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Interactive comment on “The exchange of carbon dioxide between wet arctic tundra and the atmosphere at the Lena River Delta, Northern Siberia” by L. Kutzbach et al.

Anonymous Referee #1

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This paper reports on a micrometeorological study of CO₂ exchange in an Arctic tundra setting of northern Siberia. It represents a fairly conventional study but sound and well done. It is conducted in a geographical area from where very limited data are available and it is for this reason an important contribution not the least seen in the light of the attention that recently has been given to the status of the carbon balance in the circumpolar North (in recent assessments such as ACIA, and the IPCC polar chapter). The paper is well written and I can recommend it for publication only with attention given to the mostly minor comments found below.

Units. Throughout the manuscript I believe the unit for carbon flux is in CO₂ rather than

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CO₂-C. I guess this may be why the authors are not completing their units. But, while this reviewer appreciate the consistency I still think it is important all units are named properly. There is no such thing as g m⁻²! Only g CO₂ m⁻² or g CO₂;C m⁻² is a unit. Taken out of context (which often happens;) many sentences and figures in this paper are impossible to understand as they stand.

Page 1955. Line 26 ff. The claim that it may cause “major alterations”;.. and feedbacks in the global system. Can you really argue this convincingly if you look at possible changes in arctic terrestrial CO₂ flux per se versus predicted anthropogenic emissions over the next 100 years? A paper by Zhuang et al (GRL, 2006) put some questionmark to this and I think it ought to be discussed when writing such a standard phrase.

Page 1956. Line 21. What bias towards studies from the Canadian Arctic? There aren’t too many published from that particular country.

Results particularly Fig 7 and 8. I have problems with the visualization of the “2004/2003” season. The huge gap filling exersize is a bit nervewrecking but ok from the perspective that it is convincing that the fluxes are very small during the lacking period of measuring. But I see no need to artificially construct a seasonal pattern as is done in Figure 7 and maybe most importantly in Figure 8. Figure 8 neglects the possibility that there is an impact of particular climatic conditions (for example a very dry early summer or a very late snowmelt) early in the season on dynamics later in the season. It also confuses any comparison to be made with other sites and years where a full proper season has been measured. I see very little but rather confusing value added in Fig 8 relative to Fig 5.

Page 1972. Line 22-23. Quote the original source rather than a synthesis paper when citing site-specific data. Here Nordstroem or Soegaard instead of Laurela.

Page 1980. Line 17-18. Respiration continues even at lower temperatures. See recent paper by Panikov et al. in Soil Biology and Biochemistry (2006).

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Page 1983. Line 7. First line of the conclusions. I don't think this study have shown anything that differs considerably; from other studies in other regions of the Arctic. Rather it has nicely confirmed a number of characteristics that has been documented through the Alaskan studies and maybe most comparable the work at Zackenberg in NE Greenland (Nordstroem and Soegaard et al). In this latter context a comparison may be appropriate also with the recent paper by Groendahl et al. ref below.

Groendahl L, Friborg T, Soegaard H (2006) Temperature and snow-melt controls on interannual variability in carbon exchange in high Arctic. Theoretical and Applied Climatology, doi: 10.1007/s00704-005-0228-y.

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