

Interactive comment on “Carbon balance assessment of a natural steppe of southern Siberia by multiple constraint approach” by L. Belelli Marchesini et al.

L. Belelli Marchesini et al.

Received and published: 14 May 2007

We thank the referee for the very careful reading of the manuscript and the inputs for the improvement of the manuscript. We agree with all technical comments and the suggestions concerning the text formulation, and we will modify the text accordingly. In the following we respond individually to specific comments. Whenever the referee is cited, the text has been written inside quotation marks.

2.4. “CO₂ flux measurements (eddy covariance) page 175-176: the use of coordinate rotation or planar fit is not mentioned when describing the flux calculations. page 177, lines 12-17: it is not mentioned that the energy balance closure is investigated based on half hourly or daily basis. (daily would preferred)”

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2.4 The CO₂ flux data processing includes 3D rotation of coordinates according to Aubinet et al. (2000). The energy balance closure is based on half hourly data. If based on daily totals the energy balance would include also gapfilled data, which we wanted to exclude from the analysis. Both points will be specified in a revised version of the manuscript.

2.6. “Uncertainty analysis in δ ; E.. Page 183, lines 6-11: The deviation of the three different values of NEP estimates concerning to the three different gap filling methods refers to the uncertainty of the choice of gap filling method. The overall uncertainty should contain the uncertainty stemming from the missing data (quantity, position, length). The uncertainty of NEP (EC method) is ± 30.1 gC m⁻² in the results section (p188, line 13) and in the abstract, but ± 16.9 gC m⁻² at the conclusions (p192, line 12), and ± 31.6 gC m⁻² in Table 1 (p199)”

2.6a. The comment is right. What we assessed is the uncertainty in the choice of the method and to assess the overall uncertainty gapfilling of artificial gaps would be needed. This is however partially out of the scope of the paper that doesn't want to be focused on uncertainties. To take into consideration also the overall uncertainty due to gapfilling we referred to the results found by Moffat et al 2007 where different gapfilling methods have been compared based on artificial gaps with different length and position. The three methods used in this paper have been also used in the comparison that is based on 10 different yearly datasets from 6 forest sites. The overall mean uncertainty in the annual budget for the three methods is 5.33 gC m⁻². These uncertainty has been added in the paper but the result doesn't really change because the uncertainty in the inventory based method is still one order of magnitude larger. (Moffat A., Papale D., Reichstein M., et al 2007 Comprehensive comparison of gap filling techniques for eddy covariance net carbon fluxes, submitted to Agricultural and Forest Meteorology)

2.6b. The correct value of NEP uncertainty by eddy covariance method in the submitted version of the manuscript for BGD is 31.6 gCm⁻². Other values were mistyped.

However, a revised assessment of the uncertainty of the eddy covariance method differing in the approach for the gapfilling uncertainty evaluation, will be changed in a corrected version of the paper to be submitted.

Interactive comment on Biogeosciences Discuss., 4, 165, 2007.

BGD

4, S501–S503, 2007

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