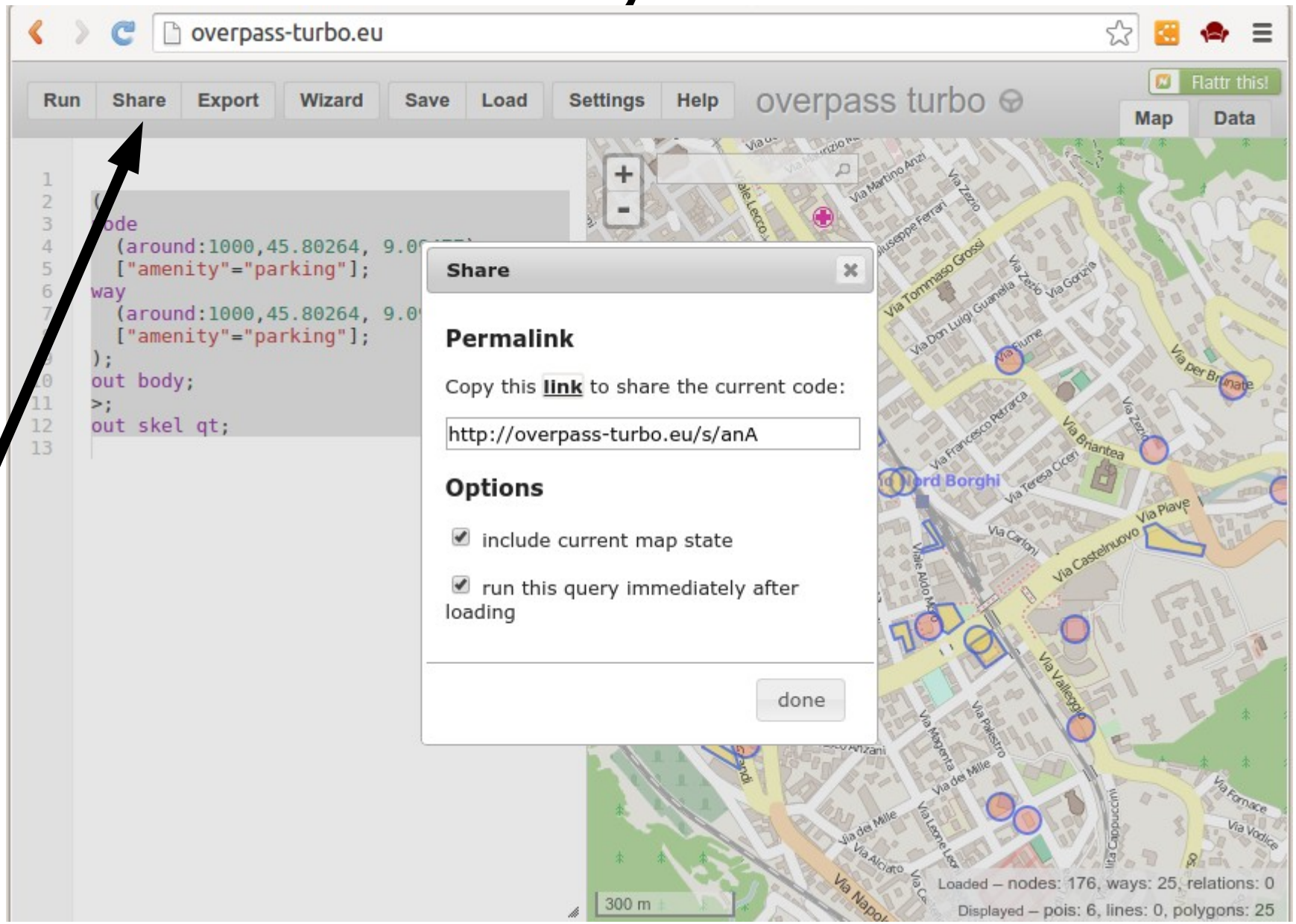
```
node
  (around:1000,45.80264, 9.09477)
  ["amenity"~"cafe|restaurant"];

out body;
```

Find all Parking Nodes and Ways around the university in Como




```
(
node
  (around:1000,45.80264, 9.09477)
  ["amenity"="parking"];
way
  (around:1000,45.80264, 9.09477)
  ["amenity"="parking"];
);
out body;
>;
out skel qt;
```

You can “SHARE” overpass query links with your friends



Looking at GeoJSON

GeoJSON is a lightweight text-based format for storing geospatial data on the web

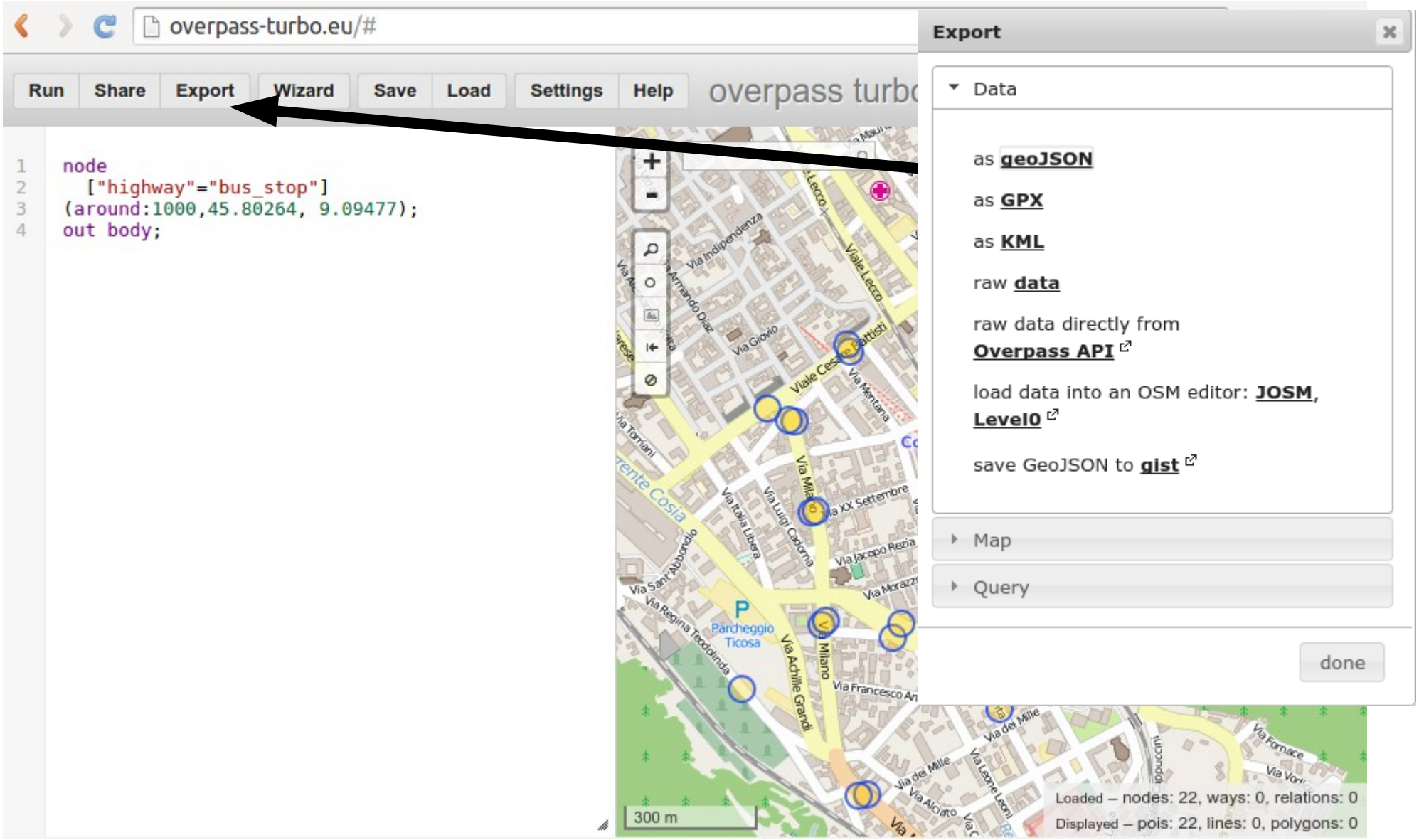
- GeoJSON is an industry standard and is produced (and consumed) by thousands of applications and services on the Internet.
- **It is a VERY USEFUL data format for displaying geospatial data on web-based maps.**
- We will make significant use of the GeoJSON format in tomorrow's (Tuesday) session on Leaflet.

The Overpass Turbo service will produce GeoJSON for our queries

- Let's look at a simple example – let's look at all of the bus shelters around Como which are mapped in OpenStreetMap

```
node
  ["highway"="bus_stop"]
(around:1000,45.80264, 9.09477);
out body;
```

Bus Shelters in Como
Query Result

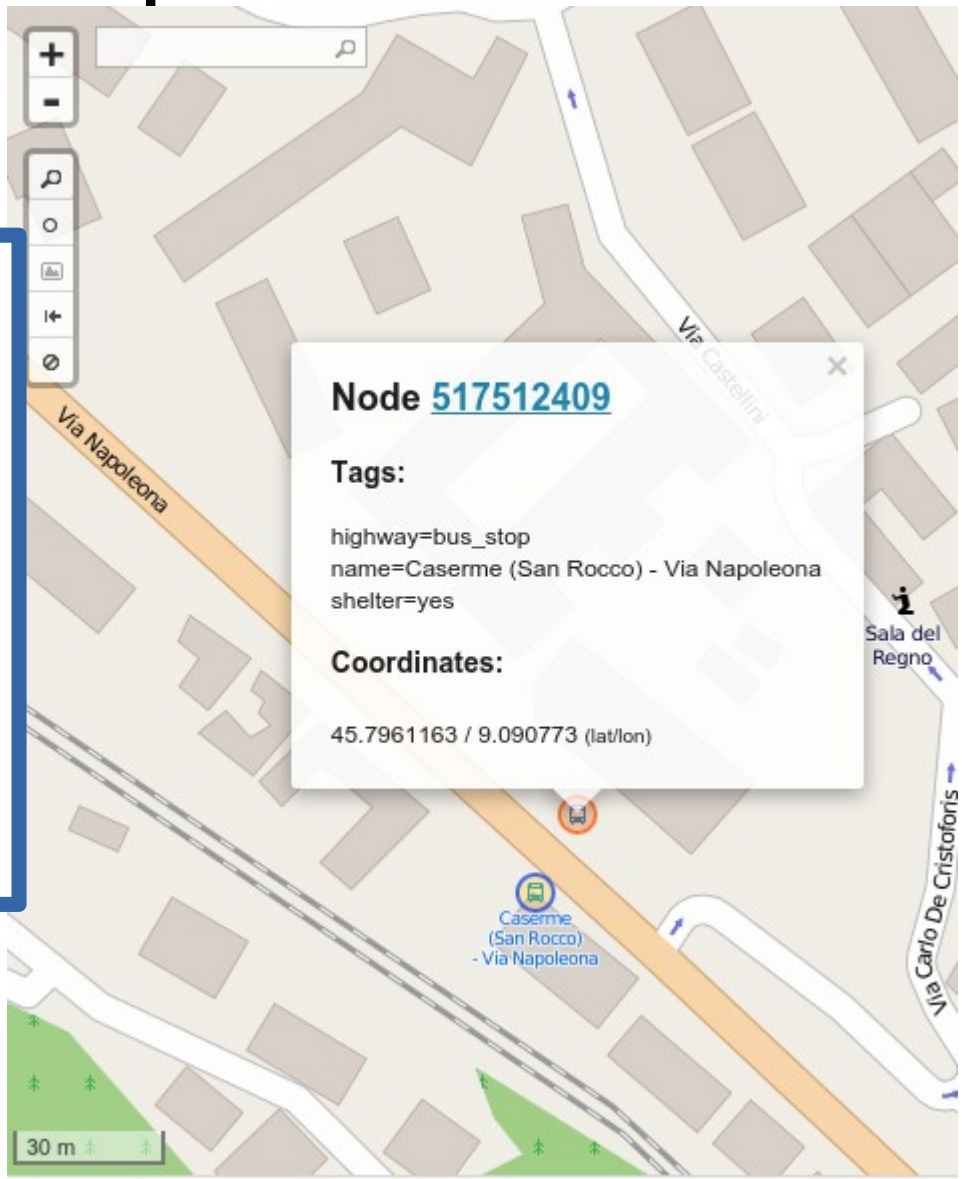


Download the resulting GeoJSON and then open it in Notepad ++

- We are going to look a little closer at the GeoJSON format which contain the query results.
- This should help you understand the potential usage of GeoJSON and how the output relates to the query results.

Here is one of the objects from the Query result in GeoJSON and displayed on the map!


```
{
  "type": "Feature",
  "id": "node/517512409",
  "properties": {
    "@id": "node/517512409",
    "highway": "bus_stop",
    "name": "Caserme (San Rocco) - Via Napoleona",
    "shelter": "yes"
  },
  "geometry": {
    "type": "Point",
    "coordinates": [
      9.090773,
      45.7961163
    ]
  }
},
```

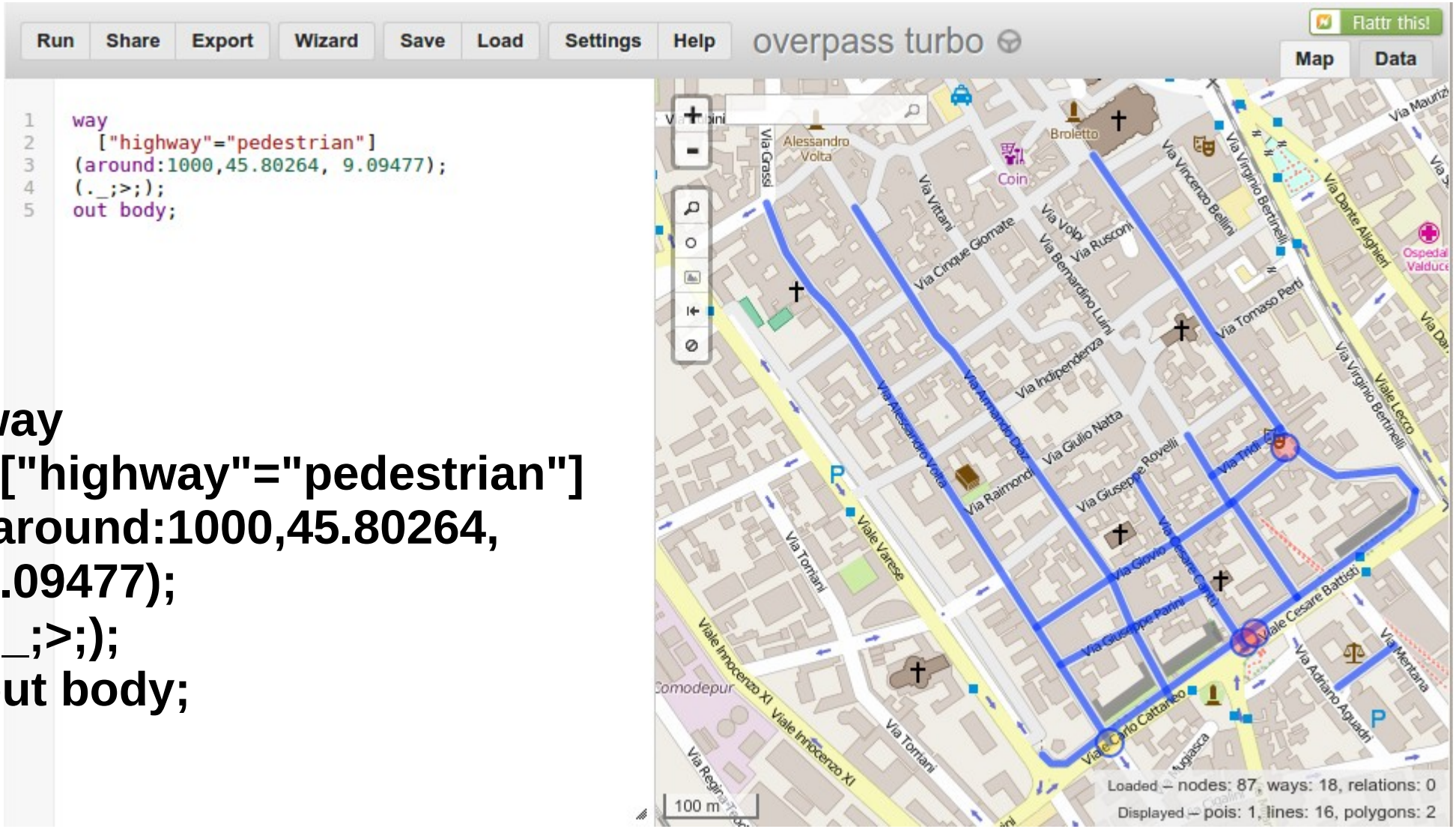
Notice how GeoJSON can accomodate different PROPERTIES

```
{
  "type": "Feature",
  "id": "node/2037227466",
  "properties": {
    "@id": "node/2037227466",
    "highway": "bus_stop",
    "name": "Via Magenta (Scuole)",
    "operator": "ASF"
  },
  "geometry": {
    "type": "Point",
    "coordinates": [
      9.0916992,
      45.7997755
    ]
  }
},
```

GeoJSON properties = OSM tags

```
{
  "type": "Feature",
  "id": "node/517512421",
  "properties": {
    "@id": "node/517512421",
    "highway": "bus_stop",
    "name": "Viale Battisti (Mercato - Tribunale)",
    "shelter": "yes"
  },
  "geometry": {
    "type": "Point",
    "coordinates": [
      9.0872108,
      45.8072857
    ]
  }
},
```

GeoJSON is flexible and allows nodes, lines and polygons




```
way
  ["highway"="pedestrian"]
(around:1000,45.80264, 9.09477);
(._;>;);
out body;
```

GeoJSON can also have WAYS included – notice the structure below

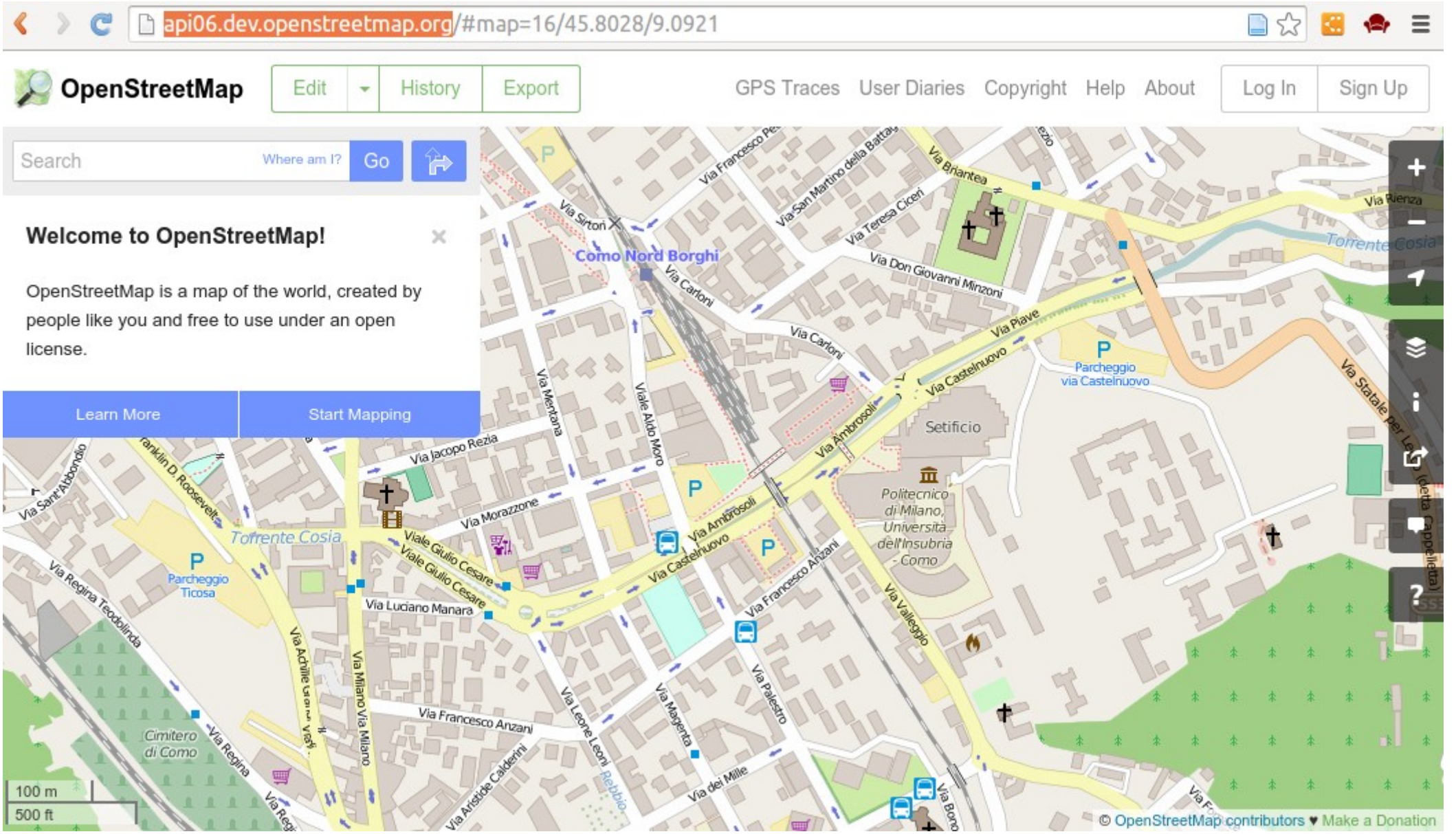
```
"features": [
  {
    "type": "Feature",
    "id": "way/30566613",
    "properties": {
      "@id": "way/30566613",
      "area": "yes",
      "highway": "pedestrian",
      "name": "Piazza Medaglie d'Oro"
    },
    "geometry": {
      "type": "Polygon",
      "coordinates": [
        [
          [9.0860682,45.8086385],
          [9.0859039,45.8085496],
          [9.0860588,45.8084104],
          [9.0862231,45.8084993],
          [9.0860682,45.8086385]
        ]
      ]
    }
  },
```

Starting to Map....

We are going to attempt some basic mapping in OSM today

- We shall approach this in two ways
- 1: Setup an account on the OSM Sandbox Server to allow us to test out editing with the iD editor
- 2: Setup an account on the OSM REAL LIVE SERVER to allow us to actually edit data within the OSM database

The OSM Mapping Sandbox
http://api06.dev.openstreetmap.org/



master.apis.dev.openstreetmap.org/welcome

OpenStreetMap | Edit | History | Export | GPS Traces | User Diaries | Copyright | Help | About | Peter Mooney

Welcome!

Welcome to OpenStreetMap, the free and editable map of the world. Now that you're signed up, you're all set to get started mapping. Here's a quick guide with the most important things you need to know.

What's on the Map

OpenStreetMap is a place for mapping things that are both *real and current* - it includes millions of buildings, roads, and other details about places. You can map whatever real-world features are interesting to you.

What it *doesn't* include is opinionated data like ratings, historical or hypothetical features, and data from copyrighted sources. Unless you have special permission, don't copy from online or paper maps.

Basic Terms For Mapping

OpenStreetMap has some of its own lingo. Here are a few key words that'll come in handy.

An **editor** is a program or website you can use to edit the map.

A **node** is a point on the map, like a single restaurant or a tree.

Sandbox Demo (signup and demo)

Sandbox Demo

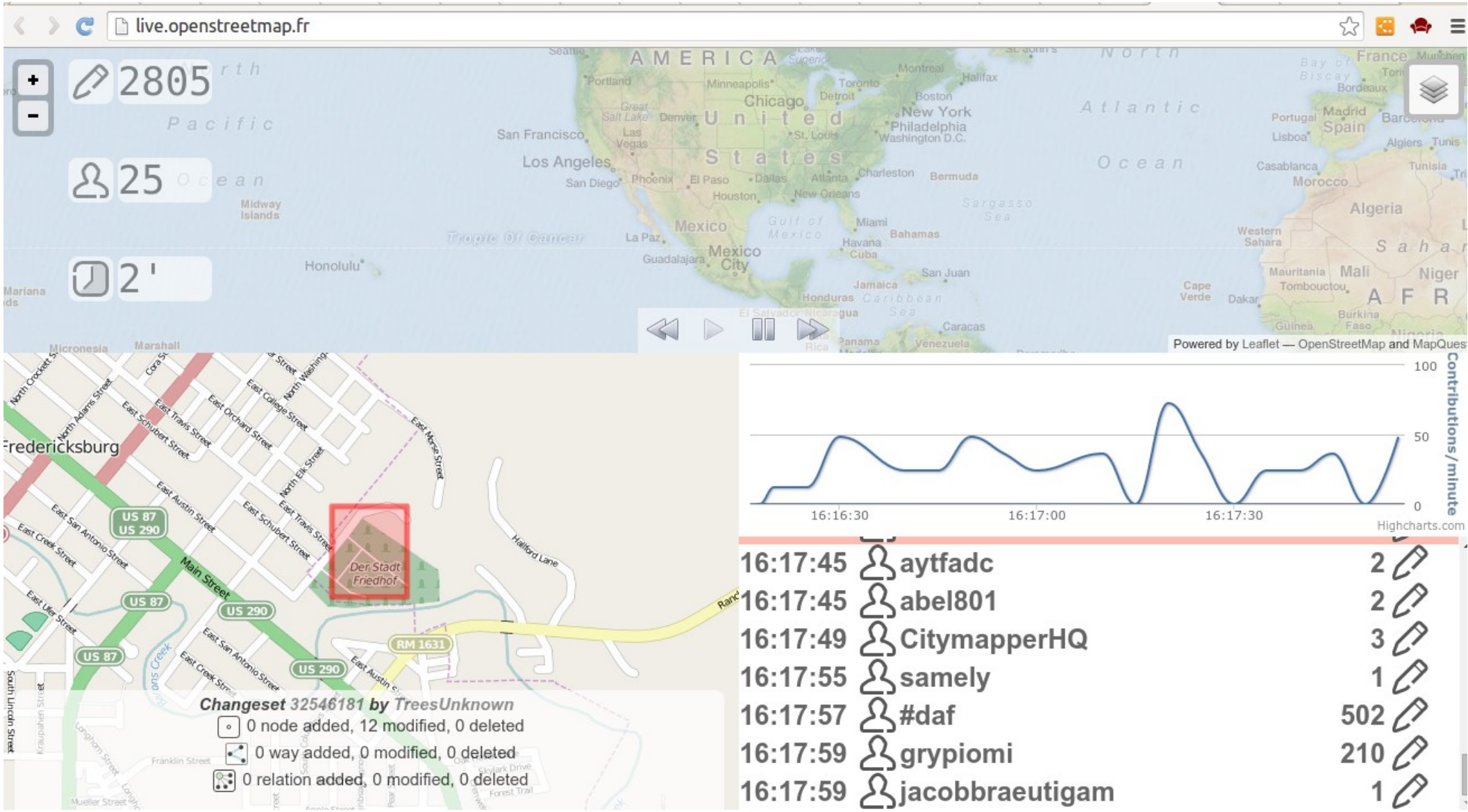
- TASK:
- Create at least one POINT (preferably a POI)
- Create at least TWO WAYS (a closed polygon such as a building and then a line such as a road or river)
- REMEMBER – edit locally – try an area where you are familiar with.

Real Live Server DEMO

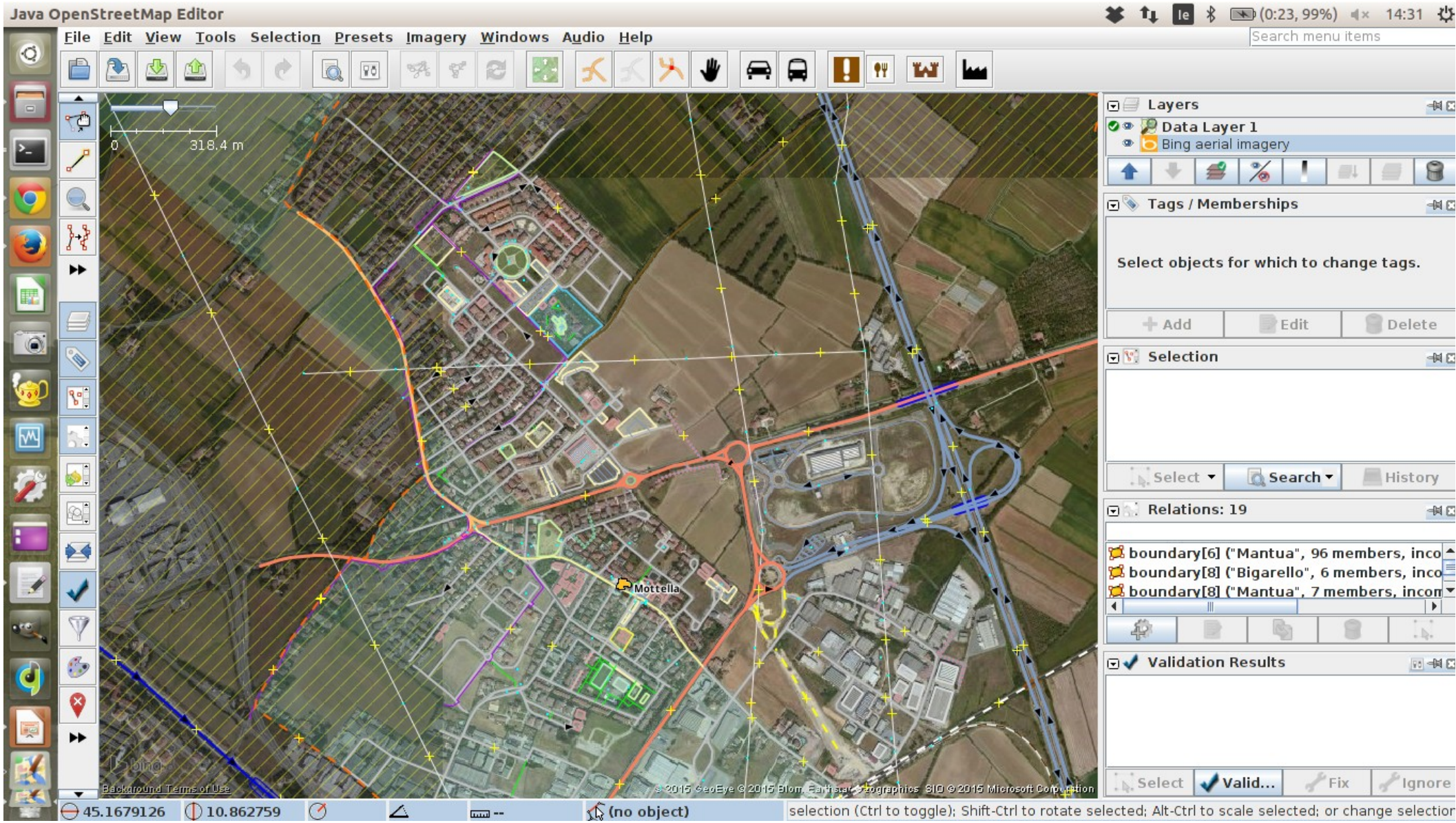
A few things to note about working on the REAL LIVE OSM SERVER

- You are on the real server now – edits which you submit will appear on the OSM world map
- Edits will appear within minutes on the OSM world map
- For this demo – do not make major edits to existing data – try to find something new to map.
- **If you make a mistake – we can delete your object and start again.**

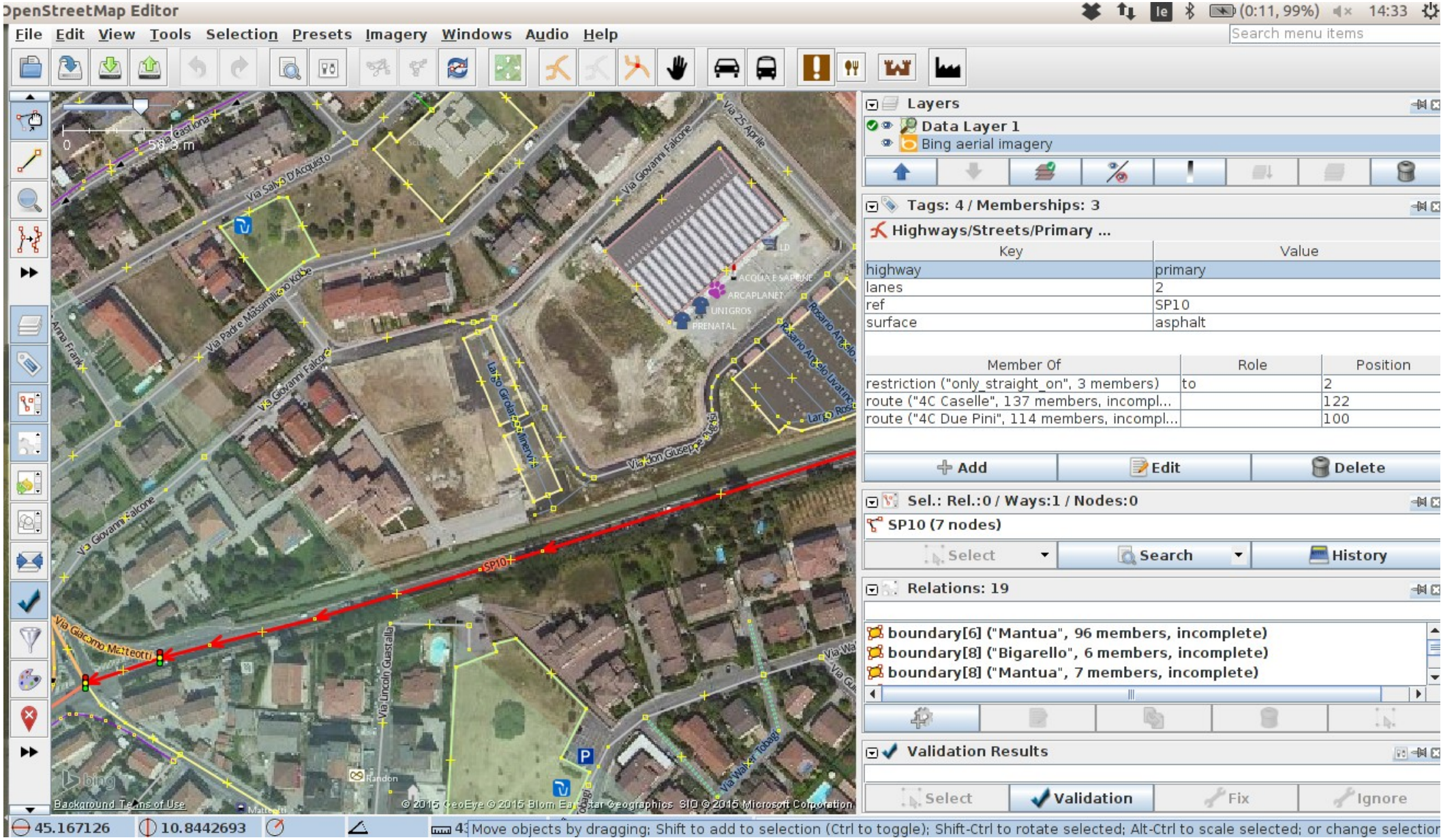
Watch live edits – **live.openstreetmap.fr**



The JOSM tool for OpenStreetMap allows for much more complex editing

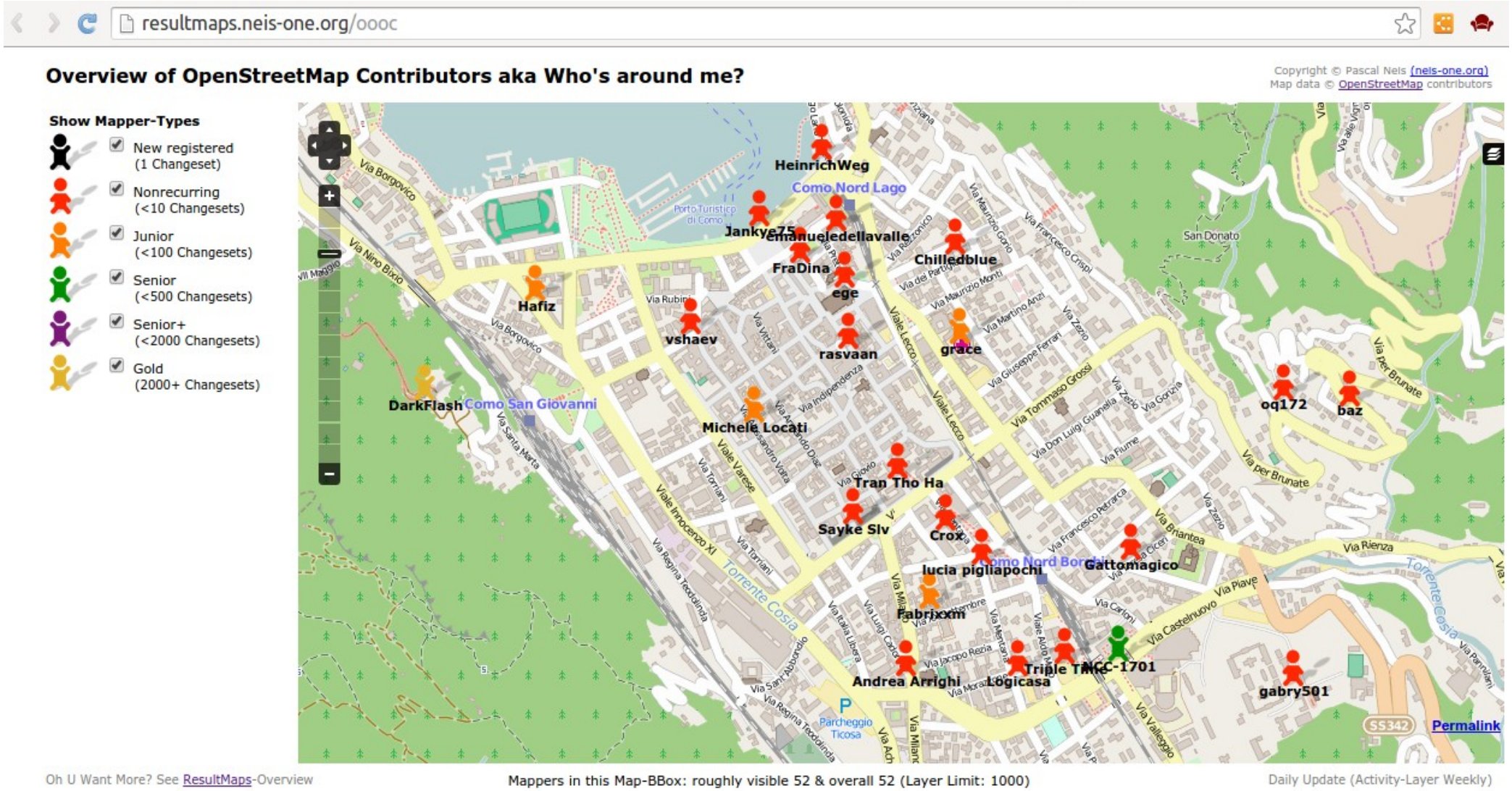


JOSM allows for much finer level of control over the OSM data model



Who is mapping close by?

Who are the other OSM mappers in the surrounding area?



http://resultmaps.neis-one.org/oooc

How did you contribute?

How did you contribute to OpenStreetMap ?

peterm7 Search

Name: peterm7
Mapper since: June 08th, 2009
Project Days: 2220
Active Mapping Days: 31 (1.4%)

Type of Mapper: A Casual Mapper

peterm7	Nodes	Ways	Relations
created:	1 506	107	0
modified:	50	85	6
deleted:	3	0	0
last modifier of:	1 424	140	6
has the following ranks:	#40361	#44028	#15345
Changesets	**Changes**	**First Changeset**	**Last Changeset**
117	1 758	Mon Jun 08 2009	Sat Apr 25 2015
OSM Notes	0 Opened	0 Commented	0 Closed
more			

Last Modifier of Way-Objects with the following Tags (% of all last modifier ways of the user)

Amenity	Building	Highway	Landuse	Leisure	Name	Natural	Addr:*
21 (15%)	40 (29%)	51 (36%)	22 (16%)	8 (6%)	45 (32%)	2 (1%)	7 (5%)

Main & Latest (6 months) Activity Area - First created & Latest edited Node

http://www.hdyc.neis-one.org/

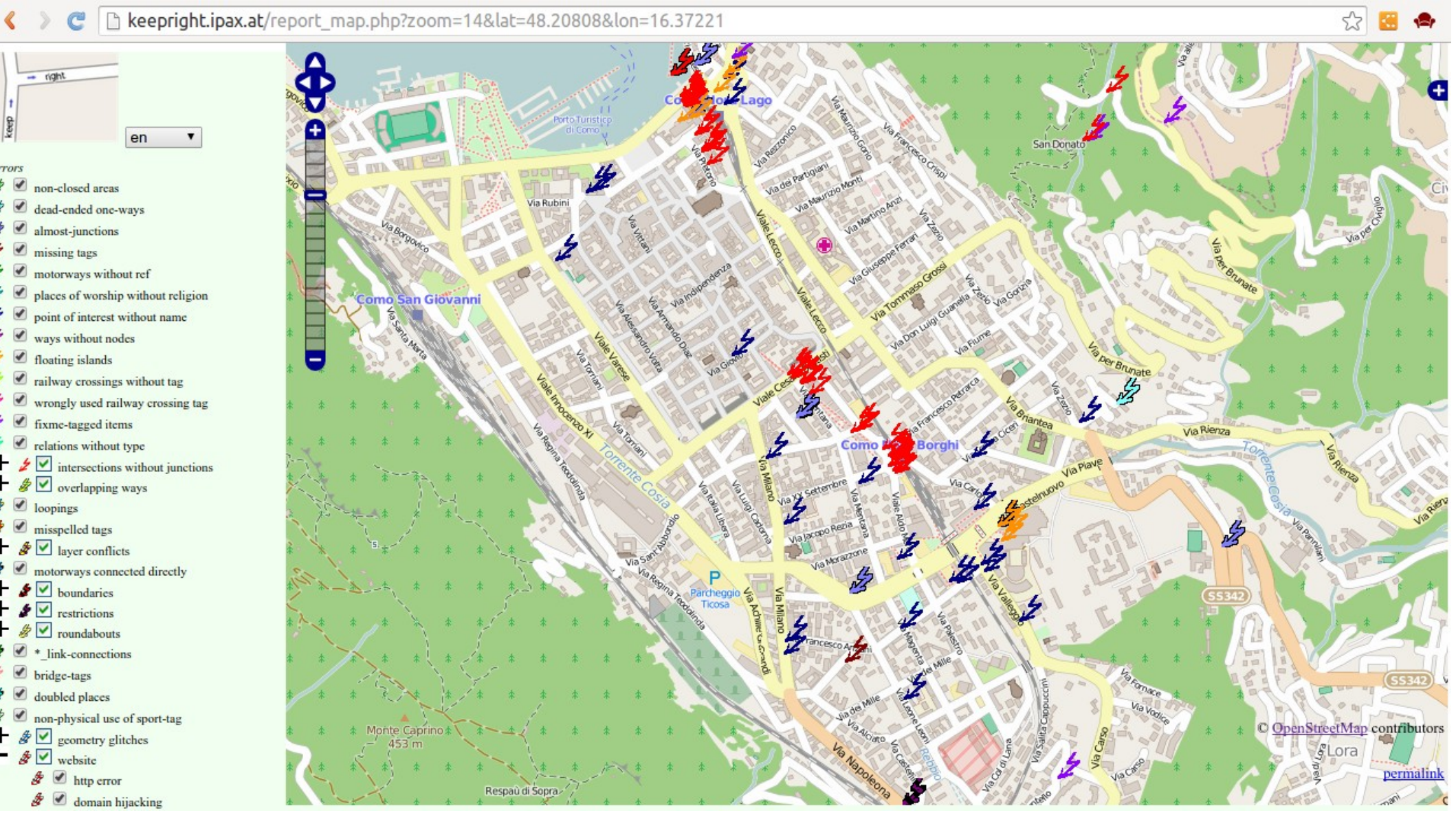
What about OSM Data quality?

Data Quality and Accuracy are very important issues in OSM

- There has been substantial work done within the OpenStreetMap community and also by the academic community in analysing the quality and accuarcy of data in OSM.
- **DISCUSSION: What are the key issues regarding accuracy and quality of data in OSM?**
- There are some tools available which will allow us to look at data quality issues in OSM.

Data Quality/Consistency Checks for OSM

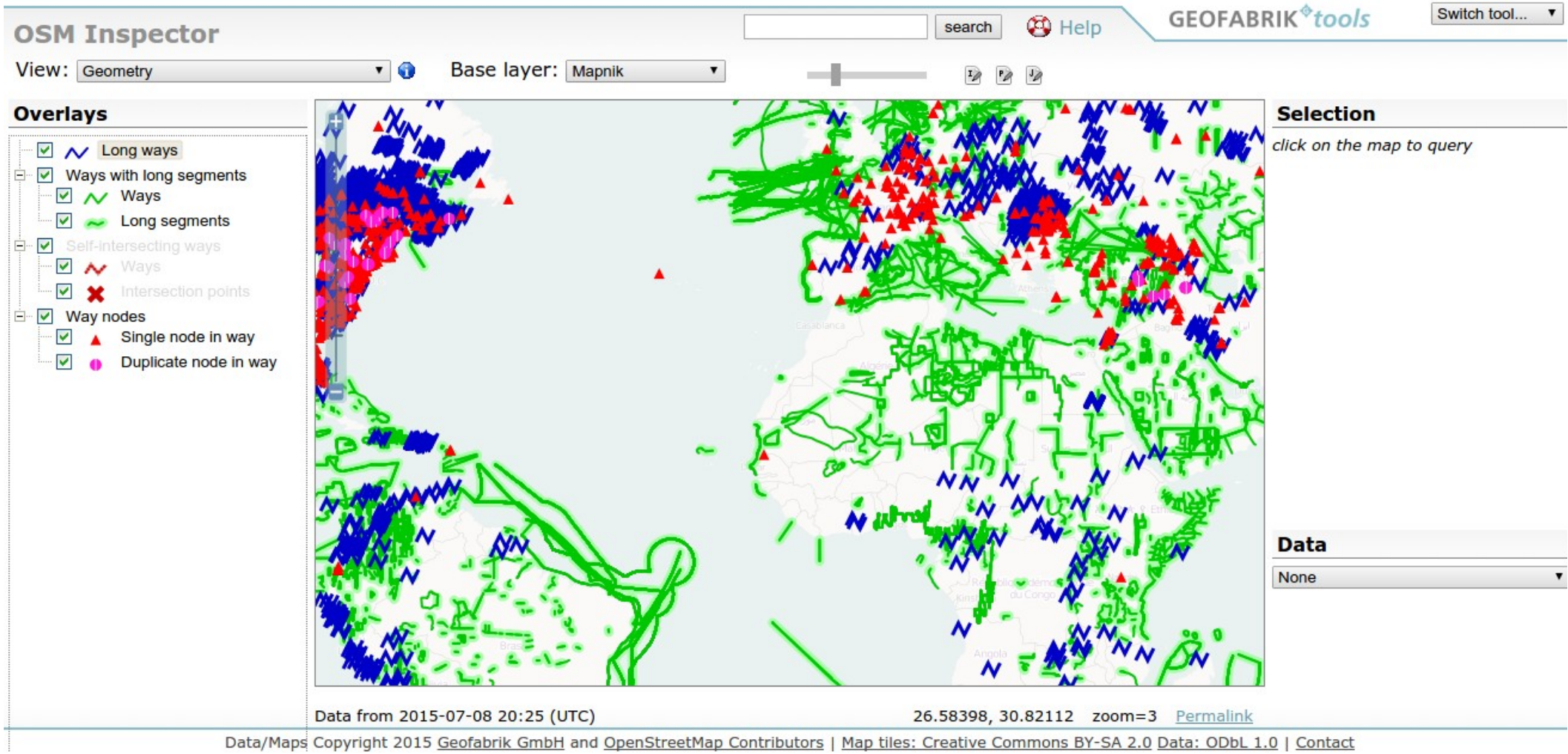
http://keepright.ipax.at/



Exercise: Using Keepright

- Keepright is a very useful tool for indicating where there are potential problems in OSM
- ARMCHAIR MAPPERS could potentially fix many ofthe errors/problems outlined
- **EXERCISE:** Use Keepright for your own area/region. Investigate the errors/issues highlighted. How many could you fix? What is the overall quality situation for OSM in this area?

http://tools.geofabrik.de/osmi/



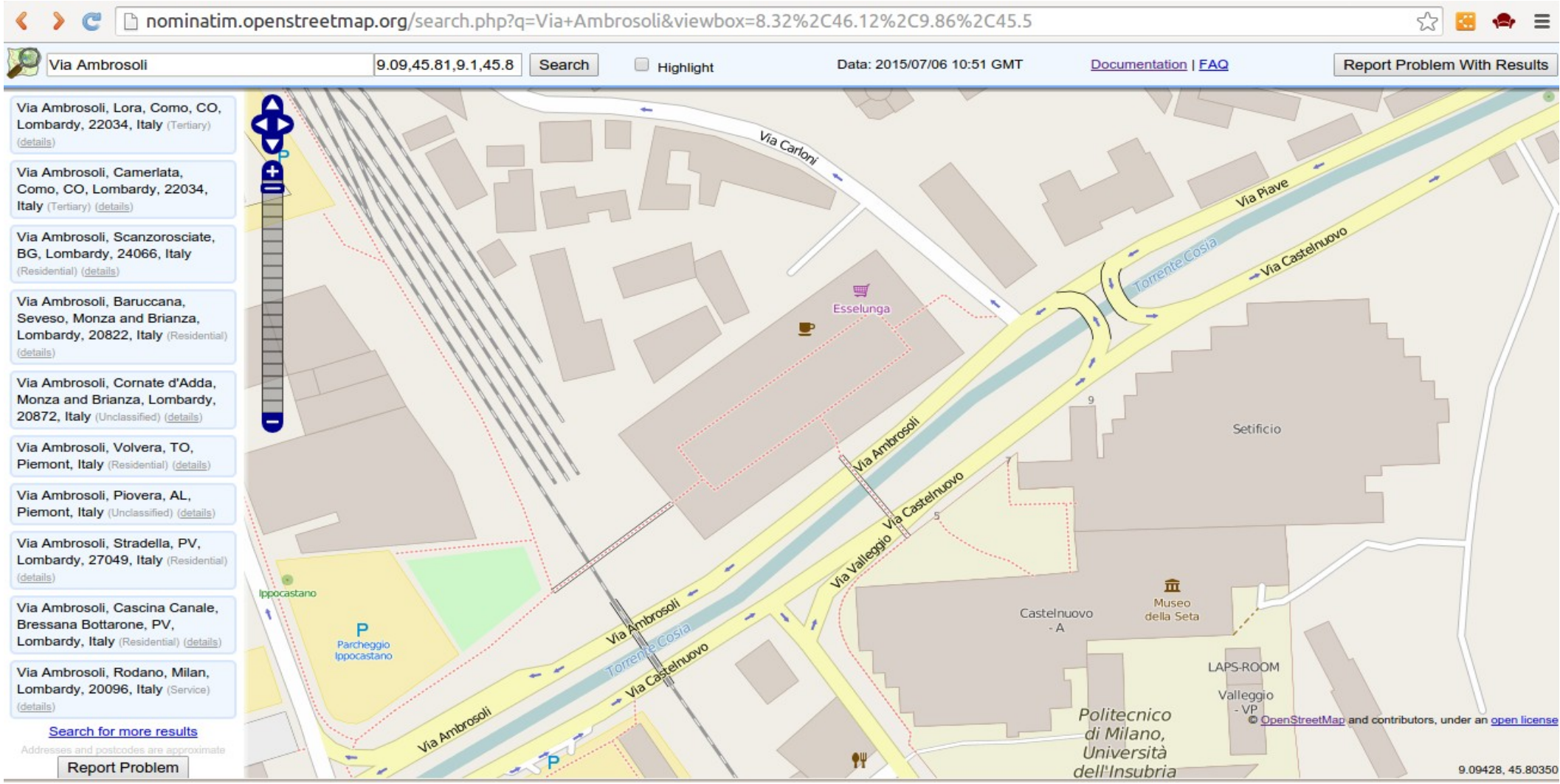
Addressing in OpenStreetMap tags

Tag	Presence	Element-type	Values	Description
`addr:housenumber` or `addr:housename`	required		string	The "house number". May contain non-digits. If a single entry has multiple house numbers, separate them by ",". E.g., "12b,12c". or The name of a house. This is sometimes used in some countries like UK and Ireland instead of a house number.
`addr:street`	strongly recommended		string	The (main) name of the related street. If not given a program may assume the name of the nearest street it can find, but this is not easy or fast to do in all cases (especially at intersections), so putting the name in here is strongly encouraged (more reliable).
`addr:state`	optional		string	The state for those countries like the US and Australia that have state abbreviations in their addresses. For other countries this is not used.
`addr:postcode`	optional		string	Postal code of the building/addressed area. Different countries have different length and different characters allowed for postal codes.
`addr:city`	optional		string	City as used in postal addresses of the building/addressed area.
`addr:country`	optional		2-letter string	The ISO 3166-1 alpha-2 two letter country code in **upper case** (see wikipedia:ISO 3166-1 alpha-2). This might be needed because postal codes are only unique inside a country. Example: "DE" for Germany, "FR" for France, "IT" for Italy, *Caveat: The ISO 3166-1 alpha-2 two letter code for Great Britain is "**GB**" and not "UK".*
`addr:full`	optional		string	Full postal address. This can be used in addition to other tags if the other tags are not enough to fully describe an address.
`addr:interpolation`	optional		even/odd/all/alphabetic	How to interpolate the house numbers belonging to the way along the related street. See below.

Nominatim

- **Nominatim** is a tool to search OSM data by name and address and to generate synthetic addresses of OSM points (reverse geocoding).
- Nominatim is also used as one of the sources for the search box on the OpenStreetMap home page

Example Search:
Via Ambrosoli (no city specified)



http://nominatim.openstreetmap.org/

An example of reverse geocoding using Nominatim

- http://nominatim.openstreetmap.org/reverse?format=xml&lat=**45.80223**&lon=**9.09525**&zoom=18&addressdetails=1

nominatim.openstreetmap.org/reverse?format=xml&lat=45.80223&l

This XML file does not appear to have any style information associated with it. The documen


```
▼<reversegeocode timestamp="Mon, 06 Jul 15 11:05:37 +0000" attribution="Data
 querystring="format=xml&lat=45.80223&lon=9.09525&zoom=18&addressdetails=1">
 ▼<result place_id="128162139" osm_type="relation" osm_id="4099341" ref="Pol
  lon="9.09504403135464">
    Politecnico di Milano, Università dell'Insubria - Como, Ingresso Museo d
  </result>
 ▼<addressparts>
  ▼<university>
     Politecnico di Milano, Università dell'Insubria - Como
   </university>
   <footway>Ingresso Museo della Seta</footway>
   <suburb>Lora</suburb>
   <town>Como</town>
   <county>CO</county>
   <state>Lombardy</state>
   <postcode>22034</postcode>
   <country>Italy</country>
   <country_code>it</country_code>
  </addressparts>
 </reversegeocode>
```

The Social Side of OpenStreetMap

Mapping Parties

Mailing Lists are a very effective means of communication in OSM

lists.openstreetmap.org Mailing Lists

Welcome!

Below is a listing of all the public mailing lists on lists.openstreetmap.org. Click on a list name to get more information about the list, or to subscribe, unsubscribe, your subscription. To visit the general information page for an unadvertised list, open a URL similar to this one, but with a '/' and the list name appended.

List administrators, you can visit the list admin overview page to find the management interface for your list.

If you are having trouble using the lists, please contact mailman@openstreetmap.org.

List	Description
Accessibility	Accessibility
Announce	OpenStreetMap Announcements
design	*[no description available]*
dev	OpenStreetMap developer discusssion
dev-fr	Discussions développeur OSM en français
dev-italia	Discussioni OpenStreetMap per sviluppatori - in italiano
diversity-talk	Discussions on improving diversity in the OSM community
Geocoding	Discussion of geocoding
GraphHopper	GraphHopper Java routing engine
Historic	Explorations of an OpenStreetMap Approach to Historic Mapping
HOT	Humanitarian OpenStreetMap Team
Hot-announce	Important HOT announcements and updates only. Very low volume.
Hot-francophone	Humanitarian OpenStreetMap Team en français
Imports	*[no description available]*
Imports-us	US Import Committee Discussion List
josm-dev	JOSM developer mailing list
Learnosm-coord	*[no description available]*
Legal-general	General discussions about alternative OSM licensing scenarios.

https://lists.openstreetmap.org/pipermail/talk/2015-June/thread.html

June 2015 Archives by thread

- **Messages sorted by:** [subject] [author] [date]
- **More info on this list...**

Starting: *Mon Jun 1 05:43:49 UTC 2015*
Ending: *Tue Jun 30 14:47:14 UTC 2015*
Messages: 296

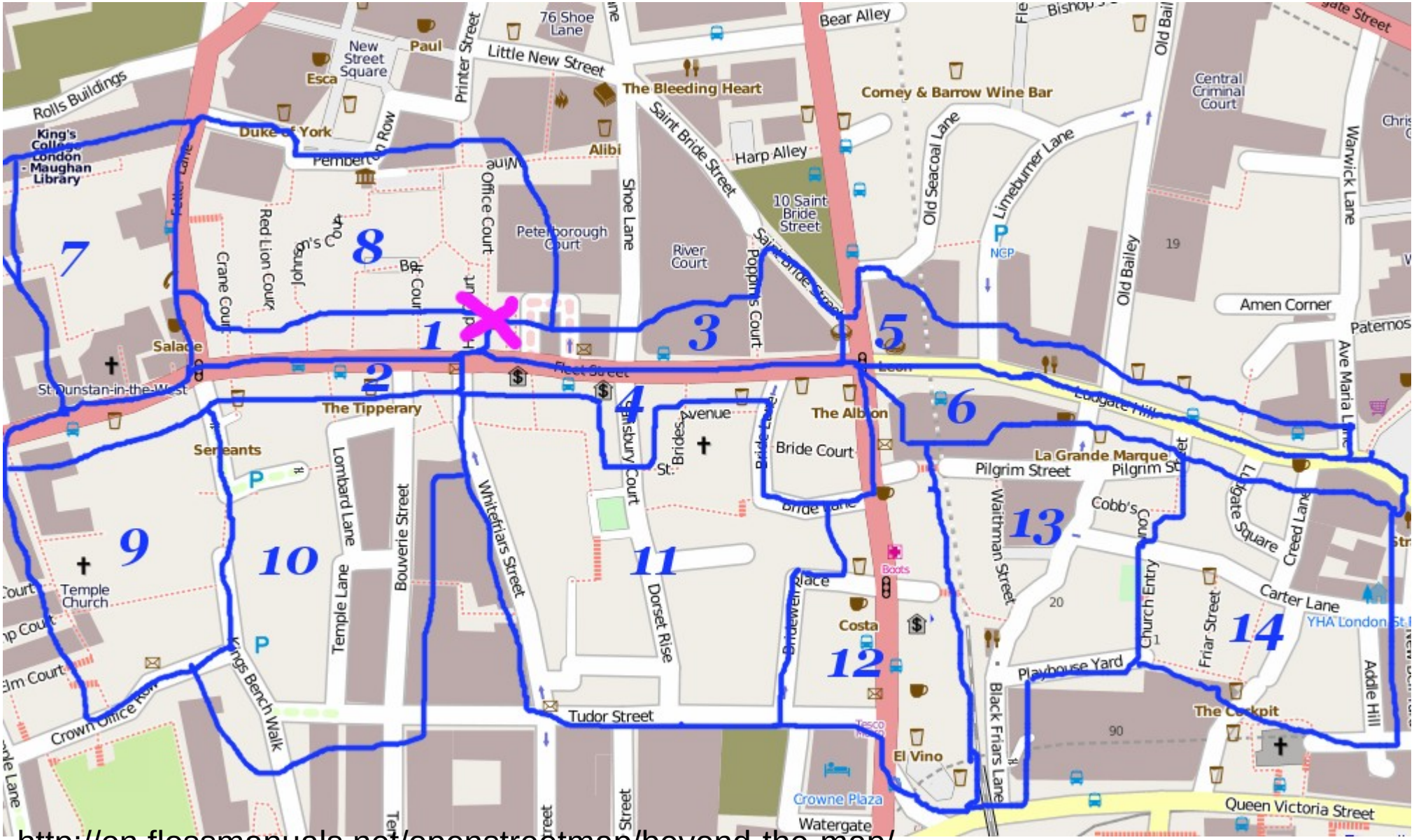
- [OSM-talk] Craigslist OpenStreetMap Rendering Issue *Andrew Hain*
  - [OSM-talk] Craigslist OpenStreetMap Rendering Issue *Bryce Nesbitt*
    - [OSM-talk] Craigslist OpenStreetMap Rendering Issue *Marc Gemis*
      - [OSM-talk] Craigslist OpenStreetMap Rendering Issue *Martin Koppenhoefer*
      - [OSM-talk] Craigslist OpenStreetMap Rendering Issue *Toby Murray*
      - [OSM-talk] Craigslist OpenStreetMap Rendering Issue *Bryce Nesbitt*
- [OSM-talk] Can wikidata links help fight name inflation? *Martin Koppenhoefer*
  - [OSM-talk] Can wikidata links help fight name inflation? *moltonel 3x Combo*
  - [OSM-talk] Can wikidata links help fight name inflation? *Minh Nguyen*
  - [OSM-talk] Can wikidata links help fight name inflation? *Kolossos*
    - [OSM-talk] Can wikidata links help fight name inflation? *Simon Poole*
      - [OSM-talk] Can wikidata links help fight name inflation? *Eugene Alvin Villar*
      - [OSM-talk] Can wikidata links help fight name inflation? *Simon Poole*
      - [OSM-talk] Can wikidata links help fight name inflation? *Eugene Alvin Villar*
      - [OSM-talk] Can wikidata links help fight name inflation? *Bryce Nesbitt*
      - [OSM-talk] Can wikidata links help fight name inflation? *Комяра*
      - [OSM-talk] (licence of wikidata) was: Can wikidata links help fight name inflation? *SomeoneElse*
      - [OSM-talk] (licence of wikidata) was: Can wikidata links help fight name inflation? *Eugene Alvin Villar*
      - [OSM-talk] (licence of wikidata) was: Can wikidata links help fight name inflation? *Andy Mabbett*
      - [OSM-talk] (licence of wikidata) was: Can wikidata links help fight name inflation? *Martin Koppenhoefer*
      - [OSM-talk] (licence of wikidata) was: Can wikidata links help fight name inflation? *Eugene Alvin Villar*
      - [OSM-talk] (licence of wikidata) was: Can wikidata links help fight name inflation? *Martin Koppenhoefer*
      - [OSM-talk] (licence of wikidata) was: Can wikidata links help fight name inflation? *Eugene Alvin Villar*
      - [OSM-talk] (licence of wikidata) was: Can wikidata links help fight name inflation? *Simon Poole*
      - [OSM-talk] (licence of wikidata) was: Can wikidata links help fight name inflation? *Christoph Hormann*
      - [OSM-talk] (licence of wikidata) was: Can wikidata links help fight name inflation? *Simon Poole*

Mapping Parties in OpenStreetMap

- Mapping Parties are a very unique aspect of how OpenStreetMap collects spatial data
- It is an organised gathering of ANYONE interested or involved in OpenStreetMap – from those experienced people to new people
- Usually organised by a local group of OSM contirbutors – focussing on a specific local area
- Usually the mapping party has a HQ in a pub, restaurant, cafe or public space where WiFi is available to allow participants to upload data to OpenStreetMap after the mapping party.

Свободная Wiki-карта мира
El WikiMapaMundi libre
自由的 Wiki 世界地圖
O Wiki de Mapas Livres do Mundo
Swobodna Wiki-Mapa Świata
Frjálsa wiki heimskortið
La carte coopérative libre
OpenStreetMap
The Free Wiki World Map
Die freie Wiki-Weltkarte
Il Wiki della mappa mondiale libera
Prost wiki zemljevid sveta
免费维基世界地图
De vrije wiki-wereldkaart

An example of how an OSM Mapping Party organises mapping



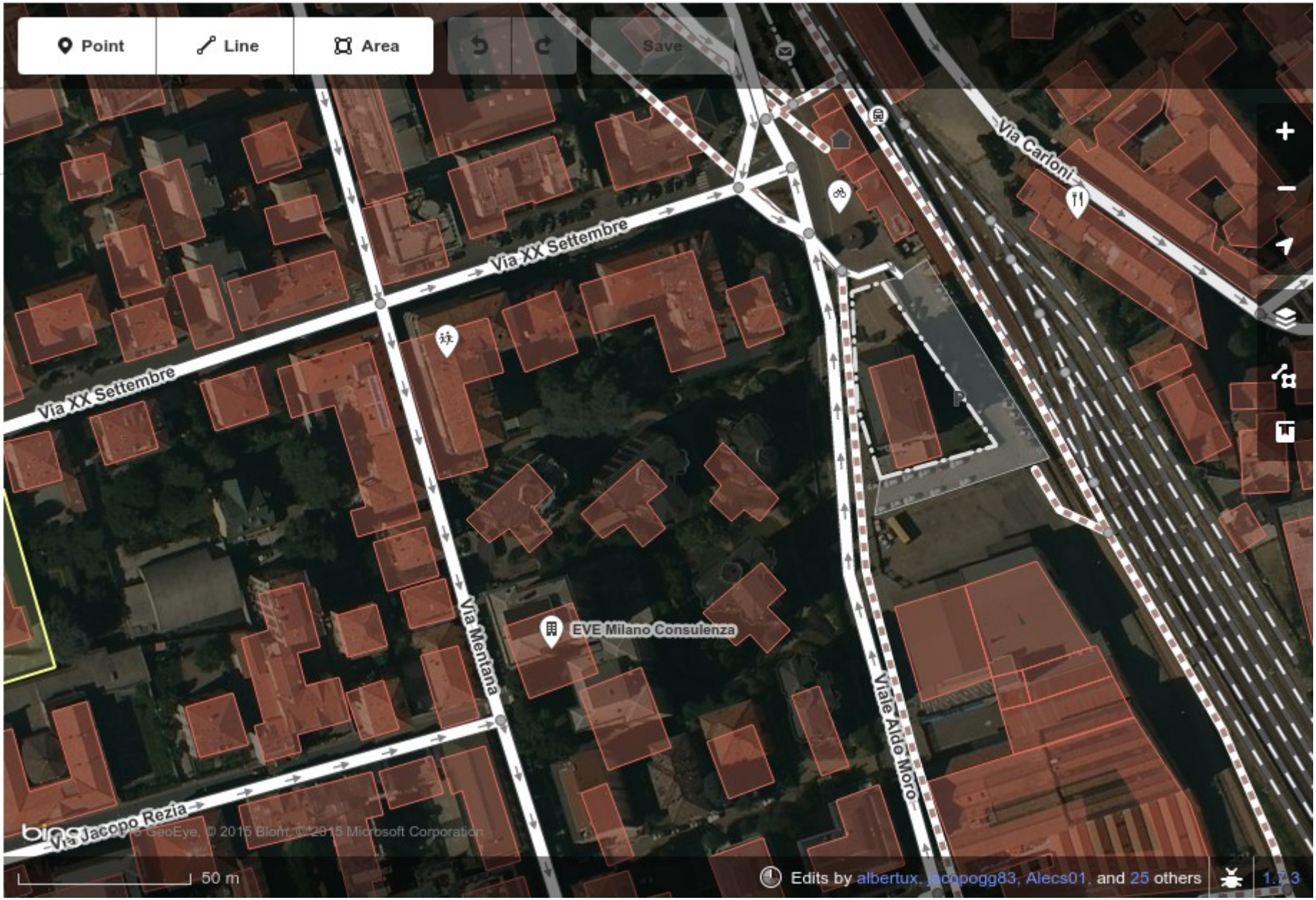
http://en.flossmanuals.net/openstreetmap/beyond-the-map/

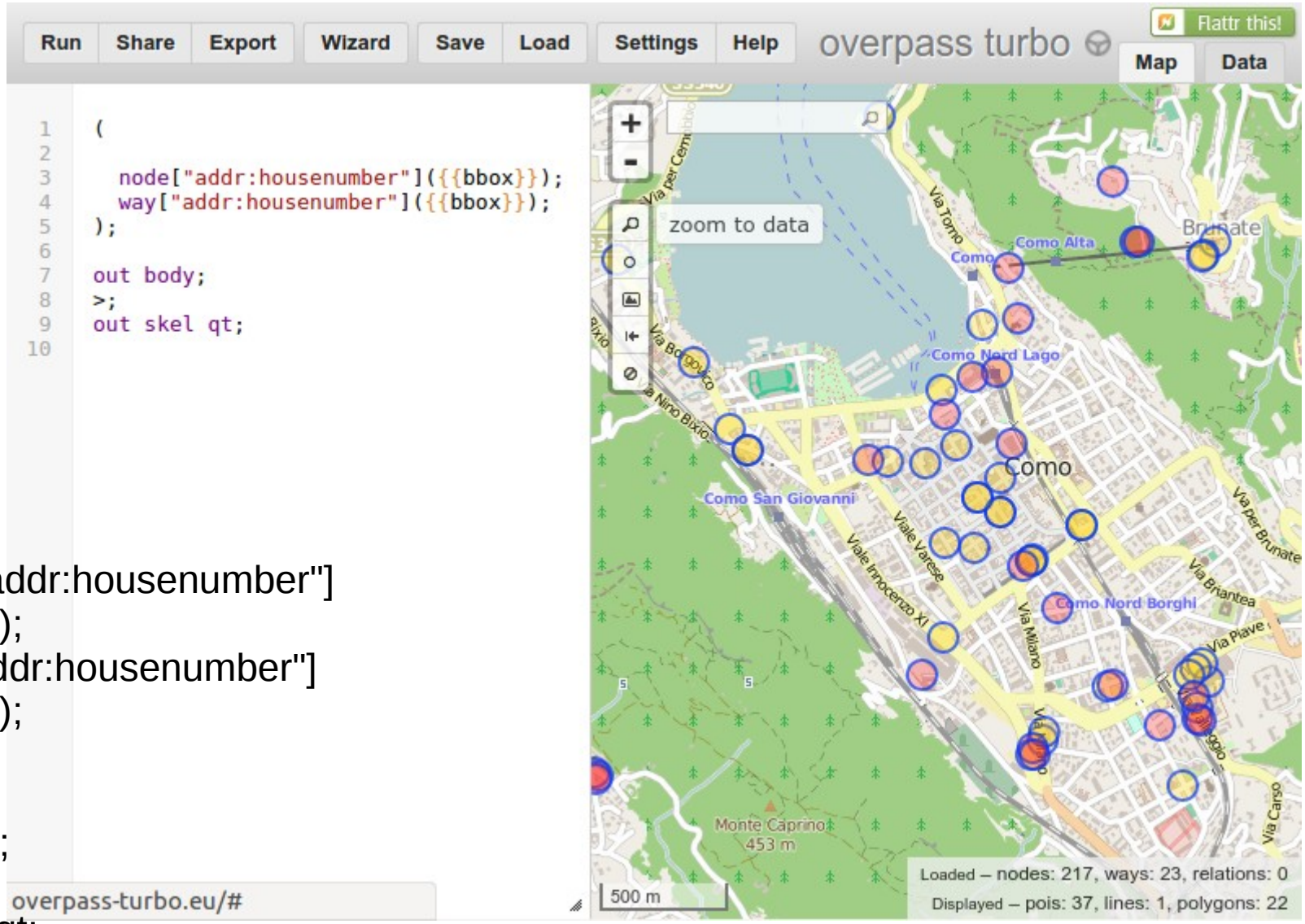
There will be an OSM Mapping Party in Como with FOSS4G 2015

- Details: Wednesday 15th July 2015 @ 16:30
- Everyone is welcome
- No OSM experience is needed
- GOAL – To add details such as POI, house numbers, building numbers, names and types etc to the OSM database for COMO
- And of course..... to have some OSM Fun

http://wiki.openstreetmap.org/wiki/Como_foss4ge_2015

LOTS of work to do in Como!






```
(

  node["addr:housenumber"]
({{bbox}});
  way["addr:housenumber"]
({{bbox}});
);

out body;
>;
out skel qt;
```

Thank You!

Email – petermooney78@gmail.com