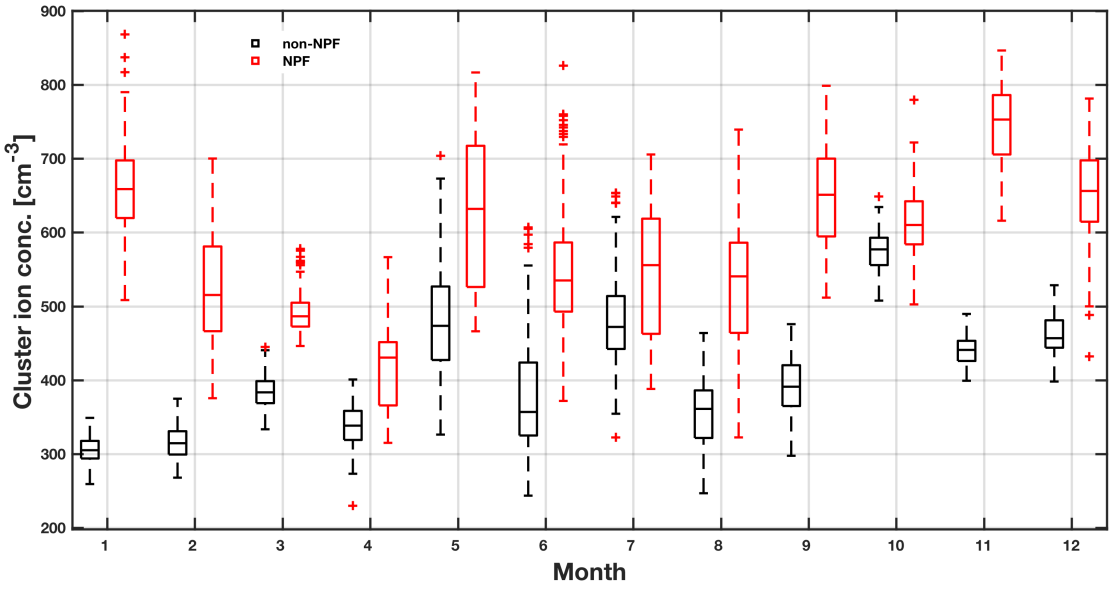

Figure S1. Seasonality in the median cluster ion (0.8-1.7 nm) concentration at SMEAR II station in southern Finland. Tops and bottoms of the boxes are the 75th and 25th percentiles of the median daily cluster ion concentrations in 10 min time resolution, with bars in the middle showing the 50th percentiles. Whiskers represent spans of the interquartile ranges multiplied by 1.5. Cluster ion concentrations on new particle formation (NPF) days shown in red and on non-event days in black. The event classification was based on the method described by Dal Maso et al. (2005).

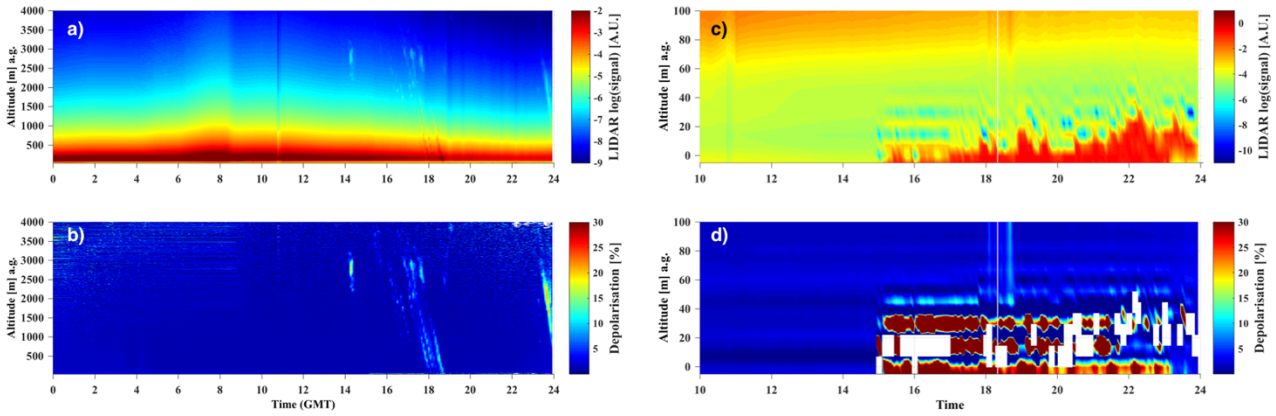

Figure S2. Left column: a) & b) Lidar observation on 20 January 2011 at Dome C. Right column: c) & d) zoom into the lowest heights (0-100 m) between 10:00 and 24:00 UTC. The lowest part of c) & d) (0-30 m) is a non-linear part in the LIDAR signal, and electrically induced noise bands are evident in d). The height information is also possibly subject to an uncertainty of ±5 m.

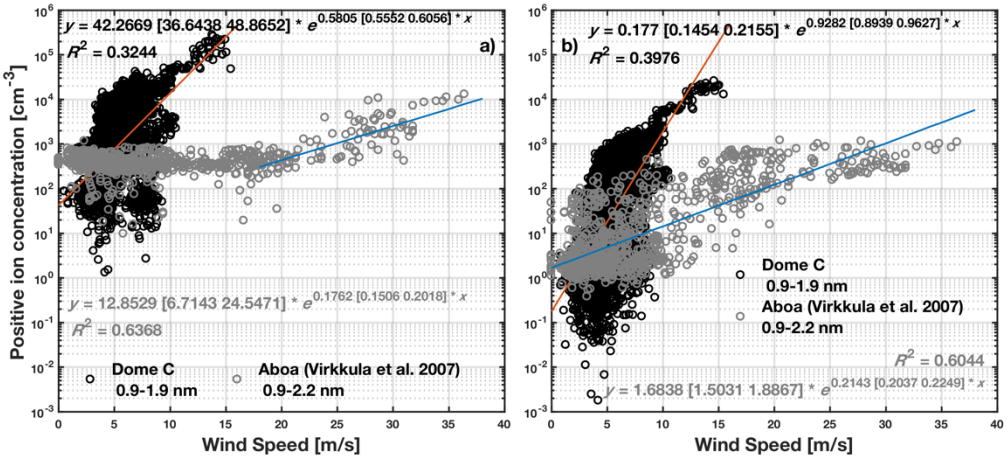

Figure S3. Ion concentrations as a function of wind speeds. a) Ion concentration in the cluster size range: 0.9-1.9 nm for Dome C (black circles) and 0.9-2.2 nm for Aboa (grey circles, from Virkkula et al. (2007)). b) Ion concentration in the size range of 1.9-10 nm for Dome C (black circles) and in the intermediate size range of 2.2-9.5 nm for Aboa (grey circles, from Virkkula et al. (2007)). The Aboa ion data were reported in mass diameters. The size ranges referred here are reconverted from the measured electrical mobility channels in mobility diameters. The solid lines are linear fits to the logarithm of the ion concentration data with 95% confidence bounds of the coefficients shown in the brackets. R^2 is the coefficient of determination measuring the goodness of fit, which denotes the fraction of the total variation in the data can be explained by the fit. In a), the linear fitting was adopted for data corresponding to wind speeds ≥ 18 m/s.