Biogeosciences Discuss., 6, C3707–C3709, 2009
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Biogeosciences Discussions

Interactive comment on "Surface energy exchanges above two grassland ecosystems on the Qinghai-Tibetan Plateau" *by* S. Liu et al.

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Received and published: 27 December 2009

Q: A good scientific paper presents not only what data are but also what data mean. This manuscript is largely a presentation of data and obvious results and thus could be improved significantly. I suggest that the authors keep to a minimum the number of figures that show temporal variations of directly measured variables and focus on figures that show relations. For example, some plots in Figures 1, 3, 4, and 5 may not be needed at all or could be easily described with words in the text. A good example of a figure that shows a relationship is Figure 8. I notice that in numerous places the authors use the phrase "data not shown". Ironically, most of those data not shown are about a relationship and thus should probably have been shown. A: The comparison of environmental variables, albedo, and components of energy flux between two sites

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were more distinct by Figures 1, 3, 4 and 5. There were three places of “data not shown” in the manuscript. On the contrary, more figures will make the manuscript more tedious. For example, there was no significant difference in effects of Rn on Bowen ratio at two levels of VPD (<1 kPa and >1 kPa) no matter what soil moisture conditions at AS and AM (data not shown). Here, it needed six figures displaying the relationship between Rn and Bowen ratio at two sites.

Q: The authors use the concept of ‘drought’ arbitrarily. Soil water content is not a good variable for defining a drought, particularly when two sites with different soils and vegetations are involved and compared. I suggest the authors use the words dry and wet conditions in place of drought and non-drought conditions. The criterion for separating these two conditions should be described and justified. A: We agree with you that SWC is not a good variable for defining a drought, and agree on using the phrase of “dry and wet conditions” in place of drought and non-drought conditions.

Q: Data screening procedures may need more caution. For example, the authors only use the data with global solar radiation > 200 Wm-2 in order to minimize potential problems with low solar elevation angles. This procedure may remove certain cloud types that may be more often at one site than another and thus may affect the comparison of energy balance at the two sites. A better alternative would be to use the solar elevation angle directly. A: Thank you for your suggestion. It maybe more reasonable using the solar elevation angle directly when making comparison of albedo between two sites. However, we suggest that it is no importance for calculating the albedo on the condition of cloudy weather which has little effect on attaining high net radiation.

Q: A number of statements are made without justification. For example, in P9167, line 8, “SWC was lower at AS due to the lower soil water-holding capacity”. What are the soil water-holding capacities at the two sites? Could the smaller SWC be due to less precipitation and/or higher evaporative demand? A: Although annual rainfall is lower for AS than AM, we suggest that lower soil water holding capacity is the main factor leading lower SWC due to the scattered stones in the surface soil profile at AS compared with

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AM. In addition, the total of potential ET in the growing season was almost 600 mm at AM, while it varied from 490 mm to 560 mm in the growing season at AS during the study periods. Therefore, there was no higher evaporative demand at AS compared with at AM.

Q: The albedo-SWC relationship may be a consequence of the correlation between SWC and vegetation status. (P9168, lines 21-25) A: The vegetation cover was very low due to the degradation resulted from overgrazing activities in the past decades at AS sites, therefore the linear model does not include the variable of vegetation cover because the LAI has little effect on the albedo.

Q: The explanation of the lowest average Bowen ratio in the growing season of 2007 is weak. How did the higher temperature affect the sensible heat flux? (P9169, lines 17-22) A: The higher ET in May 2007 resulting from higher temperature leads to higher total LE, which resulting in lower Bowen ratio at annual scale.

Q: The summary section. Discuss what you have found and what you have learned to advance the science. A: In our manuscript, the difference in surface energy exchanges between two sites as above mentioned indicates that the difference in soil type and vegetation status partly resulted from different grazing regime may lead to different process in surface energy exchanges for the ecosystems, even on the same plateau. Therefore, more attention must be paid to the complicate landscape, difference in extent of degradation and other factors when analyzing the feedback of grassland ecosystems to climate change in the future on the on the Qinghai-Tibetan Plateau.

Interactive comment on Biogeosciences Discuss., 6, 9161, 2009.