

## ***Interactive comment on “Numerical modeling of permafrost dynamics in Alaska using a high spatial resolution dataset” by E. E. Jafarov et al.***

**Anonymous Referee #2**

Received and published: 3 March 2012

### General comments:

The paper titled 'Numerical modeling of permafrost dynamics in Alaska using a high spatial resolution dataset' by Jafarov et. al. presents results of fine-scale permafrost dynamics for the state of Alaska using the GIPL2-MPI transient model from the present day conditions until the end of the current century. The paper combines model description and validation, sensitivity analysis, and projections into the future. This paper is well organized and generally well written. This study is of interest to the broad Arctic research community. With minor revisions, I recommend this paper to be published in The Cryosphere.

### Specific comments:

C73

It is unclear how the 18 geothermal zones (pg 97, Fig 1) were obtained. Do these 18 geothermal zones represent the same initial conditions (soil texture, ice content, initial moisture content, temperature profiles, etc.)? Elaboration of this paragraph and determination of the initial conditions is needed. While not necessary, a table describing the initial conditions and source of information would be valuable.

Similarly, in the 'Model sensitivity analysis' section, the algorithm description of organic layer mask (pg 102, 2nd and 3rd paragraphs) is hard to difficult for me to follow. Further clarification and expansion of this section is needed.

Finally, the final manuscript should be edited by a native English speaker for grammar and punctuation. There too many errors (predominately minor) to list out individually.

### Technical comments:

P90, L14. Remove “preliminary”

P92, L16/19, enthalpy (not Enthalpy)

P93, L17, substitute “employ” for ‘use so called’

P94, L2, ‘has a higher computational cost. The transient model simulations result in a more . . .’

P94, L6, reference for the Stefan problem?

P94, L6+, First 2 sentences are awkward.

P96, L1. What specific SNAP data are you using?

P96, L4. Is there a reference for ‘performed best for Alaska’

P96, L20. “dataset:”

P96, L22. “1997):”

P97, L27, “...and becomes more coarse toward...”

C74

P98, L10, specifically reference Figure 2 in this sentence  
P98, L14, specifically reference Figure 3 in this sentence  
P98, L15, specifically reference Figure 4 in this sentence  
P99, L15, substitute "greater" for "higher"  
P100, L1, reference Figure 6  
P100, L19, change "form" to "from"  
P100, last sentence, awkward sentence, reword  
P101, 1st paragraph, what is the significance of the MBE? The MAE and RMSE are explained.  
P101, L7, change "run" to "simulation"  
P101, L9, "stay close to \_\_\_\_oC" ... what is the \_\_\_\_?  
P102, L17, "organic layers for corresponding grid points"  
P103, L27, discontinuous  
P104, L6, MAAT is already defined and used in the paper  
P105/106, last sentence, long and awkward sentence  
P106, L8, change "far enough" to "sufficient"  
Figures 2,3,4, Capitalize left legend. Bottom axis should be Year (monthly is defined in the titles)  
Figures 5, 6, 7, Capitalize left and bottom axis legends. Includes some sort of statistical analysis. Expand the figure description.  
Figure 9, A figure showing the differences between the top and bottom panels would be very useful. Label the panels (a) and (b) as they are referenced in the description

C75

(or top and bottom).

Figure 10, What area are you referring to? The whole state of Alaska?

Figure 11, A figure showing the difference in temperature between 2000 and 2099 would be useful. Label all panels (a), (b), and (c)

Figure 12, Spell out your figure legend (Barrow, Happy Valley, etc), not BR, HV. Add trend lines and list the slope (the change over time). Capitalize the axis legends.

---

Interactive comment on The Cryosphere Discuss., 6, 89, 2012.