Supplement:

Airborne measurements of particulate organic matter by PTR-MS: a pilot study

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Figure S1. Track of NASA DC-8 flight #1271 carried out on 26 June 2018 between 10:36 and 15:54 hours local time over California. The color coding indicates the pressure altitude.
**Figure S2.** Photo taken from the cockpit when the NASA DC-8 skimmed the plume emanating from the Lions Fire over the Sierra Nevada Mountains in California (Photo credit: Megan Schill/NASA SARP)
Figure S3. Scheme of the inlet system used for the CHARON PTR-ToF-MS analyzer installed aboard the NASA DC-8. The inlet system consists of i) the UH/LARGE aerosol sampling probe with a plenum for sample distribution, ii) the NOAA/ESRL/CSD flow control system which ensures isokinetic flow conditions and iii) our own pressure-controlled inlet (PCI) from which the CHARON PTR-ToF-MS analyzer takes its sample flow. FM: flow meter; PC: pressure controller, MD4: Vacuubrand MD-4 diaphragm pump; TriScroll 600: Agilent TriScroll 600 scroll pump.
Figure S4. Average mass spectrum recorded by the CHARON PTR-ToF-MS instrument when the Lions Fire plume was sampled on 26 June 2018 between 13:03:50 and 13:04:35 hours local time. The mass spectrum is given in raw counts per second (cps), with only the 90-s pre-plume signal average being subtracted (excess signal). The dashed red line corresponds to a mass loading of 100 ng sm$^{-3}$ at the respective m/z, assuming the same signal response factor (sensitivity, in cps ng$^{-1}$ sm$^3$) as for acetone (acetone-equivalents).
Figure S5. Plot of aromaticity equivalent vs. number of carbon atoms summarizing the qualitative and quantitative organic composition of submicrometer particles detected in the Lions Fire plume. Aliphatic, monoaromatic and polyaromatic species are shown in red, yellow and blue, respectively. Mass distributions as a function of #C atoms and of aromaticity equivalent are shown in the bar graphs above and to the right of the main figure, respectively.
Figure S6. Elementally resolved mass concentration of organic aerosol as measured by CHARON PTR-ToF-MS in the boundary layer of the San Joaquin Valley. The upper panel (a) shows the distribution as recorded between 10:48 and 11:20 hours local time. The lower panel (b) shows the distribution as measured between 14:02 and 15:01 hours local time.
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