

Prof. Martin O. Saar, Ph.D.

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RESEARCH FIELD

Subsurface fluid dynamics of multiscale, multiphase, multicomponent, reactive fluid (groundwater, CO₂, hydrocarbon) and heat energy transport during processes such as water- and CO₂-based geothermal energy extraction and use/conversion, geologic CO₂ storage, grid-scale subsurface energy storage, enhanced oil/gas recovery, and groundwater flow. Methods include computer simulations, laboratory experiments, and field analyses.

POSITIONS**Academic:**

2020-2023 Chair of the Institute of Geophysics, Dept. of Earth Sciences, ETH** Zürich, Switzerland (CH)
 2015-present Chair* of Geothermal Energy and Geofluids, Dept. of Earth Sciences, ETH** Zürich, CH
 2015-present Adjunct Professor of Hydrogeology and Geofluids, Dept. of Earth Sciences, UMN***, USA
 2014-2014 Full Professor and Gibson Chair, Dept. of Earth Sciences, UMN, USA
 2011-2014 Institute on the Environment Resident Fellow, UMN, USA
 2011-2014 Associate Professor and Gibson Chair, Dept. of Earth Sciences, UMN, USA
 2009-2011 McKnight Land-Grant Chair & Professor, College of Science & Engineering, UMN, USA
 2008-2014 Affiliated Member of the Graduate Faculty, Computer Science and Engineering, UMN, USA
 2006-2014 Member of the Graduate Faculty, Water Resources Sciences, UMN, USA
 2005-2014 Gibson Chair of Hydrogeology and Geofluids, UMN, USA
 2005-2011 Assistant Professor and Gibson Chair, Dept. of Geology & Geophysics, UMN, USA
 2003-2004 Turner Postdoctoral Fellow, Dept. of Earth and Environm. Sci., U. of Michigan, MI, USA

* Endowed by the Werner Siemens Foundation, ** ETH=Swiss Federal Institute of Technology, *** UMN=U. of Minnesota, USA

Industry:

2018-present Co-Founder, CO2 POWER GmbH, A CO₂-Geothermal Energy Co., Zurich, Switzerland
 2014-present Co-Founder & Chief Scientific Officer, TerraCOH, a COH-Geothermal Co., Minneapolis., MN, USA
 2012-present Founder & Chief Manager, Geofluids LLC, a geofluids consulting firm, Minneapolis, MN, USA
 2011-2014 Co-Founder & Chief Scientific Officer, Heat Mining Company LLC, Rapid City, SD, USA
 (became TerraCOH in 2014)

EDUCATION

2003 Ph.D. in Earth and Planetary Sciences, University of California, Berkeley, CA; Adviser: Dr. Michael Manga; Dissertation: Geological Fluid Mechanics Models at Various Scales
 1998 M.Sc. in Geology, University of Oregon, Eugene, OR; Adviser: Dr. Michael Manga; Thesis: The Relationship Between Permeability, Porosity, and Microstructure in Vesicular Basalts
 1995 Vordiplom (~B.Sc.) in Geology, Albert-Ludwigs University, Freiburg, Germany

AWARDS, ENDOWMENTS AND SELECTED PATENTS

2024 Werner Siemens-Stiftung (Werner Siemens Foundation) endowment for the 10-year (2024-2034) project entitled: "GEM: Geo-Energy Magnetic Resonance Imaging - Connecting experimental, field and numerical research to pioneer the development of breakthrough geo-energy."
 2020 Best Paper Award of MIT A+B Applied Energy Symposium for the proceedings paper: "Advanced drilling technologies to improve the economics of deep geo-resource utilization" by Edoardo Rossi, Benjamin M. Adams, Daniel Vogler, Philipp Rudolf Von Rohr Hans-Olivier Schiegg and Martin O. Saar.
 2020 2019 Water Resources Research (WRR) Editors' Choice Award, given to 1% of WRR papers in a given year, for the publication: Kittilä, A., M.R. Jalali, K.F. Evans, M. Willmann, M.O. Saar, and X.-Z. Kong, Field comparison of DNA-labeled nanoparticle and solute tracer transport in a fractured crystalline rock, Water Resources Research (WRR), doi.org/10.1029/2019WR025021, 55:6577–6595, 2019.
 2012-2015 Saar, M.O., Randolph, J.B., Kuehn, T.H., & the Regents of the University of Minnesota, Carbon dioxide-based geothermal energy generation systems and methods related thereto, U.S. Patent No. US8,316,955 B2 (issued 2012); Canada Patent No. 2.753.393 (issued 2013); Europe Patent No. 2406562 (issued 2014); Australia Patent No. 2010223059 (issued 2015).
 2011 George W. Taylor Career Development Award for top tenure candidate in the College of Science and Engineering, University of Minnesota – Twin Cities

2011	Hydrogeology Journal Editor's Choice Award for the publication: Saar, M.O., Review: Geothermal heat as a tracer of large-scale groundwater flow and as a means to determine permeability fields, Hydrogeology Journal, doi.org/10.1007/s10040-010-0657-2 , 19:31-52, 2011.
2009	Awarded 2009-2011 McKnight Land-Grant Professorship and Chair position, UMN
2005	Awarded endowed Gibson Chair position, University of Minnesota
2004	Awarded Turner Postdoctoral Fellowship, University of Michigan
2000	Outstanding Student Paper Award, American Geophysical Union

PUBLICATIONS IN PEER-REVIEWED JOURNALS (Indexed in Scopus)

129 publications in peer-reviewed international journals or as patents (14.11.2024):

Scopus: h-index: 41 Number of citations: 5929
 Google Scholar: h-index: 51 Number of citations: 9054 <https://scholar.google.com/citations?user=zn8SBGYAAAAJ&hl=en&oi=ao>

ADVISER / SUPERVISER OF (<https://geg.ethz.ch/people>):

Technical and Administrative positions:

2024-present	Dr. Dieter Werthmüller	Project Manager: Deep Geothermal Energy in Switzerland Consortium
2024-present	Dr. Anke Wohlers	Reactive Transport Lab Manager
2023-present	Daniel Pokras	Process Engineer
2023-present	Anton Kulik	Full-stack Developer, IT Admin
2023-present	Dirk Alfermann	Project Manager of AEGIS-CH and of Deploy the heat
2023-present	Dr. Morteza Esmaeilpour	Software Engineer, Process Engineer
2022-present	Jasper de Reus	Project Manager of the CPG Consortium
2015-present	Dr. Allan Leal	Senior scientific software developer
2015-present	Nils Knornschild	Laboratory and Field Technician

Senior Researchers (Oberassistenten - OA):

2023-present	Dr. Tsubasa Onishi	OA: Reservoir Engineer and software engineer
2022-present	Dr. Paromita Deb	OA: Numerical modeling of geothermal systems
2021-present	Dr. Maren Brehme	OA: Geothermal power plants
2020-present	Dr. Mahmoud Hefny	OA: Subsurface energy storage; Advanced geothermal systems
2015-present	Dr. Xiang-Zhao Kong	OA: Multi-scale subsurface reactive transport (experiments & modeling)

Postdocs:

2024-present	Dr. Nikita Bondarenko	Postdoc: Inversion techniques for monitoring of subsurface fluid migration
2024-present	Dr. Jasmin Schönzart	Postdoc: Gyrotron-based contactless drilling
2024-present	Dr. Mohamed Ezzat	Postdoc: Plasma-Pulse Geo-Drilling development
2023-present	Dr. Morteza Esmaeilpour	Postdoc: Numerical modeling of complex fluid mixtures in geotherm. systems

Doctoral Students:

2022-present	Dario Schwendener	Doctoral Student: Non-Darcy flow in porous media
2022-present	Anna Kottsova	Doctoral Student: Efficiency of geothermal operations
2022-present	Lily Suherlina	Doctoral Student: Indonesian geothermal system
2021-present	Serhat Küçük	Doctoral Student: CO ₂ -Plume Geothermal after enhanced oil recovery (EOR)
2021-present	Nicolas Rangel-Jurado	Doctoral Student: CO ₂ -based Enhanced Geothermal Systems and CPG
2021-present	Kevin Hau	Doctoral Student: CO ₂ -Plume Geothermal (CPG) in Switzerland

MSc Students: Céline Graber, Lea Krohn, Janna Blaume

RECENT COURSES TAUGHT

2024 spring	ETHZ	Geothermal Energy MSc Course;
2023 fall	ETHZ	Geophysik I BSc (co-taught) (1/2 semester)
2023 fall	ETHZ	Oceanography and Hydrogeology BSc (Hydrogeology portion: 1/3 semester)
2023 fall	ETHZ	Geology and Petrography BSc (service course) (full semester)
2023 spring	ETHZ	Geothermal Energy MSc Course
2023 spring	ETHZ	Joint Applied Geophysics Masters Course I (co-taught) (1/2 semester)