Introduction

UNECE has been conducting a quinquennial census of rail traffic on main international rail lines in Europe since 2005. This census has been based on the E-Rail network as defined by the European Agreement on Main International Railway Lines (AGC) of 1985, as amended. The purpose of this interactive map is to visualise the traffic (number of trains per year) on these lines, divided into both passenger and goods trains, measured in a standardized manner across countries. This complements the E-Road census map that was published at the end of 2017 (see the map here).

What are E-Railways?

As mentioned above, the E-Rail network is defined in the AGC agreement. This agreement set up a common numbering system, and set out certain standards that these railway lines which are of international importance should adhere to. Typically, the E-Rail network will correlate with a country's mainline railway network that has international connections, and thus also the TEN-T core network. For more details of the specific lines included, please refer to http://www.unece.org/fr/trans/main/sc2/sc2_agc_text.html.

What is the Census?

Internationally comparable data on main international railway lines are of major and increasing importance in Europe, given the growing volume of international and transit traffic, and a desire to shift journeys away from the road network for environmental, road safety and other reasons. The E-Rail Census carried out under the auspices of UNECE, in cooperation with Eurostat, is the only existing international framework providing comparable data on traffic flows on main European railways on an all-European basis. The latest version of the Census was conducted in 2015, and the map also includes layers of data from the 2010 census when available. Users should note that the set of countries responding to each census differed.

*Figure 1: Passenger train traffic for 2015*
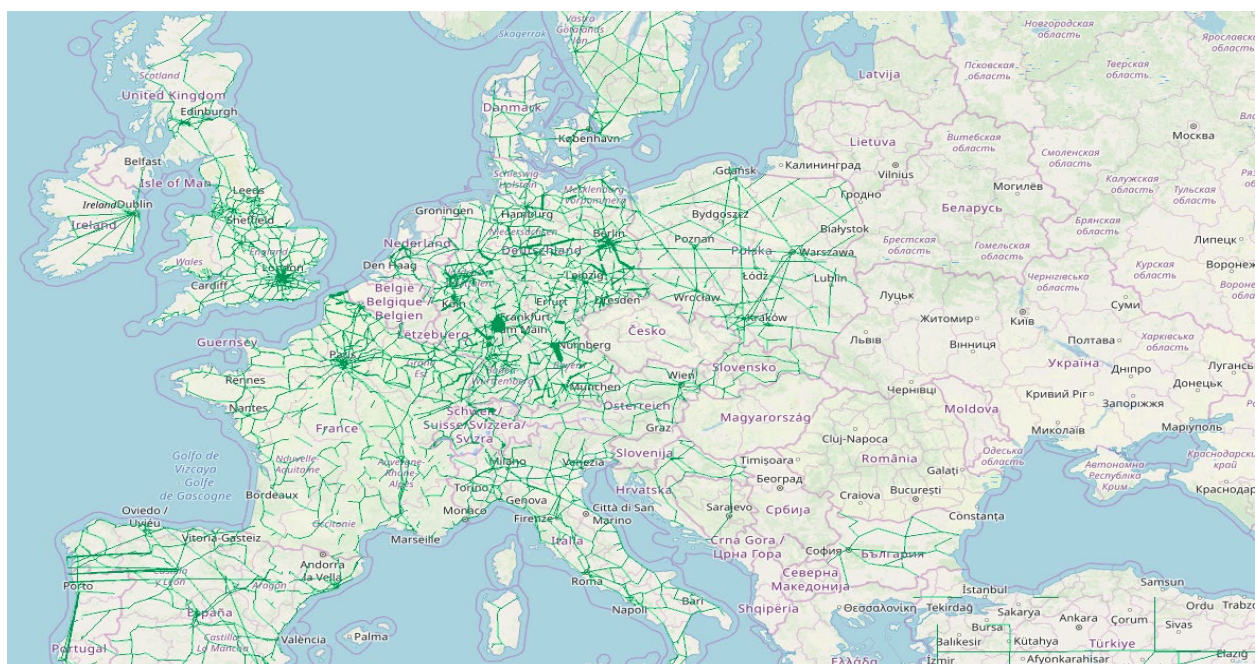
How is the Census conducted?

The E-Rail Census collates data that are typically available through infrastructure manager timetable records, that also conveniently identify traffic as either passenger or freight trains. While UNECE only collects these data every five years, many member States collect and publish their own data on an annual or even more frequent basis, either through the infrastructure managers directly or through the National Statistical Office.

How is the Map Structured?

The map has five layers in total: four layers cover data collected, showing goods trains and passenger trains for both 2020 and 2015 when available, and in addition a layer showing the structure of the TEN-T comprehensive rail network. Users can select which of these five layers can be shown or hidden at any one time.

Figure 2: the five layers of the rail map
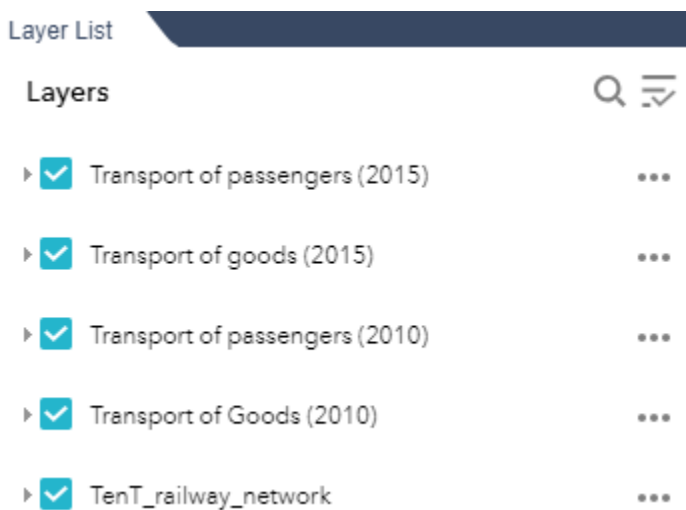
How detailed are the traffic data?

As noted the data in the map are provided by member States, and as such there is a variable degree to how well the lines fit the real network. For the road map mentioned above, many countries provided Shapefiles, which allowed the accurate mapping of their data. These were not available for the rail census, and so the only way to map the data was by connecting the start- and end-points linearly. It is thus inevitable that the lines do not perfectly fit reality.

Figure 3 shows how these start and end points are visualized in Spain and Portugal. Because of the long length of these segments, it becomes difficult to see where trains are actually moving between. Many lines in this case will likely move through Madrid, but this is not immediately visible due to the long length of segments, some of which traverse a large proportion of the country.

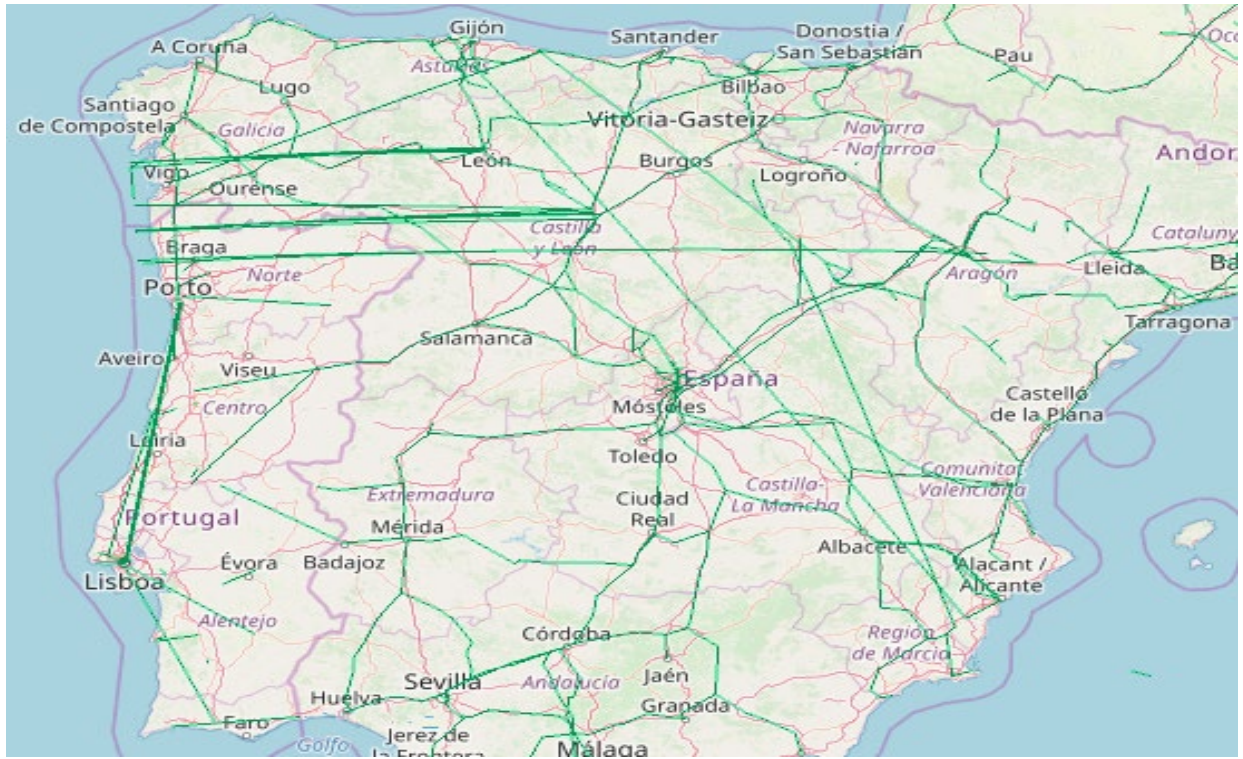*Figure 3: passenger train movements in Spain and Portugal*

Figure 4 shows freight train traffic in Poland. Again, lines are of a considerable size and thus do not perfectly fit the network. However, in this case the segment start- and end-points match some of the major cities. It is thus possible to see the freight traffic between the capital Warsaw and Gdansk (a major port), and similarly between Poznan and Szczecin.

Figure 4: Goods train movements in Poland, 2015
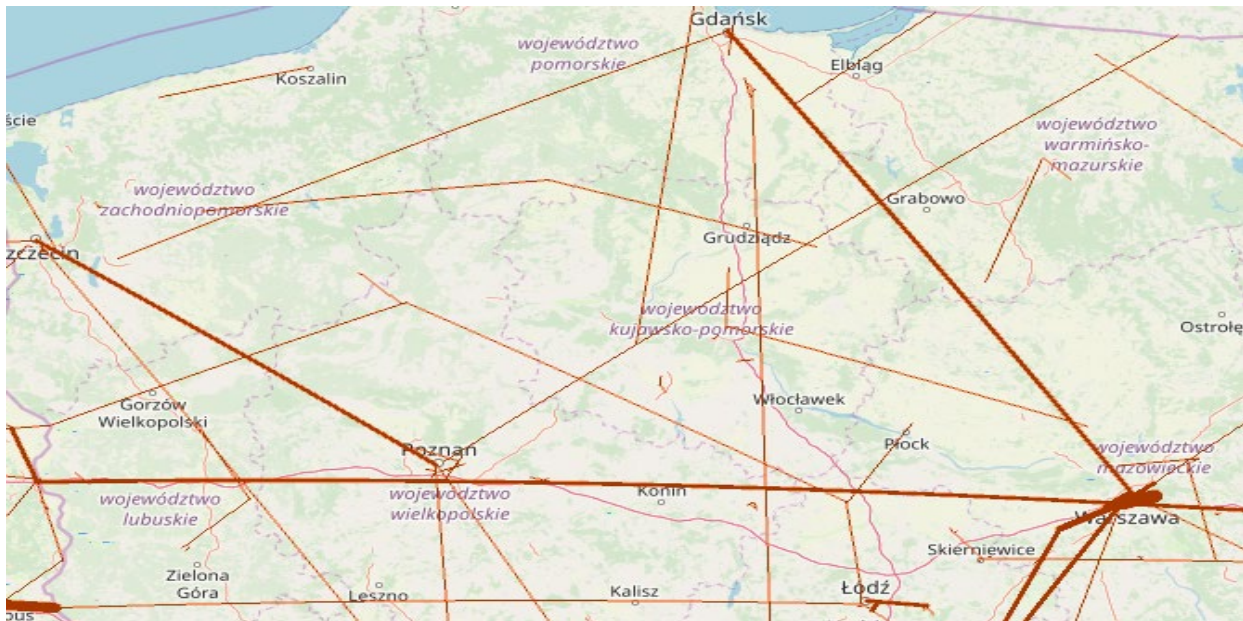
It should also be noted that data coverage differs in terms of types of lines included. Some countries have provided only AGC lines; some countries have provided all main lines (as defined by themselves or by the TEN-T core network), and some have provided all public lines. Providing greater detail is not a problem in itself, as the census asks countries to mark whether each segment is an AGC line, but this has not been done consistently across countries. As such, it was decided to publish data for all segments.

How do I use the map?

Navigate around the E-Rail map by clicking and dragging, and zooming in and out using the scroll function on the mouse, in the same way as other online maps are used. Clicking on a particular segmentof the E-Rail network will reveal the number of trains per year for that particular section. There are also several feature specific to the map that can be accessed by selecting the following icons in the top left of the map.

The *layer* tab allows the user to select any of the 2010 and 2015 passenger and goods E-Rail census layers

The *legend* tab shows how the thickness of the lines corresponds to numbers of trains per year.

The *filter* tab allows the user to show only railway segments with numbers of trains greater than a user-defined level.

The *basemap* tab allows the user to change the visual information available in the background of the map.

Other options also exist for the user to print or share the map.

Why are some countries missing?

The map shows all of the census results received by UNECE, with Eurostat collecting and providing data for European Union member States. The secretariat is keen to complete the map for 2015 and countries are encouraged to contact the secretariat if they can provide data. Data are requested ideally in shapefile format[1], but can also be generated if GPS coordinates of the segment start and end-points are provided.

What can the map be used for?

The map is a visualization of passenger and freight train movements. It is thus a useful tool in seeing where national and international rail traffic is most prevalent, and where there is any further potential for shifting transport movements from the road sector. Combined with the E-road census, corridor-specific modal shifting opportunities can be visualized.

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[1] The shapefile format is a standardized geospatial vector data format. The mandatory set of data files in shapefile format required for the E-Rail traffic census map are the following: (1) .shp ; (2) .shx ; (3) .dbf ; (4) .prj . More information on the shapefile format can be found at
http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#/Shapefile_file_extensions/005600000003000000/

How can I download the underlying data?

Data used to create the 2015 map layers are available at https://www.unece.org/trans/main/wp6/e-rails_census_2015.html.

Future improvements

UNECE hopes that the map can be improved, principally by more member States providing data. In addition, it would be beneficial if countries could typically send segments with smaller lengths (in order to better fit the reality of the rail network) and also to better identify which segments are part of the AGC and/or Ten-T core network.

Country notes

Data for European Economic Area countries were obtained in a single file from the Statistical Office of the European Union (Eurostat). These data are collected under Annex V of the European Union regulation 2018/643[2].

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[2] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32018R0643