



R in the Air

Performance Review for (European) Aviation

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EUROCONTROL

The European Organisation for the Safety of Air Navigation

11th Jul 2019

FIR/UIR in the Lower Airspace (EUROCONTROL Member States)



 FIR/UIR Lower Airspace
 EUROCONTROL Member States

Source: EAD
 Effective: 04 January 2018

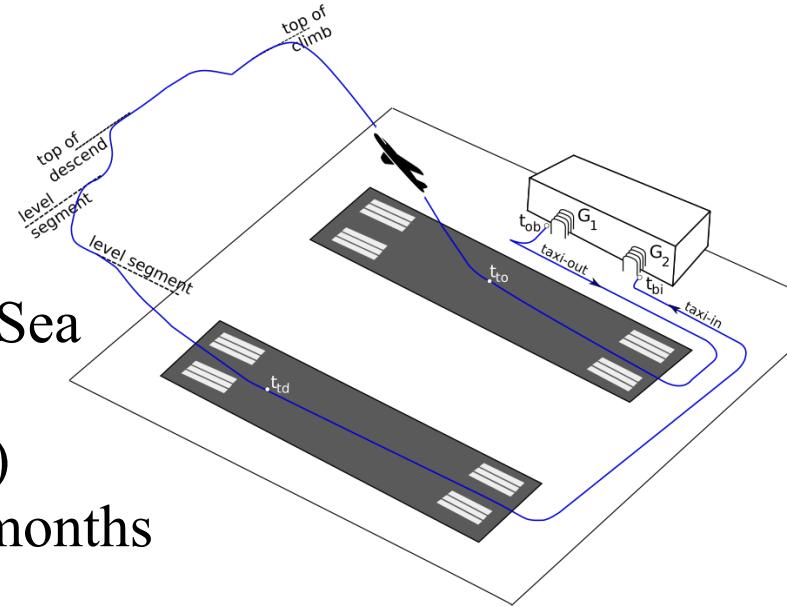
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1. Updated boundaries depicted on the chart are only indicative and have no legal
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 Disclaimer:
 Changes in chart and name in chart is due to the collection of operational data and the procedure
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Trajectories

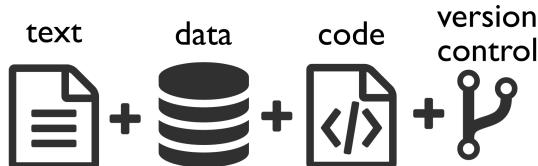
- 43 States
 - from Atlantic Ocean till Black Sea
 - from Norway to Morocco
- 32,000 Flights per day (May 2019)
- 4,27 Million flights in the last 12 months
- 20 years of civil flights in Europe
- statistical analysis via performance indicators in order to highlight best practices (fuel burnt, CO_2 and noise reduction, no ATCO overload):
 - time/distance in the Terminal Area airspace/apron
 - continuous descent operations



PRU Portal

- data dissemination
- methodology
- attempt to move towards reproducibility
- built with **blogdown**, served by **Netlify**, hosted on **GitHub**
(but we use also Google Charts/Studio/Spreadsheets, D3, MS Excel)

advertising:
text & final
results only

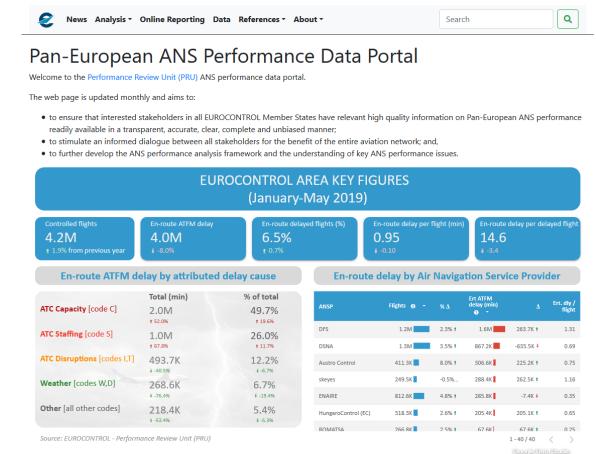


science:
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Adapted with permission from Rodríguez-González F & Freixas-Jover A J Barroso-Llaveira S (2018) Ciencia reproducible: qué por qué. *Ecosistemas* 25(2): 83-92. <http://doi.org/10.3989/ECCOS.2018.25-2.11>.
See also Novella, B. (2016). Computational Reproducibility in Archaeological Research: Basic Principles and a Case Study of Their Implementation. *Journal of Archaeological Method and Theory* 20(2): 1-27. <http://doi.org/10.1007/s10816-015-9275-9> This figure is CC-BY

Portal @ <https://ansperformance.eu>
Source @ <https://github.com/eucctrl-pru>

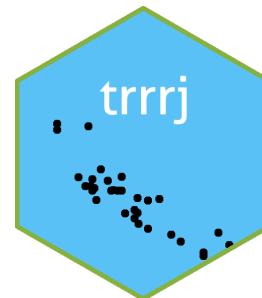
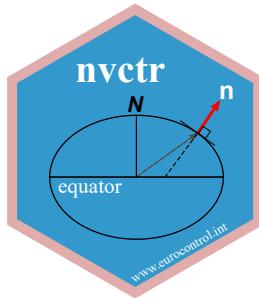


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Packaging and sharing

- **nvctr**: n-vector approach to geographical position calculations using an ellipsoidal model of Earth
- **ectrplot**: ggplot2 style (inspired by BBC's `bbplot` )
- **trrrj**: analysis facilities for flight trajectories



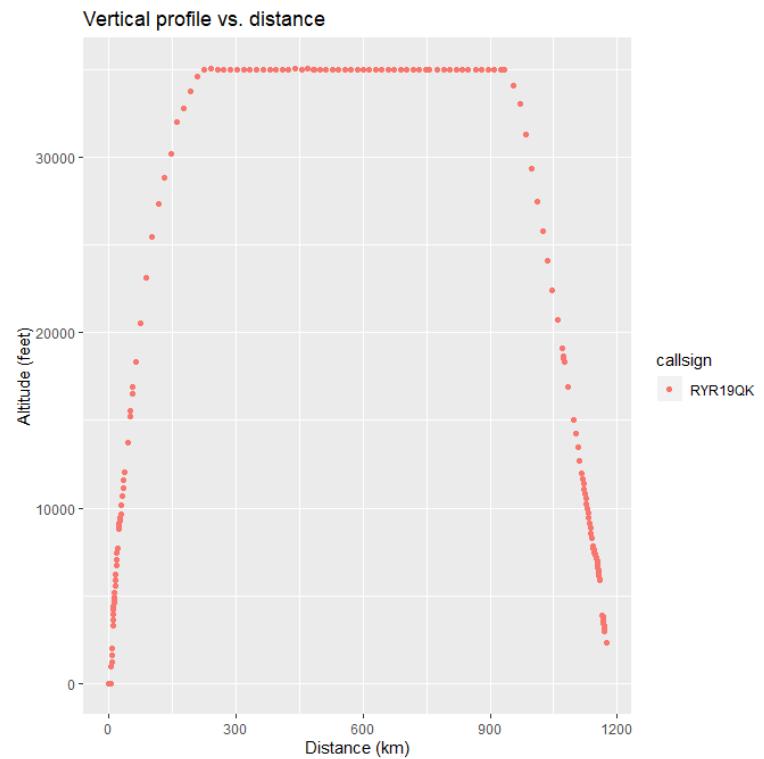
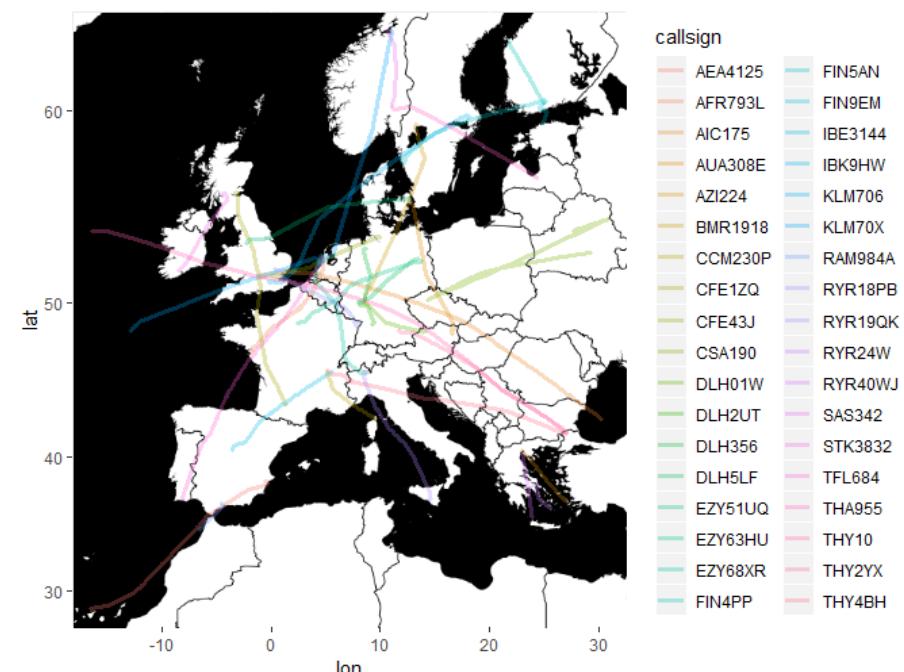
Everything @ <https://github.com/euctrl-pru>

trrrj - read

Supported file formats:

- S06: segment based description
- CPR: radar position reports
- ALL_FT+: mix of radar and flight plan

trrrj - plot



trrrj - export from DB

export from EUROCONTROL DB (internal feature):

- trajectories: dataframe of
 - flight ID
 - timestamp
 - longitude, latitude, altitude
 - ... (aircraft type, ADEP, ADES, ...)
- airspaces: polygon and min/MAX flight level

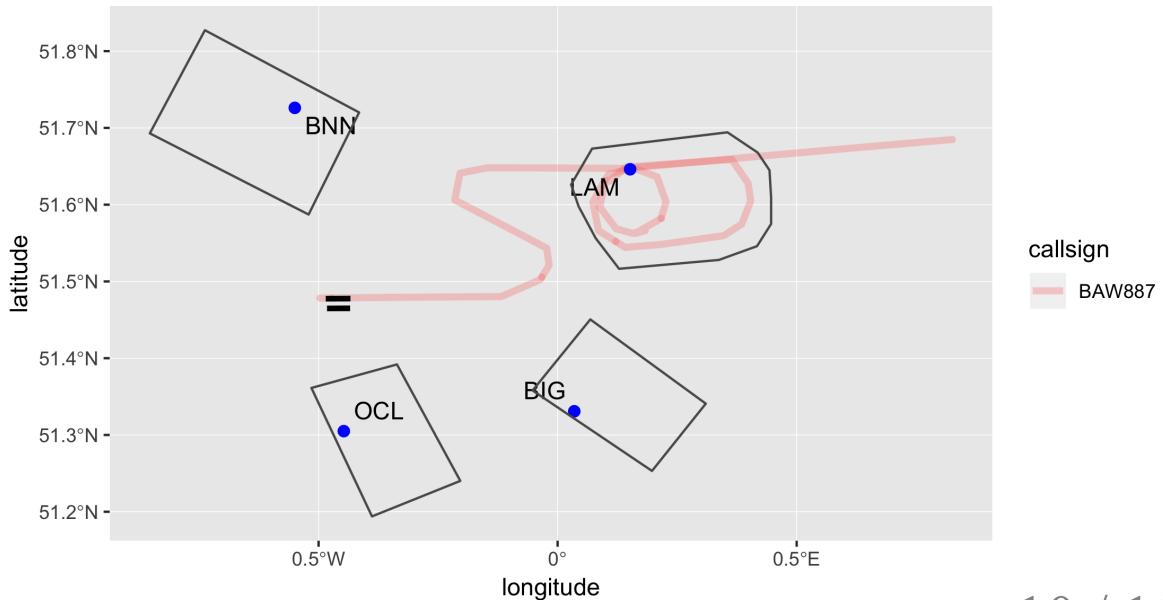
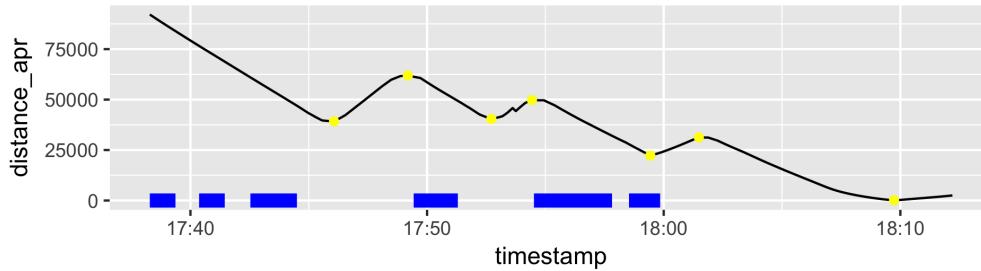
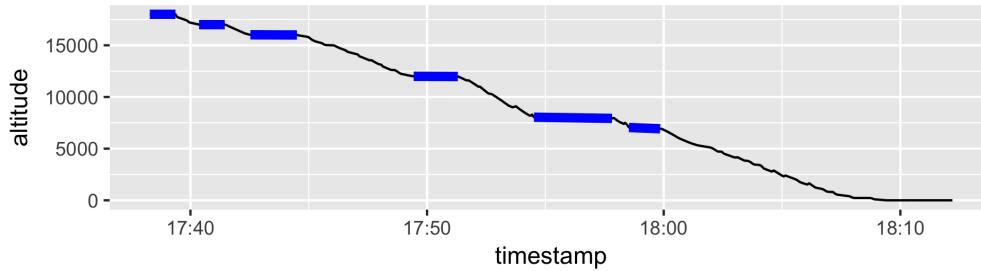
trrrj - trj/airspace intersections

No much help  from sf or other spatial s

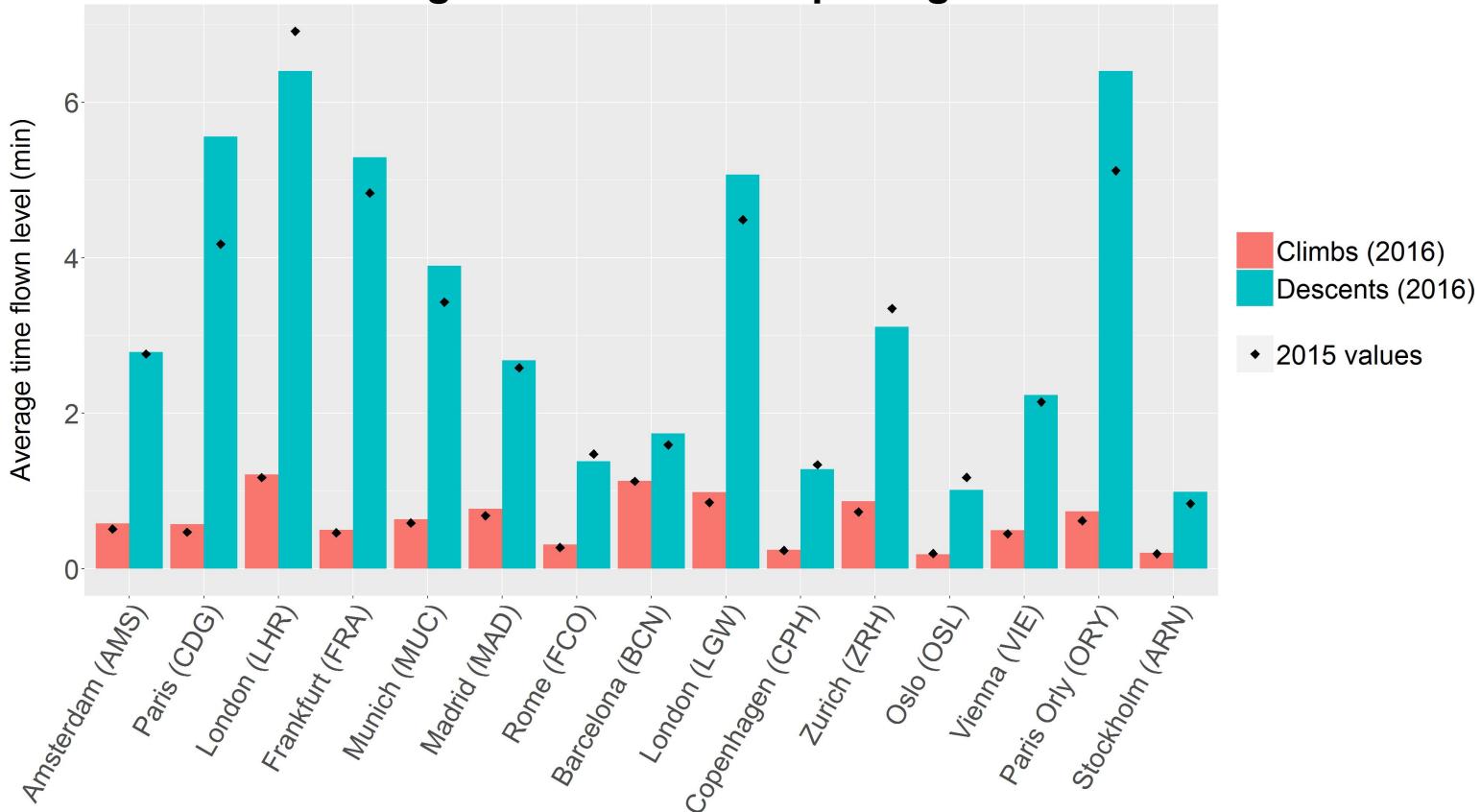


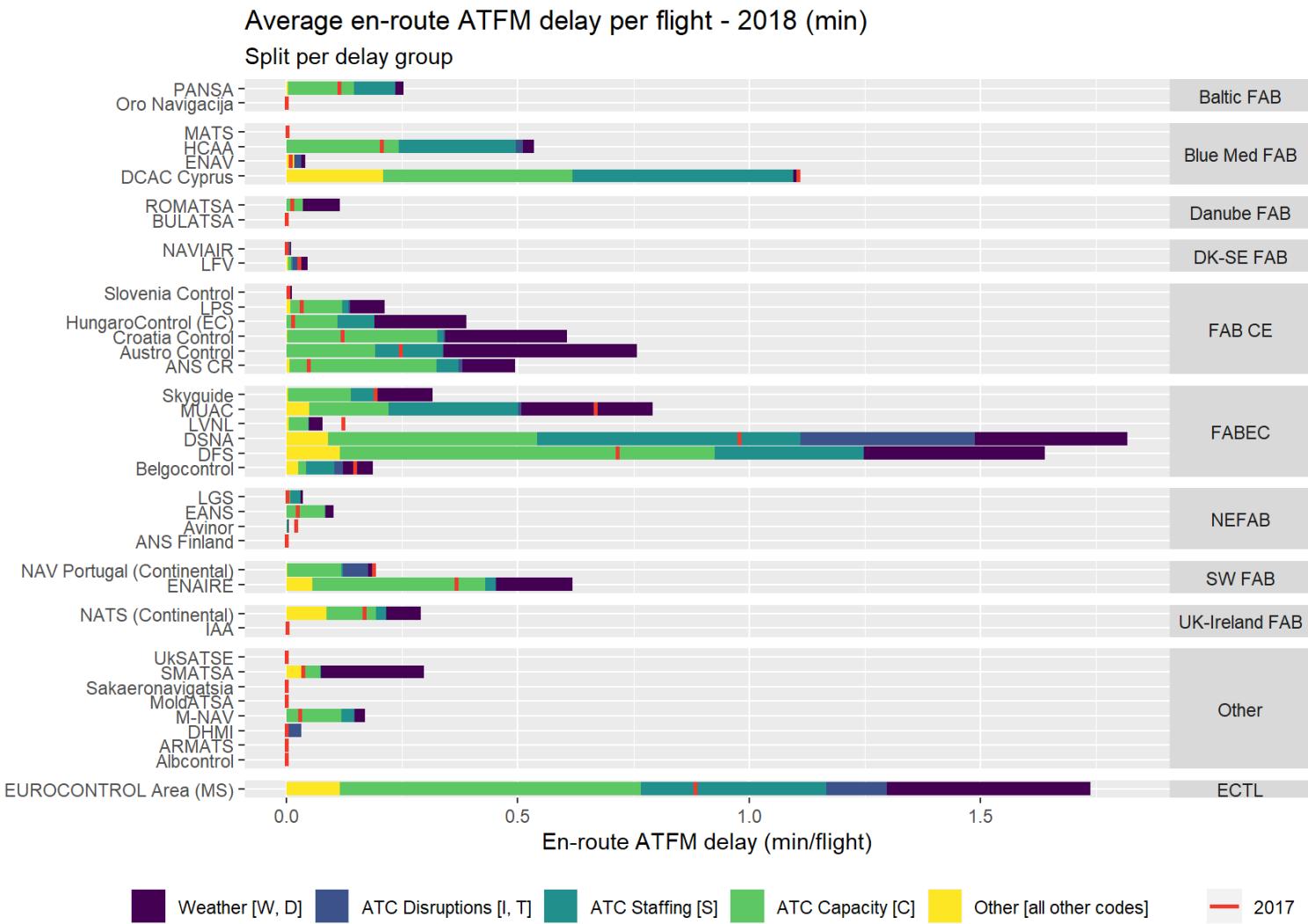
if you know/can help us, please reach out

Examples

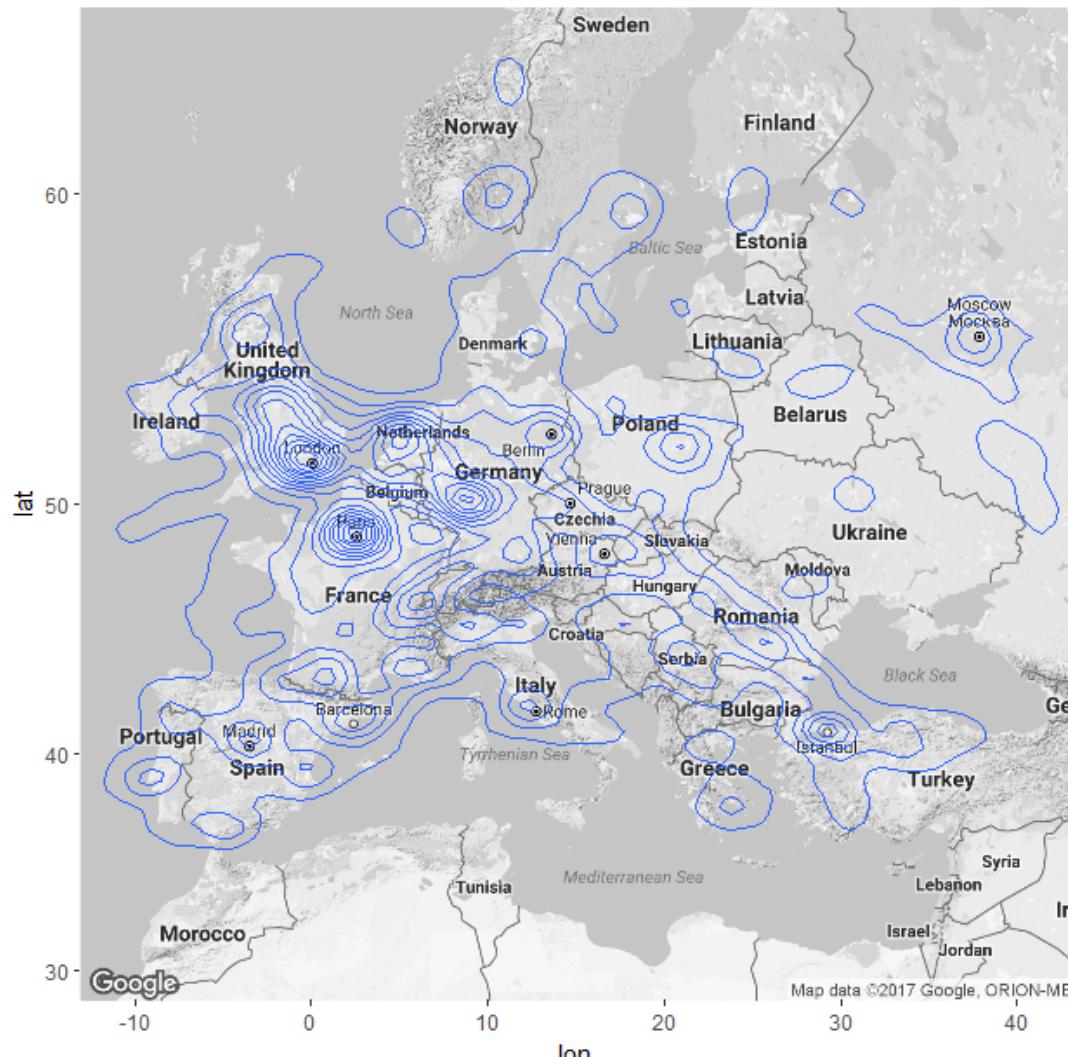


Average time flown level per flight





Density



FR24 Flights on 2017-08-97 @ 11:00 - 12:00

R can fly!

Questions?

Or drop me an email: enrico.spinielli@eurocontrol.int

