

OFFLINE VIEWING AND EDITING SPATIAL DATA FOR FOREST FIRE DEFENSE

Feedback on the GeoPoppy solution



MICHAËL DOUCHIN - 3LIZ

CONTEXT

STAKEHOLDERS, DATA, SOFTWARES

STAKEHOLDERS

- **Valabre:** french public institution
- **Help and support actors:** prevent and fight natural risks (fire, flood, etc.)
- **Actions:** test new technologies, research, trainings, share services, tools and data.
- **Partners:** cooperation between several organizations in the French Mediterranean areas.





L'interface entre la géomatique et les risques [PÔNT]



ENTENTE de Valabre

La prévention et la lutte face aux risques naturels majeurs sont les axes stratégiques de l'établissement public.

Désormais forte de 31 collectivités, l'Entente réunit 15 départements, 15 services départementaux d'incendies ainsi que la Collectivité de Corse



Contact

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Etablissement public pour la préservation des territoires et des personnes

entente-valabre.com

HISTORY: CONSOLIDATE DATA BETWEEN PARTNERS

- **Data:** fire fighting infrastructure: water tankers, tracks, watchtowers + standardized grids + base layers
- **Harmonization and centralization** between actors:
 - list of **layers** to share (name, metadata, ontology)
 - agree on data structure (fields, constraints, etc.)
 - create common glossary
 - agreement on data styling (symbols, colors, etc.)
- **Spatial extent:** French Mediterranean areas (125 965 km²)
- **Vectors** 200 Mo / **Rasters** 30Go

Couches


 Equipements DFCI

- * VIG_Gard
- DIF_Gard
- COP_Gard
- BAR_Gard
- : AIM_Gard
- TYPE_AIM**
- ⓘ Aire de croisement
- ⓘ Aire de retournement
- ⚠ Impasse non aménagée
- ⓘ Impasse aménagée

 : EAU_Gard**NATURE**

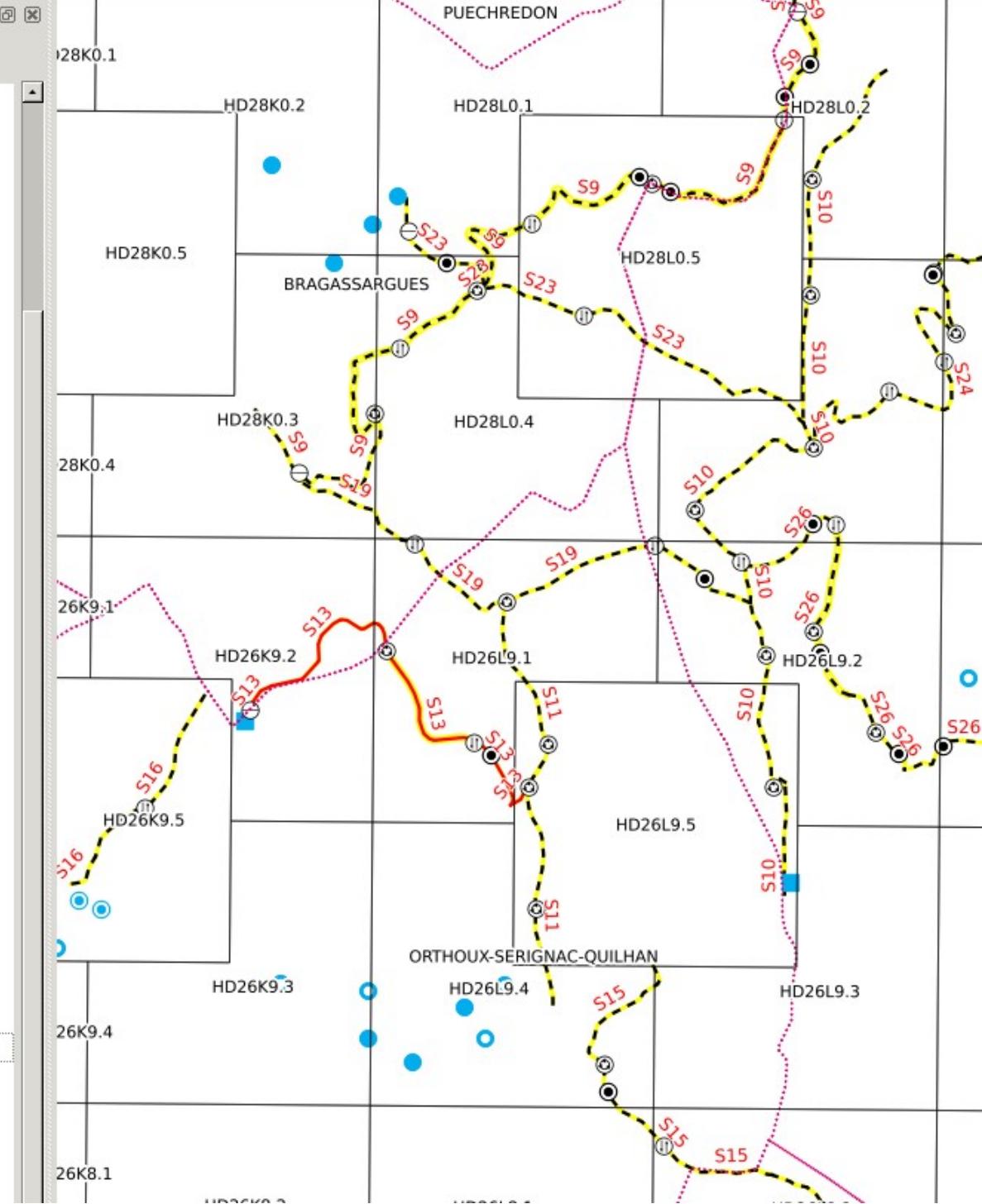
- citerne (état = oui)
- ▲ bassin (état = oui)
- ▲ point d'eau naturel (état = oui)
- ▲ retenue (état = oui)
- ▲ autre (état = oui)
- citerne métallique aérienne
- citerne métallique enterrée
- citerne béton aérienne
- citerne béton enterrée
- citerne à créer

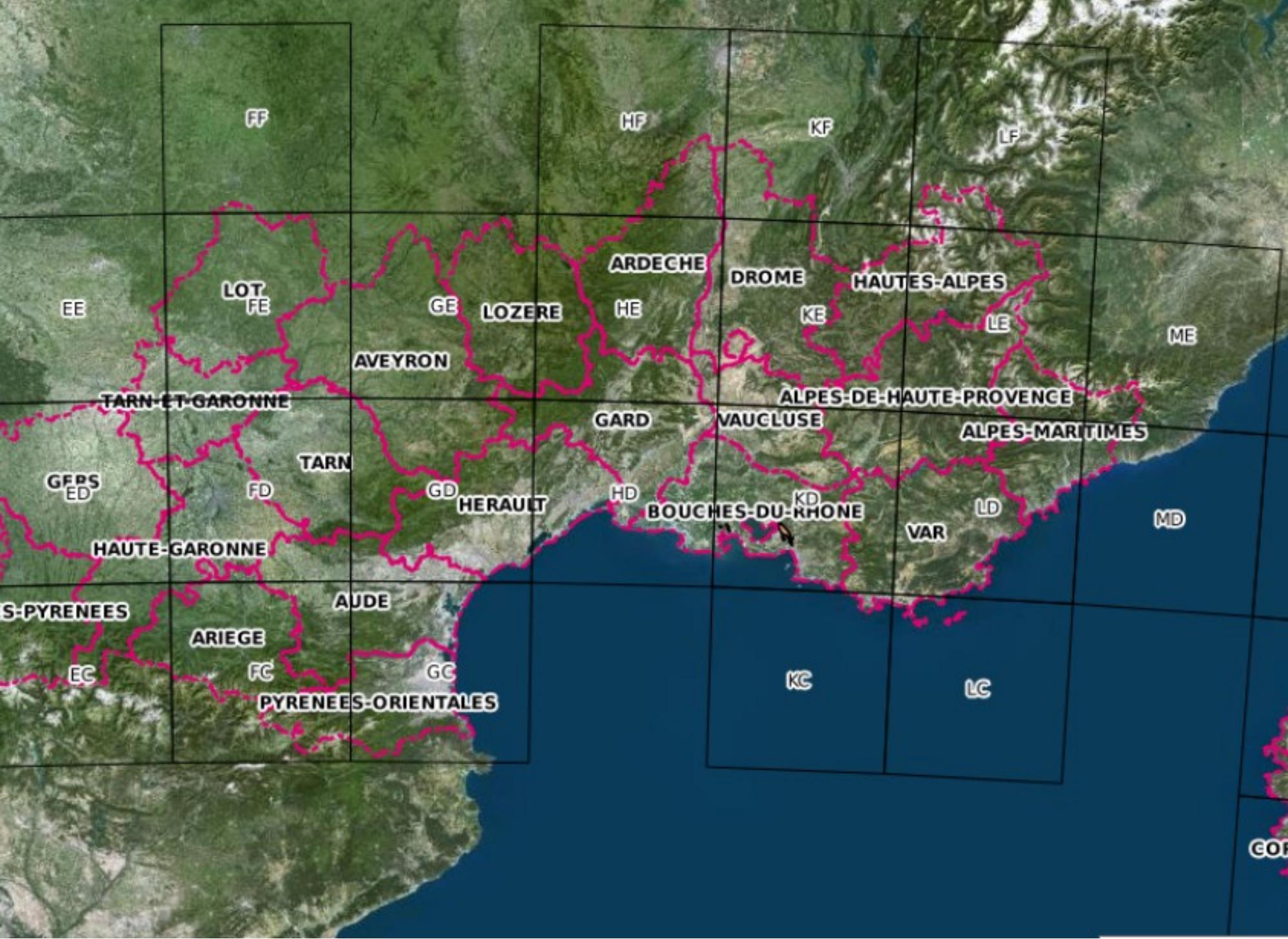
 : PBI_Gard**DEBIT**

- < 30 m3/h
- de 30 à 60 m3/h
- > ou = à 60 m3/h

 ✓ TRO_Gard**CATEGORIE**

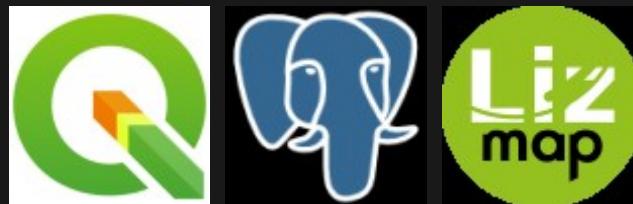
- 1ère catégorie
- - 2ème catégorie
- - - 3ème catégorie
- - Hors catégorie
- MAF_Gard
- DEB_Gard
- MOT_Gard





SOFTWARES ALREADY IN USE

- **QGIS** used by *Valabre* workers, but some actors also use Mapinfo/ESRI/Geoconcept
- **PostgreSQL** to store and process data:
 - Dedicated server (hosted by 3liz)
- **Lizmap Web Client / QGIS Server** to publish web maps from QGIS



LIZMAP WEB CLIENT ?

- **QGIS projects published as full featured web maps**
 - Lizmap QGIS plugin to configure the map
 - Respects QGIS project properties: styling, layer tree, attribute table, form editing, printing via composers, relations between layers, etc.
- **Authentication and group rights:** restrict map access, editing tools, data export, etc.



Equipements



meylan
Une histoire partagée

Aires de jeux

[Voir la carte](#) [Description](#)



meylan
Une histoire partagée

Culture

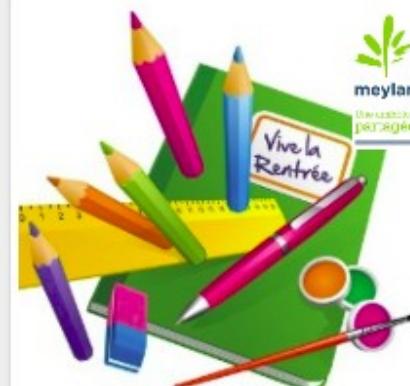
[Voir la carte](#) [Description](#)



meylan
Une histoire partagée

Petite enfance

[Voir la carte](#) [Description](#)



meylan
Une histoire partagée

Scolaire et Périscolaire

[Voir la carte](#) [Description](#)



meylan
Une histoire partagée

Sports

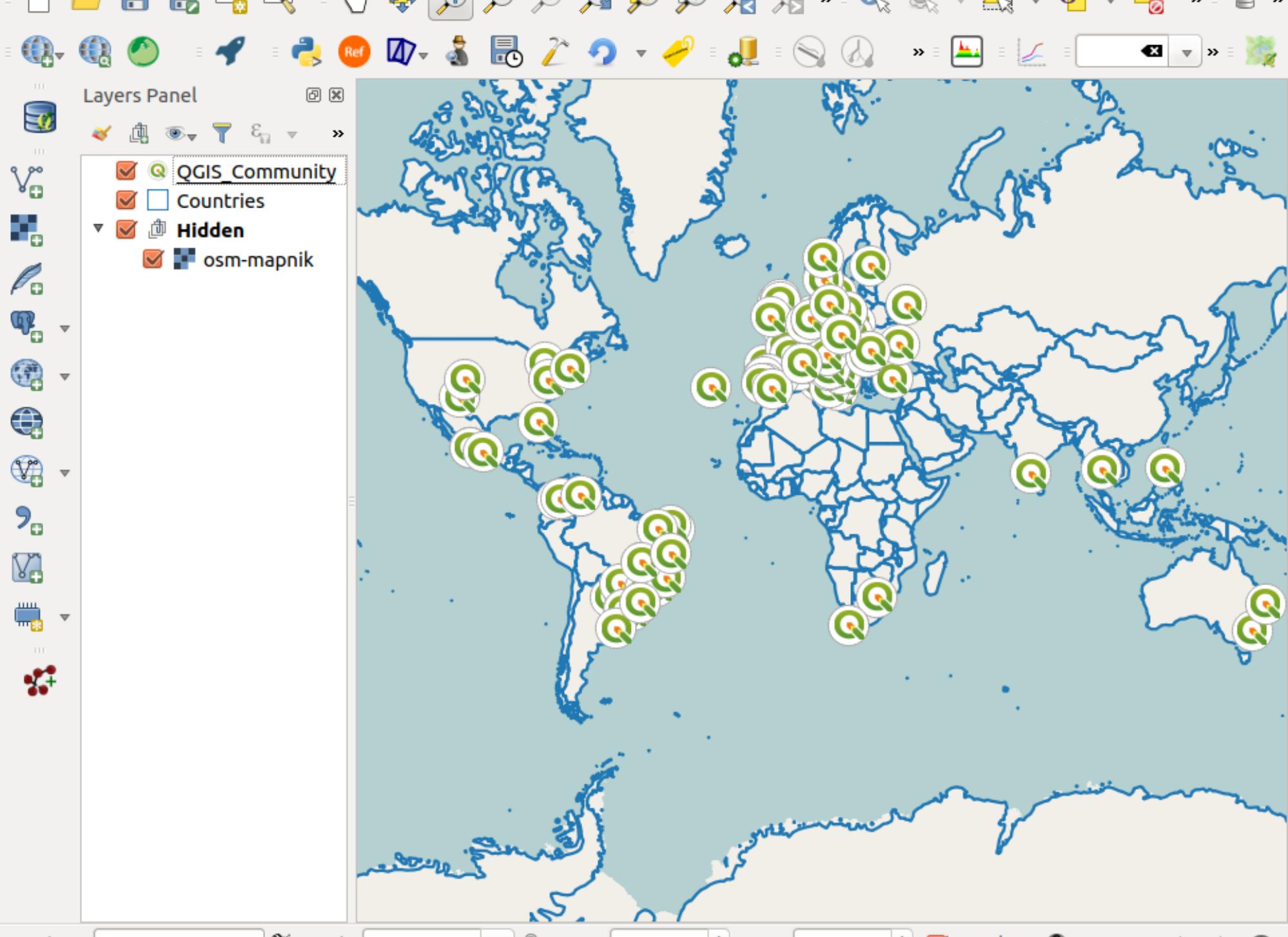
[Voir la carte](#) [Description](#)



meylan
Une histoire partagée

Tous équipements

[Voir la carte](#) [Description](#)



Rechercher



admin



Couches

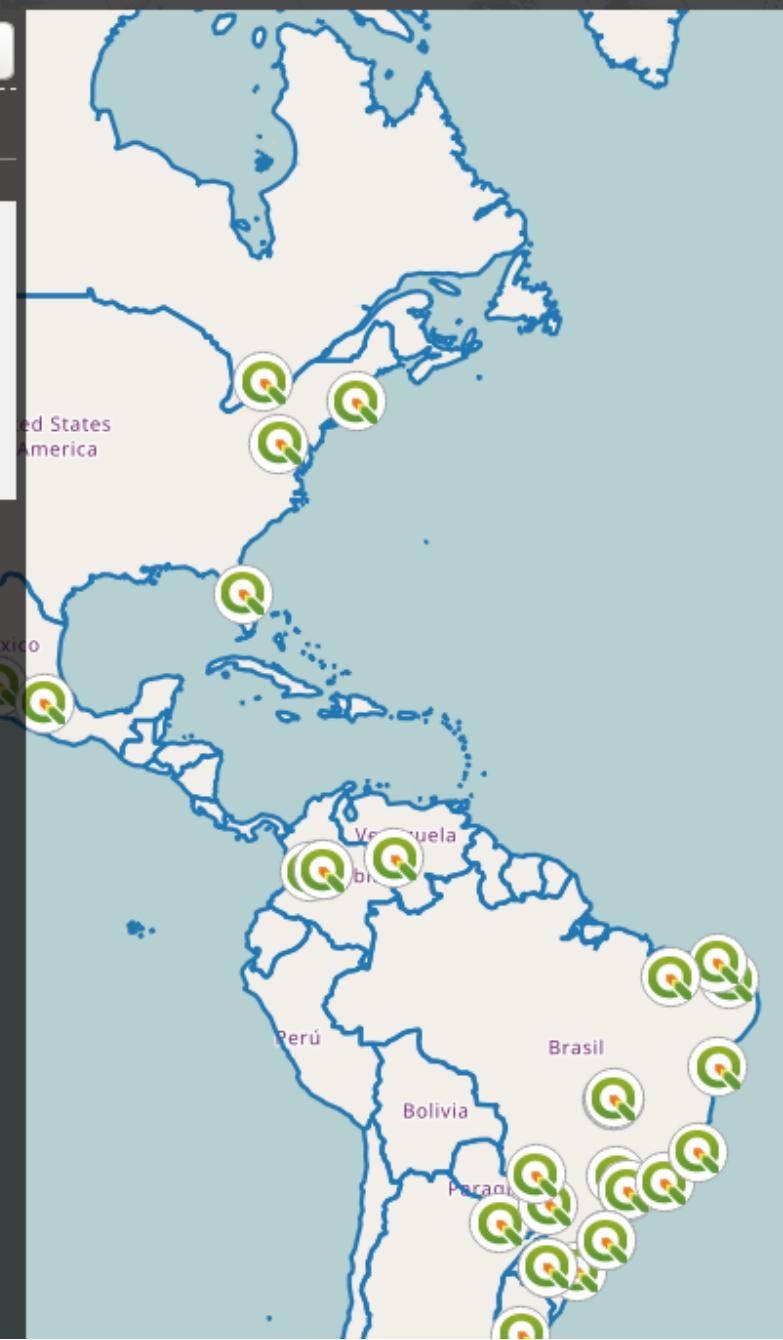
Fermer

Légende

QGIS Community



Countries

1000 km
1000 mi

1 : 73 957 191

Position de la souris

Mètres

Rue, Ville



Connexion

Localisation

Nom Pôle

EPCI

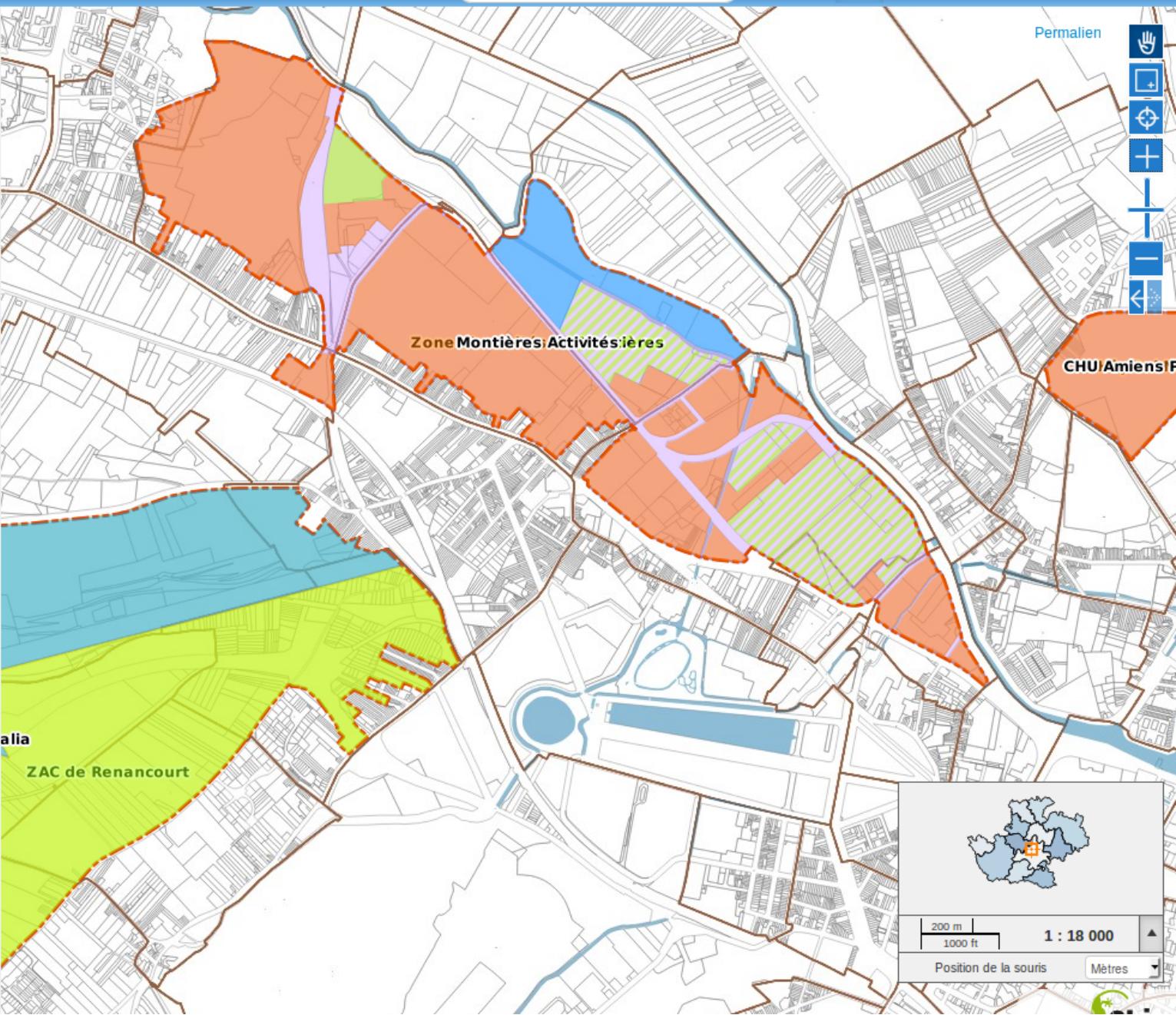
Permalien

Légende Etablissement Foncier**Phasage foncier**

- Surface occupée
- Surface disponible
- Réserve foncière constituée, en p
- Occupation prévue à moyen term
- Surface vacante (disp. moyen/lor
- Potentiel de renouvellement urba

Pôle Pôle Site

- Crédit
- Existant
- Extension



200 m
1000 ft
1 : 18 000

Position de la souris Mètres

Fond de carte

Cadastre



Édition

Édition

Annuler

Cheminements

Cheminement Localisation Avancement

Caractéristiques techniques Système

Caractéristiques principales

Code CM000000500008

Code tiers BB7-8

Noeud extrémité 1 ND000000500006
Item sélectionnéNoeud extrémité 2 ND000000500005
Item sélectionné

Cheminement extrémité 1

Cheminement extrémité 2

Référentiel de réseau

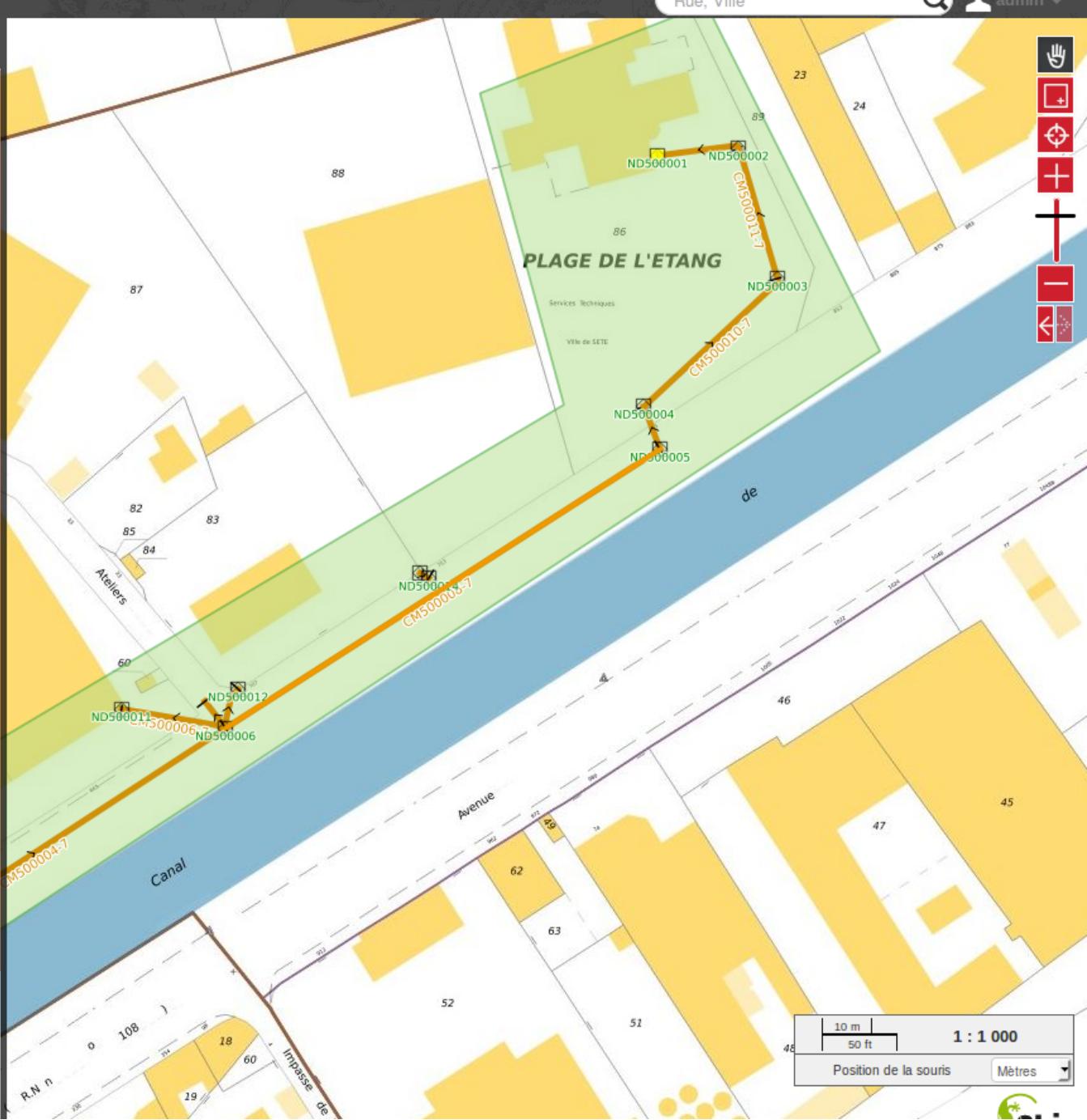
Code ref réseau 1

Code ref réseau 2

Code ref réseau 3 BB7-Inventaire2016

Code ref réseau 4

Fermer



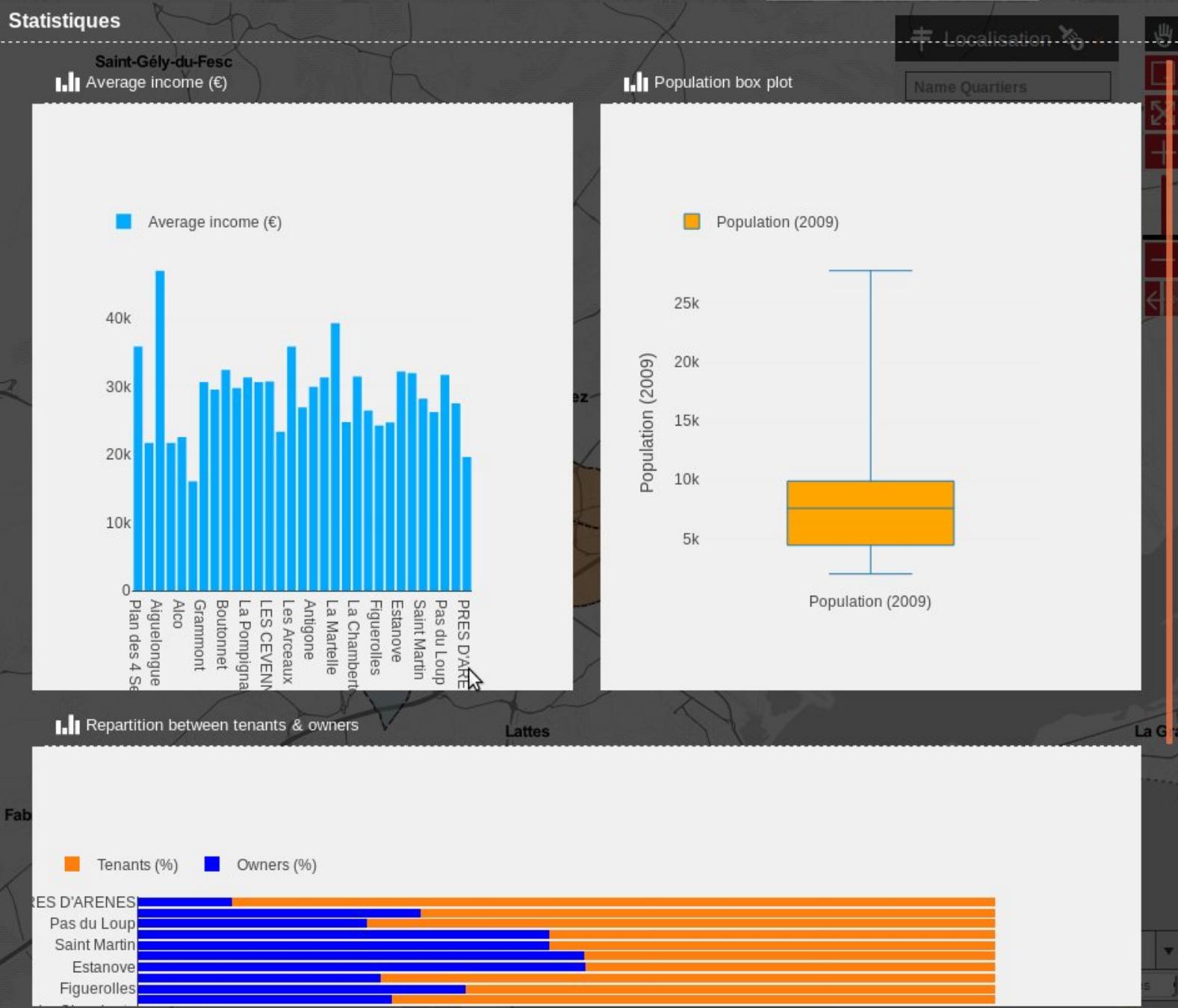
Couches Fermer

Légende

- ▼ Edition layers
 - Points of interest
 - Bicycle rides
 - Areas of interest
- Transport
- Sous-Quartiers
- Quartiers

Fond de carte

OSM Stamen Toner



Search



Connect

Countries

Search



Toggle children tables

Create a child

Link selected features

Export

<input checked="" type="checkbox"/>			Falkland Islands	3140	105.1	2. Developed region: nonG7	1. High income: OECD	South America
<input checked="" type="checkbox"/>			Faroe Islands	48856	1000	2. Developed region: nonG7	2. High income: nonOECD	Europe
<input checked="" type="checkbox"/>			Federated States of Micronesia	107434	238.1	6. Developing region	4. Lower middle income	Oceania
<input checked="" type="checkbox"/>			Fiji	944720	3579	6. Developing region	4. Lower middle income	Oceania
<input checked="" type="checkbox"/>			Finland	5250275	193500	2. Developed region: nonG7	1. High income: OECD	Europe
<input checked="" type="checkbox"/>			France	64057792	2128000	1. Developed region: G7	1. High income: OECD	Europe
<input checked="" type="checkbox"/>			French Polynesia	287032	4718	6. Developing region	2. High income: nonOECD	Oceania
<input checked="" type="checkbox"/>			French Southern and Antarctic Lands	140	16	6. Developing region	2. High income: nonOECD	Seven Islands
<input checked="" type="checkbox"/>			Gabon	1514993	21110	6. Developing region	3. Upper middle income	Africa
<input checked="" type="checkbox"/>			Gambia	1782893	2272	7. Least developed region	5. Low income	Africa

QGIS Community

User	Country	User	Trainer	Developper	Website	Picture
<input checked="" type="checkbox"/> -	 	christophe55 73	t	t	t	
<input checked="" type="checkbox"/> -	 	FOSS4GEU 73	t	f	t	https://europe.foss4g.org/2017/ /home/mdouchin
<input checked="" type="checkbox"/> -	 	kimaidou 73	t	t	t	https://twitter.com/kimaidou http://plugins.qgis.org
<input checked="" type="checkbox"/> -	 	lennepkade 73	t	t	t	http://www.lennepka.de http://plugins.qgis.org
<input checked="" type="checkbox"/> -	 	rldhont 73	t	t	t	https://www.3liz.com/blog/rldhont/ http://plugins.qgis.org
<input checked="" type="checkbox"/> -	 	sigeal 73	t	t	t	http://www.sigeal.fr http://plugins.qgis.org

Close

Pin

Minimize

León

Burgos

Logroño

Andorra la Vella

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POSTGRESQL VALABRE DATABASE

- **One schema** per actor (administrative area) + schema dedicated for admins or auditing.
- **Rights managements** via GRANT on schemas and tables
- **Procedures, triggers and Python services:**
 - default values,
 - history audit,
 - send emails to admins/users depending on data modification/validation,
 - copy data accross local schemas and global schema



PROJECT OBJECTIVES

SEE AND EDIT DATA OFFLINE

MAINLY IN THE FIELD

REQUIREMENTS AND CONSTRAINTS

- **GIS features:** multiple layers, data editing, baselayers (aerial photos, dem), attribute table, etc.
- **Based on QGIS projects** to simplify the workflow & respect harmonized styling
- Use **PostgreSQL offline:** constraints, triggers, views (buffers, etc.)
- **No internet connection** or connection **not stable or expensive** -> work offline
- **Heavy datasets**

FEATURES REQUIREMENTS

- **Rich forms:** lists, checkboxes, images, date fields, etc.
- Authentication and rights management -> login saved in data
- **Tools:** data editing, attribute tables, popups, filters, relations, etc.
- **Synchronization**
 - between the **offline database copies**
 - and the **central server database**.
 - No conflict resolution needed.

STUDIED SOLUTIONS / NEEDS

- Windows tablets -> **Android tablets** (price)
- Simple field data collection tools (ODK) -> **QGIS based** mobile solution (full-featured)
- QField -> **GeoPoppy** (PostgreSQL, Auth, known solution)

Valabre chose to test **GeoPoppy**



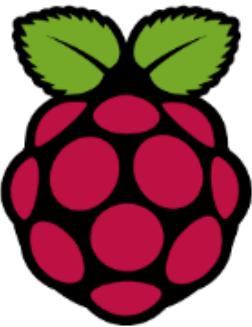
GEOPOPPY

DESCRIPTION / TESTING PHASE

GEOPOPPY

A spatial server in a box

- **Hardware:** RaspberryPi / Battery / Tablet or smartphone or laptop with a web browser (Firefox)
- **Software:** Lizmap Web Client / QGIS Server / PostgreSQL / FTP Server.
- **Main conceptor:** Julien Ancelin with some help by 3liz
- Based on **Docker**
- **Already used** by researchers in France, Ivory Coast, Madagascar, etc.



Matériel

Le Raspberry Pi est un
nano-ordinateur
monocarte

35€

Ram : 1 Go

Nombre de processeur : 4

Processeur : ARMv7 (~6x plus puissant que le précédent)

Cadence du processeur : 900 Mhz

Stockage : Carte MicroSD

Ports : 4 USB 2.0, 1 Ethernet, GPIO,

Puissance : 600 mA (3,5 W)



Géo Poppy





GEOPOPPY CONS

- **Additionnal devices:** *Do-It-Yourself look&feel*
- Tied to the **web browsers capabilities:** geolocation API, save files locally, etc.
- Lizmap interface is responsive but **not dedicated to mobile** -> some improvements needed
- Cannot connect to 3/4/5G and GeoPoppy WIFI **at the same time** -> **Android OS restriction**

GEOPOPPY PROS

- **OpenSource software** and **affordable hardware**
- Work **offline**
- **No new software**: QGIS Server / Lizmap / PostgreSQL
- **Known workflow** to publish the web maps and data to the central server
- **PostgreSQL powered** : views, constraints, triggers.
- **QGIS Server powered**: all raster/vector formats (no conversion needed)
- **Lizmap powered**: authentication and rights, rich forms from QGIS, atlas, styles, etc.



Couches

Fermer

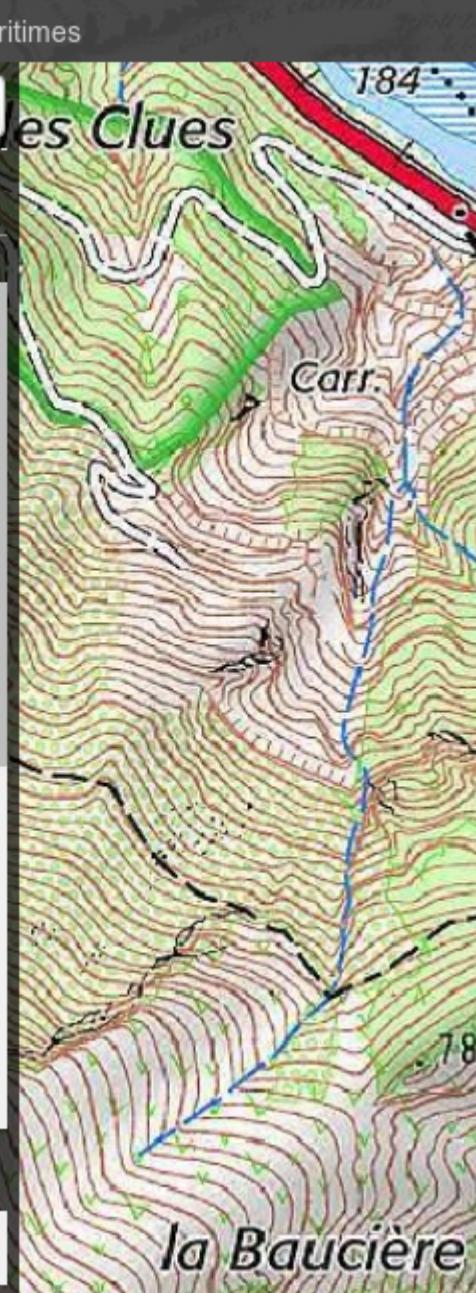


Légende

▶ Fiches de signalement▼ Carroyage DFCI▶ Carroyage 100*100 km▶ Carroyage 20*20 km▶ Carroyage 2*2km▶ Carroyage intra 2*2 km▼ Limites administratives▶ communes▶ département▼ Equipements DFCI▶ Vigies (VIG, 2018)▶ Difficultés de circulation majeures
(DIF, 2018)▶ Centres de secours ou bases
forestières (COP, 2018)▶ Aires de poser hélicoptères (APH,
2018)

▶ Fond de carte

Scan25_06





Espace de coproduction

Hérault



Popup

Fermer

VIG, 2018)

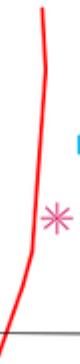


Champ	Valeur
Identifiant postgis	2
Identifiant unique dans la zone	34_VIG_CAX0001
Dénomination de la tour de guet	ROYSIS
Service armant la tour	SDIS
Identifiant du maître d'ouvrage	CONSEIL DEPARTEMENTAL DE L'HERAULT

Massifs forestiers (MAF, 2018)

GD44G3.1

014



Édition

Fermer

Édition

Fiches de signalement

IDENTIFIANT

TYPE DE SIGNALLEMENT : Un dysfonctionnement concerr

SIGNALLEMENT

OBSERVATIONS : un test

JOINDRE UNE PHOTO : Modifier, Parcourir..., Aucun fichier sélectionné

JOINDRE UN PDF : Modifier, Parcourir..., Aucun fichier sélectionné

DATE DE SAISIE : 2019-06-19

Géolocalisation

Géolocalisation

Centrer, Rester centré, Arrêter

Édition : lié à la géolocalisation

Finaliser

SYNCHRONIZATION

CONCEPTS AND TOOLS

SYNCHRONIZATION KEY IDEAS

- Two phases
 - **package** QGIS project & database from the central Lizmap/PostgreSQL server -> **deploy** to the GeoPoppy
 - **Two-way db data sync** and **upload new media** to the server
- **No conflicts management** -> last action wins
- **UUID field** in every table: *c0558823-d20a-40c8-903c-0d8c4f4dad7d*
- Each GeoPoppy defined by its **unique UUID**
- On update, **only changed fields** data is synchronized

SYNCHRONIZATION TOOLS

- Based on **PostgreSQL triggers/functions**: *audit.sql* with additionnal sync procedures
- **Log every actions** with many information :
 - initial raw data before change & changed fields,
 - user and app names, timestamp,
 - uuid of the source device, etc.
- **Centralize all audit** log in the main server
- **Sync process:**
 - Get central server modifications
 - Then send local modifications

EXAMPLE LOG FOR INSERT

```
event_id | 24
schema_name | dfci_vaucluse
table_name | VIG_Vaucluse
session_user_name | "geopoppy@valabre"
action_tstamp_tx | 2019-08-13 15:12:06.126626+02
action | I
row_data | "id"=>"47", "uid"=>"cb0344c4-c936-378a-2fae-96dd031a820b",
          "login"=>"j.doe|John|Doe|", "hauteur"=>"34", "nom_vig"=>"Vigie ", "s
changed_fields |
sync_data | {"origin": "23e2218b-42cb-0963-eb25-8fe37cf0ae50",
            "replayed_by": {"2f9c2d17-fbb3-6cd2-2dbb-2b2738ba0029": "3a80a443-13
            "vaucluse": "23e2218b-42cb-0963-eb25-8fe37cf0ae50"}}, "vaucluse": "23e2218b-42cb-0963-eb25-8fe37cf0ae50"}]
```

EXAMPLE LOG FOR UPDATE

```
event_id | 16
schema_name | dfci_bouches_du_rhone
table_name | HBE_CONTROLE
session_user_name | "geopoppy@valabre"
action_tstamp_tx | 2019-07-26 16:51:57.265702+02
action | U
row_data | "id"=>"30", "uid"=>"b714709d-129b-6a97-fe89-21260604ba0c"
"geom"=>"01010000206A080000AAF1D24D4C2C2A415839B4282D005841", "user": "photo"=>NULL, "a_supp"=>"", "trappe"=>"inc", "date_creat"=>"2017-04-24", "date_modif"=>"2017-04-24", "coordonnees_x"=>NULL, "coordonnees_y"=>NULL
changed_fields | "a_supp"=>"NON", "trappe"=>"NON", "date_modif"=>"2017-04-24"
"sync_data" | {"origin": "2c192051-2cc9-deda-fab7-f97e18b1caa6", "replayed_by": {"2f9c2d17-fbb3-6cd2-2dbb-2b2738ba0029": "acf1fffc73d8a0"} }
```

SYNC TOOLS

QGIS processing algs

- A QGIS plugin as a Python processing provider
- Use it in QGIS desktop: Processing menu with algs
- Use it server-side: 3liz WPS server async implementation based on QGIS processing framework
- Use it in the GeoPoppy device: via Lizmap

lizsync

- ▼ Lizsync
- Configuration
 - Configure Lizsync plugin
- Package and deploy
 - Create a package from central database
 - Deploy database package
- Synchronization
 - Send new media to central FTP server
 - Synchronize project and data from FTP
 - Two-way database synchronization
- Tools
 - Execute SQL
 - Get data as layer

Configure Lizsync plugin

Paramètres Journal

PostgreSQL connection to the database

Geopoppy 3liz

0% Annuler

Exécuter comme processus de lot... Fermer Exécuter

The screenshot shows a software interface with a sidebar on the left containing a search bar and a list of options under the 'lizsync' heading. The main area is a dialog box titled 'Configure Lizsync plugin'. The dialog has two tabs: 'Paramètres' (selected) and 'Journal'. Inside the 'Paramètres' tab, there is a dropdown menu labeled 'PostgreSQL connection to the database' with the value 'Geopoppy 3liz'. At the bottom of the dialog, there are several buttons: 'Annuler' (Cancel), 'Exécuter comme processus de lot...' (Run as batch process...), 'Fermer' (Close), and 'Exécuter' (Execute) with a green checkmark icon.

WPS Fermer

Choose a process to run
FICHIERS - Récupérer les car ▾

Run History Help

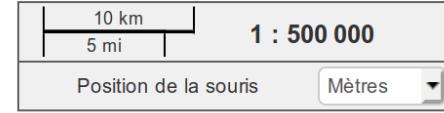
Please fill in the form and click the RUN button

Input:

Synchronization time* 2019-06-13T15:13:24.850311

Directory list to exclude, separated by commas.* data

Execute



WPS

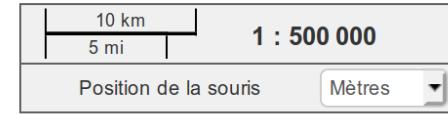
Fermer

Choose a process to run

FICHIERS - Récupérer les car

Run History Help

Start	End	Status	Actions
13/06/2019 à 17:17:17	13/06/2019 à 17:17:29	<input checked="" type="checkbox"/>	
13/06/2019 à 17:15:37			



CONCLUSION

FEEDBACK, ROADMAP, IDEAS

FEEDBACK

- **It works !**
 - in the field,
 - but also as an offline **portable full GIS server** (WMS, WFS, WPS, PostgreSQL, etc.)
 - more tests needed and QGIS plugin not released yet
- **Simplify the workflow** : easier with good QGIS & PostgreSQL knowledge
- Improve **PyQGIS WPS Server** and **Lizmap WPS client**
- Complex QGIS projects can be **slow to render**
- **Lizmap responsive web interface** can be improved

GEOPOPPY ON ANDROID !

- No additionnal hardware devices needed: **only your Android device** thanks to UserLand
- Much **better performances**
- Use **3/4/5G** in the field: sync and display external layers (WMS, WFS, etc.)
- **PostgreSQL** running on Android -> can also be used with QField or Input
- **Almost production ready**: some work needed to package this solution, add doc, etc.

SOME LINKS

- GeoPoppy: <https://github.com/jancelin/geo-poppy/>
- Julien Ancelin: <https://twitter.com/complementterre/>
- GeoPoppy on Android:
 - Github: https://github.com/jancelin/geopoppy_android
 - Video <https://twitter.com/complementterre/status/1133836725137096705>
- PostgreSQL Audit: https://github.com/Oslandia/audit_trigger/
- PyQGIS WPS Server by 3liz: <https://github.com/3liz/py-qgis-wps>
- PostgreSQL in UserLand: <https://github.com/CypherpunkArmory/UserLAnd/issues/256>
- Lizmap Web Client: <https://www.lizmap.com/en/>

THANKS FOR YOUR ATTENTION

