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Supplementary Information of

Over 20 years of observations in the boreal forest reveal a decreasing trend of atmospheric new particle formation

Li et al.

Correspondence to: Lubna Dada (lubna.dada@helsinki.fi); Markku Kulmala (*markku.kulmala@helsinki.fi*)

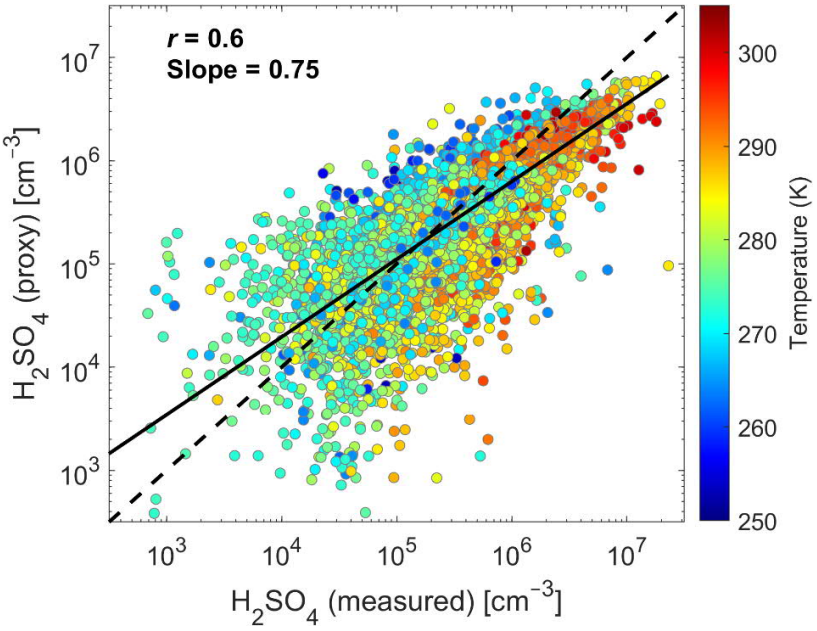

Figure S1. Scatter plot of the measured H_2SO_4 concentration vs. H_2SO_4 proxy during 2016-2019 when H_2SO_4 measurements were available. The scatter plot includes data from all four seasons and considers both daytime and nighttime measurements. Data points are hourly averaged concentrations. The straight lines represent robust linear fits, and the dashed lines are 1:1 line.

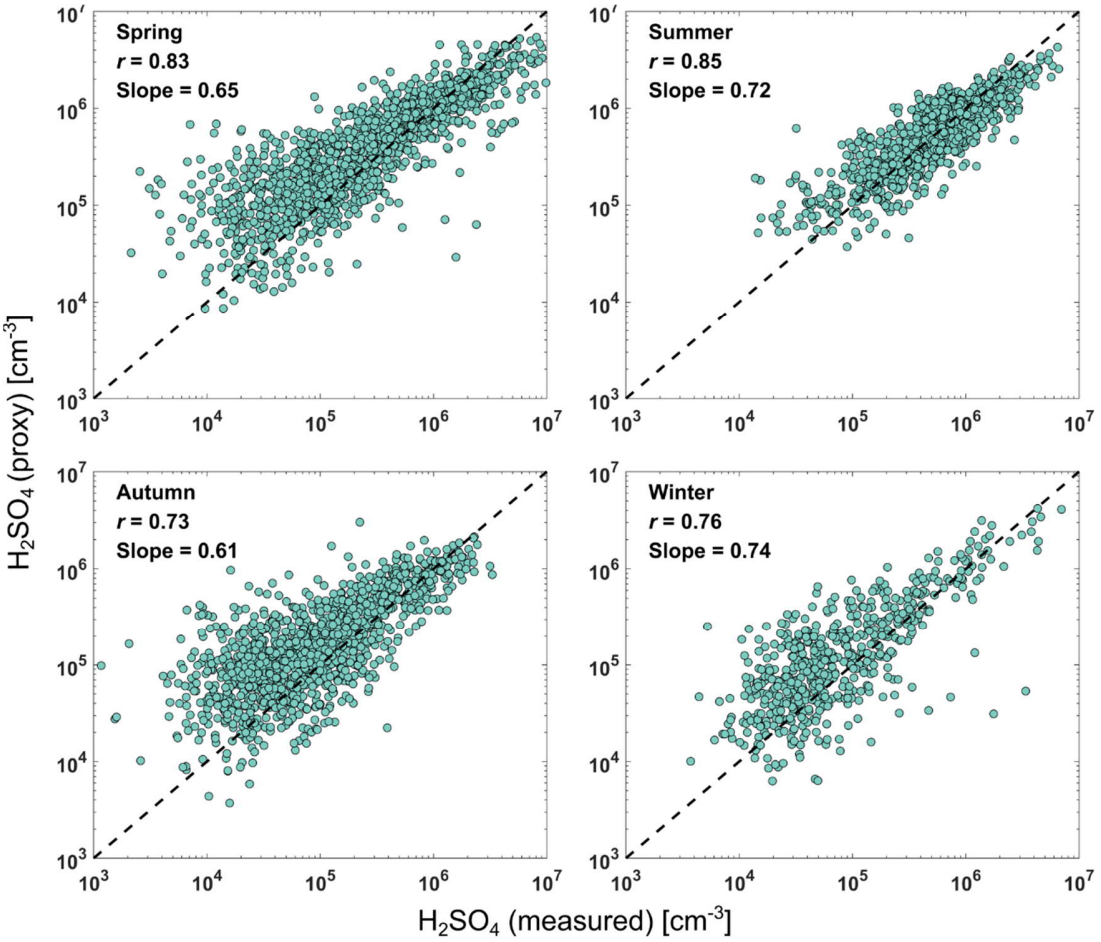

Figure S2. Scatter plot of the measured H_2SO_4 concentration vs. H_2SO_4 proxy during 2016-2019 when H_2SO_4 measurements were available. The subplots include data from four seasons separately and consider both daytime and nighttime measurements. Data points are hourly averaged concentrations. The Pearson correlation coefficients (r) and slopes are displayed in each subplot. The dashed lines are 1:1 line.

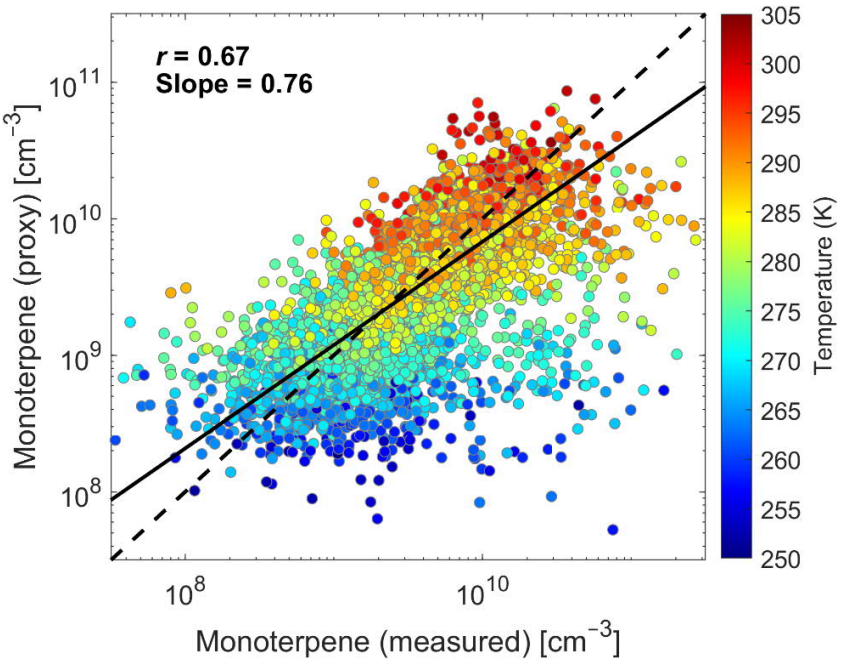

Figure S3. Scatter plot of the measured monoterpene concentration vs. monoterpene proxy during 2010-2019 when monoterpene measurements were available. The scatter plot includes data from all four seasons and considers both daytime and nighttime measurements. Data points are hourly averaged concentrations. The straight lines represent robust linear fits, and the dashed lines are 1:1 line.

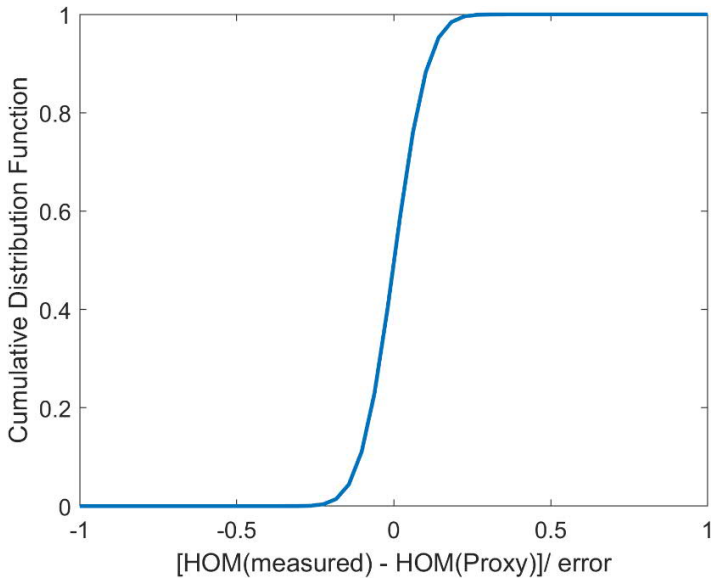

Figure S4. Cumulative distribution function (CDF) of the HOM proxy during 2016-2019 when HOMs measurements were available. This distribution shows our proxy has around 70% accuracy considering the monoterpene oxidation primarily from OH and O_3. The error was estimated as the difference between the 75th and 25th fitted HOM concentration values.

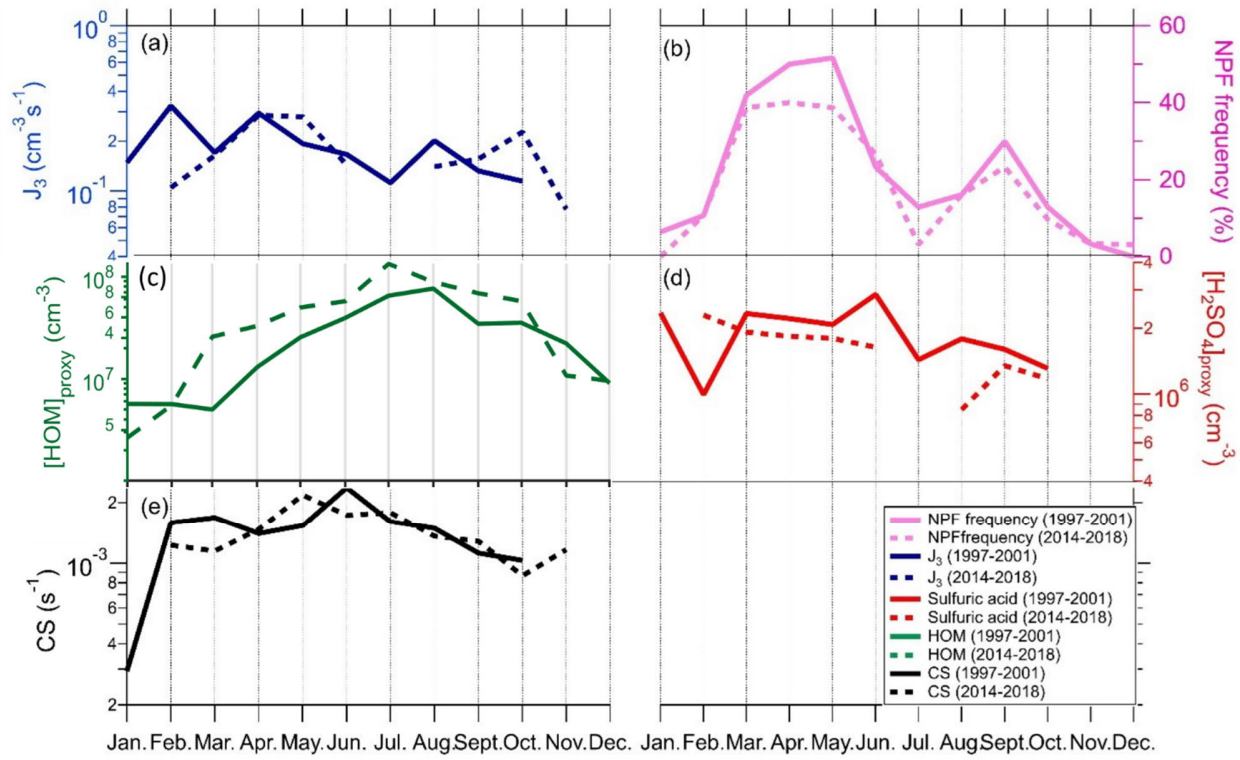

Figure S5. Median monthly variation of J_3 (**a**), NPF frequency (**b**), $[HOM]_{proxy}$ (**c**), $[H_2SO_4]_{proxy}$ (**d**), and CS (**e**) during all new particle formation periods in 1997 to 2001 and 2014 to 2018.