

EXOB-SEMINAR 2022-02-14

- MIA: “Influence of biogenic emissions from boreal forests on aerosol–cloud interactions”
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INFLUENCE OF BIOGENIC EMISSIONS FROM BOREAL FORESTS ON AEROSOL–CLOUD INTERACTIONS

T. PETÄJÄ ET. AL. 2022

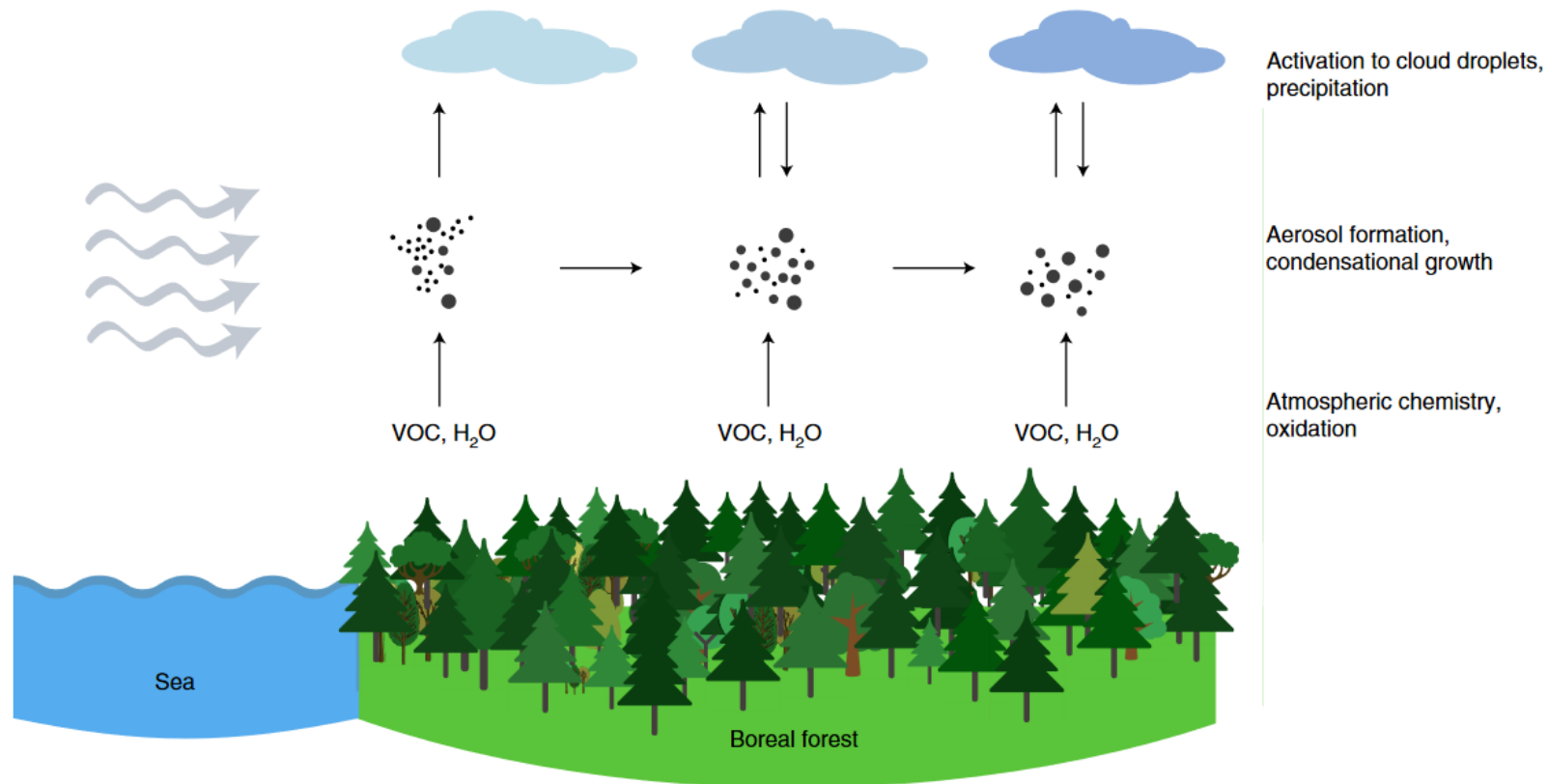




Influence of biogenic emissions from boreal forests on aerosol–cloud interactions

T. Petäjä ^{1,2} , K. Tabakova ¹, A. Manninen^{1,3}, E. Ezhova ¹, E. O'Connor ^{3,4}, D. Moisseev ^{1,3}, V. A. Sinclair ¹, J. Backman ^{1,3}, J. Levula¹, K. Luoma¹, A. Virkkula ^{1,2,3}, M. Paramonov^{1,3}, M. Rätty ¹, M. Äijälä¹, L. Heikkinen ¹, M. Ehn ¹, M. Sipilä¹, T. Yli-Juuti ⁵, A. Virtanen⁵, M. Ritsche⁶, N. Hickmon⁶, G. Pulik⁷, D. Rosenfeld ⁷, D. R. Worsnop^{1,8}, J. Bäck ⁹, M. Kulmala^{1,2,10,11} and V.-M. Kerminen¹





Source: T. Petäjä et. Al., 2022

SMEAR II STATION AT HYYTIÄLÄ

61° 51' N, 24° 17' E, 180 m above sea level

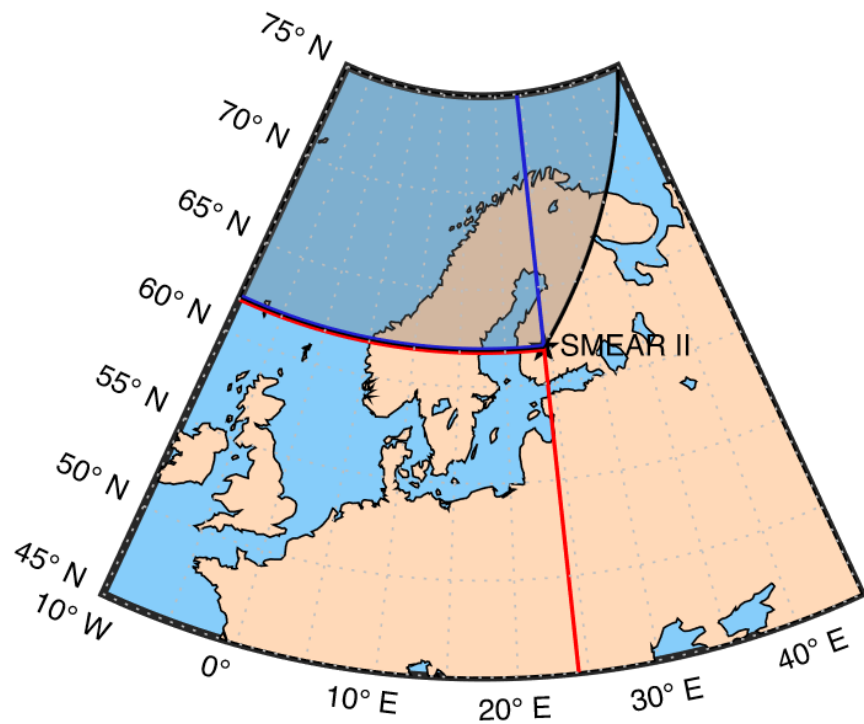
In situ instrumentation

- differential mobility particle sizer (DMPS)
- integrating nephelometer
- Cloud condensation nuclei counter
- aerosol chemical speciation monitor
- High Spectral Resolution Lidar (HSRL)
- Radiosounding
- Weather sensor at 18m

Cloud observations

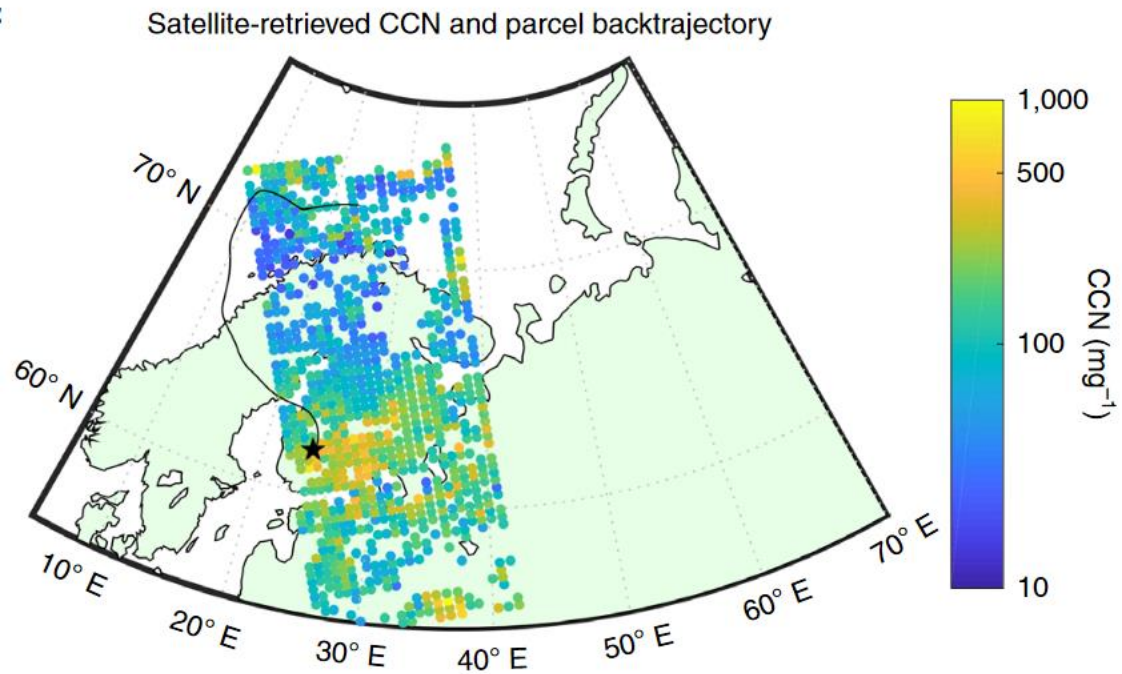
- Marine W-Band ARM Cloud Radar
- Microwave radiometer
- Cloudnet target classification product
- Satellite retrieval of CCN





- Clean sector
- Studied transport sector
- Polluted sector

Source: T. Petäjä et. Al., 2022



Source: T. Petäjä et. Al., 2022

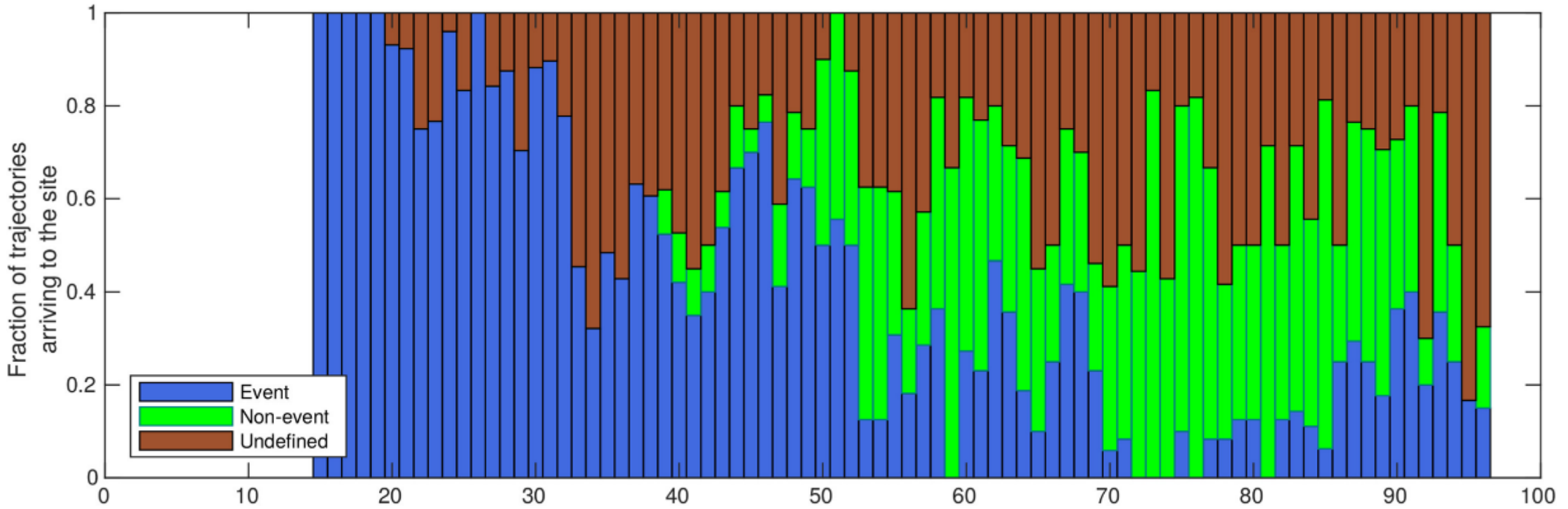


TIME OVER LAND

“For each air mass back-trajectory ensemble mean, we determined the time that this air had spent over a land area before its arrival at the SMEAR II station.”

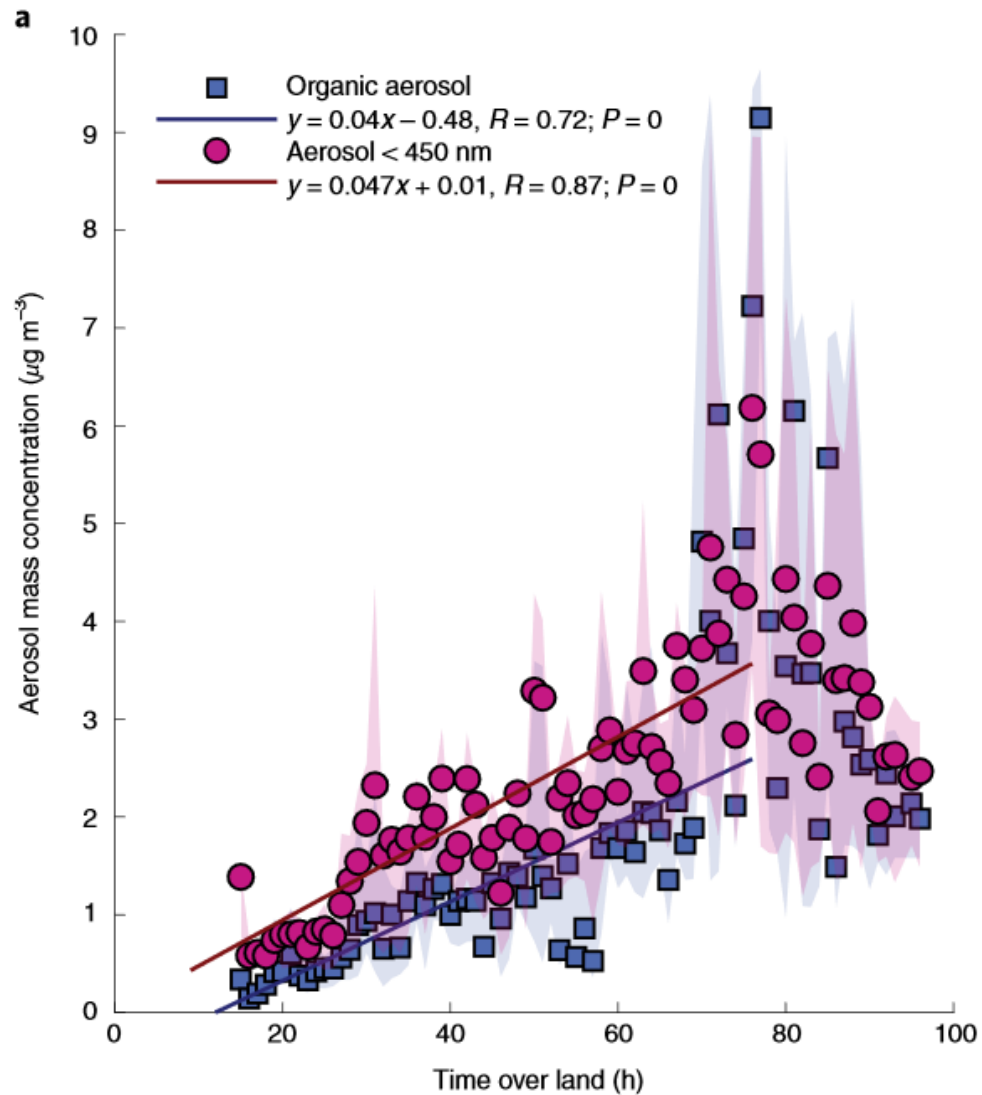
T. Petäjä et. Al., 2022



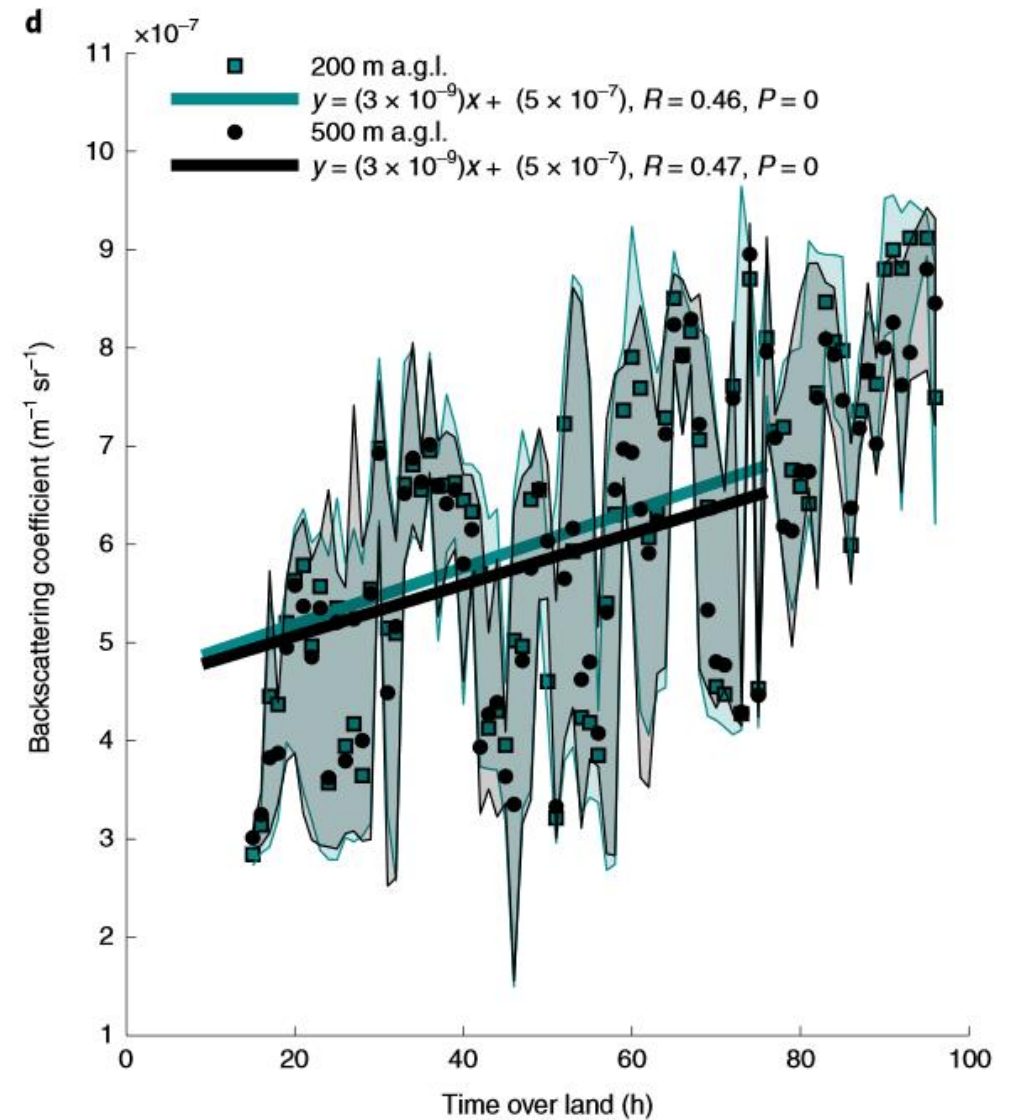


Source: T. Petäjä et. Al., 2022



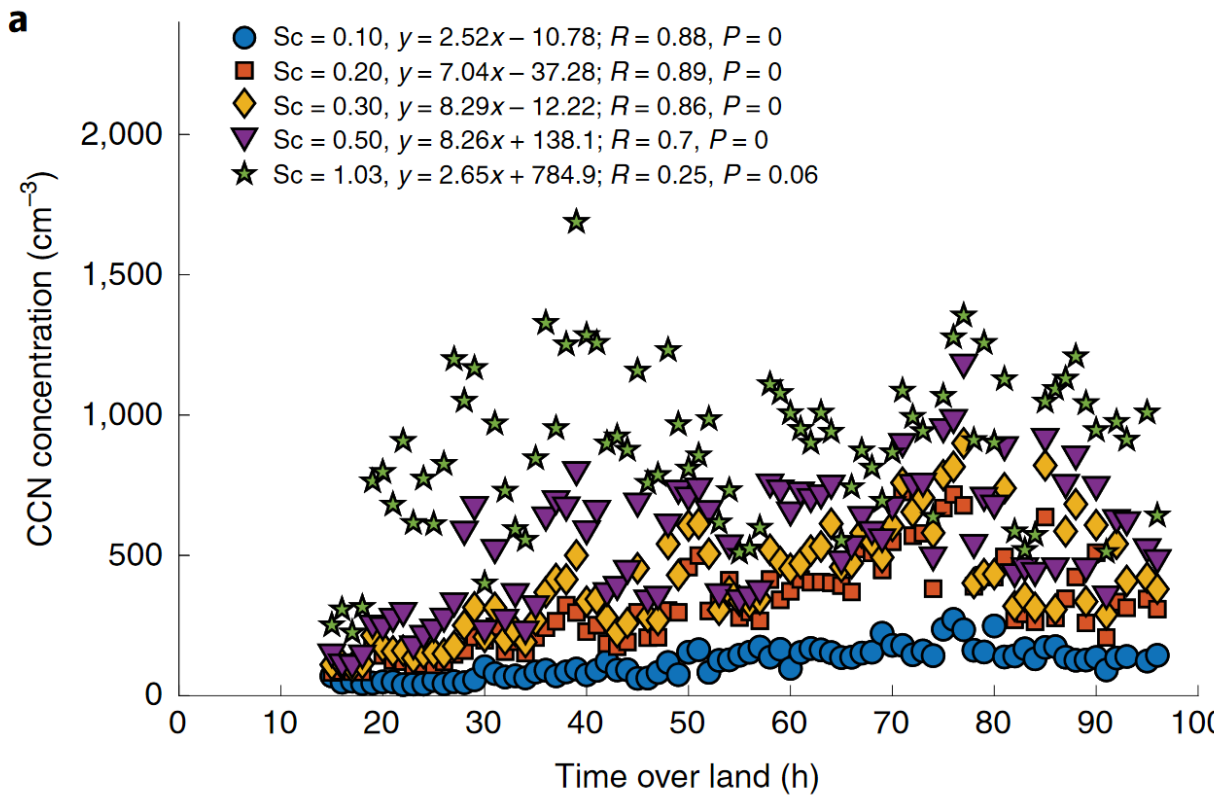


Source: T. Petäjä et. Al., 2022

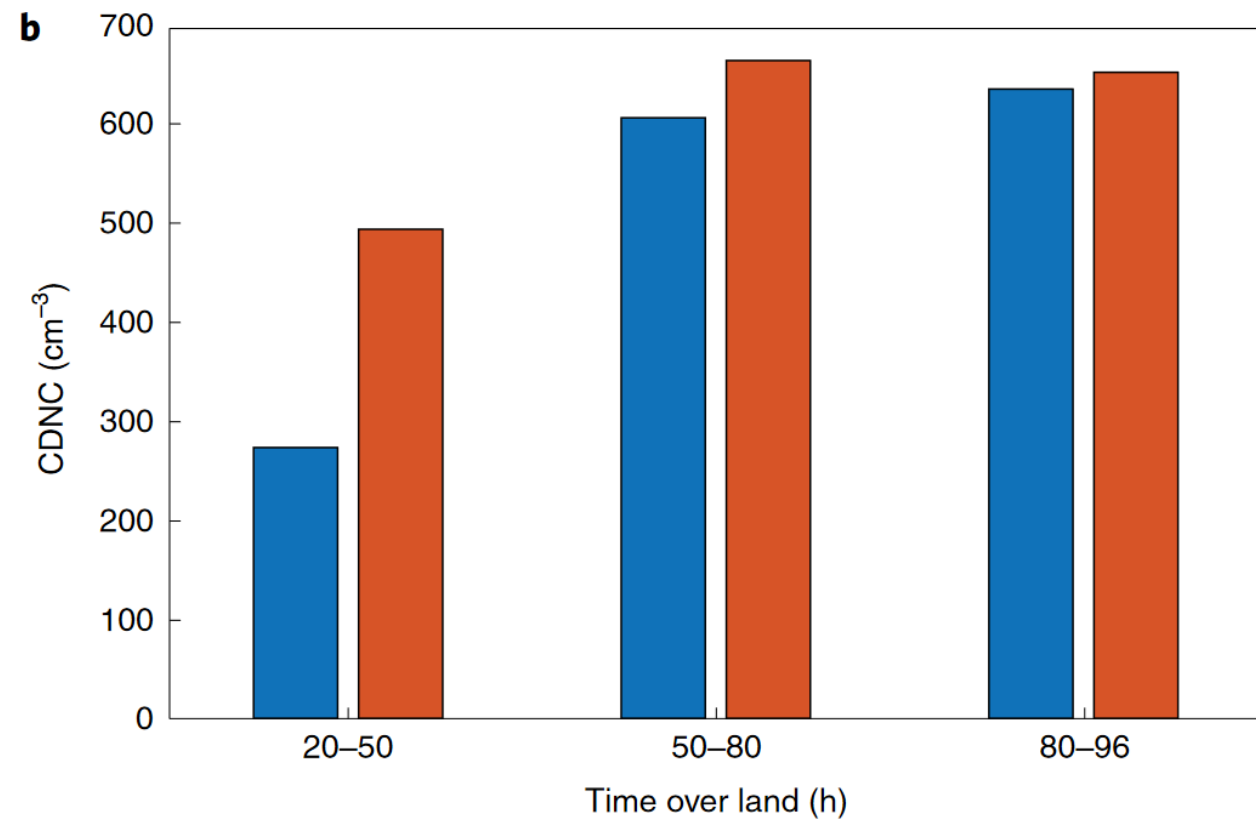


Source: T. Petäjä et. Al., 2022

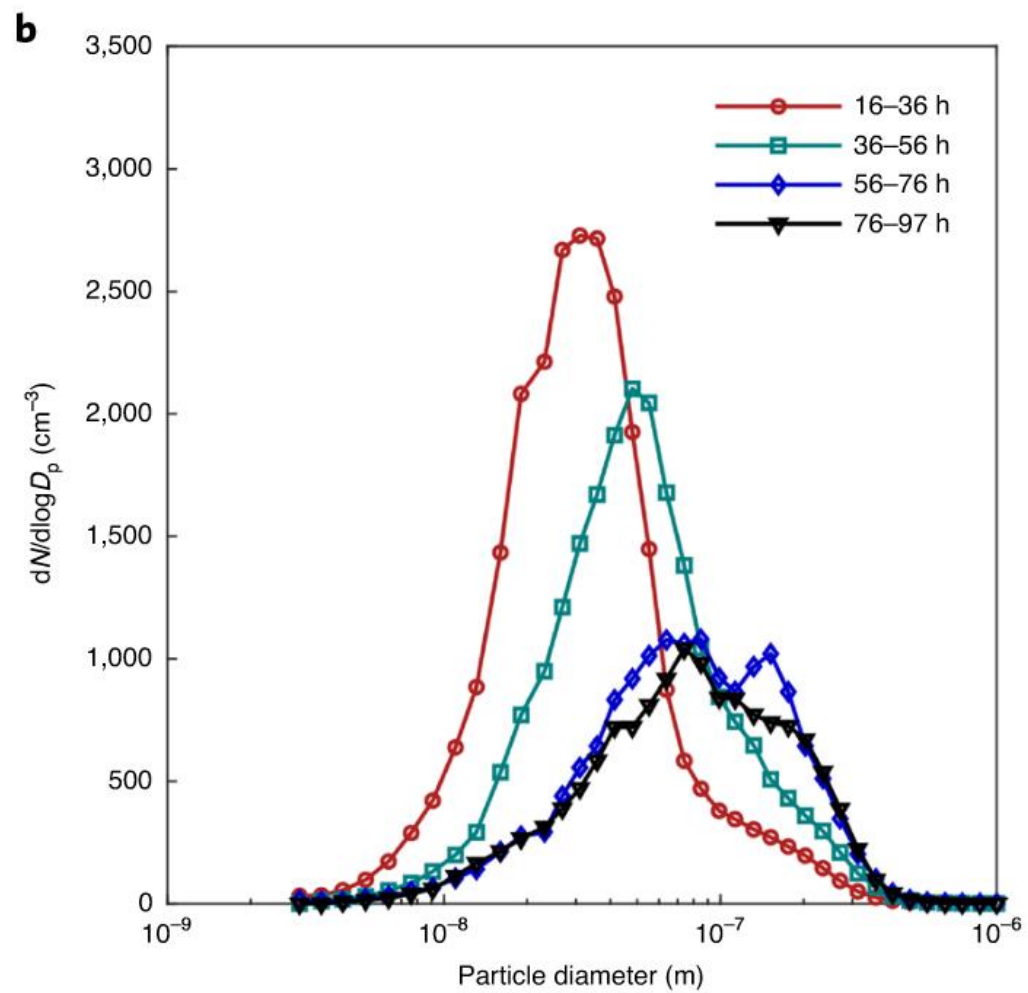




Source: T. Petäjä et. Al., 2022

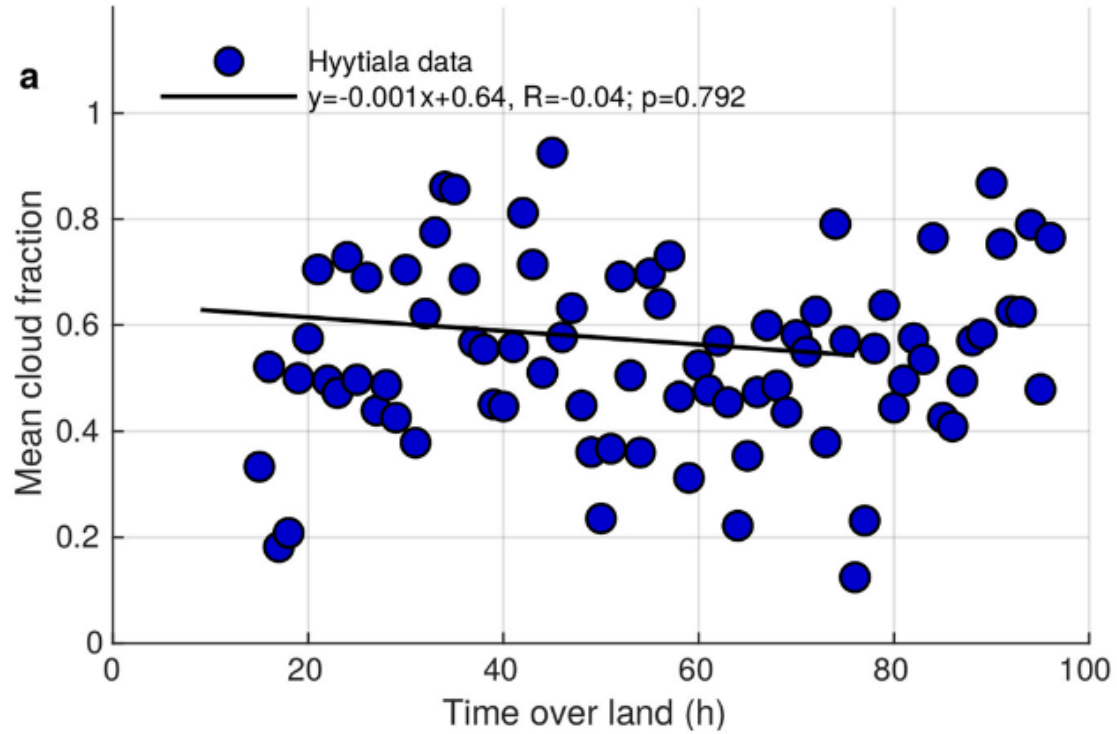


Source: T. Petäjä et. Al., 2022

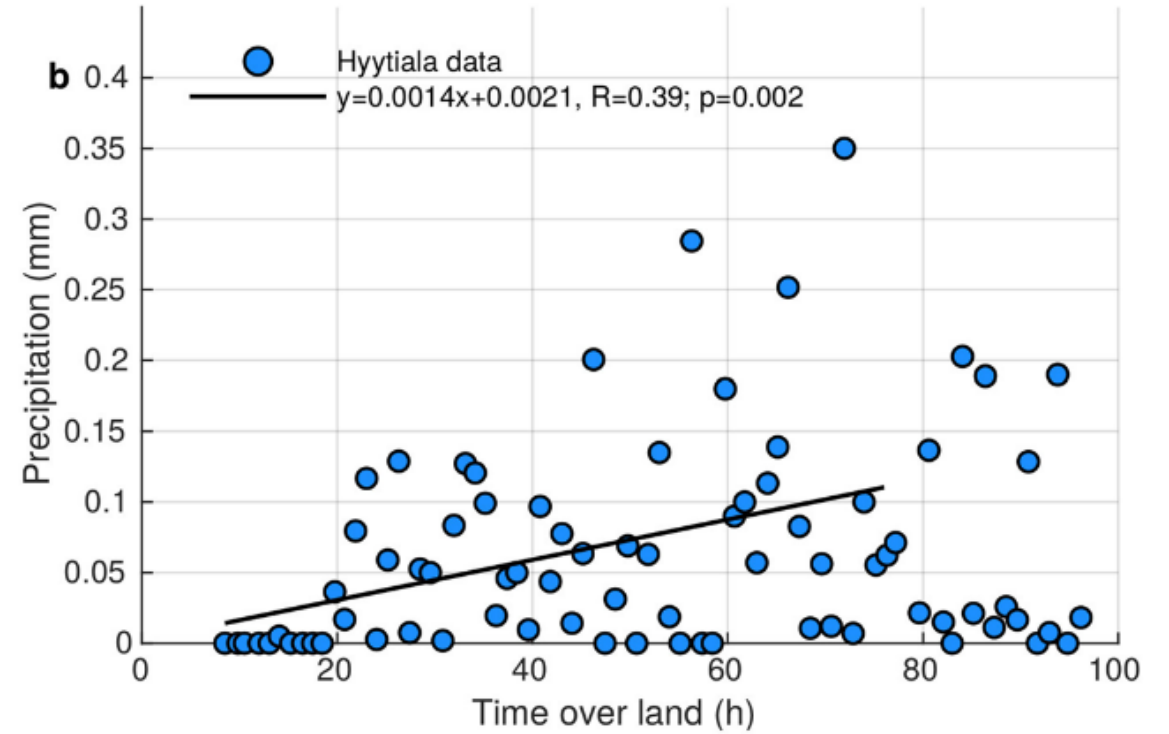


Source: T. Petäjä et. Al., 2022





Source: T. Petäjä et. Al., 2022



Source: T. Petäjä et. Al., 2022

SUMMARY & QUESTIONS

- **Time over land** is very interesting way to quantify the changes in biogenic and anthropogenic aerosol effects.
- Aerosol concentration and water cloud properties increase significantly with increasing time over land, due to biogenic aerosol.

