

A LÉGKÖRI NUKLEÁCIÓ ÉGHAJLATI ÉS EGÉSZSÉGI KÖVETKEZMÉNYEI

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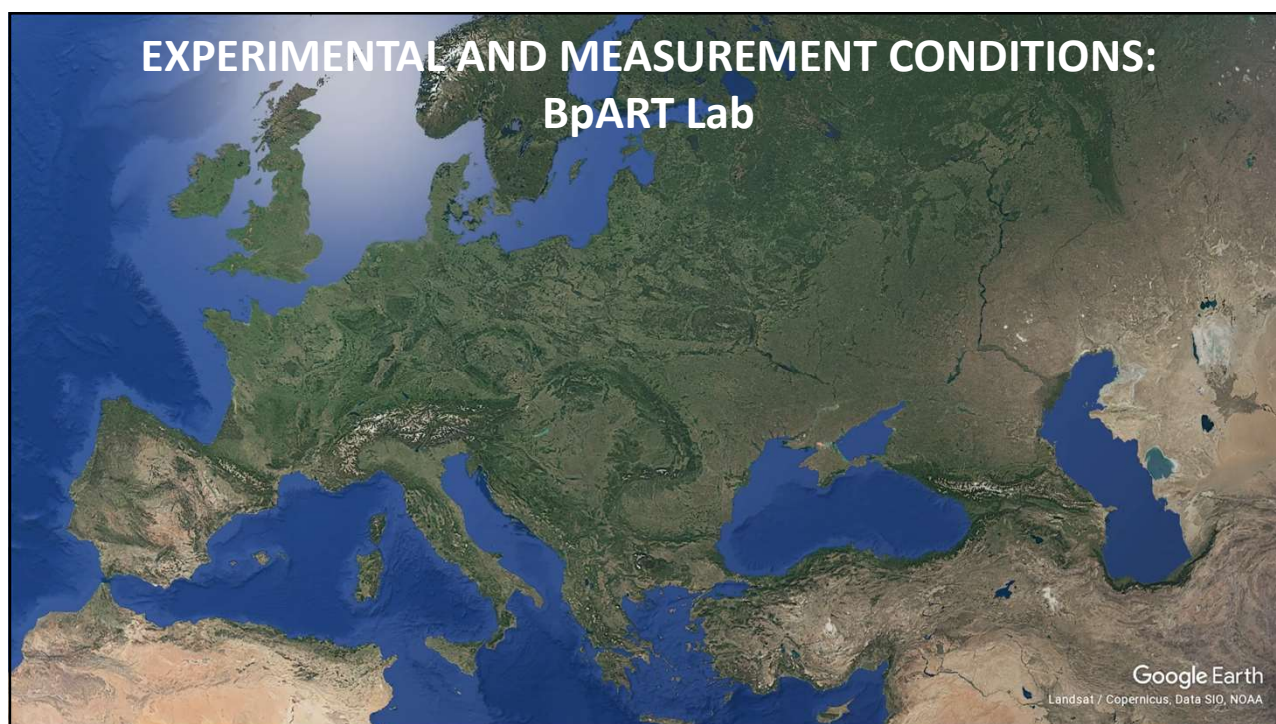
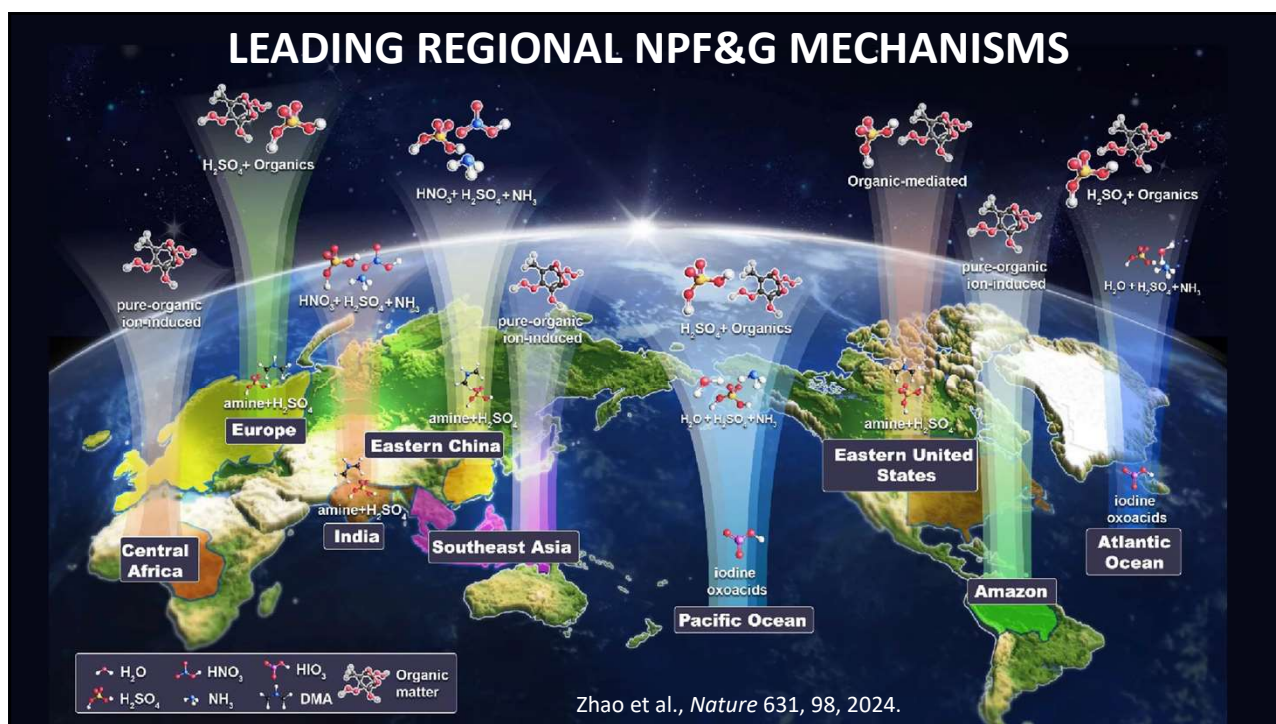
ELTE Kémiai Intézet és Meteorológiai Tanszék

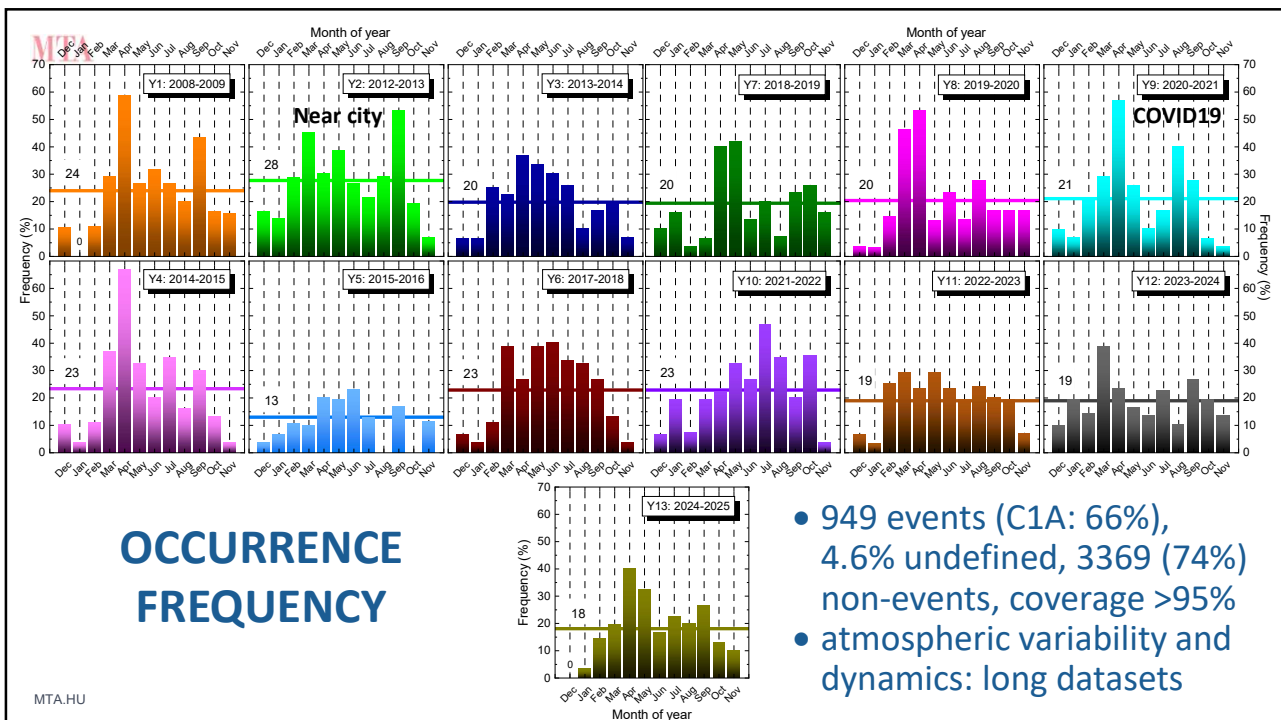
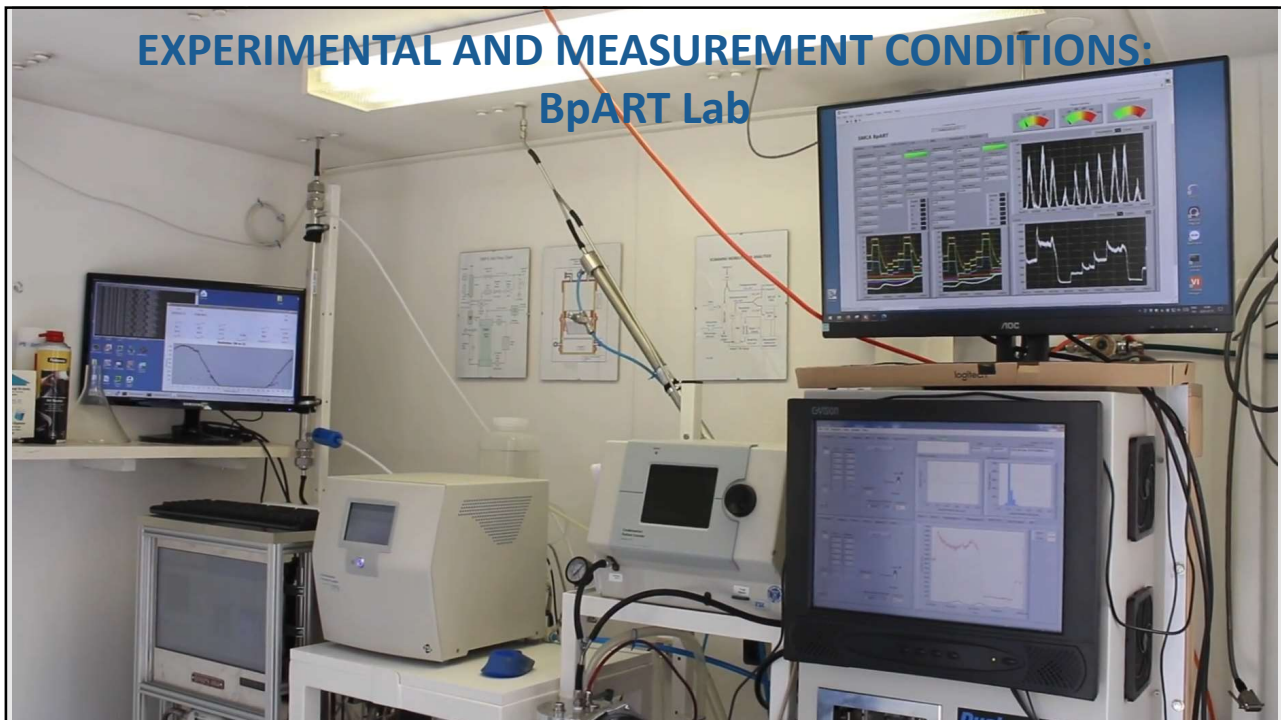
2025. november 4.

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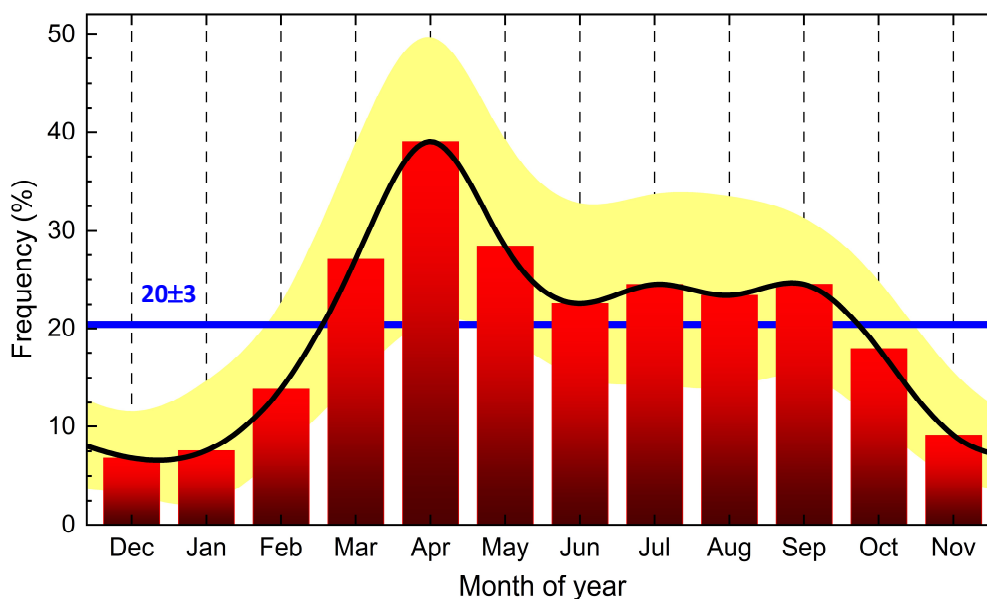
ATMOSPHERIC NPF&G PHENOMENON AND ITS IMPORTANCE

- 1) nucleation of vapours: $d_{\text{crit}} \Rightarrow$ birth of particles
- 2) particle growth: condensation $\Leftarrow$ autooxidation
- (H_2O ,) H_2SO_4 , NH_3 , amines, %LVOCs, and HOMs or HIO_3
- particle number burden and CCN in the global troposphere:
air quality, haze, clouds $\Rightarrow$ pollution and climate
- huge progress: atmospheric studies, chamber experiments,
(aerosol and climate) modelling, MD and QC calculations





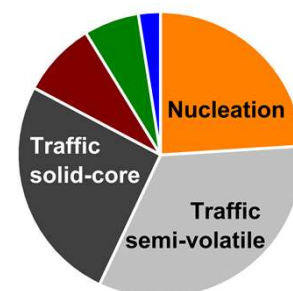
MEAN MONTHLY OCCURRENCE FREQUENCY



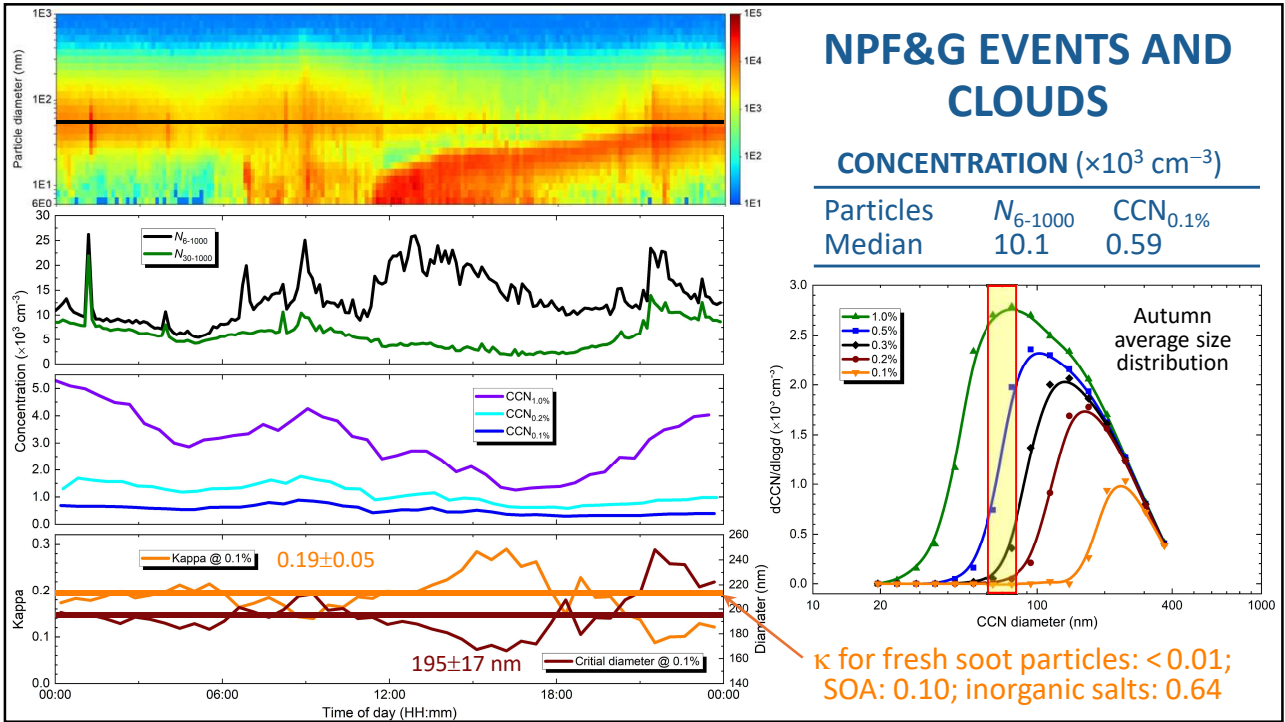
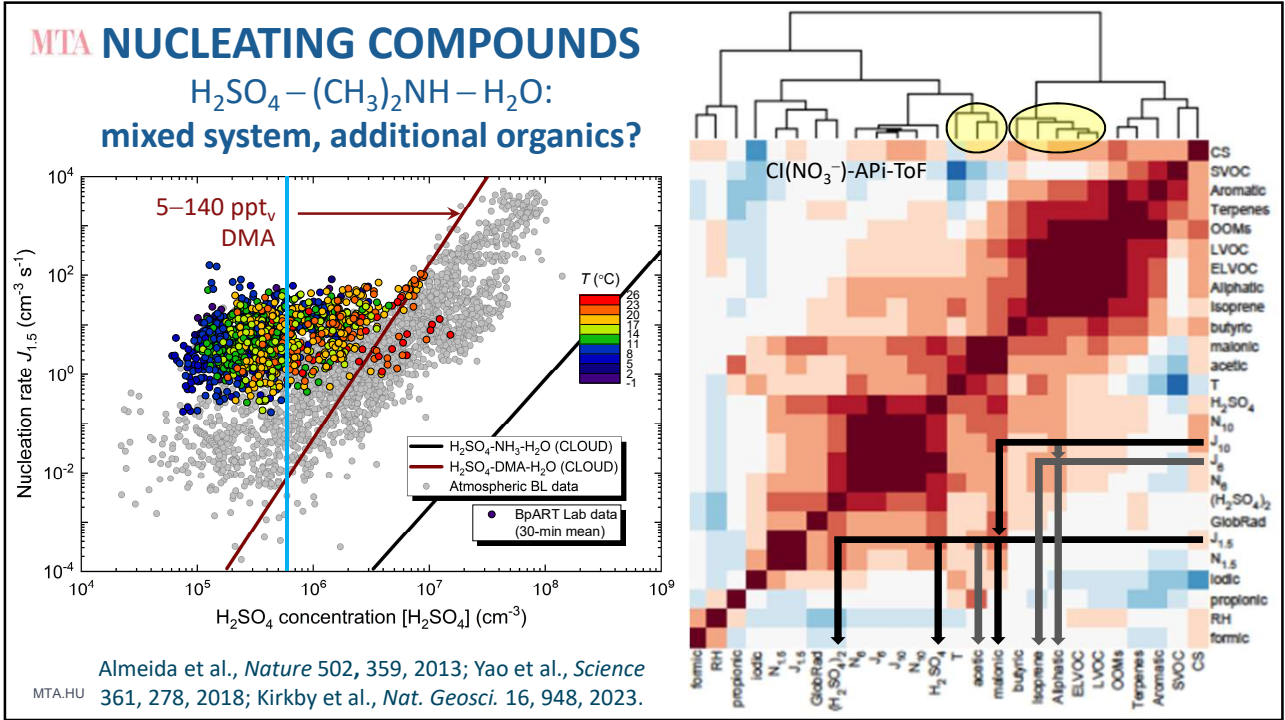
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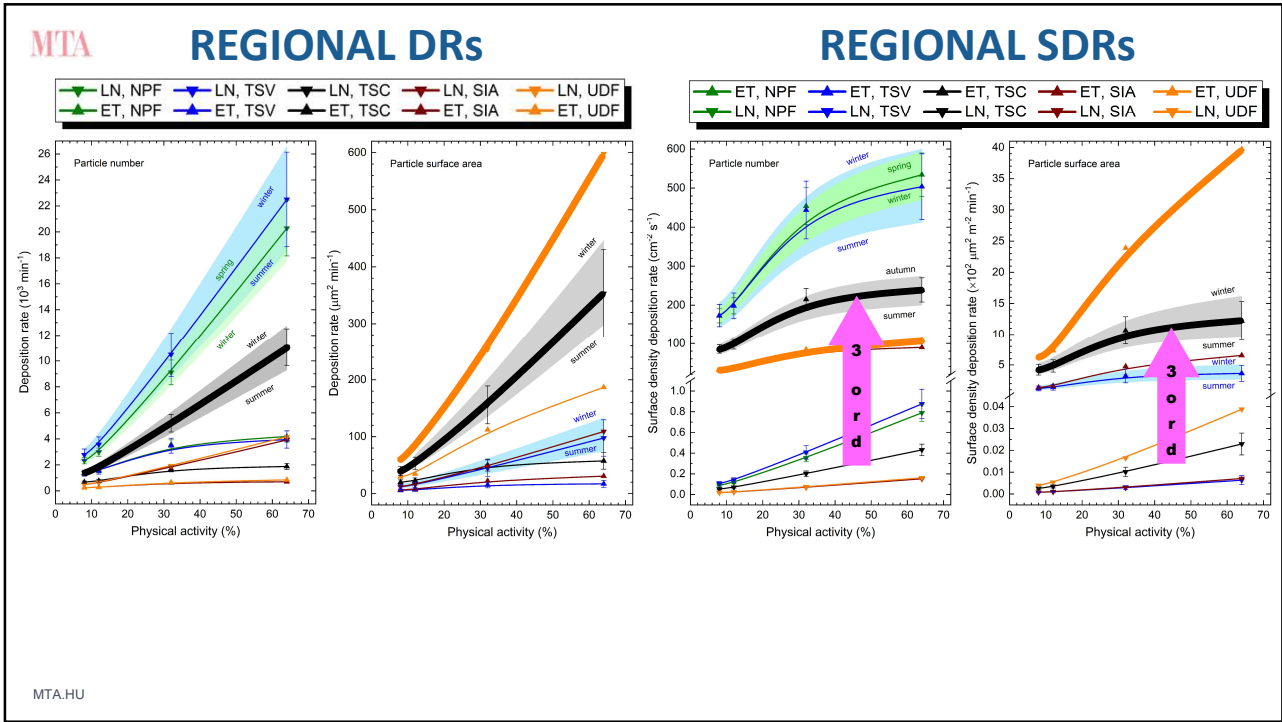
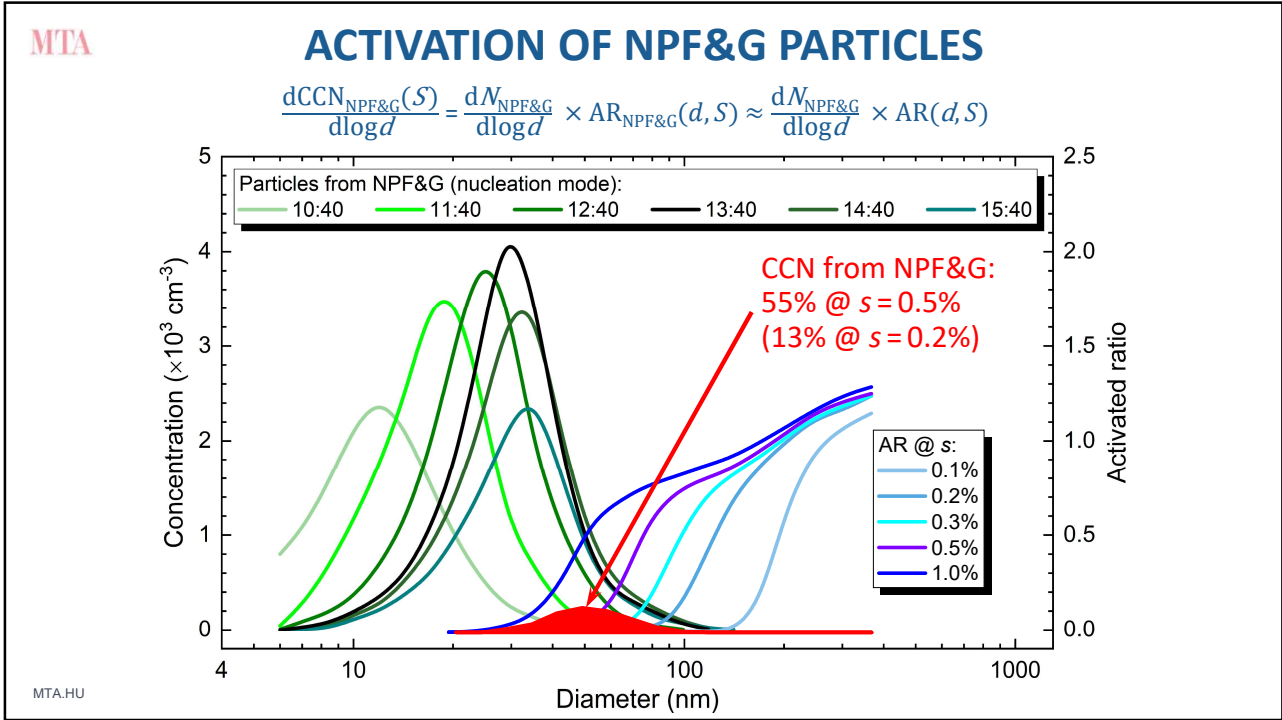
SOURCES OF PARTICLE NUMBER: PMF

- PNSD: 6-1000 nm, 27 size channels and air pollutants for 11 y with $\tau=1$ h
- separately for 4 seasons
- without/with dispersion correction (PBLH, WS)
- 6 main (3 major) sources:
 - 2 road vehicle emissions:
 - semi-volatile (TSV, $d_m \approx 30$ nm; spring-winter: 30, 26, 33, 37%)
 - solid-core (TSC, $d_m \approx 90$ nm; $26 \pm 1\%$)
 - nucleation (at least 27, 26, 24, 19%)
 - diffuse urban (UDF, solid fuel combustion, autumn & winter), SIA (sulfates, spring & summer)



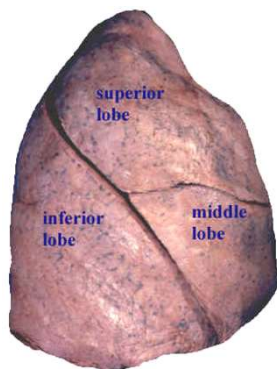
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REGIONAL DRs

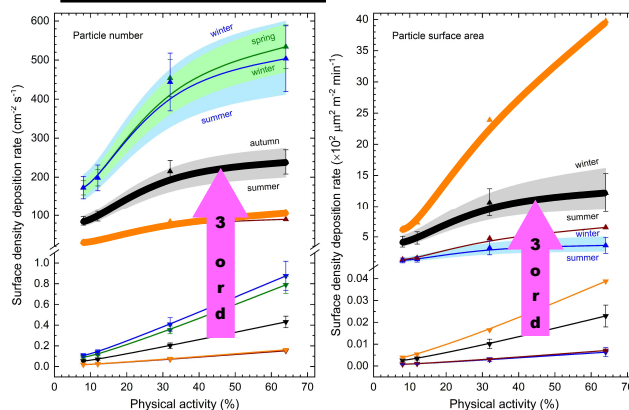


- partitioning for TSC:
AL/TB ratio $\approx 1.5-4$
- AL: thin layer, clearance

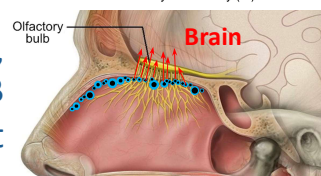
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REGIONAL SDRs

ET, NPF ET, TSV ET, TSC ET, SIA ET, UDF
LN, NPF LN, TSV LN, TSC LN, SIA LN, UDF



- smelling neurons,
bypassing the BBB
- coating of soot



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CONCLUSIONS (on effects facing the humanity)

- **human health**
 - biopersistent particles: coated soot from vehicle traffic, solid fuel burning (in winter)
 - DR: physical activity, mainly to AL region
 - SDR: direct translocation from nose to brain
- **urban climate**
 - AF and kappa lower, critical effective diameters larger
 - droplet formation: composition or size limited, NPF&G
- **health AND climate, potential answer: NPF&G process**

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