

Interactive comment on “Change in Frozen Soils and Its Effect on Regional Hydrology in the Upper Heihe Basin, on the Northeastern Qinghai-Tibetan Plateau” by Bing Gao et al.

Anonymous Referee #1

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The paper is improved. I have only minor specific comments other than the general comment below.

In general, in this paper I would like the authors to address if there is a horizontal talik above the permafrost or not. Surely there would be somewhere in the catchment especially where the permafrost is discontinuous. Horizontal taliks exist where the maximum frost depth does not extend as deep as the maximum seasonal thaw depth. So there is a perennally unfrozen zone above the permafrost but below the active layer. Could this be significant like the conversion from permafrost to seasonally frozen ground? Would the model account for this?

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L51, delete 'the'

L56, delete 'the'

L57,58, the authors should be careful with the phrase 'field experiments' here. If they are talking about looking at field data, some of the studies (e.g., Jacques and Sauchyn 2009) have been done on large spatial scales. If they are talking about intensively monitoring a catchment, that is different and likely only accomplished on fine scales.

L62, delete 'the'

L31 and many other places in the manuscript. If I were the authors I would define runoff up front. They use it in the normal hydrological way, but many hydrogeologists or civil engineers could be interested in this paper, and runoff often means different things to different people. Given that The Cryosphere is a bit of a general cold regions journal, I'd suggest a clear precise definition early on in the paper for runoff.

L70, delete 'the' before 'vertical'

L72, 'overly simple ways' is vague. Explain or remove

L83, delete 'the' before 'downstream'

L88, 'thickness' can be removed (besides it makes no sense to say that the thickness is thin and the thickness is warm)

L91, delete 'the' after 'air'

L103-107 and 172-175. This seems to be almost branding for the research grant and, in my mind, is only suitable for the acknowledgements not the main body of a research paper.

L122, 'mean' should be before 'annual'

I'm surprised by the high RMSE in the soil temperature results, especially after calibration'

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Section 5.3, the uncertainty 'analysis' is highly qualitative

Figure 1, The authors could show the plateau on the map of China. OR be clearer what the grey zone refers to in the inset.

Figure 7, the caption should be clearer why there are groups of 2 figure panels for each location.

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