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Title: Free-Air Ozone Fumigation of Mature Trees

Abstract: Asia Oceania Geosciences Society, Session OA 5, preferred mode: oral presentation Free-Air Ozone Fumigation of Mature Trees H. Werner, C. Heerdt, P. Fabian†, A.J. Nunn, I.M. Reiter, K.-H. Häberle and R. Matyssek Technical University of Munich, Dept. of Ecology, Chair of Ecoclimatology Am Hochanger 13, E-85354 Freising-Weihenstephan A novel system for continuous and controlled free-air fumigation of mature tree caopies with ozone is described. This "Kranzberg Ozone Fumigation Experiment" (KROFEX) was de-signed to continuously enhance the ambient ozone level in a mixed beech/spruce stand by a factor of 2, during the entire vegetation period. Within an interdisciplinary research project (SFB 607) aiming at investigating the impact of enhanced chronic O3 regimes, a group of 5 beech and 5 spruce trees has been subject to continuous ozone fumigation throughout 3 com-plete vegetation periods, 2001-2003, with biological and physiological effect being investi-gated.Different from exposition and open top chambers limited to small plants and thus young trees only, with wall effects creating artificial microclimate conditions, and different from FACE systems limited to trees of less than 10 m heights, KROFEX allows, for the first time, to fumigate complete canopies of grown-up trees, without any walls or containments. Ozone generated from oxygen is diluted with air in a pressurized tank and conducted into the canopies by a system of 130 PFFE tubes hanging down from a grid fixed above the crowns. With 45 calibrated outlets per tube providing a constant flow of 0.3 l/min. each, a total vol-ume of about 10x1x15 m³ comprising 5 beech and spruce canopies is fumigated. The spatial ozone distribution in the fumigated volume as well as surrounding refernce trees is controlled by continuous measurements supplemented by an array of passive samplers. The KROFEX design allows for controlled free-air fumigation up to 10 times ambient ozone levels, it can easily be expanded to cover larger volumes, and it can be applied for CO2 fumi-gation as well. KROFEX is operated in a German forest, but a system of similar design can be set up in any forest in Asia or Oceania as well. Details of KROFEX will be presented, along with a discussion of biological and physiological effects observed during 3 years of operation. † corresponding author: Peter Fabian; fabian@met.forst.tu-muenchen.de

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