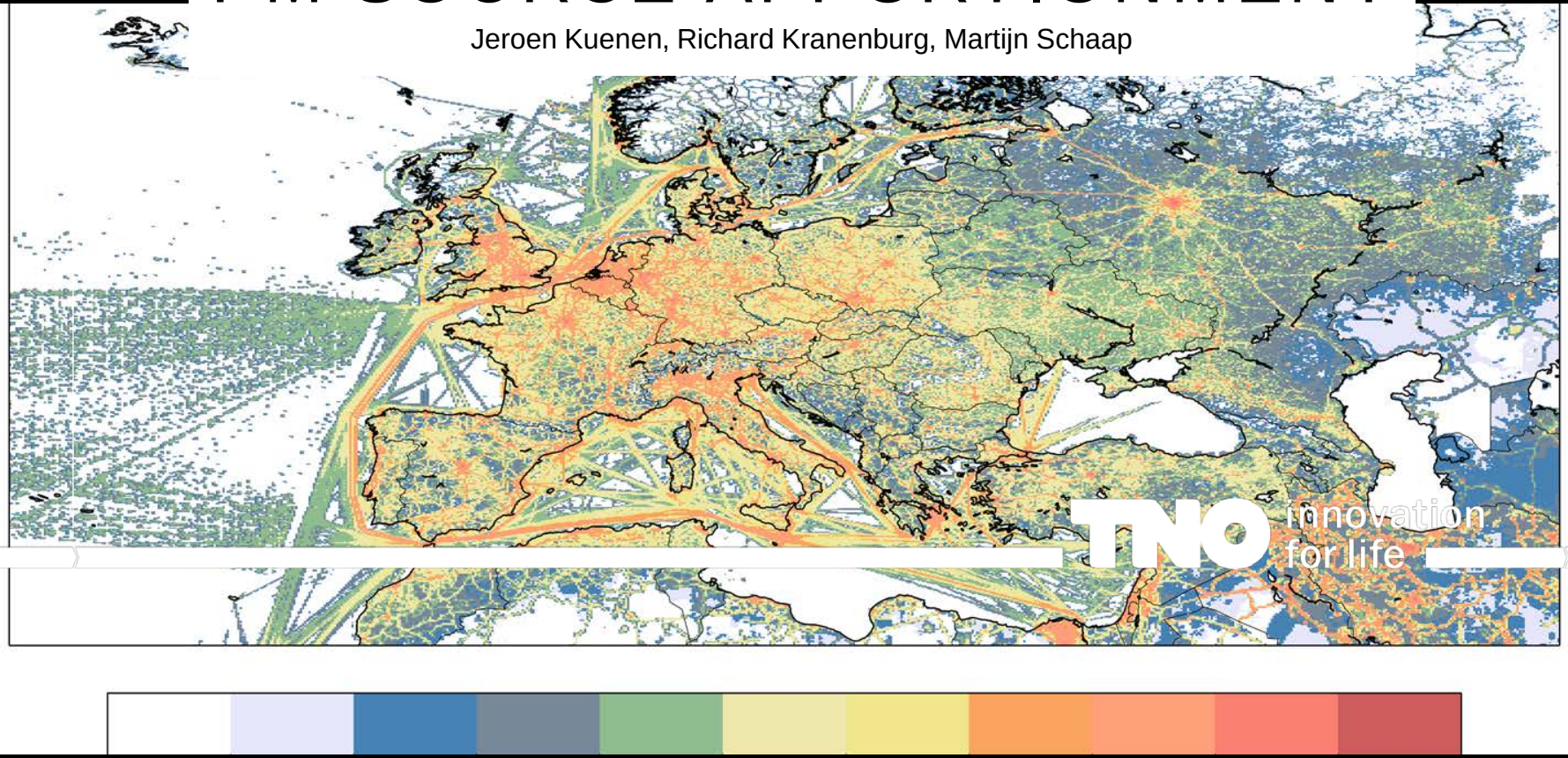
PM SOURCE APPORTIONMENT

Jeroen Kuenen, Richard Kranenburg, Martijn Schaap



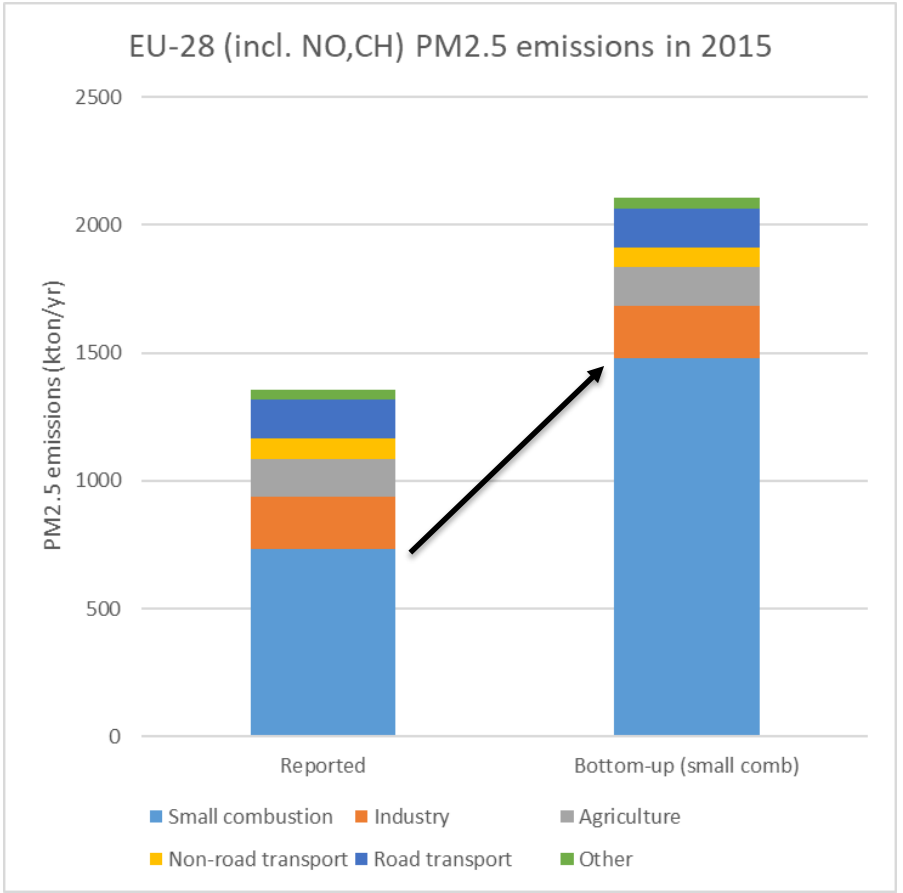
OUTLINE

- Emissions
- Modelling using LOTOS-EUROS
- TOPAS service

EMISSIONS

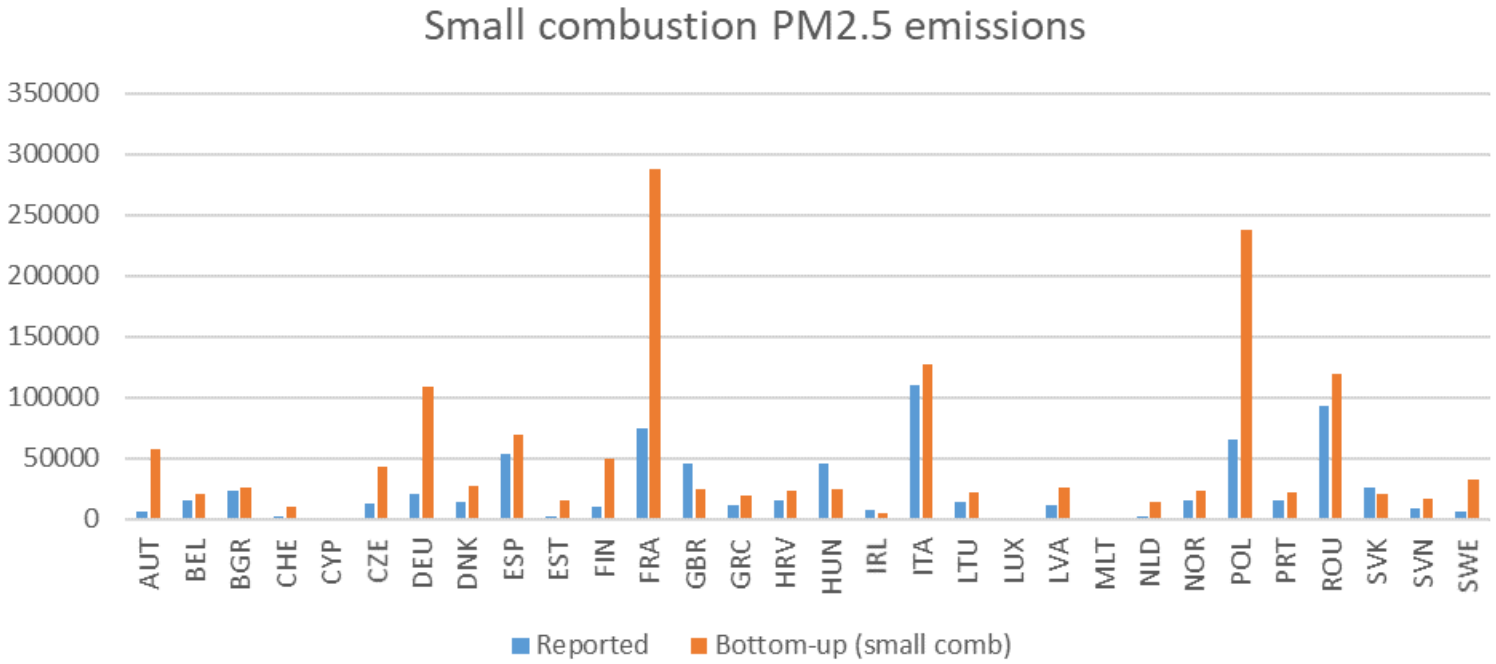
- Basis is the CAMS regional emission inventory which is largely based on official EMEP reporting with modifications (e.g. completed & improved spatial representation)
- Condensable particulate matter (formed shortly after emission upon cooling of exhaust gases) plays large role in PM emissions
- Current reported PM2.5 emissions from small combustion only could potentially double
  - Overall PM2.5 emissions increase by 30%
  - Bottom-up for small combustions sources

(update of numbers presented in Denier van der Gon et al. 2015)



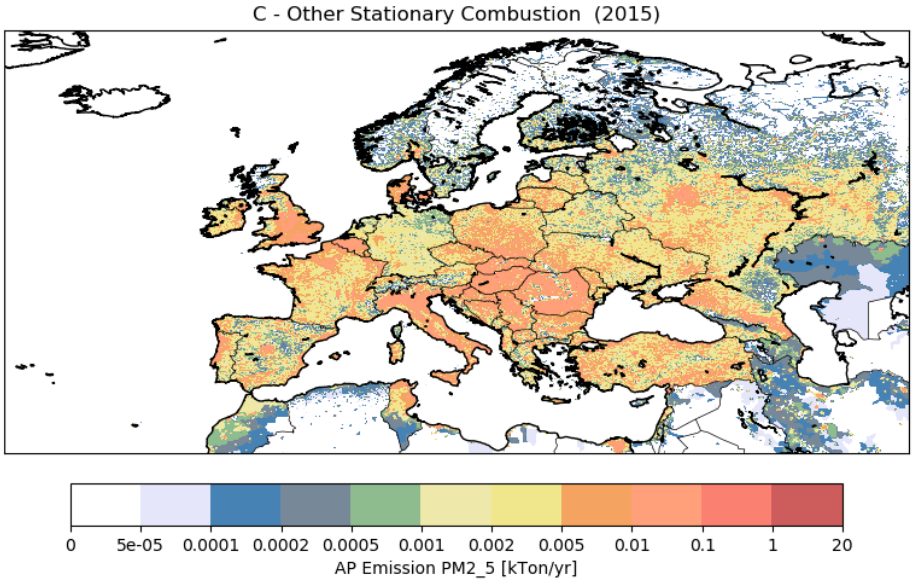
CONDENSABLES

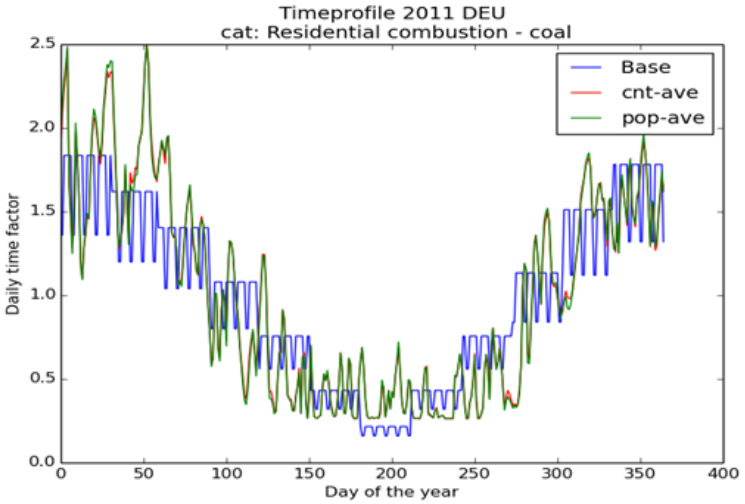
Current coverage of condensables in officlal emission inventories is a mix – need to harmonize before doing any source apportionment

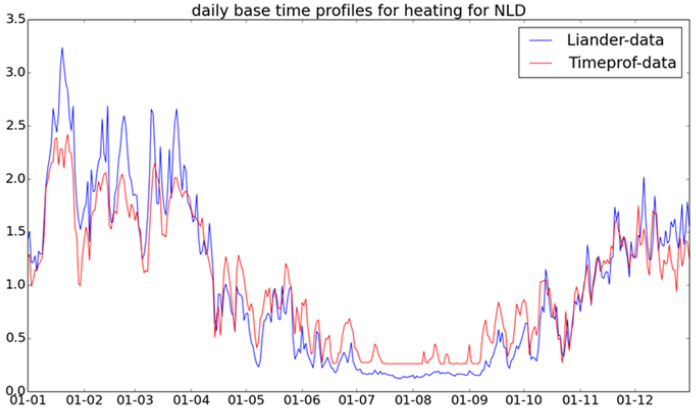


Note: reported in 2017, may have changed since then

EMISSION MODELLING (IN SPACE & TIME)



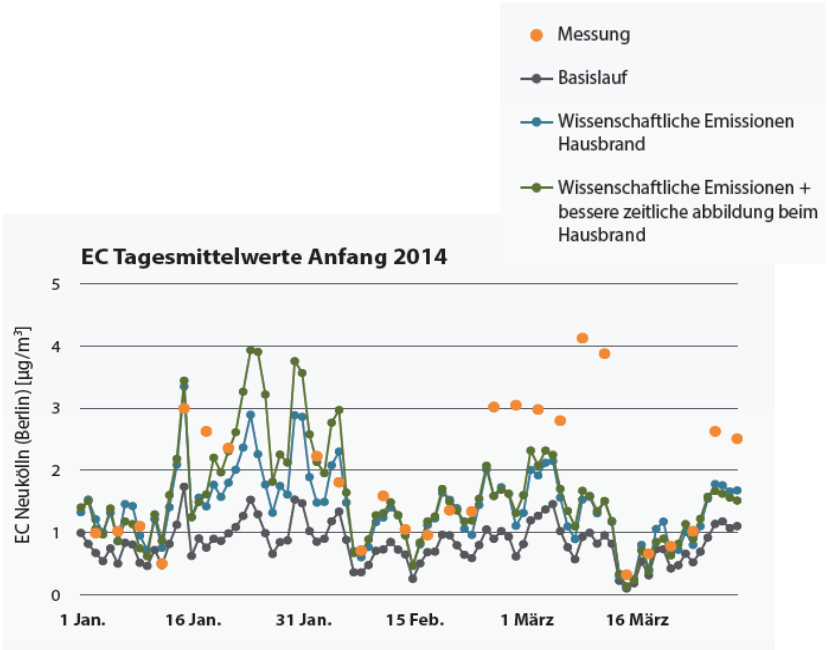


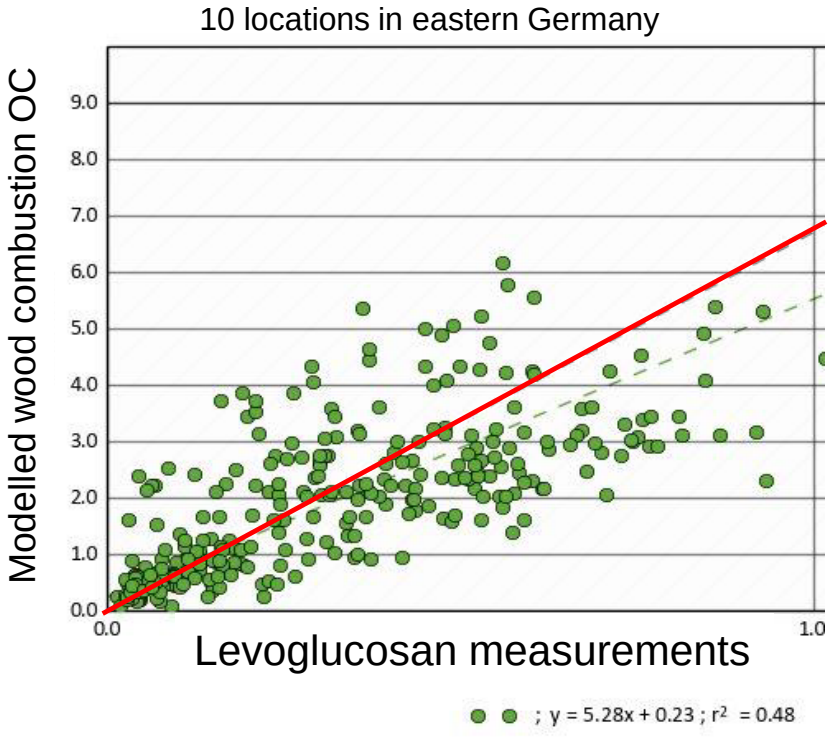


Novel spatial distribution developed for wood use depending on wood “availability” (more use near forests)

Note discrepancies at country borders => artefact of reporting

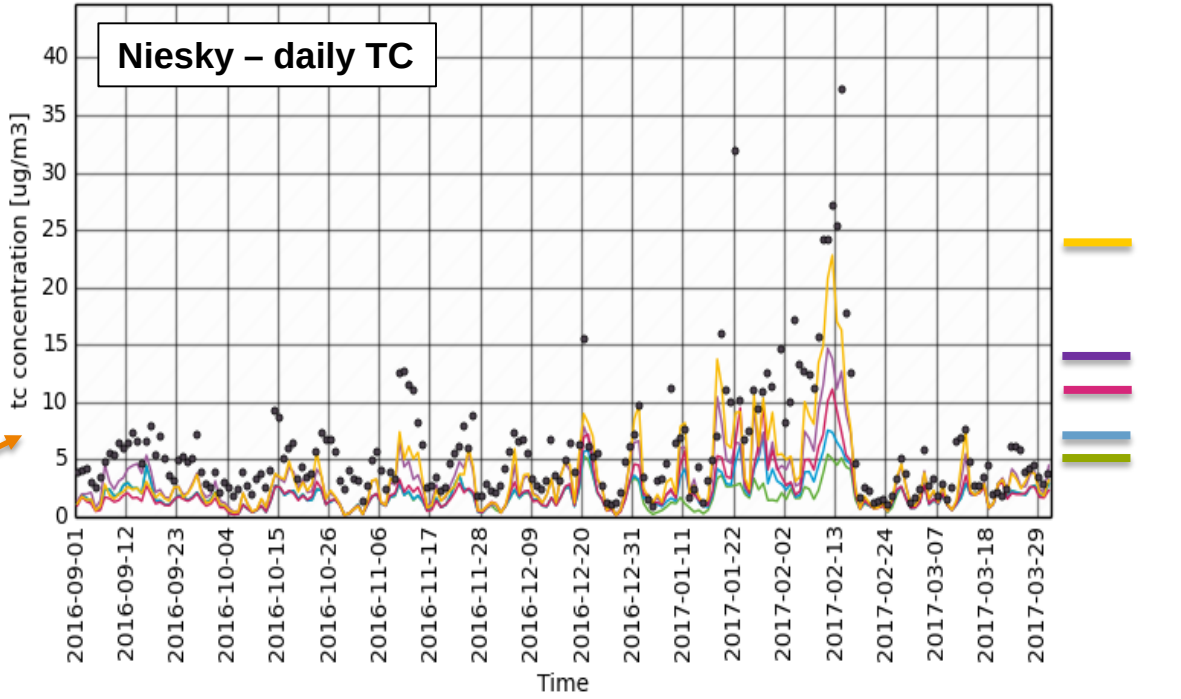
IMPACT ON MODELLED EC AND OC IN BERLIN AND EASTERN GERMANY



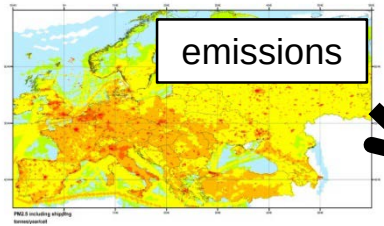


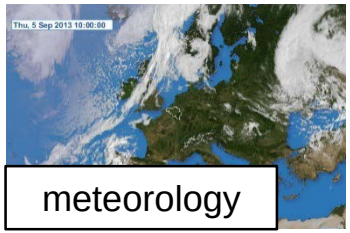
From literature: Levoglucosan : OC = 1 : 6.7 (red line)

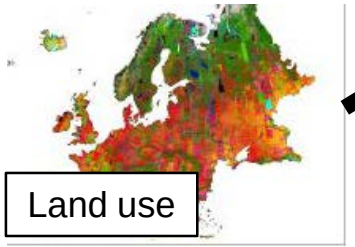
IMPACT OF IMPROVEMENTS ON TOTAL CARBON



CHEMISTRY TRANSPORT MODELS PROVIDE THE LINK BETWEEN EMISION AND CONCENTRATION

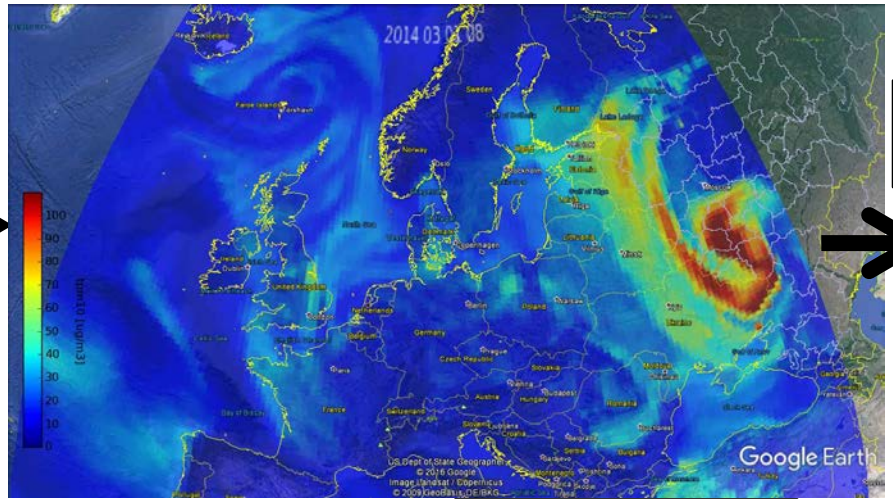






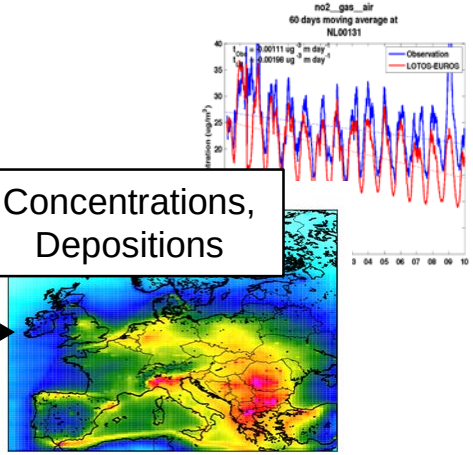
PM source apportionment

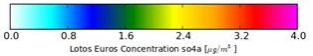
The weather and thus pollutant formation and transport are highly variable



Particulate matter
Labelling approach to track origin of PM

Concentrations, Depositions





Source contributions

GOAL OF TOPAS

https://topas.tno.nl

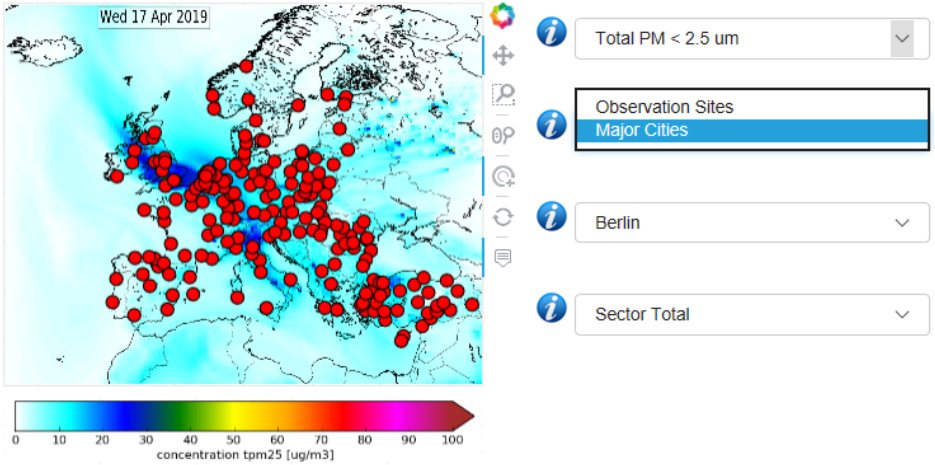
To quantify the origin of air pollution on a daily basis using our latest insights.

The prototype TNO Operational Pollution Apportionment Service (TOPAS) is based on the chemical transport model LOTOS-EUROS with its labeling approach forced by TNO emission information and CAMS products.

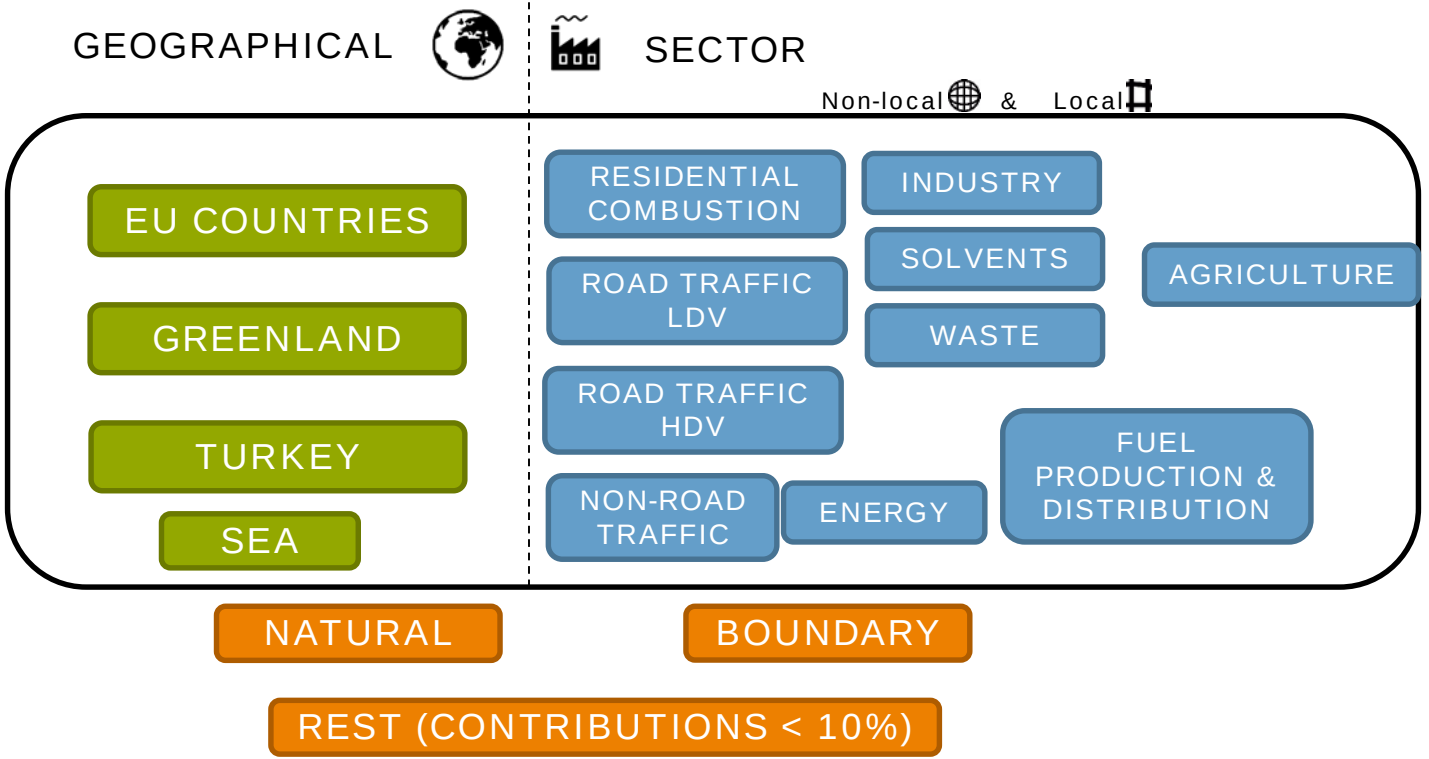
TOPAS aims to differentiate the origin of PM in:

- Local contributions
- Source sector contributions
- Transboundary contributions
- Natural contributions

Daily modelled PM10/PM2.5 based on hourly model output (model resolution 0.5x0.25°)

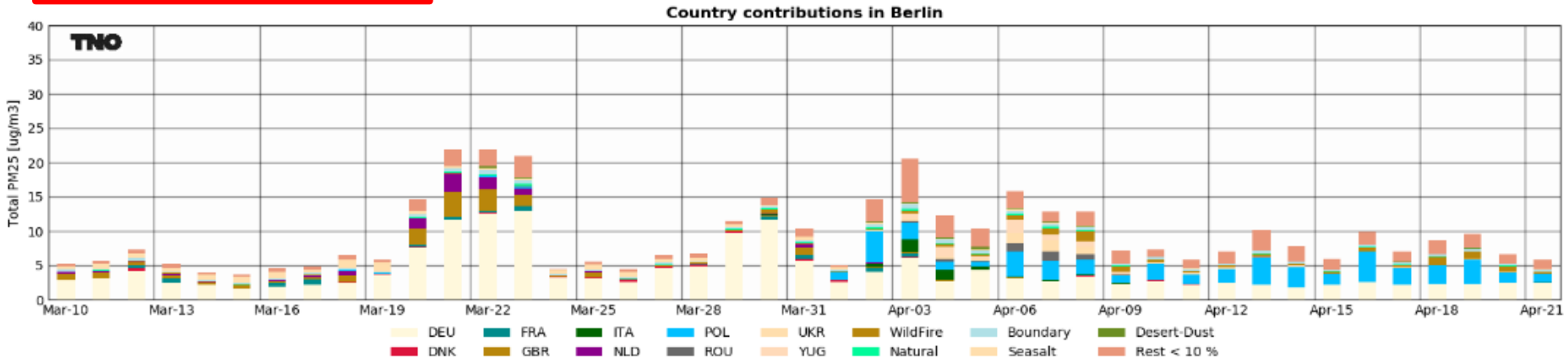


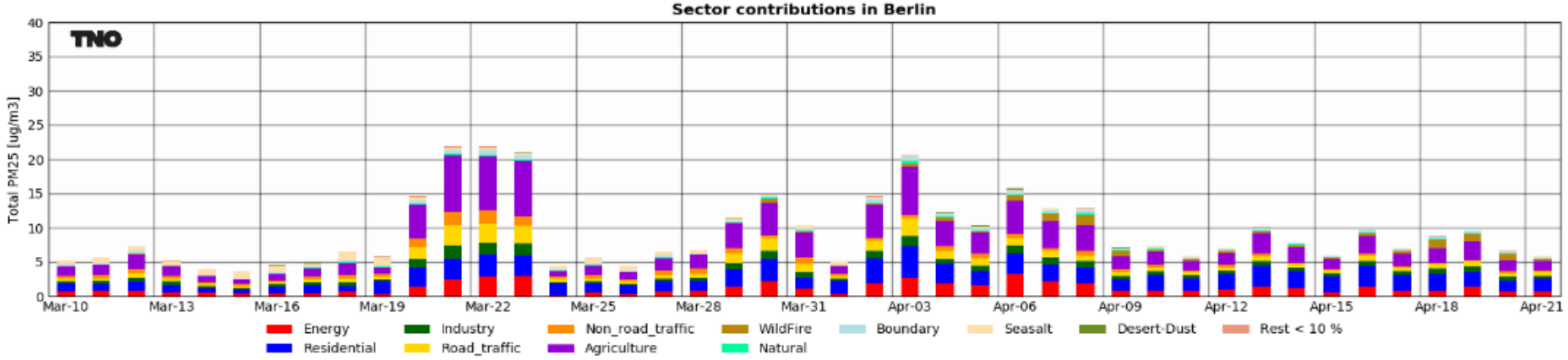
WE EXPLOIT THE LABELLING SYSTEM OF LOTOS-EUROS – TWO SIMULATIONS IN PARALLEL

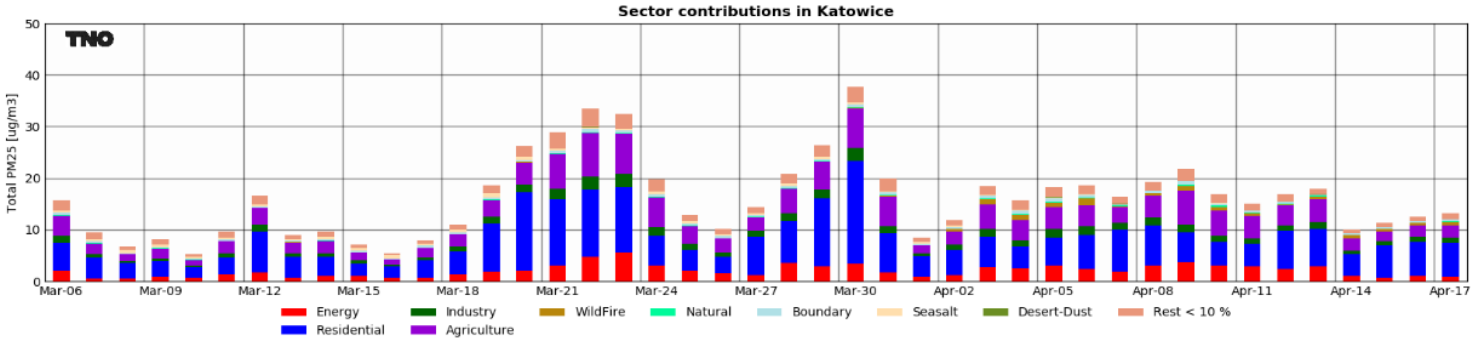


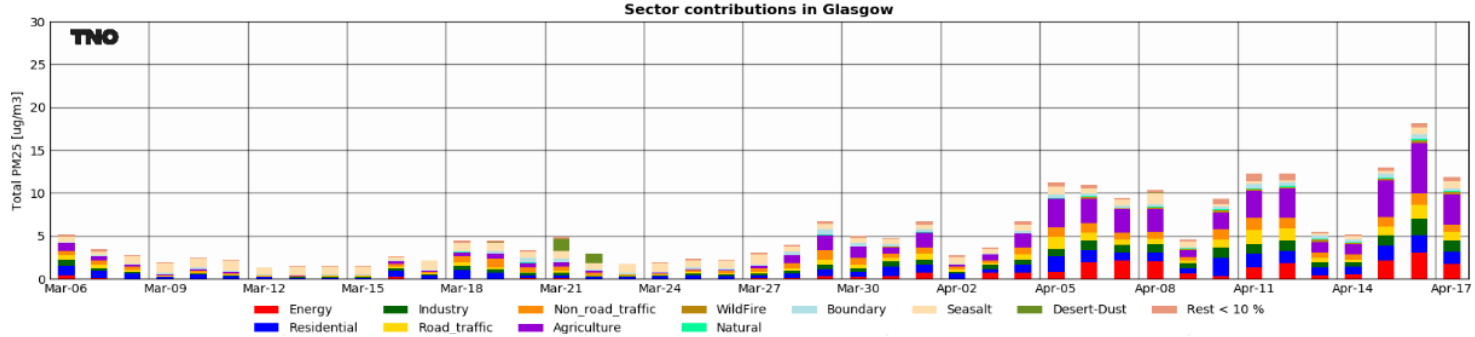
https://topas.tno.nl

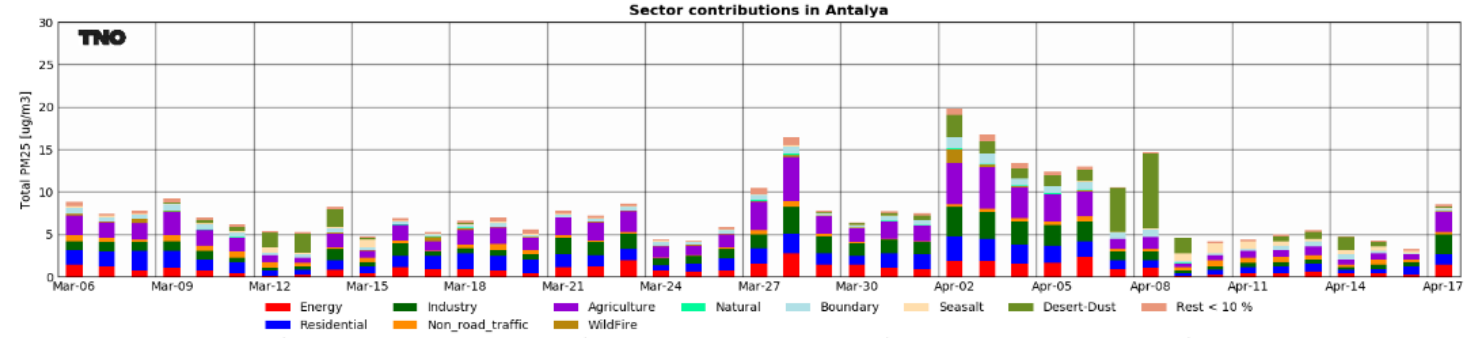
TNO innovation for life



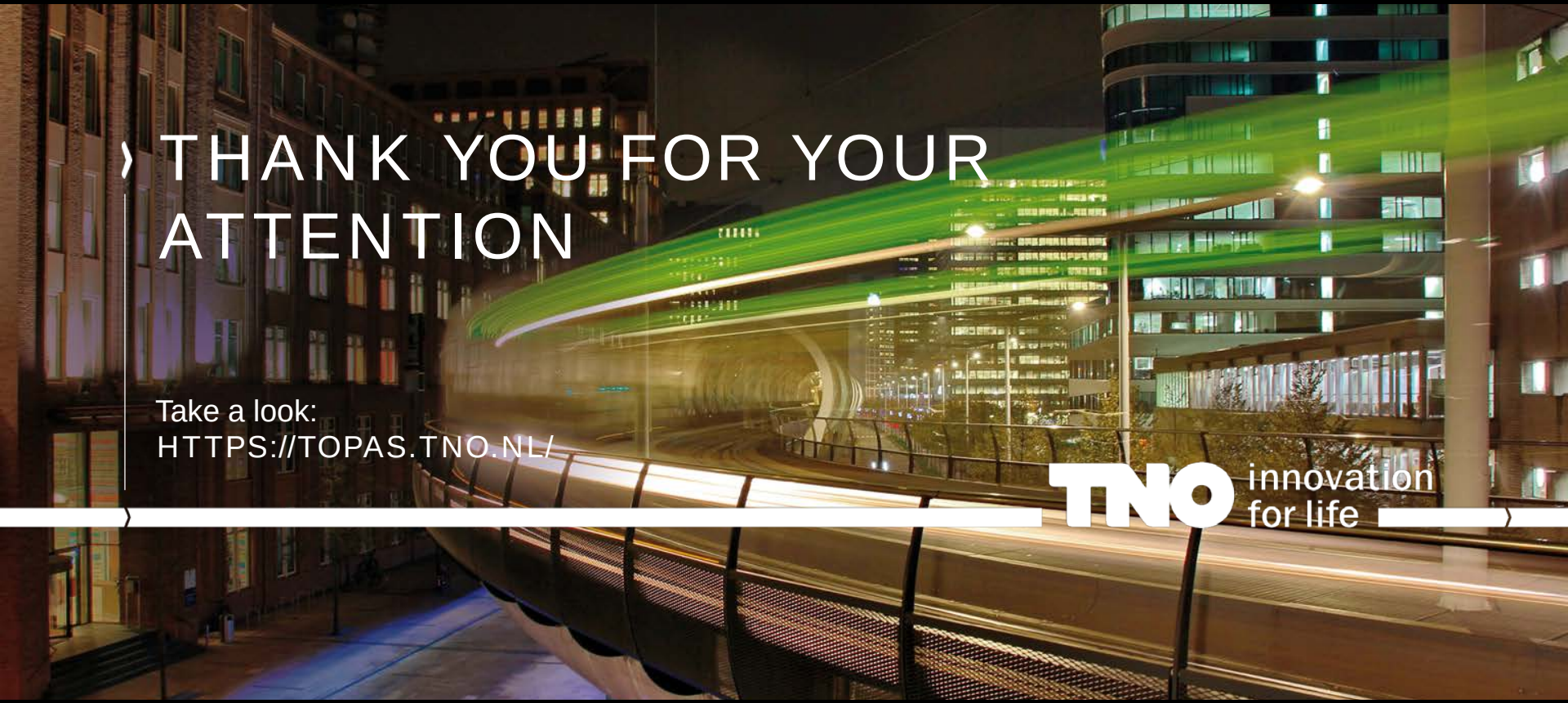








innovation for life


THANK YOU FOR YOUR ATTENTION
Take a look:
HTTPS://TOPAS.TNO.NL/
TNO innovation for life

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