

ACADEMIC EDUCATION

- 2005 – 2009 **PhD degree | Thesis:** Geophysical monitoring systems to assess and quantify ground ice evolution in mountain permafrost
Department of Physical Geography, University of Jena | DE
- 1997 - 2004 **Diploma in Geography | Thesis:** Reconstruction of the Holocene palaeoenvironmental evolution of the former lagoon of Vilamoura (PT) - Sedimentological and geophysical investigations
University of Jena | DE

ACADEMIC POSITIONS

- 2016 – present **Senior research scientist** (50-70 %) | Department of Geosciences, University of Fribourg | CH
- 2011 – 2016 **Postdoctoral research scientist** (50 %) | Department of Geosciences, University of Fribourg
› Maternity leaves: 11/2011 - 03/2012 and 08/2014 - 03/2015
- 2009 - 2015 **Postdoctoral research scientist** (30 %) | Department of Geography, University of Zürich | CH
› Maternity leaves: 11/2011 - 03/2012 and 08/2014 - 12/2014
- Apr – Jun 2013 **Visiting scientist** | Department of Geosciences, University of Oslo | NO
- Feb – Mar 2013 **Visiting scientist (SNSF International Short Visit)** | Applied and Environmental Geophysics, University of Lisbon | PT
- 2004 - 2011 **Scientist** (50 %) | Department of Physical Geography, University of Jena | DE
- 1998 - 2003 **Student assistant** | Department of Physical Geography, University of Jena | DE

RESEARCH EXPERIENCE / SELECTED PROJECTS

- 2023-2026 | SNSF | Co-PI: **Tipping Points and Resilience of Mountain Permafrost under Increasing Frequency of Heat Waves (TREAT)**
- 2022-2025 | Swiss Agency for Development and Cooperation (SDC) | Co-PI: **Cryospheric Observation and Modelling for Improved Adaptation in Central Asia (CROMO-ADAPT)**
- 2022-2023 | Swiss Polar Institute (SPI) | collaborator: **Development of low-cost and robust electrical resistivity tomography monitoring system for remote permafrost environments (PERM2ERT)**
- 2021-2023 | IPA Action Group | Co-PI: **Towards an international database of geoelectrical surveys on permafrost (IDGSP)**
- 2020-2023 | Norway Grants | collaborator: **The response of climate-sensitive environments to global warming, sea-level rise and increasing extremes: the Carpathians and Danube delta (ClimaLAND)**
- 2019-2022 | GCOS Switzerland | Co-PI: **Permafrost monitoring by reprocessing and repeating historical geophysical measurements (REP-ERT)**
- 2018-2021 | Swiss National Science Foundation (SNF) / D-A-CH project | Co-PI: **Improved ice quantification at alpine permafrost sites based on electrical and electromagnetic measurements of spectral induced polarization (SPICE)**
since 2015 | Amt für Wald des Kantons Bern, Abteilung Naturgefahren | Permafrostmonitoring Berner Oberland |
Co-PI: **Geophysical surveys for determining the permafrost distribution in the Canton of Berne, Swiss Alps**
- 2015-2019 | BGC Engineering, Vancouver | Sub-consultant for: **Geophysical surveys and determination of ground ice content in high altitude permafrost in the Andes**

2013 | SNSF International Short Visit | Host: Geophysical Institute, Univ. Lisbon, Portugal) | **Quantification of the ground composition in mountain permafrost based on geophysical data and simulated annealing**

2011-2015 | SNSF Sinergia project TEMPS: The Evolution of Mountain Permafrost in Switzerland | Co-PI of sub-project TEMPS-B: **Ground ice and water content estimation and integrative analysis of mountain permafrost monitoring elements**

2011 | **Univ. Fribourg** | Geophysical Investigation of the rock glaciers in the Quebrada NW in the Los Pelambres Mine, Chile

2008-2011 | German National Science Foundation (DFG) | DFG cluster SPCC: Sensitivity of mountain permafrost to climate warming | PI of sub-project SPCC-2: **GO4ICE - Quantitative assessment of permafrost degradation using coupled geophysical and thermal monitoring systems**

since 2008 | **Univ. Oslo & Norwegian Meteorological Institute**: seismic surveys within the Norwegian permafrost monitoring programme (2008/2010, 2019, 2024), joint processing of geoelectric and seismic data, 2008-2024; quantitative modelling of ice contents

since 2005 | Federal Office for the Environment, Swiss Academy for Sciences and MeteoSwiss (joint funding) | **Swiss Permafrost Monitoring Network PERMOS**

REVIEWER FOR SCIENTIFIC JOURNALS

Journal of Geophysical Research, Permafrost and Periglacial Processes, The Cryosphere, Near Surface Geophysics, Cold Regions Science and Technology, Frontiers in Cryospheric Sciences, Hydrological Processes, Geomorphology, Proceedings of the 9th International Conference on Permafrost, Polarforschung

TEACHING AND (CO-)SUPERVISION

UZH 2009 – 2014 | MSc Field course: High Mountain Processes and Preparatory seminar

UNIFR 2011 – present | BSc Practical course: Introduction to geophysical methods, (Teaching assignment)

2023 | Summer school on geophysical methods for permafrost measurements and glacier stream hydrology in the Arabel valley Kyrgyzstan

14/8 completed Master(Diploma)/Bachelor theses | Univ. Jena, Univ. Zurich, Univ. Fribourg, Univ. Freiburg, School of Engineering and Architecture Fribourg

1/6 completed/ongoing PhD theses | Univ. Fribourg and Univ. Vienna, co-supervision

Publications

Onaca A, Sirbu F, Poncos V, **Hilbich C**, Strozzi T, Urdea P, Popescu R, Berzescu O, Etzelmüller B, Vespremeanu-Stroe A, Vasile M, Teleagă D, Birtaş D, Lopătiță I, Filhol S, Hegyi A and Ardelean F: Slow-moving rock glaciers in marginal periglacial environment of Southern Carpathians, EGU sphere **[preprint]**, <https://doi.org/10.5194/egusphere-2024-3262>, 2025.

Mathys T, Azimshoev M, Bektursunov Z, Hauck C, **Hilbich C**, Duishonakunov M, Kayumov A, Kassatkin N, Kapitsa V, Martin LCP, Mollaret C, Navruzshoev H, Pohl E, Saks T, Silmonov I, Musaeov T, Usabaliev R and Hoelzle M: Quantifying permafrost ground ice contents in the Tien Shan and Pamir (Central Asia): A Petrophysical Joint Inversion approach using the Geometric Mean model, EGU sphere **[preprint]**, <https://doi.org/10.5194/egusphere-2024-2795>, 2024.

Koenig CEM, **Hilbich C**, Hauck C, Arenson LU, and Wainstein P: Thermal State of Permafrost in the Central Andes (27° S–34° S), EGU sphere **[preprint]**, <https://doi.org/10.5194/egusphere-2024-2244>, 2024.

- Noetzli, J., Isaksen, K., Barnett, J. et al. Enhanced warming of European mountain permafrost in the early 21st century. *Nat Commun* 15, 10508 (2024). <https://doi.org/10.1038/s41467-024-54831-9>.
- Maierhofer, T., Flores Orozco, A., Roser, N., Limbrock, J. K., **Hilbich, C.**, Moser, C., Kemna, A., Drigo, E., Morra di Cella, U., and Hauck, C. 2024. Spectral Induced Polarization imaging to monitor seasonal and annual dynamics of frozen ground at a mountain permafrost site in the Italian Alps, *The Cryosphere* 18(7):3383-3414, <https://doi.org/10.5194/tc-18-3383-2024>.
- Morard S, **Hilbich C**, Mollaret C, Pellet C and C Hauck 2024. 20-year permafrost evolution documented through petrophysical joint inversion, thermal and soil moisture data. *Environ. Res. Lett.* 19 074074. DOI 10.1088/1748-9326/ad5571.
- Hauck C and **Hilbich C** 2024. Preconditioning of mountain permafrost towards degradation detected by electrical resistivity. *Environ. Res. Lett.* 19 064010. DOI 10.1088/1748-9326/ad3c55.
- Wicky J, **Hilbich C**, Delaloye R, and Hauck C 2024. Modeling the Link Between Air Convection and the Occurrence of Short-Term Permafrost in a Low-Altitude Cold Talus Slope. *Permafrost and Periglac Process*, 35: 202-217. <https://doi.org/10.1002/ppp.2224>.
- Herring T, Lewkowicz AG, Hauck C, **Hilbich C**, Mollaret C, Oldenborger GA, Uhlemann, S, Farzamian M, Calmels F, and Scandroglio R 2023. Best practices for using electrical resistivity tomography to investigate permafrost. *Permafrost and Periglac Process*.2023;1-19. doi:10.1002/ppp.2207.
- Etzelmüller, B., Isaksen, K., Czekirda, J., Westermann, S., **Hilbich, C.**, and Hauck, C. 2023. Rapid warming and degradation of mountain permafrost in Norway and Iceland, *The Cryosphere* 17(12):5477-5497, <https://doi.org/10.5194/tc-17-5477-2023>.
- Buckel, J., Mudler, J., Gardeweg, R., Hauck, C., **Hilbich, C.**, Frauenfelder, R., Kneisel, C., Buchelt, S., Blöthe, J. H., Hördt, A., and Bücken, M. 2023. Identifying mountain permafrost degradation by repeating historical electrical resistivity tomography (ERT) measurements, *The Cryosphere* 17(7):2919-2940, <https://doi.org/10.5194/tc-17-2919-2023>.
- Mollaret, C., **Hilbich, C.**, Herring, T., Farzamian, M., Buckel, J., Dafflon, B., Draebing, D., Fossaert, H., Gugerli, R., Hauck, C., Kunz, J., Lewkowicz, A., Limbrock, J. K., Maierhofer, T., Magnin, F., Pellet, C., Pfaehler, S., Scandroglio, R., and Uhlemann, S. and the IDGSP IPA Action Group: Initiation of an international database of geoelectrical surveys on permafrost to promote data sharing, survey repetition and standardized data reprocessing, EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-10565, <https://doi.org/10.5194/egusphere-egu22-10565>, 2022.
- Lilleøren, K. S., Etzelmüller, B., Rouyet, L., Eiken, T., Slinde, G., and Hilbich, C. 2022. Transitional rock glaciers at sea level in northern Norway, *Earth Surf. Dynam.*, 10, 975–996, <https://doi.org/10.5194/esurf-10-975-2022>, 2022.
- Maierhofer T, Hauck C, **Hilbich C**, Kemna A and Flores-Orozco A 2022. Spectral Induced Polarization imaging to investigate an ice-rich mountain permafrost site in Switzerland, *The Cryosphere*, 16, 1903–1925, <https://doi.org/10.5194/tc-16-1903-2022>, 2022.
- Mathys T, **Hilbich C**, Arenson, LU, Wainstein PA and Hauck C 2022. Towards accurate quantification of ice content in permafrost of the Central Andes – Part II: an upscaling strategy of geophysical measurements to the catchment scale at two study sites, *The Cryosphere* 16(6):2595–2615, <https://doi.org/10.5194/tc-16-2595-2022>
- Hilbich C**, Hauck C, Mollaret C, Wainstein P and Arenson LU 2022. Towards accurate quantification of ice content in permafrost of the Central Andes - Part I: geophysics-based estimates from three different regions, *The Cryosphere*, 16, 1845–1872, <https://doi.org/10.5194/tc-16-1845-2022>, 2022.
- Etzelmüller B, Czekirda J, Magnin F, Duvillard PA, Ravanel L, Malet E, Aspaas A, Kristensen L, Skrede I, Majala GD, Jacobs B, Leinauer J, Hauck C, **Hilbich C**, Böhme M, Hermanns R, Eriksen HØ, Lauknes TR, Krautblatter M, and Westermann S 2022. Permafrost in monitored unstable rock slopes in Norway – new insights from temperature and surface velocity measurements, geophysical surveying, and ground temperature modelling, *Earth Surf. Dynam.*, 10, 97–129, <https://doi.org/10.5194/esurf-10-97-2022>.
- Halla C, Blöthe JH, Tapia Baldis C, Trombotto Liaudat D, **Hilbich C**, Hauck C and Schrott L 2021. Ice content and inter-annual water storage changes of an active rock glacier in the dry Andes of Argentina, *The Cryosphere*, 15, 1187–1213, <https://doi.org/10.5194/tc-15-1187-2021>, 2021.

- Etzelmüller B, Guglielmin M, Hauck C, **Hilbich C**, Hölzle M, Isaksen K, Noetzli J, Oliva M, Ramos M 2020. Twenty years of European Mountain Permafrost dynamics – the PACE Legacy. *Environmental Research Letters*, 15(10), 104070, <https://doi.org/10.1088/1748-9326/abae9d>.
- Mollaret C, Wagner FM, **Hilbich C**, Scapozza C and Hauck C 2020. Petrophysical joint inversion applied to alpine permafrost field sites to image subsurface ice, water, air and rock contents. *Front. Earth Sci.* 8:85.doi: 10.3389/feart.2020.00085
- Weigand M, Wagner FM, Limbrock JK, **Hilbich C**, Hauck C and Kemna A 2020) A monitoring system for spatiotemporal electrical self-potential measurements in cryospheric environments. *Geoscientific Instrumentation, Methods and Data Systems*, 9(2), 317-336.
- Mollaret C, **Hilbich C**, Pellet C, Flores-Orozco A, Delaloye R, and Hauck C. 2019. Mountain permafrost degradation documented through a network of permanent electrical resistivity tomography sites, *The Cryosphere* **13**(10): 2557-2578, <http://dx.doi.org/https://doi.org/10.5194/tc-13-2557-2019>
- Mewes B, **Hilbich C**, Delaloye R, and Hauck C 2017. Resolution capacity of geophysical monitoring regarding permafrost degradation induced by hydrological processes. *The Cryosphere* **11**: 2957-2974, <https://doi.org/10.5194/tc-11-2957-2017>.
- Hauck C, **Hilbich C** and Mollaret C 2017. A Time-lapse Geophysical Model for Detecting Changes in Ground Ice Content Based on Electrical and Seismic Mixing Rules. In 23rd European Meeting of Environmental and Engineering Geophysics, Malmö, 3.-7.9. 2017. doi:10.3997/2214-4609.201702024.
- Mollaret C, **Hilbich C**, and Hauck C 2017. Analysis Procedures of an ERT Monitoring Network to Assess Mountain Permafrost Degradation Rate. In 23rd European Meeting of Environmental and Engineering Geophysics, Malmö, 3.-7.9. 2017. doi: 10.3997/2214-4609.201701997.
- Kenner R, Phillips M, Hauck C, **Hilbich C**, Mulsow C, Bühler Y, Stoffel A, Buchroithner M 2017. New insights on permafrost genesis and conservation in talus slopes based on observations at Flüelapass, Eastern Switzerland. *Geomorphology* **290**: 101-113.
- Marmy A, Rajczak J, Delaloye R, Hilbich C, Hoelzle M, Kotlarski S, Lambiel C, Noetzli J, Phillips M, Salzmann N, Staub B & Hauck C 2016. Semi-automated calibration method for modelling of mountain permafrost evolution in Switzerland. *The Cryosphere* **10**: 2693-2719, doi:10.5194/tc-10-2693-2016.
- Egli M, Maisch M, Purves R, Çöltekin A & **Hilbich C** 2015. Multi-methodological reconstruction of the lake level at Morgarten in the context of the history of the Swiss Confederation. *The Holocene* **25**(11): 1727–1741. <https://doi.org/10.1177/0959683615591360>
- Staub B, Marmy A, Hauck C, **Hilbich C** & Delaloye R 2015. Ground temperature variations in a talus slope influenced by permafrost: a comparison of field observations and model simulations. *Geographica Helvetica* **70**: 45-62, doi:10.5194/gh-70-45-2015.
- Rosset E, **Hilbich C**, Schneider S & Hauck C 2013. Automatic filtering of ERT monitoring data in mountain permafrost. *Near Surface Geophysics* **11**: 423-433, doi:10.3997/1873-0604.2013003.
- Hauck C, Collet C, Delaloye R, **Hilbich C**, Hoelzle M, Huss M & Salzmann N 2012. The potential of new measurement and modelling techniques in alpine cryosphere and geomorphology research. *Geographica Helvetica* **1-2**:26-37, doi:10.5194/gh-67-26-2012.
- Hilbich C**, Fuss C & Hauck C 2011. Automated time-lapse ERT for improved process analysis and monitoring of frozen ground. *Permafrost and Periglacial Processes* **22**(4):306-319, doi 10.1002/ppp.732.
- Isaksen K, Ødegård RS, Etzelmüller B, **Hilbich C**, Hauck C, Farbrøt H, Eiken T, Hygen HO & Hipp T 2011. Degrading mountain permafrost in southern Norway - spatial and temporal variability of mean ground temperatures 1999-2009. *Permafrost and Periglacial Processes* **22**(4):361-377, doi 10.1002/ppp.728.
- Arenson LU, Hauck C, **Hilbich C**, Seward L, Yamamoto Y & Springman SM 2010. Sub-surface Heterogeneities in the Murtèl-Corvatsch Rock Glacier, Switzerland. *Geo2010, 6th Canadian Permafrost Conference*, 12.-16.9.10, Calgary, Canada.
- Hilbich C** 2010. Time-lapse refraction seismic tomography for the detection of ground ice degradation. *The Cryosphere* **4**: 243-259. doi:10.5194/tc-4-243-2010

- Hilbich C** 2009. *Geophysical monitoring systems to assess and quantify ground ice evolution in mountain permafrost*. PhD thesis, University of Jena, 173 pp.
- Hilbich C**, Marescot L, Hauck C, Loke MH & Mäusbacher R 2009. Applicability of Electrical Resistivity Tomography Monitoring to Coarse Blocky and Ice-rich Permafrost Landforms. *Permafrost and Periglacial Processes* **20**(3): 269-284. doi: 10.1002/ppp.652
- Hilbich C**, Hauck C, Delaloye R & Hoelzle M 2008. A geoelectric monitoring network and resistivity-temperature relationships of different mountain permafrost sites in the Swiss Alps. *Proceedings of the 9th International Conference on Permafrost*, Fairbanks, Alaska **1**: 699-704.
- Noetzli J, **Hilbich C**, Hauck C, Hoelzle M & Gruber S 2008. Comparison of simulated 2D temperature profiles with time-lapse electrical resistivity data at the Schilthorn crest, Switzerland. *Proceedings of the 9th International Conference on Permafrost*, Fairbanks, Alaska **2**: 1293-1298.
- Hauck C, Bach M & **Hilbich C** 2008. A 4-phase model to quantify subsurface ice and water content in permafrost regions based on geophysical data sets. *Proceedings of the 9th International Conference on Permafrost*, Fairbanks, Alaska **1**: 675-680.
- Frauenfelder R, Hauck C, **Hilbich C**, Kneisel C & Hoelzle M 2008. An integrative observation of kinematics and geophysical parameters of Gianda Grischa rockglacier, Upper Engadine, Swiss Alps. *Proceedings of the 9th International Conference on Permafrost*, Fairbanks, Alaska **1**: 463-468.
- Hilbich C**, Hauck C, Hoelzle M, Scherler M, Schudel L, Völksch I, Vonder Mühl D & Mäusbacher R 2008. Monitoring mountain permafrost evolution using electrical resistivity tomography: A 7-year study of seasonal, annual, and long-term variations at Schilthorn, Swiss Alps. *Journal of Geophysical Research* **113**: F01S90. doi: 10.1029/2007JF000799.
- Hilbich C**, Mügler I, Daut G, Frenzel P, van der Borg K & Mäusbacher R 2008. Reconstruction of the depositional history of the former coastal lagoon of Vilamoura (Algarve, Portugal): A sedimentological, microfaunal and geophysical approach. *Journal of Coastal Research* **24**(2b): 83-91. doi: <http://dx.doi.org/10.2112/04-0411.1>
- Helmschrot J, **Hilbich C**, Mäusbacher R & Daut G 2007. Geophysikalische und sedimentologische Untersuchungen zur Entstehung und Ausprägung von Feuchtgebieten im semi-ariden Südafrika. *Zentralblatt für Geologie und Paläontologie, Teil I*, 2006, **1-4**: 63-78.
- Hilbich C**, Helmschrot J, Mäusbacher R & Daut G 2006. A landscape-based model to characterize the evolution and recent dynamics of wetlands in the Umzimvubu headwaters, eastern cape, South Africa. in: Kotowski W, Maltby E, Miroslaw-Swiatek D, Okruszko T & Szatyłowicz J (eds). *Wetlands: modelling, monitoring, management*, Taylor & Francis The Netherlands/A.A. Balkema Publisher. pp. 61-69, ISBN: 10-041508202.

Other

- PERMOS 2019. *Permafrost in Switzerland 2014/2015 to 2017/2018*. Noetzli J, Pellet C and Staub B (eds.), Glaciological Report (Permafrost) No. 16-19 of the Cryospheric Commission of the Swiss Academy of Sciences, 104 pp, doi:10.13093/permos-rep-2019-16-19.
- PERMOS 2016. *Permafrost in Switzerland 2010/2011 to 2013/2014*. Noetzli J, Luethi R and Staub B (eds.), Glaciological Report (Permafrost) No. 12-15 of the Cryospheric Commission of the Swiss Academy of Sciences, 85 pp.
- PERMOS 2013. *Permafrost in Switzerland 2008/2009 and 2009/2010*. Glaciological Report (Permafrost) No. 10/11 of the Cryospheric Commission of the Swiss Academy of Sciences, 80 pp.
- PERMOS 2010. *Permafrost in Switzerland: 2006/2007 and 2007/2008*. Glaciological Report (Permafrost) No. 8/9 of the Cryospheric Commission of the Swiss Academy of Sciences, 68 pp.
- PERMOS 2009. *Permafrost in Switzerland: 2004/2005 and 2005/2006*. Glaciological Report (Permafrost) No. 6/7 of the Cryospheric Commission of the Swiss Academy of Sciences, 100 pp.