

Embracing FOSS for Vector Tile Pipelines in 2021 - 2 Case Studies

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FOSS4G Buenos Aires 2021

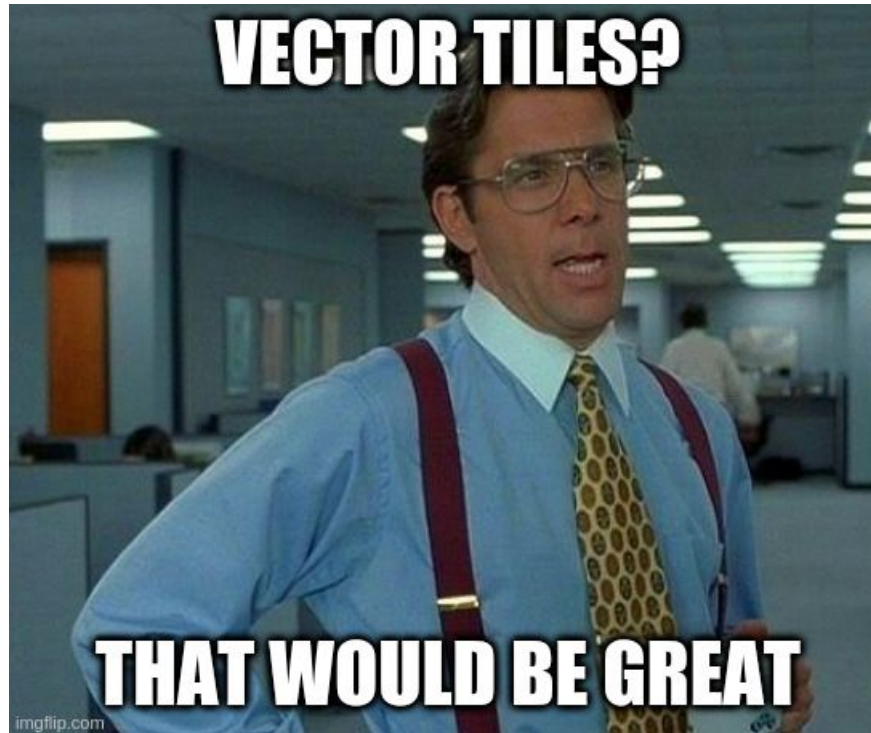


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EOX in Autumn 2020:

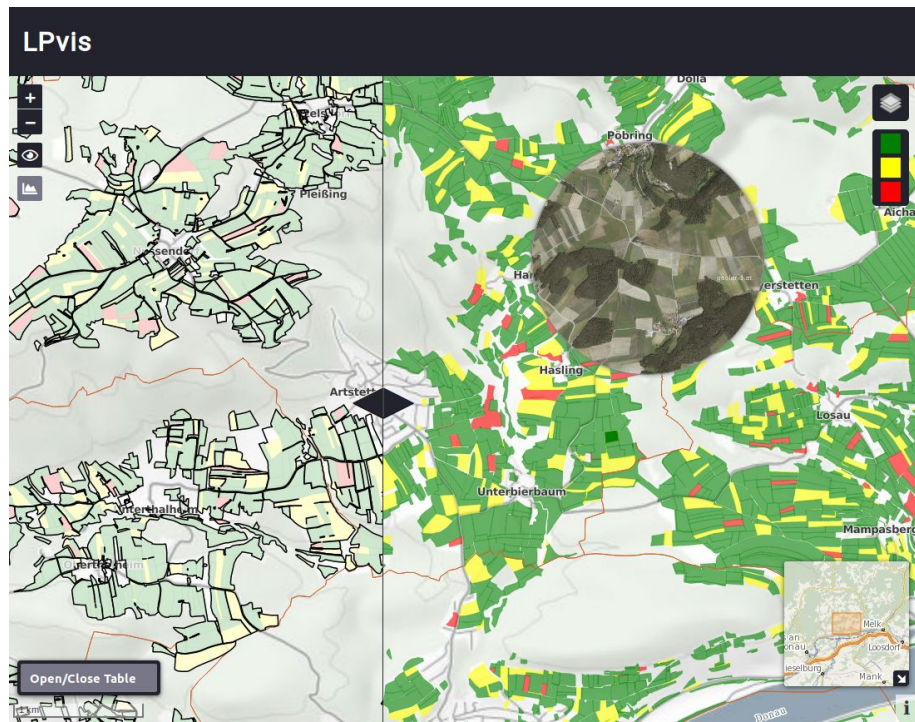


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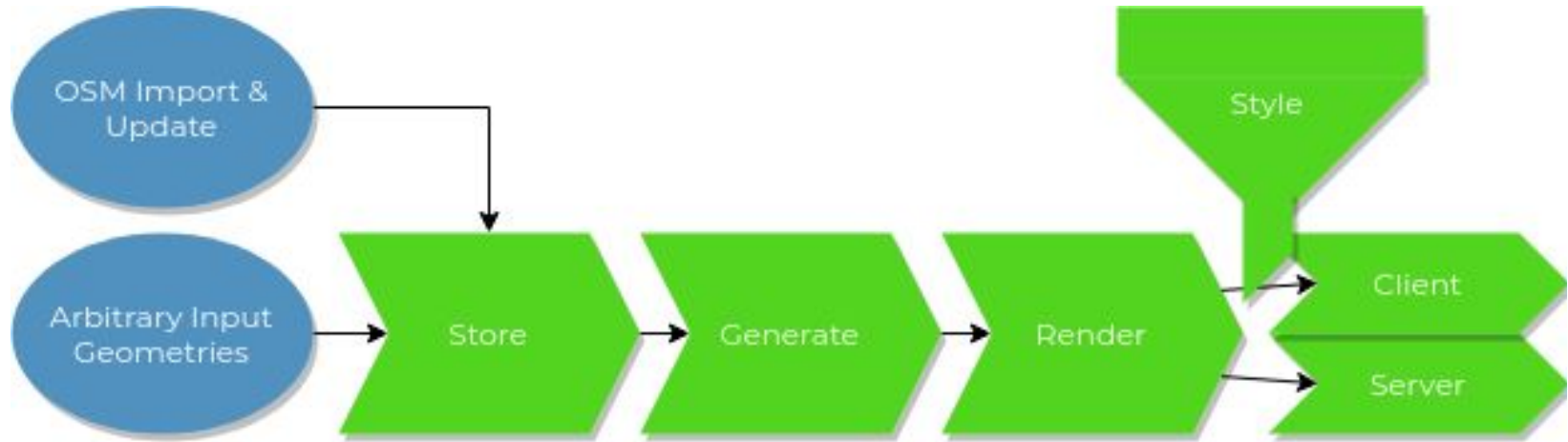
Preface

- EOX company:
~17 EOxPerts
- mainly satellite data
- Vector tiles first steps:
[LPvis](#) (Summer 2019,
instructions on Github)
- tippecanoe + Leaflet

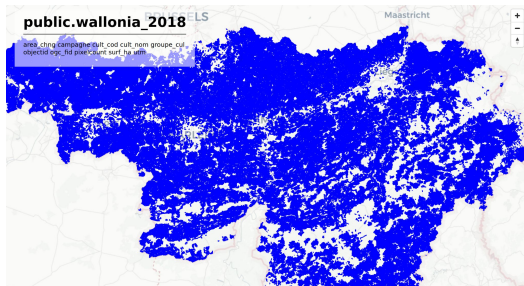


Our Use Cases (Autumn 2020)

1. On-the-fly rendering of millions of agricultural parcels
2. New [EOxMaps](#) overlay in EPSG:3857 + EPSG:4326



Initial research (ST_AsMVT of PostGIS)



Project	Latest release	Language	Example		Pros & Cons
<code>dirt</code>	✗	node.js	\$16	✗	<ul style="list-style-type: none"> ✦ A bug I discovered was fixed super quickly ✦ Issues with arbitrary postgres passwords ✦ no versioned releases
<code>tegola</code>	2021-03-24	Go	\$17	✗	<ul style="list-style-type: none"> ✦ Can use GPKG as data provider ✦ <code>ST_AsMVT</code> second-class citizen (one has to fiddle with SQL directly)
<code>Postile</code>	2018-09-08	Python	\$18	✓	<ul style="list-style-type: none"> ✦ Easy setup ✦ during local testing: bad performance
<code>martin</code>	2019-10-26	Rust	\$19	✓	<ul style="list-style-type: none"> ✦ very easy setup ✦ automatic table detection ✦ extendable with Function Sources ✦ very fast
<code>pg_tileserv</code>	2021-04-29	Go	\$20	✓	<ul style="list-style-type: none"> ✦ same features as martin ✦ Main contributor: Paul Ramsey (@postgis)

pg_tileserv

pg_tileserv

Service Metadata

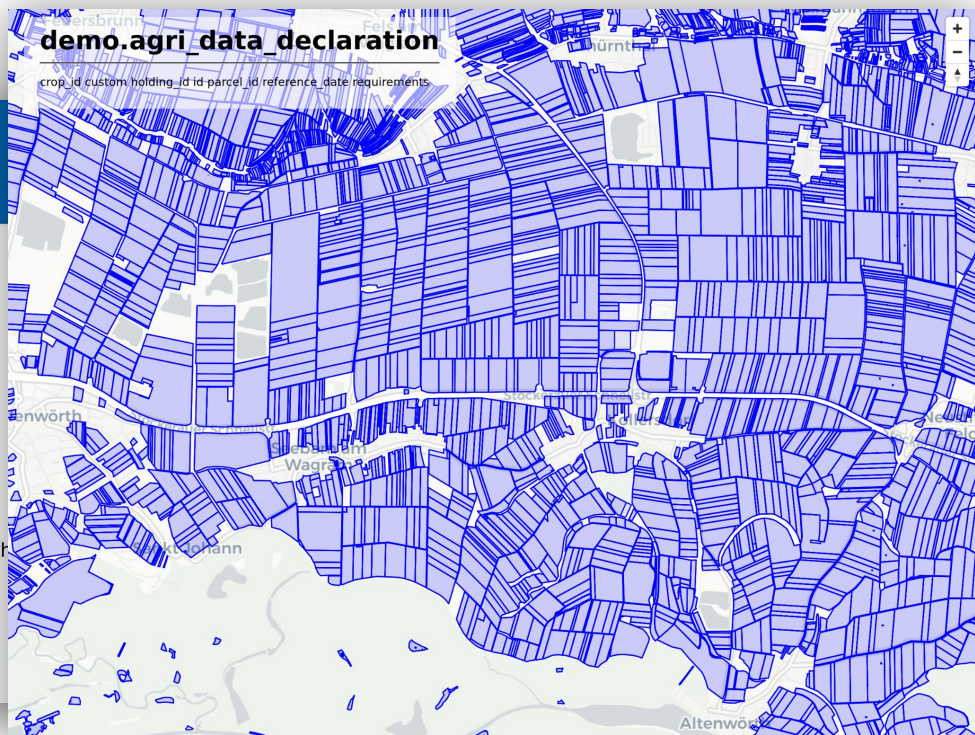
- [index.json](#) for layer list

Table Layers

- [demo.agri_data_croptypeclassificationzone](#) ([preview](#) | [json](#))
- [demo.agri_data_declaration](#) ([preview](#) | [json](#))

Function Layers

- [public.by_crop_code](#) ([preview](#) | [json](#))
Filters the countries table by the initial letters of the name using the
- [public.declarations_4326](#) ([preview](#) | [json](#))
Provides vector tiles in WGS84 (EPSG:4326).
- [public.declarations_dissolved](#) ([preview](#) | [json](#))
Provides a layer of dissolved declarations.



→ Great for beginners

1. On-the-fly rendering of millions of parcels

Requirements:

- directly from database
- dynamic set of attributes
- interactive styling in frontend



Image by [OpenClipart-Vectors](#) from [Pixabay](#)

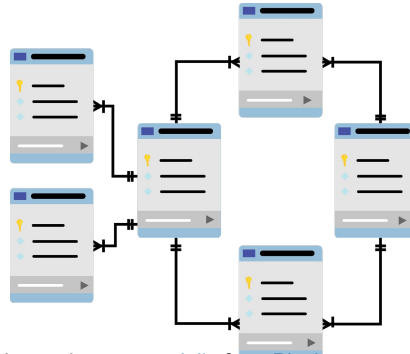
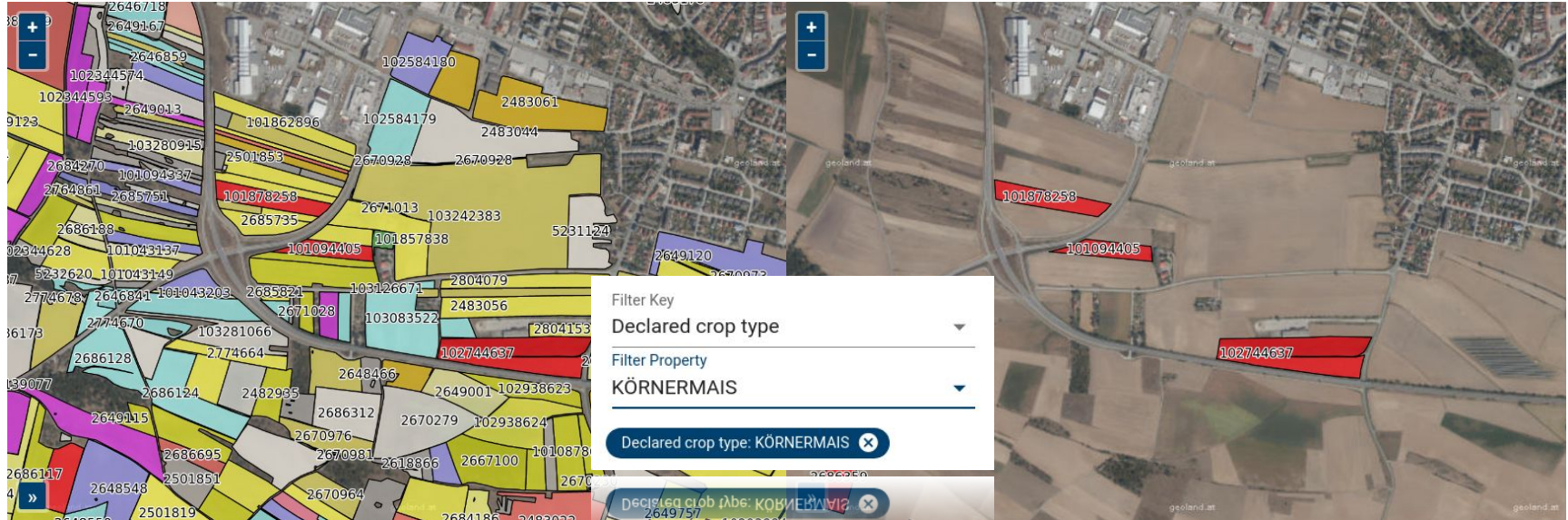


Image by [mcmurryjulie](#) from [Pixabay](#)



1. On-the-fly rendering of millions of parcels

Result in action:



1. On-the-fly rendering of millions of parcels

Solution:

- **django**
- django-vectortiles by Jean-Etienne Castagnede ([@submarcos](#))
- [EOxElements](#) (FOSS Geospatial Vue components)



VueLayers



Vue.js



OpenLayers

1. On-the-fly rendering of millions of parcels

```
class TileServerView(MVTView, ListView):
    vector_tile_geom_name = "geometry"

    def get(self, request: HttpRequest, *args, **kwargs) -> HttpResponse:
        declarations: QuerySet = Declaration.objects.filter(
            reference_date=date(*[kwargs[kw] for kw in ["year", "month", "day"]])
        )
        [...]
        tsp = get_tileserverproperties_from_metainfo(declarations)
        self.vector_tile_queryset = tsp.declarations
        self.vector_tile_fields = tsp.vector_tile_fields

        return BaseVectorTileView.get(
            self,
            request=request,
            z=kwargs.get("z"),
            x=kwargs.get("x"),
            y=kwargs.get("y"),
        )
```

```
/vectortiles/year/month/day/zoom/x/y.pbf
/vectortiles/2020/06/30/14/8909/5650.pbf
```

2. New EOxMaps overlay (3857, 4326)

Requirements:

- Same style for vector/raster tiles
- Same data source for Web Mercator and WGS84 tiles
- Light/dark styles from the same source



Image by [Monika Grafik](#) from [Pixabay](#)



Image by [OpenClipart-Vectors](#) from [Pixabay](#)

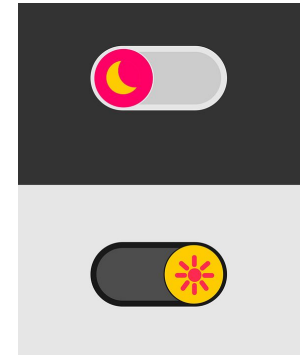


Image by [Pabitra Kaity](#) from [Pixabay](#)

2. New E^OXMaps overlay (3857, 4326)

Result in action:

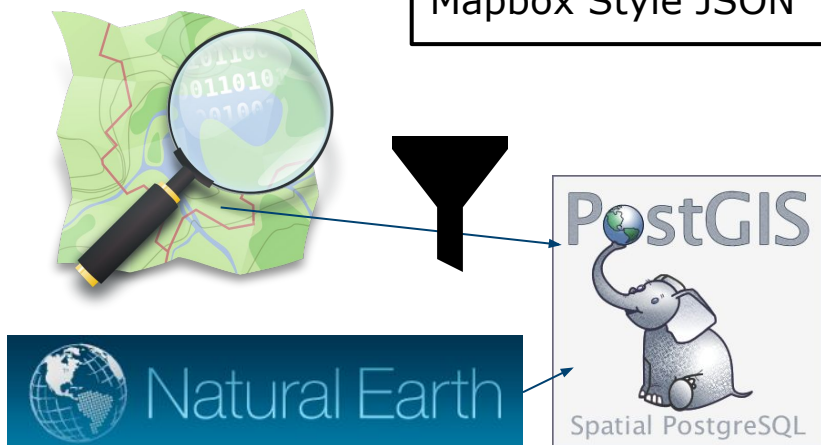


Basemap: [E^OXCloudless](#)

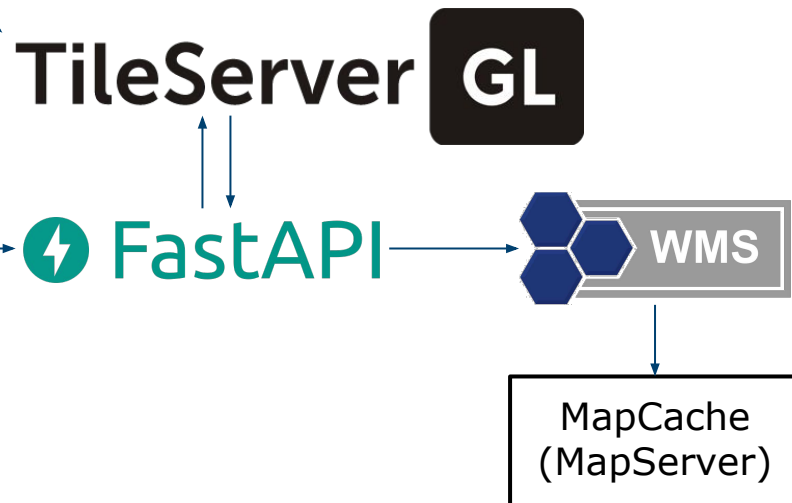
2. New EOxMaps overlay (3857, 4326)

Solution:

- Data



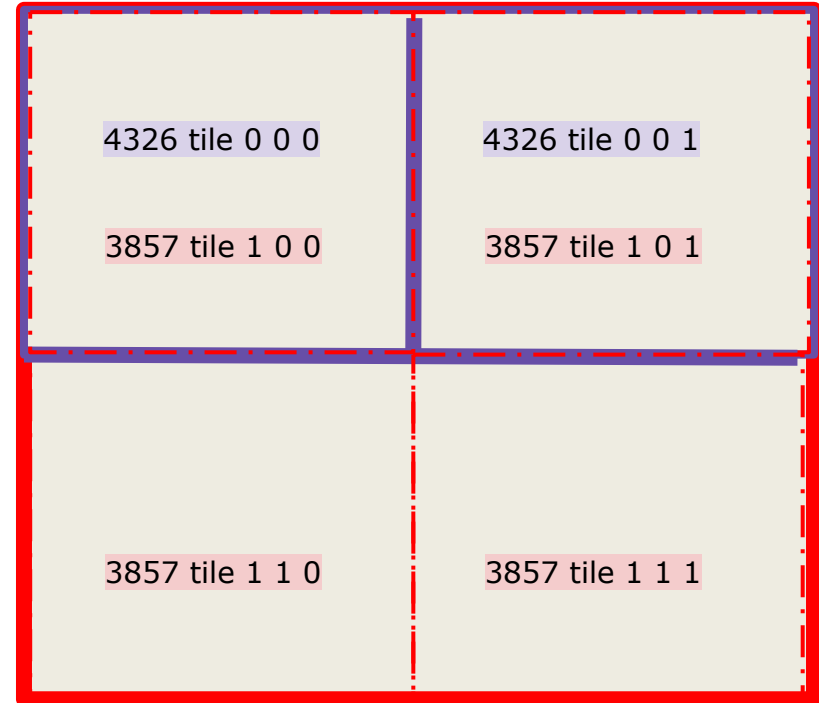
- Rendering and Serving



2. New EOxMaps overlay (3857, 4326)

- "Hack": tile pyramid zoom offset

- zoom 1 - EPSG:3857 =
zoom 0 - EPSG:4326



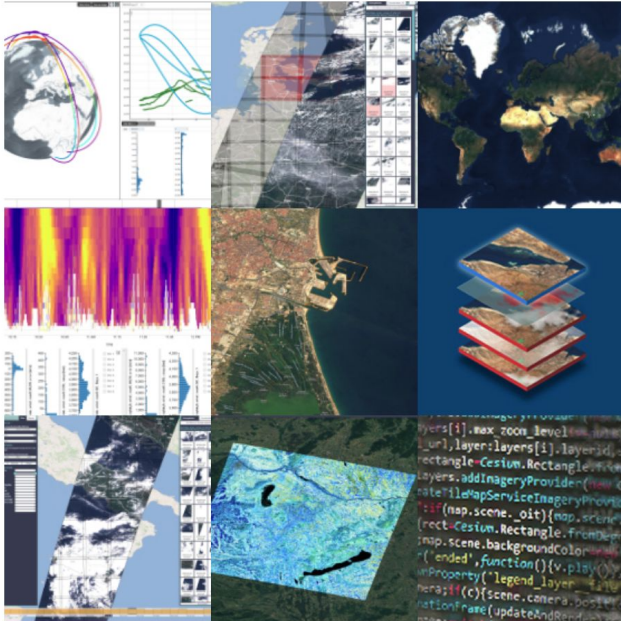
Lessons Learnt

- Mapbox Style JSON works well for static maps, but quickly becomes inefficient for high interactivity
- ST_AsMVT of PostGIS cannot be modelled by Django (see <https://stackoverflow.com/q/65508291/9778755>)
- TileserverGL is not equipped for projections other than Webmercator (EPSG:3857)

Conclusion

- The adoption of the ST_AsMVT function (Postgis) by the FOSS community has led to the democratization of vector tile generation and distribution.





VIEW THE WORLD THROUGH OUR EYES



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