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Supplement of

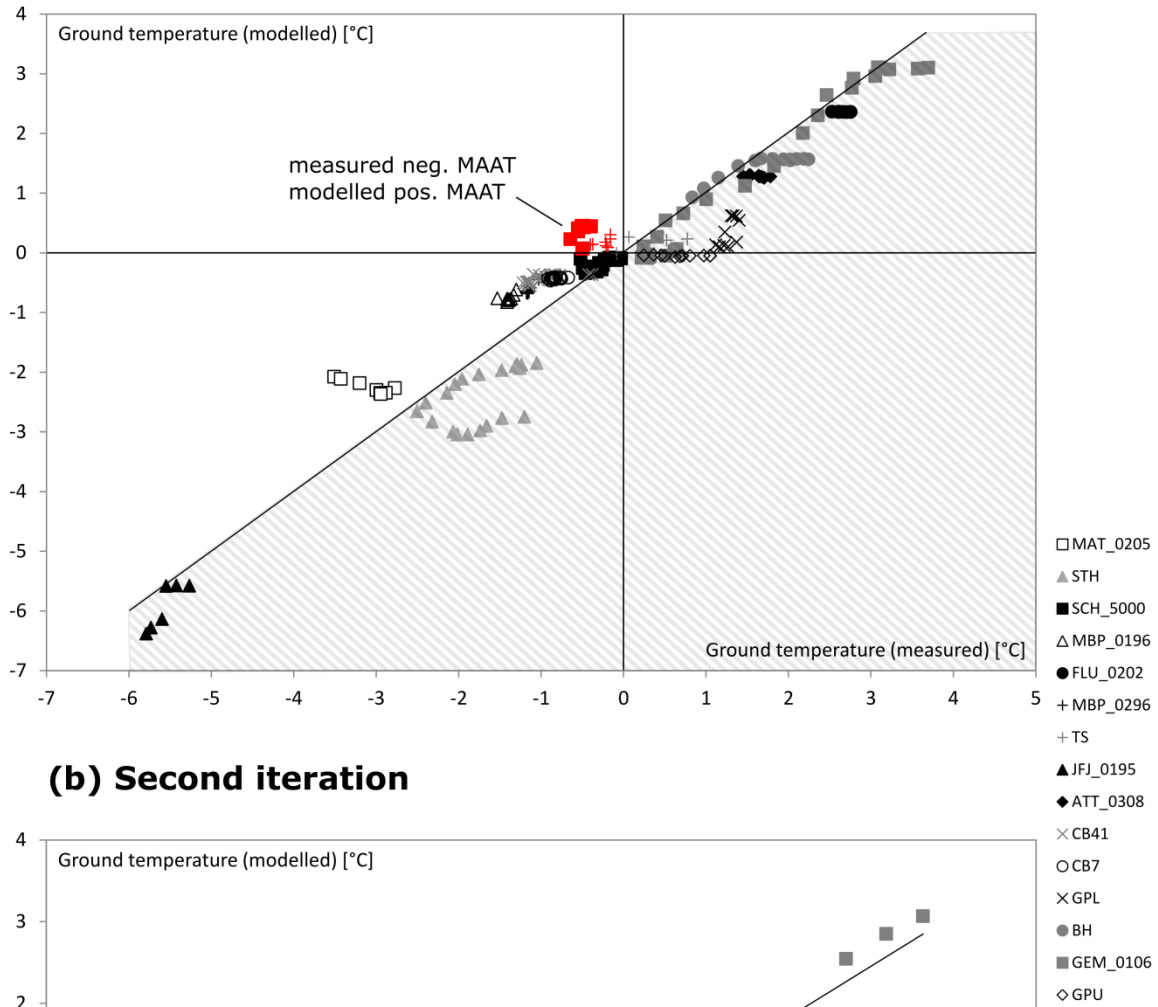
Distinguishing ice-rich and ice-poor permafrost to map ground temperatures and ground ice occurrence in the Swiss Alps

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(a) First iteration



(b) Second iteration

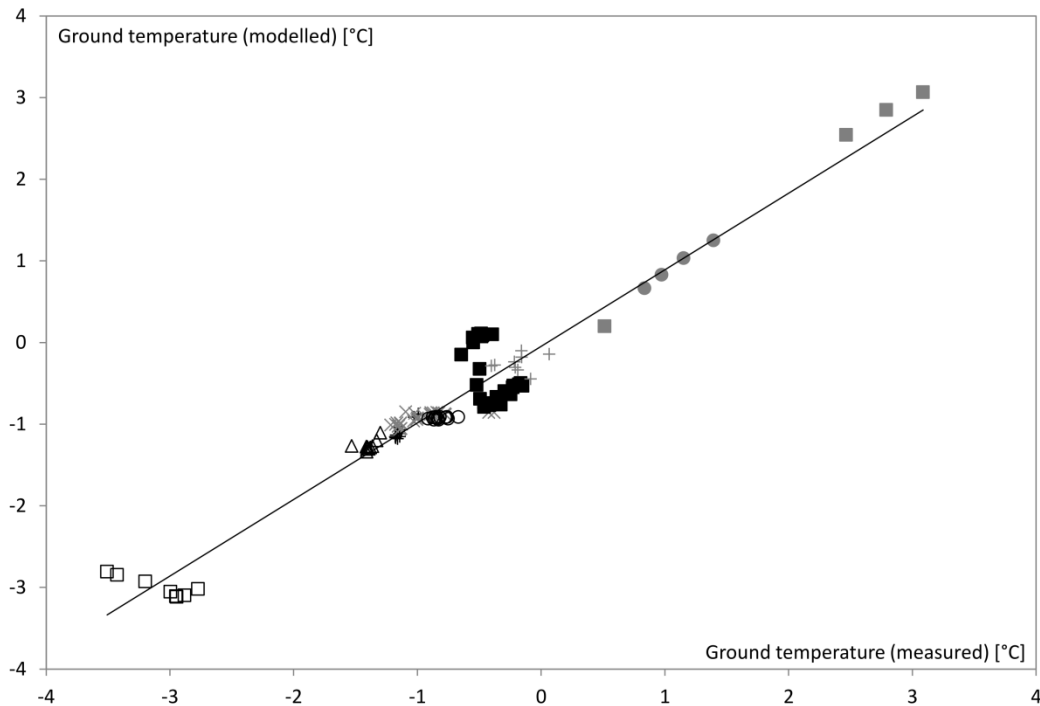


Figure A: The initial regression result (part a) showed positive and negative deviations of the modelled temperatures compared to the measured ones. This can lead to positive modelled temperatures while negative temperatures are actually present. Transferred into the map this can cause the indication of permafrost absence while permafrost is actually present. To avoid this, all temperature measurements which lie above the modelled temperatures (i.e. all data points in the shaded area below the regression line) were not used in the second iteration (part b). The regression in part b thus only includes temperature measurements which negatively deviate from the norm. This result was used to produce the map and ensures that the transition zone from permafrost to permafrost free terrain is also included in the permafrost zonation.

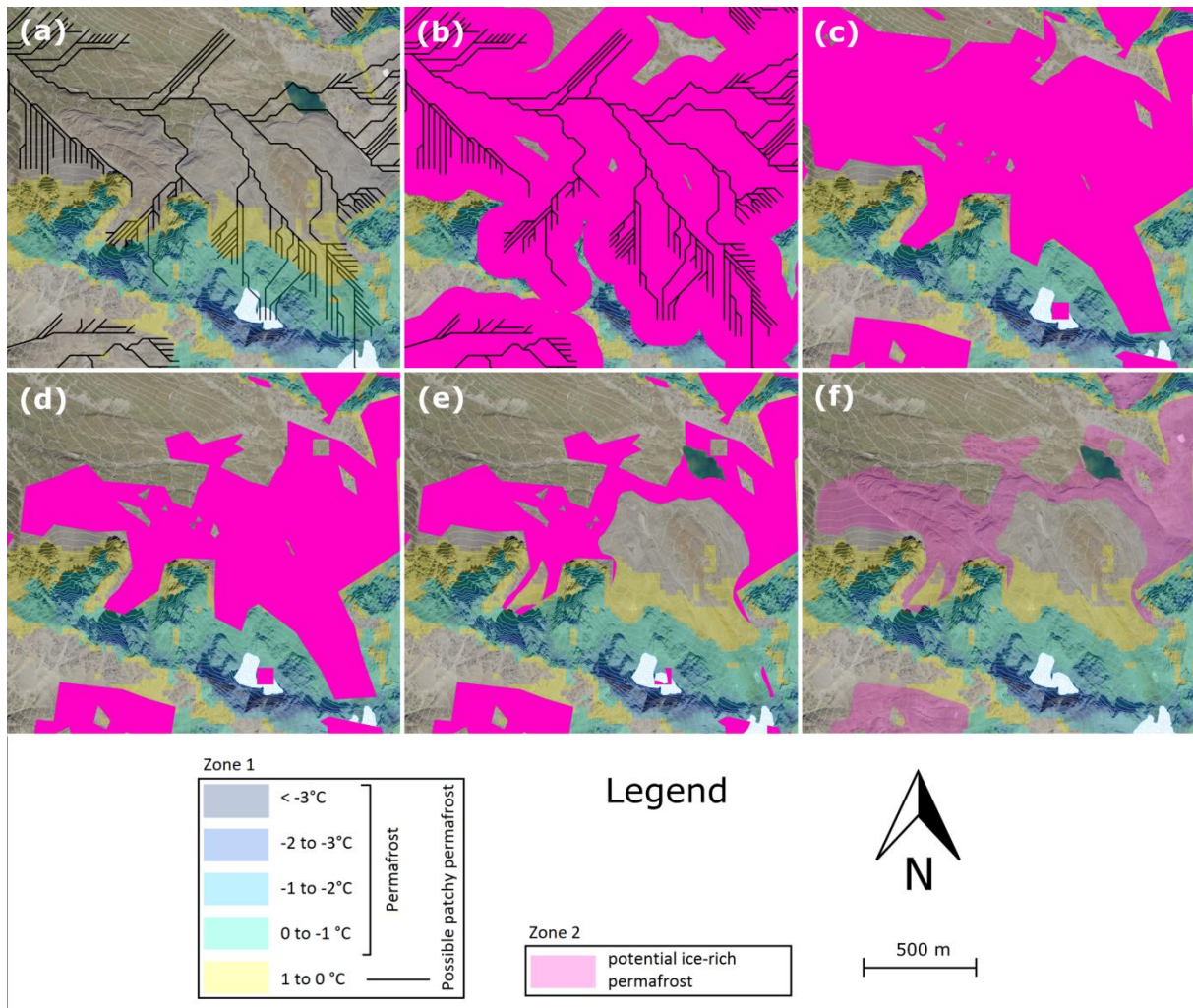


Figure B: Parts a-f show the individual work steps described in section 2.3 to create zone 2 representing ice-rich permafrost. The example shows the area around rock glacier Muragl (Kenner, 2018; Maisch et al., 2003). In short: a) Step 1: runoff tracks; b) Step 2: Buffered runoff tracks; c) Step 3: erase areas steeper 30°; d) Step 4: erase vegetated areas; e) Step 5+6: erase LIA glaciation & Lakes; f) Step 8: Simplified and smoothed output map.

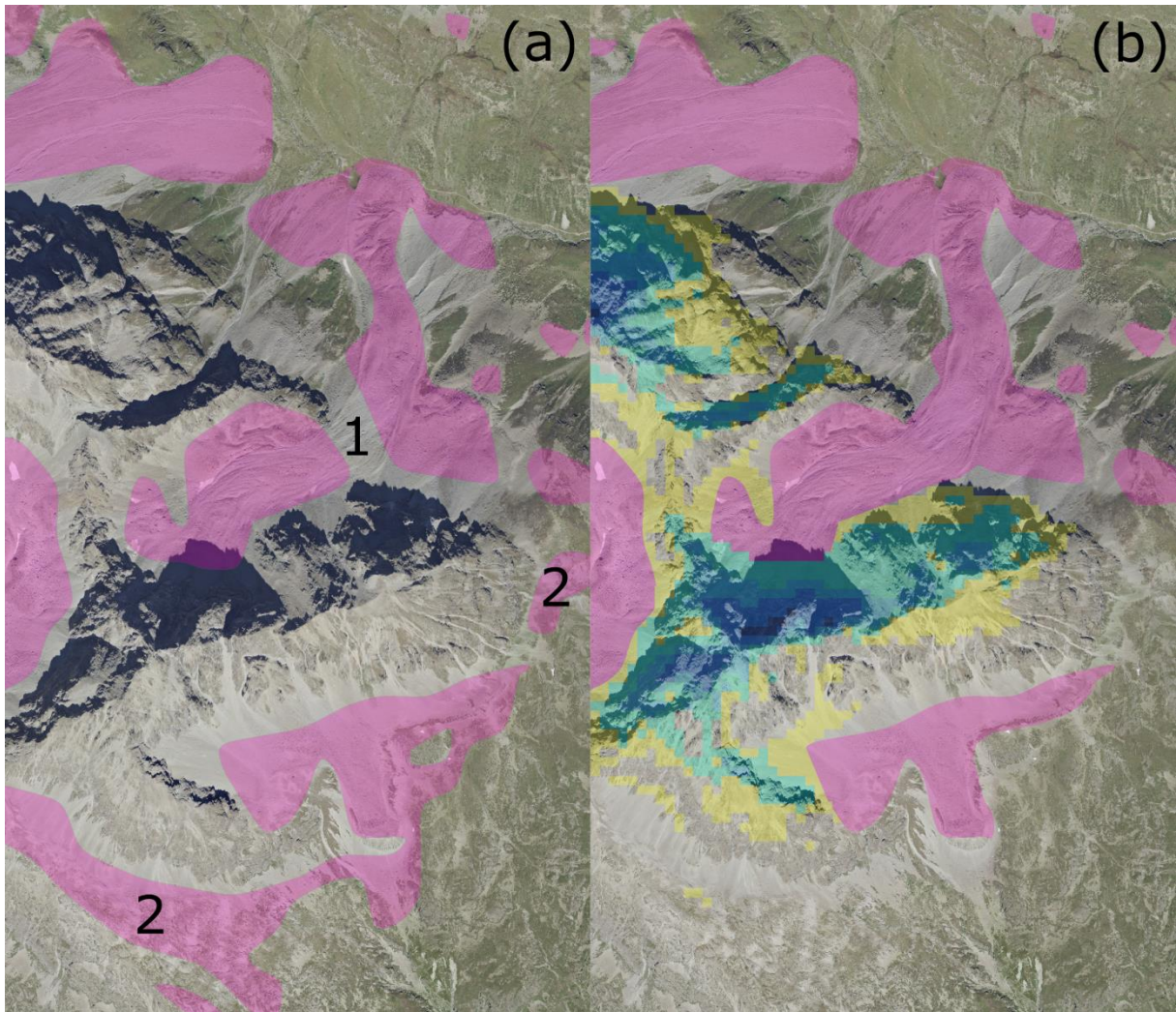


Figure C: Part a shows the raw model output for zone 2. Part b shows the edited zone 2 together with zone 1. Index 1 shows a part of the rock glacier which was not captured by the model due to a terrain step steeper than 30° and included manually. Index 2 shows zones which were manually removed as they mainly include bedrock or vegetation-covered ground.