NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION
US DEPARTMENT OF COMMERCE

A Bibliometric Analysis of Articles Supported by NOAA's Office of Ocean Exploration and Research

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ABOUT THIS REPORT

This report presents a summary-level bibliometric analysis of the known peer-reviewed journal articles produced as a result of ocean exploration missions supported by NOAA's Office of Ocean Exploration and Research (OER). This report was produced using data retrieved from the Web of Science, Science Citation Index Expanded database on 14 April, 2017. 95 articles known to have resulted from OER-supported explorations had to be omitted from this analysis, either because the articles are still in press or because Web of Science does not index the journals in which the articles were published. 15 of these omitted articles were produced with support from OER's underwater archaeology program.

The bibliometric indicators presented in this report are based on citations from the select group of peer-reviewed journal articles indexed by Web of Science and, as such, do not reflect citations to OER-supported expeditions from peer-reviewed journals not indexed by Web of Science (WoS) or from other sources such as book chapters, conference proceedings, or technical reports.

More information about the methodology used and a full listing of all of the articles evaluated in this report are available upon request to Sarah.Davis@noaa.gov.

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SUMMARY METRICS

Bibliometric Indicator	Value
Number of Publications (p)	730
Total Number of Citations Received (c)	15039
Average Number of Citations per Paper (c/p)	20.6
H- Index	57
Percentage of Publications in the Top 10% for Citation Counts	≈21.5%

Table 1: Common bibliometric indicators calculated for publications supported by OER. An H-Index of 57 indicates that this group of 730 publications includes 57 articles that have each received 57 or more citations. For more details on the H-Index, see Hirsch (2005). For more details about the Percentage of Publications in the Top 10% for Citation Counts, see page 13.

PUBLICATION ANALYSIS

The following figures analyze the number of publications produced as a result of OER-supported expeditions. For clarity, the figures showing the number of publications per subject, author, journal, institution, and funding agency only list the top 10 results in each category.

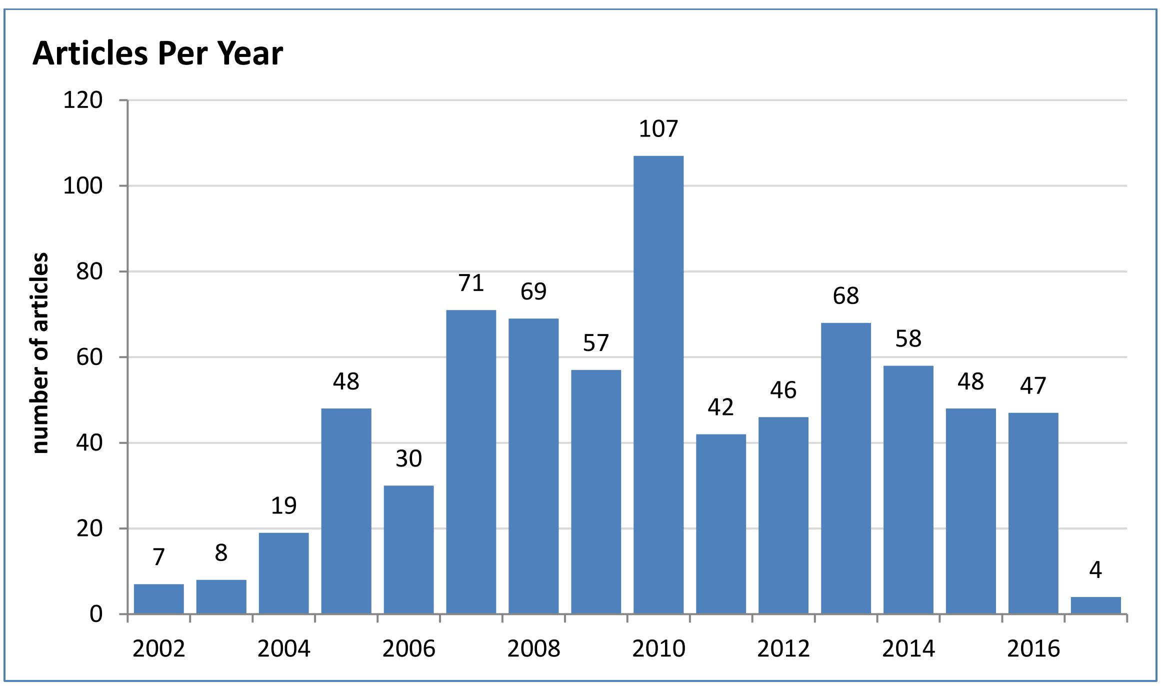

Figure 1: Non-cumulative number of OER-supported peer-reviewed articles produced per year.

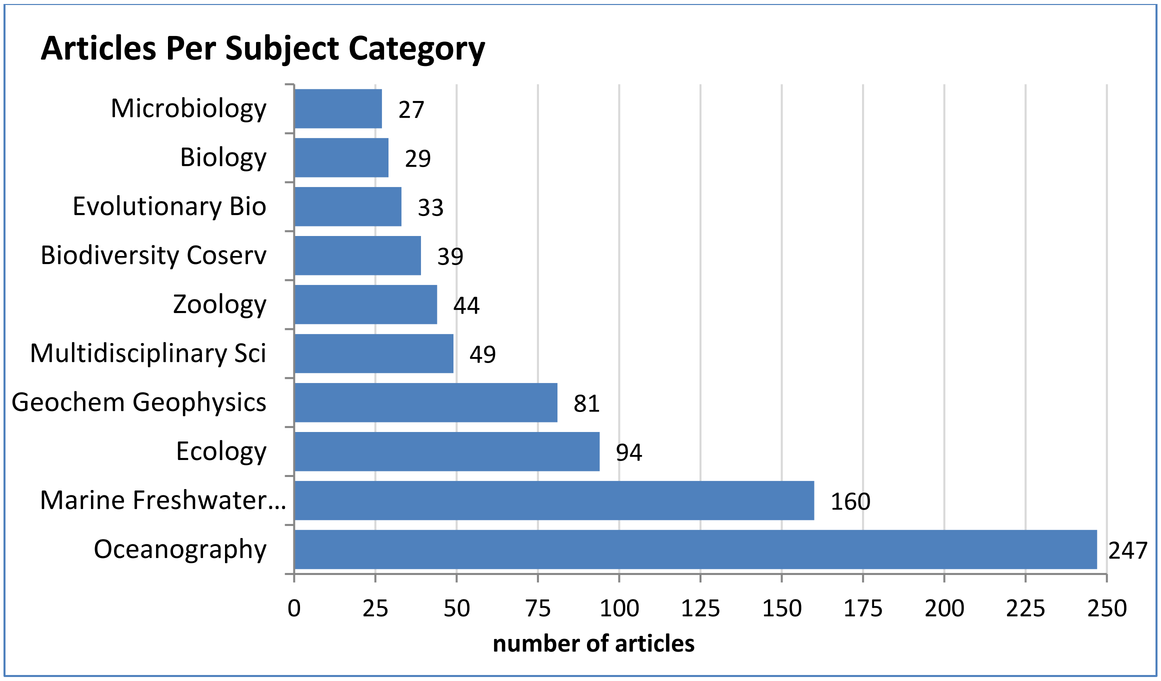

Figure 2: Number of OER-supported peer-reviewed articles assigned to subject categories by WoS based on the journal in which the article appeared. These subject categories are not mutually exclusive.

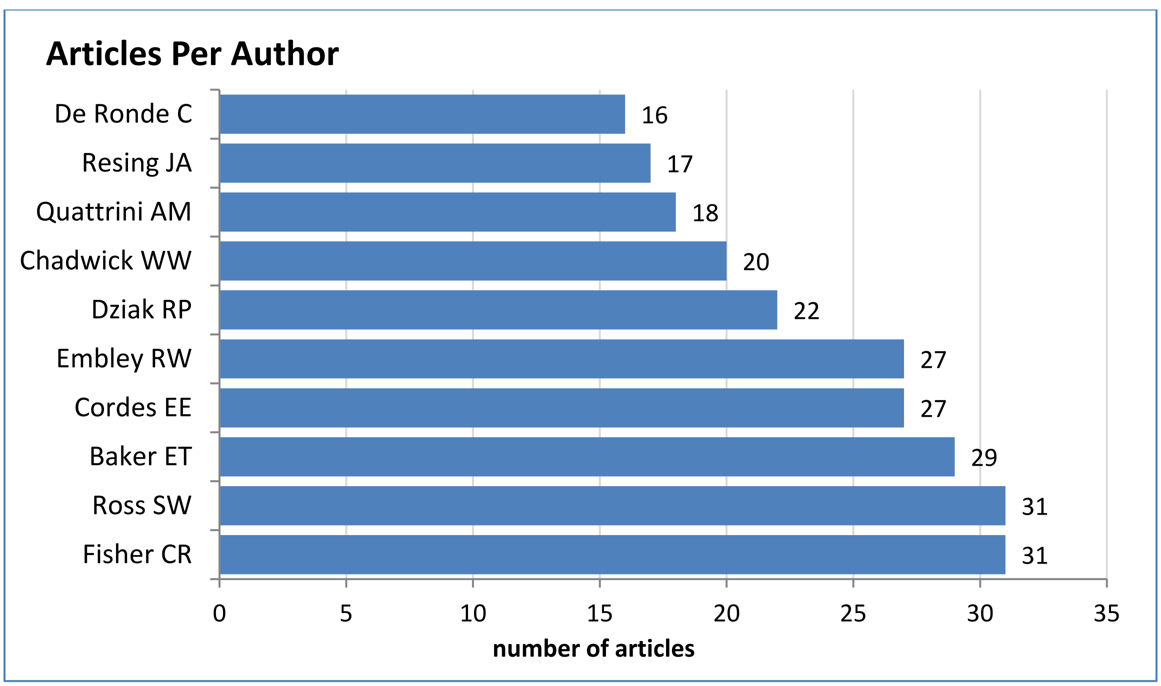

Figure 3: Number of OER-supported peer-reviewed articles produced per author.

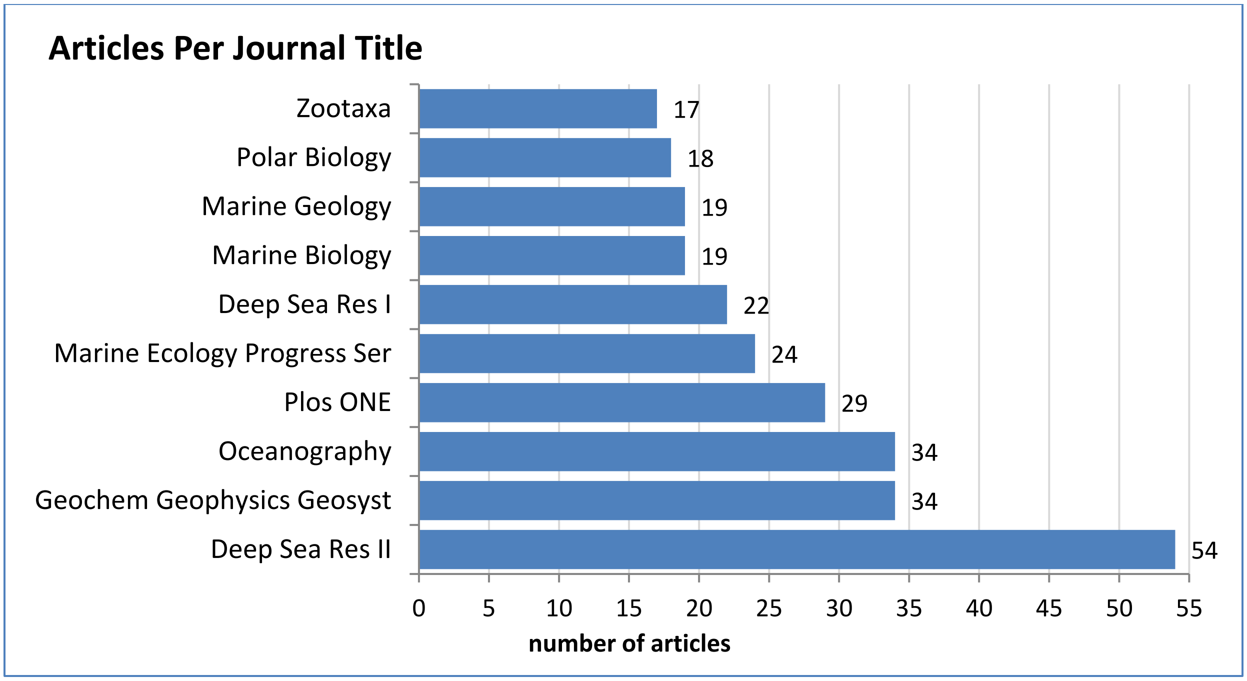

Figure 4: Number of OER-supported peer-reviewed articles per journal. Journal special issues dedicated to OER-supported explorations include: Deep-Sea Research Part II 57(1-2), 57(21-23), and 57(24-26); Journal of Geophysical Research – Solid Earth 113 (B8); Oceanography 20(4), 25(S1), and 26(S1); and Polar Biology 28(3).

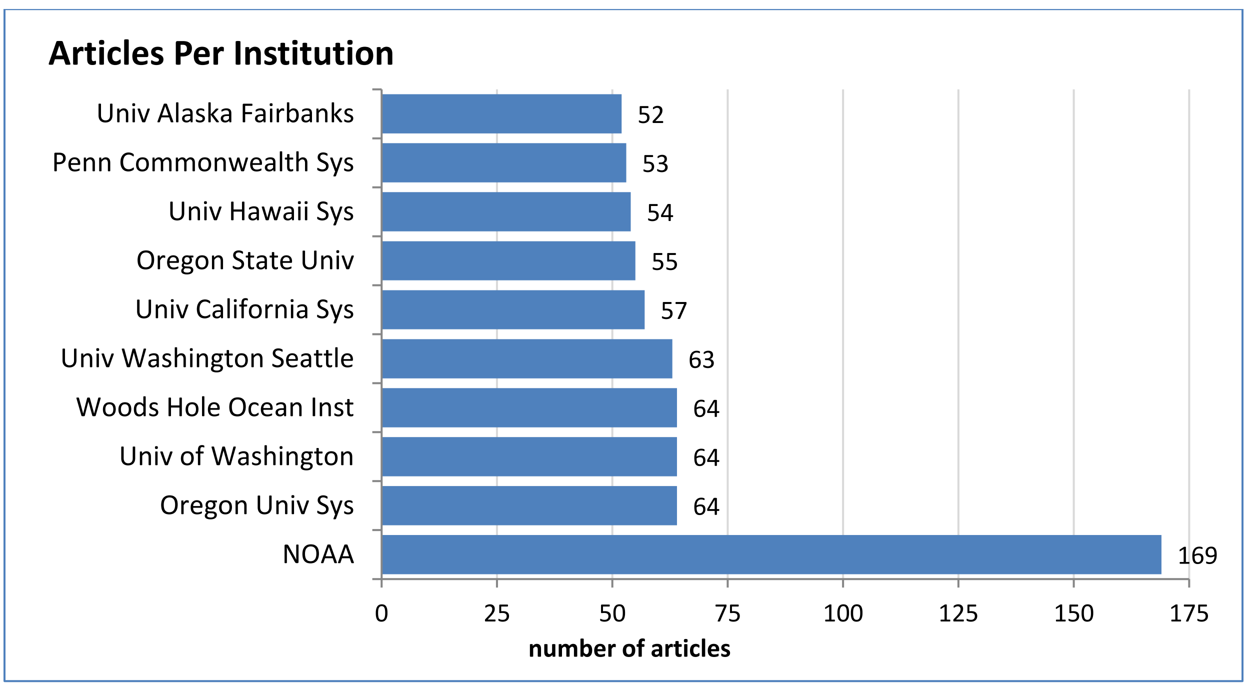

Figure 5: Number of OER-supported peer-reviewed articles per institution. Articles are counted for an institution if at least one of the article’s authors lists that institution as his/her affiliation.

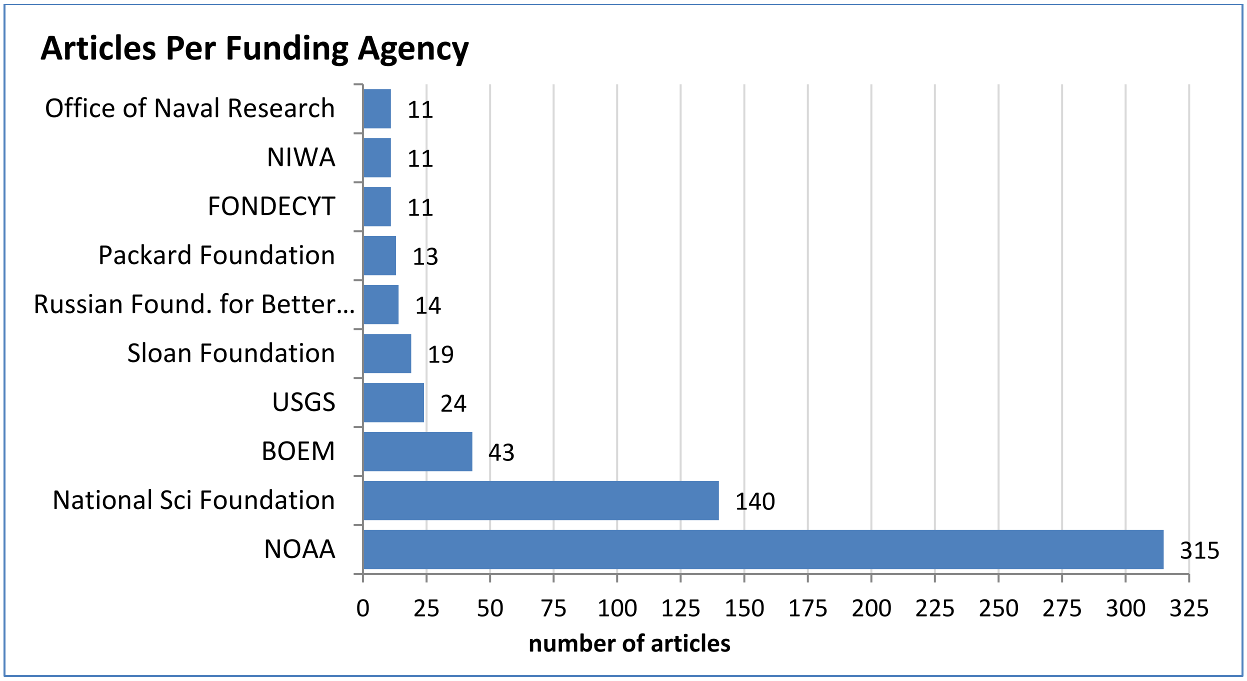

Figure 6: Number of publications co-funded by OER and other agencies and foundations. Data for this figure were derived from an analysis of the 'Acknowledgements' texts of 464 articles (64% of the 730 articles analyzed in this report) that were published from 2008 to the present for which this information is available.

CITATION COUNT ANALYSIS

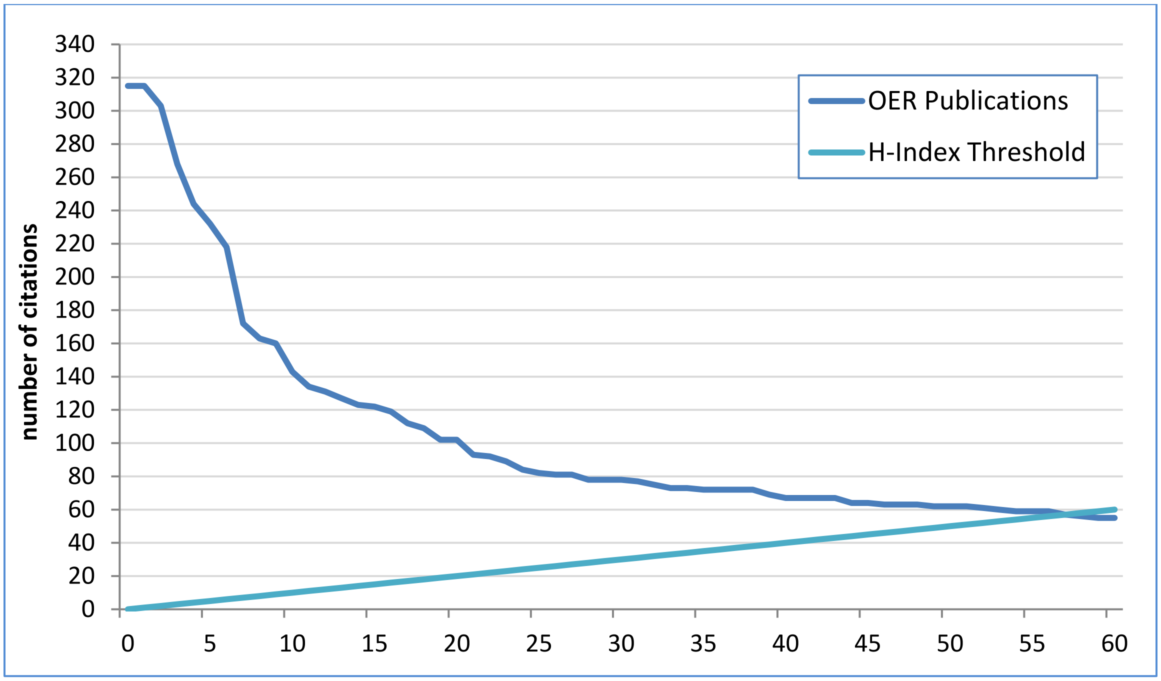

Figure 7: Distribution curve showing the citation counts of the 60 most highly cited publications supported by OER. The straight line indicates the H-Index threshold (slope: y = x). The intersect point of the two curves (x = 57) is the H-Index of OER articles.

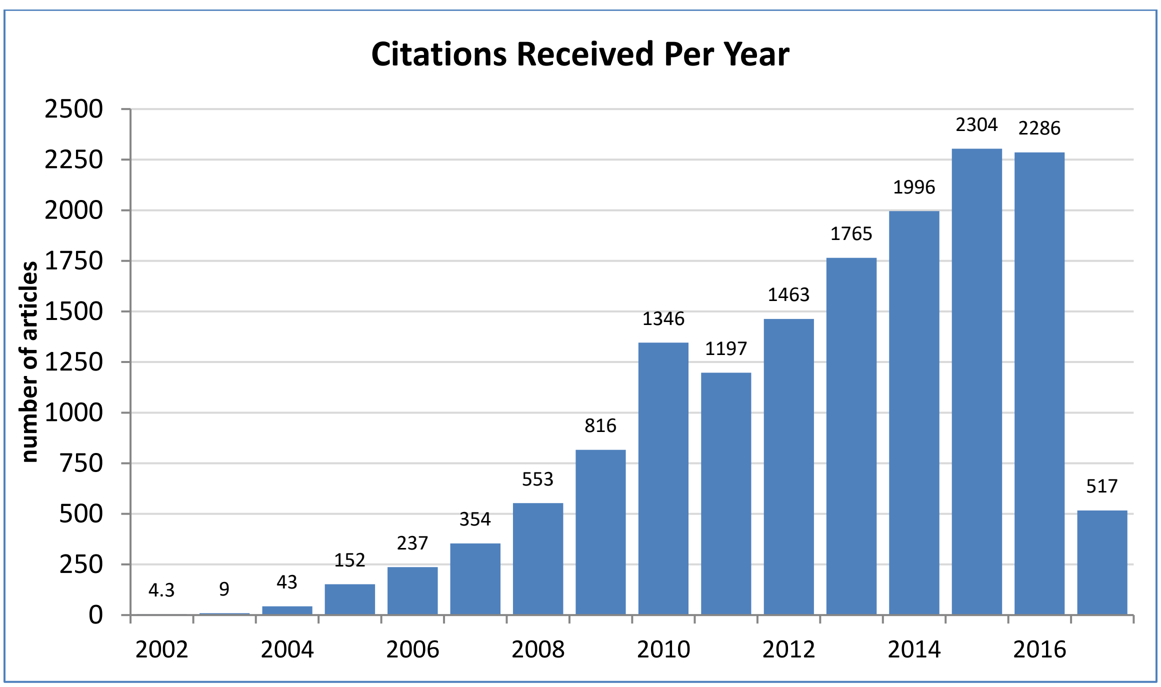

Figure 8: Non-cumulative number of citations received by all 730 OER-supported articles per year.

CITING ARTICLE ANALYSIS

The following tables analyze the 9,856 publications that have cited OER-supported articles in an attempt to indicate how these articles are used. These tables include self-citations (OER articles citing other OER articles). For brevity, each table only includes the top 10 results in each category.

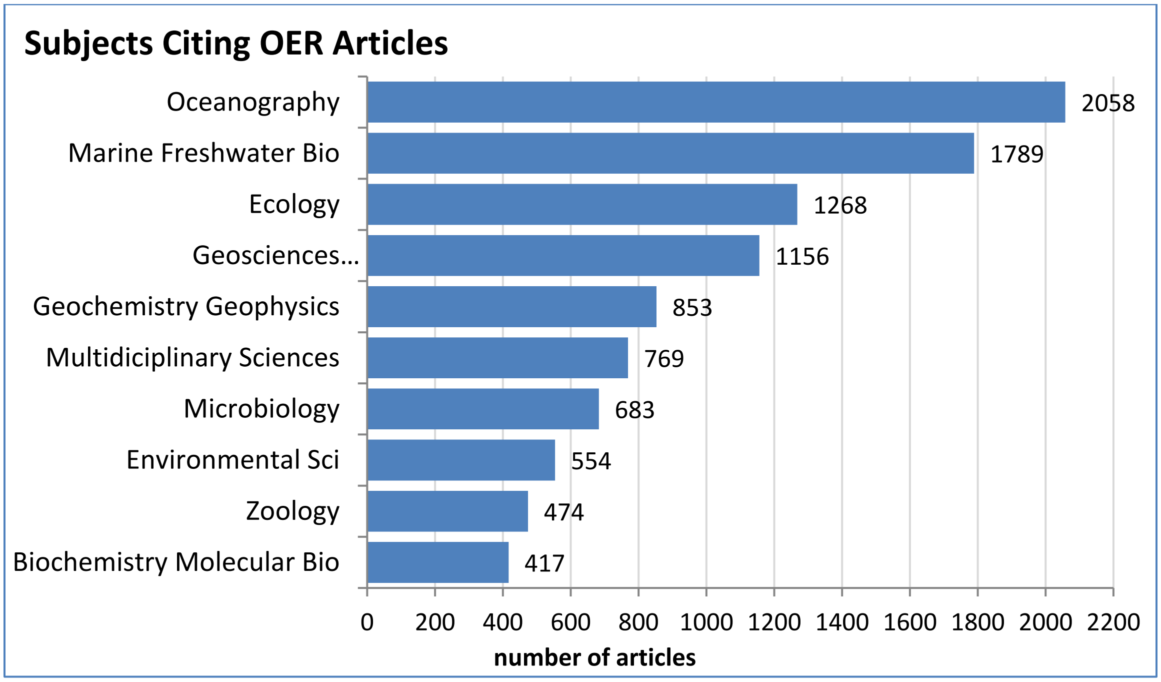

Figure 9: Number of publications per WoS-defined subject category for all publications citing OER-supported articles.

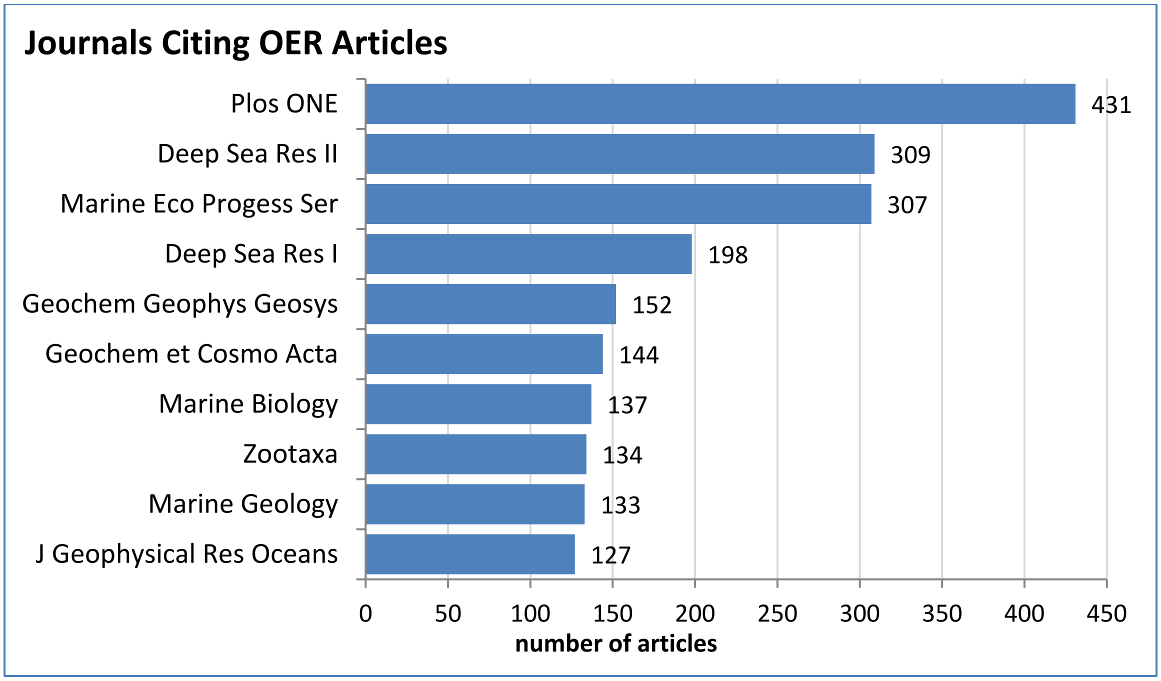

Figure 10: Number of publications per journal for all publications citing OER-supported articles.

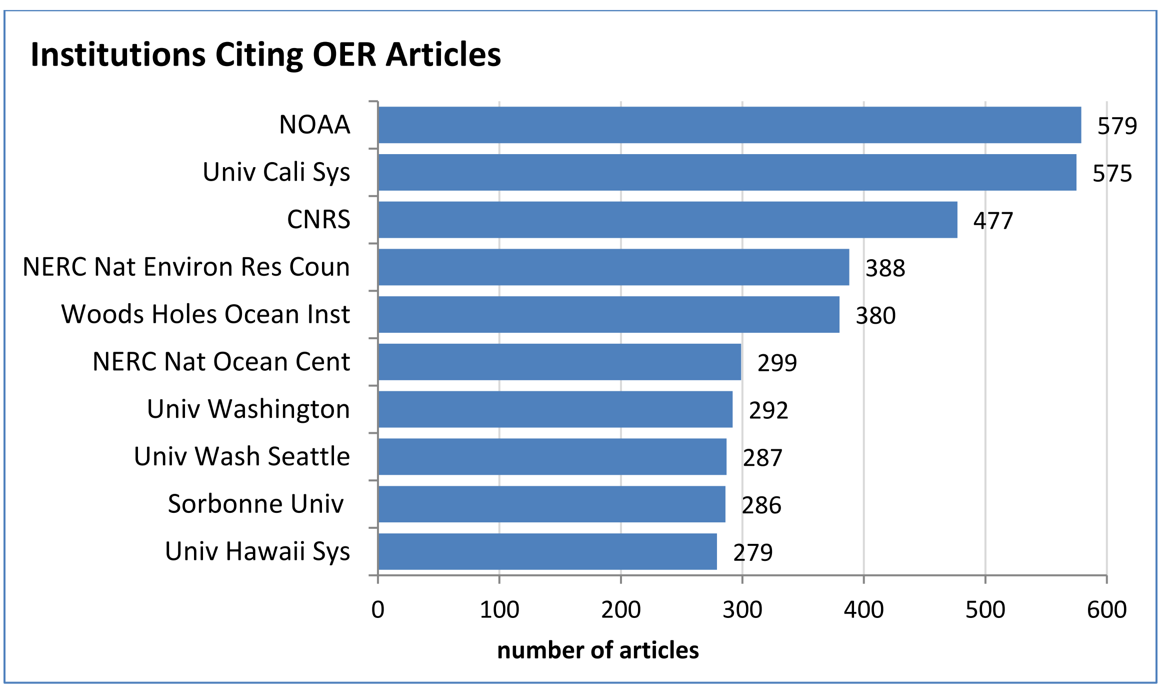

Figure 11: Number of publications per institution for all publications citing OER-supported articles. Publications are counted for an institution if at least one of the publication's authors lists that institution as their affiliation.

INTERNATIONAL PUBLICATION

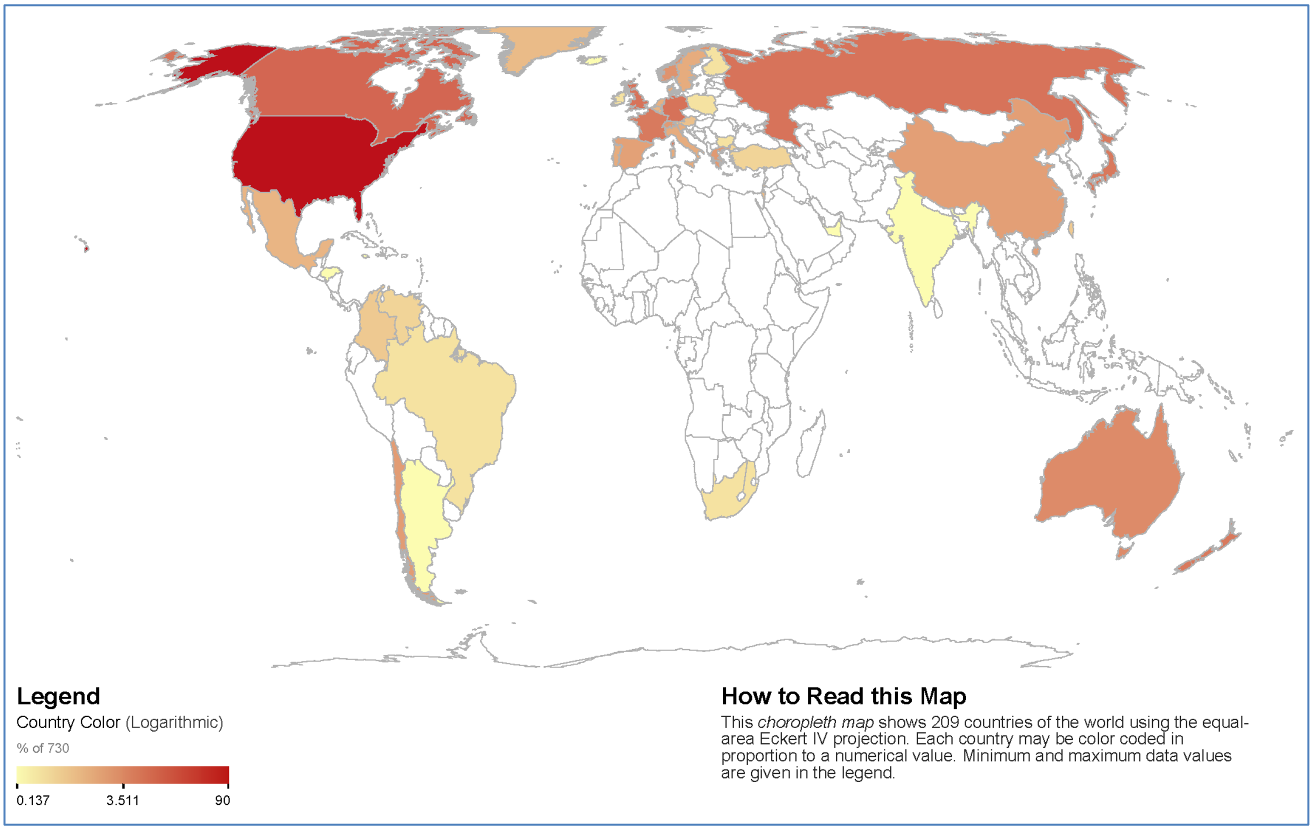

Figure 12: Map depicting the international publication of OER-supported articles. Countries are colored based on the number of OER-supported articles with at least one author from each country.

BIBLIOMETRIC MAPPING

Bibliometric maps attempt to create visual representations of the structure of scientific research by analyzing networks (Borner and others 2007) of scientific publications. Depending on the level of analysis, bibliometric maps attempt to show the relationships between different lines of research on a single topic, between sub-disciplines within a field, and between major disciplines. Such maps can be constructed depicting co-authorship networks (Newman 2001), article citation networks (Boyack and Klavans 2010), or article keyword networks (Mane and Borner 2004). For an extensive survey of the field, see Borner and others (2003).

The following maps depict co-authorship, and word co-occurrence networks derived from OER-supported journal articles indexed in Web of Science. These maps were generated using the Science of Science Tool (Sci2 Team 2009). Higher resolution images of these maps are available upon request.

Co-Authorship Network

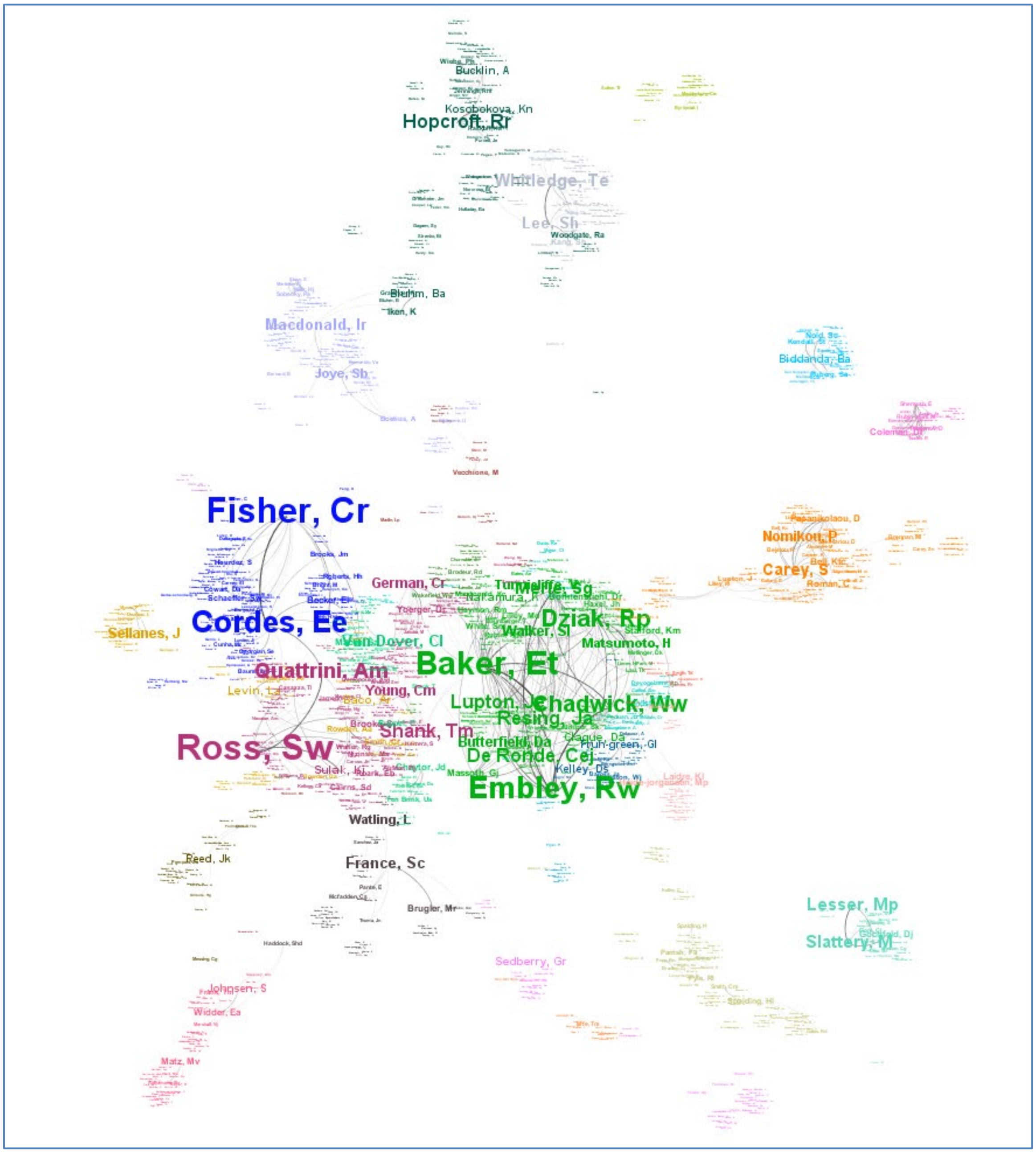

Figure 13: Bibliometric map of the largest connected co-authorship network of authors of OER-supported research. Author names were manually standardized to eliminate misspellings and name variants (e.g. Cordes E and Cordes Ee) were merged prior to creating this network. In this map, name size indicates the number of OER-supported publications by that author; values range from 1 to 31 publications. Name colors indicate communities of authors who tend to write articles together as identified by the community detection algorithm of Blondel and others (2008). Line size and darkness indicate the number of co-authored works between the connected authors; values range from 1 to 16. This map depicts 7,886 co-author relationships between 1,553 authors of OER-supported articles.

Word Co-Occurrence Network

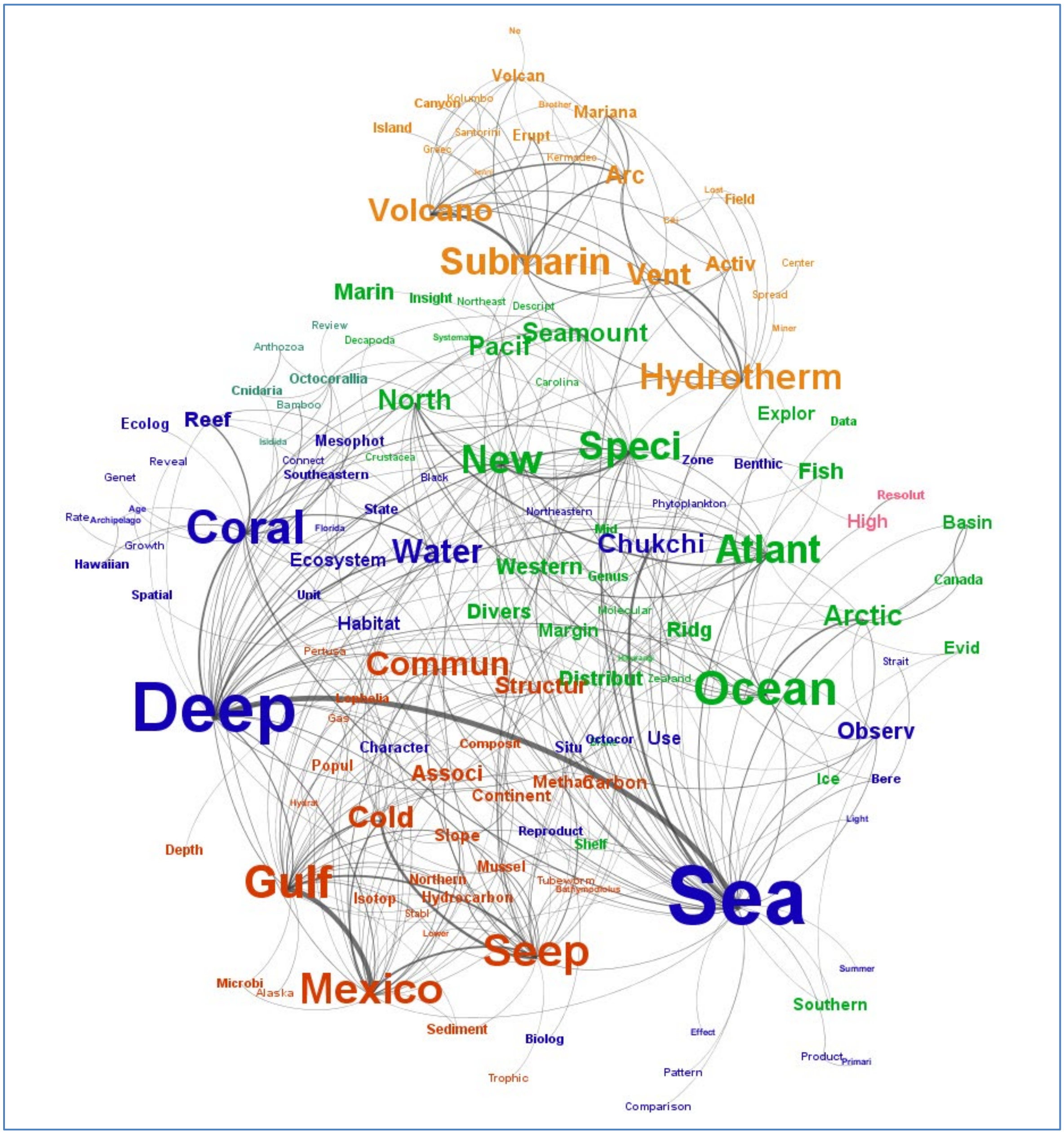

Figure 14: Word co-occurrence network map of the 142 words most commonly co-occurring in the titles of OER-supported journal articles. Words were truncated (i.e. word endings like '-es', '-al', and '-ity' were removed) to increase word matching accuracy and stop words (words that carry little meaning like "and", "the", and "if") were deleted prior to creating the network. In the map, word size indicates the number of article titles in which the word appears; these values range from 5 articles to 146 articles. Words are colored based on the results of the community detection algorithm of Blondel and others (2008) to indicate groups of words that tend to appear together in article titles. Lines represent article titles in which the connected words both appear, with line size and darkness indicating the number of articles in which the two connected words both occur. For clarity, lines with a weight of less than 5 were removed and only the largest connected component of the network is shown.

CITATION PERFORMANCE EVALUATION

Bibliometric researchers have recently agreed that paper citation counts ought to be evaluated using percentiles rather than averages. In this method, a paper is assigned a percentile rank (top 1%, top 10%, etc.) based on how its citation count compares to that of all other papers in a given set. Sets of papers, such as those by an author or by a research group, are evaluated by calculating the percentage of those papers that have citation counts that rank in a certain percentile (or set of percentiles) when compared to a similar set of papers. In practice, researchers have tended to focus on the percentage of papers in a set with citation counts ranking in the top 10% of all papers in the same database that were published in the same year and subject category. For more information about this approach, see (Bornmann and others 2012; Leydesdorff and others 2011; National Science Board 2012; Waltman and others 2012).

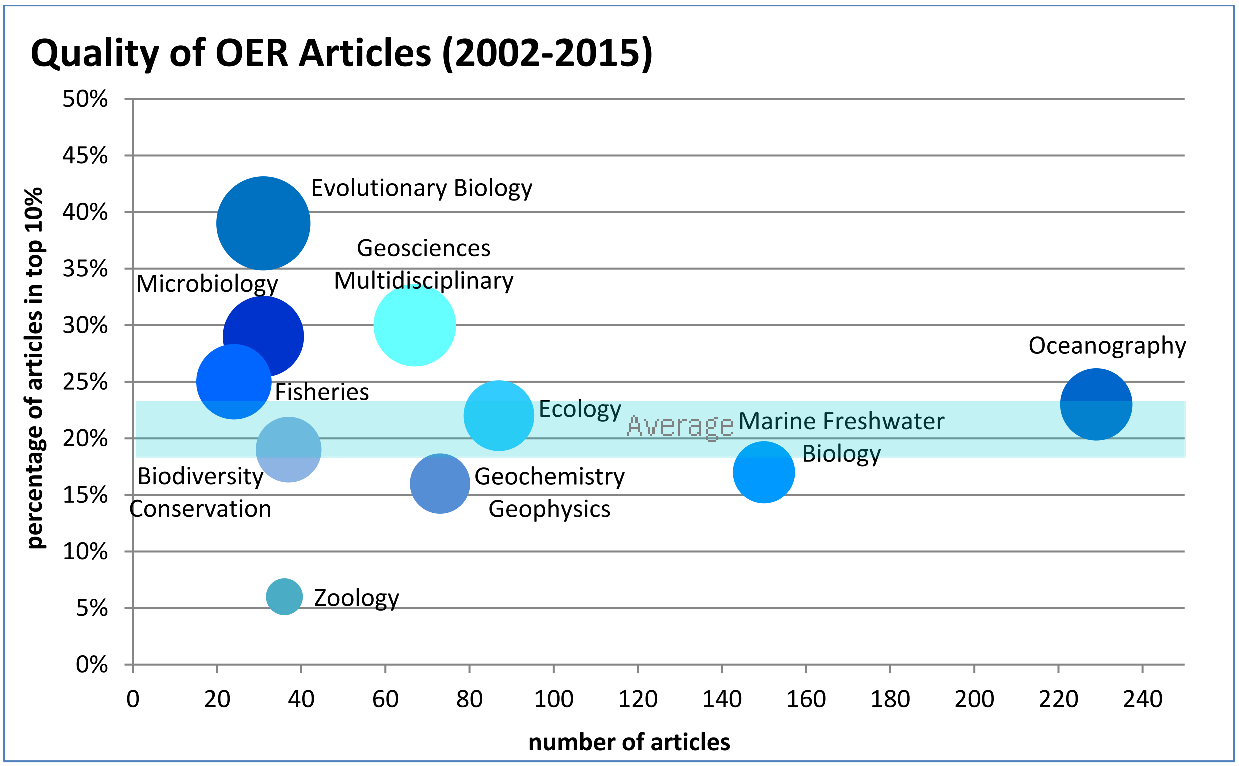

Figure 15: Bubble chart showing the percentage of OER-supported publications in ten subject categories that had citation counts ranking in the top 10% of all publications in WoS that were published in the same categories during the same years (2002-2015). Bubble size indicates the percentage of OER-supported publications in each subject area that had citation counts in the top 10% of all publications in that subject area and year of publication. The ten subject categories shown here are those in which OER-supported explorations were most often published (from Figure 2). Approximately 86% of the articles published during 2002-2016 that are analyzed in this report are included in one or more of these ten subject categories. The 'Multidisciplinary Sciences' subject category, which includes publications in Nature and Science, was omitted from this analysis because these articles could not be analyzed according to the same standards as the other subject categories.

RECENT HIGHLY CITED ARTICLES

The following lists highlight recently published OER-supported articles that have received enough citations for them to rank in the top 10% for citation counts out of all publications in WoS in their respective subject categories. Because articles typically require at least 2-3 years to accumulate enough citations for article-level bibliometric indicators to be reliable (Abramo and others 2012; Costas and others 2011), only articles published in 2015 or 2014 are listed.

2015

Ainsworth, T. D., Krause, L., Bridge, T., Torda, G., Raina, J. B., Zakrzewski, M., . . . Leggat, W. (2015). The coral core microbiome identifies rare bacterial taxa as ubiquitous endosymbionts. *Isme Journal, 9*(10), 2261-2274. doi:10.1038/ismej.2015.39

Bradley, C. J., Wallsgrove, N. J., Choy, C. A., Drazen, J. C., Hetherington, E. D., Hoen, D. K., & Popp, B. N. (2015). Trophic position estimates of marine teleosts using amino acid compound specific isotopic analysis. *Limnology and Oceanography-Methods, 13*(9), 476-493. doi:10.1002/lom3.10041

Ershova, E. A., Hopcroft, R. R., Kosobokova, K. N., Matsuno, K., Nelson, R. J., Yamaguchi, A., & Eisner, L. B. (2015). Long-Term Changes in Summer Zooplankton Communities of the Western Chukchi Sea, 1945–2012. *Oceanography, 28*(3), 100-115. doi:10.5670/oceanog.2015.60

Ershova, E. A., Hopcroft, R. R., & Kosobokova, K. N. (2015). Inter-annual variability of summer mesozooplankton communities of the western Chukchi Sea: 2004–2012. *Polar Biology, 38*(9), 1461-1481. doi:10.1007/s00300-015-1709-9

Herrera, S., Watanabe, H., & Shank, T. M. (2015). Evolutionary and biogeographical patterns of barnacles from deep-sea hydrothermal vents. *Molecular Ecology, 24*(3), 673-689. doi:10.1111/mec.13054

Katlein, C., Arndt, S., Nicolaus, M., Perovich, D. K., Jakuba, M. V., Suman, S., . . . German, C. R. (2015). Influence of ice thickness and surface properties on light transmission through Arctic sea ice. *Journal of Geophysical Research-Oceans, 120*(9), 5932-5944. doi:10.1002/2015jc010914

Keller, A. A., Ciannelli, L., Wakefield, W. W., Simon, V., Barth, J. A., & Pierce, S. D. (2015). Occurrence of demersal fishes in relation to near-bottom oxygen levels within the California Current large marine ecosystem. *Fisheries Oceanography, 24*(2), 162-176. doi:10.1111/fog.12100

Lee, Y. J., Matrai, P. A., Friedrichs, M. A. M., Saba, V. S., Antoine, D., Ardyna, M., . . . Westberry, T. K. (2015). An assessment of phytoplankton primary productivity in the Arctic Ocean from satellite ocean color/in situ chlorophyll-a based models. *Journal of Geophysical Research: Oceans, 120*(9), 6508-6541. doi:10.1002/2015JC011018

Orr, J. W., Wildes, S., Kai, Y., Raring, N., Nakabo, T., Katugin, O., & Guyon, J. (2015). Systematics of North Pacific sand lances of the genus Ammodytes based on molecular and morphological evidence, with the description of a new species from Japan. *Fishery Bulletin, 113*(2), 129-157. doi:10.7755/FB.113.2.3

Pisareva, M. N., Pickart, R. S., Spall, M. A., Nobre, C., Torres, D. J., Moore, G. W. K., & Whitledge, T. E. (2015). Flow of pacific water in the western Chukchi Sea: Results from the 2009 RUSALCA expedition. *Deep Sea Research Part I: Oceanographic Research Papers, 105*, 53-73. doi:10.1016/j.dsr.2015.08.011

Quattrini, A. M., Baums, I. B., Shank, T. M., Morrison, C. L., & Cordes, E. E. (2015). Testing the depth-differentiation hypothesis in a deepwater octocoral. *Proceedings of the Royal Society B-Biological Sciences, 282*(1807), 9. doi:10.1098/rspb.2015.0008

Wang, B. B., & Socolofsky, S. A. (2015). A deep-sea, high-speed, stereoscopic imaging system for in situ measurement of natural seep bubble and droplet characteristics. *Deep-Sea Research Part I-Oceanographic Research Papers, 104*, 134-148. doi:10.1016/j.dsr.2015.08.001

Woodgate, R. A., K.M. Stafford, and F.G. Prahl. (2015). A synthesis of year-round interdisciplinary mooring measurements in the Bering Strait (1990–2014) and the RUSALCA years (2004–2011). *Oceanography, 28*(3), 46-47. doi:10.5670/oceanog.2015.57

2014

Blanchard, A. L., & Feder, H. M. (2014). Interactions of habitat complexity and environmental characteristics with macrobenthic community structure at multiple spatial scales in the northeastern Chukchi Sea. *Deep Sea Research Part II: Topical Studies in Oceanography, 102*, 132-143. doi:10.1016/j.dsr2.2013.09.022

Brothers, D. S., Ruppel, C., Kluesner, J. W., ten Brink, U. S., Chaytor, J. D., Hill, J. C., . . . Flores, C. (2014). Seabed fluid expulsion along the upper slope and outer shelf of the U. S. Atlantic continental margin. *Geophysical Research Letters, 41*(1), 96-101. doi:10.1002/2013gl058048

De Leo, F. C., Vetter, E. W., Smith, C. R., Rowden, A. A., & McGranaghan, M. (2014). Spatial scale-dependent habitat heterogeneity influences submarine canyon macrofaunal abundance and diversity off the Main and Northwest Hawaiian Islands. *Deep Sea Research Part II: Topical Studies in Oceanography, 104*, 267-290. doi:10.1016/j.dsr2.2013.06.015

Doughty, C. L., Quattrini, A. M., & Cordes, E. E. (2014). Insights into the population dynamics of the deep-sea coral genus Paramuricea in the Gulf of Mexico. *Deep-Sea Research Part II-Topical Studies in Oceanography, 99*, 71-82. doi:10.1016/j.dsr2.2013.05.023

MacGilchrist, G. A., Naveira Garabato, A. C., Tsubouchi, T., Bacon, S., Torres-Valdés, S., & Azetsu-Scott, K. (2014). The Arctic Ocean carbon sink. *Deep Sea Research Part I: Oceanographic Research Papers, 86*, 39-55. doi:10.1016/j.dsr.2014.01.002

Micheli, F., Mumby, P. J., Brumbaugh, D. R., Broad, K., Dahlgren, C. P., Harborne, A. R., . . . Sanchirico, J. N. (2014). High vulnerability of ecosystem function and services to diversity loss in Caribbean coral reefs. *Biological Conservation, 171*, 186-194. doi:10.1016/j.biocon.2013.12.029

Quattrini, A. M., Etnoyer, P. J., Doughty, C., English, L., Falco, R., Renion, N., . . . Cordes, E. E. (2014). A phylogenetic approach to octocoral community structure in the deep Gulf of Mexico. *Deep-Sea Research Part II-Topical Studies in Oceanography, 99*, 92-102. doi:10.1016/j.dsr2.2013.05.027

Skarke, A., Ruppel, C., Kodis, M., Brothers, D., & Lobecker, E. (2014). Widespread methane leakage from the sea floor on the northern US Atlantic margin. *Nature Geoscience, 7*(9), 657-661. doi:10.1038/ngeo2232

Slattery, M., & Lesser, M. P. (2014). Allelopathy in the tropical alga Lobophora variegata (Phaeophyceae): mechanistic basis for a phase shift on mesophotic coral reefs? *Journal of Phycology, 50*(3), 493-505. doi:10.1111/jpy.12160

Tricas, T. C., & Boyle, K. S. (2014). Acoustic behaviors in Hawaiian coral reef fish communities. *Marine Ecology Progress Series, 511*, 1-16. doi:10.3354/meps10930

Weber, T. C., Mayer, L., Jerram, K., Beaudoin, J., Rzhanov, Y., & Lovalvo, D. (2014). Acoustic estimates of methane gas flux from the seabed in a 6000 km(2) region in the Northern Gulf of Mexico. *Geochemistry Geophysics Geosystems, 15*(5), 1911-1925. doi:10.1002/2014gc005271

Whitehouse, G. A., Aydin, K., Essington, T. E., & Hunt, G. L. (2014). A trophic mass balance model of the eastern Chukchi Sea with comparisons to other high-latitude systems. *Polar Biology, 37*(7), 911-939. doi:10.1007/s00300-014-1490-1

Yun, M. S., Whitledge, T. E., Kong, M., & Lee, S. H. (2014). Low primary production in the Chukchi Sea shelf, 2009. *Continental Shelf Research, 76*, 1-11. doi:10.1016/j.csr.2014.01.001