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# Evaluation of Large-scale Permafrost Models at Three Sites on the Qinghai-Tibet Plateau

X. Pan (1), U. Wollschläger (2), Q. Yu (3), and K. Roth (1)

(1) Institute of Environmental Physics, Heidelberg University, Heidelberg, Germany (xpan@iup.uni-heidelberg.de), (2) UFZ - Helmholtz Centre for Environmental Research, Leipzig, Germany, (3) State Key Laboratory of Frozen Soils Engineering Cold and Arid Regions Environmental and Engineering Research Institute, CAS, Lanzhou, China

Understanding the impact of current climate warming on the permafrost of the Qinghai-Tibet Plateau (QTP) is of great interest, because of the role of the QTP in the climate system and because of the unique climatic conditions, e.g., strong radiative forcing. Two widely used models to quantify active layer freeze/thaw processes in permafrost regions are the TTOP (mean annual temperature at the top of permafrost table) and the Stefan model. We evaluate the performance of these models on the basis of comprehensive, multi-year data sets from three sites on the QTP. One site is located in a cold and dry permafrost region, and the other two are in a warm permafrost region but with contrasting surface cover. Observations from soil-weather monitoring stations demonstrate that the temperatures in the air and in the active layer vary significantly between sites, and that non-conductive processes in the ground heat transfer are non-negligible. Due to the complex processes near the surface, defining the near-surface temperature indices is vital for using the models. In this study, focus on this point by looking into the near-surface heat transfer under the given highly variable weather conditions. On this basis, we discuss the applicability of the two models for the three study sites.