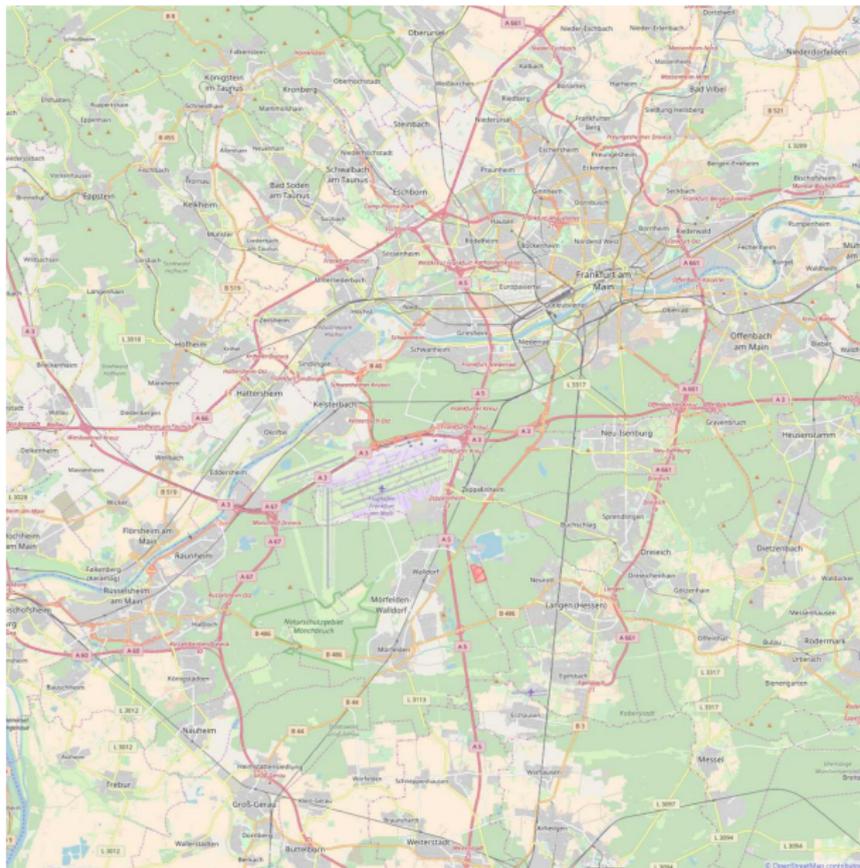


Ultrafine particles around a major airport – attempt to model total ultrafine particle number concentration around Frankfurt Airport

UFOPLAN 3716 52 200 0

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Frankfurt Airport (FRA)



2015:
2 300 ha
460 000 movements
61 million passengers
2 million tons cargo

Project UFOPLAN 3716 52 200 0 (2017 – 2019)

on behalf of the German Environment Agency (UBA)

Aims

- Model total UFP number concentration.
- Use state-of-the-art techniques.
- Identify lacks and gaps.
- Compare with measurements.

Applied Database and Model Network

Operation data

Emissions

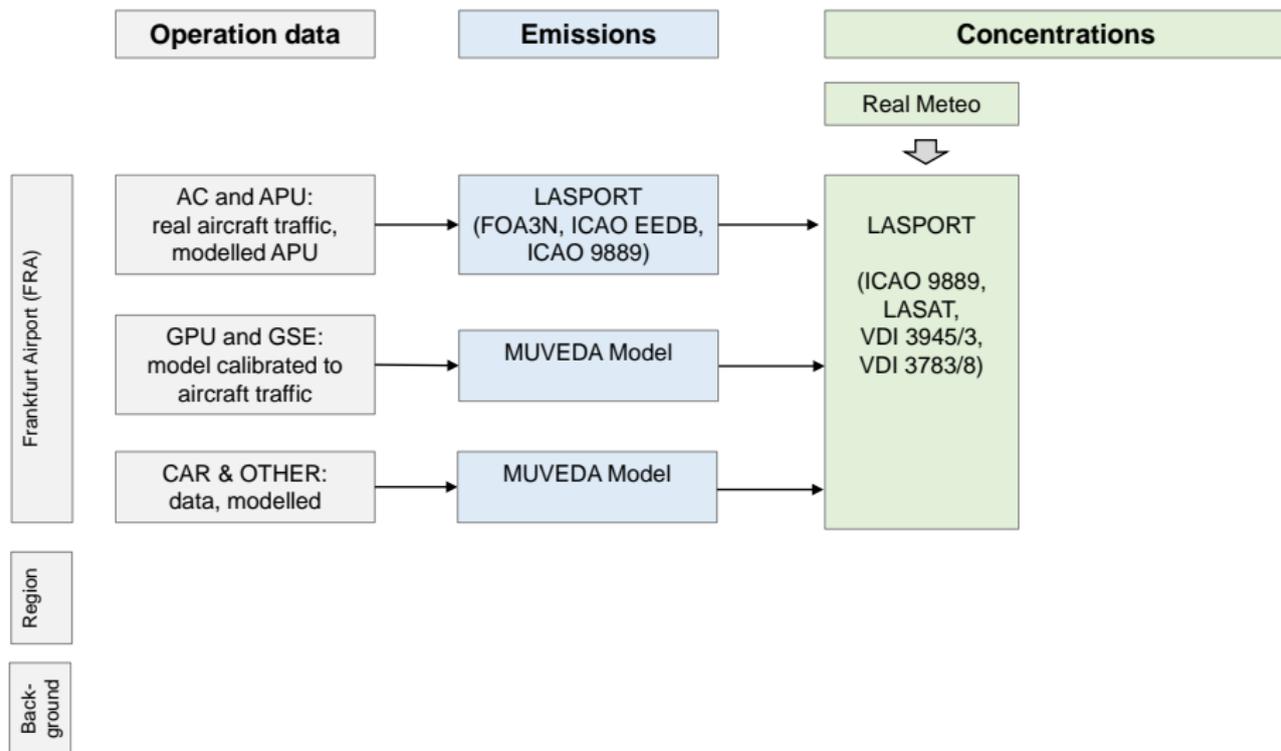
Concentrations

Frankfurt Airport (FRA)

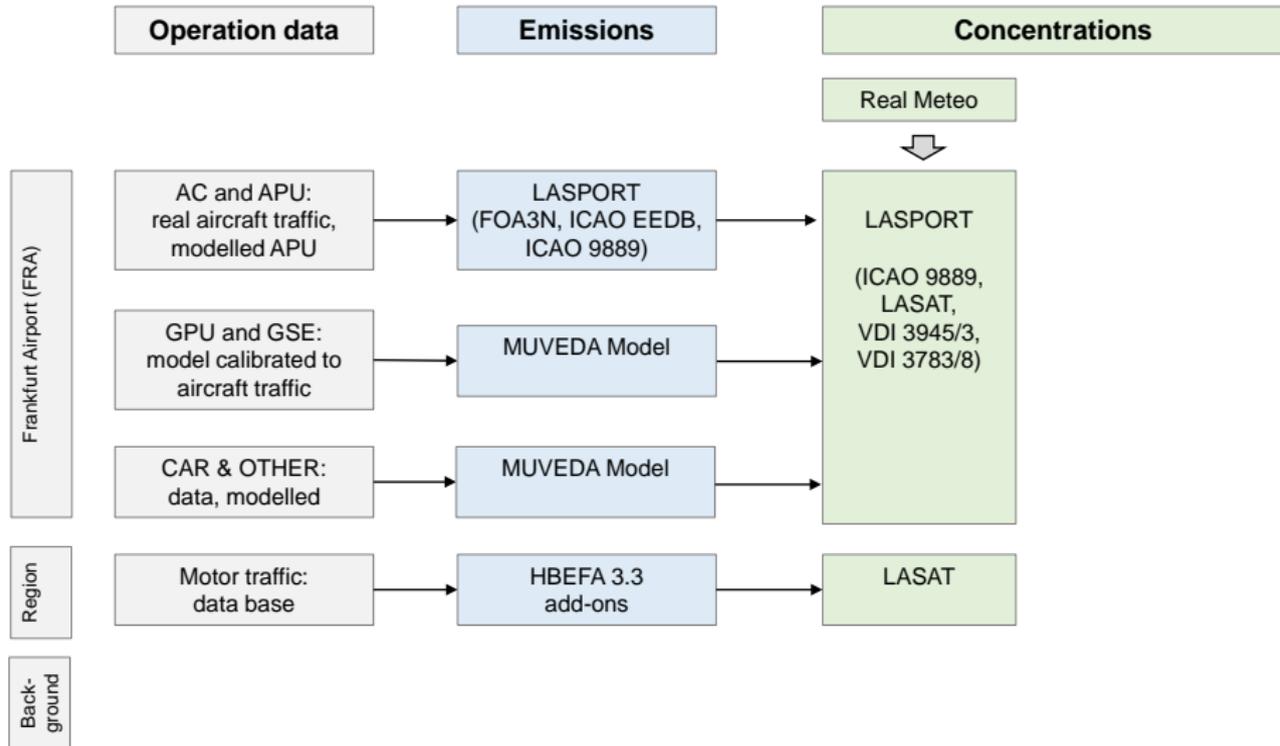
Region

Back-ground

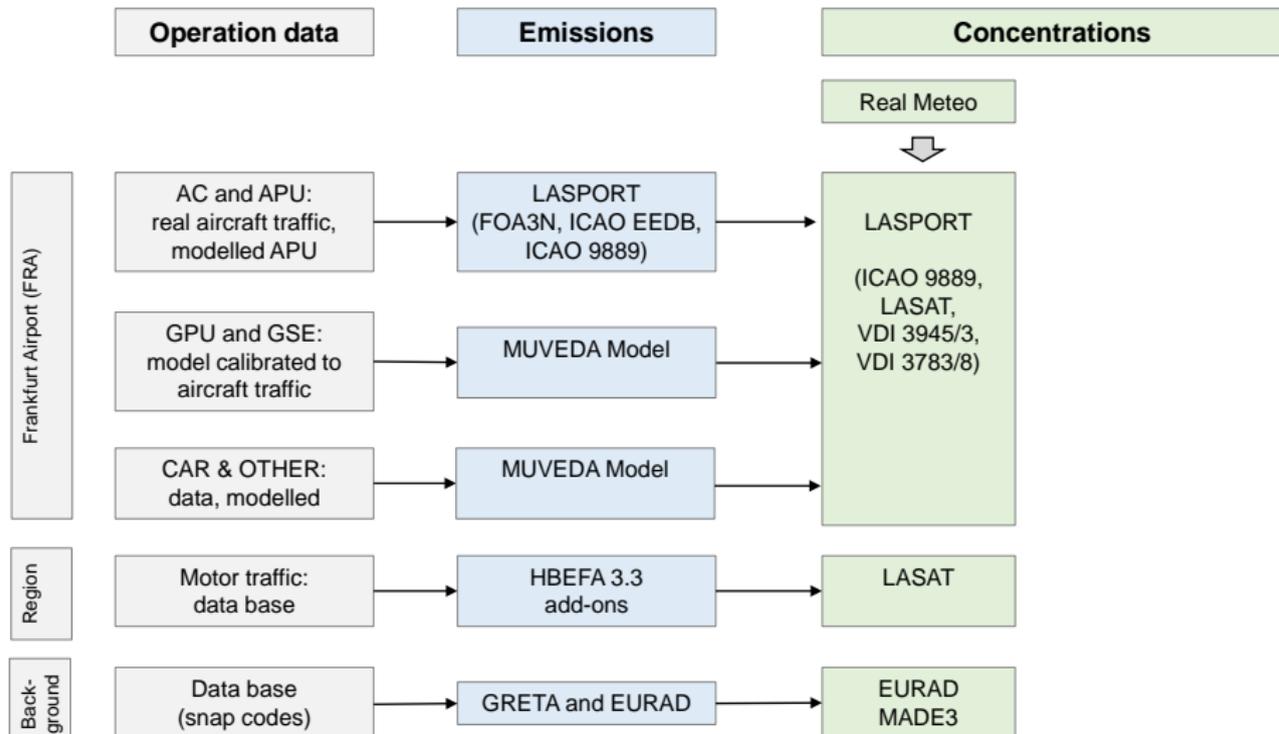
Applied Database and Model Network



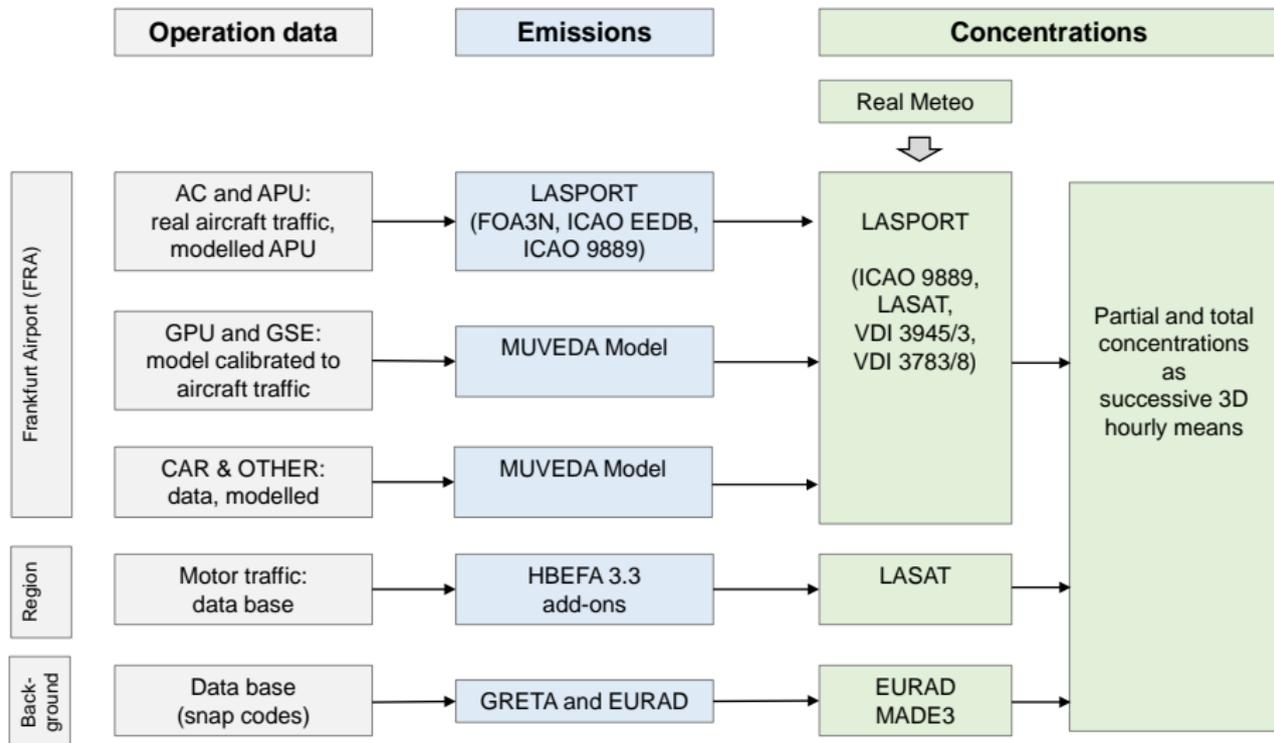
Applied Database and Model Network



Applied Database and Model Network

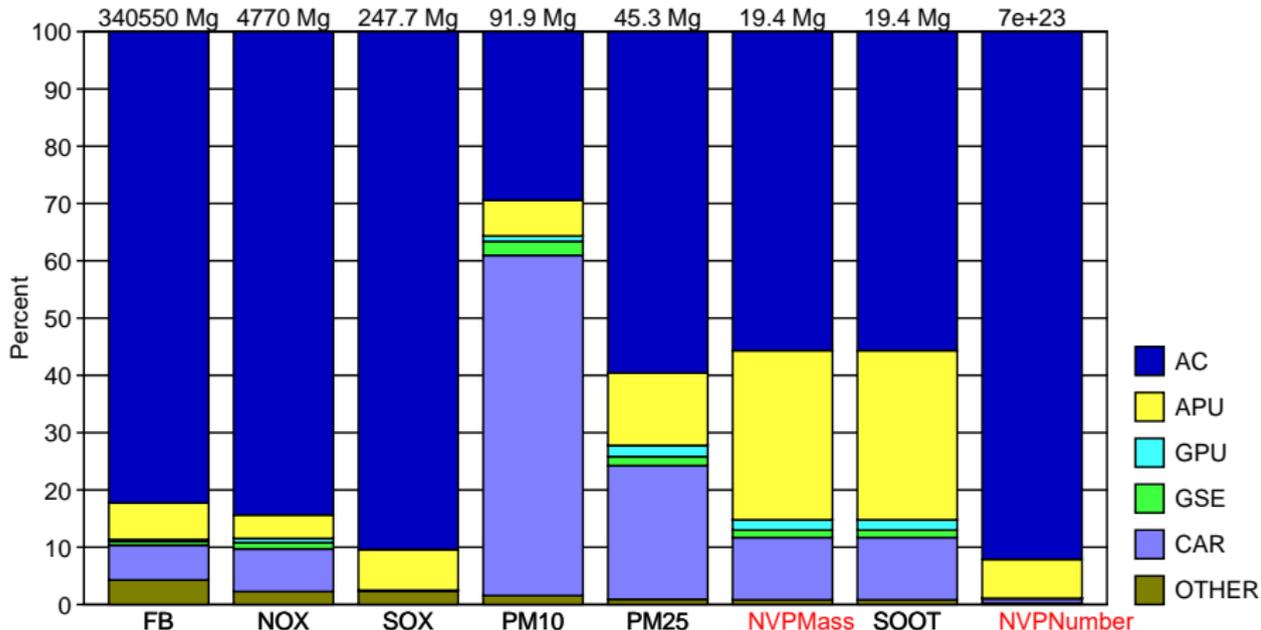


Applied Database and Model Network

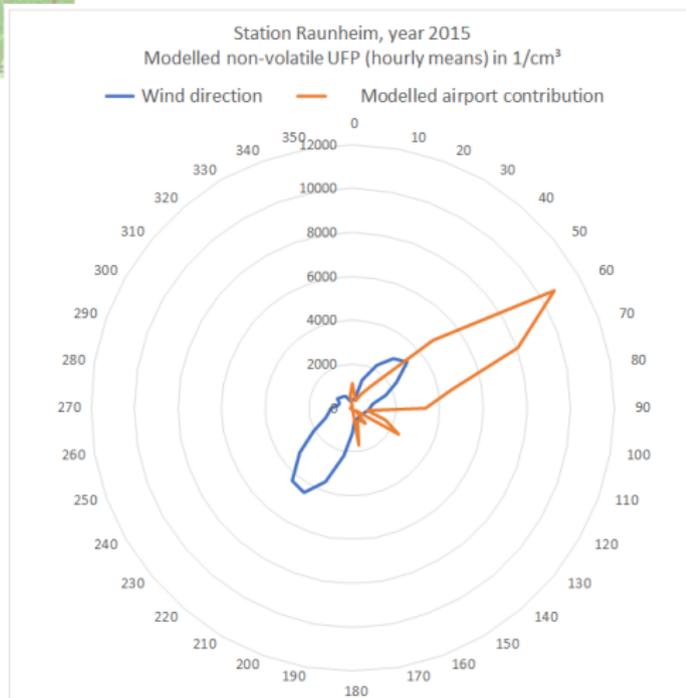


Airport Sources – Annual Emissions

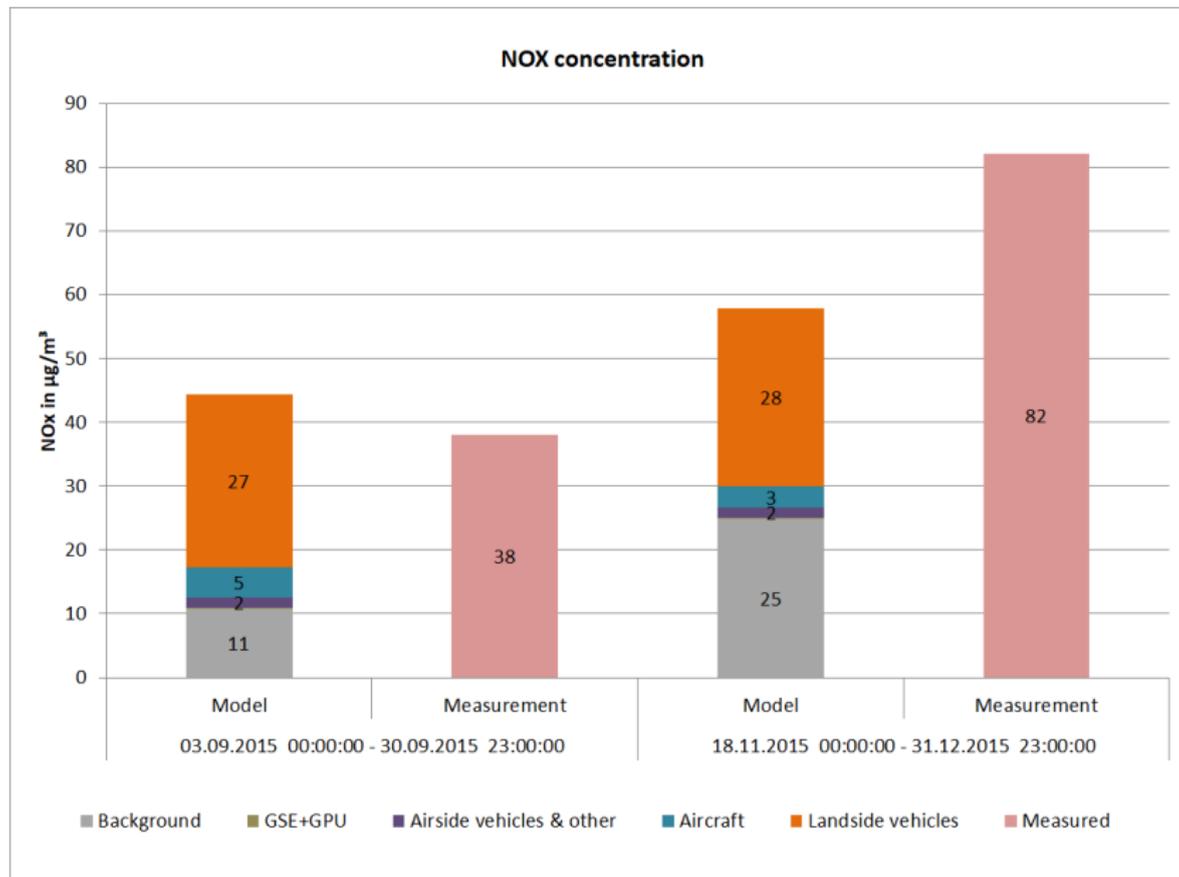
Airport & aircraft (up to 3000 ft) emissions 2015



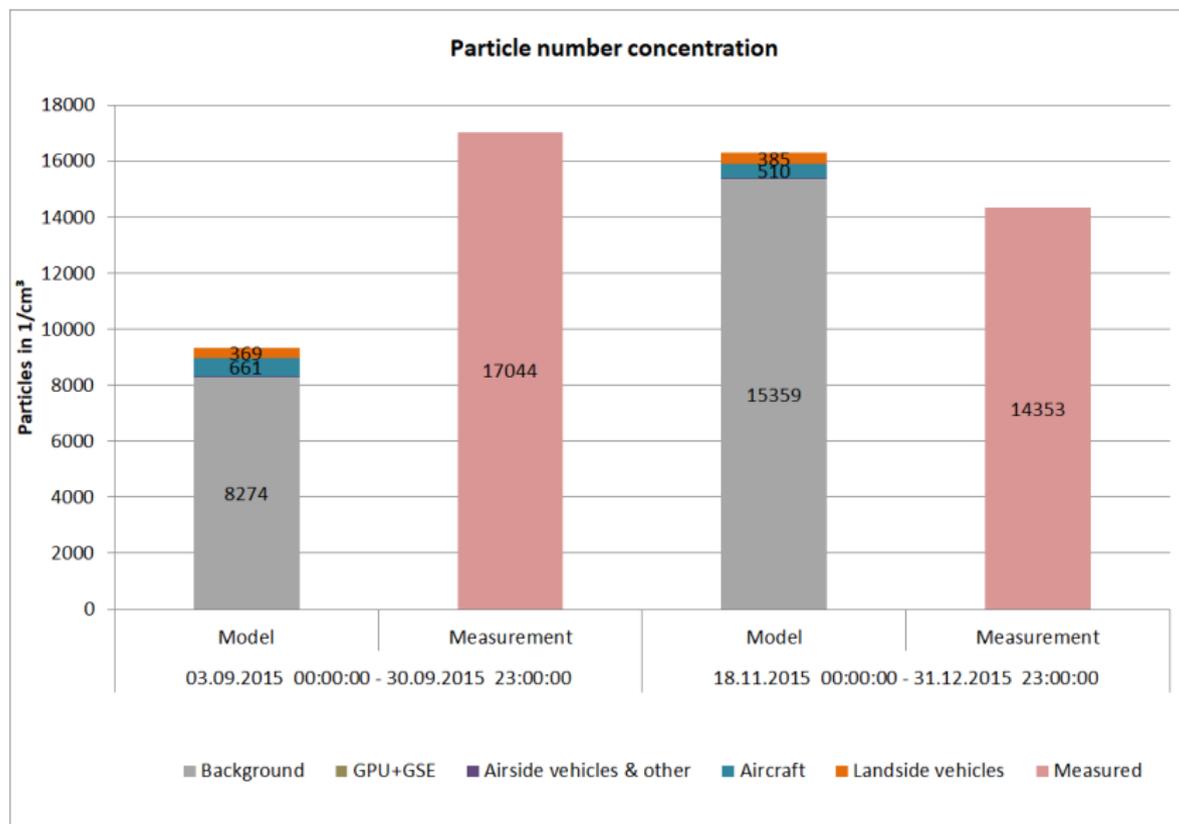
Airport Sources – Modelled Hourly Means (at Rh)



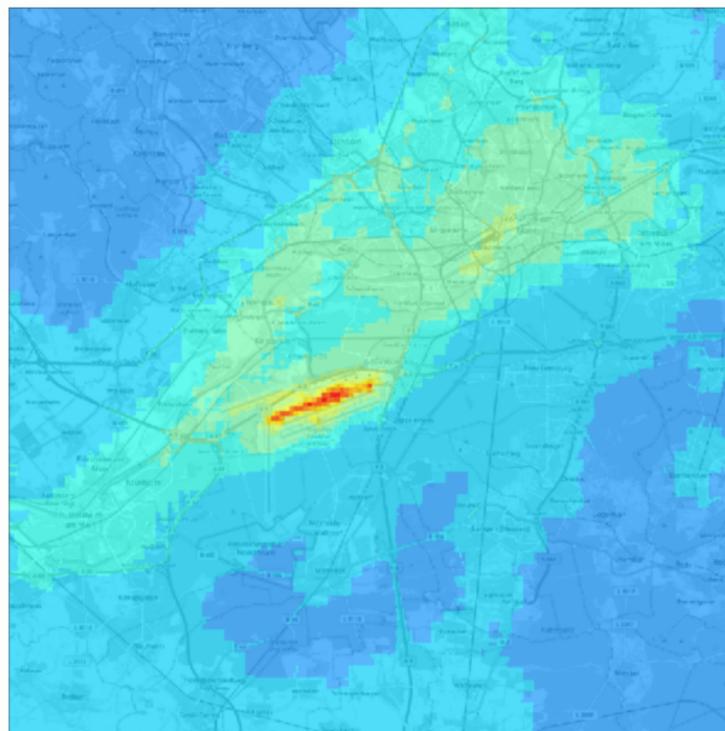
All Sources – Modelled & Measured Long-Time (Rh)



All Sources – Modelled & Measured Long-Time (Rh)



All Sources - Modelled Annual Mean



annual mean concentration near ground
aircraft nv 15-40 nm
motor nv 23-4000 nm
other nv+v 3-3000 nm
PM in 1/cm³



Apples and Oranges

Set	Data base	Particle type	Diameter Sub-ranges	Period Resolution
Modelling				
AC+APU LASPORT	ICAO + FOA3	nv	15-40 nm no	2015 1 h
airport, other LASPORT	HBEFA + more	nv	23-4000 nm no	2015 1 h
motor traffic LASAT	HBEFA + more	nv	23-4000 nm no	2015 1 h
Background EURAD+MADE	GRETA	nv+v	3-3000 nm yes	2015 1 h

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Background EURAD+MADE	GRETA	nv+v	3-3000 nm yes	2015 1 h
Measuring				
HLNUG Raunheim	UCPC TSI 3776	nv+v	3-1000 nm no	12/2015 ff 5 s
HLNUG Raunheim	SMPS TSI 3031	nv+v	10-500 nm yes	9/2017 ff 5 min
HLNUG Schwanheim	SMPS TSI 3031	nv+v	10-500 nm yes	10/2017 ff 5 min
UBA Langen	SMPS TSI 3031	nv+v	10-500 nm yes	2015 ff 5 min
UBA Langen	SMPS TSI 3936	nv+v	20-500 nm yes	2015 ff 10 min

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- Final project report to appear in 2019
- Additional measurements at and around Frankfurt Airport
- Horizon2020 Projects AVIATOR and RAPTOR

Thank you for your attention!



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