

PERSONAL DETAILS

NAME: Maria Elenius

ORGANIZATION: SMHI

GENDER: F

BIRTHDAY: 26 December 1976

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H-index: 7

WORK EXPERIENCE

SENIOR RESEARCHER HYDROLOGY AND WATER QUALITY, SMHI, SWEDEN, 2019 - PRESENT

Hydrology and water quality assessments using the hydrological model HYPE, with focus on droughts in Sweden and the relation to ecological impacts

HYDROLOGY CONSULTANT, SMHI, SWEDEN, 2018 - 2019

Consultancy for hydropower production, drinking water quality and soil stability. Assessments using hydrological simulations with HBV and HYPE

SENIOR RESEARCHER, UNI RESEARCH, NORWAY, 2015 - 2018

Modeling geological carbon storage, focus on large-scale impacts

POSTDOC IN GROUNDWATER QUALITY, TUFTS UNIVERSITY, USA, 2013 - 2015

Development of upscaled models for contaminant groundwater transport in heterogeneous soil

SENIOR RESEARCHER, UNI RESEARCH, NORWAY, 2011 - 2013

Developments for modeling geological carbon storage, focus on convective mixing at small scales

PHD STUDENT, BERGEN UNIVERSITY, DEPT. OF APPLIED MATHEMATICS, NORWAY, 2008-2011

Developments for modeling geological carbon storage, focus on convective mixing of CO₂ in brine

WSP, CONSULTANT SUBSURFACE HYDROLOGY, SWEDEN, 2001 - 2008

Risk assessment of contaminated soil, groundwater and sea sediments

EDUCATION

Readership course (Docentkurs), Lund University, 2021

PhD in Applied Mathematics, Bergen University, 2008 - 2011

MSc in Environmental Technology, Uppsala University, 1995 - 2001

PUBLICATIONS

Journal publications

1. Elenius, M.T. and G. Lindström (in review) Introduced flow variability and its propagation downstream of hydropower stations in Sweden
2. Elenius, M.T. and S.E. Gasda (2021), Convective mixing with non-monotonic density. Transport in porous media, 138:133-155. <https://doi.org/10.1007/s11242-021-01593-3>
3. Photiadou, C., B. Arheimer, T. Bosshard, R. Capell, M. Elenius, I. Gallo, F. Gyllensvärd, K. Klehmet, L. Little, I. Ribeiro, L. Santos and E. Sjökvist (2020) Designing a climate service for planning climate actions in vulnerable countries. Atmosphere, 12, 121. <https://doi.org/10.3390/atmos12010121>
4. Elenius, M.T. and L.M. Abriola (2019) Regressed models for multirate mass transfer in heterogeneous media. Water Resources Research, 55. <https://doi.org/10.1029/2019WR025476>
5. Elenius, M.T. et al. (2018) Assessment of CO₂ storage capacity based on sparse data: Skade formation. International Journal of Greenhouse Gas Control, 79:252-271. <https://doi.org/10.1016/j.ijggc.2018.09.004>
6. Gasda, S.E., M. Wangen, T.I. Bjørnarå, M.T. Elenius (2017) Investigation of caprock integrity due to pressure build-up during high-volume injection into the Utsira formation. Energy Procedia, 114:3157-3166, <https://doi.org/10.1016/j.egypro.2017.03.1444>
7. Elenius, M.T., D.V. Voskov and H.A. Tchelepi (2015) Interactions between gravity currents and convective dissolution. Advances in Water Resources, 83:77-88. <http://dx.doi.org/10.1016/j.advwatres.2015.05.006>
8. Elenius, M.T., J.M. Nordbotten and H. Kalisch (2014) Convective mixing influenced by the capillary transition zone, Computational Geosciences, 18:417-431. <https://doi.org/10.1007/s10596-014-9415-1>
9. Elenius, M.T. and S.E. Gasda (2013) Convective mixing in formations with horizontal barriers, Advances in Water Resources, 62:499-510. <http://dx.doi.org/10.1016/j.advwatres.2013.10.010>
10. Elenius M.T. and K. Johannsen (2012) On the time scales of nonlinear instability in miscible displacement porous media, Computational Geosciences 16:901-911. <https://doi.org/10.1007/s10596-012-9294-2>
11. Elenius, M.T., J.M. Nordbotten and H. Kalisch (2012) Effects of a capillary transition zone on the stability of a diffusive boundary layer, IMA J Appl Math, 77:771-787. <https://doi.org/10.1093/imat/hxs054>

PhD Thesis

1. Elenius, M.T. Convective mixing in geological carbon storage, University of Bergen, 2011. https://bora.uib.no/bora-xmlui/bitstream/handle/1956/5540/41952%20Elenius%20main_thesis.pdf?sequence=1&isAllowed=y

Reports (selection of recent)

1. Orsholm, J. and M.T. Elenius (2020) Effects of hydrology on wetland biodiversity. A literature study and development of hydrological indicators. SMHI Hydrology Report No 22. <https://www.smhi.se/publikationer/publikationer/effects-of-hydrology-on-wetland-biodiversity-a-literature-study-and-development-of-hydrological-indicators-1.180948>
2. Davani, A. and M.T. Elenius (in prep) Rewetting of drained peat as a mitigation strategy to reduce greenhouse gas emissions. SMHI Hydrology Report

3. Strömqvist, J., E. Johansson, M. Elenius, E. Bölenius, M. Bertrand and C. Hayer (2020) Förbättrad vattenbalansberäkning genom inkludering av jordbruksbevattning. SMHI Hydrologi Nr 124. ISSN 0283-7722 <https://www.smhi.se/publikationer/publikationer/forbattrad-vattenbalansberakning-genom-inkludering-av-jordbruksbevattning-1.165938>

Conference proceedings

1. Gasda, S.E., M.T. Elenius and I. Aavatsmark, Numerical Solution of CO₂-Hydrocarbon Convective Mixing, XXII International Conference on Water Resources, 2018.
2. Gasda, S.E., M.T. Elenius and R. Kaufmann, Field-Scale Implications of Density-Driven Convection in CO₂-EOR Reservoirs, EAGE Fifth CO₂ Geological Storage Workshop, 2018.
3. Tveit, S, S.E. Gasda, H. Hægland, G. Bødker and M.T. Elenius, Numerical Study of Microbially Induced Calcite Precipitation as a Leakage Mitigation Solution for CO₂ Storage, EAGE Fifth CO₂ Geological Storage Workshop, 2018.
4. Elenius, M.T., J.M. Nordbotten and H. Kalisch, Efficiency of dissolution trapping in geological carbon storage, 13th European Conference on the Mathematics of Oil Recovery (Ecmor), 2012.
5. Elenius, M.T., and S.E. Gasda, Impact of tight horizontal layers on dissolution trapping in geological carbon storage, XIX International Conference on Water Resources (CMWR), 2012.
6. Elenius M.T., H. Tchelepi and K. Johannsen, CO₂ trapping in sloping aquifers: High resolution numerical simulations, XVIII International Conference on Water Resources (CMWR), 2010.

INTERNATIONAL CONFERENCES

Dr Elenius has presented her work at approximately 20 international conferences, such as European Geophysical Union (EGU) General Assembly, American Geophysical Union (AGU) Fall meetings, Computational Methods in Water Resources (CMWR) and SIAM conferences on Mathematical and Computational Issues in the Geosciences.

PROFESSIONAL ACTIVITIES AND SERVICE

Reviewer for Advances in Water Resources, Water Resources Research, Transport in Porous Media, SPE Journal and Journal of Porous Media.

Deputy member of the Nordic Association for Hydrology (NHF)

Chair of the 2016 Gordon Research Seminar in Flow & Transport in Permeable Media.

Member of hiring committees for research staff.

EXPERIENCE IN TEACHING AND ADVISING

Guest-lecturer in university courses:

- Runoff, Uppsala University, 1TV443, Feb 2022.
- Groundwater, Uppsala University, 1TV442, Feb 2022.
- Introductory class in climate change engineering, Tufts University, ES0093-09, Nov 2013.
- Numerical Methods for Partial Differential Equations, Tufts University, Math 250, March 2015.

Other lectures:

- Trial lecture during PhD, Bergen University, Convective mixing
- Trial lecture during PhD, Bergen University, Discretization of hyperbolic partial differential equations.

Student adviser:

- Main adviser for master thesis in Environmental Engineering, Stina Perman (2021) Modeling the microbial fate and transport in rivers of South Africa. Uppsala University. <https://www.diva-portal.org/smash/get/diva2:1580847/FULLTEXT01.pdf>

Other experiences in teaching and advising:

- Adviser for recently graduated temporary staff at SMHI September 2021 – February 2022
 - Karin Lindqvist, Development of irrigation modeling in Sweden
 - Axel Lavenius, Machine-learning for evaluation of trout dependence on flow
 - Johanna Orsholm, Effects of hydrology on wetland biodiversity, literature study and development of indicators
 - Aida Esmailzadeh Davani, Rewetting of drained wetlands for reduced greenhouse gas emissions, literature study
- Adviser for individual course projects within “The advanced international training program on Climate Change – Mitigation and Adaptation”, SMHI, sponsored by the Swedish International Development Cooperation Agency
- Sensor for courses in mathematics (University of Bergen).

OTHER QUALIFICATIONS

Proficient in programming languages: Fortran, Python, R, MATLAB, and LaTeX.

Proficient in software on surface hydrology: HYPE and HBV.

Proficient in software on porous media flow (solving partial differential equations): AD-GPRS, MODFLOW, MT3D.

Fluent in Swedish, English and Spanish. Perfect understanding of Norwegian.