

Interactive comment on “Permafrost and surface energy balance of a polygonal tundra site in Northern Siberia – Part 2: Winter” by M. Langer et al.

Anonymous Referee #1

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This manuscript reported surface energy fluxes and balance measured/estimated at an arctic tundra site and a pond site of polygonal permafrost region in two winter seasons. It is obvious that tremendous efforts had been made to obtain such dataset in harsh arctic winter conditions. Such datasets are rare in high arctic regions and its potential application could extend to permafrost and land surface modeling, or other surface energy related studies. By this alone, this reviewer believes that the data and results of this study are worth to be published in The Cryosphere or other peer reviewed cold region journals. However, this reviewer also found that the current manuscript was a hard read and lack of focus. The authors may need to do some major revisions, mostly structural adjustments, to meet the final publishing standard of a peer reviewed journal.

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Following are some specific comments and technique corrections.

(a) The title “Permafrost and surface energy balance of a polygonal tundra site in Northern Siberia” is not exactly matching the contents. This study is mainly about surface energy balance, not much reported in this part was about permafrost features (e.g. active layer, permafrost temperature etc.). I would suggest something like “Surface energy balance at a polygonal permafrost site in Northern Siberia”. Deep borehole observations and soil water measurements may be reported in another paper. This would make the paper much more focused.

(b) The current manuscript is not a standalone paper. Its acceptance for publication totally depends on the successful publication of its first half. At current status, the readers have to frequently check back to its first part in order to fully understand this part. At the same time, there are many statements and paragraphs (mostly in introduction, study site, methods and conclusion sections) are repeated in both parts. I would suggest either make them independent papers or reduce the duplicated parts. It is even possible to integrate them into one paper with more focusing, concision and structural organizing (details will be discussed in following points).

(c) I believe the authors should focus on reporting the direct observations / measurement-based estimations of energy balance features at the tundra and pond sites, and reduce the indirect implications and application potentials. The implications and application may be briefly stated in introduction, but not necessarily appeared as a whole subsection (e.g. section 5.3).

(d) Reorganizing the structure of the “Results” section may help to reduce the length of current manuscript. The current results were reported in several seasonal periods (e.g. spring, summer, fall and winter) and sub-periods (e.g. early, polar and late winter). While it highlights the seasonal features of the energy balance components, the readers are easily lost the whole picture of certain energy balance components. More over the readers have to refer back to the same figures (e.g. Figs 4-6) during each

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period and only look at one section of them at a time. I would suggest reorganize the results by energy balance components (e.g. net radiation, sensible heat, latent heat and soil heat flux etc.) and integrate their seasonality into each section.

(e) Many of the section 5 (e.g. 5.1 and 5.2) are conclusion rather than discussion while many points in section 4 more like discussion rather than results. I would suggest either revise the subtitles or adjusts their contents.

(f) The orders of magnitude of energy balance components at the studied sites during the winter period are relatively small, and mostly only a small fraction of their values in southern sites or during summer periods. Some small errors (relative to the measurements in other southern locations) in the measurements or estimation procedures could lead to relative large error on the final energy balance or even shift its direction at this site. It would very helpful if more efforts (may be in the discussion section) could be made to estimate the possible error ranges or confident levels of each components and final energy balance.

(g) Page 1394 Lines 10-12: The definition of “winter period” should not be changed in the two years although the measurement periods were different. You could indicate that some data were missing during 2008-2009 winter.

(h) Page 1394 Lines 14-17: Other than the differences between the tundra and pond sites, this study still considered a study of individual point scale. Extend the results to “spatially distributed” or “large scale modeling” seemed not very convincing to me.

(i) Page 1394 Lines 24-25: should it be “the POLAR winter period is. . .”?

(j) Check the table numbering sequence, some tables referred in the text was mislabeled (e.g. table 6 should be table 3?).

(k) Page 1460 Line 8 and Line 21: “Looses” should be “loses”?

(l) Page 1422 Table 3: Qnet,P should be marked with indicators of instrument as for Qnet. The symbol (†) Qnet,P is not explained in the title.

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(m) Page 1428 and 1429: please indicate the values are daily or other period averaged values?

Interactive comment on The Cryosphere Discuss., 4, 1391, 2010.

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