

*Equipped with his five senses, man explores the universe around him
and calls the adventure Science.*

Edwin Powell Hubble

Contact

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Appointments

- Since 2016 **Research Scientist**, GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany
Research Unit Biogeochemical Modelling; Advisor: Andreas Oschlies
Parental leave: 07/2017 – 10/2017
- 2014 – 2015 **Postdoctoral Research Fellow**, Princeton University, US
Program in Atmospheric and Oceanic Sciences; Advisors: Jorge Sarmiento & Stephen Griffies
- 2013 **Postdoctoral Researcher**, ETH Zürich, Switzerland
Environmental Physics Group; Advisor: Nicolas Gruber
Parental leave: 09/2013 – 01/2014

Education

- 2009 – 2013 **Ph.D.**, Department of Environmental Systems Science, ETH Zürich, Zurich, Switzerland,
Thesis: *On Southern Ocean eddies and their impacts on biology and the atmosphere*
Advisors: Nicolas Gruber, Reto Knutti, Matthias Münnich
- 2005 – 2008 **M.Sc.**, Max Planck Institute for Meteorology & University of Hamburg, Hamburg, Germany
Thesis: *Investigation of the impact of land surface changes in West Africa on regional climate*
Advisors: Daniela Jacob, Martin Claußen
Research assistant: Research Unit Regional Climate Modelling, Max Planck Institute for Meteorology
Visiting student (2005 – 2006), Department of Oceanography, Dalhousie University, Halifax, Canada
Research Assistant: Research Unit Physical Oceanography
- 2002 – 2005 **B.Sc.**, Meteorological Institute, University of Hamburg, Hamburg, Germany,
Thesis: *Evaluation and processing of in-situ measurements of the project VALIUM* (Development and Validation of Tools for the Implementation Of European Air Quality Policy in Germany)
Advisors: Bernd Leitl, Michael Schatzmann
Research Assistant: Research Unit Technical Meteorology

Grants and Funding

- 2019 – 2022 BMBF (German Federal Ministry of Education and Research) Collaborative Project *Social-Ecological Tipping Points of the Northern Humboldt Current Upwelling System, Economic Repercussions and Governance Strategies* (work package PI)
- 2018 – 2022 BMBF Collaborative Project *Coastal Upwelling System in a Changing Ocean* (work package PI)
- 2014 – 2015 Swiss National Science Foundation (SNSF) Early Postdoc.Mobility Fellowship

Awards

- 2018 Ocean Deoxygenation International Conference Kiel, Outstanding Audience Poster Award
- 2013 EGU Outstanding Student Poster Award
- 2011 Swiss Global Change Day Poster Award
- 2005 – 2006 German Academic Exchange Service (DAAD) Scholarship
- 2005 Honors scholarship, University of Hamburg

Teaching

Lectures, tutorials & lab courses

- 2016 – 2018 *Fundamentals and Current Topics in Biogeochemical Modelling*, GEOMAR (co-lecturer)
- 2011 *Physical Oceanography*, ETH Zürich (tutorial)
- 2010 *The Synthesis Days*, ETH Zürich (tutorial)
- 2009/2010 *Physics Lab*, ETH Zürich (lab course)
- 2005 *Lab in Meteorological Measurement Devices*, University of Hamburg (lab course)

Mentoring

- 2018 Master thesis (Simon Meves) co-advisor, GEOMAR
- 2016/2017 Bachelor & highschool student internships, GEOMAR
- 2014/2015 *Princeton Environmental Institute Internship Program*, Princeton University
- 2014 *Junior Projects*, Princeton University
- 2010 – 2012 *Term paper 1: Writing*, ETH Zürich

Community Service

- Reviewer Global Biogeochemical Cycles, Journal of Geophysical Research, Ocean Science, Earth System Science Data, Geophysical Research Letters, Nature Scientific Reports, Journal of Physical Oceanography, ICES Journal of Marine Science, Journal of Advances in Modeling Earth Systems, US National Science Foundation (NSF)
- Session chair Ocean Sciences Meeting (2018), EGU General Assembly (2017/2018)

Outreach

- Assistance Massive Open Online Course ↗ MOOC Ocean (2018)
- PPPL Young Women's Conference in Science, Technology, Engineering & Mathematics (Princeton, US, 2014/2015)
- Ocean Fun Days (Island Beach/Sandy Hook State Park, US, 2014/2015)
- ETHZ/University of Zurich Scientifica (Zurich, Switzerland, 2013)
- ETHZ/University of Zurich Researchers' Night (Zurich, Switzerland, 2009)
- Design Bat Project (Future Capital Project funded by the European Commission, 2003)

Publications

Peer-Reviewed

- 2018 ▶ Yamamoto, A., Palter, J., Dufour, C., Griffies, S., Bianchi, D., Claret, M., Dunne, J., **Frenger, I.**, and E. Galbraith (2018). Roles of the ocean mesoscale in the lateral supply of mass, heat, carbon and nutrients to the Northern Hemisphere subtropical gyres, *Journal of Geophysical Research - Oceans*, 123:7016–7036, <https://doi.org/10.1029/2018JC013969>.
- ▶ Tarshish, N., Abernathey, R., Zhang, C., Dufour, C., **Frenger, I.**, and S. Griffies (2018). Identifying Lagrangian coherent vortices in a mesoscale ocean model, *Ocean Modelling*, 130:15-28, <https://doi.org/10.1016/j.ocemod.2018.07.001>.
- ▶ **Frenger, I.**, Gruber, N., and M. Münnich (2018b). Imprint of Southern Ocean mesoscale eddies on chlorophyll, *Biogeosciences*, 15:4781-4798, <https://doi.org/10.5194/bg-15-4781-2018>.
- ▶ Song, H., Long, M. C., Gaube, P., **Frenger, I.**, Marshall, J., and D. J. McGillicuddy Jr., Seasonal variation in the correlation between anomalies of sea level and chlorophyll in the Antarctic Circumpolar Current, *Geophysical Research Letters*, 45:5011–5019, <https://doi.org/10.1029/2017GL076246>.
- ▶ **Frenger, I.**, Bianchi, D., Stührenberg, C., Oschlies, A., Dunne, J., Deutsch, C., Galbraith, E., and F. Schütte (2018a). Biogeochemical role of subsurface coherent eddies in the ocean: Tracer cannonballs, hypoxic storms, and microbial stewpots? *Global Biogeochemical Cycles*, 32:226-249, <https://doi.org/10.1002/2017GB005743>.
- 2017 ▶ Dufour, C., Morrison, A., Griffies, S., **Frenger, I.**, Zanowski, H. and M. Winton (2017). Preconditioning of the Weddell Sea polynya by the ocean mesoscale and dense water overflows, *Journal of Climate*, 30:7719-7737, <https://doi.org/10.1175/JCLI-D-16-0586.1>.
- 2016 ▶ Haumann, A., Gruber, N., Münnich, M., **Frenger, I.**, and S. Kern (2016). Salinity changes in the Southern Ocean through sea-ice transport, *Nature*, 537(7618):89-92, <https://doi.org/10.1038/nature19101>.
- ▶ Byrne, D., Münnich, M., **Frenger, I.**, and N. Gruber (2016). Mesoscale atmosphere-ocean coupling enhances wind energy transfer, *Nature Communications*, 7:ncomms11867, <https://doi.org/10.1038/ncomms11867>.
- 2015 ▶ **Frenger, I.**, Münnich, M., Gruber, N., and R. Knutti (2015). Phenomenology of Southern Ocean eddies, *Journal of Geophysical Research – Oceans*, 120:7413-7449, <https://doi.org/10.1002/2015JC011047>.
- ▶ Dufour, C., Griffies, S., de Souza, G., **Frenger, I.**, Morrison, A., Palter, J., Sarmiento, J., Galbraith, E., Dunne, J., Anderson, W., and R. Slater (2015). Role of mesoscale eddies in cross-frontal transport of heat and biogeochemical tracers in the Southern Ocean, *Journal of Physical Oceanography*, 45:3057–3081, <https://doi.org/10.1175/JPO-D-14-0240.1>.
- ▶ Faghmous, J., **Frenger, I.**, Warmka, R., Lindel, A., Yao, Y., and V. Kumar (2015). A daily global mesoscale ocean eddy dataset from satellite altimetry, *Scientific Data*, 2:150028, <https://doi.org/10.1038/sdata.2015.28>.
- ▶ Byrne, D., Papritz, L., **Frenger, I.**, Münnich, M., and N. Gruber (2015). Atmospheric response to mesoscale sea surface temperature anomalies: Assessment of mechanisms and coupling strength in a high resolution coupled model over the South Atlantic, *Journal of the Atmospheric Sciences*, 72:1872–1890, <https://doi.org/10.1175/JAS-D-14-0195.1>.
- 2013 ▶ **Frenger, I.**, Gruber, N., Knutti, R., and M. Münnich (2013). Imprint of Southern Ocean eddies on winds, clouds and rainfall, *Nature Geoscience*, 6:698-612, <https://doi.org/10.1038/ngeo1863>.

Others

- 2015 ▶ Dufour, C., **Frenger, I.**, Frölicher, T., Gray, A., Griffies, S., Morrison, A., Sarmiento, J., and S. Schlunegger (2015). Anthropogenic carbon and heat uptake by the ocean: Will the Southern Ocean remain a major sink? *Variations, joint US CLIVAR & OCB newsletter*, fall edition.

- 2005 ▶ **Frenger, I.** (2005). The Database ValiData, Proc. COST-ESF Workshop Quality Assurance of Mirco-Scale Meteorological Models, Hamburg, Germany, 150p.

Selected media coverage

- ▶ Nature Geoscience News & Views, D. Chelton: ↗ [Ocean–atmosphere coupling: Mesoscale eddy effects](#)
- ▶ Nature News & Views, T. Maksym: ↗ [Southern Ocean freshened by sea ice](#)
- ▶ Spiegel Online (German only): ↗ [Die grosse Wirkung kleiner Wirbel](#)

Presentations

Conferences

- 2018 ▶ Ocean Deoxygenation Conference, Kiel, Germany (poster).
▶ Ocean Sciences Meeting, Portland (OR), US (talk).
- 2017 ▶ Workshop at NCAR: The Southern Ocean, its Dynamics, Biogeochemistry and Role in the Climate System, Boulder, US (talk & poster).
▶ EGU General Assembly 2017, Vienna, Austria (talk & poster).
- 2016 ▶ Royal Society Discussion Meeting: Ocean Ventilation and Deoxygenation in a Warming World, London, UK (poster).
▶ 2016 Liege Colloquium: Submesoscale Processes: Mechanisms, Implications and new Frontiers, Liège, Belgium (talk).
▶ Ocean Sciences Meeting, New Orleans, US (poster).
- 2015 ▶ Workshop at Linde Center for Global Environmental Science/Caltech: Southern Ocean Dynamics and Biogeochemistry, Pasadena, US (poster).
- 2014 ▶ US CLIVAR and OCB Workshop: Ocean's Carbon and Heat Uptake - Uncertainties and Metrics, San Francisco, US (poster).
▶ AGU Fall Meeting, San Francisco, US (poster).
- 2013 ▶ IAPSO/IAHS/IASPEI, Joint Assembly 2013, Gothenburg, Sweden (talk).
▶ C2SM Symposium The Water Cycle in a Changing Climate, Zurich, Switzerland (talk).
▶ EGU General Assembly 2013, Vienna, Austria (poster award).
- 2012 ▶ Ocean Sciences Meeting, Salt Lake City, US (talk).
- 2011 ▶ Swiss Global Change Day, 2011 Bern, Switzerland (poster award).
▶ EGU General Assembly 2011, Vienna, Austria (poster).
- 2010 ▶ International Polar Year, Oslo Science Conference, Oslo, Norway (poster).
- 2015 ▶ COST-ESF Workshop Quality Assurance of Mirco-Scale Meteorological Models, Hamburg, Germany (talk).

Seminars

- 2014 ▶ Center for Atmosphere Ocean Science Colloquium, Courant Institute of Mathematical Sciences/NYU, New York, US.
▶ Ocean Biogeochemistry Research Group, INSTAAR/UC, Boulder, US.
- 2012 ▶ FB2-Seminar, GEOMAR, Kiel, Germany (invited).
▶ ZMAW Seminar Series, MPI-M, Hamburg, Germany.
▶ C-Seminar, AWI, Bremerhaven, Germany (invited).