Dr. Nadine Mengis

Curriculum Vitae

Professional Development

2021–dato **Independent Junior Research Group Leader**, *GEOMAR, Helmholtz Centre for Ocean Research, Kiel*, Germany, *FOOTPRINTS - From carbOn remOval To achieving the PaRIs agreemeNt's goal: Temperature Stabilisation*.
Emmy Noether Programme of the German Research Foundation

2019–2021 **Researcher**, *GEOMAR, Helmholtz Centre for Ocean Research, Kiel*, Germany, *Helmholtz-Initiative Climate Adaptation and Mitigation - Net-Zero-2050 Cluster*.
Prof. Dr. Andreas Oschlies

2019 March - August **Postdoctoral Fellow**, *Simon Fraser University, Vancouver*, Canada, *Development, Calibration and Evaluation of the University of Victoria Earth System Climate Model version 2.10*.
Prof. Dr. Kirsten Zickfeld

2017–2019 **Horizon Postdoctoral Fellow**, *Concordia University, Montreal*, Canada, *Carbon Cycle uncertainty quantification of the 1.5°C carbon budget.*.
Prof. Dr. H. Damon Matthews

2013–2016 **PhD candidate**, *GEOMAR, Helmholtz Centre for Ocean Research, Kiel*, Germany, *German Research Foundation priority program 1689: Climate Engineering - Risks, Challenges, Opportunities?*.
Prof. Dr. Andreas Oschlies

Degrees

2016 **Doctorate in Natural Sciences (Dr. rer. nat.)**, *Christian Albrechts University of Kiel*, Germany, *magna cum laude*.
Title: Towards a comprehensive, comparative assessment of Climate Engineering schemes – Metrics, Indicators and Uncertainties

2013 **Master of Science (M.Sc.)**, *Christian Albrechts University of Kiel*, Germany, *Final grade: 1.5 (Excellent)*.
Climate Physics: Meteorology and Physical Oceanography

2010 **Bachelor of Science (B.Sc.)**, *Christian Albrechts University of Kiel*, Germany, *Final grade: 1.5 (Excellent)*.
Physics of the Earth's System - Meteorology - Oceanography - Geophysics

Funding Acquisition Record

2024–2027 **Consortium lead**, *ASMASYS II - Assessment framework for marine CO2 removal and synthesis of current knowledge*, Funding Agency: German Federal Ministry of Education and Research.
value: 4.5M Euro, GEOMAR allocation: 2.0M Euro

2022–dato **Principal investigator**, *RESCUE - Response of the Earth System to overshoot, Climate neUtrality and negative Emissions*, Funding Agency: EU Horizon Europe research and innovation programme.
value: 7M Euro, GEOMAR allocation: 700.000 Euro

2021–dato **Research group lead**, *FOOTPRINTS - From carbOn remOval To achieving the PaRIs agreemeNt's goal: Temperature Stabilisation*, DFG Emmy Noether Programme.
value: 1.46M Euro

Awards, Honours and other funding

2024–2027 **Co-Chair**, *CDRmare - Research Mission of the German Marine Research Alliance (DAM) »Marine carbon sinks in decarbonisation pathways«*.

2023–2028 **Membership**, *Die Junge Akademie - Die Junge Akademie was founded in 2000 as the first academy for outstanding young academics. Funding Agencies: German Federal Ministry of Education and Research*.
value: project based funding, personal allocation: ?? Euro

2020 **Invitation to participate in the 70th Lindau Nobel Laureate Meeting**, Nomination and funding by Helmholtz-Society, *Meinau (online), June 27 - July 2*.

2019 **Invitation to Expert Workshop - Progress for carbon budget assessments**, Wosk Centre for Dialogue, *Vancouver, January 14-16*.
value: 600 CAD

2018 **Invitation to Colloquium on the Occasion of the Appointment for Assistant Professorship at the GEOMAR**, Kiel, Germany, Oct. 26 - Nov. 3.
value: 800 Euro

2017 **Concordia University Conference and Exposition Award**, *September*.
value: 1000 CAD

– **Invitation to First Gordon Research Conference of Climate Engineering**, *August*.
value: 1800 CAD

2016 **Horizon Postdoctoral Fellowship, Concordia University**, appointed a 2 year position starting in January 2017, *accepted in October*.
value: 47,500 CAD per year

2015 **Coordination and participation of Funding Proposal for the second phase of the ComparCE project, within the second call for the SPP 1689**, *September*.
value: 772.000 Euro, GEOMAR allocation: 360.000 Euro

– **Invitation to SCRiM Summer School**, *August*.
value: 500 USD

Publication record

Nadine Mengis has 28 peer-reviewed publications, 9 first author and 5 last author publications, with a total number of 506 article citations and a h-index of 13 (scopus.com, 21 Jan. 2024; Google-Scholar records 870 total citations and a h-index of 15, 21 Jan. 2024).

ORCID: 0000-0003-0312-7069
Scopus Author ID: 56913293400

Peer-reviewed publications

2024 Borchers, M., Frster, J., Thrn, D., ... and **N. Mengis**. A Comprehensive Assessment of Carbon Dioxide Removal Options for Germany, *Earth's Future*, doi.org/10.1029/2023EF003986

- Voget-Kleschin, L., Baatz C., Heyward C., Van Vuuren D., and **N. Mengis**. Re-assessing the need for carbon dioxide removal: Moral implications of alternative climate target pathways, *Global Sustainability*, doi.org/10.1017/sus.2023.21

2023 **Mengis, N.**, Paul A., and M. Fernández-Méndez. Counting (on) Blue Carbon - Challenges and Ways forward for carbon accounting of ecosystem-based carbon removal in marine environments, *PLOS Climate*, doi.org/10.1371/journal.pclm.0000148

- De Sisto, M. L., MacDougall, A. H., **Mengis, N.**, and S. Antoniello. Modelling the terrestrial nitrogen and phosphorus cycle in the UVic ESCM version 2.10, *Geosci. Model Dev.*, doi.org/10.5194/gmd-16-4113-2023
- Köhnke F., Steuri B., El Zohbi J., Görl K., Borchers M., Förster J., Thrän D., **Mengis, N.**, Oschlies A. and Jacob D. On the path to net-zero: Establishing a multi-level system to support the complex endeavor of reaching national carbon neutrality, *Front. Clim.*, doi.org/10.3389/fclim.2023.1056023

2022 **Mengis, N.**, Kalhori, A., Simon, S., Harpprecht, C., Baetcke, L., Prats-Salvado, E., Schmidt-Hattenberger, C., Stevenson, A., Dold, C., El Zohbi, J., Borchers, M., Thrän, D., Korte, K., Gawel, E., Dolch, T., Heß, D., Yeates, C., Thoni, T., Markus, T., Schill, E., Xiao, M., Köhnke, F., Oschlies, A., Förster, J., Görl, K., Dornheim, M., Brinkmann, T., Beck, S., Bruhn, D., Li, Z., Steuri, B., Herbst, M., Sachs, T., Monnerie, N., Pregger, T., Jacob, D., and R. Dittmeyer. Net-zero CO_2 Germany - A Retrospect From the Year 2050, *Earth's Future*, doi.org/10.1029/2021EF002324

- MacDougall A. H., Mallett J., Hohn D., and **N. Mengis**. Substantial Regional Climate Change Expected Following Cessation of CO_2 Emissions, *Environmental Research Letters*, doi.org/10.1088/1748-9326/ac9f59
- Borchers M., D. Thrän, Y. Chi, N. Dahmen, R. Dittmeyer, T. Dolch, C. Dold, J. Förster, M. Herbst, D. Heß, A. Kalhori, K. Koop-Jakobsen, Z. Li, **N. Mengis**, T. B. H. Reusch, I. Rhoden, T. Sachs, C. Schmidt-Hattenberger, A. Stevenson, T. Thoni, J. Wu and C. Yeates. Scoping carbon dioxide removal options for Germany–What is their potential contribution to Net-Zero CO_2?, *Front. Clim.*, doi.org/10.3389/fclim.2022.810343

- Hadziosmanovic, M., Lloyd, S. M., Bjørn, A., Paquin, R. L., **Mengis, N.**, and H. D. Matthews. Using cumulative carbon budgets and corporate carbon disclosure to inform ambitious corporate emissions targets and long-term mitigation pathways, *Journal of Industrial Ecology*, doi.org/10.1111/jiec.13322
- Förster J., Beck S., Borchers M., Gawel E., Korte K., Markus T., **Mengis, N.**, Oschlies A., Schaller R., Stevenson A., Thoni T. and D. Thrän. Framework for Assessing the Feasibility of Carbon Dioxide Removal Options Within the National Context of Germany, *Front. Clim.*, doi.org/10.3389/fclim.2022.758628

2021 Dean, J., Kiendler-Scharr, A., **Mengis, N.**, Rudich, Y., Schepanski, K., and R. Zimmermann. Above us only sky, *Comm. Earth & Environment*, doi.org/10.1038/s43247-021-00245-0

- Matthews, H. D., Tokarska, K. B., Rogelj, J., Smith, C. J., MacDougall, A. H., Haustein, K., **Mengis, N.**, Sippel, S., Forster, P. M. and R. Knutti. An integrated approach to quantifying uncertainties in the remaining carbon budget, *Comm. Earth & Environment*, doi.org/10.1038/s43247-020-00064-9
- Boettcher, M., Brent, K., Buck, H. J., Low, S., McLaren, D. and **N. Mengis**. Navigating Potential Hype and Opportunity in Governing Marine Carbon Removal, *Frontiers in Climate*, doi.org/10.3389/fclim.2021.664456
- Kvale, K. F., Koeve, W. and **N. Mengis**. Calcifying Phytoplankton Demonstrate an Enhanced Role in Greenhouse Atmospheric CO_2 Regulation, *Frontiers in Marine Science*, doi.org/10.3389/fmars.2020.583989
- Martin, M. A., Alcaraz Sendra, O., Bastos, A., Bauer, N., Bertram, C., Blenckner, T., Bowen, K., Brando, P. M., Brodie Rudolph, T., Büchs, M., Bustamante, M., Chen, D., Cleugh, H., Dasgupta, P., Denton, F., Donges, J. F., Donkor, F.K., Duan, H., Duarte, C. M., Ebi, K. L., Edwards, C.M., Engel, A., Fisher, E., Fuss, S., Gaertner, J., Gettelman, A., Girardin, C. A. J., Golledge, N. R., Green, J. F., Grose, M. R., Hashizume, M., Hebden, S., Hepach, H., Hirota, M., Hsu, H. H., Kojima, S., Lele, S., Lorek, S., Lotze, H. K., Matthews, H. D., McCauley, D., Mebratu, D., **Mengis, N.**, Nolan, R. H., Pihl, E., Rahmstorf, S., Redman, A., Reid, C. E., Rockström, J., Rogelj, J., Saunois, M., Sayer, L., Schlosser, P., Sioen, G. B., Spangenberg, J. H., Stammer, D., Sterner, T. N. S., Stevens, N., Thonicke, K., Tian, H., Winkelmann, R., and J. Woodcock. Ten new insights in climate science 2021: a horizon scan, *Global Sustainability*, doi.org/10.1017/sus.2021.25

2020 **N. Mengis**, and H. D. Matthews. Non-CO_2 forcing changes will likely decrease the remaining carbon budget for 1.5°C, *npj Climate and Atmospheric Science*, doi.org/10.1038/s41612-020-0123-3

- **N. Mengis**, Keller, D. P., MacDougall, A., Eby, M., Wright, N., Meissner, K. J., Oschlies, A., Schmittner, A., Matthews, H. D., and K. Zickfeld. Evaluation of the University of Victoria Earth System Climate Model version 2.10 (UVic ESCM 2.10), *Geosci. Model Dev.*, doi.org/10.5194/gmd-13-4183-2020
- Kreuter J., N. Matzner, D. P. Keller, T. Markus, C. Baatz, F. Wittstock, U. Bernitt. **N. Mengis**. Unveiling assumptions through interdisciplinary scrutiny: Observations from the German Priority Program on Climate Engineering (SPP 1689), *Climatic Change*, doi.org/10.1007/s10584-020-02777-4

- MacDougall, A. H., T. L. Frölicher, C. D. Jones, J. Rogelj, H. D. Matthews, K. Zickfeld, V. K. Arora, N. J. Barrett, V. Brovkin, F. A. Burger, M. Eby, A. V. Eliseev, T. Hajima, P. B. Holden, A. Jeltsch-Thommes, C. Koven, **N. Mengis**, L. Menviel, M. Michou, I. I. Mokhov, A. Oka, J. Schwinger, R. Seferian, G. Shaffer, A. Sokolov, K. Tachiiri, J. Tjiputra, A. Wiltshire, and T. Ziehn. Is there warming in the pipeline? A multi-model analysis of the zero emission commitment from CO_2, *Biogeosiences*, doi.org/10.5194/bg-2019-492
- Matthews H. D., K. B. Tokarska, Z. R. J. Nicholls, J. Rogelj, J. G. Canadell, P. Friedlingstein, T. L. Frolicher, P. M. Forster, N. P. Gillett, T. Ilyina, R. B. Jackson, C. D. Jones, C. Koven, R. Knutti, A. H. MacDougall, M. Meinshausen, **N. Mengis**, R. Seferian, and K. Zickfeld. Opportunities and challenges in using remaining carbon budgets to guide climate policy, *Nature Geoscience*, doi.org/10.1038/s41561-020-00663-3
- Thoni, T., Beck, S., Borchers, M., Förster, J., Görl, K., Hahn, A., **Mengis, N.**, Stevenson, A. and D. Thrän. Deployment of Negative Emissions Technologies at the national level: A need for holistic feasibility assessments, *Frontiers in Climate*, doi.org/10.3389/fclim.2020.590305

2019 **Mengis, N.**, W. Rickels, D. P. Keller, M. Quaas, and A. Oschlies. Climate engineering-induced changes in correlations between Earth system variables – implications for appropriate indicator selection, *Climatic Change*, doi.org/10.1007/s10584-019-02389-7

- Chavaillaz, Y., P. Roy, A.-I. Partanen, L. Da Silva, E. Bresson, **N. Mengis**, D. Chaumont, and H. D. Matthews. Exposure to excessive heat and impacts on labour productivity linked to cumulative CO_2 emissions, *Scientific reports*, doi.org/10.1038/s41598-019-50047-w
- Jones, C. D., T. L. Frölicher, C. Koven, A. H. MacDougall, H. D. Matthews, K. Zickfeld, J. Rogelj, K. B. Tokarska, N. Gillett, T. Ilyina, M. Meinshausen, **N. Mengis**, R. Seferian. The Zero Emission Commitment Model Intercomparison Project (ZECMIP) contribution to CMIP6: Quantifying committed climate changes following zero carbon emissions, *Geosci. Model Dev.*, doi.org/10.5194/gmd-12-4375-2019

2018 (a) **Mengis, N.**, D. P. Keller, and A. Oschlies. Systematic Correlation Matrix Evaluation (SCoMaE) – a bottom-up, science-led approach to identifying indicators, *Earth System Dynamics*, doi.org/10.5194/esd-9-15-2018

(b) **Mengis, N.**, A.-I. Partanen, J. Jalbert, and H. D. Matthews. 1.5°C carbon budget dependent on carbon cycle uncertainty and future non-CO_2 forcing, *Scientific Reports*, doi.org/10.1038/s41598-018-24241-1

2017 Oschlies, A., H. Held, D. P. Keller, K. Keller, **N. Mengis**, M. Quaas, W. Rickels, and H. Schmidt. Indicators and metrics for the assessment of Climate Engineering, *Earth's Future*, doi.org/10.1002/2016EF000449

2016 **Mengis, N.**, T. Martin, D. P. Keller, and A. Oschlies. Assessing climate impacts and risks of ocean albedo modification in the Arctic, *Journal of Geophysical Research - Oceans*, doi.org/10.1002/2015JC011433

2015 **Mengis, N.**, D. P. Keller, M. Eby, and A. Oschlies. Uncertainty in the response of transpiration to CO_2 and implications for climate change, *Environmental Research Letters*, doi.org/10.1088/1748-9326/10/9/094001

in review Sanderson, B. M., B. B. Booth, J. Dunne, V. Eyring, R. A. Fisher, P. Friedlingstein, M. J. Gidden, T. Hajima, C. D. Jones, C. Jones, A. King, C. D. Koven, D. M. Lawrence, J. Lowe, **N. Mengis**, G. P. Peters, J. Rogelj, C. Smith, A. C. Snyder, I. R. Simpson, A. L. S. Swann, C. Tebaldi, T. Ilyina, C.-F. Schleussner, R. Seferian, B. Samset, D. van Vuuren, and S. Zaehle. The need for carbon emissions-driven climate projections in CMIP7, *EGUsphere [preprint]*, doi.org/10.5194/egusphere-2023-2127

- Silvy et al., AERA-MIP: Emission pathways, remaining budgets and carbon cycle dynamics compatible with 1.5 ºC and 2 ºC global warming stabilization, *EGUsphere [preprint]*, doi.org/10.5194/egusphere-2024-488
- Tank et al., Distinguish between Feasibility and Desirability when Assessing Climate Response Options, *npj Climate Action*
- Monteiro et al., FROT: A Framework to comprehensively describe forcing contribution onto temperature responses, *Environmental Research Letters*, ERL-117867
- Yao, Morganti, et al., Exploring site-specific carbon dioxide removal options with storage or sequestration in the marine environment - The 10 Mt CO2 / yr removal challenge, *Earth's Future [preprint]*, doi.org/10.22541/essoar.171650351.11778445/v1

Non Peer-Reviewed Publications

2022 Klima retten mit Kohlendioxid-Entnahme?, *promet* Heft 105, 51-58, doi.org/10.5676/DWD_pub/promet_105_09

- IDEENLAUF - Gesellschaftliche Impulse für Wissenschaft und Forschungspolitik, *Wissenschaft im Dialog & BMBF*
- Final Report 2022, *Helmholtz Climate Initiative*

2018 Conference Report: Climate Engineering Conference 2017, *IASS, Potsdam*. Parallel Session 3.4: CE assessment metrics – Comparative, Integrative, Comprehensive

Academic Services

Comittees

2022–dato Member of WCRP Task Team on CMIP7 Strategic Ensemble Design

2021–dato Member of GESAMP Working group 41: Ocean Interventions for Climate Change Mitigation

2021–dato Permanent Guest in *Extended Directorate and Steering Committee of GEOMAR* as representative of Young Investigator Group Leaders

2021–dato External Advisor ASMASYS Project within CDRmare consortium

2022–2023 Member for WCRP Task Team on Climate Interventions

2019–2021 Steering committee member for Climate Engineering in Context 2021 conference

Editorial activities

2021–2022 Editorial Board Member for npj Communications Earth & Environment

Reviews provided

Nature Geoscience, Nature Climate Change, Geophysical Research Letters, Environmental Research Letters, Earth's Future, Journal of Geophysical Research: Atmosphere, Cambridge University Press - book proposal, Flanders Innovation & Entrepreneurship on behalf of the Hermes Fund - Project Proposal

Outreach and transfer activities (selected)

2023 **45 Minuten Zukunft**, Folge 12: Treibhausgase endlagern? Holz, Humus oder Hightech zur langfristigen Kohlenstoff-Speicherung, Thünen Institute's podcast on the transformation of land and sea use

2022-2023 Factsheets, Science Stories, Policy Briefings and Infographics in collaboration with *CDRmare*: Chancen und Hurden der marinen geologischen CO2-Speicherung; Das 10 Millionen-Tonnen CO2-Ziel: Im Team schaffen, was allein nicht zu leisten ist; Möglichkeiten ozeanbasierter Methoden der Kohlendioxid-Entnahme zur Erreichung des 1,5^{o} Ziels; Vergleich der Emissionen Deutschlands 2019 mit einem Netto-Null-CO2-Emissionsziel 2050

2022 **Orchester des Wandels** - Naturfantasie in Bildern, *Music and Congress Hall Lübeck*, text content creation in close collaboration with performing artist

- **Ideenlauf**, Member of scientific jury, in the context of Science Year 2022 *organised by BMBF*
- **Back from the Future**, Interview with helmholtz-klima.de

2021 **How much more CO_2 can we emit? - A stroll down uncertainty-lane**, TEDxESMTBerlin

- 10 New Insights in Climate Science 2021, *Future Earth, The Earth League, WCRP*. Policy report
- **Energy and Climate**, Panel discussion at 70th Lindau Nobel Laureate Meeting
- **Klimagipfel in Glasgow: Ist das unsere letzte Chance?** – mit Klimaforscherin Dr. Nadine Mengis, funk Podcast

2019-2021 Project and policy briefings in the context of *Helmholtz Climate Initiative*: Defining the German carbon budget; Avoided and removed emissions; Defining the scenario approach; Spatial Heterogeneity – Challenges and Opportunities for Net-Zero Germany

2017 **Let Cities Lead: Catalyzing Local Climate Action**, press conference organized by Climate Reality Canada

2016 **Fernreisen mit gutem Gewissen? Wie wir das Klima beeinflussen können**, KlimaTaucher by the German Research Foundation (DFG)

2013–2016 **Active Participation in SPP Outreach and School program**, *under the Coordination of Ulrike Bernitt and Martin Behrens*.

Climate Engineering Game (development and execution), Role Play discussion (development and execution), Information Brochures, Talks