

Sebastian Uhlemann

RESEARCH SCIENTIST · PH.D.

Lawrence Berkeley National Laboratory, Berkeley, CA, USA

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Summary

Research scientist at the Lawrence Berkeley National Laboratory. 8+ years experience specializing in geophysical imaging and monitoring of hydrological characteristics and processes. His research focuses on the development and application of geophysical techniques (geo-electrical and seismic) to understand subsurface processes that impact upon groundwater dynamics, slope instabilities, and interactions with plants and the atmosphere at a range of scales. This includes:

- development of novel sensing and monitoring approaches applied to natural hazards, groundwater recharge, environmental pollution, and sustainable management of energy resources,
- integrated monitoring and modelling of geophysical, hydrological, and geomechanical properties and processes
- optimization of geophysical survey design,
- machine learning for automated processing of multi-modal data streams.

Education

Ph.D. in Applied Geophysics

Zurich, Switzerland

ETH ZURICH

Sep. 2013 - Apr. 2018

- Thesis title: Geoelectrical monitoring of moisture driven processes in natural and engineered slopes

Advisors: Prof. Dr. Hansruedi Maurer, Prof. Dr. Jonathan Chambers

This thesis advances “landslide geophysics” by developing methodologies for a robust and cost-effective characterization and monitoring of subsurface landslide processes. In doing so it addresses some of the inherent difficulties of geophysical monitoring of landslides. Three key challenges are addressed: (i) accounting for electrode displacements, (ii) improved geoelectrical imaging through structurally constrained inversion using seismic data, and (iii) optimized survey design to improve image resolution whilst reducing installation costs. The results bring geoelectrics one step closer to being used as an early-warning tool.

- Awarded with an ETH Silver Medal for an outstanding Ph.D. thesis

M.Sc. in Applied Geophysics

Delft, The Netherlands

Zurich, Switzerland

Aachen, Germany

TU DELFT, ETH ZURICH, RWTH AACHEN

Aug. 2010 - Aug. 2012

- Thesis title: On the Suitability of Capacitive Resistivity Imaging (CRI) for Permafrost Monitoring

Advisors: Prof. Dr. Alan G. Green, Dr. Oliver Kuras

- Graduated with distinction (cum laude)

B.Sc. in Geoinformation Sciences and Geophysics

Freiberg, Germany

FREIBERG UNIVERSITY OF MINING AND TECHNOLOGY

Oct. 2007 - Aug. 2010

- Thesis title: Einfluss einer CO₂-Phase auf die elektrische Leitfähigkeit salinärer Porenwässer (Impact of CO₂ on the electrical conductivity of brines)

Advisors: Prof. Dr. Klaus Spitzer, Dr. Jana Börner

Experience

Lawrence Berkeley National Laboratory

Berkeley, CA, USA

RESEARCH SCIENTIST

Sep. 2020 - Present

- Real-time sensing and modelling approaches for assessing natural hazards
- Geophysical characterization and monitoring of permafrost systems
- Assessing hillslope hydrology using multi-scale geophysical data
- Quantification of groundwater recharge using novel geophysical sensing approaches

Lawrence Berkeley National Laboratory

Berkeley, CA, USA

POSTDOCTORAL SCHOLAR

Jun. 2018 - Sep. 2020

- Estimating bedrock hydraulic properties using multi-scale geophysical data
- Geophysical characterization and monitoring of permafrost dynamics in Arctic environments
- Development of real-time sensing and modelling approaches for assessing natural hazards
- Geophysical characterization of flood defenses and monitoring of groundwater recharge systems
- Advanced geoelectrical data acquisition and monitoring

- Development of electrical resistivity monitoring approaches, particularly regarding implementation on landslides
- Design/implementation/guidance of geophysical field campaigns worldwide
- Management/development of field observatories employing time-lapse electrical resistivity tomography and geotechnical sensing
- Laboratory testing to establish property relationships between geophysical and geotechnical properties

Grants, Awards & Scholarships

GRANTS

Awarded

2020-2021	PI , 5G-enabled real-time, distributed sensing for critical infrastructure assessment, <i>Laboratory Directed Research & Development Grant, Lawrence Berkeley National Laboratory Funds</i>	\$200k
2019-2020	PI , Integrated surface and subsurface monitoring of landslide dynamics at Berkeley Lab – towards early warning of slope failure, <i>Early Career Development Grant, Lawrence Berkeley National Laboratory Funds</i>	\$30k
2019-2021	Investigator , Next Generation Multi-Hazard Levee Risk Assessment, <i>Delta Science Program, Delta Stewardship Council</i>	\$952k

AWARDS

2019	ETH Silver Medal , in recognition of an outstanding doctoral thesis	Zurich, Switzerland
2015	Best Paper Award , 21st European Meeting of Environmental and Engineering Geophysics	Turin, Italy
2015	Best Early Stage Researcher Poster , EU-COST TU2012 annual workshop	Porto, Portugal
2015	Best Paper Award , 20th European Meeting of Environmental and Engineering Geophysics	Athens, Greece

Professional Activity & Association

- 2019 - **Associate editor**, Near surface geophysics
present
- 2020 **Special issue editor**, Near surface geophysics for geohazard assessment in *Near Surface Geophysics*
- 2018 **Special issue editor**, Mining and Mineral Exploration Geophysics in *Minerals*
- Reviewer**, Science of the Total Environment; Water Resources Research; Geophysical Journal International; Geomorphology; Journal of Hydrology; Engineering Geology; Geomatics, Natural Hazards and Risk; Journal of Applied Geophysics; Near Surface Geophysics; Journal of Environmental and Engineering Geophysics; Pure and Applied Geophysics; and other journals
- 2013 -
present
- 2018 -
present **Member Hydrogeophysics Technical Committee**, American Geophysical Union (AGU)
- 2012 -
present **Member**, American Geophysical Union (AGU), European Association of Geoscientists and Engineers (EAGE), European Geosciences Union (EGU)
- 2018 -
present **Volunteer for Groundwater Relief**, UK Charity providing hydrogeological and groundwater expertise to support humanitarian efforts to eradicate water poverty

Publications

PEER-REVIEWED JOURNAL ARTICLES

First-Author Publications

- [1] **S. Uhlemann**, J. E. Chambers, P. I. Meldrum, P. McClure, and B. Dafflon. "Geophysical monitoring of landslides – A step closer towards predictive understanding?" In: *WLF5 Vol. 8: Specific Topics in Landslide Science and Applications*. Ed. by Z. Arbanas. Kyoto, Japan: World Landslide Forum, 2020.
- [2] **S. Uhlemann**, B. Dafflon, J. Peterson, C. Ulrich, I. Shirley, S. Michail, and S. S. Hubbard. "Geophysical Monitoring Shows that Spatial Heterogeneity in Water Infiltration Reshapes Transitional Permafrost System". In: *Geophysical Research Letters* under review (2020).
- [3] **S. Uhlemann**, J. Chambers, W. Falck, A. Tirado Alonso, J. Fernández González, and A. Espín de Gea. "Applying Electrical Resistivity Tomography in Ornamental Stone Mining: Challenges and Solutions". In: *Minerals* 8 (2018), p. 491. doi: 10.3390/min8110491.

- [4] **S. Uhlemann**, P. B. Wilkinson, H. Maurer, F. M. Wagner, T. C. Johnson, and J. E. Chambers. “Optimized survey design for electrical resistivity tomography: combined optimization of measurement configuration and electrode placement”. In: *Geophysical Journal International* 214 (2018), pp. 108–121. doi: 10.1093/gji/ggy128.
- [5] **S. Uhlemann**, J. Chambers, P. Wilkinson, H. Maurer, A. Merritt, P. Meldrum, O. Kuras, D. Gunn, A. Smith, and T. Dijkstra. “Four-dimensional imaging of moisture dynamics during landslide reactivation”. In: *Journal of Geophysical Research: Earth Surface* 122 (2017), pp. 398–418. doi: 10.1002/2016JF003983.
- [6] **S. Uhlemann**, O. Kuras, L. A. Richards, E. Naden, and D. A. Polya. “Electrical Resistivity Tomography determines the spatial distribution of clay layer thickness and aquifer vulnerability, Kandal Province, Cambodia”. In: *Journal of Asian Earth Sciences* (2017). doi: 10.1016/j.jseaes.2017.07.043.
- [7] **S. Uhlemann**, S. Hagedorn, B. Dashwood, H. Maurer, D. Gunn, T. Dijkstra, and J. Chambers. “Landslide characterization using P- and S-wave seismic refraction tomography – The importance of elastic moduli”. In: *Journal of Applied Geophysics* 134 (2016), pp. 64–76. doi: 10.1016/j.jappgeo.2016.08.014.
- [8] **S. Uhlemann**, A. Smith, J. Chambers, N. Dixon, T. Dijkstra, E. Haslam, P. Meldrum, A. Merritt, D. Gunn, and J. Mackay. “Assessment of ground-based monitoring techniques applied to landslide investigations”. In: *Geomorphology* 253 (2016), pp. 438–451. doi: 10.1016/j.geomorph.2015.10.027.
- [9] **S. Uhlemann**, J. P. R. Sorensen, A. R. House, P. B. Wilkinson, C. Roberts, D. C. Goody, A. M. Binley, and J. E. Chambers. “Integrated time-lapse geoelectrical imaging of wetland hydrological processes”. In: *Water Resources Research* 52 (2016), pp. 1607–1625. doi: 10.1002/2015WR017932.
- [10] **S. Uhlemann**, P. B. Wilkinson, J. E. Chambers, H. Maurer, A. J. Merritt, D. A. Gunn, and P. I. Meldrum. “Interpolation of landslide movements to improve the accuracy of 4D geoelectrical monitoring”. In: *Journal of Applied Geophysics* 121 (2015), pp. 93–105. doi: 10.1016/j.jappgeo.2015.07.003.
- [11] **S. Uhlemann** and O. Kuras. “Numerical Simulations of Capacitive Resistivity Imaging (CRI) Measurements”. In: *Near Surface Geophysics* 12.2028 (2014), pp. 523–537. doi: 10.3997/1873-0604.2014008.