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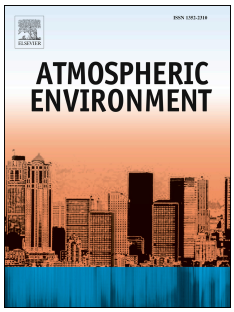


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# Multi-year levels and trends of non-methane hydrocarbon concentrations observed in ambient air in France

Antoine Waked[1,2], Stéphane Sauvage[1,2],Agnès Borbon[,3] , Julie Gauduin[4], Cyril Pallares[5], Marie-Pierre Vagnot[6], Thierry Léonardis[1,2] , Nadine Locoge[1,2]

1. Mines Douai, Sciences de l'Atmosphère et Génie de l'Environnement (SAGE), F-59508 Douai Cedex, France, Mines Douai, F-59508, Douai, France
2. Université de Lille, F-59000 Lille, France
3. Laboratoire de Météorologie Physique (LaMP), CNRS, UMR-6016, Université Blaise Pascal, F-63171, Aubière, France
4. Agence de surveillance de la qualité de l'air (AIRPARIF), F-75004, Paris, France
5. Agence de surveillance de la qualité de l'air (ASPA), F-67300, Schiltigheim, France
6. Agence de surveillance de la qualité de l'air (Air Rhône-Alpes), F-69500, Bron, France

*Correspondence* : antoine.waked@mines-douai.fr; stephane.sauvage@mines-douai.fr

**Abstract**

Measurements of 31 non-methane hydrocarbons (NMHCs) were carried out at three urban (Paris 2003-2014, Strasbourg 2002-2014 and Lyon 2007-2014) sites in France over the period of a decade. A trend analysis was applied by means of the Mann-Kendall non-parametric test to annual and seasonal mean concentrations in order to point out changes in specific emission sources and to assess the impact of emission controls and reduction strategies. The trends were compared to those from three rural sites (Peyrusse-Vieille 2002-2013, Tardière 2003-2013 and Donon 1997-2007). The results obtained showed a significant yearly decrease in pollutant concentrations over the study period and for the majority of species in the range of -1 to -7% in accordance with the decrease of NMHC emissions in France ( -5 to -9%). Concentrations of long-lived species such as ethane and propane which are recognized as tracers of distant sources and natural gas remained constant. Compounds associated with combustion processes such as acetylene, propene, ethylene and benzene showed a significant decline in the range of -2% to -5% $yr^{-1}$. These trends are consistent with those recently described at urban and background sites in the northern mid-latitudes and with emission inventories. C7-C9 aromatics such as toluene and xylenes as well as C4-C5 alkanes such as isopentane and isobutane also showed a significant decrease in the range of -3% to -7% $yr^{-1}$.The decreasing trends in terms of % $yr^{-1}$ observed at these French urban sites were typically higher for acetylene, ethylene and benzene than those reported for French rural sites of the national observatory of Measurement and Evaluation in Rural areas of trans-boundary Air