Geophysical Research Abstracts, Vol. 9, 09821, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-09821

Permafrost creep within recently deglaciated glacier forefields. A case study at Muragl glacier, Swiss Alps

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The currently observed glacier retreat uncovers forefields, some of which are located within the mountain permafrost belt and contain thick deposits of glacier sediments. Questions arise concerning the extent to which potentially pre-existing permafrost was influenced by overriding during the LIA glacier advances, and the extent and rate to which permafrost and ground ice can build up, or recover, after ground exposure to the atmosphere due to glacier retreat.

In this study we present digital photogrammetric measurements of surface movement, 1981-94, on the Muragl glacier forefield (Swiss Alps). The results are compared to direct current resistivity surveys for the same area. At three locations isolated patches of frozen sediments were inferred, each about 10'000-20'000 m2 in area. These were deforming at surface velocities of up to 50 cm per year. The locations where creep was observed coincide well with areas where two-dimensional (2D) resistivity surveys suggest ice is present within the ground.

Finally, we discuss general conclusions from this study concerning climate change impacts on glacier forefields and related slope stability issues.