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The Cryosphere Discussions

Interactive comment on "Thermal state of the active layer and permafrost along the Qinghai-Xizang (Tibet) railway from 2006 to 2010" *by* Q. Wu et al.

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tzhang@nsidc.org

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Anonymous Referee #2 The main contribution of the manuscript is in providing new permafrost temperature and ALT data from the Qinghai-Xizang (Tibet) Plateau. However, to be truly valuable, the data included in the paper should be accompanied by more detailed site descriptions. Such critical information as climate, vegetation, soils and proximity to human disturbance/structures are missing. For example the "Site Description" section just review the basic ground thermal regime information, which is somewhat redundant since the results-related sections, graphs, and tables essentially do the same. In addition, the geographic locations mentioned in the text (e.g. moun-

tain ranges, basins) are not labeled in figure 1. Authors claim that sites are located in undisturbed, "natural" conditions. However, the discussion attributes the most significant ALT changes (site WL3) to "sand protection facility." This raises the concern about anthropogenic influences at this and other sites. In general, since the basic climate information and site descriptions are missing it is impossible to interpret the results.

Reply: Thank you for the reviewer's suggestions. Because Qinghai-Xizang Railway construction had better protection measures of environment, it is ensured that the environment and surface conditions around sites 30 to 80 meters away from railway have not been disturbed. The survey results in September, 2011 show that surface conditions around these sites maintain the original natural state. We add some site description on environment impact.

Because Qinghai-Xizang Railway started to be constructed since 2001, and environment and surface conditions outside of embankment had been protected during the period of construction, we believed that these sites have not been impacted by the railway construction and operation during the periods of the past 10 years. We conducted a comprehensive survey on surface conditions around these sites in September, 2011 and found that the surface conditions maintain the original state compared with those several hundred meters away from the railway. We believe the surface disturbance by the railway is minimum and negligible. Long-term monitoring and further studies are certainly needed.

Below I provide several specific comments: 1) Section 2.1 should include detailed information on climate, surface characteristics, and disturbance/proximity to structures for sites used in analysis. Some of this information can/should be included in table 1.

Reply: Thank you very much. We add the details information of climate, and disturbance for sites in Table 1.

2) Section 2.2: It is unclear how many thermistors are on each string. Information on thermistor spacing should also be included. This info is critical for assessing the

accuracy of ALT estimation by interpolation.

Reply: Thank you very much. We describe in details thermistor spacing.

All measurements were made by a string of thermistors with intervals of 5, 20, 40, 80, 120, 160 and 200 cm from surface to 2 m deep and with intervals of 0.5 m from 2 m to 10 m deep and with intervals of 1m from 10 m to 20 m deep, including 33 thermistors.

3) Section 2.3: Interpolation technique used to estimate ALT should be briefly described

Reply: Thank you very much. We added:

ALT is estimated as the maximum thaw depth in the late autumn through linear interpolation of soil temperature profiles between two neighboring points above and below the 0°C isotherm at all sites.

4) Section 3 and 4: Without climate (e.g. air temp, precipitations) and site description (e.g. vegetation, terrain, exposition) the values presented in the paper are just numbers. Impossible to interpret.

Reply: We have added details information in Table 1. And air temperatures along the Qinghai-Xizang Railway, Ecosystem, and disturbance extent of the railway construction are added in Table 1. Soil types and vegetation cover for observed sites are revised.

5) Figures 2 and 3 and Tables 2-4: Should include climate (at least air temperature) data.

Reply: There are a few climatic data along the Qinghai-Xizang Railway, and we include air temperature in some locations, such as Chumaer high plains, Beilu River, Tuotuo River, Kaixinling in Table 1.

In Figure 2 and 3 and Table 2-4, it is difficult to include air temperature data because there are no air temperatures for respective sites. Because air temperature includes in Table 1, it seems to be repeated for including air temperature in Table 2-4.

6) Section 5: Discussion is rather meaningless without supporting information on climatic and edaphic characteristics for sites. What are “sand protection facilities?” Site WL3 should probably be excluded from analysis.

Reply: We have added data and information on climatic and edaphic characteristics for sites. And we deleted the WL3 site in the manuscript. And air temperatures along the Qinghai-Xizang Railway, Ecosystem, and disturbance extent of the railway construction are added in Table 1. Soil types and vegetation cover for observed sites are revised.

Interactive comment on The Cryosphere Discuss., 5, 2465, 2011.