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Airborne measurement of peroxy radicals in the lower troposphere

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The importance of peroxy radicals in the tropospheric chemistry is well recognized in the scientific literature. Hydroxy- and organic peroxy radicals (HO_2 and RO_2, R being an organic chain) are key intermediates in the OH radical initiated oxidation of CO and SO_2, of volatile organic compounds (VOC), in the ozonolysis of alkenes and photo-oxidation of carbonyl species. Peroxy radicals are responsible for the ozone production in the troposphere, the formation of peroxides and other oxidants. Although radical chemistry in the troposphere has been subject of intensive research in the past three decades, it is still very few known about the vertical distribution of peroxy radicals. Airborne observations are scarce in spite of their particular importance to improve the understanding of the tropospheric chemistry and the oxidising capacity of the atmosphere at different altitudes.

In situ trace gas measurements were carried out in summer 2010 on board of the INTA (Instituto Nacional de Técnicas Aeroespaciales) C212 aircraft over Spain in the frame of the EUFAR project VERDRILLT (VERtical Distribution of Radicals In the Lower Layers of the Troposphere), and in cooperation with the DLR (Deutsches Zentrum für Luft- und Raumfahrt), the University of Wuppertal, the CEAM (Centro de Estudios Ambientales del Mediterráneo) and the UPV-EHU University in Bilbao. VERDRILLT aimed at getting a deeper understanding of the vertical distribution of peroxy radicals in the lower layers of the troposphere. Measurements were taken over urban areas and extensions of different vegetation under meteorological conditions favouring active photochemistry and convection from the ground into close atmospheric layers. Results and main findings will be presented and discussed.