



## Fluxes of biogenic volatile organic compounds in a green oak forest

Pauline Buysse (1), Florence Lafouge (1), Julien Kammer (1,3), Raluca Ciuraru (1), Michael Staudt (2), Sandy Bsaibes (3), François Truong (3), Valérie Gros (3), Karim Piquemal (2), Jean-Marc Ourcival (2), Felix Piel (4), and Benjamin Loubet (1)

(1) UMR ECOSYS, INRA-AgroParisTech, Université Paris-Saclay, 78850 Thiverval-Grignon, France (pauline.buysse@inra.fr), (2) Centre d'Ecologie Fonctionnelle et Evolutive, UMR 5175, CNRS, 34090 Montpellier, France, (3) Laboratoire des Sciences du Climat et de l'Environnement, LSCE, UMR CNRS-CEA-UVSQ, IPSL, 91191 Gif-sur-Yvette, France, (4) Ionicon Analytik GmbH, Innsbruck, Austria

Volatile organic compounds (VOCs) play a key role in atmospheric chemistry. 90% of them are of biogenic origin and, more specifically, forests represent a large source of monoterpenes and isoprene [1]. Thanks to the use of a high-precision PTR-Qi-TOF-MS (National instrument within the ANAEE-France framework), this work aimed at identifying less known VOCs emitted by forests, and characterize their vertical and temporal dynamics in a mixed green oak (*Quercus ilex*) forest at the ICOS site of Puechabon in the South of France.

The field campaign was carried out from 20 June until 10 July 2018. The experimental set-up combined eddy-covariance flux measurements at the stand level, VOC concentration measurements at different heights in the canopy (vertical profile) and flux measurements in dynamic chambers over several compartments of the ecosystem.

At the canopy level, results from the analysis of eddy-covariance fluxes showed that monoterpenes ( $m/z$  137.13) and their fragments (hexene,  $m/z$  81.06), together with isoprene ( $m/z$  69.07) were the main VOCs emitted by the forest. Apart from these main VOCs, smaller emissions of methanol, acetaldehyde and acetic acid were observed. At the Puechabon site, boxwood, present throughout the undergrowth environment, is the main emitter of isoprene, as it was shown by the chamber measurements (see further). Many other VOCs were also detected and contributed to a much lesser extent to the total VOC emissions. The fluxes of monoterpenes, hexene and isoprene showed very clear daily emission cycles throughout the period.

At the plant level, about 15 compounds contributed up to 70 - 90% of total emissions depending on the species and on the oak chemotype. Oaks mainly emitted monoterpenes (>60%) and isoprene (<6%). Surprisingly, one oak had a distinct emission profile, with lower monoterpene emissions and larger emissions from other masses. Boxwood, present in the undergrowth, mainly emitted isoprene (about 65%).

Part of this work is still ongoing and further data analyses have to be performed but these first results provide interesting insights to better characterize VOC emissions in mixed forest ecosystems.