

URBAN ULTRAFINE PARTICLES IN EUROPE RI-URBANS Research Infrastructures Services Reinforcing Air Quality Monitoring Capacities in European Urban & Industrial Areas

RI-URBANS WP1 GROUP

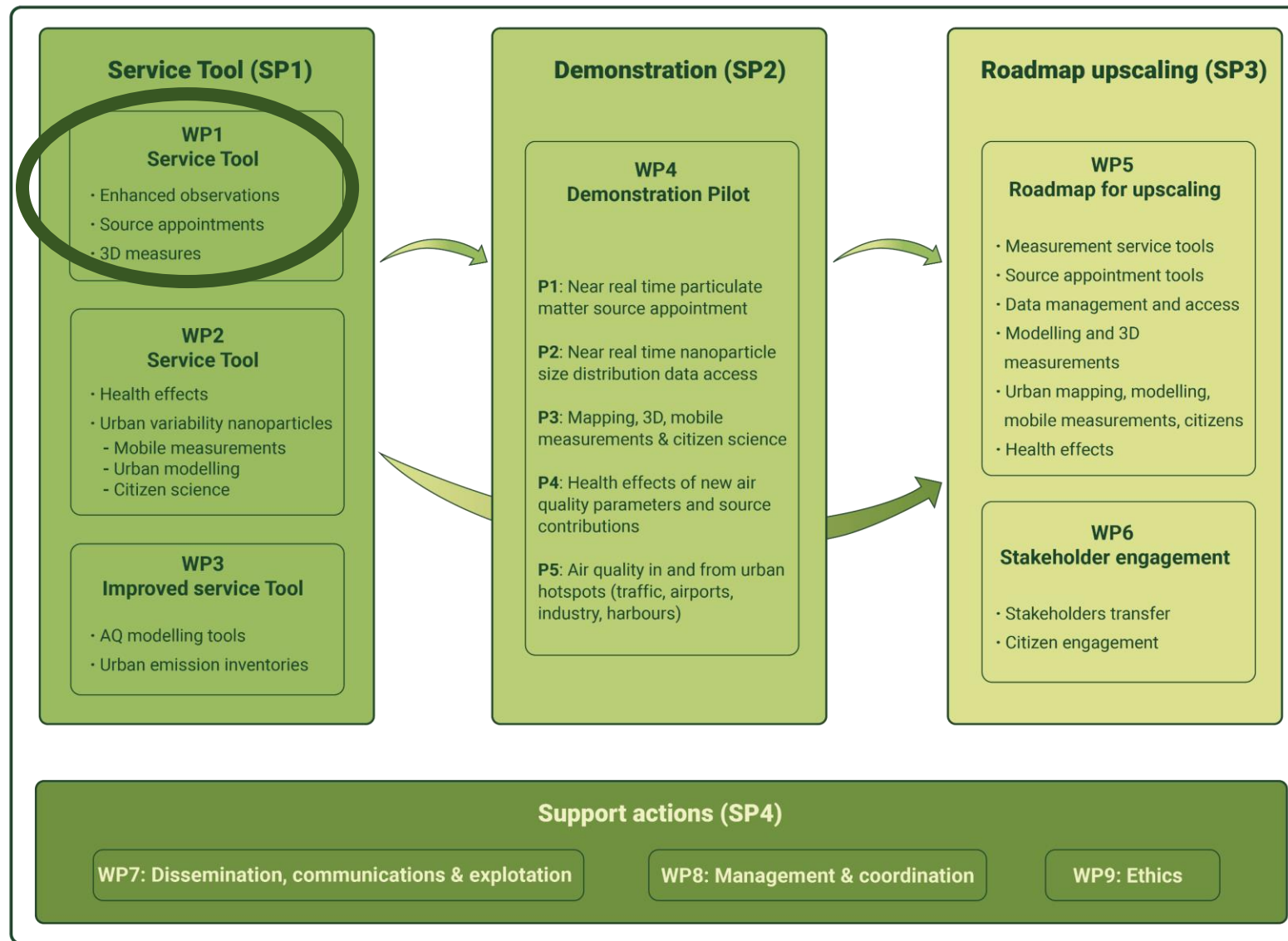
4th Expert Panel on Clean Air in Cities (EPCAC) 16 November 2022



RI-URBANS (101036245)

PILLARS & WORK PACKAGES

UFP
PNSD

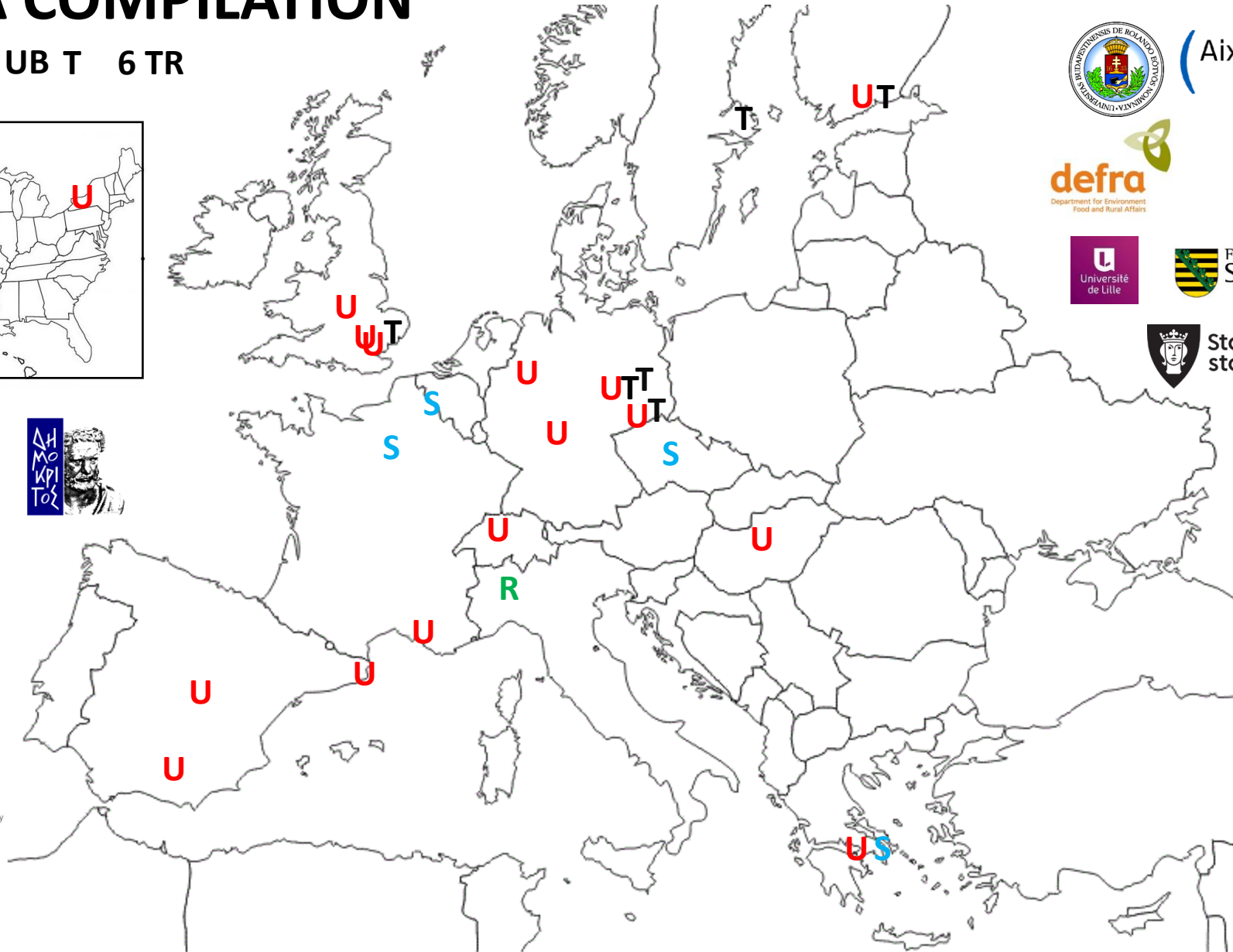
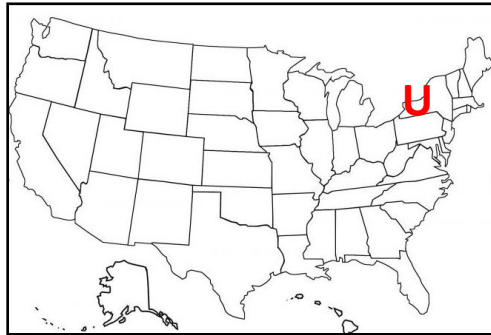


14 countries, 25 beneficiaries, 1 associated beneficiary, starting with 11 cities



UFP-PSD DATA COMPILATION

R, S 1 REG, 4 SUB U 16 UB T 6 TR



UKD Universitätsklinikum
Düsseldorf



Aix-Marseille
université

Umwelt
Bundesamt

defra
Department for Environment
Food and Rural Affairs



Université
de Lille

Freistaat
SACHSEN

Stockholm
University

Stockholms
stad

SLB · analys

INSTITUTE
OF CHEMICAL
PROCESS
FUNDAMENTALS
OF THE ASCR

12 datasets



Other than
ACTRIS

15 datasets

RI
URBANS

RI-URBANS (101036245)



UNIVERSITY OF
BIRMINGHAM



CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

INERIS

TROPOS

Leibniz-Institut für
Troposphärenforschung



Joint Research Centre
JRC

Imperial College
London

Empa
Materials Science and Technology



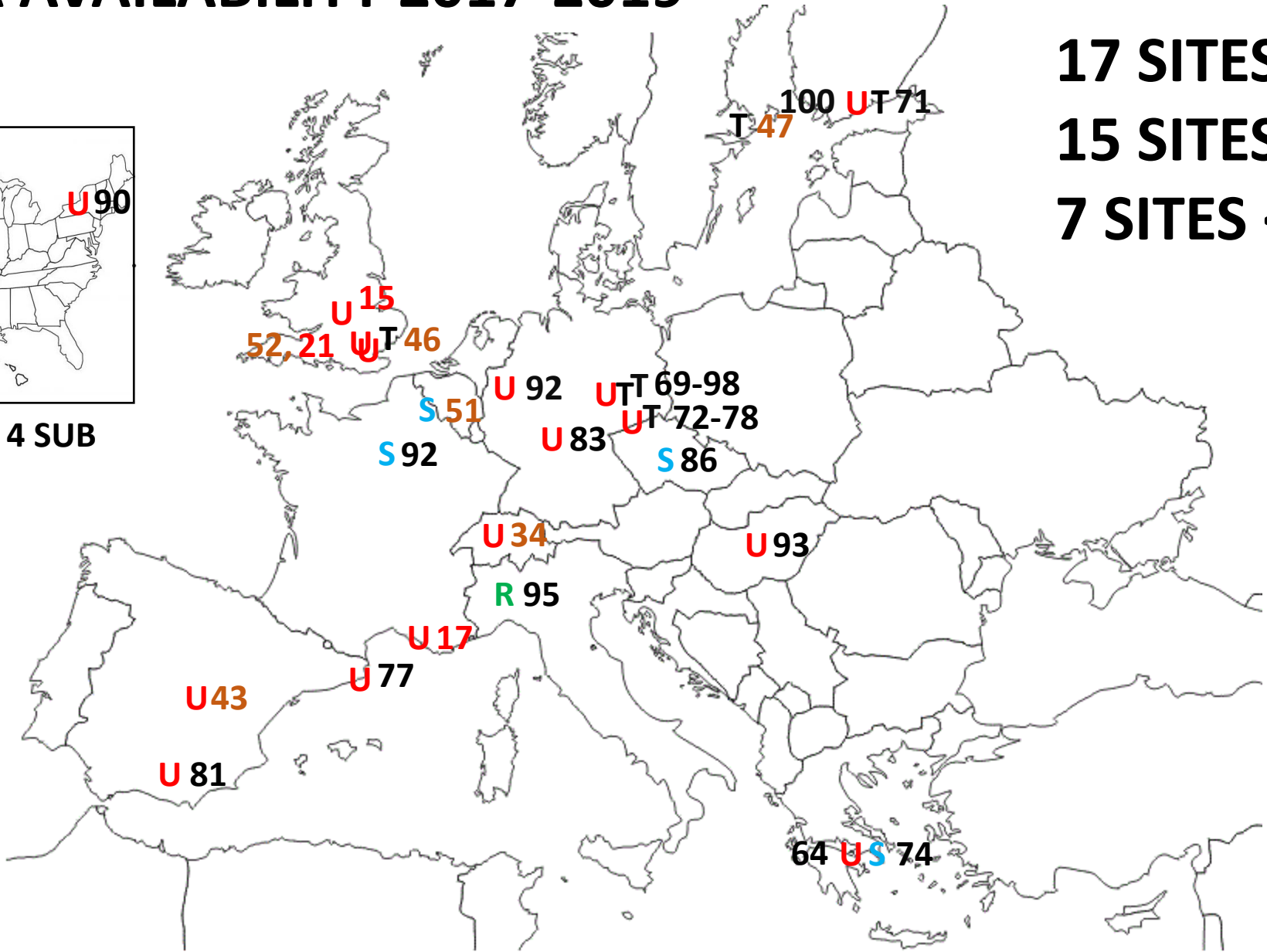
European
Commission



4th Expert Panel on Clean Air in Cities (EPCAC) 16 November 2022

UFP-PSD DATA AVAILABILITY 2017-2019

17 SITES 64-100%
15 SITES >70%
7 SITES <50%



R, S 1 REG, 4 SUB
U 16 UB
T 6 TR



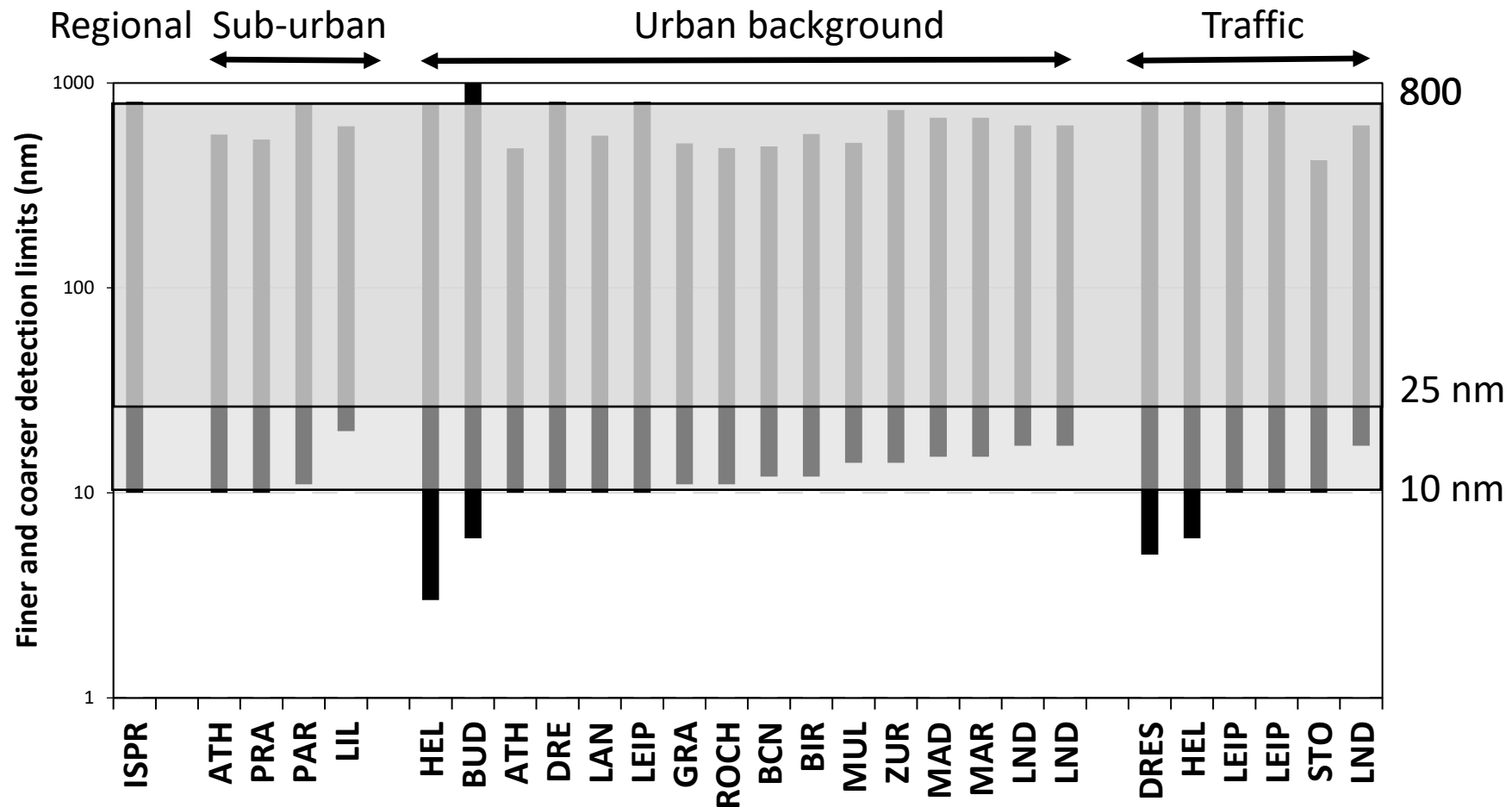
4th Expert Panel on Clean Air in Cities (EPCAC) 16 November 2022

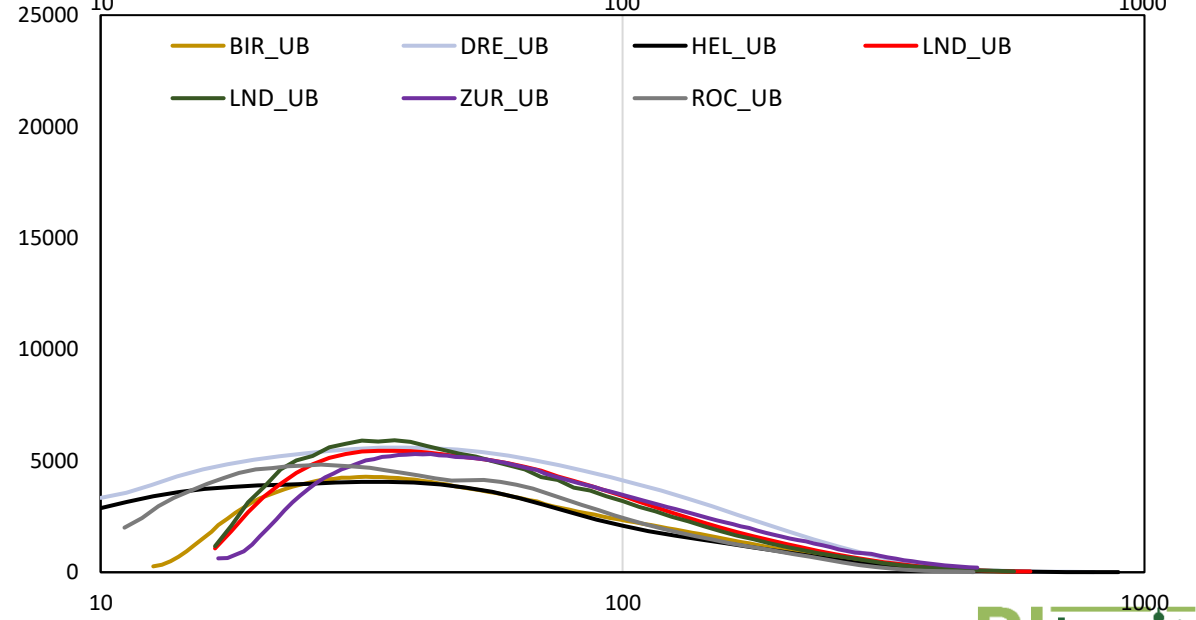
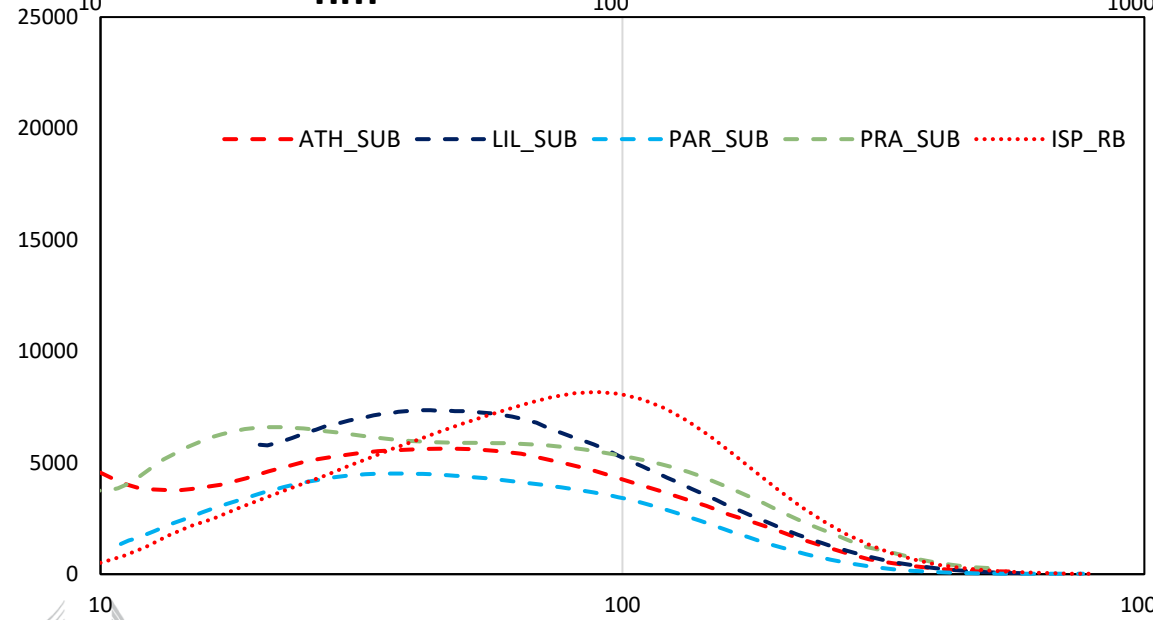
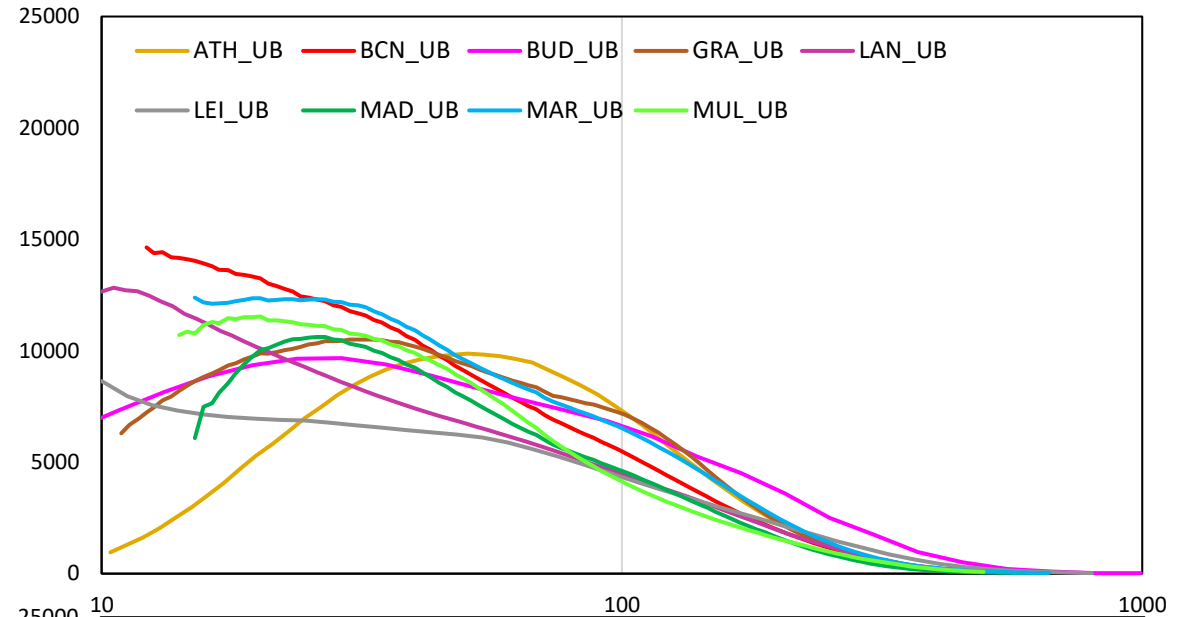
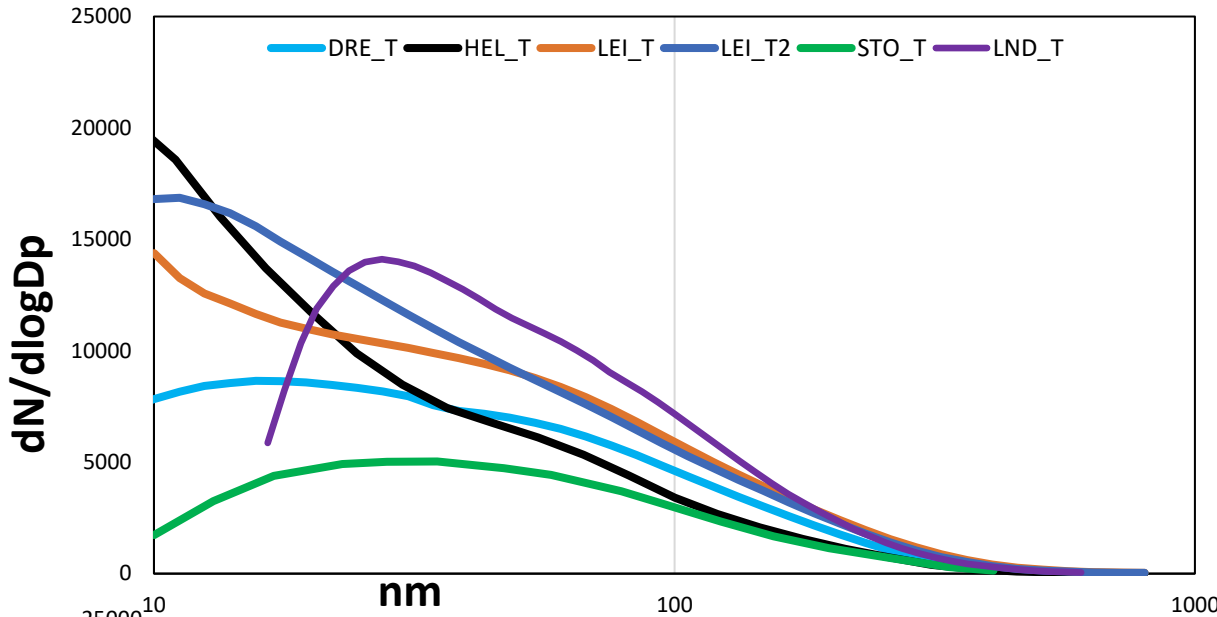


RI-URBANS (101036245)

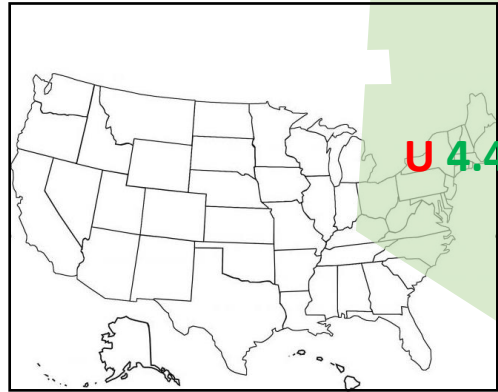
SELECTION OF N₁₀₋₈₀₀ FOR COMPARISON AND HEALTH STUDIES

P10	6	475
P25	10	532
P50	10	604
P75	14	800
P90	17	800

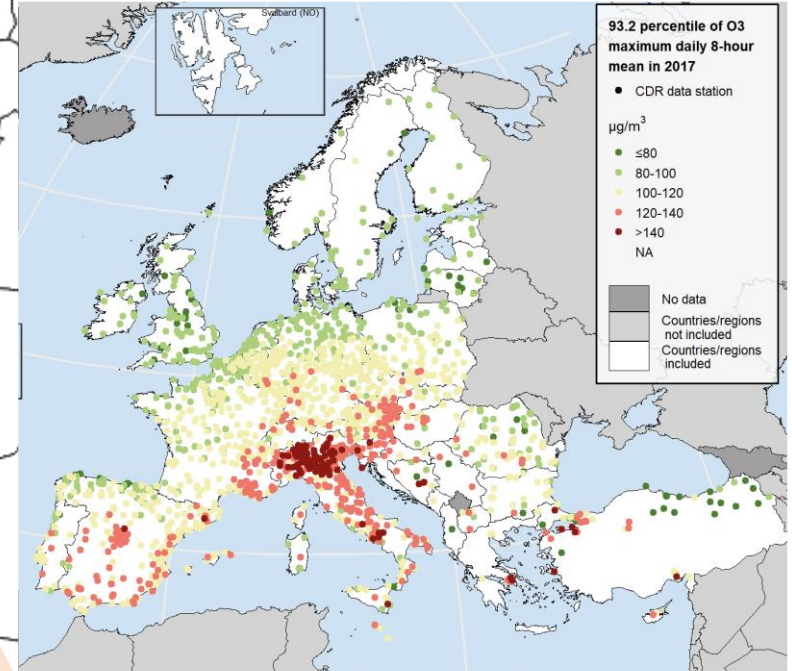
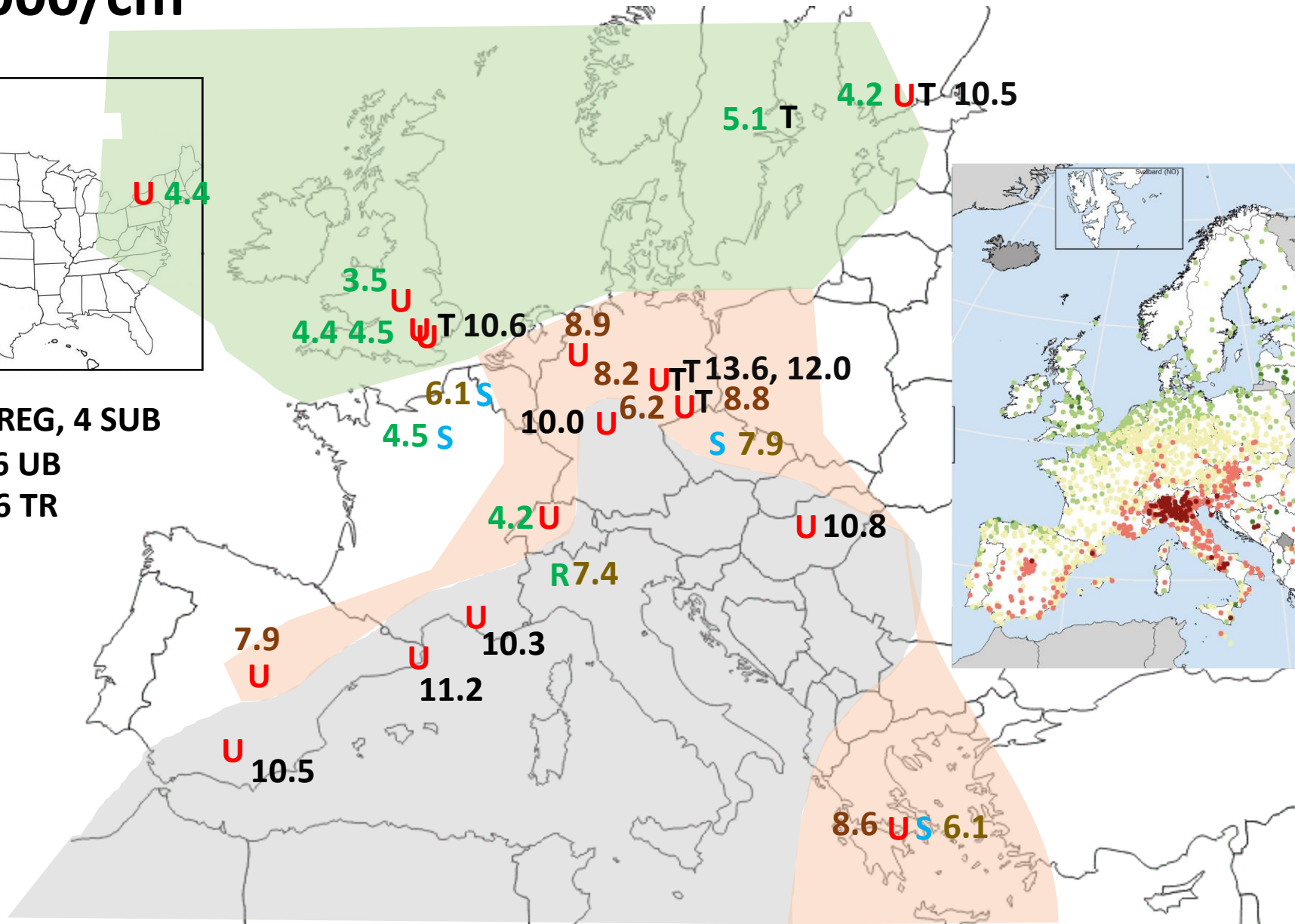




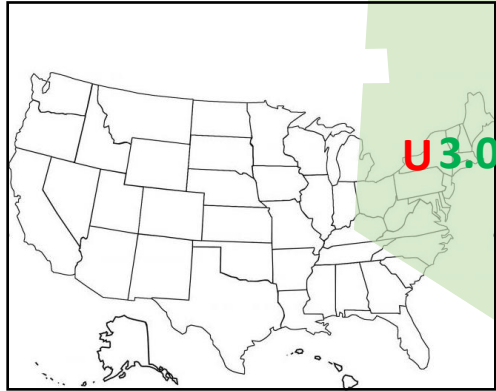
N_{10-800} #/1000/cm³



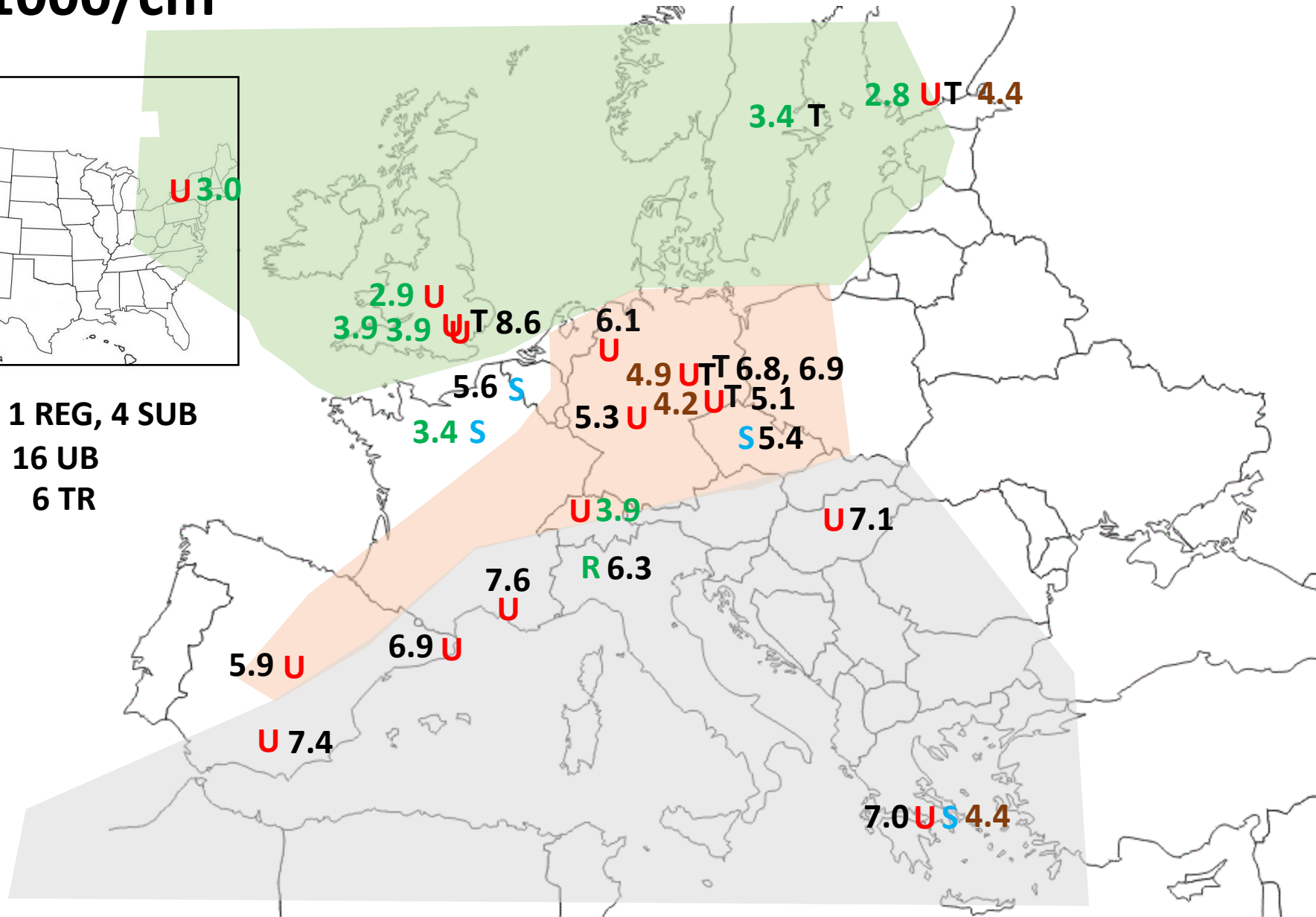
R, S 1 REG, 4 SUB
 U 16 UB
 T 6 TR



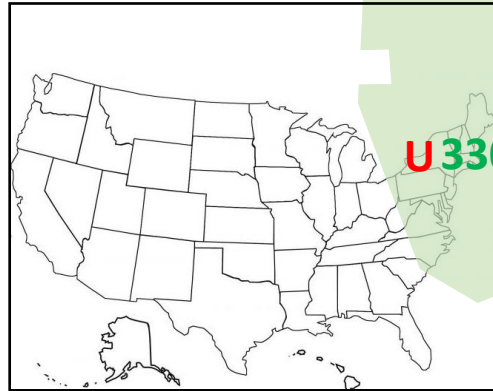
N_{25-800} #/1000/cm³



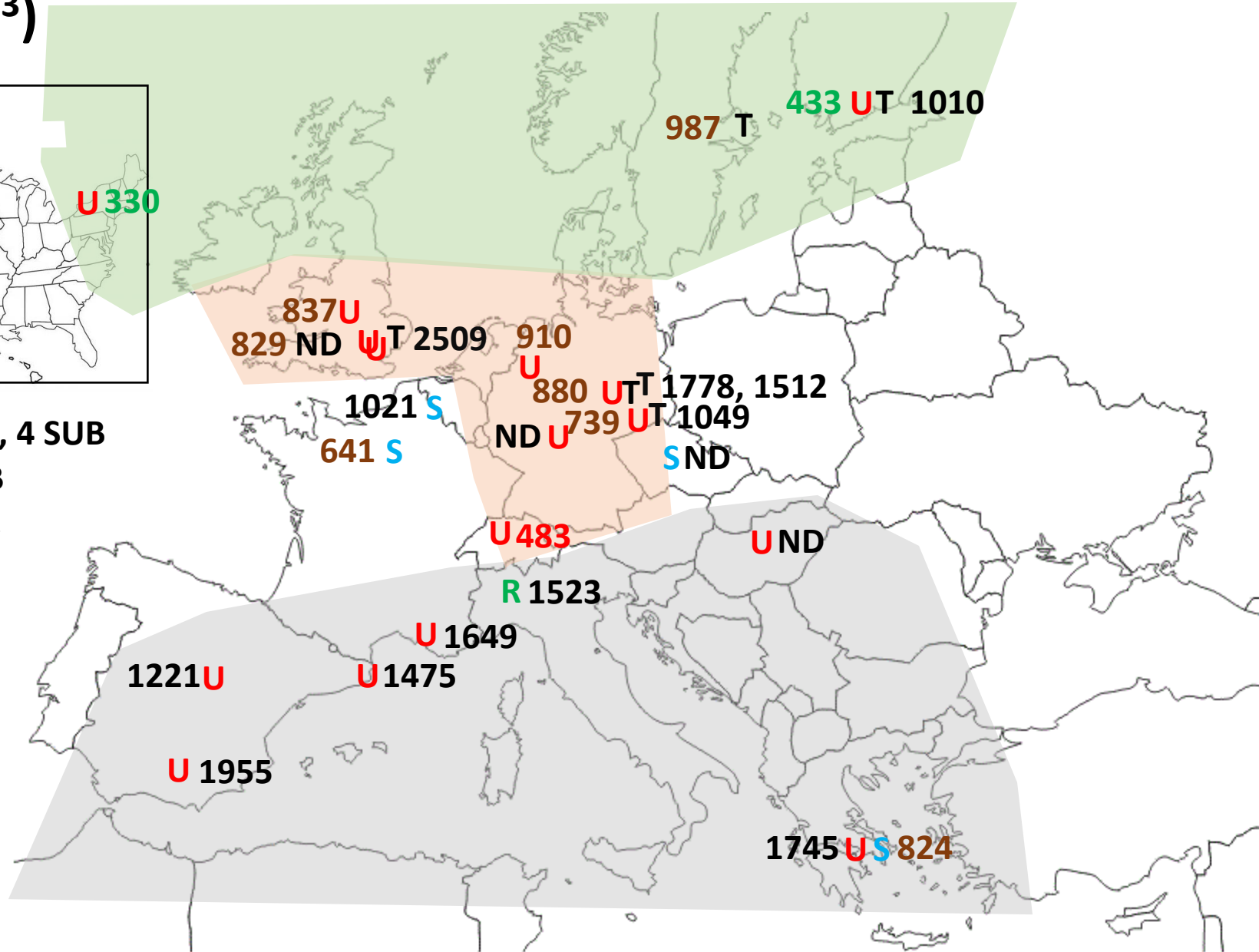
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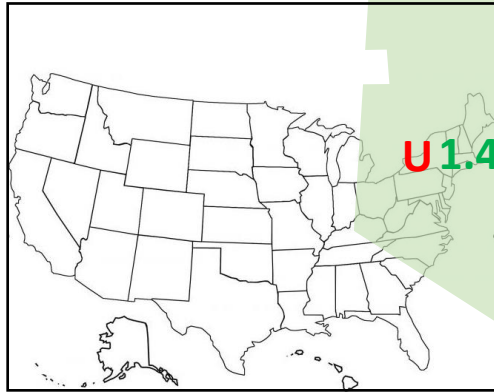
BC (ng/m³)



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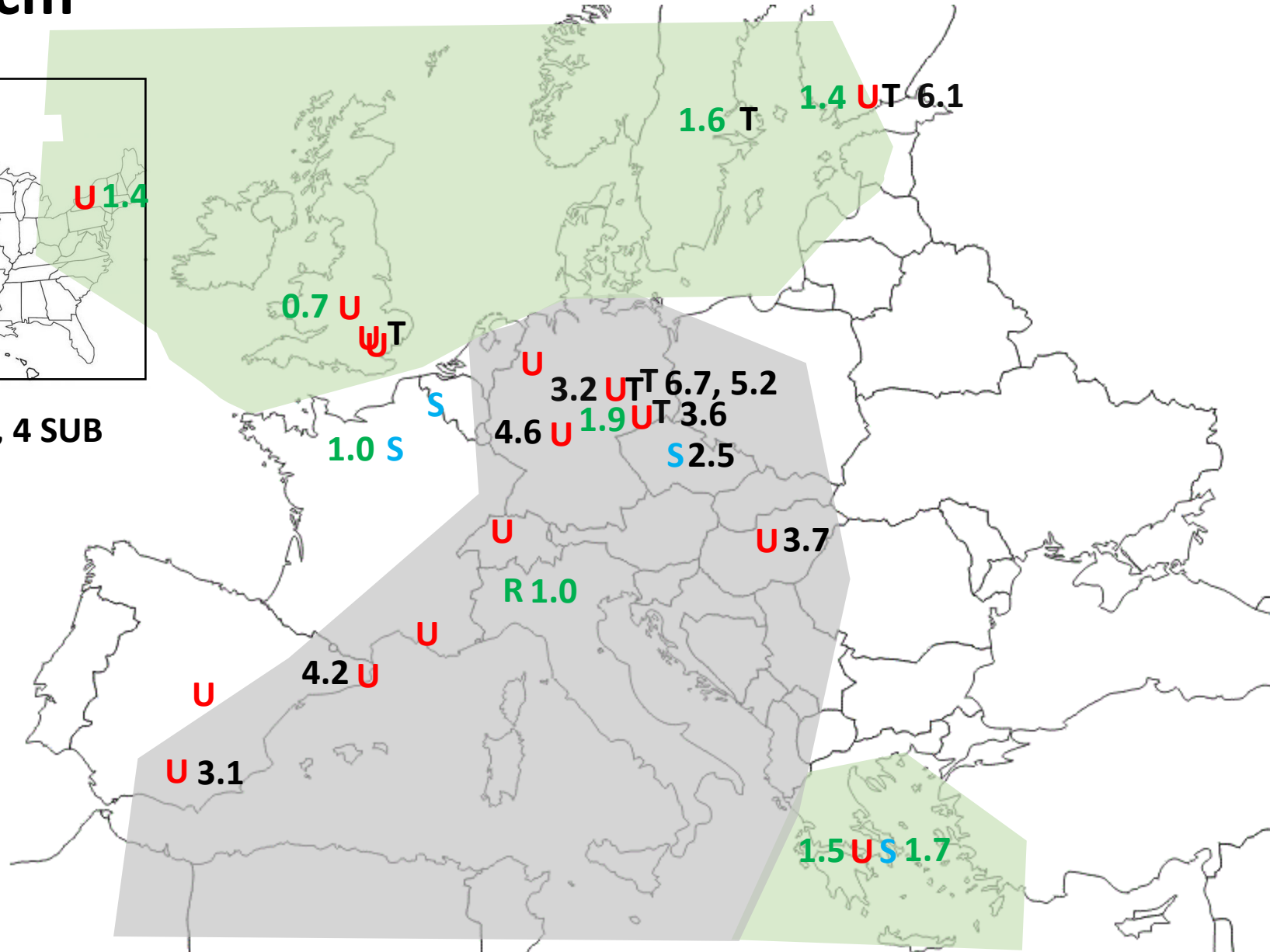
N_{x-25} #/1000/cm³



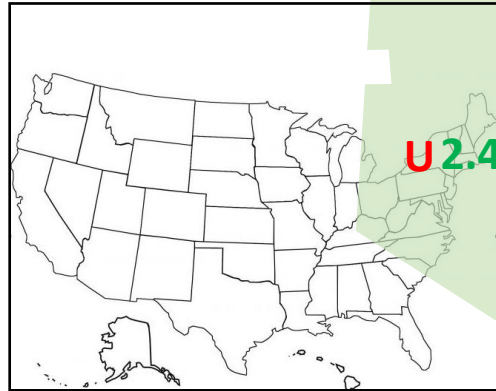
R, S 1 REG, 4 SUB

U 16 UB

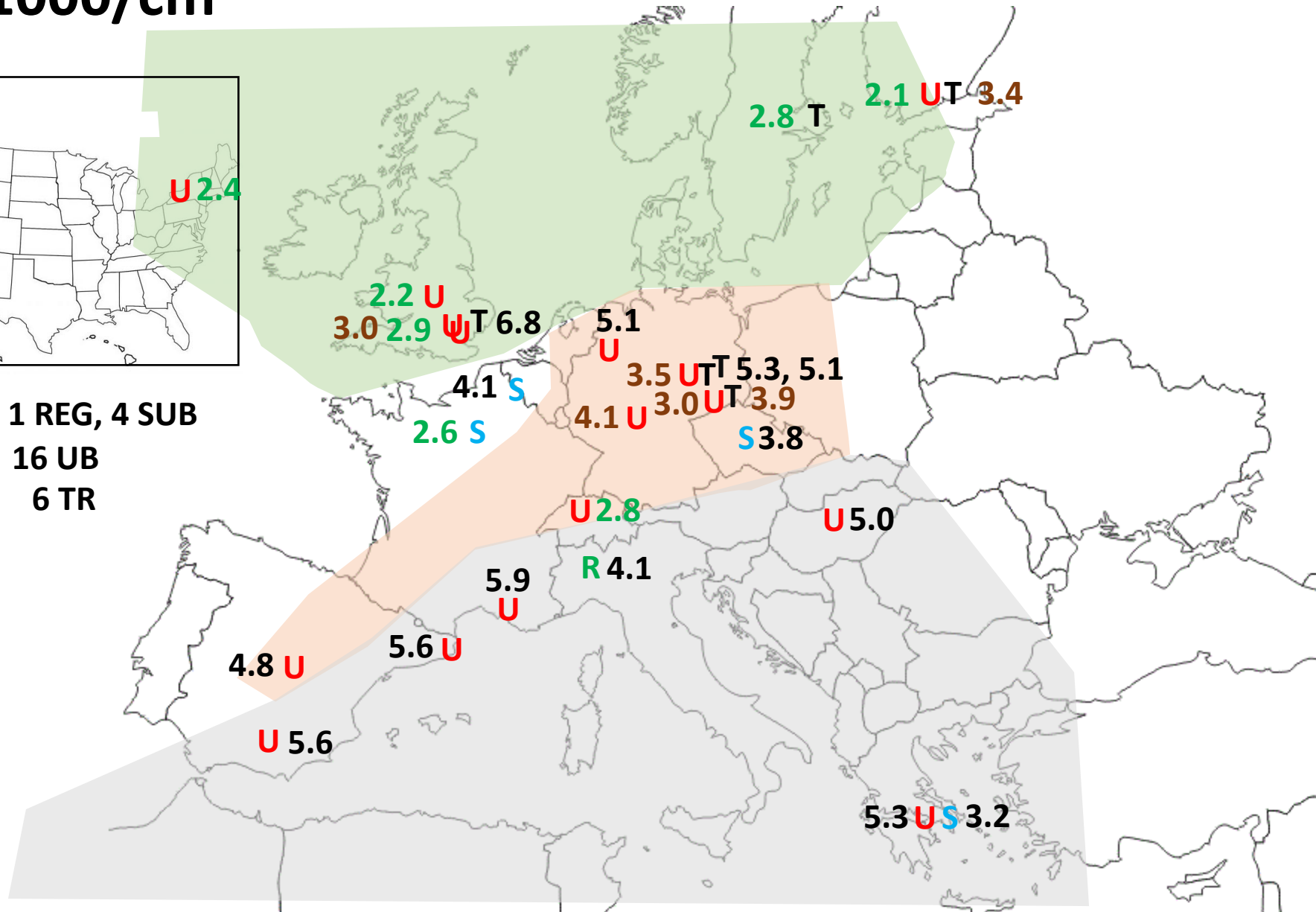
T 6 TR



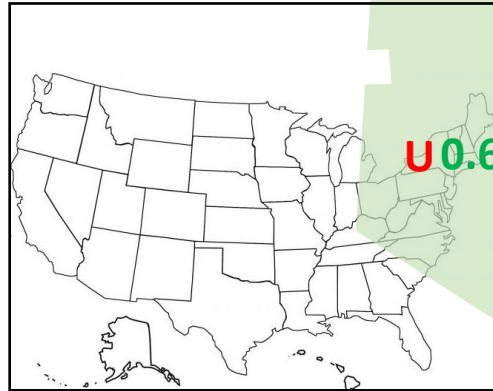
N_{25-100} #/1000/cm³



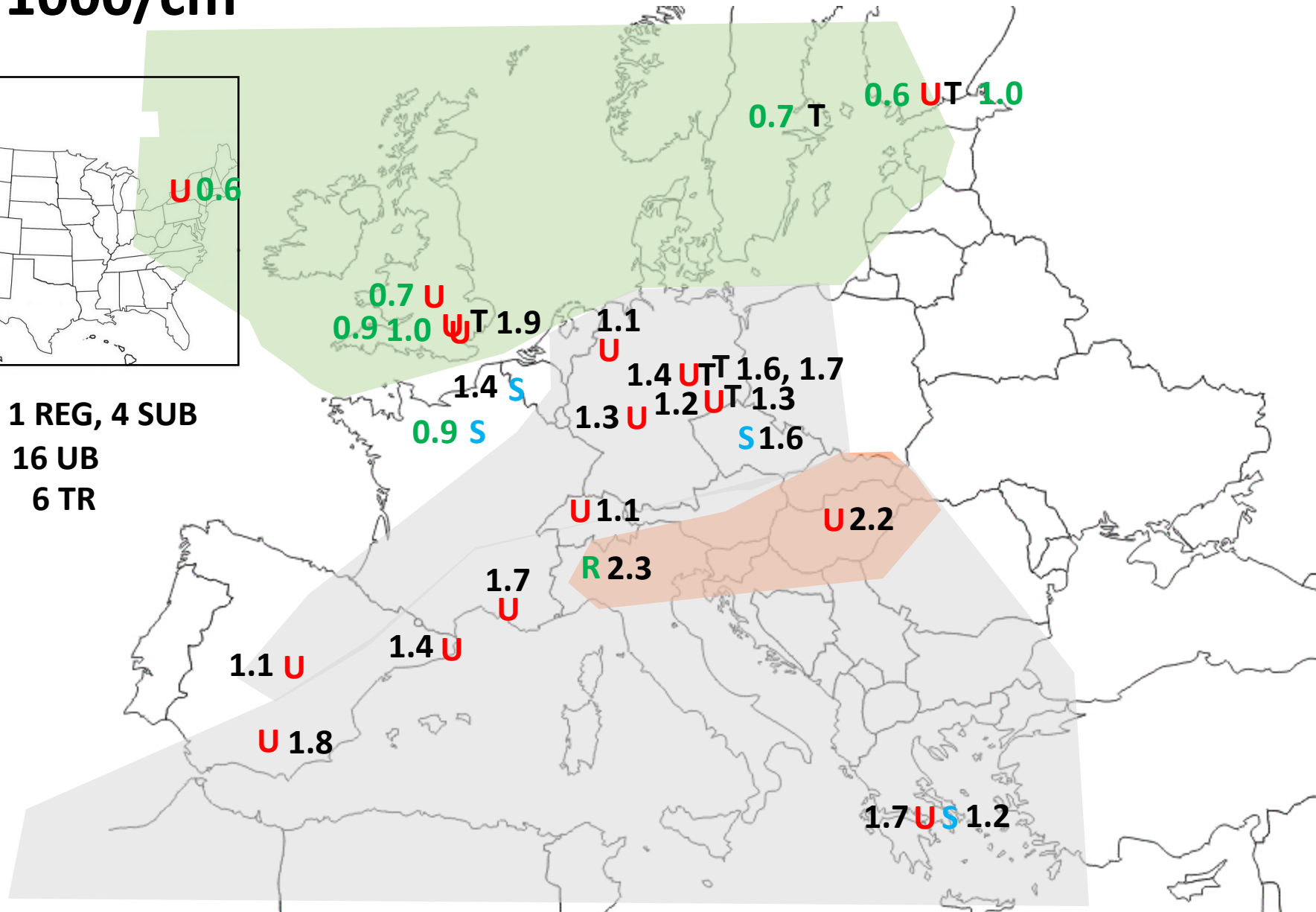
R, S 1 REG, 4 SUB
 U 16 UB
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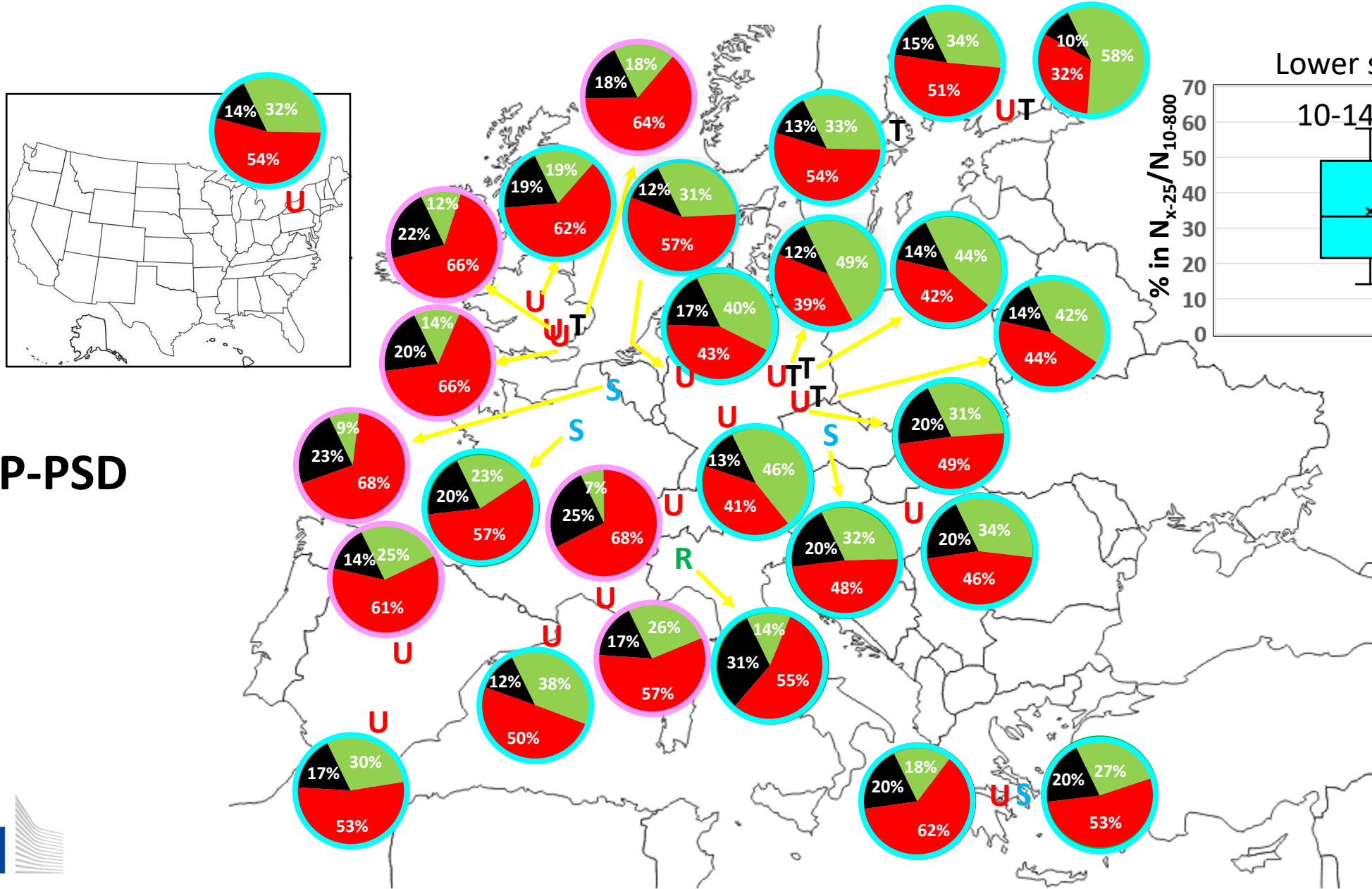
$N_{100-800}$ #/1000/cm³



R, S 1 REG, 4 SUB
 U 16 UB
 T 6 TR



NUCLEATION, AITKEN & ACCUM SIZES (1000#/cm³) AVERAGE DAILY PATTERNS

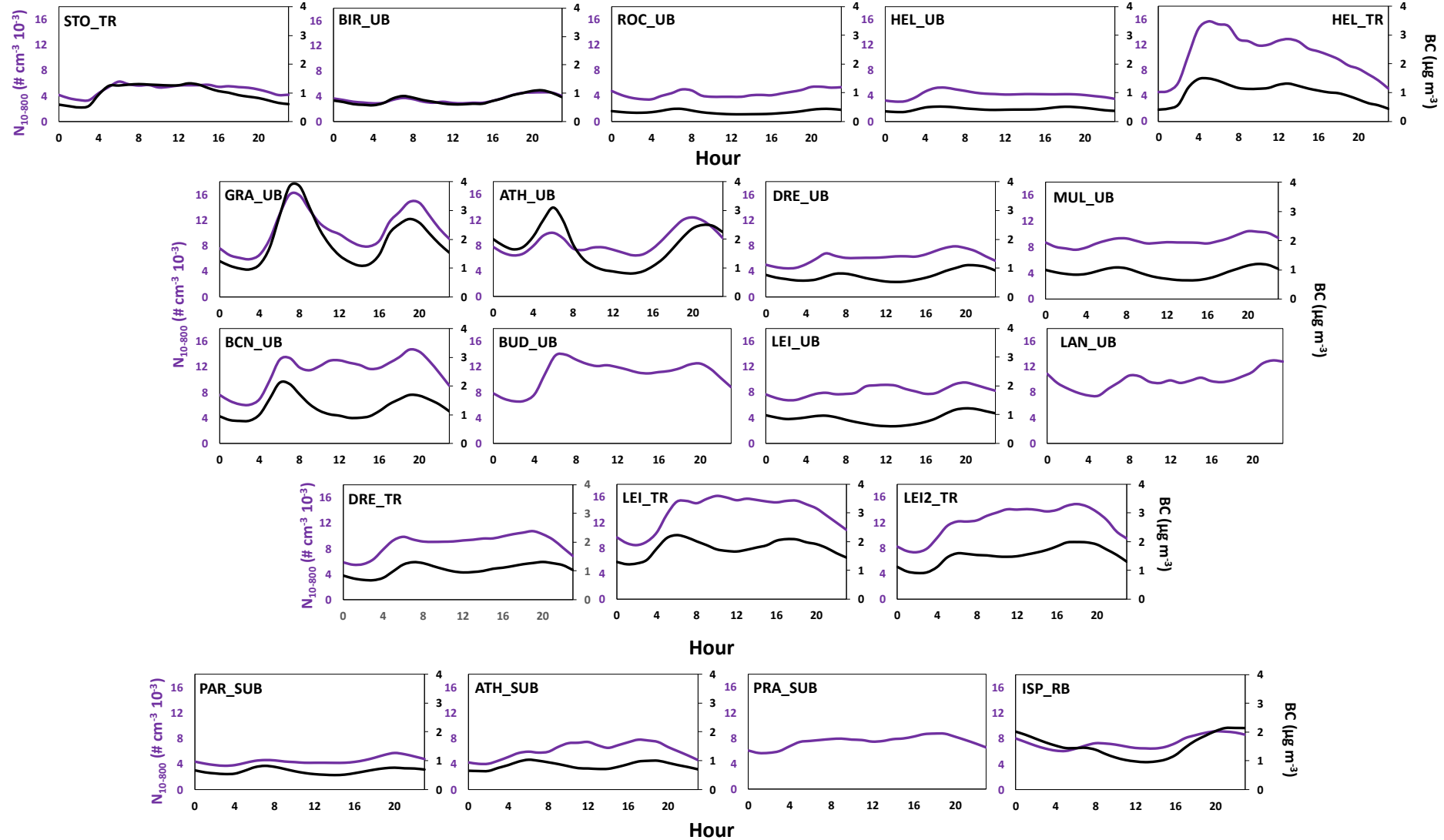


UFP-PSD



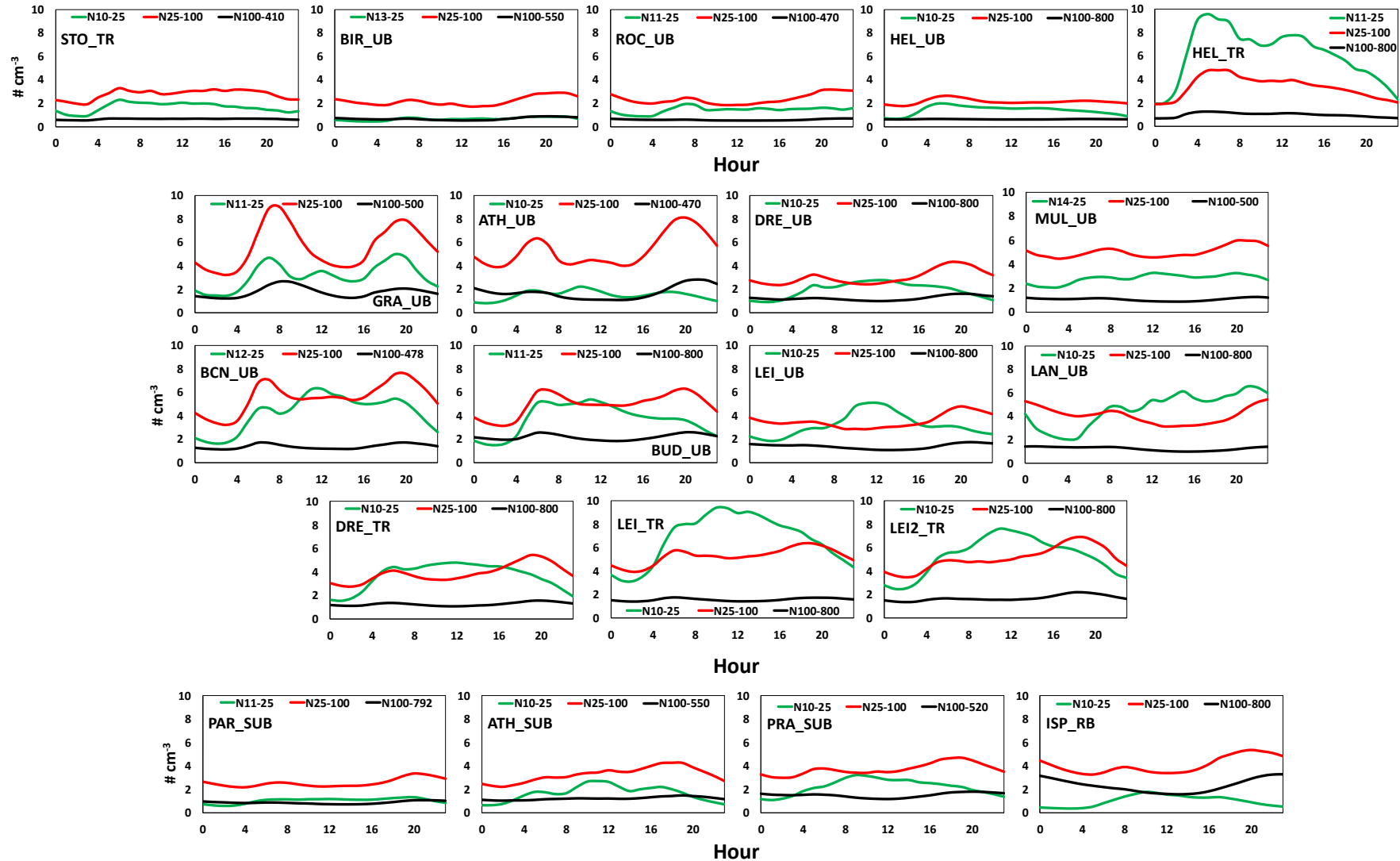
BC ($\mu\text{g}/\text{m}^3$) & N10-800 ($1000\#/\text{cm}^3$) AVERAGE DAILY PATTERNS

Excluding N_{15-800} , N_{17-800} , N_{20-800}

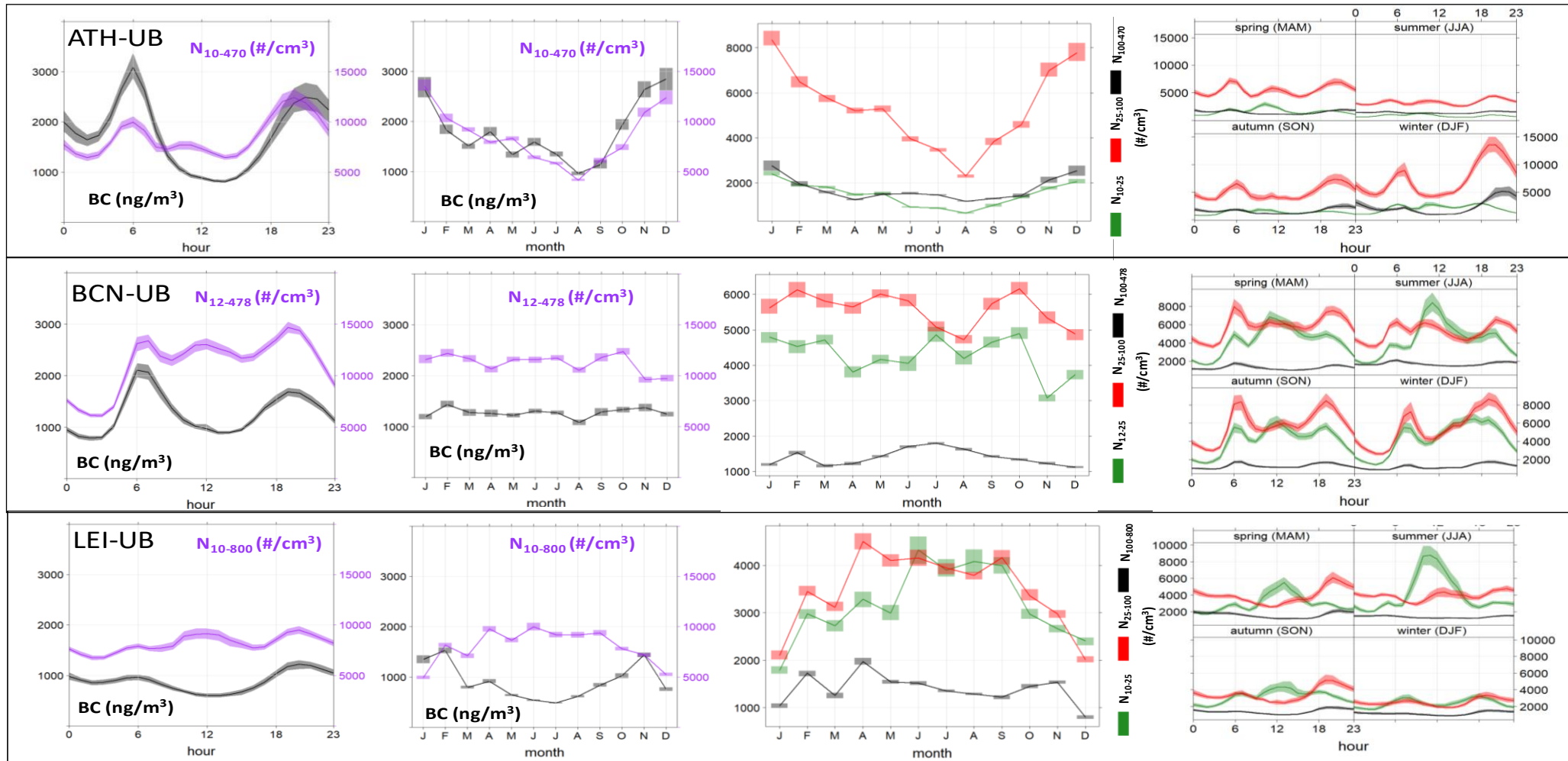


NUCLEATION, AITKEN & ACCUM SIZES (1000#/cm³) AVERAGE DAILY PATTERNS

Excluding N₁₅₋₈₀₀, N₁₇₋₈₀₀, N₂₀₋₈₀₀



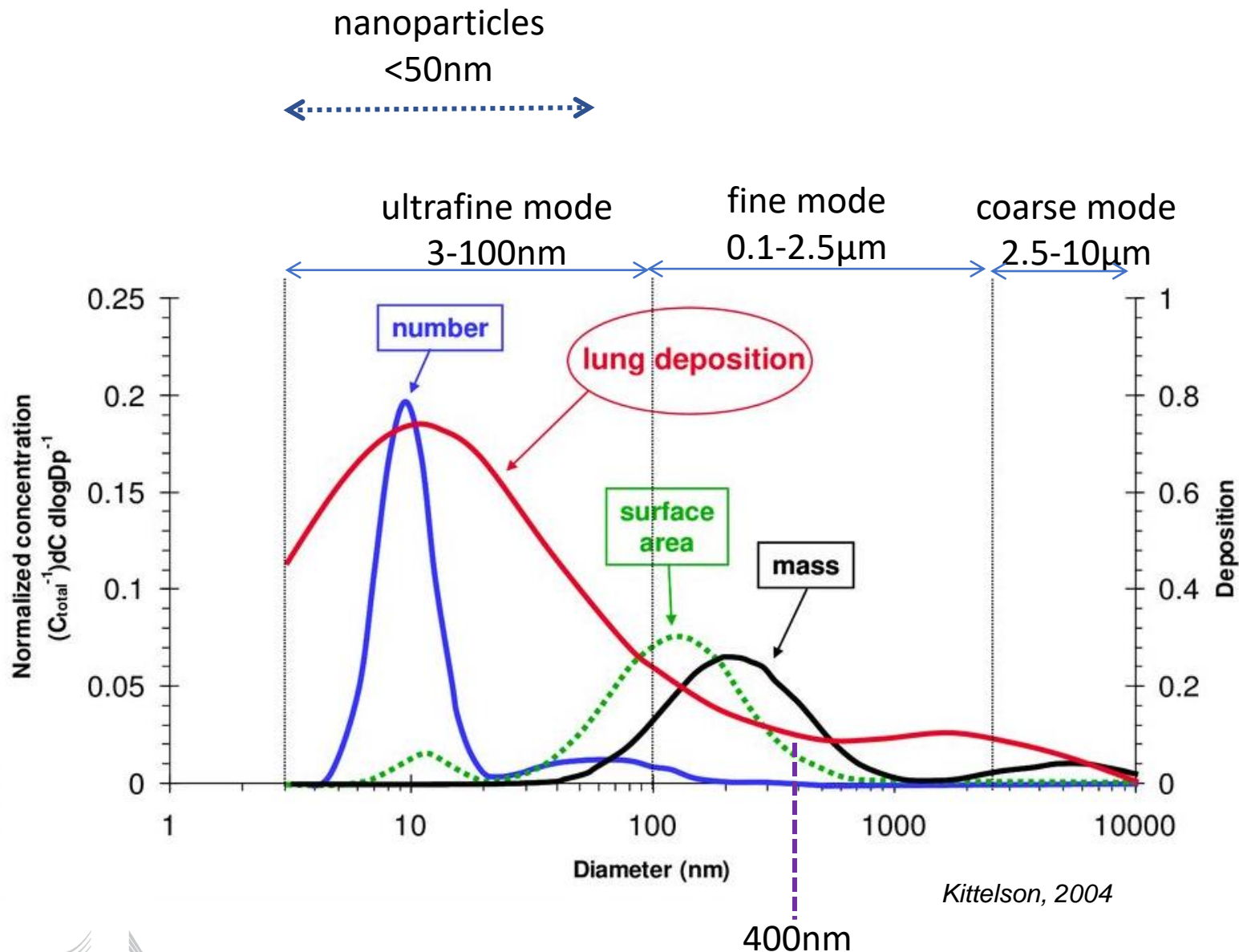
SEASONAL PATTERNS



FINAL CONSIDERATIONS

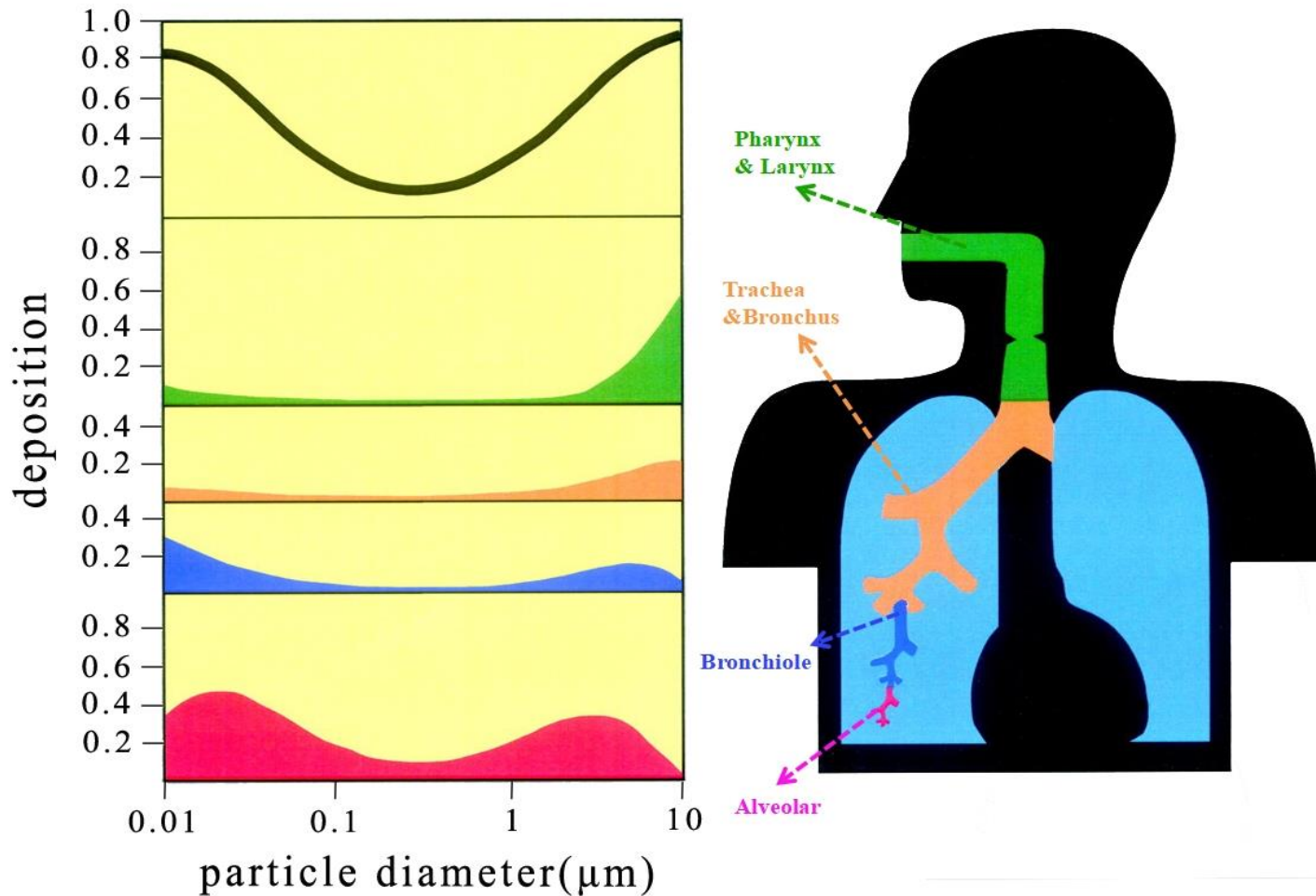
- For N_{10-800} and N_{25-800} : Gradient to decrease S>C>N Europe
- (As expected) T>UB>SUB
- PNC seems to be dominated by road traffic contributions (correlation with BC), but in some cities midday or morning photochemical nucleation accounts for a very relevant proportion
- High midday photochemical nucleation/harbour/airport/industry/power generation is not always higher in S-Europe (higher insolation), but not exclusively
- Seasonal patterns might completely differ
- NEXT STEPS:
 - **Include dataset in EBAS**
 - **Stablish data flow of non-ACTRIS datasets to ACTRIS EBAS**
 - Source apportionment and epidemiology studies for short term effects
 - Risk analysis using PNSD

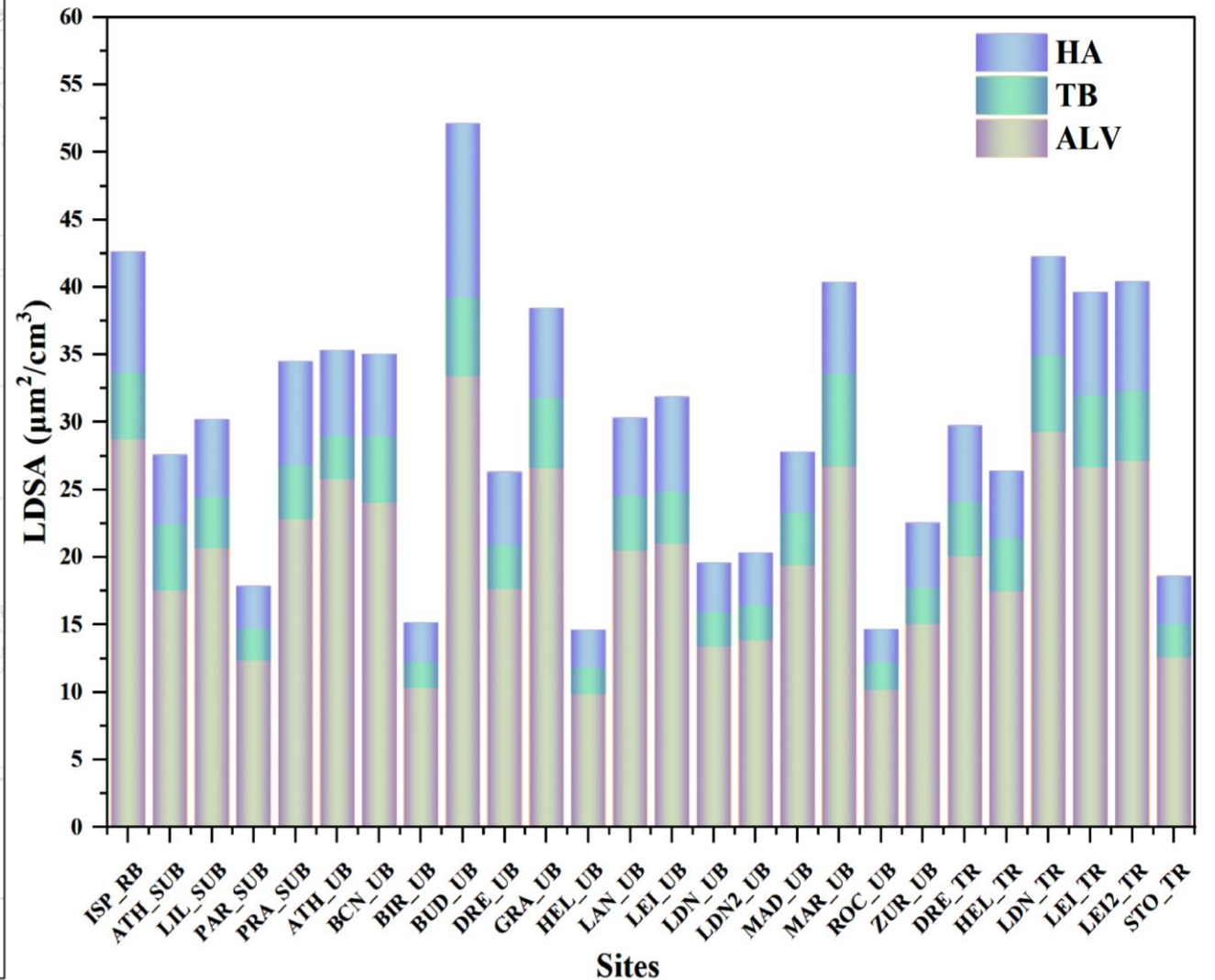
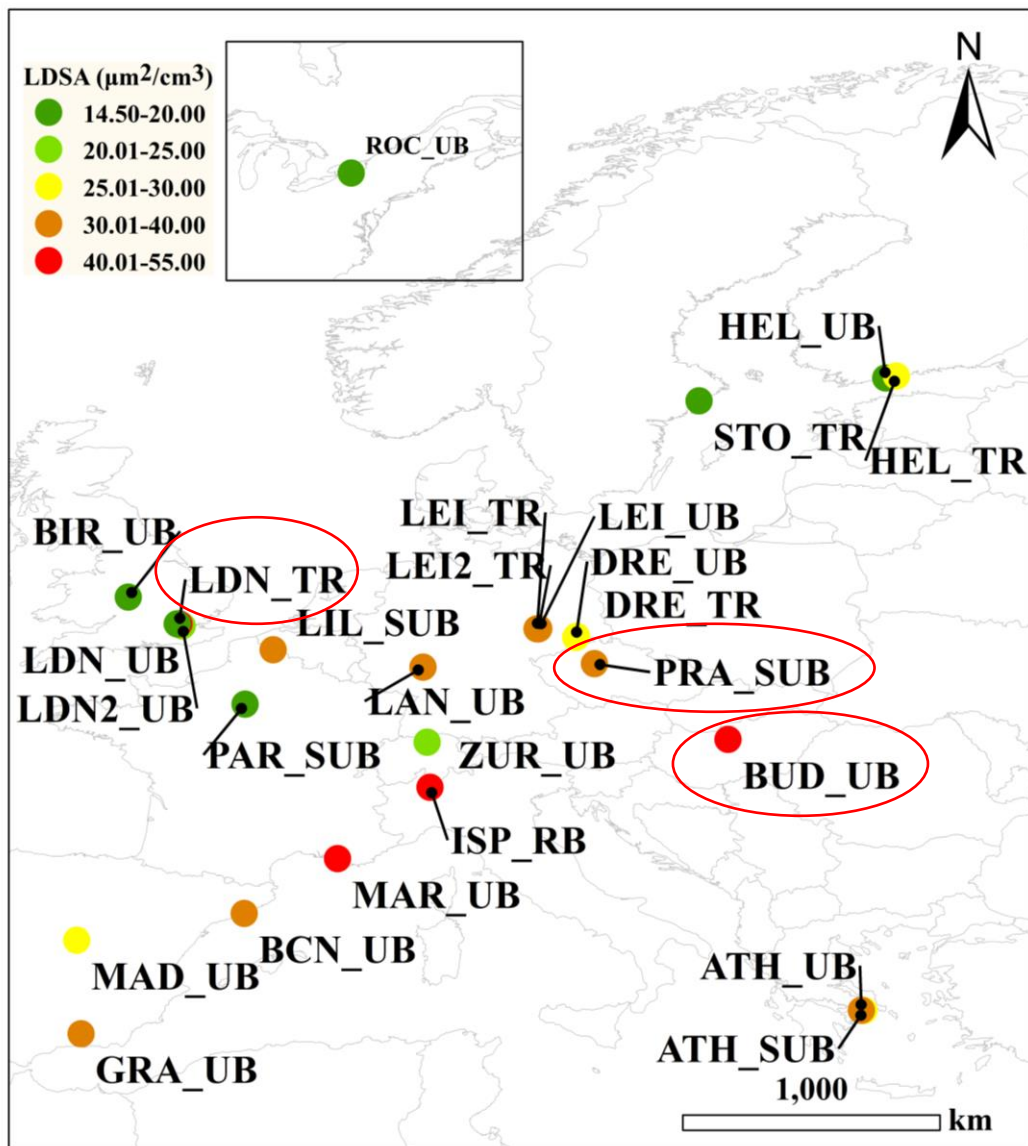
Thanks for your attention!!!!



- **LDSA** is lung deposited surface area, which is the most relevant physical metric for quantifying exposure to particles

Heyder et. al 2004, Proc American Thoracic Society, 1(4)





• 2017-2019 average concentrations of total LDSA in **twenty-five European sites and one in USA**

• The contribution of annual average LDSA in different regions of the respiratory tract, including **head (HA), tracheobronchial (TB), and alveolar (ALV)**