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Analysis of the composition of organic aerosol from long term measurements at the rural Cabauw site in the Netherlands

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Observations of organic aerosol (OA) chemical composition were performed as part of the European ACTRIS-2 program with a thermal-desorption proton-transfer-reaction mass spectrometer (TD-PTR-MS) in Cabauw, a rural atmospheric observation site in the western part of the Netherlands (51.971 °N, 4.927 °E). The campaign lasted 10 months from December 2015 to October 2016. During the whole campaign, 1280 individual ions in the range of 14-653 Da were quantified and only 56 (4.4%) ions were classified as inorganic compounds. The typically observed aerosol concentrations ranged from 200 ng/m3 to 3000 ng/m3 detected by the TD-PTR-MS, excluding a few high-pollution events. The organic compounds were released from the particle collection-thermal-desorption cell (CTD-cell) by uniformly ramping the temperature up to 350 °C (15.5 °C/min). We divided the whole temperature range into 7 equal temperature intervals. Masses released at the 200 °C temperature interval accounted for the largest proportion of the total concentration, approximately 30% of the total measured burden. The higher the OA concentration was, the higher was the fraction that desorbed at lower temperatures which is related to more volatile organic compounds. Among the "clean" days, a larger fraction was desorbed at higher temperatures (250 °C or 300 °C). Many individual organic compounds exhibited an obvious character of oscillation which showed a strong dependency on diurnal changes.