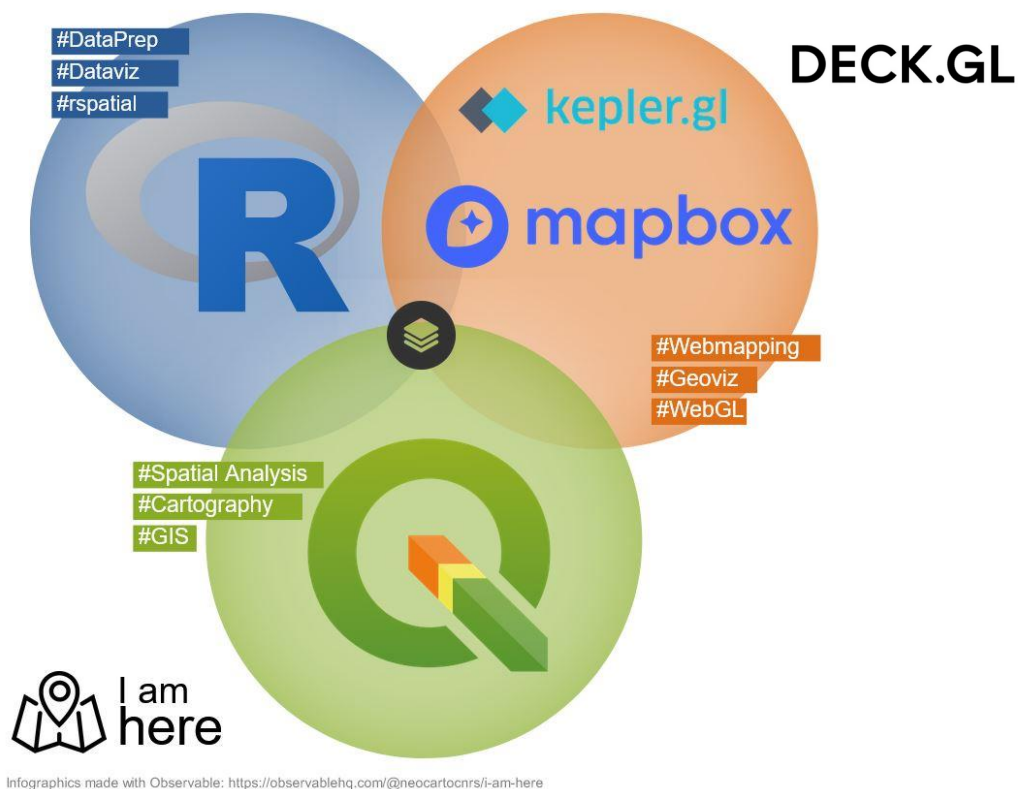


Explorer et visualiser des données spatiales avec kepler.gl et **DECK.GL**

Explorer et visualiser des données urbaines

Open Data
Action publique
Cartographie
Analyse spatiale
Géomatique
Science ouverte Géoweb
Données
Traces
Géovisualisation
Aménagement
Urbanisme **Big Data**
Représentations
Territoires



Un écosystème opensource...



Vis.gl is a suite of composable, interoperable open source geospatial visualization frameworks centered around [deck.gl](#).

...porté par de grandes entreprises

Contribution

Lead Contributors



Created By

Uber

Open Governance

vis.gl is under open governance, and anyone can join the open planning meetings. Contributor status is available and technical steering committee membership is available to major contributors.



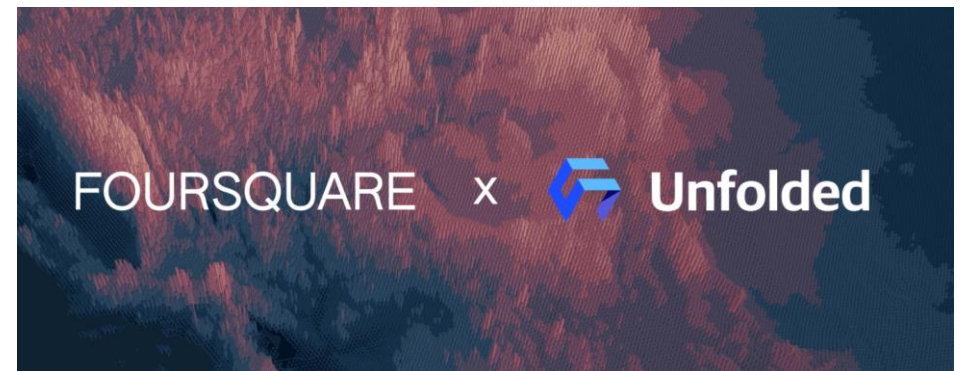
Une genèse en plusieurs phases

- 2015 – Développements au sein de Uber Engineering
- 2017 – Lancement de vis.gl (passage à l'open source)
- 2019 – Création de l'entreprise Unfolded par trois anciens salariés
- 2021 – Rachat de Unfolded par Foursquare

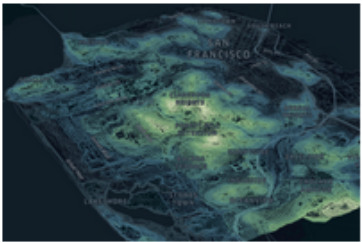
Engineering November 10, 2016 / Global

Visualize Data Sets on the Web with Uber Engineering's
[deck.gl Framework](#)

In this article, we discuss deck.gl, an open sourced, WebGL-
powered framework specifically designed for exploring and...

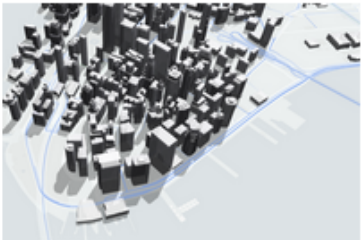


Un ensemble d'outils libres complémentaires



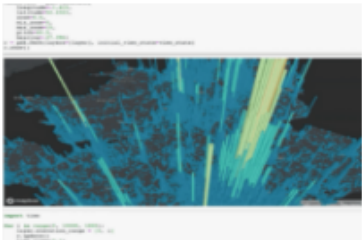
kepler.gl

The kepler.gl demo application is a widely used geospatial tool for visualization and exploration of geospatial data using deck.gl. It demonstrates the power of the kepler.gl application framework, designed to let users build advanced custom geospatial applications.



deck.gl

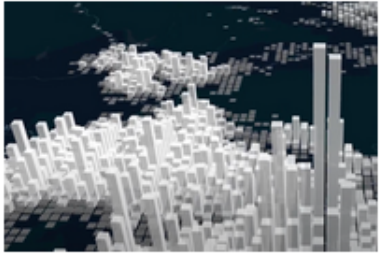
Providing high-performance, GPU powered visualization layers for large scale geospatial data. deck.gl is the corner stone of the vis.gl framework suite. A selection of submodules provide layers for various geospatial and 3D use cases.



pydeck

Python bindings for deck.gl that enable powerful custom geospatial visualizations to be programmed directly in Jupyter Notebooks.

Un ensemble d'outils libres complémentaires



hubble.gl

A powerful animation and video capture solution for deck.gl and kepler.gl visualizations.



react-map-gl


A React wrapper for Mapbox GL JS that integrates with deck.gl.



FlowmapBlue

FlowmapBlue is a tool for visualizing aggregated numbers of movements between geographic locations as flow maps. It is used for representing data on urban mobility, travel, transportation, human and animal migration, material flows, supply chains, waste management and many other topics.

Dépôts de codes open source



Vis.gl

Frameworks for WebGL-powered large-scale data visualization

124 followers San Francisco, CA <https://vis.gl>

[Overview](#) [Repositories 11](#) [Projects](#) [Packages](#) [People 1](#)

Popular repositories

deck.gl Public

WebGL2 powered visualization framework

JavaScript 10.5k 1.9k

react-map-gl Public

React friendly API wrapper around MapboxGL JS

TypeScript 6.9k 1.3k

luma.gl Public

High-performance Toolkit for WebGL-based Data Visualization

TypeScript 2.1k 202

loaders.gl Public

Loaders for big data visualization. Website:

TypeScript 514 140

hubble.gl Public


A client-side JavaScript library for animating data visualizations and rendering videos.

JavaScript 113 25

deck.gl-data Public

Data for the data visualization library deck.gl examples (<https://uber.github.io/deck.gl/#/>)

60 53



keplergl

[Overview](#) [Repositories 4](#) [Projects](#) [Packages](#) [People](#)

Popular repositories

kepler.gl Public

Kepler.gl is a powerful open source geospatial analysis tool for large-scale data sets.

TypeScript 9.1k 1.6k

kepler.gl-tableau Public

A Tableau Extension for embedding and interacting with Kepler.gl.

CSS 36 14

tsc Public

kepler.gl TSC

ts-smoosh Public

Combine type decls with related source files

JavaScript

Une offre commerciale en complément

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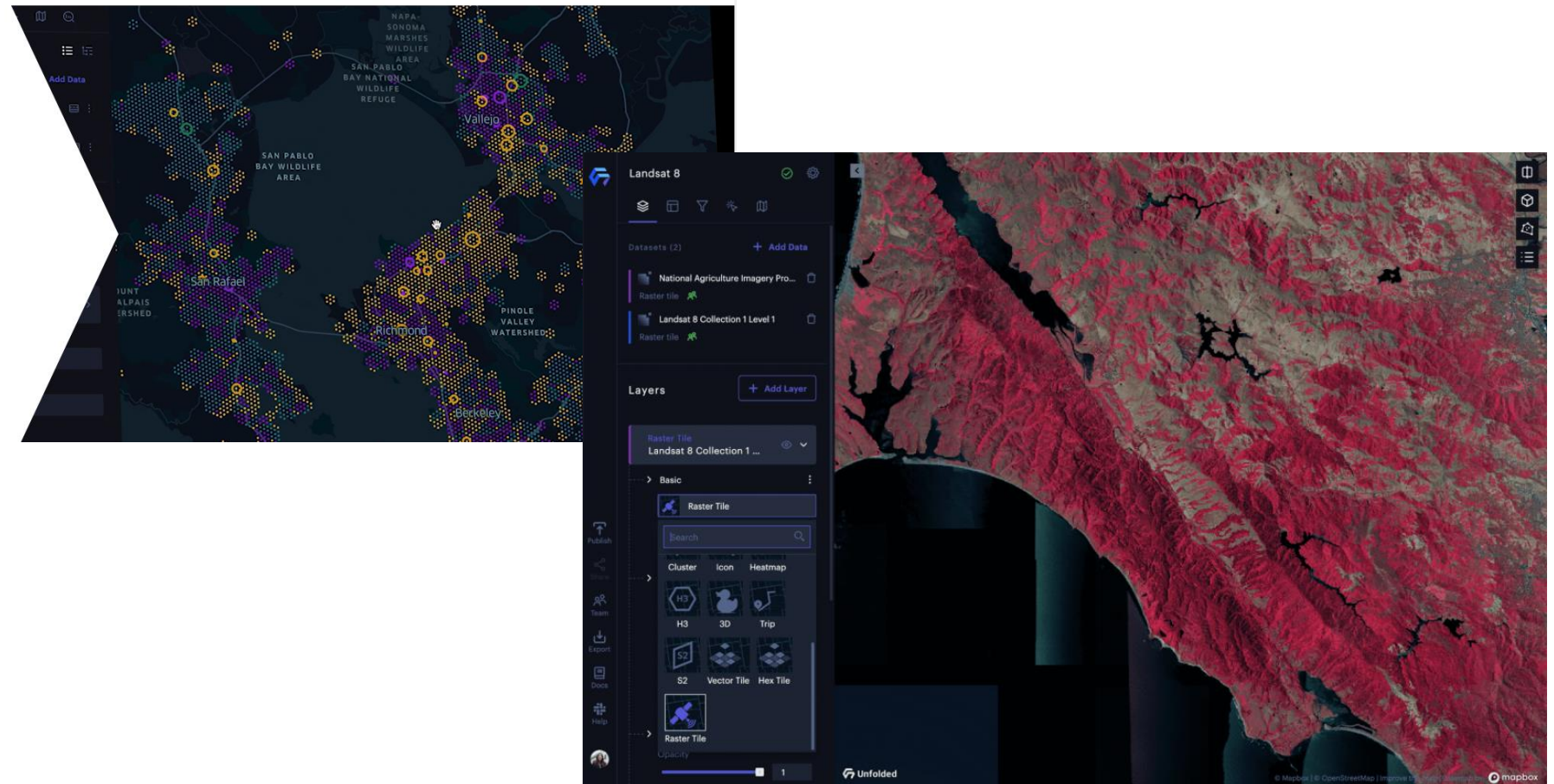
[PRODUCTS](#) / STUDIO

Geospatial visual analytics for your next location-driven decision

Unlock real-time location insights in minutes, not days. Foursquare Studio is a highly flexible and advanced platform designed to visualize and analyze large-scale geospatial data at the speed of business.

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[Talk to an Expert](#)

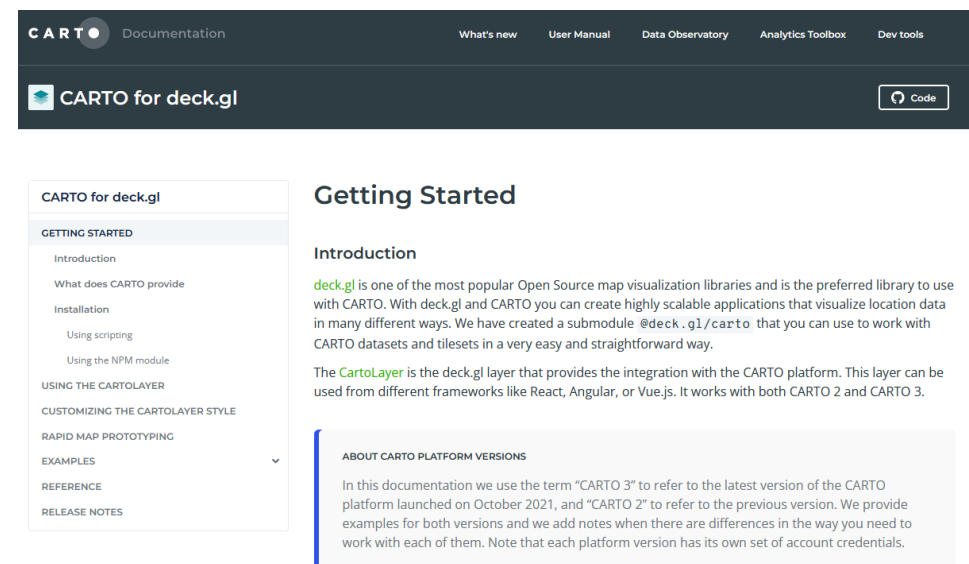
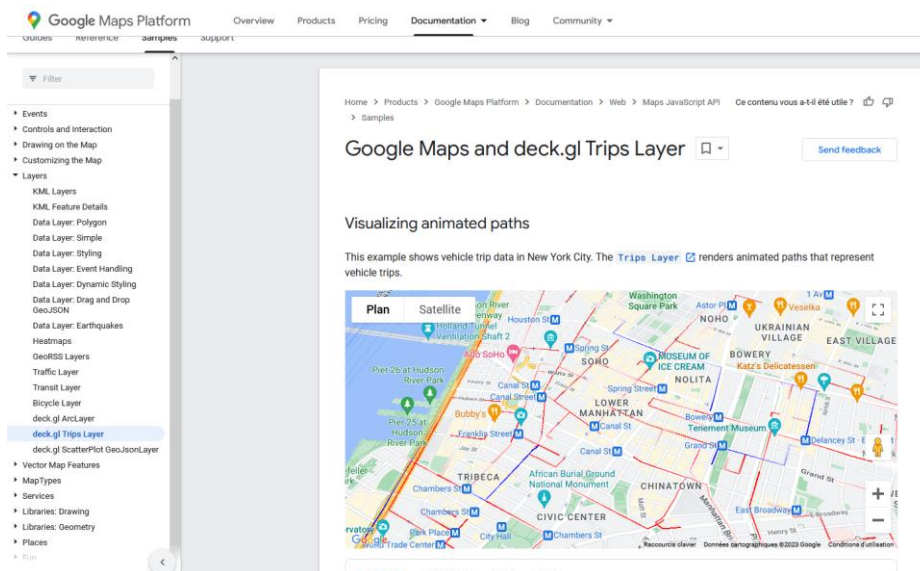


En quelques mots

- Une approche exploration de données et pas analyse de données
 - Des outils de (géo)datascientist et pas vraiment de géomaticiens/cartographes
- Exploration et visualisation de données spatiales complexes
 - Volumineuses / Spatio-temporelles / 3D / raster et vecteur
- Combinaison tuiles vectorielles + WebGL
 - Travail de rendu côté client (accélération matérielle)
 - Permet la manipulation de jeux de données volumineux
 - Rendus en 3D au sein des navigateurs Web
- De multiples modes de représentation
 - Dotmap, grid, hexbin, extrusion 3D, arcs, lines, cluster, heatmap, H3...
- De nombreuses fonctionnalités d'interaction avec les données
 - Filtres, graphiques, timeslider, brushing, popup...

Qui utilise deck.gl ?

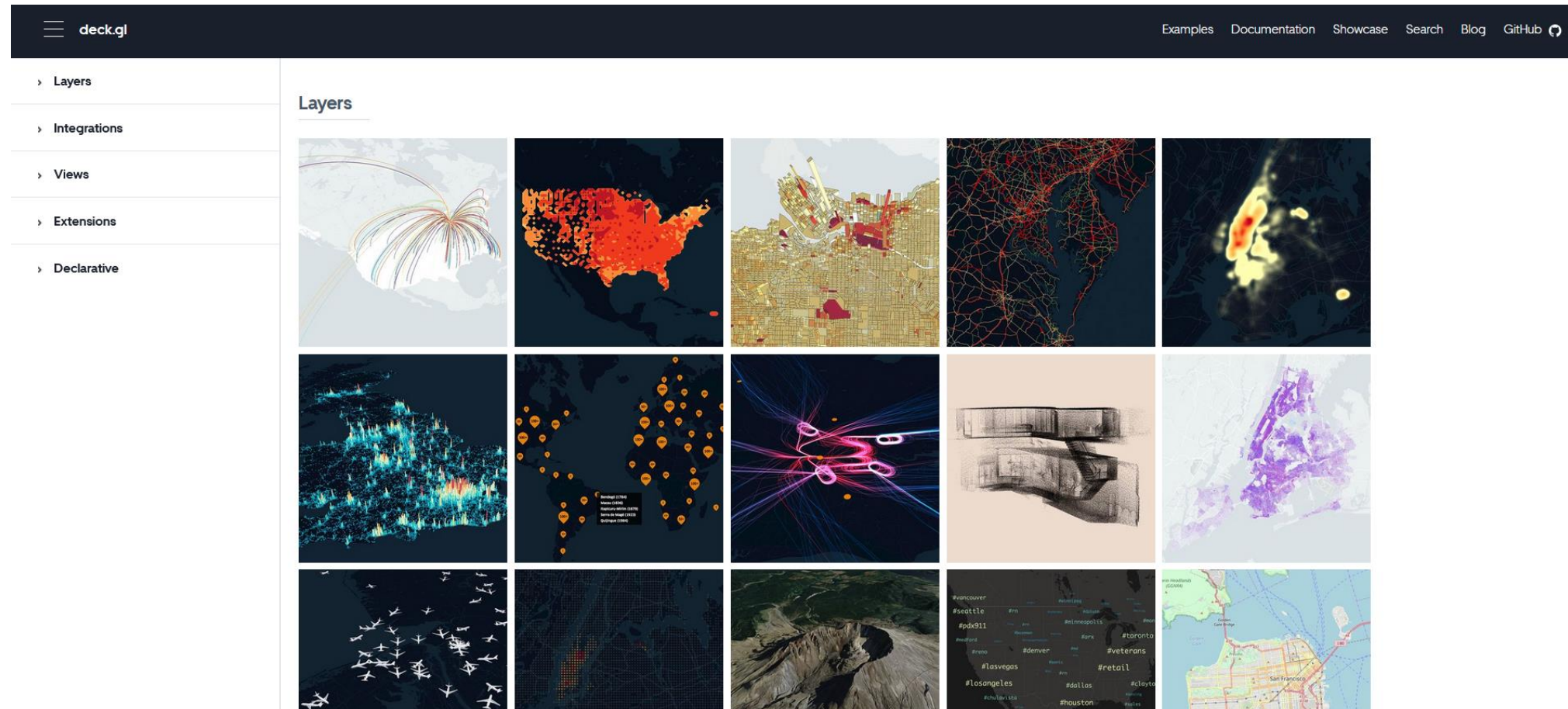
- Pas une grosse communauté directe d'utilisateurs
 - Développeurs, quelques datajournalistes, datascientists et chercheurs
- Une intégration de l'outil dans la plupart des solutions de Webmapping commerciales (Google Maps, CARTO, ESRI, Mapbox...)



Quelques exemples pour illustrer l'outil

- <https://stevekirks.github.io/deckgl-trips/?dataIdx=0>
- <https://dbabbs.github.io/mobility-map/>
- <https://greatestescape.co/>
- <https://minitokyo3d.com/>
- <https://dxlab.sl.nsw.gov.au/subplot/>
- https://nahelou.github.io/pages/deck_mobiliPro/index.html

Exemples des développeurs



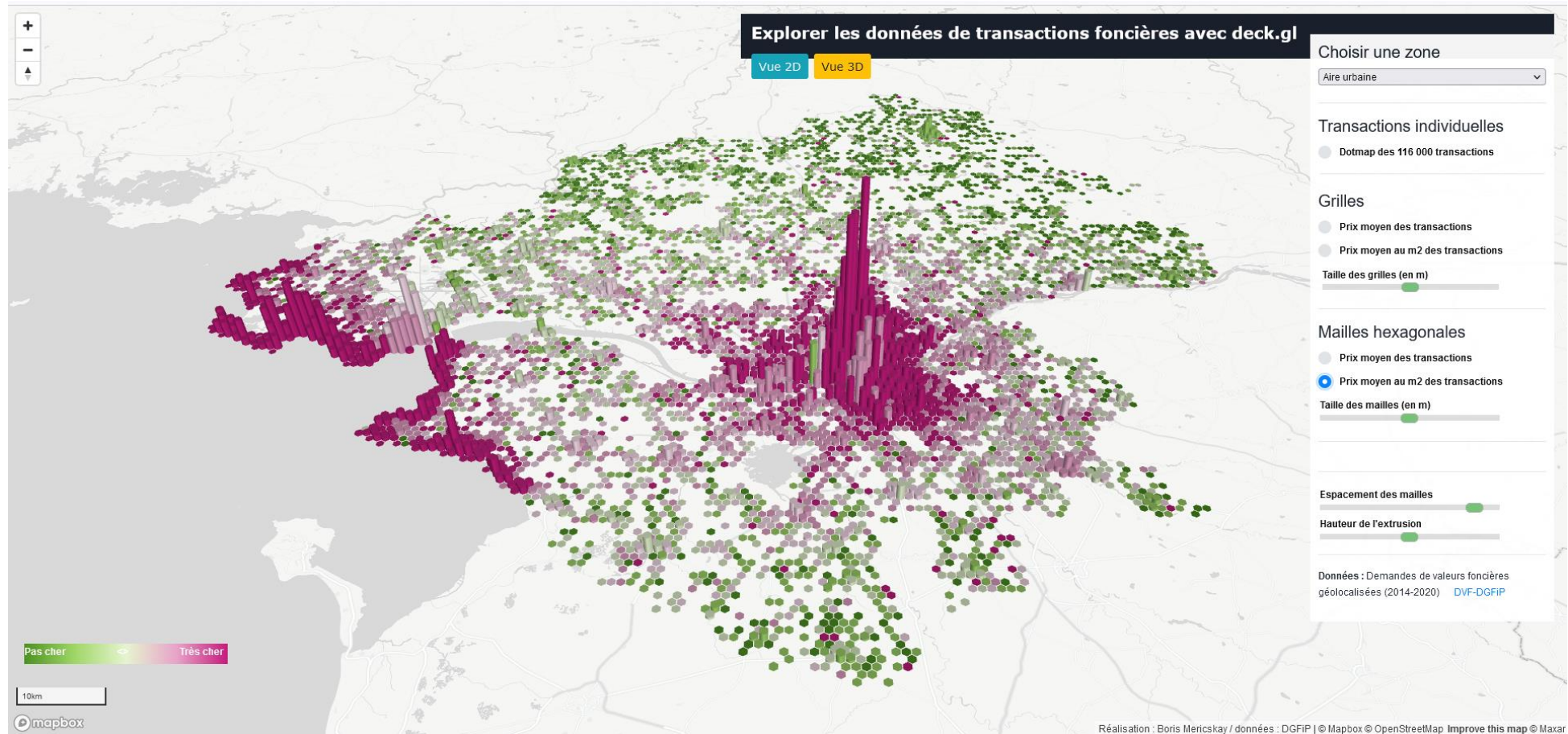
<https://deck.gl/examples>

Exemples personnels



<https://bmericksay.github.io/portfolio/WebGL.html>

Exemples personnels



Exploration des données du RPC





Préparation de données

```
RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function Addins
ScriptRPCR x
Source on Save Run Import Dataset 1.6 GiB
10 octobre2022 <- read.csv("C:/Users/mericksay_b/Downloads/2022-10.csv", sep=";")
11 novembre2022 <- read.csv("C:/Users/mericksay_b/Downloads/2022-11.csv", sep=";")
12
13
14 RPC <- rbind(septembre2022, octobre2022, novembre2022)
15
16 ## Préparation dataframe
17
18 ### Suppression des doublons
19
20 RPC <- RPC %>% distinct(RPC$trip_id, .keep_all= TRUE)
21
22 ## Garder et renommer les colonnes utiles
23
24 RPC <- RPC %>% select(timestamp = journey_start_datetime, latO = journey_start_lat, lon
latD = journey_end_lat, longD = journey_end_lon, dep = journey_s
25
26 ## Agréger les trajets par commune
27
28 RPCCommune <- RPC %>% select(CommuneO = journey_start_insee, CommuneD= journey_end_insee
29 Commune <- RPCCommune %>% group_by(CommuneD, CommuneO) %>% summarise(nb=n())
30
31
32 (Top Level) R Script
```

```
Environment History Connections Tutorial
R Global Environment 1.6 GiB
Data
novembre2022 650962 obs. of 27 variables
octobre2022 610120 obs. of 27 variables
RPC 1370915 obs. of 6 variables
septembre2022 528140 obs. of 27 variables
```

```
Files Plots Packages Help Viewer Presentation
Zoom Export
```

```
Console Terminal Background Jobs
R 4.2.1 ~/\>
> ### Suppression des doublons
>
> RPC <- RPC %>% distinct(RPC$trip_id, .keep_all= TRUE)
>
> ## Garder et renommer les colonnes utiles
>
> RPC <- RPC %>% select(timestamp = journey_start_datetime, latO = journey_start_lat, longO
= journey_start_lon,
+ latD = journey_end_lat, longD = journey_end_lon, dep = journey_start
+ _department)
>
> ## Agréger les trajets par commune
>
> RPCCommune <- RPC %>% select(CommuneO = journey_start_insee, CommuneD= journey_end_insee,
dep = journey_start_department)
Error in `select()`:
! Can't subset columns that don't exist.
x Column `journey_start_insee` doesn't exist.
Run `rlang::last_error()` to see where the error occurred.
> |
```

- Fusion
- Nettoyage
- Filtre
- Formatage
- Agrégation...

```
timestamp,latO,longO,latD,longD,dep,epci,distance,duree
2022-09-01T00:00:00+02:00,"47.481","-0.567","47.473","-0.542","49",CU Angers Loire Métropole,"2525","10"
2022-09-01T00:00:00+02:00,"48.339","-0.286","48.304","-0.617","53",CC du Mont des Avaloirs,"27582","32"
2022-09-01T00:20:00+02:00,"48.645","-2.007","48.679","-1.98","35",CA du Pays de Saint Malo Agglomération,"5215","13"
2022-09-01T00:20:00+02:00,"47.472","-0.545","47.443","-0.417","49",CU Angers Loire Métropole,"13179","23"
2022-09-01T01:00:00+02:00,"47.157","-1.6","47.476","-0.537","44",Nantes Métropole,"102095","95"
2022-09-01T01:50:00+02:00,"48.102","-1.457","48.042","-1.154","35",CC Pays de Châteaugiron Communauté,"27343","32"
2022-09-01T02:20:00+02:00,"47.132","-1.667","47.273","-1.797","44",Nantes Métropole,"32240","40"
2022-09-01T02:20:00+02:00,"47.132","-1.666","47.245","-1.728","44",Nantes Métropole,"23541","33"
2022-09-01T03:30:00+02:00,"46.776","-0.828","47.16","-1.593","85",CC du Pays de Pouzauges,"101349","106"
2022-09-01T04:10:00+02:00,"47.934","-1.225","47.971","-1.225","35",CA Vitré Communauté,"6041","11"
2022-09-01T04:10:00+02:00,"47.414","-2.173","47.317","-2.163","44",CC du Pays de Pontchâteau Saint-Gildas-des-Bois,"17951","20"
2022-09-01T04:10:00+02:00,"47.443","-2.233","47.302","-2.176","44",CA de la Région Nazairienne et de l'Estuaire (CARENE),"20436","25"
2022-09-01T04:10:00+02:00,"47.355","-2.369","47.316","-2.167","44",CA de la Presqu'île de Guérande Atlantique (Cap Atlantique),"21337","27"
2022-09-01T04:10:00+02:00,"47.114","-1.951","47.315","-2.169","44",CA Pornic Agglo Pays de Retz,"36009","37"
```

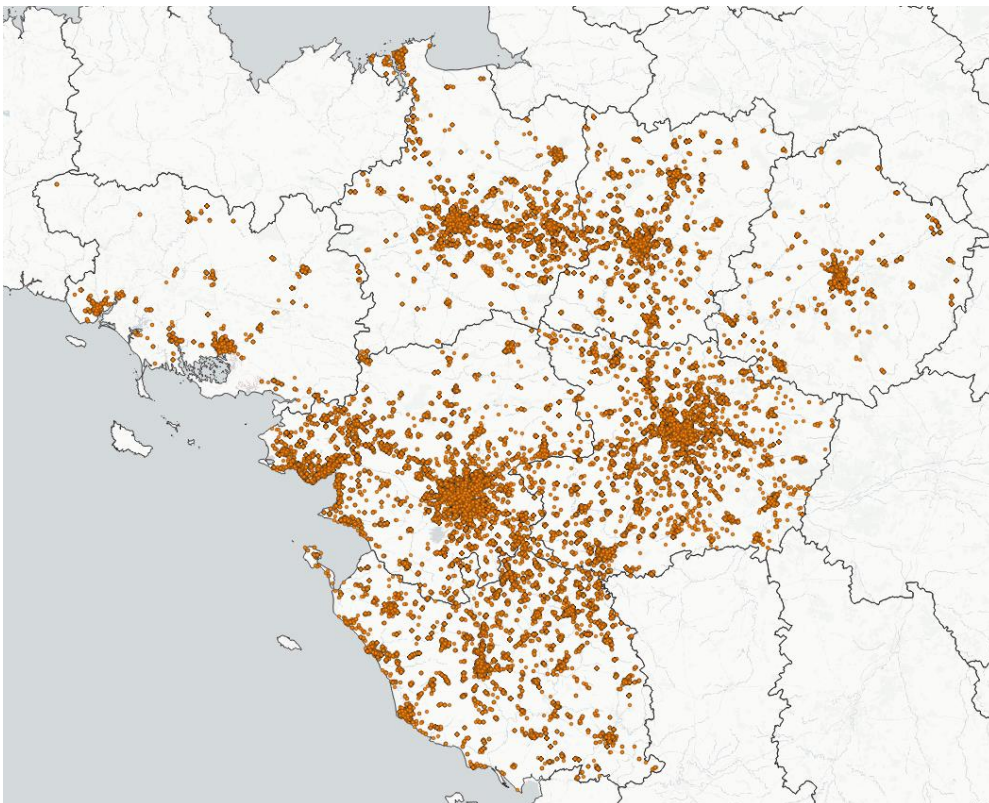
➤ Conversion en .json (jsonlite)

```
{
  "field_1": 85,
  "timestamp": "2022/09/01 03:20:00",
  "lato": 45.461,
  "longO": 4.762,
  "latD": 45.286,
  "longD": 4.824,
  "dep": 69,
  "epci": "CA Vienne Condrieu",
  "distance": 23146,
  "duree": 38
},
{
  "field_1": 88,
  "timestamp": "2022/09/01 03:30:00",
  "lato": 45.771,
  "longO": 5.077,
  "latD": 45.816,
  "longD": 5.185,
  "dep": 38,
  "epci": "CC Lyon Saint Exupéry en Dauphiné",
  "distance": 21127,
  "duree": 31
},
,
```



Préparation de données

- 3 mois de covoiturage pendulaire dans 7 départements
 - Septembre, Octobre et Novembre 2022 > 202 000 trajets



	timestamp	latO	longO	latD	longD	dep	epci	distance	duree
1	01/09/2022 00:00:00 (...)	47.481	-0.567	47.473	-0.542	49	CU Angers Loir...	2525	10
2	01/09/2022 00:00:00 (...)	48.339	-0.286	48.304	-0.617	53	CC du Mont de...	27582	32
3	01/09/2022 00:20:00 (...)	48.645	-2.007	48.679	-1.98	35	CA du Pays de ...	5215	13
4	01/09/2022 00:20:00 (...)	47.472	-0.545	47.443	-0.417	49	CU Angers Loir...	13179	23
5	01/09/2022 01:00:00 (...)	47.157	-1.6	47.476	-0.537	44	Nantes Métrop...	102095	95
6	01/09/2022 01:50:00 (...)	48.102	-1.457	48.042	-1.154	35	CC Pays de Châ...	27343	32
7	01/09/2022 02:20:00 (...)	47.132	-1.667	47.273	-1.797	44	Nantes Métrop...	32240	40
8	01/09/2022 02:20:00 (...)	47.132	-1.666	47.245	-1.728	44	Nantes Métrop...	23541	33
9	01/09/2022 03:30:00 (...)	46.776	-0.828	47.16	-1.593	85	CC du Pays de ...	101349	106
10	01/09/2022 04:10:00 (...)	47.934	-1.225	47.971	-1.225	35	CA Vitré Comm...	6041	11
11	01/09/2022 04:10:00 (...)	47.414	-2.173	47.317	-2.163	44	CC du Pays de ...	17951	20
12	01/09/2022 04:10:00 (...)	47.443	-2.233	47.302	-2.176	44	CA de la Régio...	20436	25

Exploration de données



Géovisualisation de données



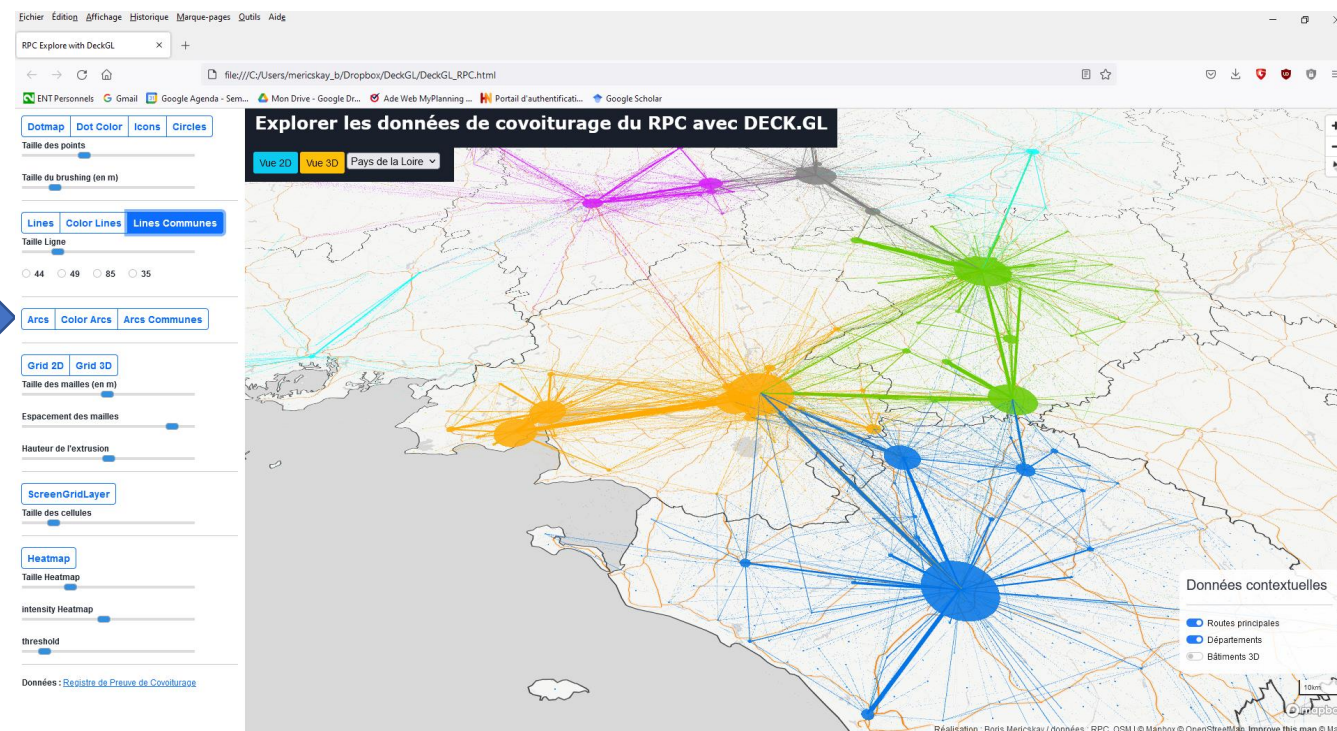
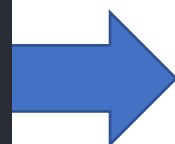
DECK.GL



DeckGL_RPC.html — C:\Users\mericaskay_b\Dropbox\DeckGL — Atom

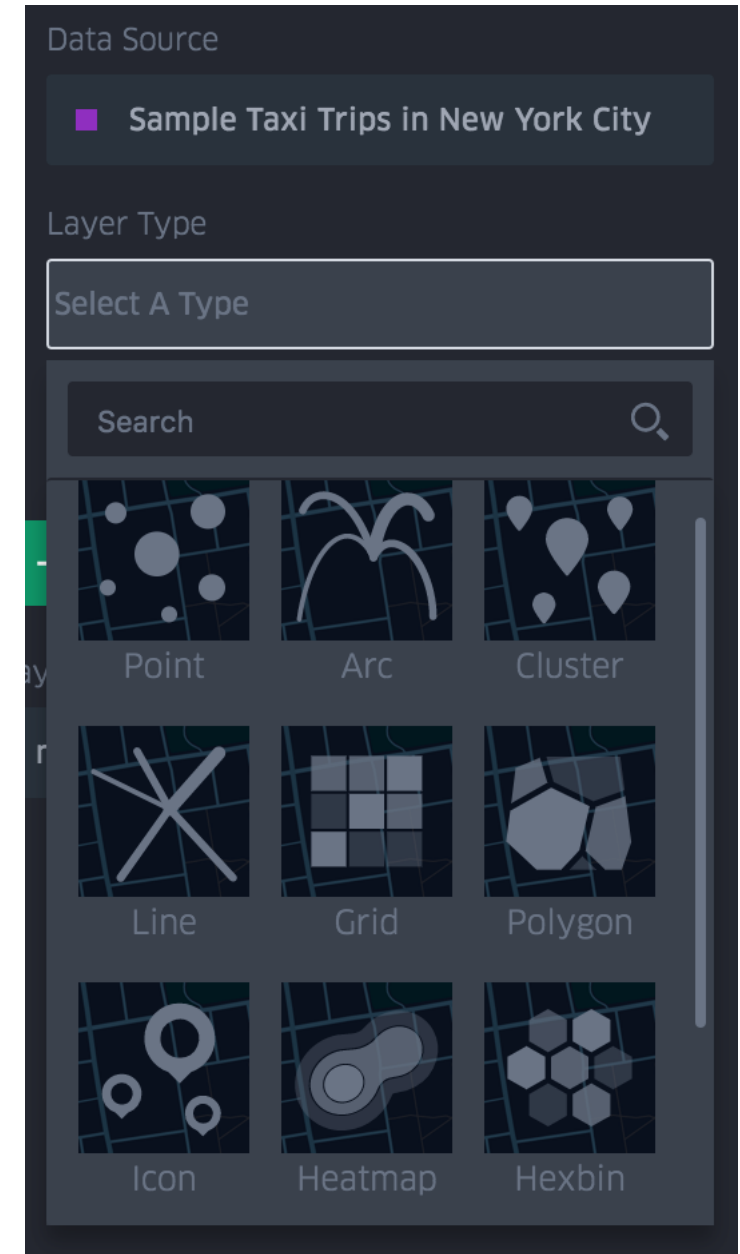
```
Project
  > WebSites
  > DeckGL
    > src
      7_24aout_trajetsgrandesvilles.geojson
      Arcs_MobilitéPendulaire.html
      ArcsBlaBlaCar.html
      ArcsFiltering.html
      ArcsRPC - Copie.html
      Brushing.html
      Cluster.html
      DeckGL_DVF.html
      DeckGL_RPC_RhoneAlpes.html
      DeckGL_RPC.html
      DVF_Nantes.geojson
      Filter.html
      Grid.html
      Heatmap.html
      Heatmap2.html
      Heaxgon.html
      Heaxgon2.html
      Polygon.html
      Polygon3D.html
      Scatter.html
      scriptsTRIPS.R
      SimpleMap.html
      Trips.html
      TripsBobcat.html

DeckGL_RPC.html
816 id: 'Heatmap',
817 type: HeatmapLayer,
818 data: 'https://raw.githubusercontent.com/mastersigat/data/main/RPC_PDL.json',
819 getPosition: d => [d.long0, d.lat0],
820 aggregation: 'SUM',
821 radiusPixels: 30,
822 intensity: 50,
823 threshold: 0.1,
824 colorRange: [
825   [77,146,33],
826   [161,215,106],
827   [230,245,208],
828   [253,224,239],
829   [233,163,201],
830   [197,27,125]],
831 opacity: 0.8,
832 pickable: true,
833 });
834
835 // Add sliders to change the layer's settings based on user input
836
837 OPTIONS.forEach(key => {
838   document.getElementById(key).onchange = (evt) => {
839     var value = Number(evt.target.value);
840     document.getElementById(key + '-value').innerHTML = value;
841     if (GridLayer1) {
842       GridLayer1.setProps({
843         [key]: value });
844     };
845     if (GridLayer2) {
846       GridLayer2.setProps({
847         [key]: value });
848     };
849   });
850   if (ScatterplotLayer2) {
851     ScatterplotLayer2.setProps({
```



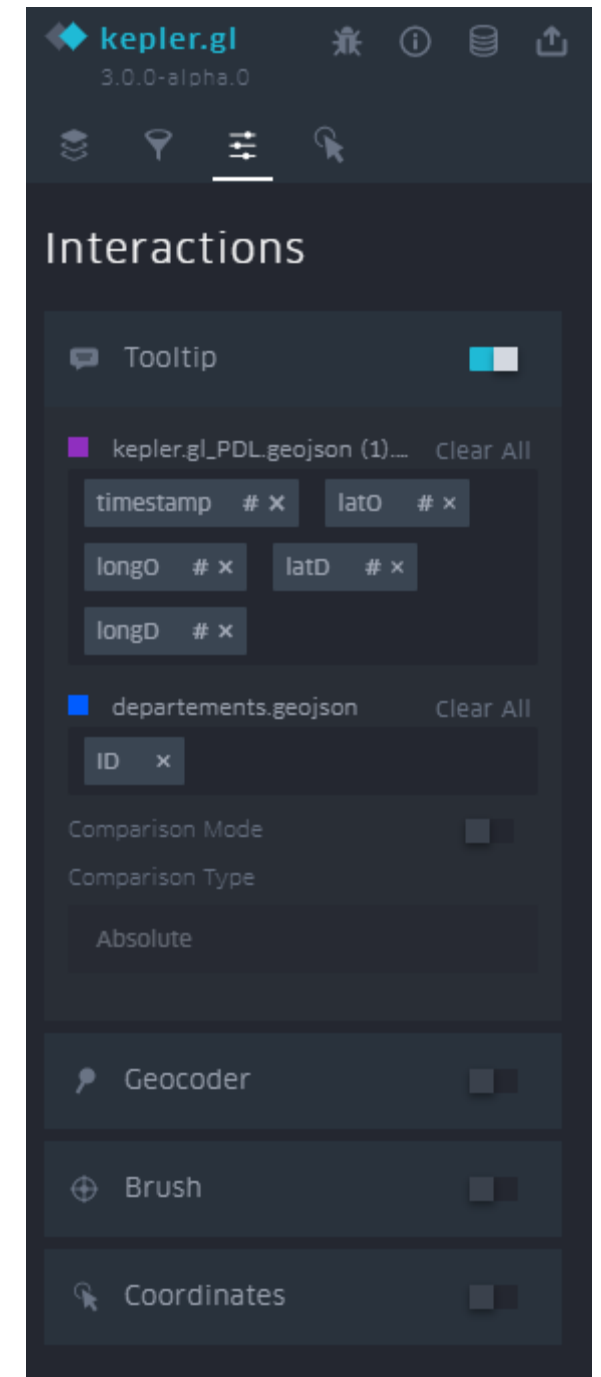
Modes de représentation

- Carte en points (graduées / catégorisées)
- Aplat de couleur (graduées / catégorisées)
- Carroyage (carreaux ou hexagones) + 3D
- Cluster et Heatmap
- Lignes et arcs 3D
- H3, trips...

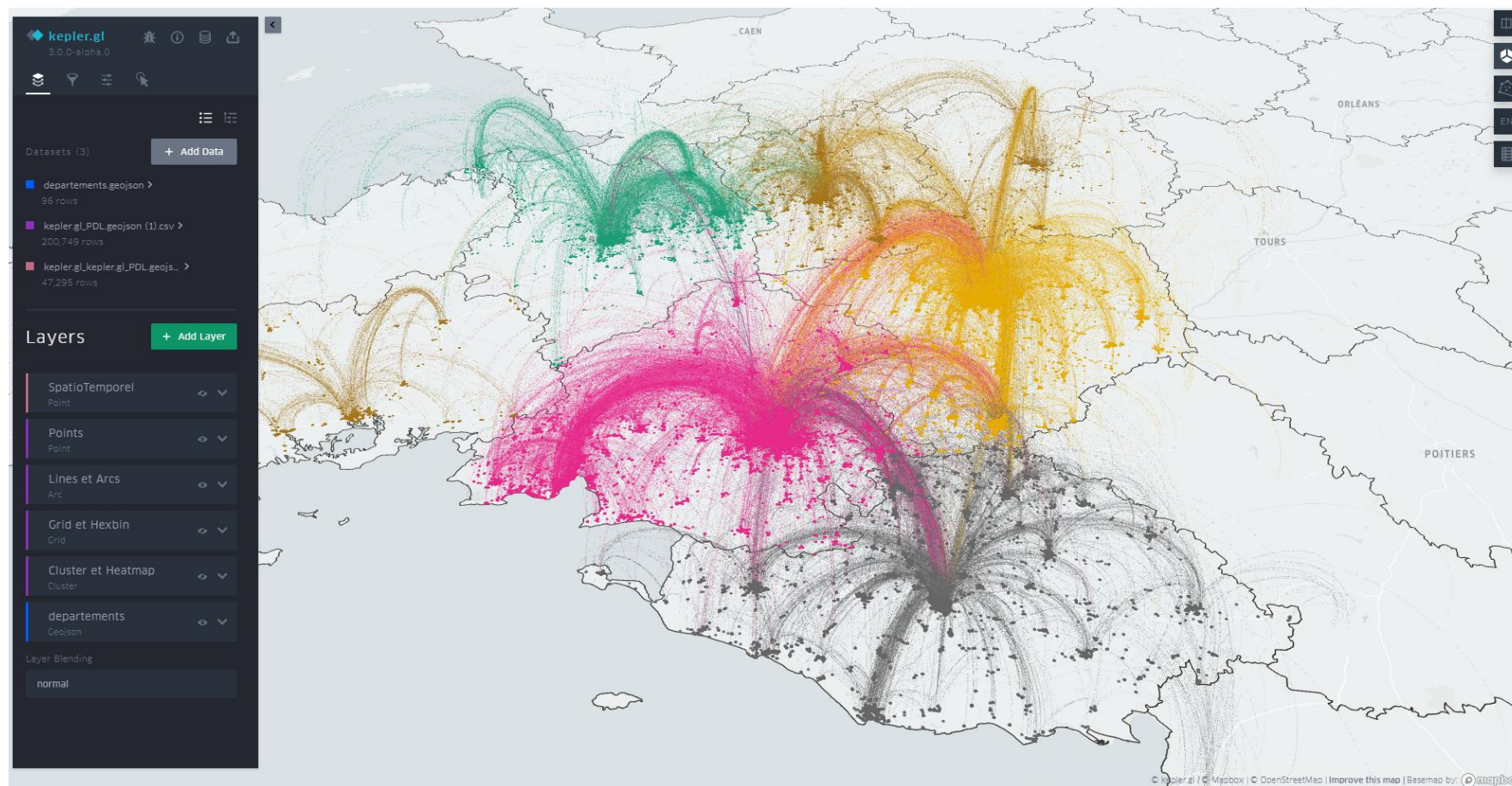


Modes d'interaction

- Filtres (graphes et modalités)
- Time Slider
- Brushing
- Popup
- Gestion des couches
- Gestion des fonds de carte
- Géocodeurs
- Cartes multiples
- ...

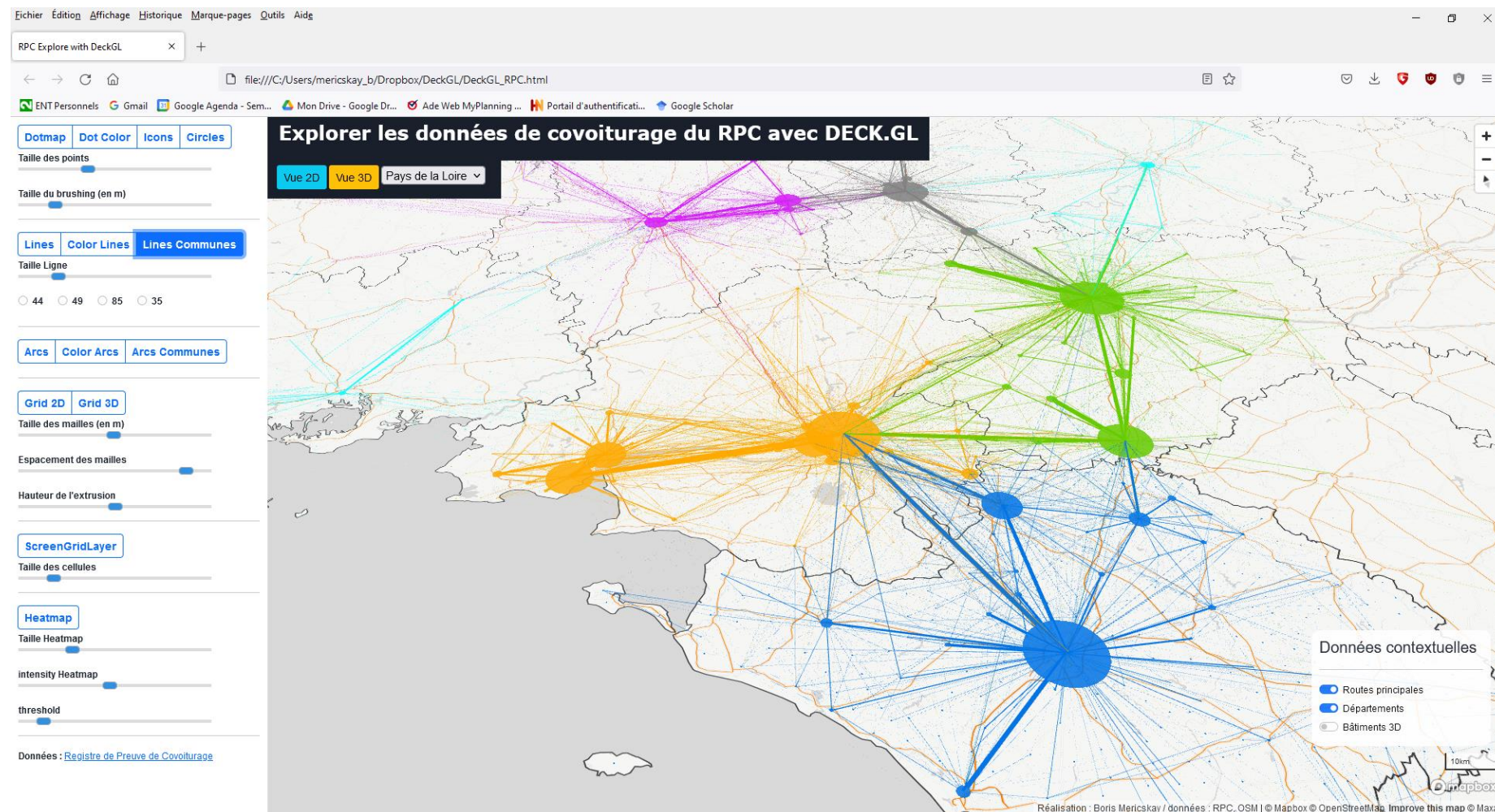


Démonstration



Aller plus loin avec deck.gl

DECK.GL

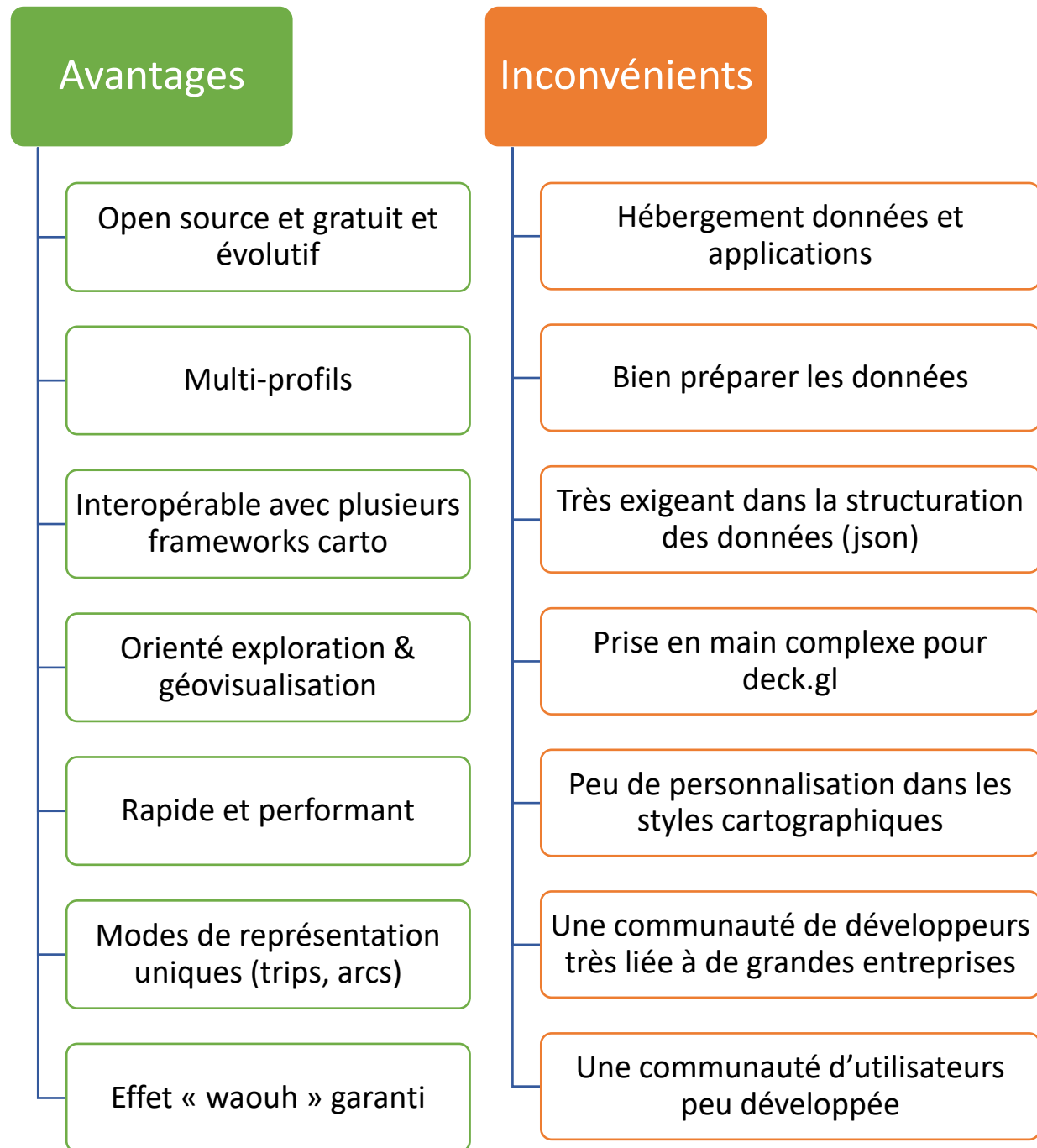


https://bmericksay.github.io/portfolio/DeckGL_RPC.html

Et après ?

- Préparer les données pour d'autres modes de représentation
 - Agrégation à diverses échelles (EPCI, départements...)
 - Enrichissement des données avec d'autres variables
- Augmenter l'interactivité avec les données
 - Proposer plus de fonctionnalité comme des boutons/listes pour filtrer
 - Proposer des sliders pour filtrer les distances/durée/dates
 - Animer les cartes (animation temporelle ou flyto)
- Reproductibilité assez simple
 - Préparation des données standardisée
 - Personnalisation de l'application en ligne assez simple (quelques lignes à modifier)

Bilan



En conclusion

- Des outils peu connus et encore sous utilisés
 - Kepler.gl super pour des non spécialistes des SIG
 - Deck.gl super pour des développeurs SIG
- Très orienté Design/dataviz
- De nombreux développement autour du raster (visualisation et 3D)

