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Biogeosciences Discussions

Interactive comment on "Decreased summer drought affects plant productivity and soil carbon dynamics in Mediterranean woodland" *by* M. F. Cotrufo et al.

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We are pleased that reviewer 4 appreciated the importance of our work, and referred to our study as of "great interest". We respond below to the queries posed, several of them were also addressed in the response to the other three referees.

Throughfall manipulation experiment

Our irrigation treatment is designed to release the vegetation from water limitation during the growing season and not to simulate a predicted scenario of climate change. We motivate this choice in the introduction, where we state: "In the context of climate change, and because of the high uncertainty associated with future precipitation

scenarios (IPCC, 2007), our manipulation experiment was designed to generate soil moisture conditions that contrast (i.e. drier fall-winter-spring periods and wetter summers) with those commonly occurring in the Mediterranean region, allowing the study of fundamental controls of soil moisture on plant and soil C dynamics in this region". In 2008 and 2009 growing season rainfall was particularly low and thus, the amount of water added through irrigation was larger than in previous years. During irrigation events, water was added by suspended sprinklers at a rate of 15-20 mm hour-1 for 3 to 4 hours, depending on well pressure thus to simulate short, moderate to heavy, rain events. The number of heavy rains registered at the site was usually between 1 and 3% across the year. More frequent were moderate rains. We have added the following sentence to the text: "Each irrigation event lasted 3 to 4 hours, when water was added at a rate of 15-20 mm hour-1".

Modelling

Also this referee, as others previously, questioned the added value of the modelling results. Accepting the referees' advice, we have removed the section concerning respiration modelling from this study, and now use the model results only for gap filling of measured data. We use the same model, as reported in the method section, for all treatments, while fitting parameters changed depending on the treatment. Non-linear analysis was performed using a modified Gauss – Newton procedure of least squares estimation in Stata 7 for each plot (© Stata Corporation, College Station, USA).

Drain effects

As reported in the ms, the drains were positioned below the canopy in our very dense evergreen Mediterranean woodland. We did not measure shading effects, but given the canopy density and architecture we firmly believe that drains could not have significantly affected shading. Indeed, we found a significant difference in mean annual soil temperature in 2006 and 2007 (Anova: p=0.021 and p=0.079, respectively) between control and the other two treatments (Tukey test: p=0.037 and p=0.029, respectively),

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but not between dry and wet. No significant difference in annual maximum soil temperature was found among treatments ($p>0.05$; data not reported). Referee 1 had very similar concerns. As we responded to his/her comment, we have been very careful at positioning our replicate soil collars for respiration measurements and soil climate sensors fully at random, to avoid bias due to position. Also drains were periodically cleaned off litter and litter redistributed underneath the drains. We now specify this in the text.

Figure 9

We are not sure what the referee refers to here, since we do not have a figure 9 in our ms, but we believe that the reference is to the former figure 3, now figure 2 (see response to previous referee's comments). Our figure reports a general relationship which was found between annual differences in water input and the corresponding differences in litter fall. We appreciate the suggestion to discuss the effects of inter-annual climate variability on results. Unfortunately, we do not have a long enough record of results for any of the parameter studied to thoroughly address this topic.

C4-soil cores

Unfortunately we do not have data on root biomass in the cores. Please see our previous response to this same concern for full explanation. The limitations of the C4-soil core methods are extensively reported in the text.

Interactive comment on Biogeosciences Discuss., 8, 5955, 2011.