



Navigare 2010
GNSS in ITS: the way of co-operation
30th of June 2010 EPFL- Lausanne

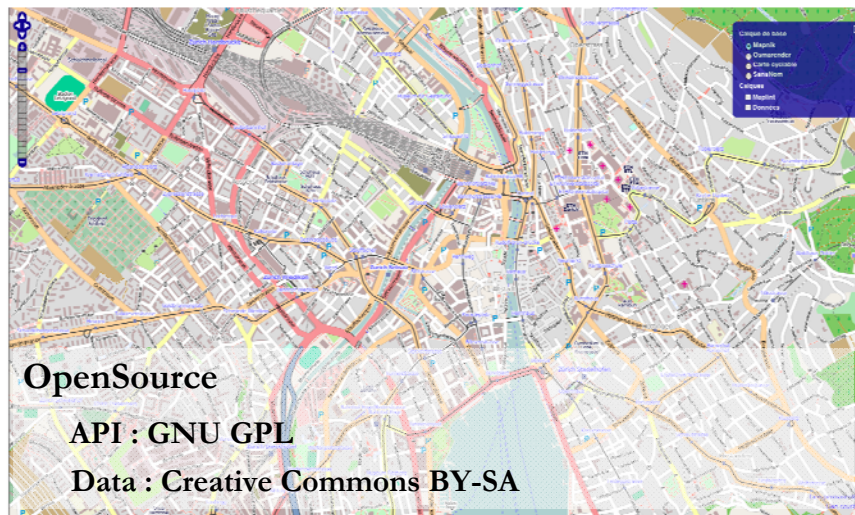
Potentiel des données d'OpenStreetMap pour la télématique des transports routiers

*Quality of Navigation data
in OpenStreetMap (OSM)*



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OSM? Free and collaborative since 2004



OpenSource

API : GNU GPL

Data : Creative Commons BY-SA



<http://www.openstreetmap.org>



OSM? Impulsed by 240 000 volunteers



<http://vimeo.com/2598878>



OSM? An incomparable reactivity of the community



<http://vimeo.com/9182869>



OSM? Example of the Haitian earthquake



Motivations

Research at the Geodetic Engineering Laboratory:

- Management of data quality in road information system
- Use of navigation data for road telematics



How good is OSM data?
What are the expected
applications ?

Steps and project organisation

References and concepts

- Spatial data quality
- Conceptual schemas for ITS
- OSM quality in England via Muki Haklay's studies from UCL

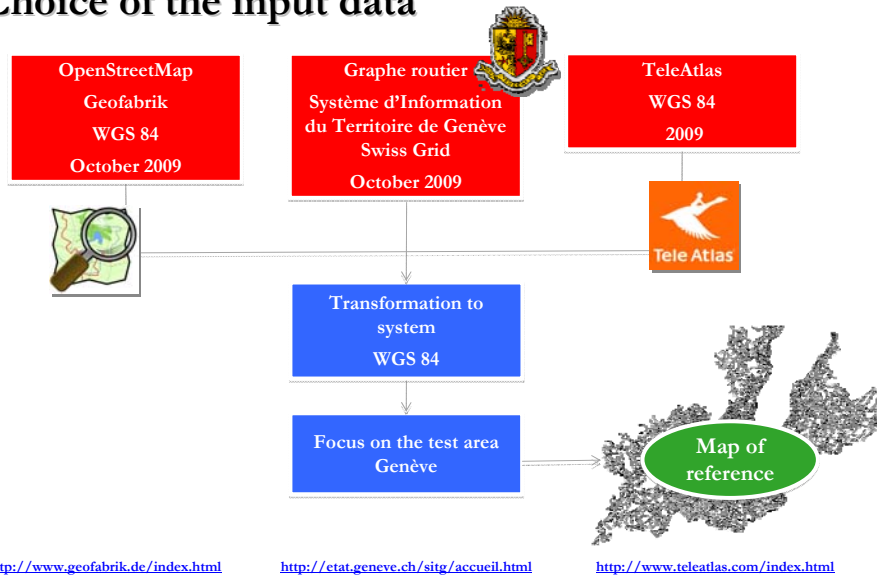
Technical definition

- Student's semester project
- Test area : Genève
- Period : September to December 2009

Agenda

- Choice of dataset
- Assessment and visualisation of data quality
 - Geometric completeness
 - Geometric accuracy
 - Semantic completeness
 - Semantic accuracy
 - Visual comparison...
- Results
- Potential of OSM data for navigation and road telematics
- References and Internet

Choice of the input data



Geometric completeness

Reference

The best database corresponds to the higher total length

SQL : Total length of segments

Data	OSM RC	OSM RN	SITG RC	SITG RN	TeleAtlas RC	TeleAtlas RN
Roads length (km)	1163	76	1398	84	2348	85

Total length of roads by categories



OSM data has geometric completeness of high quality for the major road axis ✓

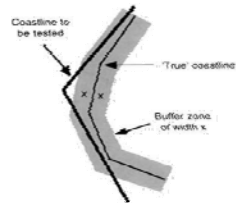
Geometric accuracy

Reference

Buffer

MapBasic

Tables of
overlapping
percentage



Reference : Goodchild, 1997

Roads or Street name	Corresponding OSM-SITG %	Corresponding OSM-TeleAtlas %
Rue du Général Dufour	83.14	35.86
Avenue Henri Dunant	34.59	61.83
Boulevard Helvétique	72.50	62.11
Chemin de Ruth	68.52	76.85
Quai Wilson	61.71	52.88
Route de Lausanne	84.74	59.86
Quai Gustave Ador	74.81	59.92
Route de Lullier	69.56	75.97
Autoroute A1	75.45	84.72



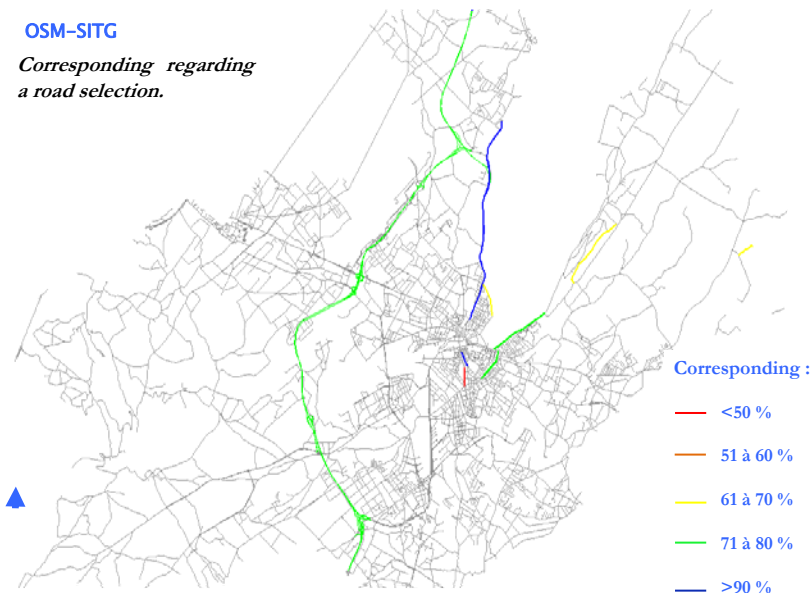
4m : Cantonal Roads

8 m : National Roads



OSM-SITG

Corresponding regarding
a road selection.



Corresponding :

- <50 %
- 51 à 60 %
- 61 à 70 %
- 71 à 80 %
- >90 %



Attribute completeness



SQL: Count of roads with attributes

Percentage of roads with attributes

Number of roads with the attribute « Name »
via an SQL query

```
SELECT count(*) from OSM
```

```
SELECT count(*) from OSM WHERE OSM.Name <> ""
```

	OSM RC	OSM RN	SITG RC	SITG RN	TeleAtlas RC	TeleAtlas RN
Total roads number	3720	360	8909	119	24338	11
Roads with attributes	62%	100%	91%	100%	86%	100%

➔ OSM's attribute definition is incomplete 🐍



RC: Cantonal Roads

RN: National Roads



Attribute accuracy



SQL: Name comparison

Percentage of corresponding

Database comparison of the attribute « Name »

	OpenStreetMap / SITG	OpenStreetMap / TeleAtlas
Cantonal Roads	489	549
Roads number grouped by Name	OSM : 1280 SITG : 2483	OSM : 1280 TeleAtlas : 2757
National Roads	0	1
Roads number grouped by Name	OSM : 2 SITG : 7	OSM : 2 TeleAtlas : 2

➔ Only half of the roads (OSM) are correctly registered 🐍



Visual comparison

Reference

Visual comparison

Maps

Visual comparison of the OSM, the SITG and the TeleAtlas data on 3 different zones with specific land cover:



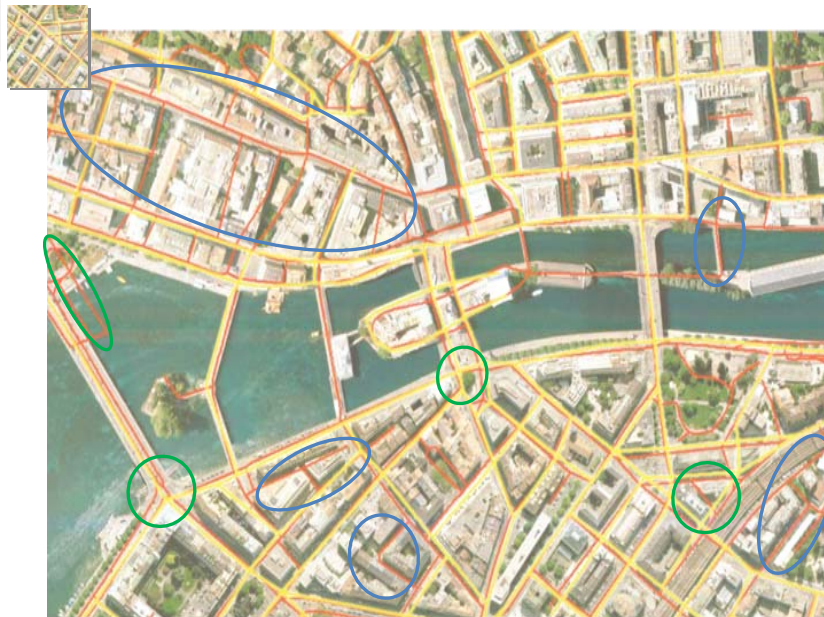
Down town (high building density)



Industrial area and motorway junction



Residential area (back country)



No data

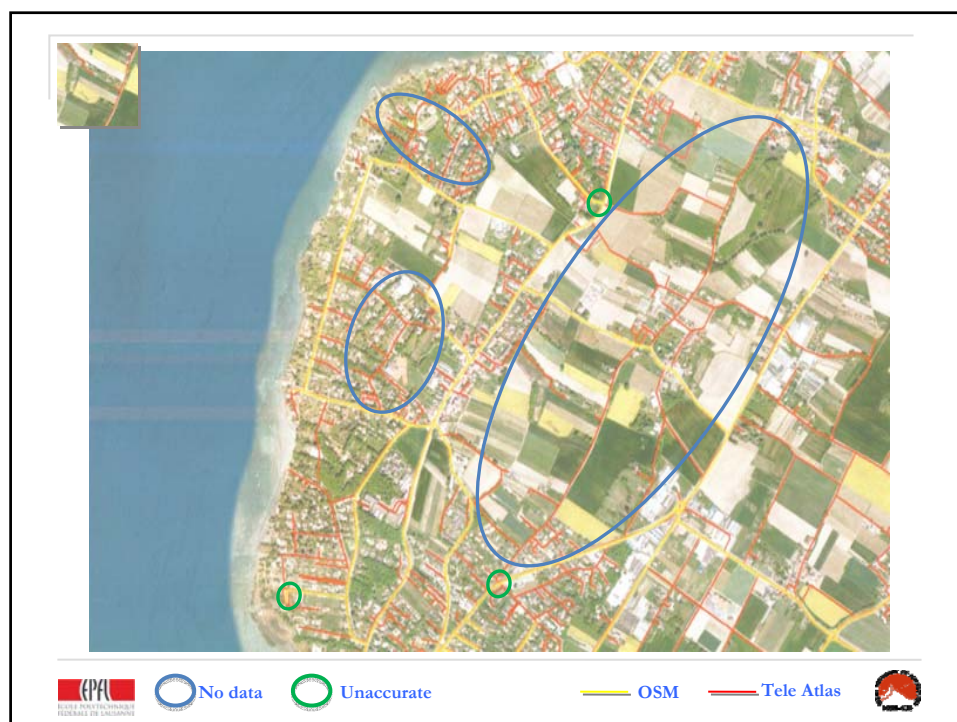


unaccurate

OSM

Tele Atlas





Visual comparison results

➔ Zone order regarding 4 criteria

Geometric completeness



Geometric accuracy



Accuracy of the traffic junctions



GPS imprecision



Count of contributors

Reference



Count of contributors

Tables with number of contributors

Download of the *.osm data via the JOSM interface and counting of contributors numbers.

High numbers of contributors = accuracy and completeness ?

Zones			
Contributors number	52	19	51



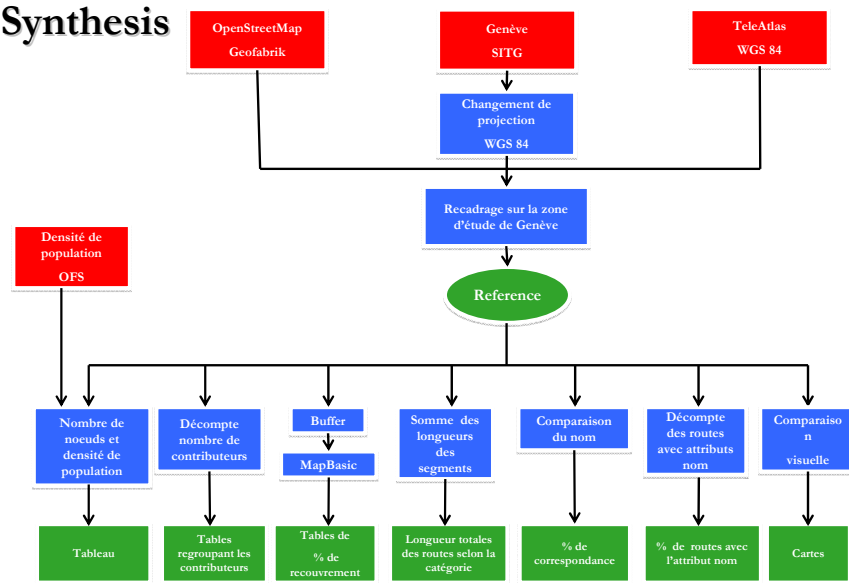
Zones 1 and 2 looks consistent



Zone 3 : not significant



Synthesis



How good is OpenStreetMap ?

Geometric accuracy	High quality / Low	✓✗
Geometric completeness	High	✓
Attribute accuracy	Low	✗
Attribute completeness	Low	✗
Volunteers' number	High	✓✓
Users repartitions	/	

Future work and improvement:



Precision and semantic completeness

Perspectives for the road telematics

Through this study, we notice that OSM is, for the moment, not the most complete and stable database for road telematics applications. However this concept of VGI and open source license motivates a lot of people.



Propositions :

- To develop a toolbox within OSM programs highlighting the regions where the OSM data (tracks or attributes) is missing (large and local scale).
- To encourage data owners to participate to the project
- To generalize this approach to Switzerland for a better assessment of OSM quality



Perspectives for the road telematics

Visualisation and valorisation of the geographic information :

Use the API as a background information for GIS or Web-mapping interface.

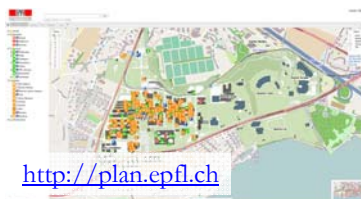
Calculus:



<http://maps.cloudmade.com>

<http://www.openaddresses.org>

Advanced navigation tool such as EPFL :



<http://plan.epfl.ch>

House #	Street Name
10	rue de la gare
City or Town	
Chavannes près Renens	
State	Country Name
1022	Suisse
Search for a business or point of interest	
Clear Search	Search

We couldn't find what you were looking for, why not [add it to OpenStreetMap?](#)



References

Conceptual schema for road network :

Carles, O., (2002), Modèle conceptuel de données génériques pour la représentation des réseaux intermodaux.

Spatial data quality :

Devilleers, R., Jeansoulin, R., (2005), Qualité de l'information géographique.

OpenStreetMap:

- Ramm, F., Topf, J., (2008), OpenStreetMap : die freie Weltkarte nutzen und mitgestalten.

- F.Van der Biest, C.Moulet, C.Philipona,(2010) OpenstreetMap: plateforme collaborative mondiale de l'information Géographique libre. Géomatique suisse 6/2010 page 260.

- Études de UCL Muki Haklay :
<http://www2.cege.ucl.ac.uk/staff/staffpage.asp?StaffID=804>

Interesting URL

Open Street Map presentation:

http://wiki.openstreetmap.org/wiki/Main_Page

<http://www.slideshare.net/fvanderbiest>

Tools and software available:

<http://wiki.openstreetmap.org/wiki/JOSM>

<http://potlatchosm.wordpress.com>

<http://www.merkaartor.org>

<http://www.openaddresses.org>

Interesting URL

Statistics : http://www.openstreetmap.org/stats/data_stats.html

Import BMO :

<http://wiki.openstreetmap.org/wiki/BMO>

Walking Papers :

<http://walking-papers.org/>

MapOSMatic :

<http://www.maposmatic.org/>

OpenSeaMap and OpenAerialMap:

<http://www.openseamap.org/> and <http://www.openaerialmap.org/>

OSM with WMS :

<http://osm-wms.de/> and <http://wms.geofabrik.de/>



**Welcome to new volunteers
And many thanks for your attention.**



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