

Description of the netcdf file ocean_ch4.nc

This netcdf file accompanies the manuscript “Global ocean methane emissions constrained by machine learning models”, by T. Weber, N. Wiseman and A. Kock. It contains distributions of CH₄ disequilibrium and air-sea fluxes averaged across a large ensemble of model predictions.

Grid variables (0.25°x0.25° grid)

LON: Longitude of grid cell centers in degrees East of Prime meridian

LAT: Latitude of grid cell centers in degrees North of Equator

AREA: Area of grid cells in m²

Tracer variables

dch4_monthly: Monthly climatology of surface ocean methane disequilibrium (ΔCH_4) in nM, averaged across ensemble of 200,000 machine learning model predictions.

dch4_annual: Annual-mean surface ocean methane disequilibrium (ΔCH_4) in nM, averaged across ensemble of 200,000 machine learning model predictions.

Flux variables

Fch4_diffusive: Annual-mean diffusive CH₄ flux from the ocean to atmosphere in mmol/m²/yr, averaged across ensemble of 200,000 machine learning model predictions.

Fch4_ebullitive: Idealized estimate of ebullitive flux from the ocean to atmosphere in mmol/m². We assume that 35TgCH₄/yr bubble across the seafloor in continental shelf environments¹ and estimate transfer to the atmosphere using output from a rising bubble model². Two end-member scenarios are averaged together here: One in which the seafloor flux is spread across regions shallower than 200m, and one where it is spread across regions shallower than 100m. See manuscript for further details.

References

- 1 Kvenvolden, K. A. & Rogers, B. W. Gaia's breath - Global methane exhalations. *Marine and Petroleum Geology* **22**, 579-590, doi:10.1016/j.marpetgeo.2004.08.004 (2005).
- 2 McGinnis, D. F., Greinert, J., Artemov, Y., Beaubien, S. E. & Wüest, A. Fate of rising methane bubbles in stratified waters: How much methane reaches the atmosphere? *Journal of Geophysical Research: Oceans* **111**, doi:10.1029/2005jc003183 (2006).