

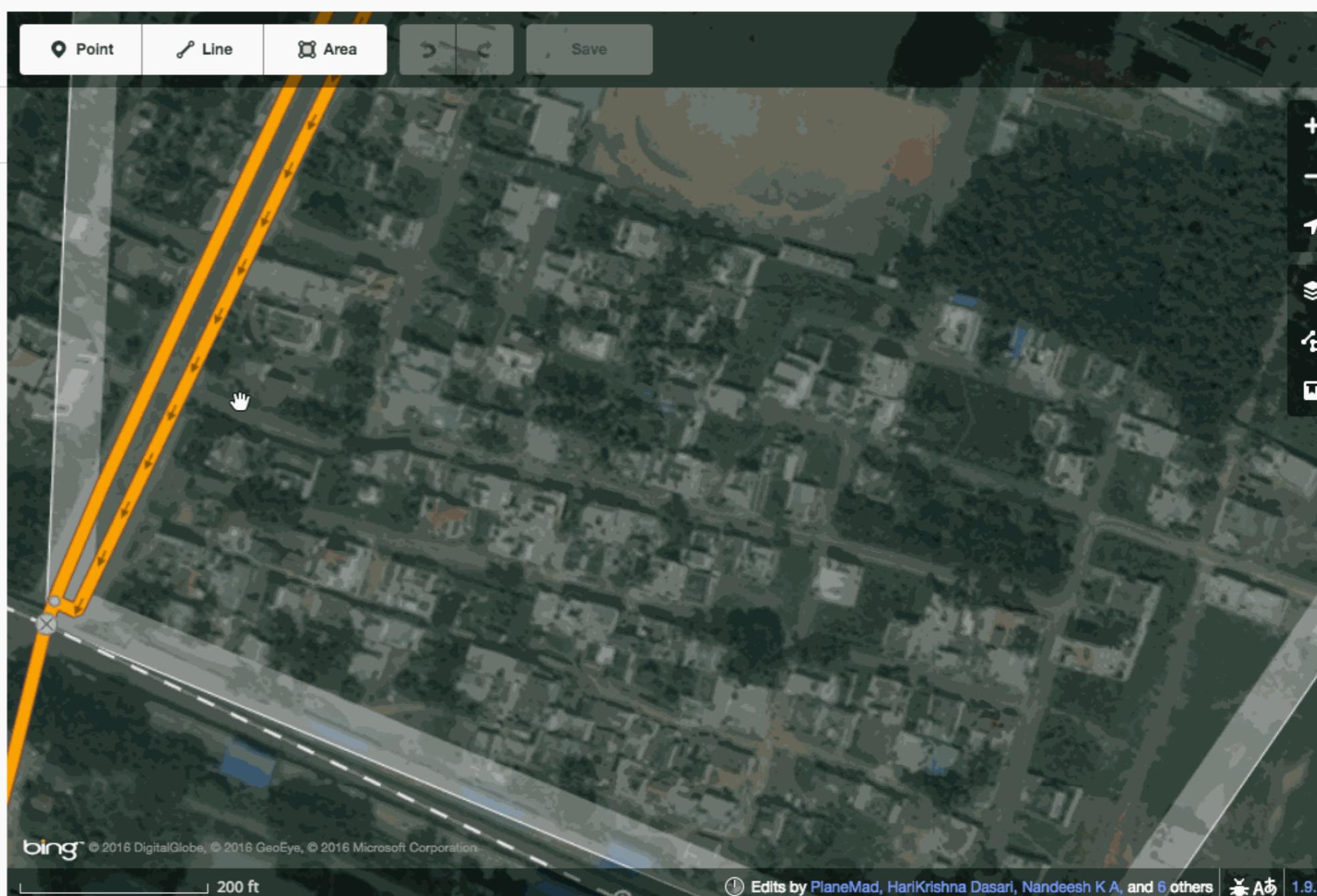


Validating the Map

Chethan Gowda @Mapbox

Search features

Search



OpenStreetMap Awesomeness

- The community is amazing at monitoring their regions/hometown/fixing the problems
- Very clear learning resources/wikis/ documentations.
- Forums/Local mailing list, Data Working Group (DWG).
- Most bad edits are accidental - very little intentional vandalism.

OSM Stats

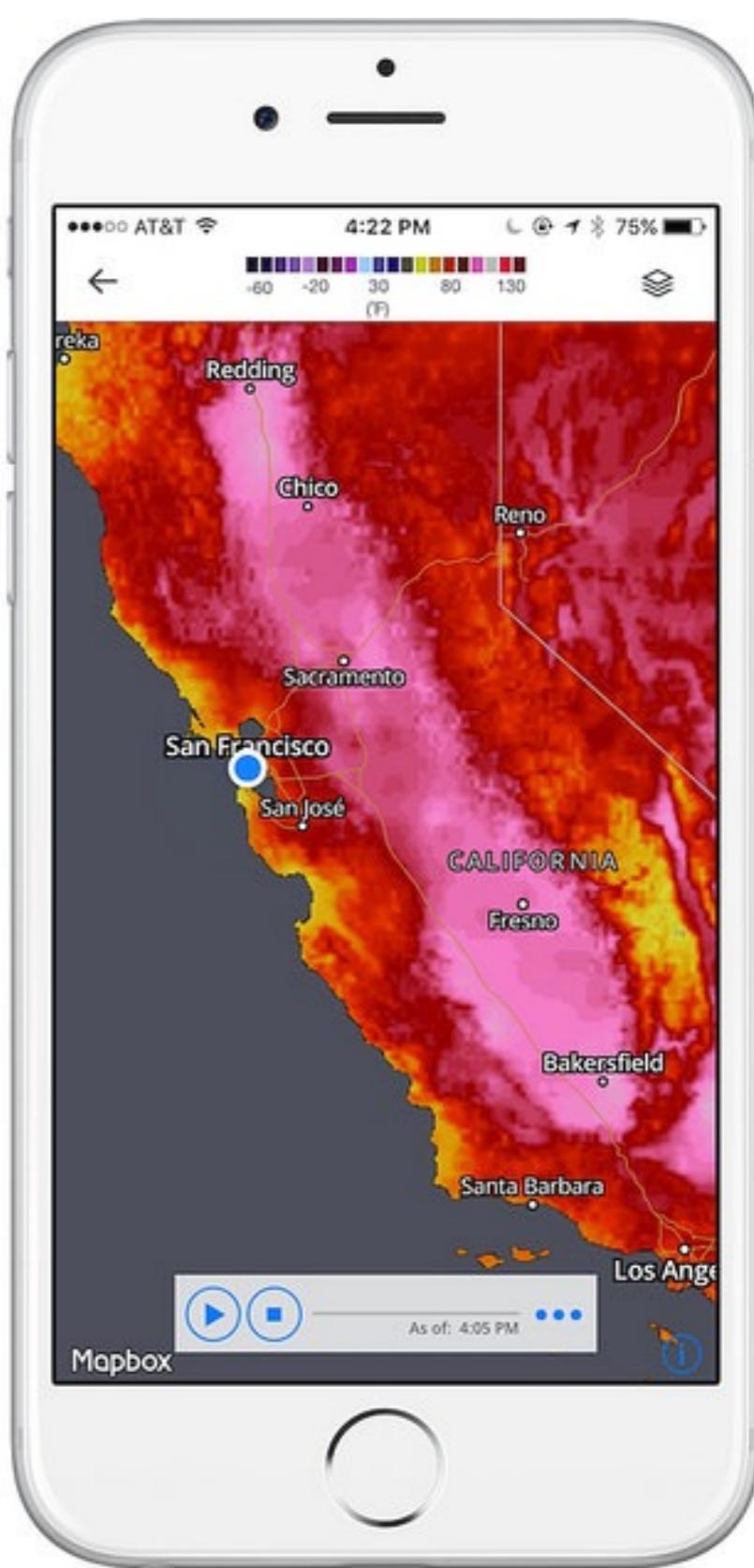
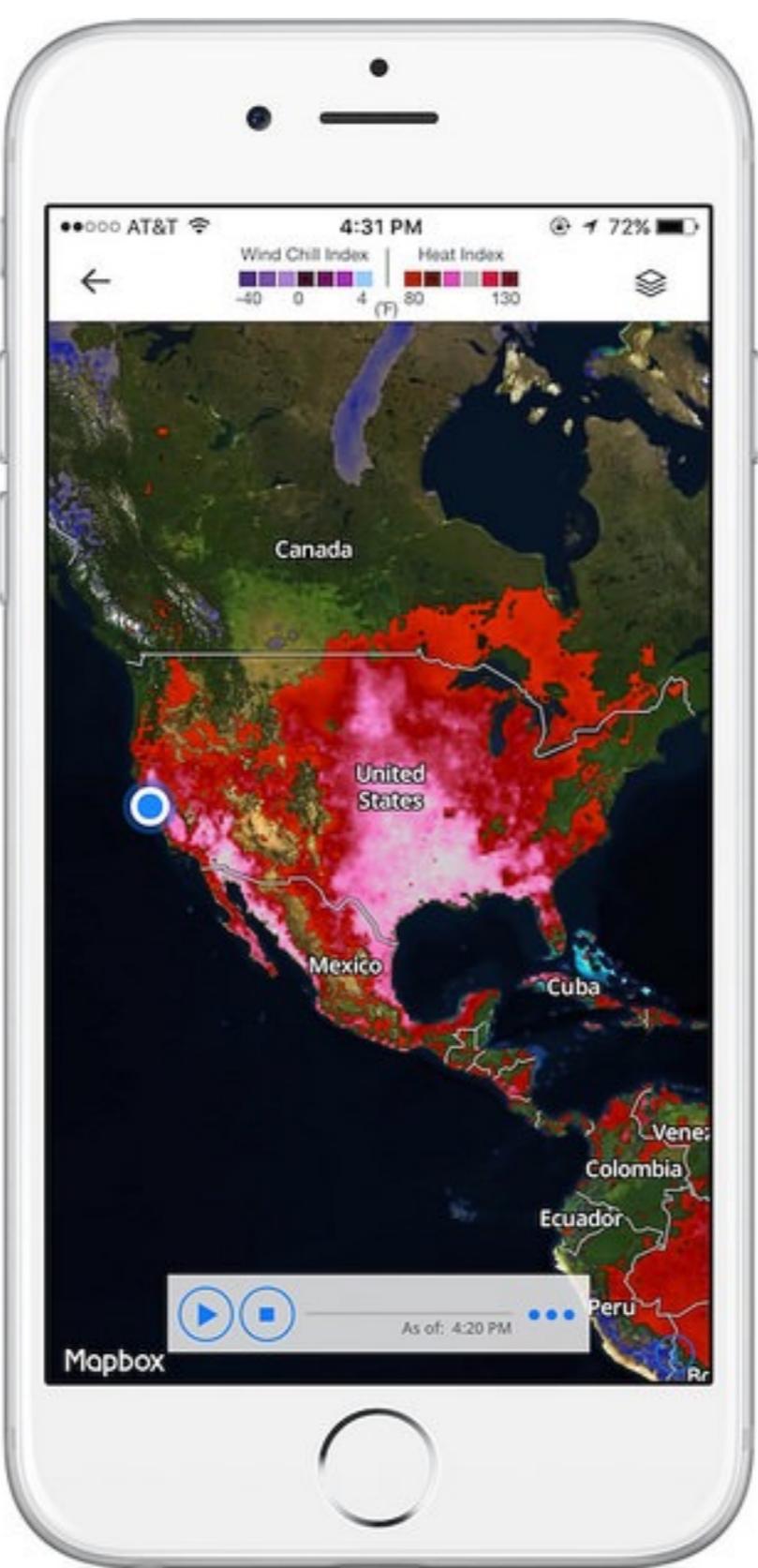
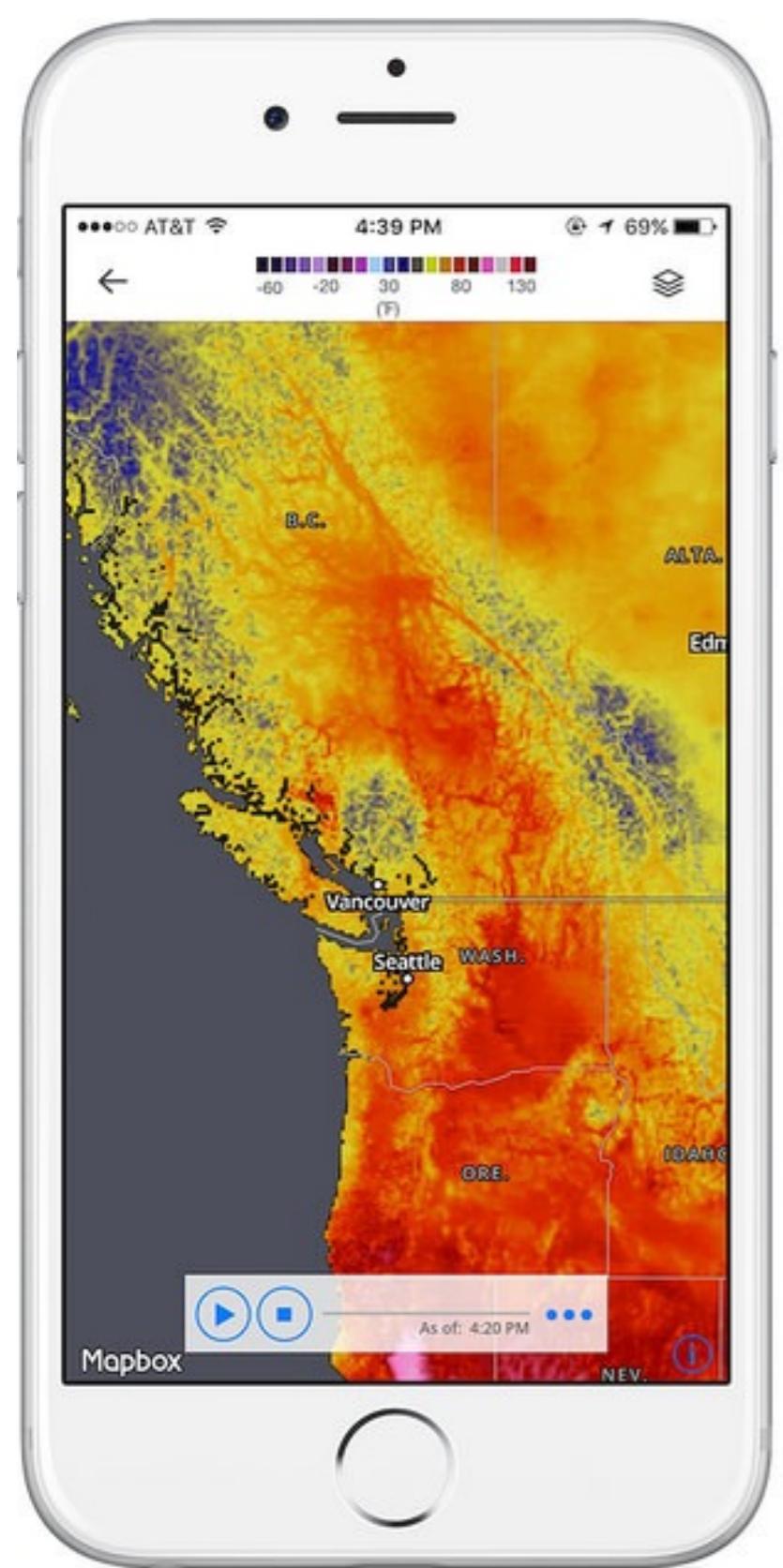
Number of users: 3,057,072

Number of active users/day: 4187

Number of changesets/day: 22,915

Mapbox

- We update our global maps in real-time from OpenStreetMap.
- We provide directions based on OpenStreetMap data.
- Breakages in OpenStreetMap result in broken maps for our customers and end-users.



STRAVA™

STRAVA ROUTE BUILDER BETA

Exit Builder

Enter a location



Undo

Redo

Clear

Use Popularity

Min Elevation

Manual Mode

Ride

Run

Save



Run

Route Type

16.9 mi

Distance

937 ft

Elevation Gain

2:49:18

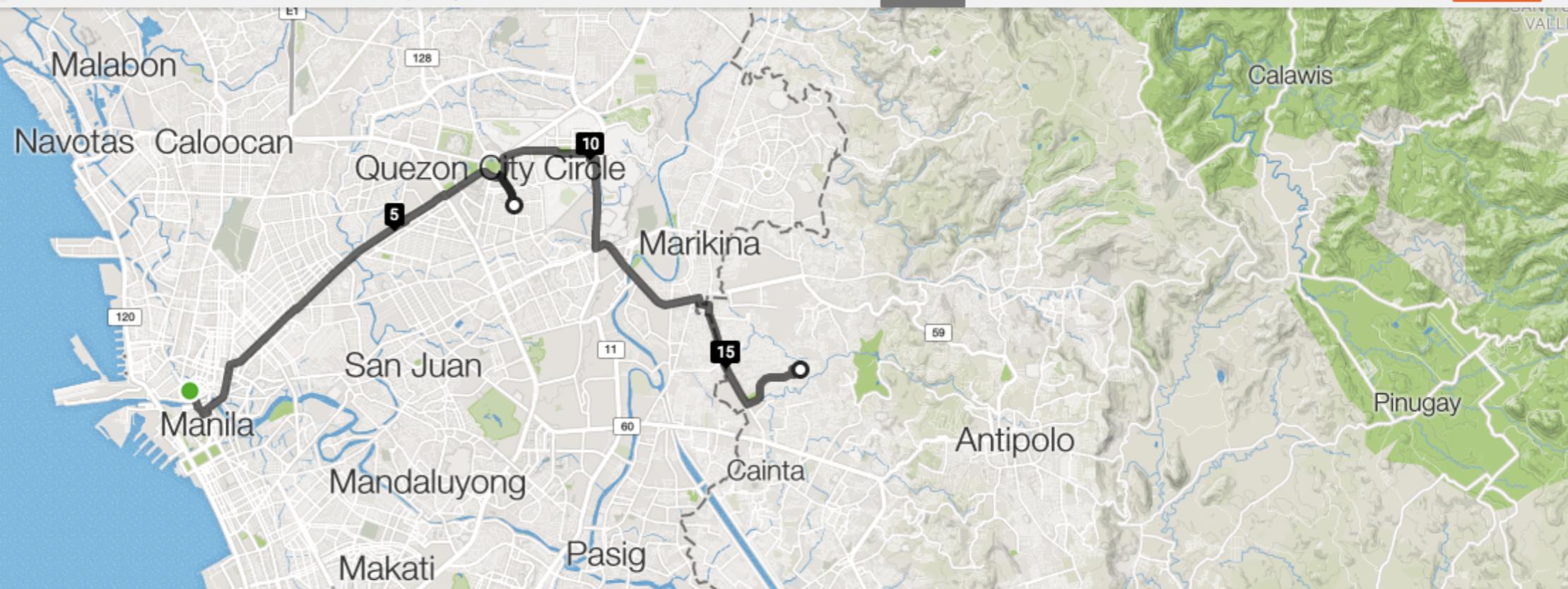
Est. Moving Time

Elevation Off ▲

Google

© Mapbox © OpenStreetMap

Terms of Use



How do we start **validating** and **detect map breakages**?

Our approach

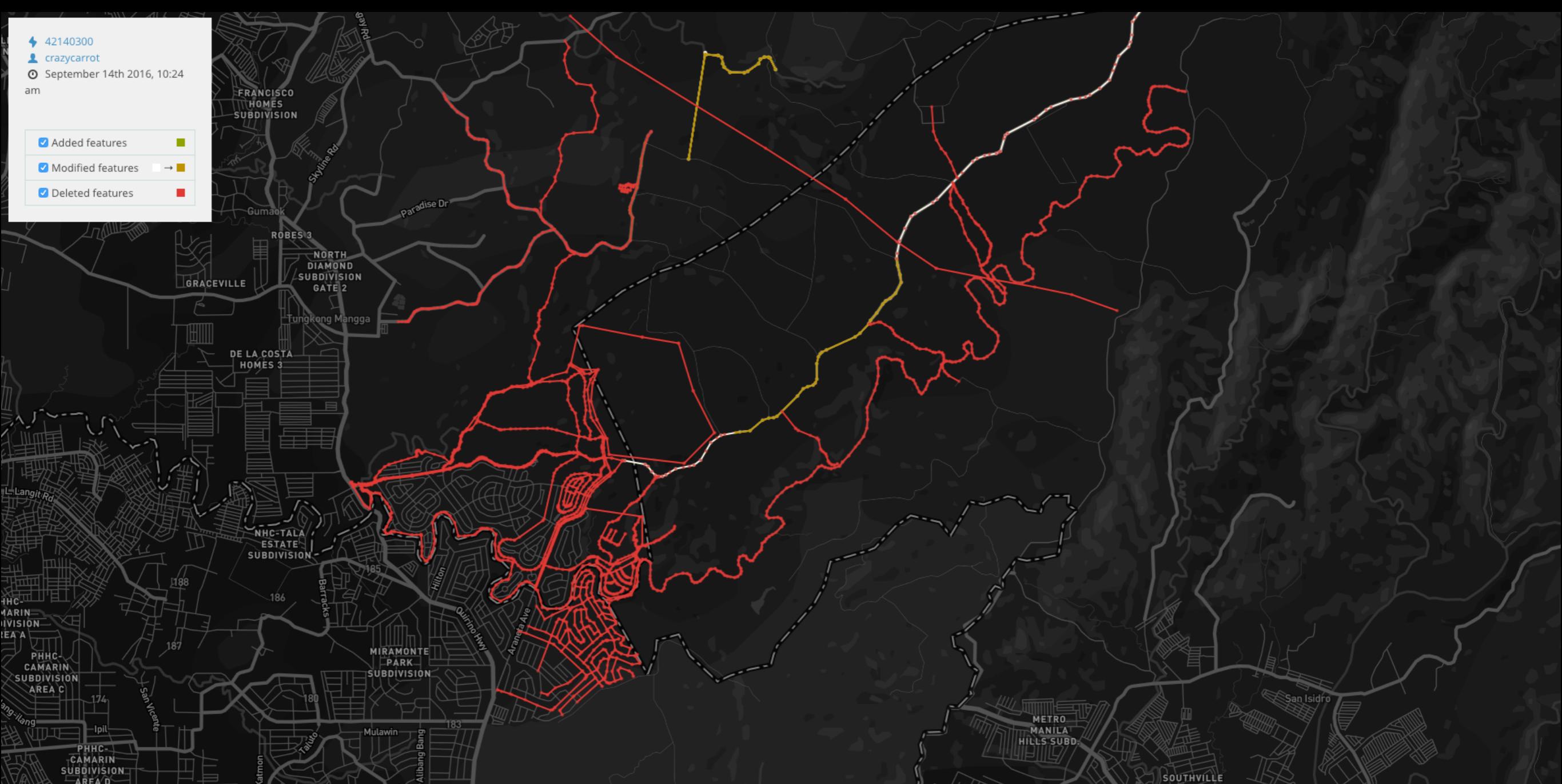
- Manual review of OpenStreetMap edits on daily basis.
- Enhance software using iterative methods.
- Identify problems and editing patterns.

Types of errors

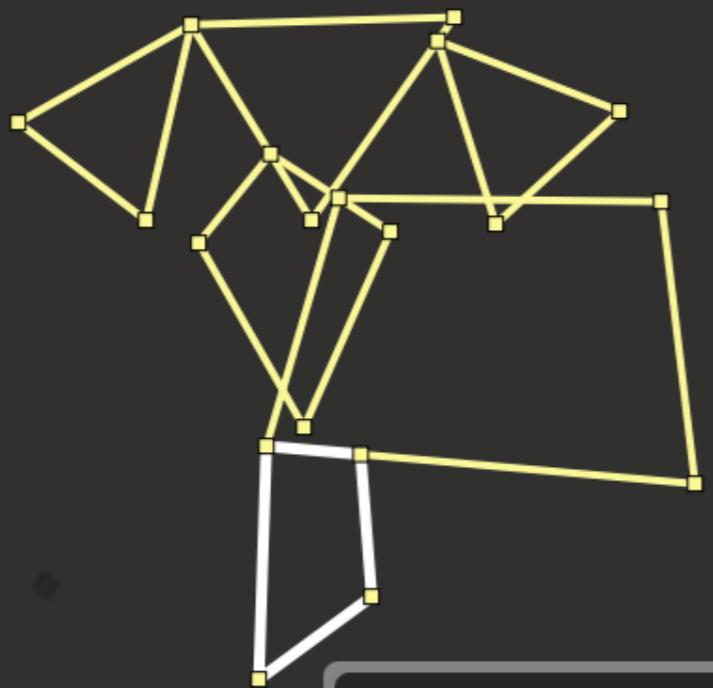
- Newbie errors
- Tracing for rendering purpose
- Unregistered imports/license violations
- Fantasy mappers: pokemon
- Accidental breakages
- Intentional damage

42140300
crazycarrot
September 14
am

- Added features ■
- Modified features ■ → ■
- Deleted features ■



A new mapper deleted existing highways
on 14th September just above La Mesa
Reservoir.



create way [398782202](#)

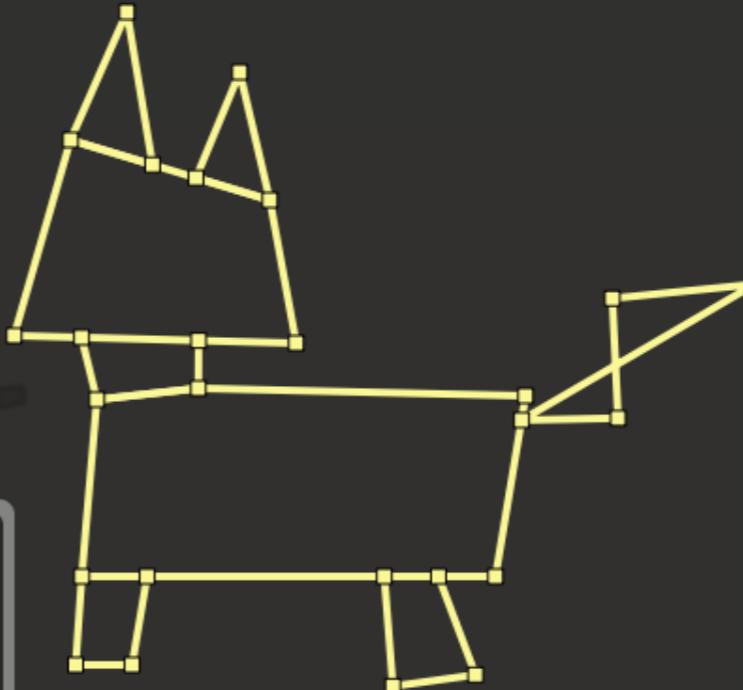
timestamp [2016-02-20 00:59](#)

user [G Jenny](#)

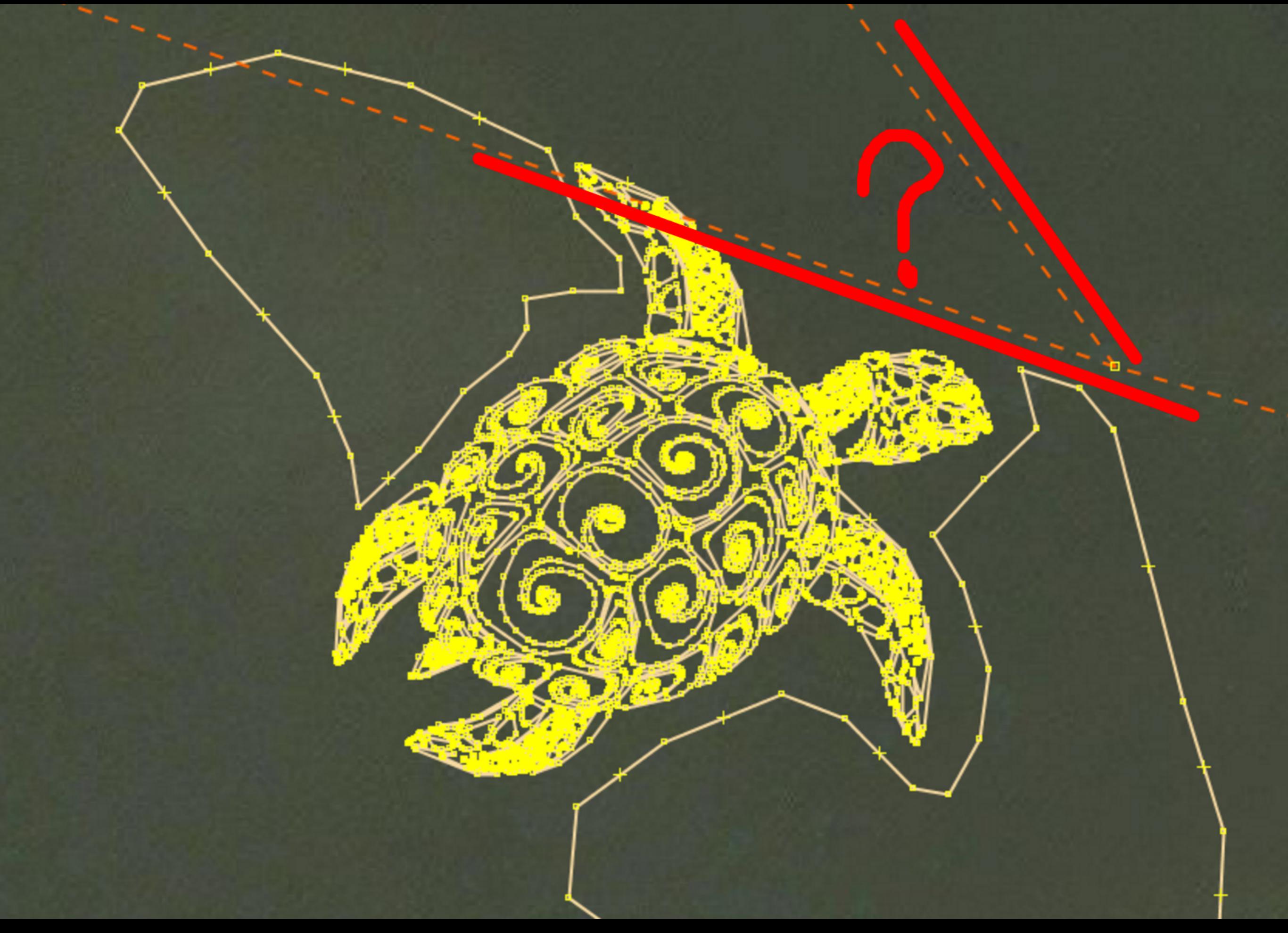
version 1

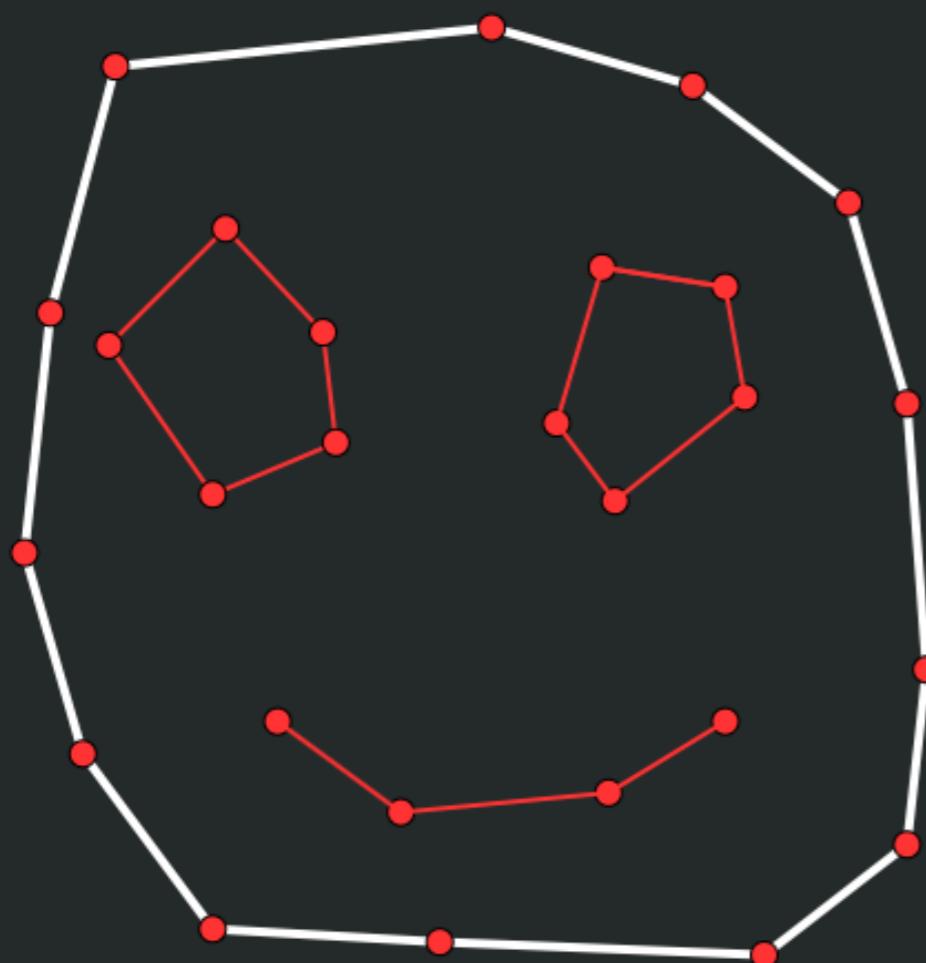
changeset [37315914](#)

building house



Kitty on the map!



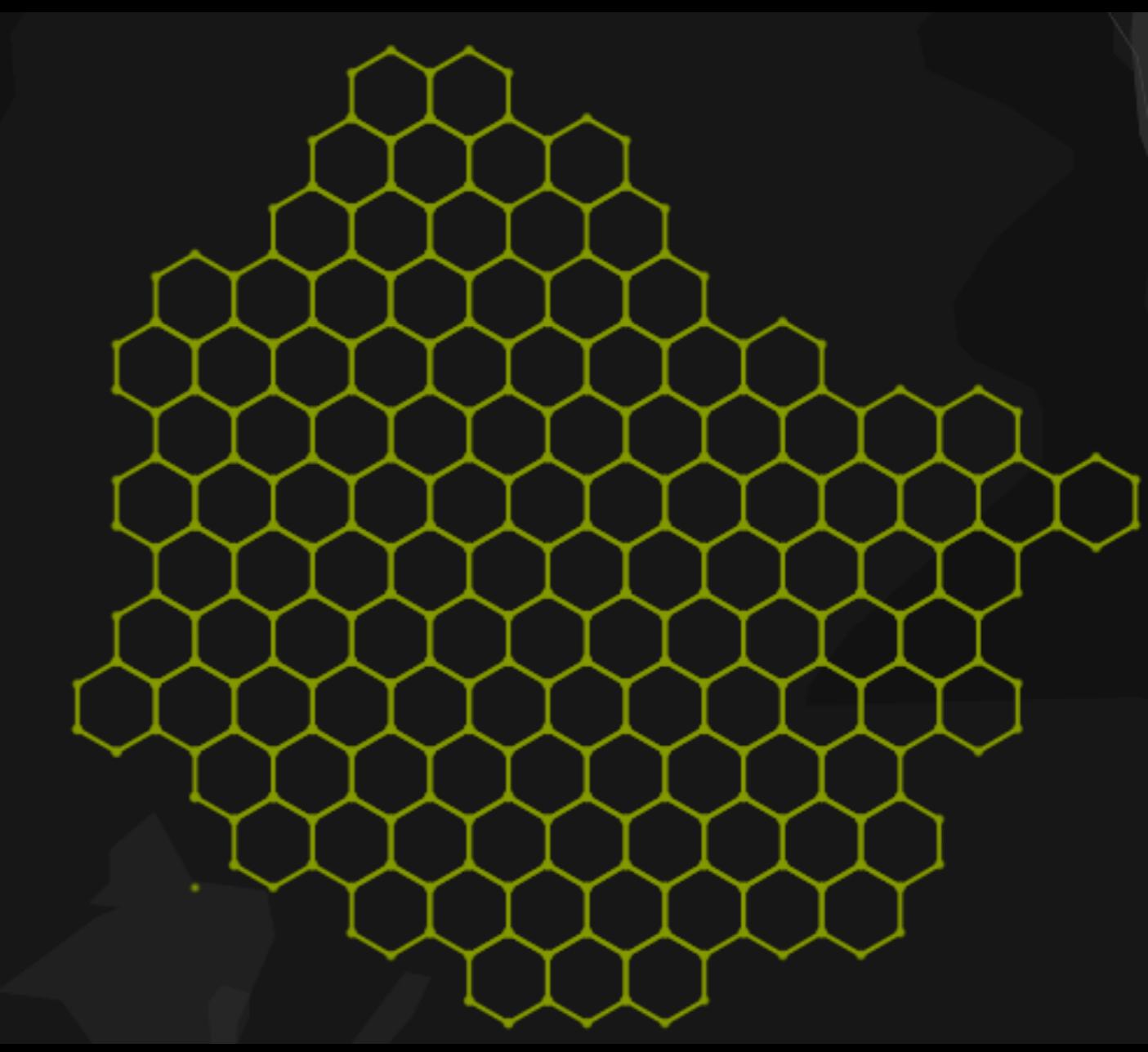


delete way 401125902

timestamp	2016-03-02 07:11	2016-03-02 09:10
user	<u>Andzeyek</u>	<u>naoliv</u>
version	1	2
changeset	<u>37558228</u>	<u>37558836</u>
name	smile	
tourism	attraction	

Sometimes smileys too!

Be nice to new mappers! :)



Undocumented imports!
Ask the exact source?

Changeset: 37726167

X

Garamchashma_OSM

Closed 6 months ago by [REDACTED]

Tags

created_by	JOSM/1.5 (9900 en_GB)
source	Google



Discussion [Subscribe](#)

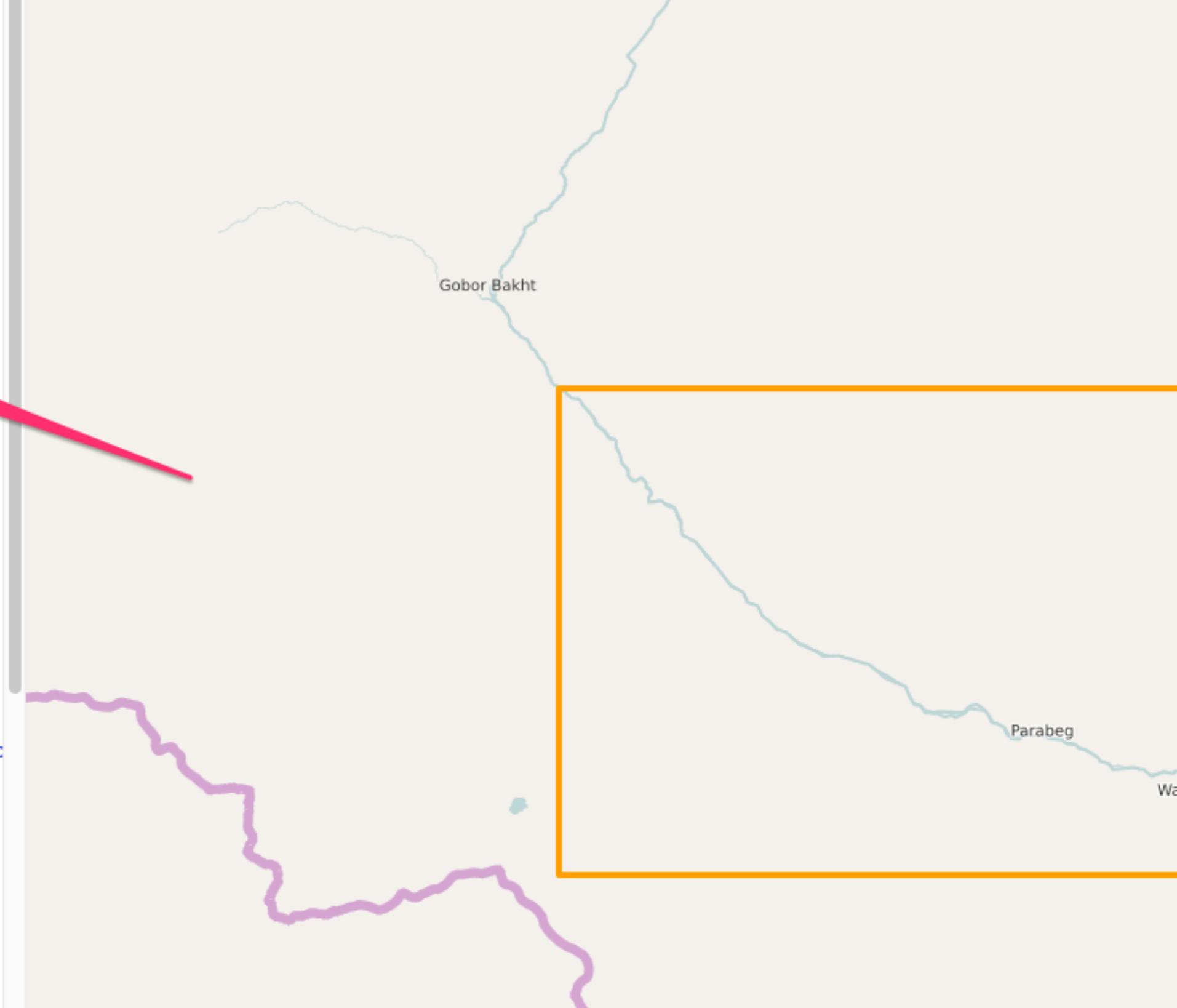
Comment from [jinalfoolia](#) 6 months ago

Hi [REDACTED],
You have mentioned Google as the source. Can you
please clarify in what context have you used
Google?

You should not be using Google as a source of
information for addition of any data on OSM. Look in
here for more information -

http://wiki.openstreetmap.org/wiki/FAQ#Why_don.27t_use_Google

Best,
Jinal Foflia



Copying from proprietary maps!

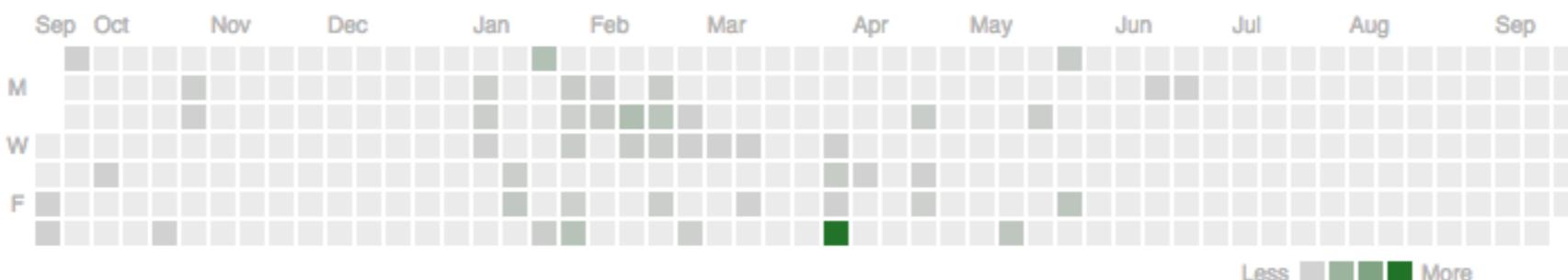
How we respond

- Changeset comments: be friendly, welcoming.
- OSM Message
- JOSM Revert plugin.
- Case report to DWG for severe edits.
- Most often, problems are already fixed. The community is great!

QA Tools

- HDYC: <http://hdyc.neis-one.org/>
- OSM Inspector: <http://tools.geofabrik.de/osmi/>
- Osmose: <http://osmose.openstreetmap.fr/en/map/>
- Keepright: <http://keepright.ipax.at/>
- Maproulette: <http://maproulette.org/>

How did you contribute to OpenStreetMap ?

Name: maning**Mapper since:** January 13th, 2006**Project days:** 3900**Active mapping days:** 1670 (42.8%)**GPS-tracks:** 426**Changesets:** 8 851**Map changes:** 2 582 668**Related accounts**1. [OSM Wiki](#): Editcount 1736**Type?** Super Mapper (Active)**Recent activities in** No activity**Changeset discussions:** Participated in 20 and created 21 comments**OSM Notes:** Closed 200, commented 9 and 139 opened**Activity calendar of all contributions for the past 12 months (overall 47 mapping days)****Name: maning (UID 1417)****Nodes****Ways****Relations**

Created:

1 537 843

138 011

219

Modified:

333 696

110 165

722

Deleted:

420 835

18 079

126

last modifier of:

1 227 410

109 743

192

has the following ranks:

#460

#528

#2913

Changesets**With comments****Unique comments****Median length**

8 851

7 875

2 713 (34.0%)

23.00

Amount of map changes<15 changes:
2 130 changesets>15 <150 changes:
3 249 changesets>150 changes:
3 472 changesets

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:***

590 (1%)

39 090 (36%)

60 868 (55%)

3 876 (4%)

191 (0%)

9 064 (8%)

3 179 (3%)

2 485 (2%)

OSM Inspector

The figure is a screenshot of the OSM Inspector tool interface. The top navigation bar includes 'OSM Inspector' (highlighted in red), 'Search' (input field), 'Help' (with a gear icon), 'GEOFABRIK tools' (with a globe icon), and 'Switch tool...' (button). The main toolbar features icons for zoom, search, and other functions.

The left sidebar contains the 'Overlays' section, which is expanded to show several categories of data:

- Highway types
- Unknown
- Deprecated
- highway=road
- Highway name/ref
- None (major roads)
- None (minor roads)
- Fixme
- Additional attributes
- Oneway
- Lanes
- Maxspeed
- Maxheight

The central area is a map of Southeast Asia, specifically focusing on Cambodia, Vietnam, Laos, and parts of Thailand and Myanmar. The map shows a network of roads, rivers, and administrative boundaries. Several airports are marked with blue squares containing white airplane icons. Labels for cities like Phnom Penh, Siem Reap, Battambang, Sihanoukville, Phnom Penh, Kampong Thom, Pursat, Kratie, Sen Monorom, Kampong Chhnang, Kampong Cham, Phnom Penh, Takeo, Svay Rieng, Tay Ninh, An Thoi, Rach Gia, TP Cao Lanh, Bao Loc, Lang Xoai, Gia Nghia, Buon Ma Thuot, Kon Tum, Pleiku, Quy Nhon, Tu Hoi, Nha Trang, Cam Ranh, Da Lat, Phan Rang - Thap Cham, Binh Dinh, Vung Tau, Tra Vinh, Cai Mau, Bac Lieu, and Binh Thuan are visible.

The right sidebar includes sections for 'Selection' (with a note to 'click on the map to query') and 'Data' (with a dropdown menu set to 'None').

At the bottom, there is a footer with the text 'Data from 2016-09-14 20:25 (UTC)', coordinates '106.67121, 8.64577', a 'zoom=7' link, and a 'Permalink' link.

OSMOSE

Change language ▾ Issues by user Relation analyser Statistics Export ▾ Help ▾ Delay 0.85s Login

Severity 1 only
Fixable Topic Select: all nothing invert

Structure 25/25 all nothing

- overlapping building
- invalid polygon
- reverse roundabout
- orphan nodes
- sudden highway type change
- bad * link highway
- broken highway continuity
- big relation
- multipolygon
- not-connected highway/cycleway
- duplicate geometry

Missing tags 11/11 all nothing

- junction=roundabout
- oneway
- highway

Bad tag 24/24 all nothing

- bad source tag
- multiple tags
- incorrect tag
- bad tag key
- typo in tag
- parking lane

Tags to remove 11/11 all nothing

- on_junction-roundabout
- incompatible tags
- ref in name
- fixme import
- duplicate object
- unwanted tag on node

Tags name 6/6 all nothing

- orthograph
- two names
- local language

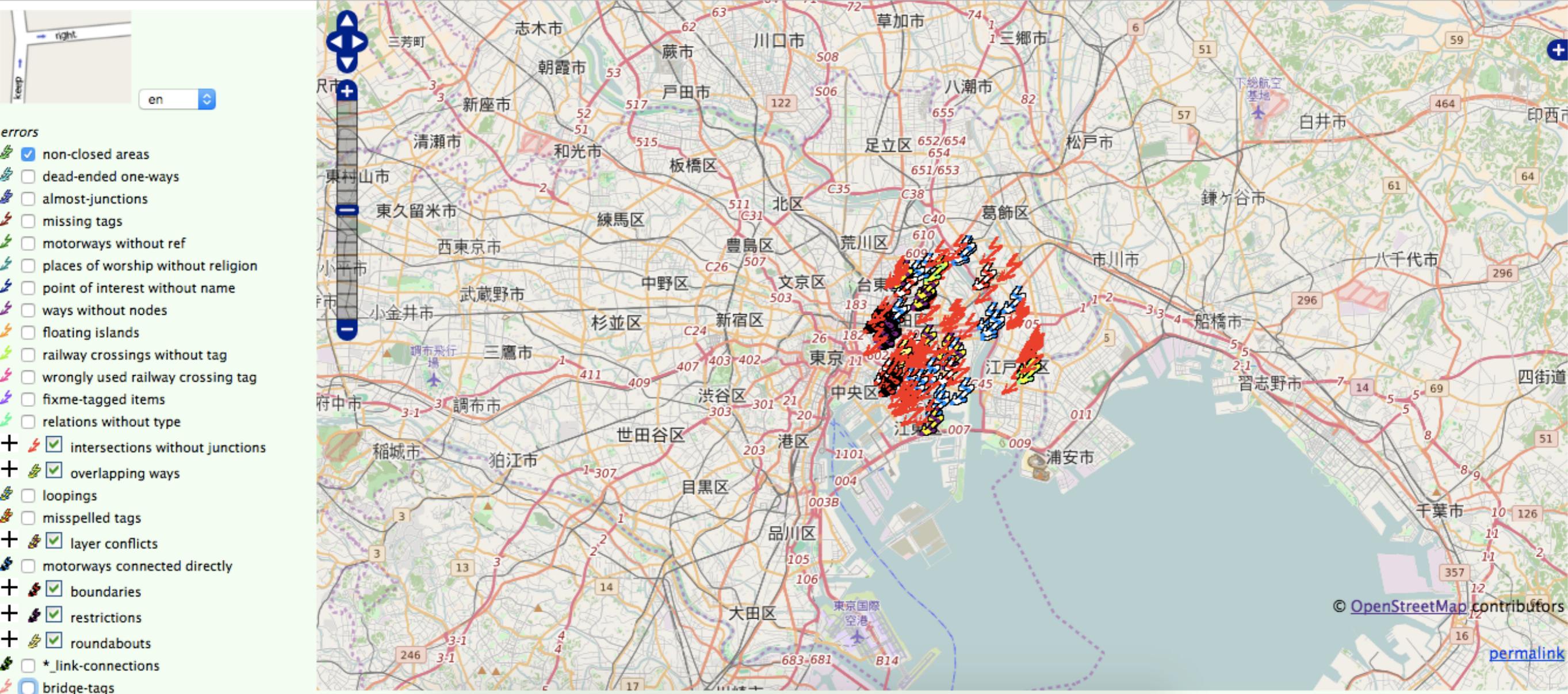
Administrative 6/6 all nothing

- open polygon
- place without name
- INSEE code
- erroneous boundary
- out of boundary

To map 18/18 all nothing

- TMC
- relation type=boundary

Integration 43/43 all nothing



Unclosed-areas errors in Tokyo

MapRoulette

MapRoulette

Chetan_Gowda Online

Search...

Use Map Bounds

Administration

Projects

Challenge Metrics

What to do?

+ Latest <

Featured <

Challenge: Connectivity Error in Ecuador

Connect the ways that are almost connected if they are in the real world.

Status: Created

Edit False Positive Skip

Leaflet | © OpenStreetMap contributors, CC-BY-SA

Mapbox Approaches

- Based on changeset metadata: Osmcha-Django
- Mapbox Map-feedback
- Daily analysis of QA tiles: OSMLint + To-Fix
- Real-time change monitoring of features as they are edited in OpenStreetMap.

[Hide Filters](#)**From**

mm/dd/yyyy

To

mm/dd/yyyy

Min. Additions**Max. Additions****Min. Modifications****Max. Modifications****Min. Deletions****Max. Deletions****Changeset Score (Max)****User Score (Max)****Editor****User****Imagery Source****User changeset count
(max):****Comment****User edit count (max):****User Has Blocks****Show changesets** Only suspicious All**White-list:** Hide White-listed Users Show All**Harmful changesets:** Only harmful All**Checked changesets:** Only checked All**Reason**

Sort

OSMCha-Django: <https://osmcha.mapbox.com>

ID	Date	User	Comment	Count	Reasons	Verified
42199782	Sept. 16, 2016, 10:42 a.m.	Joao Bras-Jorge	Parked here	1 0 0	Suspect_word	✗
42199757	Sept. 16, 2016, 10:41 a.m.	Yorvik Prestigitator	duplicate level cro...	13 17 3	Suspect_word	✗
42199742	Sept. 16, 2016, 10:40 a.m.	eric22	geometric correctio...	0 489 0	Mass modification	✗
42199686	Sept. 16, 2016, 10:37 a.m.	muramototomoya	神津島北部の道路を修正	624 3 1317	Mass deletion	✗
42199432	Sept. 16, 2016, 10:22 a.m.	eric22	geometric correctio...	0 503 0	Mass modification	✗
42199422	Sept. 16, 2016, 10:21 a.m.	Arun M Unnithan	Add connection road	261 0 0	Possible import	✗
42199354	Sept. 16, 2016, 10:17 a.m.	Warin61	Australia, NSW. Add...	259 0 0	Possible import	✗
42199221	Sept. 16, 2016, 10:10 a.m.	Warin61	Australia, NSW. Add...	288 0 0	Possible import	✗
42199220	Sept. 16, 2016, 10:10 a.m.	makmar	Melissia area build...	250 0 0	Possible import	✗
42199152	Sept. 16, 2016, 10:06 a.m.	eric22	geometric correctio...	0 535 0	Mass modification	✗
42199110	Sept. 16, 2016, 10:04 a.m.	Arun M Unnithan	Add connection road	322 0 0	Possible import	✗
42199107	Sept. 16, 2016, 10:04 a.m.	ismatr2	ajout de données à ...	1 2 1415	Mass deletion	✗
42199040	Sept. 16, 2016, 10:01 a.m.	PutriRachiemnys	#hotosm-project-213...	233 0 0	Possible import	✗
42199032	Sept. 16, 2016, 10 a.m.	makmar	Melissia area build...	255 0 0	Possible import	✗
42198911	Sept. 16, 2016, 9:55 a.m.	DaryR	#hotosm-project-213...	347 0 0	Possible import	✗

Page 1 of 5443

Next →

<https://osmlab.github.io/changeset-map/>



Total number of changesets checked: 12361

Total number of harmful changesets found: 746

Number of users with harmful changesets: 317

Count by Suspicion Reason

Suspicion reason	Checked	Verified Harmful
None	3777	320
mass deletion	2190	181
possible import	3323	66
moved an object a significant amount	536	5
edited an object with a significant tag	351	7
mass modification	722	16
edited a wikipedia landmark	514	4
suspect_word	2325	157
edited an object with a significant place tag	370	5

746/12361 bad changesets!

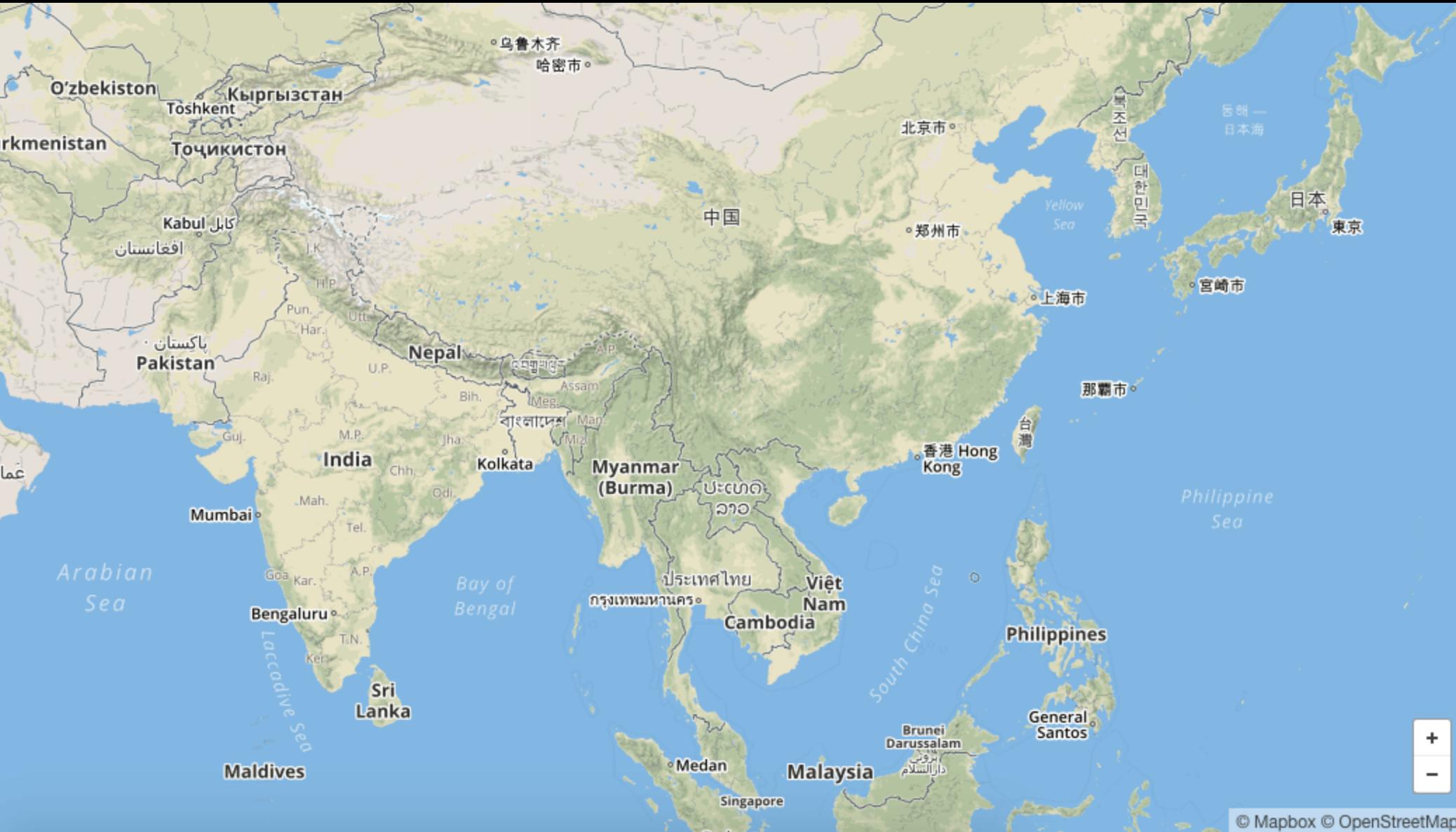
<https://www.mapbox.com/map-feedback/>

 Report an error on the map

1 Click on the place on the map where you found the problem

2 A select a location type is
select a reason

3 More details... If it is misnamed, what is the current name?



© Mapbox © OpenStreetMap



OSMLint: Using OSM QA Tiles + Tile-Reduce to Lint the Planet.



Account

[Authorize on OSM](#)

Tasks

Broken polygons

Crossing minor highways

Highway intersects footpath

Highway intersects water - m...

Highway intersects water - m...

Impossible one-ways minor h...

Invalid relations

Invalid turn lanes

Islands major highways

Loopings

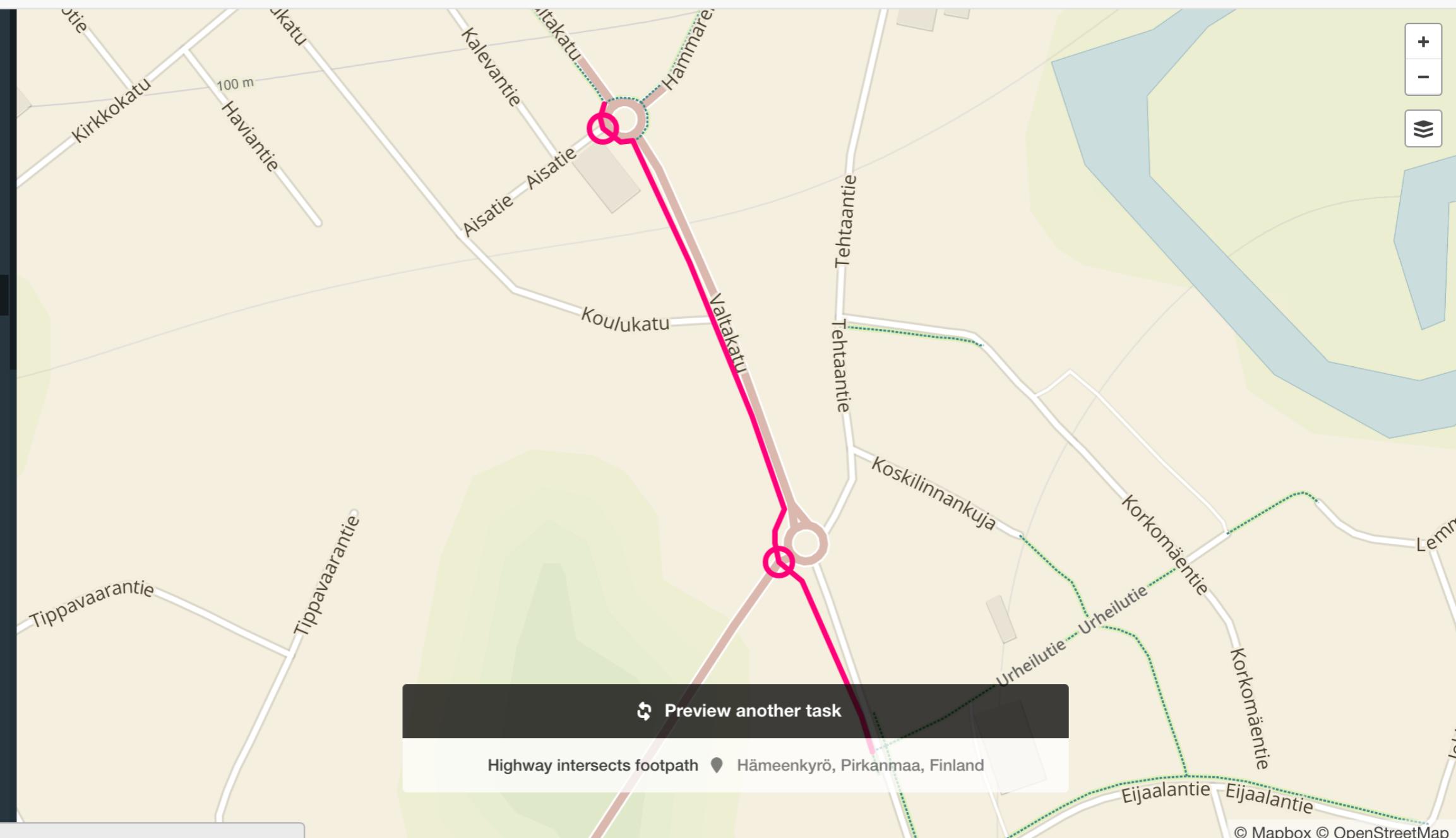
#MapLesotho - Track Assess...

Missing layer bridges - major

Missing layer bridges - minor

Missing oneway - motorway_...

Misspelled tags

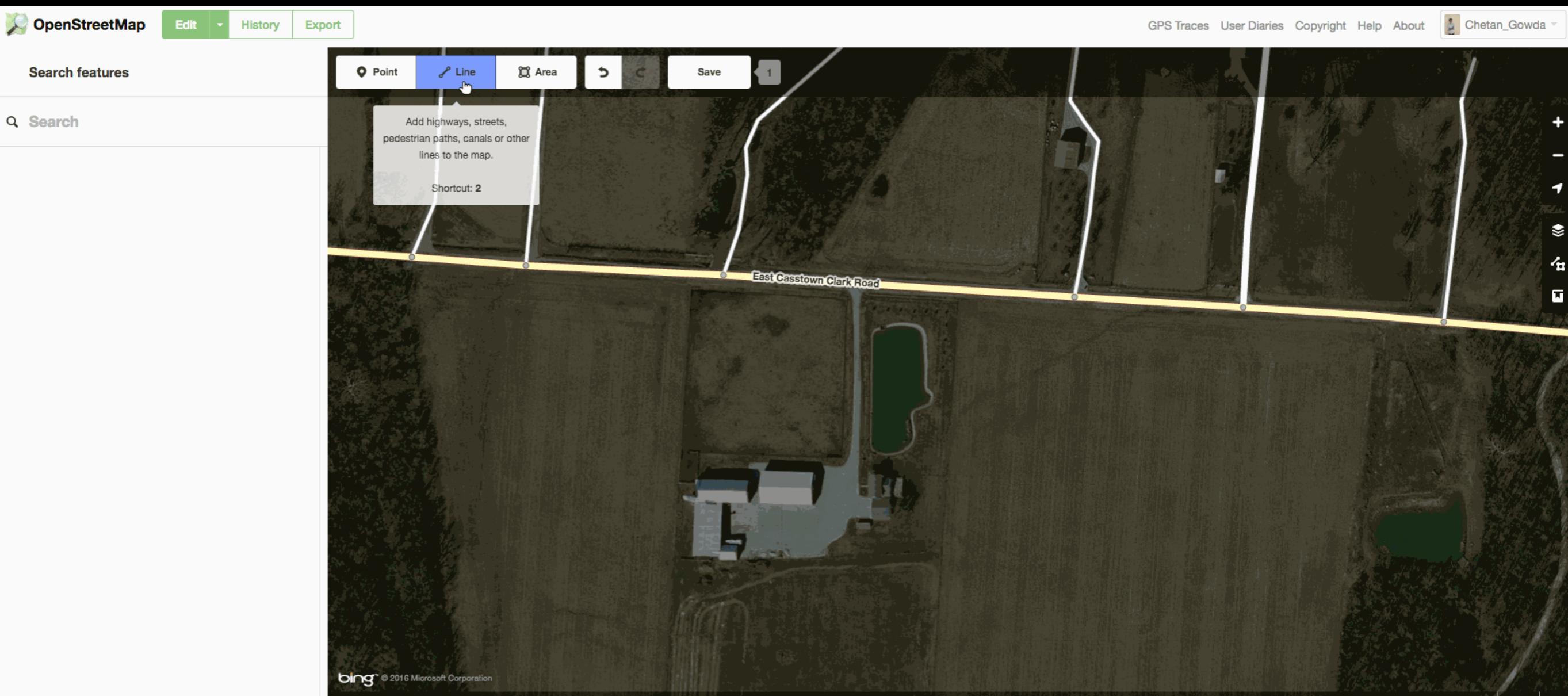
osmlab.github.io/to-fix/#

Micro-tasking fixes with To-Fix

~10,000 fixes every week

Task	Total issues	Fixed issues	Not error issues	Total issues by team	fixed by team	not error by team
Disconnected Nepal	591	591	0	251	251	0
Highway intersects footpath	465	249	216	294	181	113
Highway intersects water - minor	7008	6108	900	2199	1737	462
Kinks major highways	66680	59067	7613	59055	51556	7499
Overlapping minor highways	2019	1698	321	2015	1694	321
Loopings	14251	4942	9309	11780	3636	8144
#MapLesotho - Track Assessment	116	95	21	0	0	0
Misspelled tags	85	57	28	19	11	8
Mixed layers major highways	891	650	241	711	531	180
Broken polygons	14285	8910	5375	13606	8382	5224
NYC Building Overlaps	4209	4191	18	4181	4181	0
krakatoa	12296	11729	567	6887	6802	85
Roundabout USA	178038	178023	15	2	0	2
Small components	53	23	30	27	11	16
Strange layer	1263	931	332	1134	830	304

Tiger delta	221817	178023	43794	185132	146017	39115
Islands minor highways	23506	14061	9445	23404	14004	9400
Unconnected Japan	1888	1678	210	883	765	118
Invalid relations	25	21	4	21	17	4
Impossible one-ways major highways	791	462	329	652	330	322
Unconnected towns India	221	104	117	221	104	117
USA overlapping buildings	519	449	70	24	22	2
Overlapping major highways	6641	5239	1402	6421	5043	1378
Islands major highways	2979	1591	1388	2958	1572	1386
Impossible one-ways minor highways	64883	62120	2763	59685	57068	2617
Crossing major highways	253838	153489	100349	224237	131624	92613
Missing layer bridges - major	28224	27541	683	28191	27508	683
Kinks minor highways	18835	13104	5731	18776	13054	5722
Unconnected paths	555	108	447	527	84	443
Unconnected major highways	59167	56948	2219	34659	33256	1403
Mixed layers major highways	3027	1980	1047	2666	1752	914



Google warning in iD editor!

Change Detection in Real Time

- We have an internal tool to check **features changes** in real-time.
- Compares **old** and **new** versions.
- Flag **new mapper's** suspicious edits.
- Interface to review possible suspicious changes.

 Show Escalated

♥ -13way!432985857

♥ -13way!380079344

♥ -12way!308772974

♥ -12way!363140852

♥ -11node!324710069

♥ -11way!40943396

♥ -11way!50115069

♥ -11way!151860684

♥ -11way!223362746

♥ -11way!149148357

♥ -11way!237467065

♥ -10way!260051970

♥ -10way!36276153

♥ -10way!175013300

♥ -10way!431666199

♥ -10way!228785483

♥ -10way!429288088

♥ -10way!13881149

♥ -10way!170932774

♥ -10way!52172479

♥ -9way!261226675



a way was edited on September 17, 2016 5:25 PM by lurrlrl

USER
lurrlrl 5219OSM
HDYCCHANGESET
#40894582OSM
Changeset MapFEATURE
way #308772974OSM
Open in JOSM

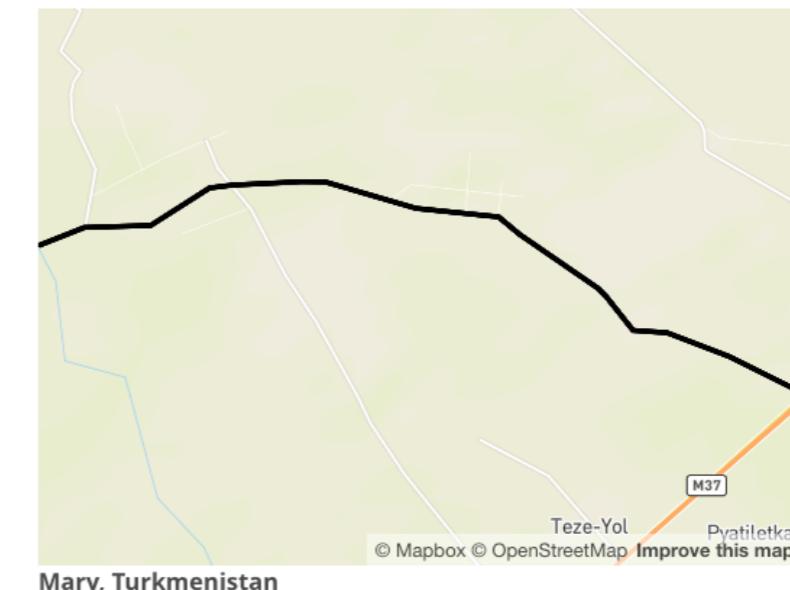
highways, buildings, railways

Summary

Modified
Geometry changed
Feature Version: 8♥ Good ⚠ Bad / Unsure

TAGS

No tags changed



1 unchanged tags

You are posting as Chetan_Gowda

Comment...

Internal tool under development and we will push the code to the public soon!

Probe data to improve the map

- We use telemetry data to detect incorrect and missing highways or navigation data.
- Flag Unroutable road networks from our Directions API's.

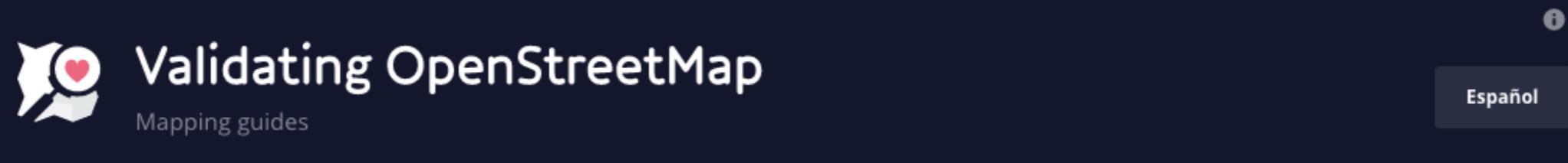
Challenges and Blockers

- Real time feature detection QA tools.
- The documentation of QA tools/process.
- Greater involvement with the community to protect the world's big geo-data.
- Constant effort in detective work :)

Github repositories

- OSMCha-Django: <https://github.com/willemarcel/osmcha-django>
- OSMLint: <https://github.com/osmlab/osmlint>
- Feature compare functions: <https://github.com/mapbox/osm-compare>
- To-Fix: <https://github.com/osmlab/to-fix>

<https://www.mapbox.com/mapping/validating-osm/>



Validating OpenStreetMap

At Mapbox, we map as well as inspect the data that is coming into OpenStreetMap for quality. This is the definitive guide that we follow - from detecting potentially harmful changes to inspecting them and eventually fixing the map.

What is a problematic edit?

Every change to OpenStreetMap is contained in a [changeset](#). They consist of either additions (new feature), modifications (change existing tags, feature location, or location of a referred feature) or deletions by a mapper.

What is a problematic edit?

[Identifying problematic edits.](#)

Investigation

[Inspecting the change](#)
[Understand the mapper](#)
[Investigate the changeset](#)

Response

[Communicate](#)

Combining efforts

- Community Engagement in validation.
- Validation focussed forums?
- Train newbies to become a better mappers!
- Engagement with developers to build amazing tools?
- Redesign existing tools or think something else?

Visions for the future

- How can we put **constant effort** with the community, teams and power mappers to protect the map?
- Look through to utilise **Machine Learning** techniques.
- **Automate validation**
- Amazing **Feature level** QA tools

Thank you!



chethan@mapbox.com



@chtnha



Chetan_Gowda