



Observation of drought effect on monoterpene Mediterranean oak canopy fluxes

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Branch enclosure measurements of *Quercus ilex* monoterpene emission in inland Iberian Peninsula have revealed a great emission reduction under hot and dry weather during early autumn season (Núñez et al, 2002). This effect was attributed to drought conditions, which strongly affect diurnal physiological activity of sclerophyll oak forest (Tenhunen et al, 1981).

Aiming to document this effect at a greater scale, a gradient method to measure vertical fluxes was implemented within a vast oak forest in the surroundings of Madrid metropolitan area. A meteorological tower was erected and two above-canopy temperature and monoterpene concentration measurement levels (12 and 27 m) and one heat flux measurement level (20m) were instrumented to calculate fluxes by the modified Bowen-ratio technique. This work presents the experimental results obtained in two 2003 field campaigns.

Hot and clear-sky days were chosen for flux measurements during early July and late September 2003. Quite different emission behaviour was observed in these two periods. Summer flux values presented a reasonably good fit to Guenther's parameterisation. Early autumn flux values as well as monoterpene concentrations showed a significant reduction, which was deeply enhanced at high ambient PAR and temperature. Precipitation data and water potential measurements indicated the presence of water-limited conditions, more pronounced during early autumn campaign. Thus parameterisations of monoterpene emission driven by these two ambient factors would lead to great overestimations under water stress conditions. A different or complementary parameterisation of emission would be required for a fair description of the emission reduction derived from the physiological response of sclerophyll natural vegetation to long-term drought.

Núñez L., Plaza J., Pérez-Pastor R., Pujadas M., Gimeno B.S., Bermejo V., García-Alonso S., High water vapour pressure deficit influence on *Quercus ilex* and *Pinus pinea* field monoterpene emission in the central Iberian Peninsula (Spain), *Atmos. Environ.*, 36(28), 4441-4452, 2002.

Tenhunen J.D, Lange O.L., Braun M., Midday stomatal closure in Mediterranean type sclerophylls under simulated habitat conditions in an environmental chamber, *Oecologia*, 50, 5-11, 1981.