

Interactive comment on “Short-term cropland responses to temperature extreme events during late winter” by G. De Simon et al.

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Reviewer #2

Comment #1 Abstract: Change “Most of this research has been. . .” into “Most of these researches have been. . .”.

We modified the sentence in the abstract according to reviewer suggestions.

Comment #2 In the end of Abstract, I'd like to suggest add one sentence of your study application or/and conclusion.

We agree with the reviewer, thus we added at the end of the abstract the following sentence: “In conclusion, from the results of our experiment we can assert that an

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increase in the frequency of both heat and cold waves is unlikely to have large effects on the overall annual carbon balance of irrigated croplands”.

Comment #3 Introduction: Suggest merge the first and second paragraphs into one graph and re-organize them.

We re-organized the first and second paragraphs into one paragraph: “Several studies have focused on the effects of gradual climatic changes (e.g. increase in mean annual temperature, increase in mean atmospheric CO₂ concentration, etc.; Jentsch et al., 2007) on carbon cycle. In particular, as soil respiration (R_s) is the second largest carbon flux in most ecosystems (Davidson et al., 2002) and can influence the overall soil carbon reservoir, there has been a growing interest about the effects of gradual climate change on this outgoing flux and about feedbacks on atmospheric CO₂ concentration related to its possible increase (Cox et al., 2000; Jones et al., 2003; Knorr et al., 2005; Davidson and Janssens, 2006; Heimann and Reichstein 2008; Mahecha et al., 2010). Estimated global R_s in 2008 amounted to 98 ± 12 PgC, with an increasing rate of 0.1 PgC yr⁻¹ between 1989 and 2008, implying a global R_s response to temperature (Q₁₀) of 1.5 (Bond-Lamberty and Thomson, 2010). Recently, several papers regarding the impacts of climate extremes and climate variability on the carbon cycle have been also published (Easterling et al., 2000; Jentsch et al., 2007) following the forecasted increase in both mean climatic values and occurrence of extreme weather events (Meehl et al., 2000; Jentsch et al., 2007; Jentsch and Beierkuhnlein, 2008). In fact, such events can have an even greater influence on ecosystems and societies than gradual shifts in mean temperatures and precipitation regimes (Jentsch and Beierkuhnlein, 2008). Among all, heat waves are predicted to become more frequent, intense and longer lasting (Karl and Trenberth, 2003; Meehl and Tebaldi, 2004), especially in certain areas like central-western Europe, where the length of summer heat waves has doubled and the frequency of hot days has almost tripled in recent decades (Della Marta et al., 2007). Regarding cold waves, instead, a recent paper foresaw an increased likelihood of cold in the European region (Fereday et al., 2012)”.

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Comment #4 Discussion: The Discussion is interesting. But I would like authors to correct one minor gap. In the beginning of the first paragraph, please start your results directly, not give many other previous studies to explain the why. Suggest re-write the first and second paragraphs.

We agree with the reviewer suggestions, thus we deleted the second paragraph and modified the first part of the discussion into: “The overall net effect of extreme events on the carbon balance of a cropping system is the result of the difference between carbon gains and losses. In this study we were able to enhance/decrease soil temperatures in a realistic way by modifying soil albedo, especially before crop canopy closure (figure 1(a)). When soil water is in ample supply. . .”.

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