Bending geographic maps for enhanced railway space-time diagrams

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Railways and Open Transport devroom
I develop dataviz web apps at OuestWare
and since early 2021 we work for SNCF Réseau to contribute to OSRD
at some point we've been tasked to enhance the Space-Time Diagrams
what are

Space-Time Diagrams

...or Circulation Diagrams

...or Graphical Timetables

...or Train Graphs
The Visual Display of Quantitative Information

EDWARD R. TUFTE

a good enough graphic to be the cover of a field reference book
but this chart is actually even better once we introduce blocks
A quick word about blocks
in OSRD
can we make it even more informative?
a schematic strategy
allows rendering exactly what we want/need

requires to know the exact topology
a cartographic strategy
we show everything a map would show
it's called Strip maps
and it's actually been used with space-time diagrams already!
so...

let's bend geographic maps
the strategy is to generate a triangles grid along the path and another straight grid and to translate coordinates between the grids
here's our initial path
we build a grid along the path
we smoothen the grid
we index the grid, and generate a straight similar grid
we have a projection \( o / \)

For a given point \( P \)

1. Find the quad that contains \( P \)
2. Find the triangle \( T \) (indexed in the quad) that contains \( P \)
3. Find the related triangle \( T' \) in the straight grid
4. Transpose coordinates from \( T \) to \( T' \) to obtain \( P' \), using barycentric coordinate system
So, to get a map

Using react-map-gl and MapLibre

1. Render a hidden map that contains the full grid (with layers from OSM and OSRD)
2. Wait for every features to be rendered (the map's "idle" event)
3. Query all the rendered features (with map.querySourceFeatures)
4. Project every features
5. Render a new map with the projected features
the two maps side by side
how it looks like in OSRD
it works for *almost* any path
it does bring context

👍

we lose zoomable data
it is quite slow atm

👎
(demo time)
thanks!