Supplement of

Brief communication: On the potential of seismic polarity reversal to identify a thin low-velocity layer above a high-velocity layer in ice-rich rock glaciers

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Fig. S1 a) experimental recordings of 1 shot at Schafberg site with 20kg sledgehammer, time and frequency domain; b) Ricker wavelet adopted for synthetic modelling centred at 50 Hz.

S1. Technical info for SRT / ERT processing

Flüelapass site
- ERT Acquisition
  Syscal Pro- device, 48 channels, 2 m spacing, Dipole-Dipole skip 0-3, stacking range 3-6 (5% standard deviation threshold), and direct and reciprocal measurements.

  - ERT inversion modelling ResiPy
    Filtering
      - \( \rho_i < 0 \)
      - stacking error < 5%
      - reciprocal error < 10% (1050/1901)
    Inversion modelling
      - Inversion type: regularized inversion with linear filtering;
      - Regularization mode: normal regularization;
      - Data type: logarithmic;
      - Expected data error: 10% (a_wgt = 0.01, b_wgt = 0.10);
      - Flux type: 3D;
      - Weights update: routine based on Morelli and LaBrecque (1996);
      - smoothing factor: normal isotropic regularisation (= 1);
      - Iteration: 2;
      - Final RMS misfit: 1;

Expected data error evaluated with the reciprocal check. We defined a boundary threshold for the reciprocal error that allowed for a reliable quality of the measured apparent resistivities but at the same time a homogeneous distribution of measured points in the pseudo-section.

We applied an isotropic smoothing since we were interested in highlighting both lateral and vertical variations of resistivity.
SRT acquisition
Geode seismographs, 48 channels, 100 Hz geophones, 2 m geophones spacing, 4 meters shots spacing, 2 shots in each position, 20 kg hammer as seismic source.

SRT inversion modelling Pygimli
Inversion modelling:
- Picking error: 2 ms
- smoothing factor: normal isotropic regularisation (= 1);
- Regularization factor λ: 200;
- Starting model: gradient model 500-5000 m/s;
- Iteration: 4;
- Abort criteria reached: dPhi = 0.42 (< 2.0%);
- \( \text{rms/rms(data, Response)} \text{= 0.0030} \text{9603/17.893%} \);
- \( \chi^2(\text{data, Response, error, log}) \text{= 2.39635;} \)

Picking error: we evaluated the data uncertainty by performing a repeated picking of P-wave first arrivals for several shot gathered, calculating this way a representative standard deviation of 2 ms.

Regularization factor: we chose \( \lambda \) values using the L-curve analysis.
We applied an isotropic smoothing since we were interested in highlighting both lateral and vertical variations of Vp.

Schafberg site
ERT Acquisition
Syscal Pro- device, 48 channels, 3 m spacing, Dipole-Dipole skip 0-3, stacking range 3-6 (5% standard deviation threshold), and direct and reciprocal measurements.

ERT inversion modelling ResIPy
Filtering
- \( \rho_0 < 0 \)
- stacking error < 5%
- reciprocal error < 20% (saved 1029/1901)
Inversion modelling
- Inversion type: regularized inversion with linear filtering;
- Regulation mode: normal regularization;
- Data type: logarithmic;
- Expected data error: 20% (\( a_{\text{wgt}} = 0.01, b_{\text{wgt}} = 0.20 \));
- Flux type: 3D;
- Weights update: routine based on Morelli and LaBreque (1996);
- smoothing factor: normal isotropic regularisation (= 1);
- Iteration: 2;
- Final RMS misfit: 1.17

Expected data error evaluated with the reciprocal check. We defined a boundary threshold for the reciprocal error that allowed for a reliable quality of the measured apparent resistivities but at the same time a homogeneous distribution of measured points in the pseudo-section.
We applied an isotropic smoothing since we were interested in highlighting both lateral and vertical variations of resistivity.

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