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Interactive comment on "Using O_2 to study the relationships between soil CO_2 efflux and soil respiration" *by* A. Angert et al.

Anonymous Referee #1

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GENERAL COMMENTS: It is a well written manuscript about how to get a correct quantification of the respired CO2 combining O2 and CO2 measurements in different soil types (Mediterranean, Temperate and Alpine forest). The paper concludes that in calcareous soils not all the respired CO2 is immediately emitted from the soil to the atmosphere during some seasons because part of this CO2 is temporally storage into the soil (mainly dissolving into soil water or reacting with carbonates), this is not new. Thus, the paper recommends to divide the measured CO2 efflux by the ARQ to estimate the correct respired CO2 on weekly and seasonal timescales. This recommendation is new but the paper do not convince me why is so important to know the respired CO2 instead of the CO2 flux from the soil to the atmosphere, what is more, it is not clear when do we have to do this, for all seasons?. From my point of view, if finally the paper is considered publishable, here are two major comments that should be consider prior

to publication: - To argue the importance to estimate the respired CO2 instead of the CO2 emitted to the atmosphere. The time-scale can be an argument, however this argue only appear in conclusions and should be mention in the introduction, giving some examples. -Methodology is a mess. A table including the main characteristics of the sites (including a short name for each site instead of numbers) together with type and days of measurements is indispensable to follow the paper. SPECIFIC COMMENTS: Introduction: Pg 3 Ln 5-7: Did you do this calculation about the amount of C into the soil? Could you give us any reference? Pg 3 Ln 8: "few is vague, please, give values. Pg 3 Ln 9: I do not understand the meaning of "significant" here. Pg 3 Ln 10-11: in Mediterranean ecosystem with low rain, the CO2 stored into gas phase in fissures and cavities can be very important, even more than those dissolve into water. Pg 3 Ln 14: I would reference here the equation 1 (to the right) instead the inclusion of equation 2 (the process is already included in eq. 1) Pg 22 Ln 4: I would delete "for instance" Eq. 5: It is not clear to me how to get eq. 5 from eq. 4. Could you give us more information? Pg 6 Ln 2: " It can be showed numerically that eq. 7 is valid also under other respiration profiles", the sentence is not clear to me. Pg 6 Ln 3: Please, define OR. Methodology: I would include in the beginning of this section a summary (part of the first paragraph of results could be moved here) about the measured plan. Section 2.1: Could you please argue the reason to choose these sites? Section 2.3: Could you please explain the reason you did soil incubation only for the alpine site? Section 2.4: The two first sentences are also in section 2.1. I would use the section 2.1 only for explaining the sites and then I would include a section 2.2 about gas analysis, to avoid to repeat information. Discussion: Pg 14 Ln 2-4: This is wrong. If advection is dominating the gas exchange it will not depend on the vertical gradient of the gas, thus, equation 7 cannot be apply. Pg 14 Ln 9-12: Please, revise this sentence. Tables and Figures: Please, avoid in the figure and table captions, some comments that should be include in the result section (such us the caption of Figure 4). Please, be consistent and use the same template for all figures Table 1: In methodology you explain you measured twice. Are these values the average? Could you include the standard devi-

ation? TECHNICAL CORRECTIONS: Pg 17 Ln 24: Amazonian instead of Amzonian. Pg 27 Ln 10: percent instead of precent Pg 27 Ln 10: order instead of oreder Pg 10 Ln 17: calculated instead of caluclated

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Interactive comment on Biogeosciences Discuss., 11, 12039, 2014.