

EGU21-13408

<https://doi.org/10.5194/egusphere-egu21-13408>

EGU General Assembly 2021

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Observations of New Particle Formation events during summertime in Helsinki

Roseline Thakur¹, Lubna Dada¹, Lisa Beck¹, Tommy Chan¹, Juha Sulo¹, Marjan Marbouti¹, Xu-Cheng He¹, Janne Lampilahti¹, Markus Lampimäki¹, Lauriane L.J. Quéléver¹, Yee Jun Tham¹, Nina Sarnela¹, Katrianne Lehtipalo^{1,2}, Markku Kulmala^{1,3,4}, Mikko Sipilä¹, and Tuija Jokinen¹

¹Institute for Atmospheric and Earth System Research/Physics, Faculty of Science, 00014 University of Helsinki, Helsinki, Finland (roseline.thakur@helsinki.fi)

²Finnish Meteorological Institute, Helsinki, Finland

³Aerosol and Haze Laboratory, Beijing Advanced Innovation Center for Soft Matter Science and Engineering, Beijing University of Chemical Technology, 100089 Beijing, China.

⁴Joint International Research Laboratory of Atmospheric and Earth System Sciences, Nanjing University, 210023 Nanjing, China.

Aerosols can originate from different sources and undergo various formation pathways. New Particle formation (NPF) events occur when precursor vapors nucleate and vapors with low volatility condense on the critical nuclei enabling them to grow to cloud condensation nuclei (CCN) relevant sizes. As CCN, these aerosols affect the occurrence of clouds and their lifetime on local, regional and global level. Many studies have investigated new particle formation events from various sites ranging from urban areas, boreal forests to pristine locations; however, there is still a dearth of studies investigating coastal new particle formation, which is a complex phenomenon due to the dynamic and ever-changing atmospheric conditions at the coast. A comprehensive study of particle number distributions and aerosol forming precursor vapors was carried out in a coastal capital city of Finland, Helsinki, during the summer of 2019. The experimental setup comprising of a nitrate-based chemical ionization atmospheric pressure interface time of flight mass spectrometer (CI-API-TOF), a neutral cluster-air ion spectrometer (NAIS) and a particle size magnifier (PSM) were housed in and around the SMEAR III station in Kumpula Science campus. SMEAR III is a unique site situated in a semi-urban yet coastal location. The period of experiment coincided with the cyanobacterial bloom in the coastal areas of Finland and in the Baltic Sea region. Our study recorded several regional NPF and aerosol burst events during this period. High concentrations of sulfuric acid was found to be associated with the regional NPF events whereas increasing iodic acid concentrations was mostly associated with the initiation of burst events. The sources of sulfuric acid and iodic acid has been carefully evaluated in this study.