Geophysical Research Abstracts,
Vol. 11, EGU2009-14091, 2009
EGU General Assembly 2009

The ACCENT-VOCBAS field campaign on biosphere-atmosphere interactions in a Mediterranean ecosystem

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Biosphere-atmosphere interactions were investigated on a sandy dune Mediterranean ecosystem in a field campaign held in 2007 within the frame of the European Projects ACCENT and VOCBAS. The campaign was carried out in the Presidential estate of Castelporziano, a peri-urban park close to Rome where several investigations on the emission of biogenic volatile organic compounds (BVOC) in Mediterranean area were performed in the past 15 years. While specific aspects of the campaign will be discussed in companion papers, the general climatic and physiological aspects will be presented here together with information regarding BVOC emission from the most common plants present in this ecosystem. During the campaign regular air movements were observed, dominated by moderate nocturnal land breeze and diurnal sea breeze. A regular daily increase of ozone concentration in the air was also observed, but daily peaks of ozone were much lower than those measured downwind of the Rome conurbation. The site was ideal as a natural photochemical reactor to observe reaction, transport and deposition processes occurring in the Mediterranean basin, where a sea-land breeze circulation system allows a strong mixing between biogenic and anthropogenic emissions and secondary pollutants. The campaign investigated emissions from a poorly studied and largely biodiverse ecosystem, often subjected to a combination of environmental stresses and to anthropogenic pollution. Measurements were run in May, when plant physiological conditions were still optimal, in absence of severe drought and heat stress. Foliar rates of photosynthesis and transpiration were as high as generally recorded in unstressed Mediterranean sclerophyllous plants. Most of the plant species emitted high level of monoterpenes, despite measurements being made in a period in which emissions of volatile isoprenoids could be restrained by developmental and environmental factors, such as leaf age and relatively low air temperature. No high isoprene emitting plants were found in the ecosystem. It is speculated that environmental stresses limit the emission during summer, differently than in other Mediterranean ecosystems. Accounting for the high spring emission of the dune ecosystem may be important to correct current algorithms at regional, ecosystem levels, and to interpret measurements of fluxes of volatile isoprenoids and pollutants.