

ID: W2104893775

TITLE: Temperature effects on oxygen thresholds for hypoxia in marine benthic organisms

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ABSTRACT:

Global Change Biology Volume 17, Issue 5 p. 1788-1797 Temperature effects on oxygen thresholds for hypoxia in marine benthic organisms RAQUEL VAQUER-SUNYER, RAQUEL VAQUER-SUNYER Department of Global Change Research, IMEDEA (CSIC-UIB), C/Miquel Marqués 21, 07190 Esporles (Mallorca), Spain Search for more papers by this author CARLOS M. DUARTE, CARLOS M. DUARTE Department of Global Change Research, IMEDEA (CSIC-UIB), C/Miquel Marqués 21, 07190 Esporles (Mallorca), Spain Search for more papers by this author RAQUEL VAQUER-SUNYER, RAQUEL VAQUER-SUNYER Department of Global Change Research, IMEDEA (CSIC-UIB), C/Miquel Marqués 21, 07190 Esporles (Mallorca), Spain Search for more papers by this author CARLOS M. DUARTE, CARLOS M. DUARTE Department of Global Change Research, IMEDEA (CSIC-UIB), C/Miquel Marqués 21, 07190 Esporles (Mallorca), Spain Search for more papers by this author First published: 30 September 2010 <https://doi.org/10.1111/j.1365-2486.2010.02343.x> Citations: 160 Raquel Vaquer-Sunyer, tel. +34 971610897, fax +34 971611761, e-mail: raquel.vaquer@uib.es Read the full text About PDF Tools Request permission Export citation Add to favorites Track citation Share Share Give access Share full text access Share full-text access Please review our Terms and Conditions of Use and check box below to share full-text version of article. I have read and accept the Wiley Online Library Terms and Conditions of Use Shareable Link Use the link below to share a full-text version of this article with your friends and colleagues. Learn more. Copy URL Share a link Share on Facebook Twitter LinkedIn Reddit Wechat Abstract The effect of warming on the oxygen requirements and the survival of benthic organisms under hypoxia was tested using a meta-analysis of published results of experiments evaluating the effects of temperature on the median lethal time and median lethal concentration of benthic macrofauna under hypoxia. The meta-analysis confirmed that survival times under hypoxia were reduced by on average 74% and that median lethal concentration increased by on average 16% when marine benthic organisms were exposed to warmer temperatures. Warming reduced survival times of marine benthic macrofauna under hypoxia by a median of 3.95 ± 1.67 h °C⁻¹ and increased the oxygen thresholds for hypoxia-driven mortality by a median of $1.02 \pm 0.15\%$ saturation °C⁻¹ or 0.07 ± 0.01 mg O₂ L⁻¹ °C⁻¹. The corresponding Q10 values averaged 3.01 ± 0.29 for the median survival time and 2.09 ± 0.20 for the median lethal oxygen concentration. Use of these Q10 values predicts that the 4 °C warming expected during the 21st century will lead to survival times 35.6% lower under hypoxia and that the threshold oxygen concentrations for high mortality to occur will increase by, on average, 25.5% if bottom water temperature increased by 4 °C. Hence, ocean warming is expected to increase the vulnerability of benthic macrofauna to reduced oxygen concentrations and expand the area of coastal ecosystems affected by hypoxia. Citing Literature Supporting Information Table S1. Median lethal time of benthic organisms reported in experimental assessments. Table S2. Median lethal oxygen content of benthic organisms reported in experimental assessments. Appendix S1. References for Figure 1. Appendix S2. References for Figure 2. Please note: Wiley-Blackwell is not responsible for the content or functionality of any supporting materials supplied by the authors. Any queries (other than missing material) should be directed to the corresponding author for the article. Filename Description GCB_2343_sm_suppinfo.doc 1.2 MB Supporting info item Please note: The publisher is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing content) should be directed to the corresponding author for the article. Volume 17, Issue 5 May 2011 Pages 1788-1797 Related Information

SOURCE: Global change biology

PDF URL: None

CITED BY COUNT: 207

PUBLICATION YEAR: 2010

TYPE: article

CONCEPTS: ['Benthic zone', 'Hypoxia (environmental)', 'Q10', 'Oxygen', 'Biology', 'Ecosystem', 'Ecology', 'Animal science', 'Environmental science', 'Chemistry', 'Respiration', 'Botany', 'Organic chemistry']