

## ***Interactive comment on “Spatial distribution of pingos in Northern Asia” by G. Grosse and B. M. Jones***

**Anonymous Referee #2**

Received and published: 17 November 2010

### **GENERAL COMMENTS:**

This is a very extensive paper and clearly represents a huge amount of mapping. It has the potential to form a major contribution to our knowledge of the spatial distribution of pingos in the northern hemisphere. The methodology appears to be sound and the research has been conducted in an assiduous fashion. The maps and figures which accompany the paper, are generally excellent, although I doubt that all of maps reproduced are strictly necessary. I would favour a few large scale maps which really show the spatial distribution of the features in a small area.

Overall, I support the publication of this paper, but suggest a small number of minor revisions.

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### **SPECIFIC COMMENTS:**

I would have liked to have seen greater reference to the pingo literature and importantly reference to the work of Mackay (1979) which clearly sets out the reasons for using the terms ‘hydrostatic’ and ‘hydraulic’ instead of closed system and open system. The use of these outdated and misleading terms persists because they are continually promulgated in the new publications. We need to ensure that this stops in order to avoid further confusion in the future.

I would question whether some of the features mapped are perennial cryogenic mounds of a non-pingo origin, such as lithalsas or mineral permafrost mounds. There is little discussion of this possibility.

It is interesting to note that there are no features in excess of 40 m high (the highest pingo globally is of the order of 55 m). Although the authors make the comment that there may be some features that have been missed. Surely the largest pingos would be more likely to have been included in the original mapping which was acquired for this work?

It is possible that within these data on pingo distribution (e.g. in the Anadyr river valley displayed in Figure 11) there might be some clues concerning, or at least further examples, of what have been described as ‘aligned pingos’ by other workers (e.g. Gurney and Worsley, 1997). There are some references made to hydrogeological controls in the discussion and these could be extended if examples of ‘alignment’ were discovered.

On the issue of pingo densities, it is stated that 8 pingos per square kilometre is the maximum recorded in the literature. This is incorrect. Worsley and Gurney (1996) report a group of hydraulic pingos on Traill Ø (Traill Island), east Greenland which number 11 (named the ‘Zurich group’) and which exist in less than one square kilometre. Not all of the features are active as some have decayed and have been eroded by fluvial processes, nevertheless, this is the highest ever pingo density reported. This paper is

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cited elsewhere in the manuscript (in Table 5) and is listed in the references.

TECHNICAL CORRECTIONS:

Page 1, Line 18 (P1, L11): a comma is needed in 6000 to read 6,000.

Page 1, Line 18 (P1, L18): Do not use the term 'closed system'; instead use the term 'hydrostatic' (see comments above).

P2, L24: It is possible to write ground water as one word 'groundwater'.

P3, L2: The highest pingo ever recorded had a height in excess of 50 m, see paper by Mackay in 1998.

P3, L23: Mueller should be Müller. It is correct in the reference list.

P3, L24: The reference should be Lomborinchen, 2000. It is correctly listed in the references.

P4, L10: Again ground water can be written as one word.

P4, L11: Citation of Worsley and Gurney (1996) would be useful here as it is a paper on pingos which specifically discusses their hydrogeological significance.

P7, L12: Comma need in 3600 to read 3,600.

P9, L6: Comma needed in 6059 to read 6,059.

P9, L19: Comma needed in 2990 to read 2,990.

P9, L22: Comma needed in 1620 to read 1,620.

P9, L28: Spaces and long hyphen for the reference here which is not consistent with the format used elsewhere on this page (no space & short hyphen).

P10, L10: Comma needed in 4166 to read 4,166.

P10, L23: Comma needed in 3109 to read 3,109.

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P10, L10: Comma needed in 2873 to read 2,873.

P13, L1: Comma needed in 2525 to read 2,525.

P13, L13: Comma needed in 1558 to read 1,558.

P14, L21: Comma needed in 2073 to read 2,073.

P16, L19: Should this not read "Limitation of the pingo database"?

P16, L21: Comma needed in 6000 to read 6,000.

P18, L6: This is not the case as discussed above. The paper by Worsley and Gurney (1996) on pingos in east Greenland should be checked and the text changed to reflect the new information.

P23, L15: The reference should be Lagerbäck R and Rodhe L (hence both authors names are incorrect here).

Figure 2 caption: Comma needed, 6059 should read 6,059.

Figure 9: A much more useful map would show an enlargement of the area north and east of Yakutsk (i.e. just the central section of this map).

Figure 11 caption: Please use the term 'hydraulic' NOT 'open system' in this caption.

Figure 12 caption: A space is needed between the value and unit (50m becomes 50 m) and a comma in 1000 to become 1,000.

Figure 14 caption: A comma is required, 3109 should read 3,109.

Figure 20: Highlighting the area with highest pingo density is a good idea, but it is not all clear, in practice on a map of this scale.

Figure 21 caption: Space needed between value and unit (2m becomes 2 m).