Title

Corrigendum: Turbulent diapycnal fluxes as a pilot Essential Ocean Variable

Authors

Le Boyer, Arnaud

Couto, Nicole

Alford, Matthew H

et al.

Publication Date

2024-05-03

DOI

10.3389/fmars.2024.1408850

Peer reviewed

TYPE Correction
PUBLISHED 03 May 2024
DOI 10.3389/fmars.2024.1408850

OPEN ACCESS

EDITED AND REVIEWED BY
Junhong Liang,
Louisiana State University, United States

*CORRESPONDENCE
Arnaud Le Boyer
aleboyer@ucsd.edu
Nicole Couto
ncouto@ucsd.edu

RECEIVED 28 March 2024
ACCEPTED 08 April 2024
PUBLISHED 03 May 2024

CITATION
Le Boyer A, Couto N, Alford MH, Drake HF, Bluteau CE, Hughes KG, Naveira Garabato AC, Moulin AJ, Peacock T, Fine EC, Mashayek A, Cimoli L, Meredith MP, Melet A, Fer I, Dengler M and Stevens CL (2024) Corrigendum: Turbulent diapycnal fluxes as a pilot Essential Ocean Variable. *Front. Mar. Sci.* 11:1408850. doi: 10.3389/fmars.2024.1408850

Corrigendum: Turbulent diapycnal fluxes as a pilot Essential Ocean Variable

Arnaud Le Boyer[1*], Nicole Couto[1*], Matthew H. Alford[1], Henri F. Drake[2], Cynthia E. Bluteau[3], Kenneth G. Hughes[4], Alberto C. Naveira Garabato[5], Aurélie J. Moulin[6], Thomas Peacock[7], Elizabeth C. Fine[1], Ali Mashayek[8], Laura Cimoli[9], Michael P. Meredith[10], Angelique Melet[11], Ilker Fer[12], Marcus Dengler[13] and Craig L. Stevens[14,15]

[1]Scripps Institution of Oceanography, University of California San Diego, La Jolla, CA, United States, [2]Department of Earth System Science, University of California, Irvine, Irvine, CA, United States, [3]Institute of Ocean Sciences, Fisheries and Oceans Canada, Sidney, BC, Canada, [4]College of Earth, Ocean, and Atmospheric Sciences, Oregon State University, Corvallis, OR, United States, [5]Ocean and Earth Science, University of Southampton, Southampton, United Kingdom, [6]Applied Physics Laboratory, University of Washington, Seattle, WA, United States, [7]Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, MA, United States, [8]Department of Earth Sciences, University of Cambridge, Cambridge, United Kingdom, [9]Department of Applied Mathematics and Theoretical Physics, University of Cambridge, Cambridge, United Kingdom, [10]British Antarctic Survey, Cambridge, United Kingdom, [11]Scientific Directorate, Mercator Ocean International, Toulouse, France, [12]Geophysical Institute, University of Bergen, Bergen, Norway, [13]Research Division 1, Physical Oceanography, GEOMAR Helmholtz Centre for Ocean Research Kiel, Kiel, Germany, [14]National Institute of Water and Atmospheric Research, Wellington, New Zealand, [15]Department of Physics, University of Auckland, Auckland, New Zealand

KEYWORDS

turbulent fluxes, ocean turbulence, turbulent diffusivity, turbulent dissipation, mixing efficiency, dissipation rate, GOOS, EOV

A Corrigendum on

Turbulent diapycnal fluxes as a pilot Essential Ocean Variable

by Le Boyer A, Couto N, Alford MH, Drake HF, Bluteau CE, Hughes KG, Naveira Garabato AC, Moulin AJ, Peacock T, Fine EC, Mashayek A, Cimoli L, Meredith MP, Melet A, Fer I, Dengler M and Stevens CL (2023). *Front. Mar. Sci.* 10:1241023. doi: 10.3389/fmars.2023.1241023

Error in Figure/Table

In the published article, there was an error in Table 1 as published. The equations for eddy diffusion coefficients K_T, K_S, and K_ρ in the "Mathematical Definition" column wrongly all began with K_ρ. The corrected Table 1 and its caption "b is buoyancy; q is enthalpy; S is the salinity concentration; and C is an arbitrary scalar tracer concentration. u',v',w' are microscale perturbations of ocean velocities. ρ is the water density. g is the gravitational constant. N is the buoyancy frequency. c_p is the water thermal capacity. θ is the potential

TABLE 1 Ocean Turbulent Mixing variable and its sub-variables.

	Name	Description	Mathematical Definition	Units
Essential Ocean Variable	J_b, J_q, J_S, J_C	Subsurface turbulent fluxes	$J_b = -\frac{g}{\rho_0}\overline{\{w'\rho'\}} \approx K_\rho N^2$	W kg^{-1}
			$J_q = -\rho c_p\overline{\{w'\theta'\}} \approx \rho c_p K_\theta \frac{d\bar{\theta}}{dz}$	W m^{-2}
			$J_S = -\overline{\{w'S'\}} \approx K_S \frac{d\bar{S}}{dz}$	psu m s-1
			$J_C = -\overline{\{w'C'\}} \approx K_C \frac{d\bar{C}}{dz}$	$[C]$ m s^{-1}
Sub-variables	ϵ	Rate of turbulent kinetic energy dissipation per unit mass	$\epsilon = 7.5\ \nu \int_{k_0}^{k_c} \phi_{u_z}^2(k)dk$	W kg^{-1}
	χ	Rate of temperature dissipation per unit mass	$\chi = 6\kappa_\theta \int_{k_0}^{k_c} \phi_{\theta_z}^2(k)dk$	K^2 s^{-1}
	Γ	Mixing coefficient	$\Gamma = \frac{\chi N^2}{2\epsilon\left(\frac{\partial\bar{\theta}}{\partial z}\right)^2}$	unitless
	K_T, K_S, K_ρ	Eddy diffusion coefficient across density surfaces (of temperature, salinity, density, oxygen, nutrients, etc.)	$K_T = \chi_\theta/2\theta_z^2$ $K_S = \chi_S/2S_z^2$ $K_\rho = \Gamma\epsilon/N^2$	m-2 s^{-1}
Supporting variables	$\frac{d\bar{t}}{dz}$, $\frac{d\bar{S}}{dz}$, $\frac{d\bar{C}}{dz}$	Background vertical gradient of temperature, salinity, and tracer C		K m^{-1}, psu m^{-1}, $[C]$ m^{-1}

b is buoyancy; q is enthalpy; S is the salinity concentration; and C is an arbitrary scalar tracer concentration. u′,v′,w′ are microscale perturbations of ocean velocities. ρ is the water density. g is the gravitational constant. N is the buoyancy frequency. c_p is the water thermal capacity. θ is the potential temperature. k_0,k_c represents the wavenumber range for spectral integration. ϕ_{u_z} and ϕ_{θ_z} are the spectra of vertical shear and temperature gradient.

temperature. k_0,k_c represents the wavenumber range for spectral integration. ϕ_{u_z} and ϕ_{θ_z} are the spectra of vertical shear and temperature gradient." appear below.

The authors apologize for this error and state that this does not change the scientific conclusions of the article in any way. The original article has been updated.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.