

Cloud condensation nuclei (CCN) & Black Carbon (BC) measurements with the HALO aircraft in European and Asian airspace

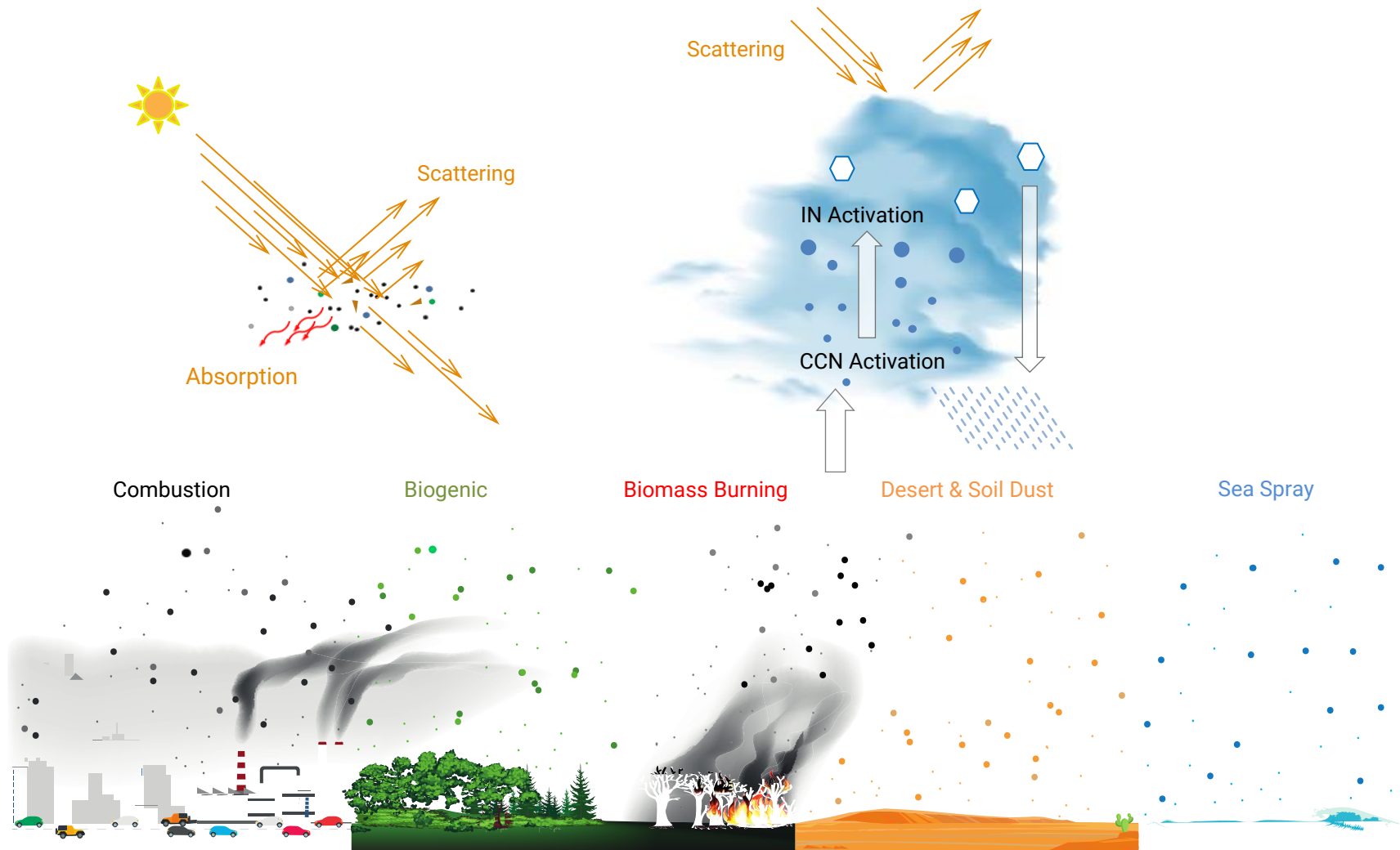
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Atmospheric Aerosol Properties & Interactions

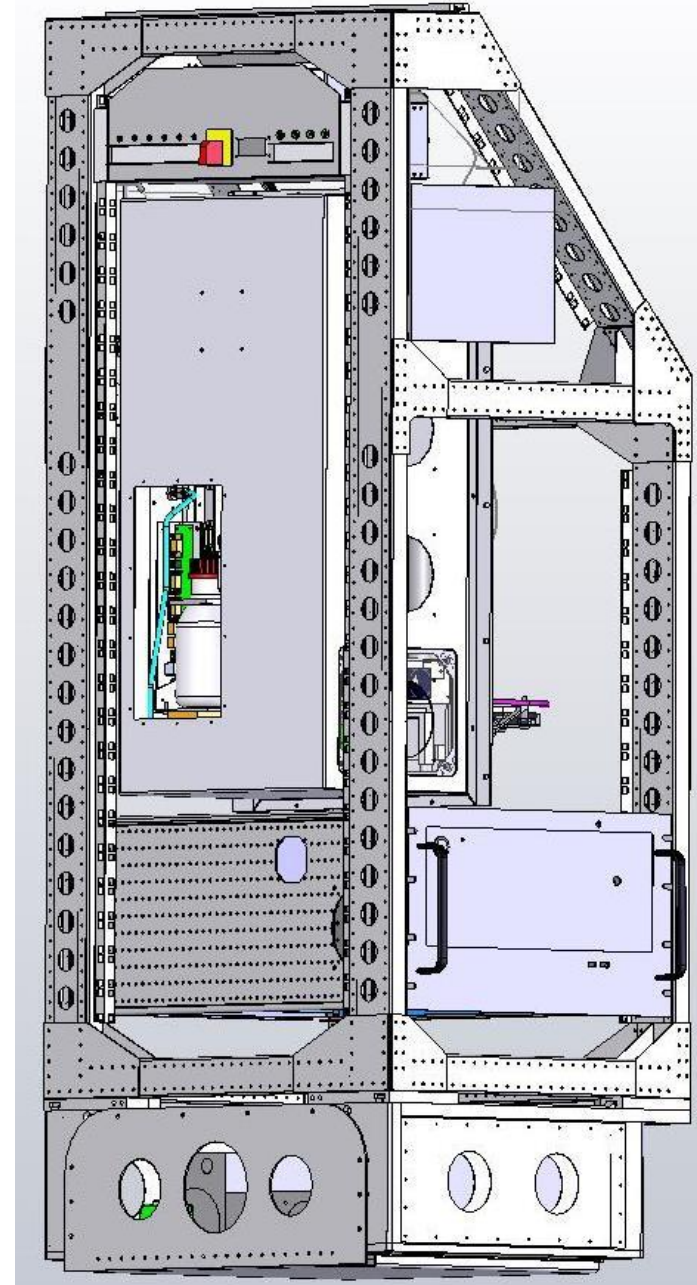
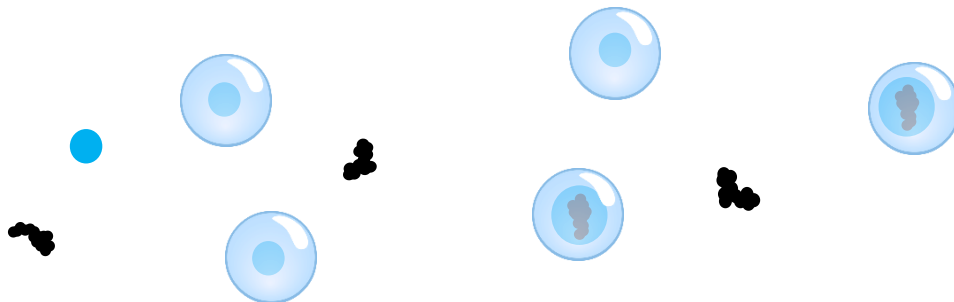


- Anthropogenic/polluted vs. natural/pristine conditions
- Aerosol effects on radiation, clouds and precipitation

HALO-CCN-Rack

→ 1 s time resolution

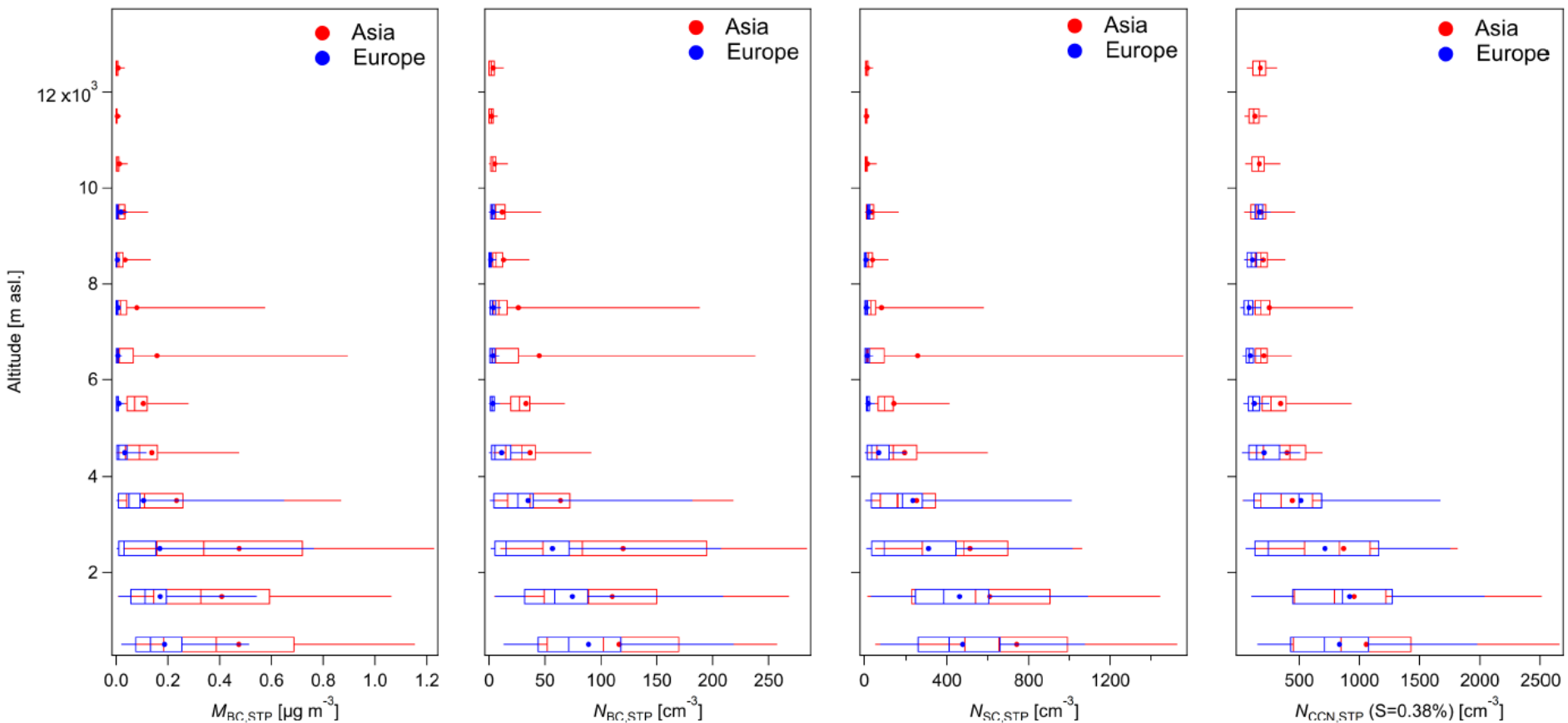
- CCN-200: Dual Column Cloud Condensation
 - CCN number concentration (N_{CCN})
 - A: $S = 0.3 \%$ (constant)
 - B: $S = 0.1 - 0.9 \%$ (scanning)
- SP-2: Single Particle Soot Photometer:
 - Black Carbon (BC) size distribution
 - Scatter Particle (SC) size distribution
 - BC coating
- Impactor: Aerosol sampling
 - microstructure
 - composition
 - e.g. SEM-EDX, STXM-NEXAFS



EMeRGe Asia & EMeRGe Europe Field Campaigns



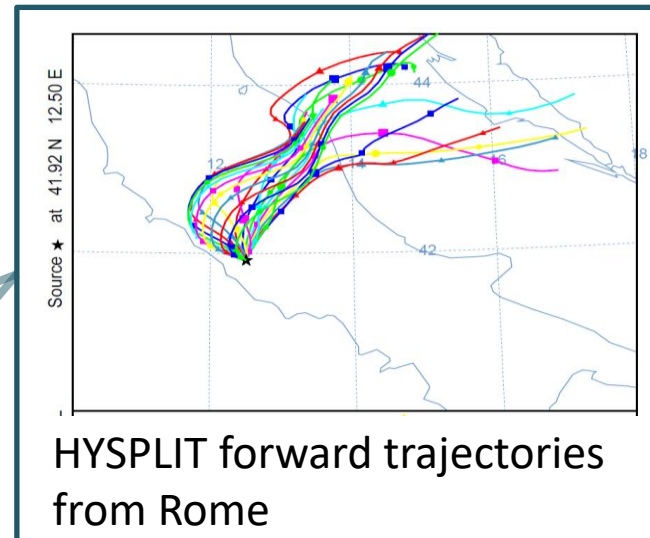
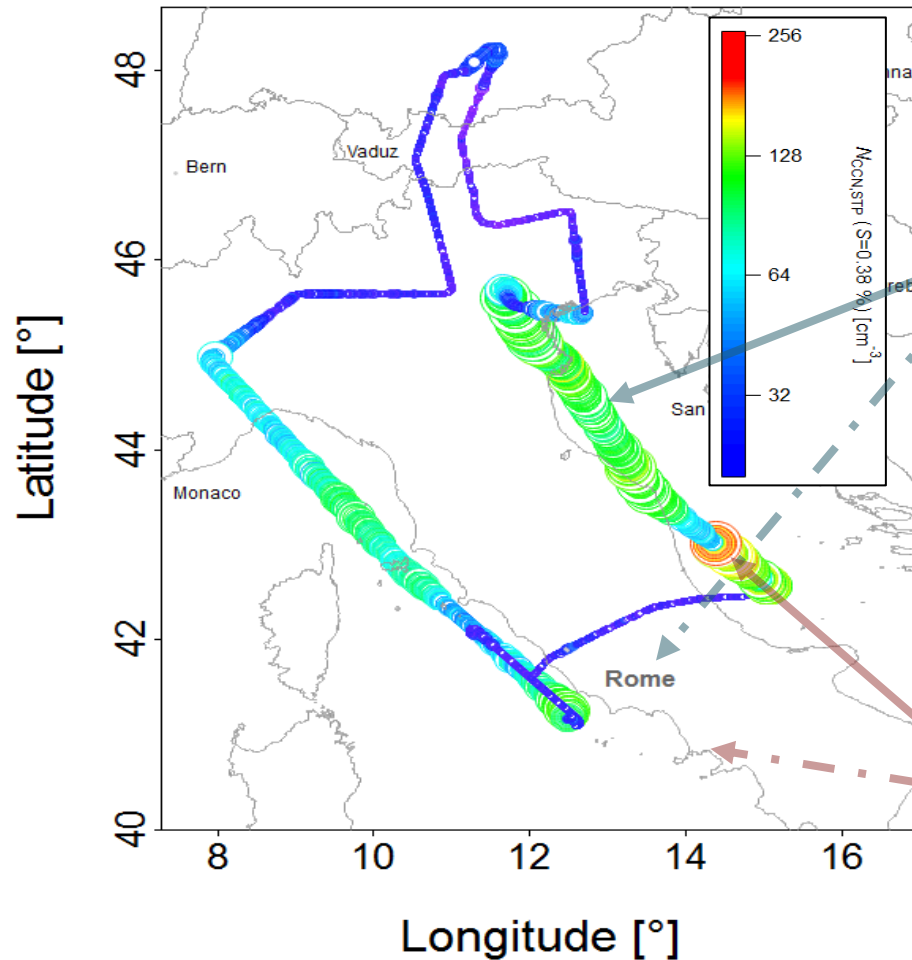
Vertical Profile of CCN & BC



- Elevated aerosol loading up to ~4 km
- Elevated aerosol concentrations in Asia, in comparison to Europe

Rome Case Studie

— ▸ Air mass origin —▸ Air mass measured



Flight map E_EU_03 (11 July 2017), thickness of flight track indicates altitude (thick = low, thin = high)

- This flight shows higher N_{CCN} from biomass burning in comparison to Rome city plume

Summary

- Largest number concentrations of anthropogenic aerosol in boundary layer – steep decrease with altitude
- Similar shape of vertical profile in Asia & Europe with larger concentrations in Asia
- Higher N_{CCN} for biomass burning aerosol in comparison to urban plume from Rome