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Measurements of organic gases during aerosol formation events in the boreal forest atmosphere during QUEST

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Abstract. Biogenic VOCs are important in the growth and possibly also in the early stages of formation of atmospheric aerosol particles. In this work, we present 10 min-time resolution measurements of organic trace gases at Hyytiälä, Finland during March 2002. The measurements were part of the project QUEST (Quantification of Aerosol Nucleation in the European Boundary Layer) and took place during a two-week period when nucleation events occurred with various intensities nearly every day. Using a ground-based Chemical Ionization Mass Spectrometer (CIMS) instrument, the following trace gases were detected: acetone, TMA, DMA, mass 68amu (candidate=isoprene), monoterpenes, methyl vinyl ketone (MVK) and methacrolein (MaCR) and monoterpene oxidation products (MTO). For all of them except for the amines, we present daily variations during different classes of nucleation events, and non-event days. BVOC oxidation products (MVK, MaCR and MTO) show a higher ratio to the CS on event days compared to non-event days, indicating that their abundance relative to the surface of aerosol available is higher on nucleation days. Moreover, BVOC oxidation products are found to show significant correlations with the condensational sink (CS) on nucleation event days, which indicates that they are representative of less volatile organic compounds that contribute to the growth of the nucleated particles and generally secondary organic aerosol formation. Behaviors of BVOC on event and non event days are compared to the behavior of CO.

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