

Interactive comment on “Effects of cloudiness on carbon dioxide exchange over an irrigated maize cropland in northwestern China” by B. C. Zhang et al.

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Received and published: 19 May 2011

General comments:

Zhang et al. investigate the effect of diffuse radiation on photosynthesis. This is a relevant and important relation that is not yet fully understood. They use data of an agricultural ecosystem, that has so far not gained much attention with respect to the response to cloudiness.

The description in the methods part could be more precise, e.g. include the polynomial fit for GEP, vegetation type and species for the site characteristics. In the results part it seems they use observations of the whole growing season to study the relation to me-
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eteorological drivers, this would mean they neglect the development of the vegetation. This might be the reason why they come to the strange conclusion that low VPD suppresses photosynthesis, while the opposite is usually found in papers as plants close their stomates for high VPD to decrease the water loss. Moreover it is not clear from the figure whether this effect is significant, for high and low radiation the results are opposite of what they write. Their results rather suggest that there is no influence of VPD on the carbon uptake.

Overall the paper does not improve our understanding as most results seem insignificant or confounded by other factors not accounted for.

Answer: We sincerely thank you for your valuable and constructive comments on our manuscript submitted to Biogeosciences ‘bg-2010-293’. We have tried our best to improve our manuscript according to yours comments. The major revisions according to your above general comments included the following aspects:

1. We shorted the study period to eliminate the effect of LAI.
2. We recalculated the GPP values as there exist error in previous, it was maybe from the daytime period we defined with large solar radiation.
3. Materials and methods was rewritten more detail, including the site information and the used equation, such as the relationship between NEE, GPP and PAR, diffuse PAR estimation, canopy stomatal conductance. (page5-page7, page8: line1-13)
4. The response of canopy stomatal conductance to PAR, GPP and CI was analysed, and the relationship between NEE and CI also added in the result and ‘Results and discussion’ part.

Specific comments:

p. 1672, l. 5: give the vegetation type and main species.

Answer: We have added the vegetation type according to your suggestion. (Page4, line6)

p. 1674, l. 14: how do you get the Sf, the total diffuse radiation?

Answer: We have rewritten this part more clearly. (Page7, line9-16)

p. 1675, l. 11-13: this should be moved to the methods part

Answer: We have added it to methods part according to your suggestion. (Page5, line21-23)

p.1675: l.18-20: how do you find that there is no saturation??

Answer: Because NEE increased with increasing PAR in the total range. (Figure2, page9, line12)

p. 1676: shouldn't the polynomial go through zero? For zero radiation also GEP should be zero. The polynomial equation doesn't seem to fit the data well, maybe a light response curve could serve better in this context.

Answer: The polynomial should go through zero, we have recalculated the GPP values and we reanalyzed their relationship with Rectangular hyperbola equation. (Page10, line20-22 to page11,line1-19)

p. 1677, l. 6: what is the optical temperature?

Answer: Canopy photosynthesis reached its maximum values when reached its optical temperature. All below or above the optical temperature are not good for plant growth. And we have rewritten this part. (Page10, line20-22 to page11,line1-19)

p. 1677, l.19, this effect seems not significant.

Answer: We have rewritten this part, we added analysis of the relationship between C1122

GPP and canopy stomatal conductance, GPP and VPD in total. (Page11 to page12)

p.1678,l. 10, in figure 10 you don't remove the effect of radiation on NEE? Then the relation between NEE and temperature is confounded by this.

Answer: It was regret since lacking direct daytime ecosystem respiration estimation, so we changed using nighttime respiration and air temperature. (Figure10)

Technical comments:

p.1671, l 20: you mention studies but cite only one

Answer: We have corrected it according to your suggestion. (Page3, line12-13)

p.1671, l. 29: change 'to investigated' into 'to investigate'

Answer: We have corrected it according to your suggestion. (Page3, line20)

Interactive comment on Biogeosciences Discuss., 8, 1669, 2011.