



Publications

Helmholtz Centre for Environmental Research – UFZ

Topic 8: Georesources for the Energy Transition and a High-Tech Society

Preface

This list includes all publications of the year 2025 assigned to program topic 8 “Georesources for the Energy Transition and a High-Tech Society” of the Helmholtz research program "Changing Earth – Sustaining our Future" within the research field Earth and Environment which were authored, co-authored or edited by staff members of the Helmholtz Centre for Environmental Research - UFZ.

If a publication belongs to more than one program topic, both primary and secondary assignments are indicated.

The editorial deadline for this publication list was 6 March 2026.

In contrast to external authors, UFZ staff names are highlighted in **bold type** in all publications.

The concluding index lists all UFZ authors in alphabetical order with the sequential numbers of their publications.

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Publications in ISI/Scopus listed journals/series

1. **Bilke, L., Fischer, T., Naumov, D., Meisel, T.** (2025):
Reproducible HPC software deployments, simulations, and workflows – a case study for far-field deep geological repository assessment
Environ. Earth Sci. **84** (17), art. 502
[10.1007/s12665-025-12501-z](https://doi.org/10.1007/s12665-025-12501-z)
Main topic T8; Secondary topic T5
2. **Bin Hudari, M.S., Vogt, C.** (2025):
Sulfidic toluene mineralization by aquifer microbial communities at different temperatures
FEMS Microbiol. Ecol. **101** (8), fiaf079
[10.1093/femsec/fiaf079](https://doi.org/10.1093/femsec/fiaf079)
Main topic T7; Secondary topic T8
3. Birkholzer, J.T., Graupner, B.J., Harrington, J., Jayne, R., **Kolditz, O.**, Kuhlman, K.L., LaForce, T., Leone, R.C., Mariner, P.E., McDermott, C., Plúa, C., Stein, E., Sugita, Y., Tamayo-Mas, E., Thatcher, K., Yoon, J.S., Bond, A.E. (2025):
DECOVALEX-2023: An international collaboration for advancing the understanding and modeling of coupled thermo-hydro-mechanical-chemical (THMC) processes in geological systems
Geomech. Energy Environ. **42** , art. 100685
[10.1016/j.gete.2025.100685](https://doi.org/10.1016/j.gete.2025.100685)
4. **Buchwald, J., Grunwald, N., Wang, W., Shao, H., Kolditz, O., Nagel, T.** (2025):
The relevance of two-phase flow in the thermo-hydro-mechanical evolution of clay formations exposed to high temperatures by heat-emitting waste
Appl. Therm. Eng. **264** , art. 125379
[10.1016/j.applthermaleng.2024.125379](https://doi.org/10.1016/j.applthermaleng.2024.125379)
Main topic T8; Secondary topic T5
5. Cai, W., Wang, F., Zhang, Y., Jiang, J., Wang, Q., **Shao, H., Kolditz, O., Nagel, T., Chen, C.** (2025):
Field test and long-term heat extraction performance evaluation of the deep U-type borehole heat exchanger system
Renew. Energy **240** , art. 122171
[10.1016/j.renene.2024.122171](https://doi.org/10.1016/j.renene.2024.122171)
6. Chen, C., Witte, F., Taherdangkoo, R., Cai, W., Chen, S., Kong, Y., **Shao, H., Hofmann, M., Nagel, T.** (2025):
Thermal performance response and heat load redistribution mechanism of a deep U-type borehole heat exchanger in heating systems
Appl. Energy **382** , art. 125216
[10.1016/j.apenergy.2024.125216](https://doi.org/10.1016/j.apenergy.2024.125216)

7. **Chen, C., Zhou, H., Nagel, T., Renaud, T., Naumov, D., Kolditz, O., Shao, H.** (2025): Parametric analysis on the transient two-phase wellbore model applied to the Yangyi high-temperature geothermal field
Geotherm. Energy **13** , art. 1
[10.1186/s40517-024-00322-5](https://doi.org/10.1186/s40517-024-00322-5)
Main topic T8; Secondary topic T5
8. **Heinze, J., Lehmann, C., Meisel, T., Rink, K., Kreye, P., Renz, A., Zeunert, S., Rühaak, W.** (2025): Combining FEFLOW and OpenGeoSys for interoperable workflows in environmental geotechnics
Environ. Earth Sci. **84** (16), art. 457
[10.1007/s12665-025-12380-4](https://doi.org/10.1007/s12665-025-12380-4)
Main topic T5; Secondary topic T8
9. Hu, M., Yoon, J.S., Sasaki, T., Liu, H., Wang, Z., Park, J.-W., Park, C.-H., Rutqvist, J., **Kolditz, O.**, Birkholzer, J. (2025): Benchmark study of a new simplified DFN model for shearing of intersecting fractures and faults
Geomech. Energy Environ. **41** , art. 100644
[10.1016/j.gete.2025.100644](https://doi.org/10.1016/j.gete.2025.100644)
10. Huan, C., Meng, F., Yang, Z., Cai, W., Wang, Z., Wang, F., **Chen, C.-F.** (2025): Heat extraction performance and techno-economic analysis of a deep U-type borehole heat exchanger under intermittent operation
Geothermics **130** , art. 103307
[10.1016/j.geothermics.2025.103307](https://doi.org/10.1016/j.geothermics.2025.103307)
Main topic T8; Secondary topic T5
11. Jafari, A., **Mollaali, M.**, Ma, L., Shahmansouri, A.A., Zhou, Y., Dugnani, R. (2025): Brittle fracture strength prediction via XML with reliability considerations
Eng. Fract. Mech. **328** , art. 111555
[10.1016/j.engfracmech.2025.111555](https://doi.org/10.1016/j.engfracmech.2025.111555)
12. Kaiser, S., **Wang, W., Buchwald, J., Naumov, D., Chaudhry, A.A., Nagel, T.** (2025): Differential assessment of effects of increasing model complexity in THM coupled models of the FE experiment at Mt. Terri
Geomech. Energy Environ. **42** , art. 100637
[10.1016/j.gete.2025.100637](https://doi.org/10.1016/j.gete.2025.100637)

13. **Kiszkurno, F.K., Buchwald, J.,** Silbermann, C.B., **Kolditz, O., Nagel, T.** (2025):
Is more always better? Study on uncertainties introduced by decision-making process of model design — A case study with thermo-osmosis
Int. J. Rock Mech. Min. Sci. **189** , art. 106075
[10.1016/j.ijrmms.2025.106075](https://doi.org/10.1016/j.ijrmms.2025.106075)
Main topic T8; Secondary topic T5

14. **Kolditz, O.,** McDermott, C., Yoon, J.S., **Mollaali, M., Wang, W.,** Hu, M., Sasaki, T., Rutqvist, J., Birkholzer, J., Park, J.-W., Park, C.-H., Liu, H., Pan, P.-Z., **Nagel, T.,** Nguyen, S., Kwon, S., Lee, C., Kim, K.-I., Bond, A., Hadgu, T., Wang, Y., Zhuang, L., Yoshioka, K., Benitez Cunha, G., Fraser-Harris, A. (2025):
A systematic model- and experimental approach to hydro-mechanical and thermo-mechanical fracture processes in crystalline rocks
Geomech. Energy Environ. **41** , art. 100616
[10.1016/j.gete.2024.100616](https://doi.org/10.1016/j.gete.2024.100616)

15. **Kolditz, O.,** Zheng, Y., Ma, Y., Kolditz, B., Dörhöfer, G., LaMoreaux, J.W. (2025):
Environmental earth sciences
Environ. Earth Sci. **84** , art. 550
[10.1007/s12665-025-12601-w](https://doi.org/10.1007/s12665-025-12601-w)
Main topic T5; Secondary topic T8

16. **Li, S., Vogt, C.** (2025):
Anaerobic mineralization of ¹³C-labeled biomass by thermophilic microorganisms from aquifer sediments
Environ. Technol. Innov. **40** , art. 104547
[10.1016/j.eti.2025.104547](https://doi.org/10.1016/j.eti.2025.104547)
Main topic T7; Secondary topic T8

17. **Mollaali, M., Yoshioka, K., Lu, R., Montoya, V.,** Vilarrasa, V., **Kolditz, O.** (2025):
Variational phase-field fracture approach in reactive porous media
Int. J. Numer. Methods Eng. **126** (1), e7621
[10.1002/nme.7621](https://doi.org/10.1002/nme.7621)
Main topic T8; Secondary topic T5

18. **Nagel, T., Gerasimov, T.,** Remes, J., Kern, D. (2025):
Neighborhood watch in mechanics: nonlocal models and convolution
SIAM Rev. **67** (1), 176 - 193
[10.1137/22M1541721](https://doi.org/10.1137/22M1541721)

19. **Nagel, T.,** Rühaak, W., Amann, F., Bracke, G., Buske, S., Kowalski, J., Reiche, S., Schäfer, T., Scheytt, T., Stumpf, T., Völzke, H., Wellmann, F., **Kolditz, O.** (2025):
Deep geological disposal
Environ. Earth Sci. **84** (3), art. 78
[10.1007/s12665-024-12075-2](https://doi.org/10.1007/s12665-024-12075-2)

20. Park, J.-W., Park, C.-H., Park, E.-S., **Kolditz, O.** (2025):
A novel FEM–DEM coupling methodology for hydro-mechanical modeling in fractured geological media
Int. J. Rock Mech. Min. Sci. **196**, art. 106324
[10.1016/j.ijrmms.2025.106324](https://doi.org/10.1016/j.ijrmms.2025.106324)
21. **Raith, F.**, Scheuermann, G., Heine, C. (2025):
Simplifying Jacobi sets' topology and geometry by selective smoothing of bivariate 2D scalar fields
Journal of WSCG **33** (1-2), 63 - 72
[10.24132/JWSCG.2025-7](https://doi.org/10.24132/JWSCG.2025-7)
22. **Rieß, A.**, **Dietrich, P.** (2025):
Investigation of hydrogeological structures in carbonate rock with ground penetrating radar
Environ. Earth Sci. **84** (8), art. 202
[10.1007/s12665-025-12162-y](https://doi.org/10.1007/s12665-025-12162-y)
Main topic T5; Secondary topic T8
23. Rodríguez Cortéz, C.A., Duvauchelle, J.-E., Demaille, D., Zapata, R., Estève, I., Biscaras, J., Maisonhaute, E., Jarrier, R., **Buchwald, J.**, Patriarche, G., Zheng, Y., Cruguel, H., Vidal, F., Hennes, M. (2025):
Photoinduced thermal strain in epitaxial SrRuO₃ thin films
Phys. Rev. Mater. **9** (10), art. 103605
[10.1103/cn7d-pth7](https://doi.org/10.1103/cn7d-pth7)
24. Silbermann, C.B., **Zill, F.**, **Meisel, T.**, Kern, D., **Kolditz, O.**, Magri, F., **Nagel, T.** (2025):
Automated thermo-hydro-mechanical simulations capturing glacial cycle effects on nuclear waste repositories in clay rock
Geomech. Geophys. Geo-Energy Geo-Resour. **11** (1), art. 58
[10.1007/s40948-025-00960-4](https://doi.org/10.1007/s40948-025-00960-4)
25. Simo, E., de Lesquen, C., Leon-Vargas, R.P., Vu, M.-n., Raude, S., El Tabbal, G., Dizier, A., Seetharam, S., Narkuniene, A., Collin, F., Song, H., Gens, A., Song, F., Tatomir, A.-B., **Nagel, T.**, **Buchwald, J.** (2025):
THM-modelling benchmark initiative on the effects of temperature on the disposal of heat-generating radioactive waste in clay formations
Acta Geotech. **20**, 1621 - 1642
[10.1007/s11440-024-02502-w](https://doi.org/10.1007/s11440-024-02502-w)

26. Simo, E., de Lesquen, C., Vu, M.-n., Raude, S., El Tabbal, G., Narkuniene, A., Poskas, P., Collin, F., Abhishek, R., Song, H., Gens, A., Song, F., Leon-Vargas, R.P., Tatomir, A.-B., Mánica, M., **Nagel, T., Buchwald, J.** (2025):
Benchmarking thermo-hydro-mechanical models for geological barrier integrity in clay-based repositories
Acta Geotech. **20** (10), 5407 - 5425
[10.1007/s11440-025-02683-y](https://doi.org/10.1007/s11440-025-02683-y)
27. Stemmler, R., Arab, A., Bauer, S., Beyer, C., Blöcher, G., Bossennec, C., **Dörnbrack, M.**, Hahn, F., Jaeger, P., Kranz, S., Mauerberger, A., Nordheim, J.N., Ohagen, M., Petrova, E., Regenspurg, S., Rettenmaier, D., Saadat, A., Sass, I., Scheytt, T., Scholliers, N., **Shao, H.**, Tzoufka, K., Zosseder, K., Blum, P. (2025):
Current research on aquifer thermal energy storage (ATES) in Germany [Aktuelle Forschung zu thermischen Aquiferspeichern in Deutschland]
Grundwasser **30** (2), 107 - 124
[10.1007/s00767-025-00590-3](https://doi.org/10.1007/s00767-025-00590-3)
Main topic T8; Secondary topic T5
28. **Tripathi, M., Vinson, A.C.,** Yadav, P.K., Chahar, B.R., **Dietrich, P.** (2025):
Analytical quantification of streambed and aquifer influence on exchange flux in fully connected losing streams
Sustain. Wat. Resour. Manag. **11** (2), art. 31
[10.1007/s40899-025-01192-w](https://doi.org/10.1007/s40899-025-01192-w)
Main topic T5; Secondary topic T8
29. **Vehling, F.,** Kosakowski, G., **Shao, H.** (2025):
Two-phase reactive transport modeling of heterogeneous gas production in a low- and intermediate-level radioactive waste repository
Appl. Geochem. **178** , art. 106219
[10.1016/j.apgeochem.2024.106219](https://doi.org/10.1016/j.apgeochem.2024.106219)

Publications in other journals

30. **Kolditz, O.**, McDermott, C., Yoon, J.S., Renner, J., Zhuang, L., Fraser-Harris, A., Chandler, M., Graham, S., Wang, J., **Mollaali, M.** (2025):
SAFENET-2 – fracture evolution in crystalline rocks (from lab to in situ scale)
Saf. Nucl. Waste Disposal **3**, 15 - 30
[10.5194/sand-3-15-2025](https://doi.org/10.5194/sand-3-15-2025)

Reports

31. Bremer, J., Kohl, T., Sass, I., **Kolditz, O.**, Rudolph, B., Rühaak, W., Köbe, W., Dehmer, D., Schamp, J., Grimmer, J.C., Scheuven, D., Schüth, C., Deon, F., Lüth, S., Haaf, N., Hoffert, U., Milsch, H., Giese, R., Zimmermann, G., Könitz, D., **Rink, K.**, **Şen, Ö.O.**, **Goldstein, S.**, **Jahn, M.**, Steinhülb, J., Bauer, F., Selzer, M., Schätzler, K. (2025):
GeoLaB annual report 2024
GeoLab, Karlsruhe, 126 pp.
[10.5445/IR/1000184950](https://nbn-resolving.org/urn:nbn:de:hbz:5:1-65864-p0101-9)
Main topic T8; Secondary topic T5

Conference papers

32. **Dörnbrack, M., Weiß, H., Shao, H.** (2025):
Models for the experiment design of a combined ATES and remediation pilot plant in an urban environment
EGU General Assembly 2025, Vienna, Austria, 27 Apr–2 May 2025
EGUsphere
Copernicus Publications, EGU25-5675
[10.5194/egusphere-egu25-5675](https://doi.org/10.5194/egusphere-egu25-5675)
Main topic T8; Secondary topic T5
33. **Lehmann, C., Bilke, L., Graebing, N., Heinze, J., Meisel, T., Naumov, D., Sen, Ö.O., Kolditz, O.** (2025):
Software products from the OpenWorkFlow project
EGU General Assembly 2025, Vienna, Austria, 27 Apr–2 May 2025
EGUsphere
Copernicus Publications, EGU25-15544
[10.5194/egusphere-egu25-15544](https://doi.org/10.5194/egusphere-egu25-15544)
Main topic T8; Secondary topic T5
34. **Selzer, P., Zill, F., Silbermann, C., Shao, H., Kolditz, O.** (2025):
Accurate and consistent Lagrangian transport simulations for finite-element-models of thermo-hydro-mechanical processes in porous media
EGU General Assembly 2025, Vienna, Austria, 27 Apr–2 May 2025
EGUsphere
Copernicus Publications, EGU25-13190
[10.5194/egusphere-egu25-13190](https://doi.org/10.5194/egusphere-egu25-13190)

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