Aerosol removal efficiency of moss
Influence of relative humidity and aerosol size in an experimental chamber
Elena Hartner, Esther Breuninger, Andreas Held

Background

- Nowadays decreasing air quality and climate change pose new challenges for society, politics and science
- Anthropogenic aerosols affect climate, air quality and human health
- Reduction measures include among others technical approaches like source oriented emission reductions, such a promising approach could be moss applications
- Moss has been used as a bioindicator due to its properties (Element & nutrient uptake via atmospheric deposition, surface charge) \(^{1,2}\)

Experimental Setup

- Generated NaCl aerosols are directed into a temperature & humidity controlled stainless steel chamber (MARS chamber)
- Chamber lined with air-dried moss (Sphagnum spp.)
- Experimental conditions:
  - Controlled relative humidities highRH: 60 %, lowRH: 20 %
  - Exposure time: 1 h
  - Temperature: 20 °C
- Scanning mobility particle sizer (SMPS) measurements
  - Aerosol concentration and size distribution (8-700 nm)
  - Efficiency of aerosol removal by moss
- Conductivity measurements of washed moss in purified water after aerosol exposure
- Indication of aerosol removal by moss

Research Questions

1. Efficiency of moss to remove aerosols (number of particles)
2. Influence of aerosol size (size range: 8-700 nm)
3. Influence of relative air humidity

Conclusions

(1+2) Efficiency of moss to remove aerosols
- From 45 nm to 700 nm: > 99 % (Fig.2)
(3) Influence of relative air humidity
- Removal of aerosols to a similar extent at both, high and low RH (Fig.3)
- No significant difference in conductivity between both RH (Fig.4)

Aerosol removal by moss is a very promising approach for future reduction measures

Results

![Graph showing efficiency of moss to remove aerosols](Image)

- Fig.2 Comparison of the efficiency of moss to remove aerosols at high and low RH from 45 nm to 700 nm: efficiency > 99 % below 45 nm; efficiency increases with aerosol size.

![Graph showing conductivity after exposure](Image)

- Fig.4 Mean conductivity after exposure for highRH and lowRH shows no significant difference.

Outlook

- Further experiments that determine influence of other parameters
  - Aerosols (chemical composition, shape, size)
  - Moss species
  - Reduced ratio of moss area to air volume
  - Chamber volume
- Pilot study in urban area

References