

# Damien Couespel

*Physical-biogeochemical oceanographer*

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## Current & previous positions

- Since 2023 **Researcher, NORCE Norwegian Research Centre AS, Bergen, Norway**, Climate & Environment department, affiliated Bjerknes Centre for Climate Research
- 2021-2023 **Post-Doc, NORCE Norwegian Research Centre AS, Bergen, Norway**, Climate & Environment department, affiliated Bjerknes Centre for Climate Research  
COLUMBIA project which aims to constrain the large uncertainties in Earth System Model projections with a big data approach
- 2018-2021 **Post-Doc, National Centre for Scientific Research (CNRS), Paris, France**, Laboratoire d'Océanographie et du Climat : Expérimentations et Approches Numériques (LOCEAN-IPSL)

## Education

- 2014 – 2018 **PhD, Sorbonne Université, Paris, France**, Environmental Sciences, supervised by M. Lévy & P. Klein  
Dissertation title: Ocean deoxygenation in the 21st century: influence of sub-mesoscale and mesoscale processes.  
<https://tel.archives-ouvertes.fr/tel-02555275>
- 2013 – 2014 **MS, Sorbonne Université, Paris, France**, Sciences of the Universe, Environment, Ecology: Ocean, Atmosphere, Climate and Space Observations
- 2010 – 2014 **Engineering degree, ENSTA ParisTech, Paris, France**
- 2012 – 2013 **ERASMUS exchange, Technical University of Denmark, Copenhagen, Denmark**

## Relevant professional experiences

- HPC Realization of high-resolution simulations on french national HPCs, computational allocation of 3.2 M-cpu-hours from GENCI
- Scientific code Coupled physical-biogeochemical ocean model NEMO, Development and realization of climate change simulations
- Programming Python, Machine learning analysis, CMIP6 model outputs analysis, Fortran,  $\text{\LaTeX}$ , Shell scripting
- Scientific activities Reviewer (Geophysical Research Letters, Global Biogeochemical Cycles, Biogeosciences, Journal of Geophysical Research), Convener (EGU 2023), Organizing committee of the Bjerknes Early Career Scientist Forum (2022-2023)
- Languages English (fluent and scientific), French (native)

## Publications

- 2025 Tjiputra, J. F., **Couespel, D.**, Sanders, R. *Marine ecosystem role in setting up preindustrial and future climate*. Nature Communications. <https://doi.org/10.1038/s41467-025-57371-y>
- 2024 Ruan X., **Couespel D.**, Lévy M., Li J., Mak J., Wang Y. *Combined physical and biogeochemical assessment of mesoscale eddy parameterisations in ocean models: Eddy-induced advection at eddy-permitting resolutions*. Ocean Modelling. <https://doi.org/10.1016/j.ocemod.2024.102396>
- 2024 **Couespel D.**, Tjiputra J., Johannsen K., Vaittinada Ayar P., Jensen B. *Machine learning reveals regime shifts in future ocean carbon dioxide fluxes inter-annual variability*. Nature Communications Earth & Environment. <https://doi.org/10.1038/s43247-024-01257-2>
- 2024 **Couespel D.**, Lévy, M., Bopp, L. *Stronger Oceanic CO<sub>2</sub> Sink in Eddy-Resolving Simulations of Global Warming*. Geophysical Research Letters. <https://doi.org/10.1029/2023GL106172>
- 2024 **Couespel D.**, Tjiputra J. *What goes in must come out: the oceanic outgassing of anthropogenic carbon*. Environmental Research Letters. <https://doi.org/10.1088/1748-9326/ad16e0>

- 2024 Lévy M., **Couespel D.**, Haeck C., Keerthi M.G., Mangolte I., Prend C.J. *The Impact of Fine-Scale Currents on Biogeochemical Cycles in a Changing Ocean*. Annual Review of Marine Science. <https://doi.org/10.1146/annurev-marine-020723-020531>
- 2023 Ruan X., **Couespel D.**, Lévy M., Mak J., Li J., Wang Y., *Combined physical and biogeochemical assessment of mesoscale eddy parameterisations in ocean models: Eddy induced advection at non-eddy resolving resolutions* Ocean Modelling. <https://doi.org/10.1016/j.ocemod.2023.102204>
- 2022 Lévy M., Resplandy L., Palter J.B., **Couespel D.**, Lachkar Z. *Chapter 13 - The crucial contribution of mixing to present and future ocean oxygen distribution*. Alberto C. Naveira Garabato and Michael P. Meredith. Ocean Mixing, Elsevier. <https://doi.org/10.1016/B978-0-12-821512-8.00020-7>
- 2021 **Couespel D.**, Lévy M., Bopp L. *Oceanic primary production decline halved in eddy-resolving simulations of global warming*. Biogeosciences. <https://doi.org/10.5194/bg-18-4321-2021>
- 2019 **Couespel D.**, Lévy M., Bopp L. *Major Contribution of Reduced Upper Ocean Oxygen Mixing to Global Ocean Deoxygenation in an Earth System Model*. Geophysical Research Letters, 2019GL084162. <https://doi.org/10.1029/2019GL084162>
- 2019 Kwiatkowski L., Naar J., Bopp L., Aumont O., DeFrance D., **Couespel D.** *Decline in Atlantic Primary Production Accelerated by Greenland Ice Sheet Melt*. Geophysical Research Letters, 46(20), 11347?11357. <https://doi.org/10.1029/2019GL085267>
- 2016 Kiørboe T., Gonçalves R.J., **Couespel D.**, van Someren Gréve H., Saiz E., Tiselius P. *Reply to comment: Prey perception in feeding-current feeding copepods*. Limnology and Oceanography, 61(4), 1169?1171. <https://doi.org/10.1002/lno.10293>
- 2015 Gonçalves R.J., van Someren Gréve H., **Couespel D.**, Kiørboe T. *Mechanisms of prey size selection in a suspension-feeding copepod, Temora longicornis*. Marine Ecology Progress Series, 517, 61?74. <https://doi.org/10.3354/meps11039>

## Communications

- 2025 Couespel, D., Berzaghi, F., Tjiputra, J. F., Sanders, R., Rusiecka, D. *Guest post: How marine life provides climate benefits worth billions of dollars*. Blog post. **Carbon Brief**, <https://www.carbonbrief.org/guest-post-how-marine-life-provides-climate-benefits-worth-billions-of-dollars/>
- 2025 Couespel D., Tjiputra J., *Stronger Ocean CO<sub>2</sub> Sink in Higher Resolution Simulation From NorESM2*. Poster. **Bjerknes Annual Meeting**, Bergen, Norway.
- 2025 Couespel D., Tjiputra J., Lauvset S.K., Goris N., Jeansson E., Davila X. *Earth system models overestimate the sensitivity of AOU to age change in the deep ocean*. Poster. **OceanICU Annual Science Meeting**, Sopot, Poland.
- 2024 Couespel D., Tjiputra J., Lauvset S.K., Goris N. *Projections and drivers of future changes in biological pump as inferred from apparent oxygen utilisations*. Poster. **EGU General Assembly 2024**, Vienna Austria.
- 2023 Couespel D., Tjiputra J. *The future of the ocean carbon sink: a release of anthropogenic carbon to the atmosphere?* Poster. **ICOS Nordic 2023**, Bergen, Norway.
- 2023 Couespel D., Tjiputra J. *Re-emergence of anthropogenic carbon from the ocean*. Oral presentation. **World Climate Research Program Open Science Conference**, Kigali, Rwanda.
- 2023 Couespel D., Tjiputra J., Johannsen K., Vaittinada Ayar P., Jensen B. *Machine learning-based drivers of present and future inter-annual variability in air-sea CO<sub>2</sub> fluxes*. Poster. **EGU General Assembly 2023**, Vienna, Austria.
- 2023 Couespel D., Tjiputra J., Johannsen K., Vaittinada Ayar P., Jensen B. *Regime shifts in future ocean CO<sub>2</sub> fluxes revealed through machine learning*. Oral presentations. **54th International Liège Colloquium on Ocean Dynamics** Liège, Belgium.
- 2022 Couespel D., Tjiputra J. *Re-emergence of anthropogenic carbon from the ocean in NorESM2*. Oral presentation. **Bjerknes Annual Meeting**, Bergen, Norway.
- 2022 Couespel D., Tjiputra J., Johannsen K., Vaittinada Ayar P., Jensen B. *Identifying the underlying mechanisms of present and future inter-annual variability of oceanic carbon uptake using a machine learning approach with CMIP6 simulations*. Oral presentations. **Ocean Sciences Meeting 2022**, online, & **EGU General Assembly 2022**, Vienne, Austria, & **Constraining Model Uncertainty Workshop**, Bergen, Norway.

- 2020 Couespel D., Lévy M., Bopp L. *Increased resolution lessen climate change induced primary production decline in an idealized simulation of the North Atlantic/Pacific*. Oral presentation. **Ocean Sciences Meeting 2020**, San Diego, CA, USA.
- 2019 Couespel D., Lévy M., Bopp L. *Future changes in oxygen ventilation pathways related to the 21st century deoxygenation*. Poster. **EGU General Assembly 2019**, Vienne, Austria.
- 2017 Couespel D., Lévy M., Klein P., Talandier C., Bopp L. *Contribution Of Meso And Sub-Mesoscale To O2 Subduction In The North Atlantic*. Poster. **EGU General Assembly 2017**, Vienne, Austria.
- 2016 Couespel D., Lévy M., Klein P., Talandier C. *Response of the North Atlantic Ocean carbon sink to climate change : role of sub-mesoscale processes*. Oral presentation. **2016 International Liege Colloquium: Submesoscale Processes: Mechanisms, Implications and new Frontiers**, Liège, Belgium.