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Interactive comment on "Temperature data acquired from the DOI/GTN-P Deep Borehole Array on the Arctic Slope of Alaska, 1973–2013" *by* G. D. Clow

G.D. Clow

clow@usgs.gov

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I thank Referee #1 for their thoughtful review. I accept all the suggestions made by the reviewer and have changed the manuscript accordingly as this will help clarify a number of points. A couple of comments that perhaps deserve further discussion are:

Pg 6 line 1-5: The reviewer notes that the temperature profiles of the coastal wells may be influenced by their proximity to the coast and coastal erosion rather than to changing climate. The point is well taken as transgression of the Arctic Ocean onto

land represents a large temperature change (of order 10 K) at the upper boundary of permafrost. If the coastal erosion rate is much slower than the velocity of thermal diffusion, warm subsurface temperatures will precede the coast as it moves inland. However, if the erosion rate is much faster than the velocity of thermal diffusion, subsurface temperatures just inland of the coast are relatively unaffected by the approaching ocean.

The mean coastal-erosion rates for the 5 wells within a kilometer of the Arctic Ocean vary considerably with rates ranging 0.6 to 10.0 m/yr. The two wells (ESN, TUL) where the coastal erosion rates are much less than the thermal diffusion velocity are relatively distant from the shoreline so the thermal effect of the transgressing ocean is still quite small. For the other three wells (DRP, JWD, ATI), the thermal effect is small as the mean erosion rate exceeds the thermal diffusion velocity. A two-dimensional thermal model of a transgressing ocean indicates the influence of the Arctic Ocean on the last temperature log in the five coastal wells was limited to: DRP (10^{-22} K), JWD (10^{-14} K), ATI (0.3 mK), TUL (0.2 mK), ESN (0.2 mK). Thus, the influence of the ocean on the temperature profiles from the DOI/GTN-P coastal wells is believed to have been small compared to the changing land surface temperatures during the period of record (1973–2013). We note that the protocol is to plug & abandon DOI/GTN-P wells before they become too close to the shoreline for environmental safety reasons. Thus DRP, JWD, and ATI have been plugged. TUL and ESN remain active monitoring wells as they do not currently pose an environmental risk.

Pg 14 line 1-3: The reviewer suggests the wells be logged deeper than 200 m to track changes in the base of permafrost over time. I agree this would be useful. The decision to log only to 200 m for the most recent logs was due entirely to funding constraints. If we can identify additional funds in the future, we will log through the base of permafrost. A helicopter must be used to log these wells.

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Figure 13: The isothermal portion of the 1973 Echooka log was due to latent heat effects.

Interactive comment on Earth Syst. Sci. Data Discuss., 7, 1, 2014.