Florian M. Wagner

Curriculum vitae

Work Experience

since Nov. 2011 **Research assistant**, *GFZ German Research Centre for Geosciences, Section 6.3 - Geological Storage, Potsdam, Germany.*
Research on geoelectrical CO_2 monitoring, field experiments, server administration

Education

2006–2009 **Bachelor of Science**, *RWTH Aachen University.*
B.Sc. in Georesources Management

2009–2011 **Master of Science**, *IDEA League: TU Delft, ETH Zurich, RWTH Aachen.*
Joint M.Sc. in Applied Geophysics (`http://www.idealeague.org/geophysics`)

since Nov. 2012 **PhD Student**, *ETH Zurich.*

Bachelor Thesis

Title *Evaluation of groundwater hazards for a selection of underground coal gasification (UCG) sites*

University RWTH Aachen

Grade *1.0* (ECTS-Grade: A)

Master Thesis

Title *Geoelectrical detection of groundwater salinization in analog transport models*

University ETH Zurich / GFZ German Research Centre for Geosciences

Grade *1.0* (ECTS-Grade: A)

PhD Thesis

Title *New developments in electrical resistivity imaging with applications to geological CO_2 storage*

Supervision Prof. Dr. H. Maurer (ETH Zurich) & Dr. C. Schmidt-Hattenberger (GFZ)

Date of Defense May 4, 2016

Practical Experience

March 2009 **Internship**, *Trasswerke Meurin*, Andernach, Germany.
Internship at Trasswerke Meurin Produktions- und Handelsgesellschaft mbH (`www.meurin.com`). Gained experience in the excavation of volcanic rocks for the production of quality construction materials including sieve analyses and strength tests.

June 2010 **Field Campaign**, *ETH Zurich*, Kloten and Laegeren, Switzerland.
Comprehensive geophysical field work incorporating data acquisition, processing and reporting. Applied measuring techniques included: Electrical Resistivity Tomography (ERT), Seismic Refraction Tomography (SRT), Ground Penetrating Radar (GPR), Electromagnetics (EM31 and EM38), Transient Electromagnetics (TEM) and Magnetics.

July 2010 **Internship**, *DMT GmbH & Co. KG*, Essen, Germany.
Large-scale 3D seismic survey by DMT GmbH & Co. KG (`www.dmt.de/en/home.html`) in Jointville, France.

Gained hands-on experiences in:
- Large-scale data acquisition
- Reflection & Refraction Seismics
- Vertical Seismic Profiling (VSP)
- Well Logging
- Quality Control

September 2013 **Research visit**, *University of Alberta*, Edmonton, Canada.
I worked on acoustic and electrical analysis of reservoir sandstones in the Geomechanical Reservoir Experimental Facility (`www.geo-ref.ca`) of the University of Alberta in Edmonton, Canada, under supervision of Dr. Chalaturnyk and his team.

Teaching experience

Nov. 2012 Introduction to Scientific Computing and Data Visualization using Python (Seminar talk at the German Research Centre for Geosciences)

2013-2015 Co-Supervision of the M.Sc. summer block course on Geophysical Field Work and Data Processing at ETH Zurich

2012, 2015 Supervision of two master theses within the IDEA League program

Scholarships / Awards

2009–2011 Private scholarship from RWE Dea AG

2009–2011 Co-financing from the education fund of North Rhine-Westphalia

Sep. 2012 Best oral presentation award at the 2^{nd} Science Forum of the Helmholtz-Alberta-Initiative, Potsdam, Germany

Sep. 2013 Best oral presentation award at the 3^{rd} Science Forum of the Helmholtz-Alberta-Initiative, Edmonton, Canada

Sep. 2014 Best oral presentation award at the 4^{th} Science Forum of the Helmholtz-Alberta-Initiative, Edmonton, Canada

Scientific interests

- Geophysical monitoring of subsurface fluid migration
- Tomographic experimental design
- Numerical modeling and inversion
- Data analysis and parallel computing
- Scientific software development (`www.gimli.org`)

Languages

German	Native
English	Fluent (oral and written)
French	Basic knowledge

Computer skills

Programming	Linux, Scientific Python, MATLAB	Inversion	BERT, GIMLi (`www.gimli.org`), PEST
Numerical Modeling	Experiences in TOUGH2, MODFLOW, SHEMAT	Office / Writing	LaTeX, Vim, MS Office
Seismic Processing	ProMAX	Website development	HTML, CSS, Photoshop, Illustrator

Additional personal skills

Driving license	B
Communication skills	Excellent verbal and written communication skills, experienced at giving presentations to large audiences, experience in panel discussions, good telephone manner
Organizational skills	Excellent organizational and prioritization skills
Other skills	Cooking, acoustic guitar, singing, juggling

Journal articles

2016

P. Bergmann, M. Diersch, J. Götz, M. Ivandic, A. Ivanova, C. Juhlin, J. Kummerow, A. Liebscher, S. Lüth, S. Meekes, B. Norden, C. Schmidt-Hattenberger, **F. M. Wagner**, F. Zhang (2016): Review on geophysical monitoring of CO_2 injection at Ketzin, Germany. *Journal of Petroleum Science and Engineering*, 139, 112-136, `http://dx.doi.org/10.1016/j.petrol.2015.12.007`.

P. Bergmann, C. Schmidt-Hattenberger, T. Labitzke, **F. M. Wagner**, Christina Flechsig, Anita Just (2016): Fluid injection monitoring using electrical resistivity tomography - Five years of CO_2 injection at Ketzin, Germany. *Geophysical Prospecting* (**in press**).

C. Schmidt-Hattenberger, P. Bergmann, T. Labitzke, **F. M. Wagner**, D. Rippe (2016): Review on permanent crosshole electrical resistivity tomography (ERT) as an established method for the long-term CO_2 monitoring at the Ketzin pilot site, International Journal of Greenhouse Gas Control (**submitted**).

2015

F. M. Wagner, P. Bergmann, C. Rücker, B. Wiese, T. Labitzke, C. Schmidt-Hattenberger, H. Maurer (2015): Impact and mitigation of borehole related effects in permanent crosshole resistivity imaging: An example from the Ketzin CO_2 storage site. *Journal of Applied Geophysics*, 123, 102-111, `http://dx.doi.org/10.1016/j.jappgeo.2015.10.005`.

F. M. Wagner, T. Günther, C. Schmidt-Hattenberger, H. Maurer (2015): Constructive optimization of electrode locations for target-focused resistivity monitoring. *GEOPHYSICS*, 80, E29-E40, `http://dx.doi.org/10.1190/geo2014-0214.1`.

2014

C. Schmidt-Hattenberger, P. Bergmann, T. Labitzke, **F. M. Wagner** (2014): CO_2 Migration Monitoring by Means of Electrical Resistivity Tomography (ERT) - Review on Five Years of Operation by Means of Electrical Resistivity Tomography at the Ketzin Pilot Site. *Energy Procedia*, 63, 4366-4373, `http://dx.doi.org/10.1016/j.egypro.2014.11.471` *(review paper)*.

2013

F. M. Wagner, M. Möller, C. Schmidt-Hattenberger, T. Kempka, H. Maurer (2013): Monitoring freshwater salinization in analog transport models by time-lapse electrical resistivity tomography. *Journal of Applied Geophysics*, 89, 84-95, `http://dx.doi.org/10.1016/j.jappgeo.2012.11.013`.

C. Schmidt-Hattenberger, P. Bergmann, D. Bösing, T. Labitzke, M. Möller, S. Schröder, **F. M. Wagner**, H. Schütt (2013): Electrical Resistivity Tomography (ERT) for Monitoring of CO_2 Migration - from Tool Development to Reservoir Surveillance at the Ketzin Pilot Site. *Energy Procedia*, 37, 4268-4275, `http://dx.doi.org/10.1016/j.egypro.2013.06.329`.

Conference contributions

2015

F. M. Wagner, B. Wiese, C. Schmidt-Hattenberger, H. Maurer (2015): Insights on CO_2 migration by means of a fully-coupled hydrogeophysical inversion. *3rd International Workshop on Geoelectrical Monitoring - GELMON (Vienna 2015)*.

D. Rippe, P. Bergmann, T. Labitzke, **F. M. Wagner**, C. Schmidt-Hattenberger (2015): Surface-downhole geoelectrics for post-injection monitoring at the Ketzin pilot site. *3rd International Workshop on Geoelectrical Monitoring - GELMON (Vienna 2015)*.

C. Schmidt-Hattenberger, P. Bergmann, T. Labitzke, D. Rippe, **F. M. Wagner** (2015): Technical and methodological requirements for a permanent downhole geoelectrical measurement system as CO_2 monitoring tool - A review from the Ketzin pilot site. *3rd International Workshop on Geoelectrical Monitoring - GELMON (Vienna 2015)*.

C. Rücker, T. Günther, **F. M. Wagner** (2015): Coupled hydrogeophysical modelling and ERT monitoring using pyGIMLi. *3rd International Workshop on Geoelectrical Monitoring - GELMON (Vienna 2015)*.

C. Rücker, T. Günther, **F. M. Wagner** (2015): PyGIMLi - Eine Open Source Python Bibliothek zur Inversion und Modellierung in der Geophysik. 75. Jahrestagung der Deutschen Geophysikalischen Gesellschaft (DGG), Hannover 2015.

F. M. Wagner, P. Bergmann, T. Labitzke, B. Wiese, C. Schmidt-Hattenberger, C. Rücker, H. Maurer (2015): Effekte und Korrektur von Bohrloch bedingten Fehlern bei der permanenten geoelektrischen Überwachung von geologischen Speichern. 75. Jahrestagung der Deutschen Geophysikalischen Gesellschaft (DGG), Hannover 2015.

D. Rippe, P. Bergmann, T. Labitzke, **F. M. Wagner**, C. Schmidt-Hattenberger (2015): A Permanent Downhole Electrode Array as Valuable Tool for CO_2 Monitoring at the Ketzin Pilot Site. 8th Trondheim Conference on CO_2 Capture, Transport and Storage, 16-18 June 2015 (Trondheim, Norway).

C. Schmidt-Hattenberger, P. Bergmann, **F. M. Wagner** (2015): A Permanent Downhole Electrode Array as Valuable Tool for CO_2 Monitoring at the Ketzin Pilot Site. Third EAGE Workshop on Permanent Reservoir Monitoring 2015 (Stavanger, Norway 2015), http://dx.doi.org/10.3997/2214-4609.201411959.

2014

F. M. Wagner, P. Bergmann, T. Labitzke, C. Schmidt-Hattenberger, C. Rücker, H. Maurer (2014): Accounting for complex borehole completion in crosshole resistivity monitoring. *4th Helmholtz-Alberta Initiative (HAI) Science Forum, September 29, 2014, Edmonton, Canada.*

F. M. Wagner, P. Bergmann, T. Labitzke, C. Schmidt-Hattenberger, T. Günther, H. Maurer (2014): High-Resolution Monitoring of CO_2 Injection with Permanent Electrodes: A 5-Year Retrospect from the Ketzin Site and Design Recommendations for Future Projects. *AGU Fall Meeting, 15-19 December, 2014, San Francisco, USA.*

F. M. Wagner, P. Bergmann, T. Labitzke, N. Deisman, C. Schmidt-Hattenberger, H. Maurer, R. Chalaturnyk (2014): Paving the way to estimate CO_2-saturation from geoelectrical data. *4th Helmholtz-Alberta Initiative (HAI) Science Forum, September 29, 2014, Edmonton, Canada (acknowledged with the Best Oral Presentation Award).*

2013

C. Schmidt-Hattenberger, P. Bergmann, D. Bösing, T. Labitzke, M. Möller, S. Schröder, **F. M. Wagner**, H. Schütt (2013): Permanent Downhole Geoelectrical Monitoring at the Ketzin CO_2 Pilot Site. *Second EAGE Workshop on Permanent Reservoir Monitoring 2013 - Current and Future Trends (Stavanger, Norway 2013)*, `http://dx.doi.org/10.3997/2214-4609.20131314`.

C. Schmidt-Hattenberger, P. Bergmann, T. Labitzke, **F. M. Wagner** (2013): Electrical Resistivity Tomography (ERT) as a permanent monitoring tool to image the CO_2 migration at the Ketzin pilot site - Experiences from more than five years of operation. *2nd Internat. Workshop on Geoelectrical Monitoring, GELMON 2013, Vienna, 04.-06.12.2013, Berichte Geol. B.-A., 104, ISSN 1017-8880.*

F. M. Wagner, T. Günther, C. Schmidt-Hattenberger, H. Maurer (2013): On the Design of Crosshole Resistivity Arrays for High-resolution and Cost-effective Storage Reservoir Monitoring. *Near Surface Geoscience 2013 - the 19th European Meeting of Environmental and Engineering Geophysics of the Near Surface Geoscience (Bochum 2013)*, `http://dx.doi.org/10.3997/2214-4609.20131430`.

F. M. Wagner, T. Günther, C. Schmidt-Hattenberger, H. Maurer (2013): Optimized crosshole resistivity monitoring strategies for geological carbon dioxide storage reservoirs. *3rd Helmholtz-Alberta Initiative (HAI) Science Forum, September 2013, Edmonton, Canada (acknowledged with the Best Oral Presentation Award).*

F. M. Wagner, T. Günther, C. Schmidt-Hattenberger, H. Maurer (2013): Estimating optimum

electrode locations for high-resolution cross-hole resistivity monitoring. *2nd Internat. Workshop on Geoelectrical Monitoring, GELMON 2013, Vienna, 04.-06.12.2013, Berichte Geol. B.-A., 104, ISSN 1017-8880.*

F. M. Wagner, C. Schmidt-Hattenberger, P. Bergmann, T. Labitzke, R. Chalaturnyk, B. Giroux (2013): Towards quantitative monitoring of CO_2 with time-lapse electrical resistivity tomography (ERT): Experiences from the Ketzin pilot site, Germany. *3rd Annual Conference of Carbon Management Canada, Calgary, Canada.*

2012

T. Kempka, R. Endler, D. Eydam, R. Herd, E. Huenges, C. Jahnke, E. Jolie, S. Janetz, Y. Krause, M. Kühn, F. Magri, I. Moeck, M. Möller, G. Muñoz, B. Nakaten, O. Ritter, W. Schafrik, C. Schmidt-Hattenberger, E. Schöne, E. Tillner, H. Voigt, **F. M. Wagner**, G. Zimmermann (2012): CO_2-storage in eastern Brandenburg: Implications for geothermal heat provision and conception of a salinisation early warning system - Review of current progress of the joint-project brine. *Schriftenreihe der Deutschen Gesellschaft für Geowissenschaften 78.*

M. Möller, C. Schmidt-Hattenberger, **F. M. Wagner**, S. Schröder (2012): Hochauflösende Geoelektrik als Teil eines Frühwarnsystems zur Überwachung einer möglichen Grundwasserversalzung bei der CO_2-Speicherung. *72. Jahrestagung der Deutschen Geophysikalischen Gesellschaft (DGG) (Hamburg 2012).*

F. M. Wagner, B. Hosseini, T. Kempka, C. Schmidt-Hattenberger, R. Chalaturnyk (2012): Optimized resistivity monitoring strategies for geological carbon dioxide storage based on reservoir simulations. *2nd Science Forum of the Helmholtz-Alberta-Initiative, Potsdam Sep. 2012 (acknowledged with the Best Oral Presentation Award).*

F. M. Wagner, M. Möller, C. Schmidt-Hattenberger, T. Kempka, H. Maurer (2012): Monitoring brine migration in analog transport models using surface-to-hole ERT. *Geophysical Research Abstracts Vol. 14, EGU2012-2101, 2012.*

F. M. Wagner, C. Schmidt-Hattenberger, P. Bergmann, T. Labitzke, M. Möller, S. Schröder (2012): Quantitative CO_2 monitoring via time-lapse electrical resistivity tomography (ERT): From tool development to advanced inversion strategies. *3rd Annual Meeting, Helmholtz Alberta Initiative (Edmonton, Alberta, Canada 2012).*

2011

M. Möller, C. Schmidt-Hattenberger, **F. M. Wagner**, S. Schröder (2011): Development of an integrated monitoring concept to detect possible brine migration. *1st International Workshop on Geoelectrical Monitoring - GELMON (Vienna 2011).*

F. M. Wagner, M. Möller, C. Schmidt-Hattenberger, T. Kempka, H. Maurer (2011): Detection of groundwater salinisation by geoelectric measurements. *EGU General Assembly 2011, Vienna.*