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Biogeosciences Discussions

Interactive comment on "The ACCENT-VOCBAS field campaign on biosphere-atmosphere interactions in a Mediterranean ecosystem of Castelporziano (Rome): site characteristics, climatic and meteorological conditions, and eco-physiology of vegetation" *by* S. Fares et al.

S. Fares et al.

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We are grateful to the reviewers for the insightful comments to our paper “The ACCENT-VOCBAS field campaign on biosphere-atmosphere interactions in a Mediterranean ecosystem of Castelporziano (Rome): site characteristics, climatic and meteorological conditions, and eco-physiology of vegetation”.

As mentioned by one of the reviewers we tried to accommodate in the same report two ambitious objectives: first, to introduce the International experimental campaign

which took place in 2007 in Castelporziano, explaining the rationale of the campaign and introducing the companion reports, and, second, to present original data on eco-physiology and isoprenoid emissions by the poorly investigated dune ecosystem.

The referees observed a certain unbalance in the wealth of information contained in the paper. Reviewer 1, in particular, suggested to make more punctual and short the discussion about ozone level, and more detailed the description of the field site. We rearranged the discussion on ozone levels and their dependence on urban plumes, biogenic emissions and air circulation, hopefully making it more clear and concise, and also considering the comments from a third external scientist (see below for the specific points). With regard to the specific information on the field site, we examined more deeply the current literature, and added to the introduction more information, although were unable to find specific studies on the dune ecosystem which could be used to describe more in detail the features of the site. As also suggested, especially by reviewer 2, we also outlined more thoroughly the differences between the ACCENT campaign and the BEMA campaign, which took place in a site more distant from the coast, on a different ecosystem and on a different season. We also edited figure 1 which now shows the many different vegetation types present in the Castelporziano area. They represent almost the totality of Mediterranean ecosystems all over the Mediterranean basin, but, as highlighted in the paper, the coastal ecosystem has been poorly investigated in comparison with the inland Pine and Oak ecosystems. Finally, we further highlighted the importance of our emission inventory for modeling and upscaling purposes, especially when considering the seasonality of the emission and the emission of BVOC other than isoprene.

The text was also amended to incorporate the specific comments of the referees, as below specified by single item.

Anonymous Referee #2 Abstract p1187, lines 7 and 17: after the 15 years of BVOC emission investigations in the area (line 7), is it the specific coastal sand dune ecosystem that you consider “poorly studied” (line 17) in comparison with the

BGD

6, S1074–S1079, 2009

Interactive Comment

Mediterranean macchia in general, or do you refer to other ecosystem types, such as evergreen oak stands (p1190, line5)?

P2 l 3: We referred to dune as compared to other Mediterranean ecosystem types. The sentence has been rewritten to clarify this point.

p1187, line 26: “It is speculated that environmental stresses limit the emission during summer, differently than in other Mediterranean ecosystems” Is it the environmental stress factors (salinity, temperature etc) that differs from others Mediterranean ecosystems, or emission responses? Please clarify.

We actually believe that during summer emissions are restrained by environmental stresses in many Mediterranean ecosystems. By running the campaign in May, when especially the drought stress is not heavy, we wanted to get rid of this limitation, although isoprenoid emission might have been limited by other environmental or biological factors (low temperature, ontogeny).

Introduction p1188, line 6: “The Mediterranean ecosystems represent 1% of the Earth’s land surface” Is there any available figure on the aerial extent of Mediterranean sand dune ecosystems similar to the one in this study?

We changed figure 1 with a more detailed figure which explains the vegetational types in Castelporziano, and highlights differences between the dune vegetation and other Mediterranean vegetation types of the coastal areas. We did not find other suitable figures describing the Mediterranean ecosystems at a larger scale that could further elucidate our reasoning.

p1190, line 8: “The Presidential Estate of Castelporziano is a large park at the southeastern edge of the large conurbation of Rome”. Looking at Fig. 1, to me it looks like the site is located more to the southwest of Rome? C.f. the companion special issue paper (Methods section) by Davidson et al. (BGD 6 2183-2216).

P 7 l 21: The reviewer is right, there was a typing mistake and the sentence has been

BGD

6, S1074–S1079, 2009

Interactive Comment

corrected.

p1191-1192, points a-f: Would it be possible to here also refer to the other papers of the special issue where the respective objectives are treated?

P 6-7 l 17-03: A very useful recommendation. We added in the text reference to other contributions of the special issue.

Material and methods p1192, line 14: “located 25 km SE from the center of Rome” Should it be SW (see comment above)?

Corrected, see above.

p1196: “Measurements of plant physiological properties and isoprenoids emission&# 8221; Did you allow any time for leaf acclimation in-between leaf enclosure and onset of BVOC sampling to avoid sampling of any stress-related emissions? Was the active carbon cartridge placed in the inlet sample stream before or after the LI-6400 console and chemical tubes and did you analyze any blank cuvette samples to compensate for possible contamination generated by the system?

P 12 l 9-25; P 13 l 1-11: All these technical aspects, correctly highlighted by the reviewer, were considered at the time of measurements and always incorporated in our routine, as it is now described in the text.

p1206, line10-12: “Therefore, in the Mediterranean area, whose climate is characterized by already rather high spring temperatures, a sustained emission of isoprenoids could be seen already in spring”. What was the developmental state of the investigated leaves?

P 22 l 4-7: We measured, when possible, both young and old fully expanded leaves. This has been now explained in the text (see also next comment).

p1206, line 24-25: “Both mature (second year) leaves, and young, still expanding leaves, emitted similar rates of total monoterpenes” Please clarify if this

BGD

6, S1074–S1079, 2009

relates to the current study or earlier ones from Castelporziano (see comment above).

We highlighted in the text that the developmental stage relates to the present measurements, as also outlined in table 2.

p1208, lines 19-26: “our finding indicates strong control of water availability over the synthesis of isoprenoids in this species. This finding is in contrast with recent conclusions that isoprenoid biosynthesis is resistant to drought stress (Pegoraro et al., 2004; Brilli et al., 2007). However, Cistus spp. are water-spending plants characterized by low stomatal control on water content and very dramatic changes of leaf water status, especially when living in an environment subjected to fast changes of soil water content, as is the case of the sandy soil of Castelporziano site”. What could the main reason for this strong link to water availability be? Any links to, e.g., photosynthetic capacity coupled to plant water status?

P21 l 12-14: The reviewer hypothesis that lack of photosynthetic substrates down-regulates and eventually suppresses isoprene emission under drought stress is the most plausible one, as also mentioned in some older papers of this group. This was also mentioned in the text.

p1209, line 11-17: “After measuring the basal emission at leaf level of each representative species of the stand (Table 2), an upscaling procedure was developed…” Can these figures be compared with the figures presented in Davidson et al. (BGD 6 2183-2216)? It would be interesting to directly compare how well the two measurement/modeling techniques (leaf scale vs. ecosystem scale measurements) agree.

The basal emission rates presented in this paper were used by Davison et al. to model fluxes with a light and temperature algorithm.Further comparisons, e.g. normalization of measured fluxes for basal conditions for light and temperature will be performed in the Davison et al. paper, since we considered it out of scope in an introductory paper such as our.

BGD

6, S1074–S1079, 2009

Technical comments p1200, line 12: “can be as twice as the” should be “can be twice as high as the”

P 16 L 14 The correction has been introduced in the text.

Table 1: Please indicate in the table legend the number of replicates in this inventory (did it include all individuals in the whole study area or a selected number of plants). What were the respective standard deviations?

P39 l 2-5: The inventory included all individuals in the whole study area, up to 17 individual per species.

Figures 2 and 4 would benefit (especially when printed) from increased font sizes and line thicknesses.

Tables and pictures were edited according to the reviewer suggestion, including standard deviations where available and increasing line and text size.

Interactive comment on Biogeosciences Discuss., 6, 1185, 2009.