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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NOAA Central Library
October 2015

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 13 October 2015. 48 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.

CONTENTS

SUMMARY METRICS

Bibliometric Indicator	Value
Number of Publications (p)	605
Total Number of Citations Received (c)	10,345
Average Number of Citations per Paper (c/p)	17.10
H- Index	46
Percentage of Publications in the Top 10% for Citation Counts	≈18.5%

Table 1: Common bibliometric indicators calculated for publications supported by OER. An H-Index of 45 indicates that this group of 597 publications includes 45 articles that have each received 45 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 14.

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.

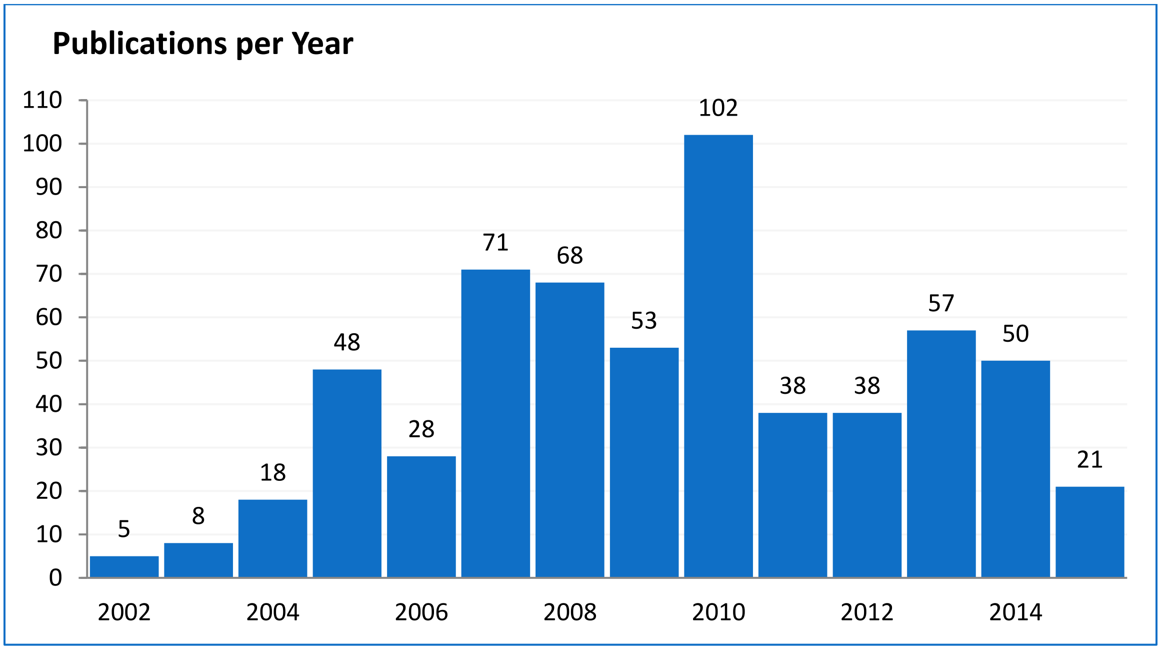

Figure 1: Non-cumulative number of OER-supported publications produced per year.

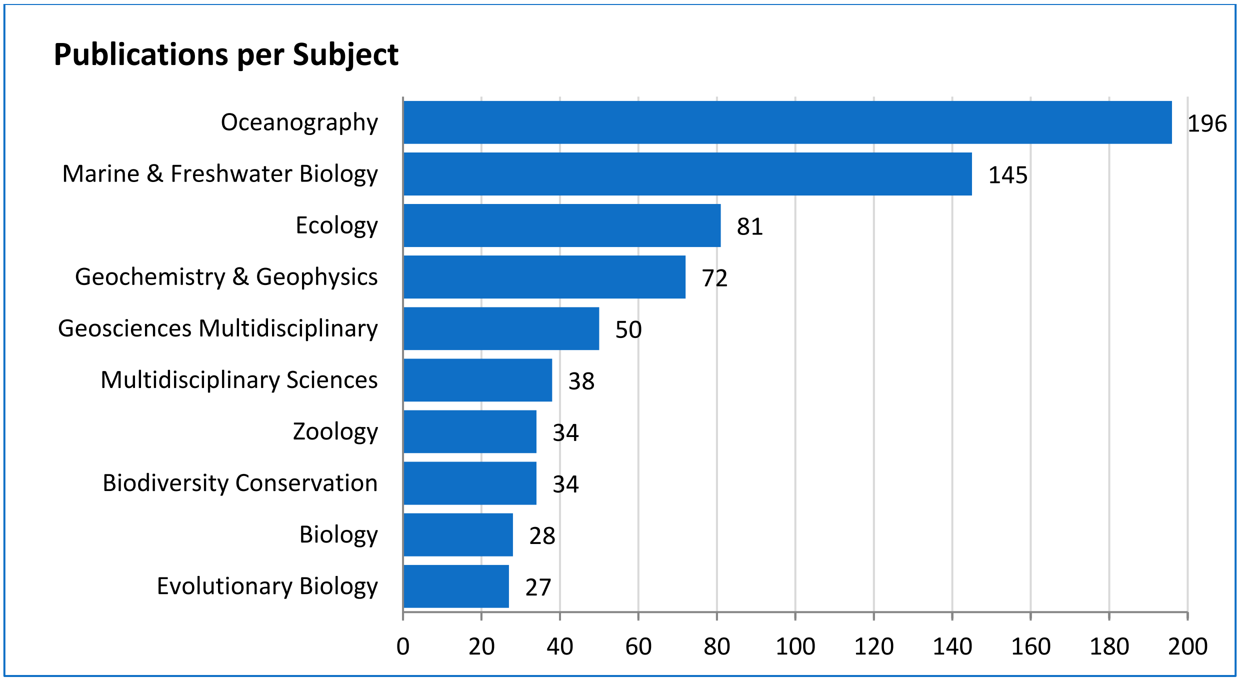

Figure 2: Number of OER-supported publications assigned to subject categories by WoS based on the journal in which the publication appeared. These subject categories are not mutually exclusive.

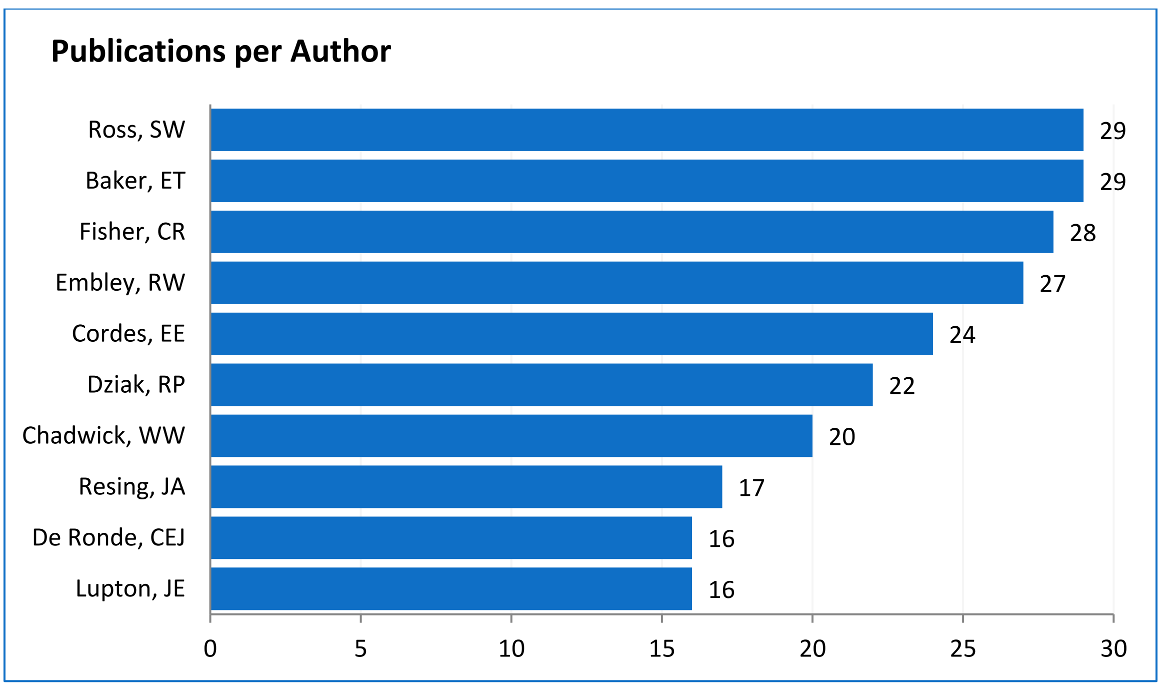

Figure 3: Number of OER-supported publications produced per author.

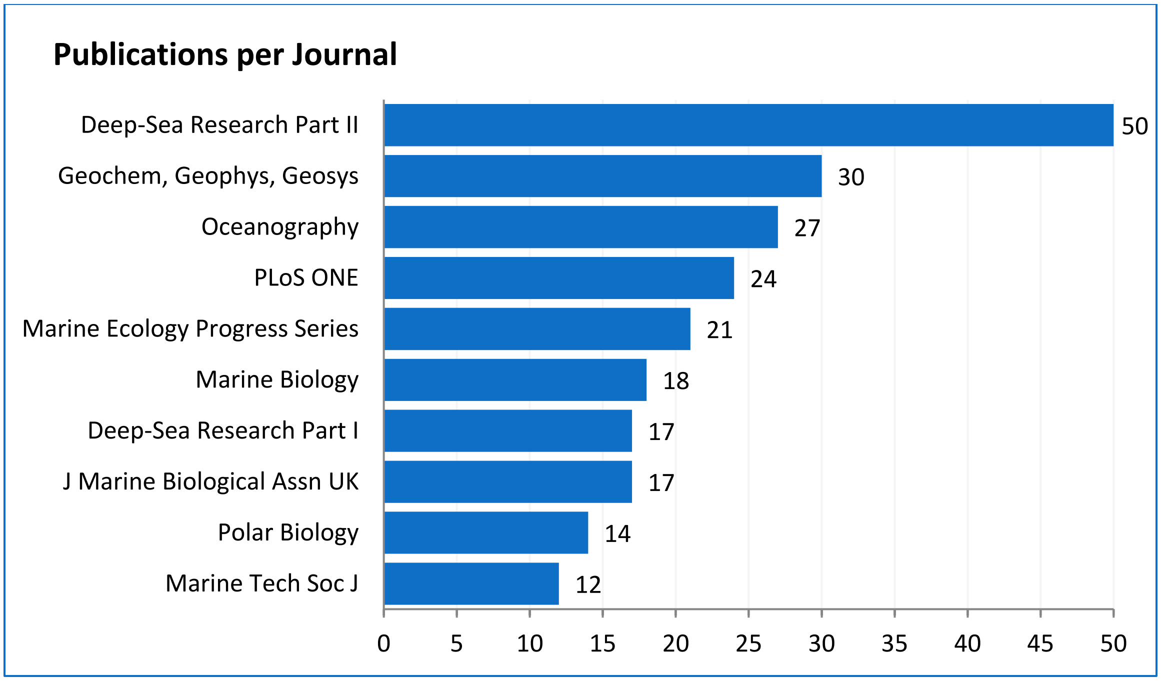

Figure 4: Number of OER-supported publications per journal. Journal special issues dedicated to OER- supported explorations include: Deep-Sea Research Part II 57(1-2), 57(21-23), and 57(24-26); Journal of Geophysical Research – Solid Earth 113 (B8); Oceanography 20(4), 25(S1), and 26(S1); and Polar Biology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

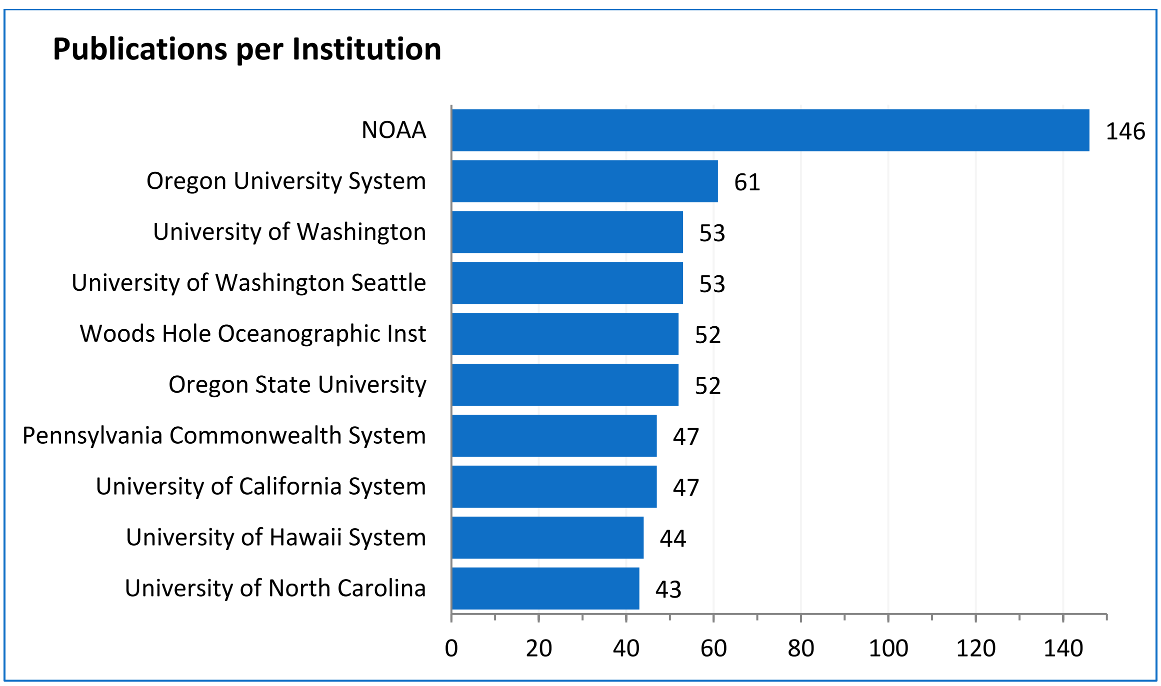

Figure 5: Number of OER-supported publications per institution. Publications are counted for an institution if at least one of the publication's authors lists that institution as his/her affiliation.

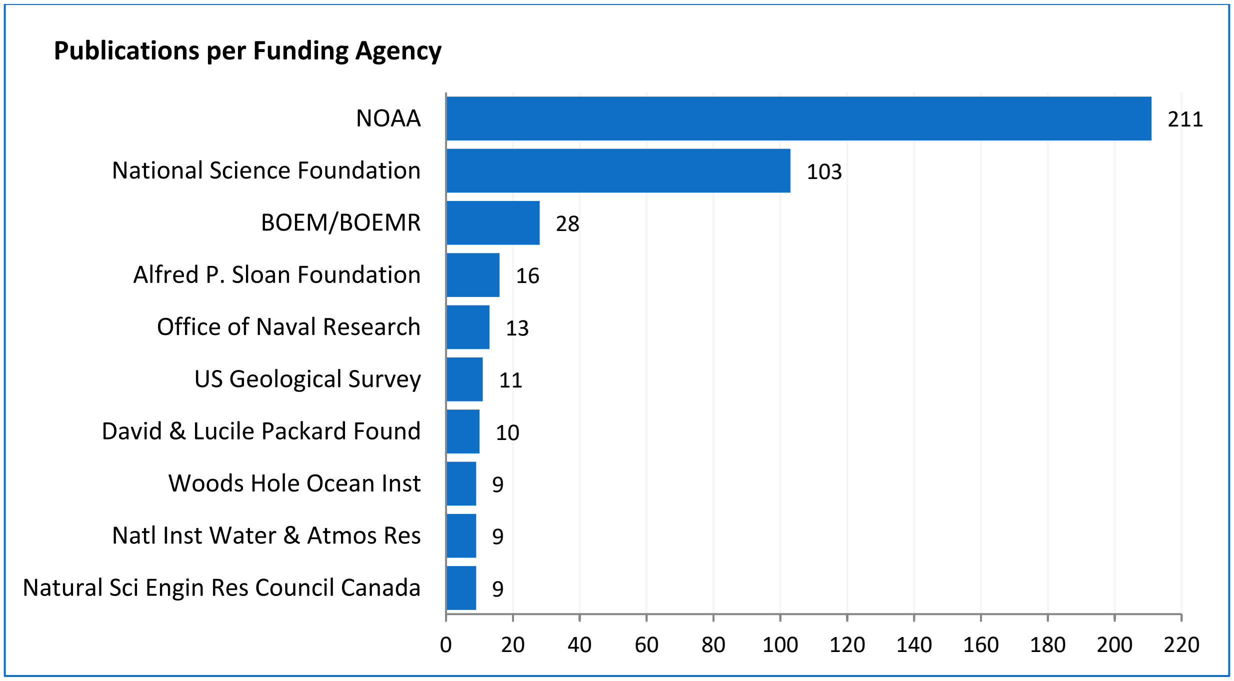

Figure 6: Number of publications co-funded by OER and other agencies and foundations. Data for this figure were derived from an analysis of the 'Acknowledgements' texts of 360 articles (59% of the 605 articles analyzed in this report) that were published from 2008 to the present for which this information is available.

CITATION COUNT ANALYSIS

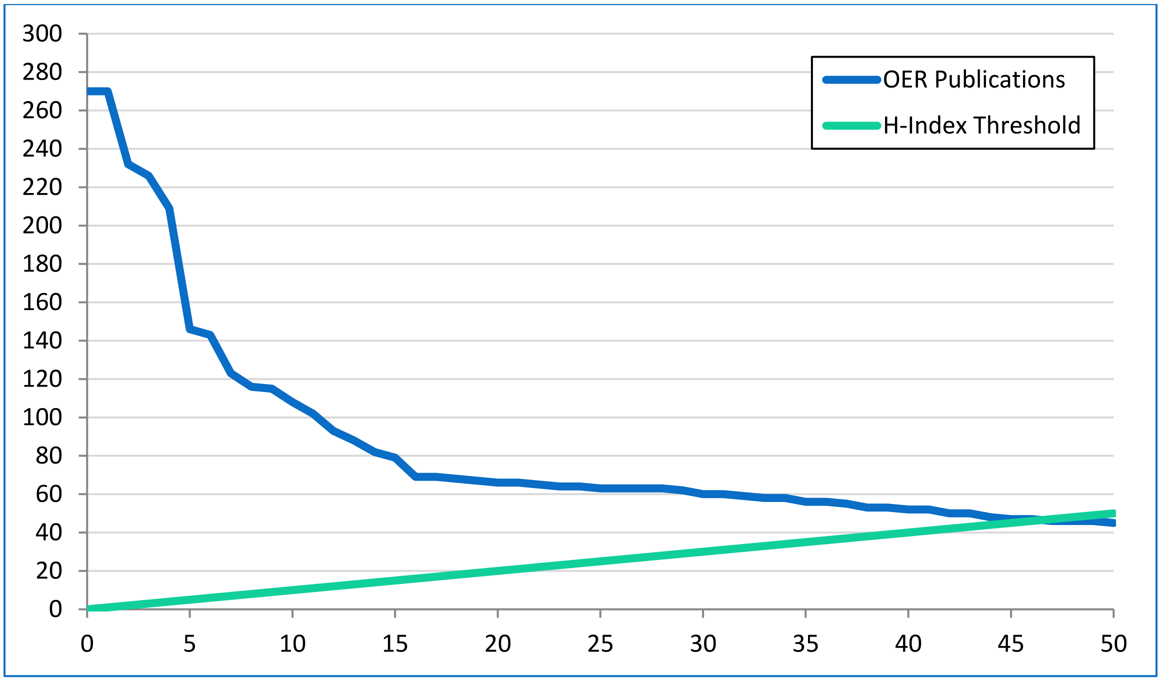

Figure 7: Distribution curve showing the citation counts of the 50 most highly cited publications supported by OER. The straight line indicates the H-Index threshold (slope: y = x). The intersect point of the two curves (x = 46) is the H-Index of OER articles.

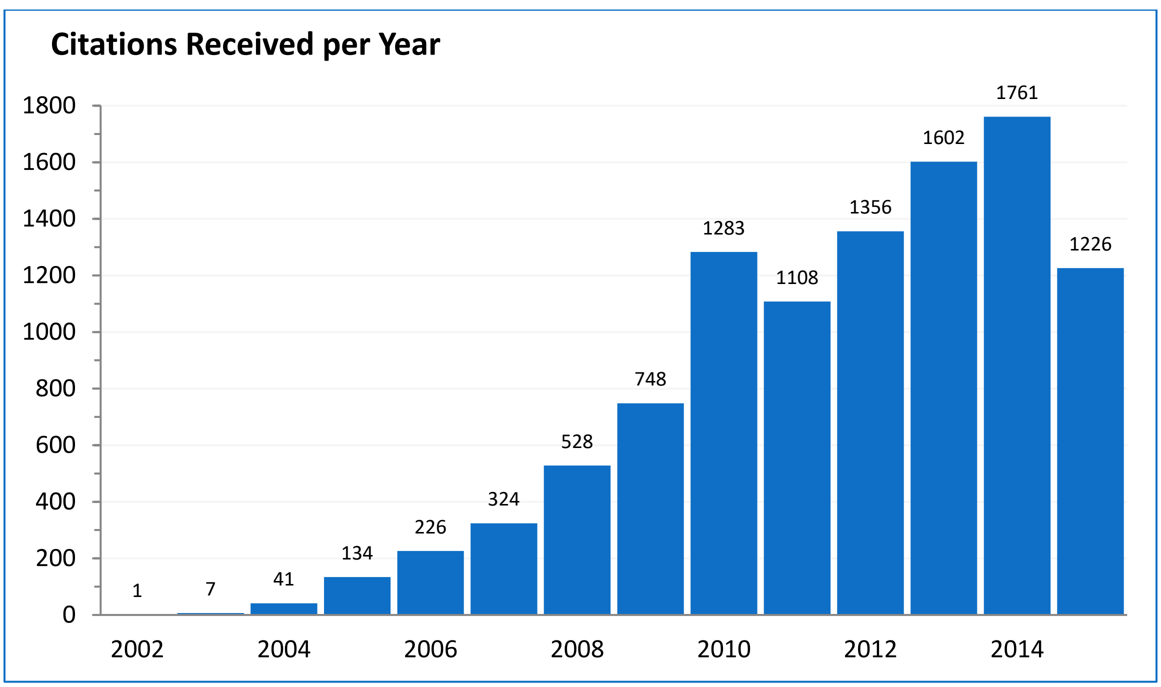

Figure 8: Non-cumulative number of citations received by all 605 OER-supported articles per year.

CITING ARTICLE ANALYSIS

The following tables analyze the 6,824 publications that have cited OER-supported publications in an attempt to indicate how these publications are used. These tables include self-citations (OER publications citing other OER publications). For brevity, each table only includes the top 10 results in each category.

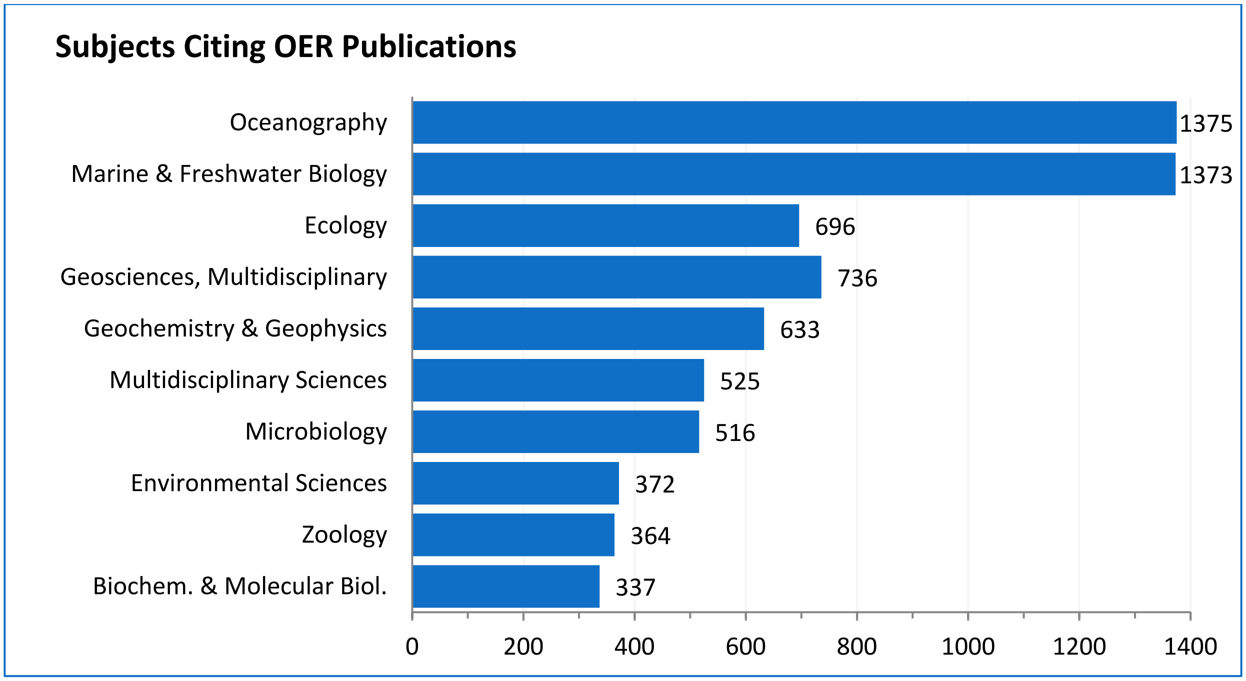

Figure 9: Number of publications per WoS-defined subject category for all publications citing OER-supported publications.

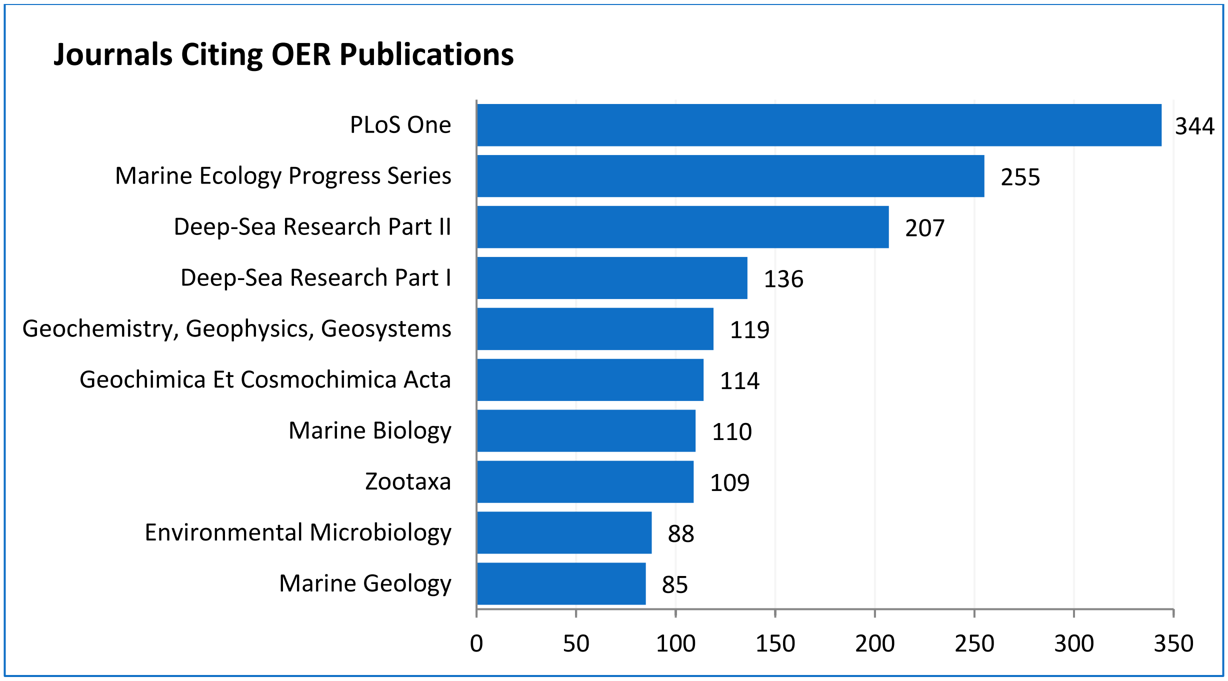

Figure 10: Number of publications per journal for all publications citing OER-supported publications.

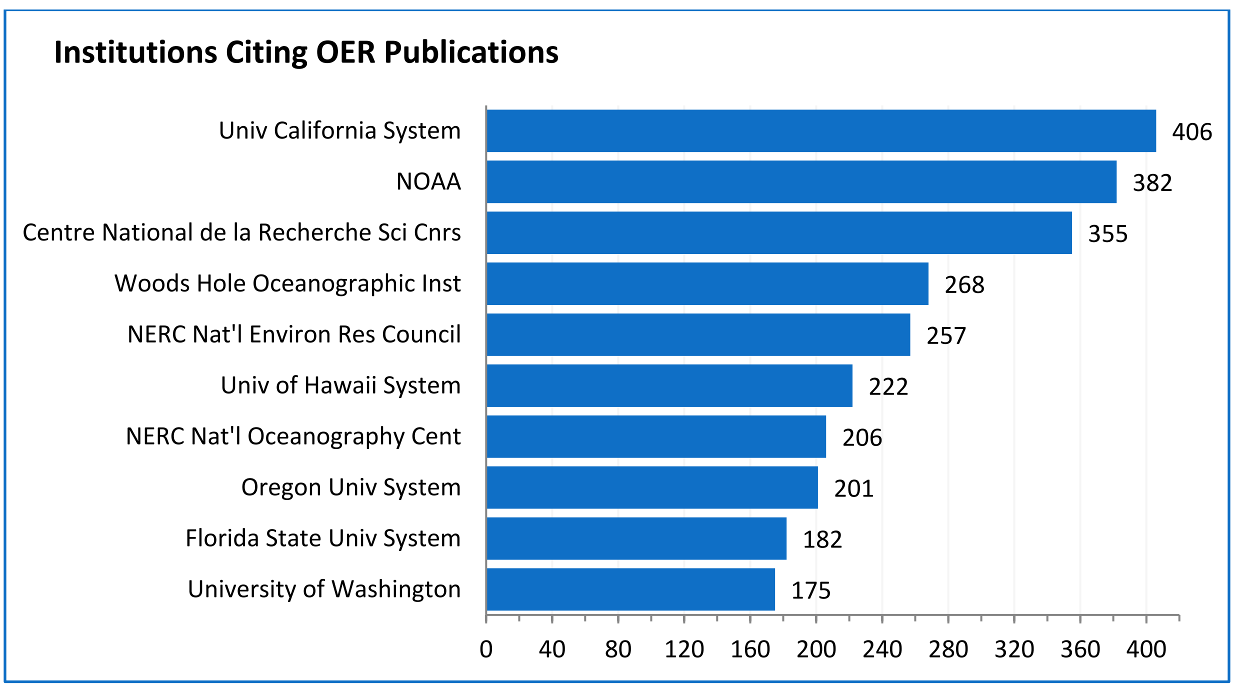

Figure 11: Number of publications per institution for all publications citing OER-supported publications. Publications are counted for an institution if at least one of the publication's authors lists that institution as their affiliation.

INTERNATIONAL PUBLICATION

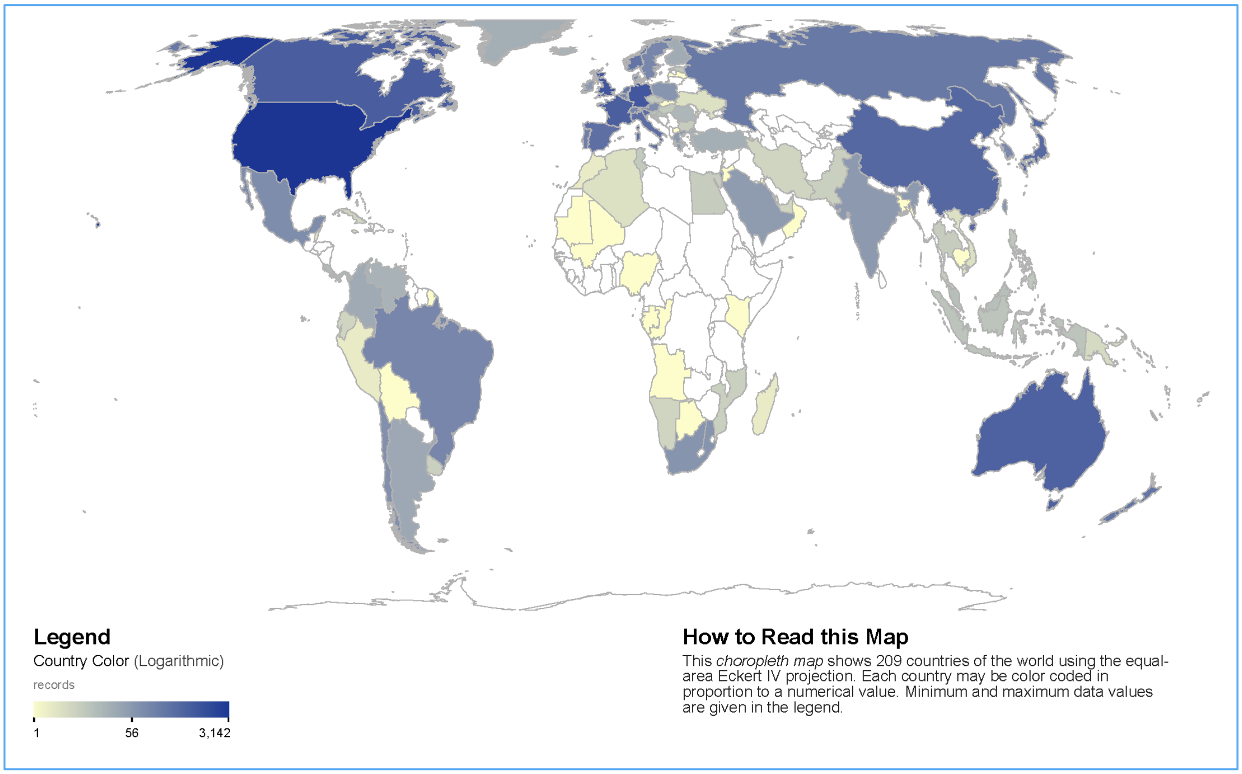

Figure 12: Map depicting the international publication of OER-supported articles. Countries are colored based on the number of OER-supported articles with at least one author from each country.

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, paper citation, 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

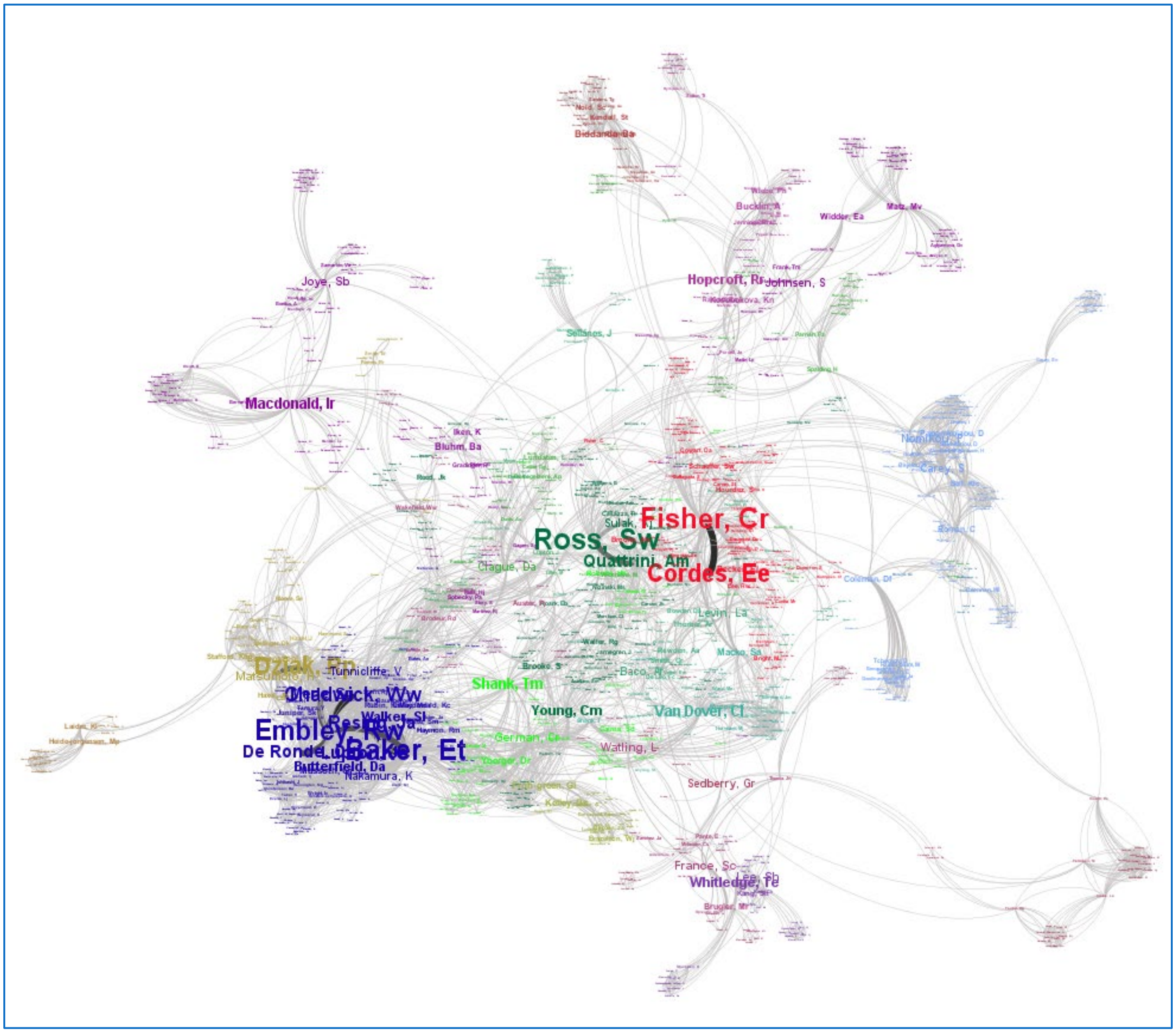

Figure 13: Bibliometric map of the largest connected co-authorship network of authors of OER-supported research. Author names were manually standardized to eliminate misspellings and name variants (e.g. Cordes E and Cordes Ee) were merged prior to creating this network. In this map, name size indicates the number of OER-supported publications by that author; values range from 1 to 29 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 6,073 co-author relationships between 1,230 authors of OER-supported articles.

Article Bibliographic Coupling Network

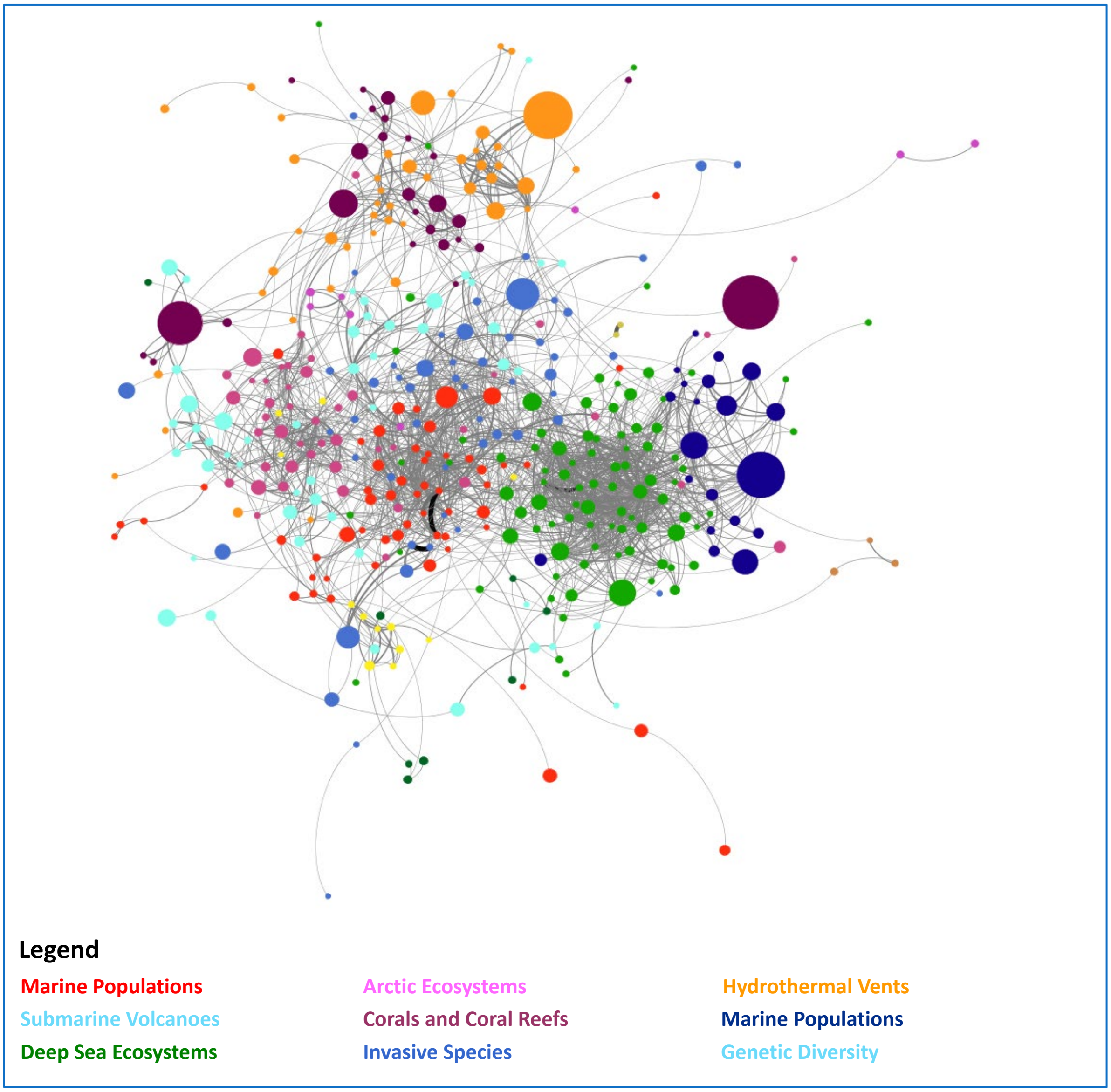

Figure 14: Bibliometric map depicting the bibliographic coupling network of 456 (75%) of the 605 articles analyzed here. Bibliographic coupling (Kessler 1963) is a method of grouping papers into topical clusters based on the number of cited references they share. The larger the number of common references between two articles, the higher the probability that they are about the same topic. The 456 articles depicted on this map are representative of the major topics covered by OER-supported journal articles. In this map, circles represent articles and lines represent bibliographic coupling links. Circle size is proportional to the article's citation count; paper citation counts range from 0 to 270 citations. Circle colors represent groups of articles, or research topics, identified by the community detection algorithm developed by Blondel and others (2008). Article topics indicated in the Legend were added based on manual review of the articles placed in each group by the algorithm. Line size and darkness indicates the number of shared references between the connected articles; the number of shared references depicted ranges from 3 to 52. For clarity, lines with a weight of less than 3 were removed and only the largest connected component of the network is shown.

Word Co-Occurrence Network

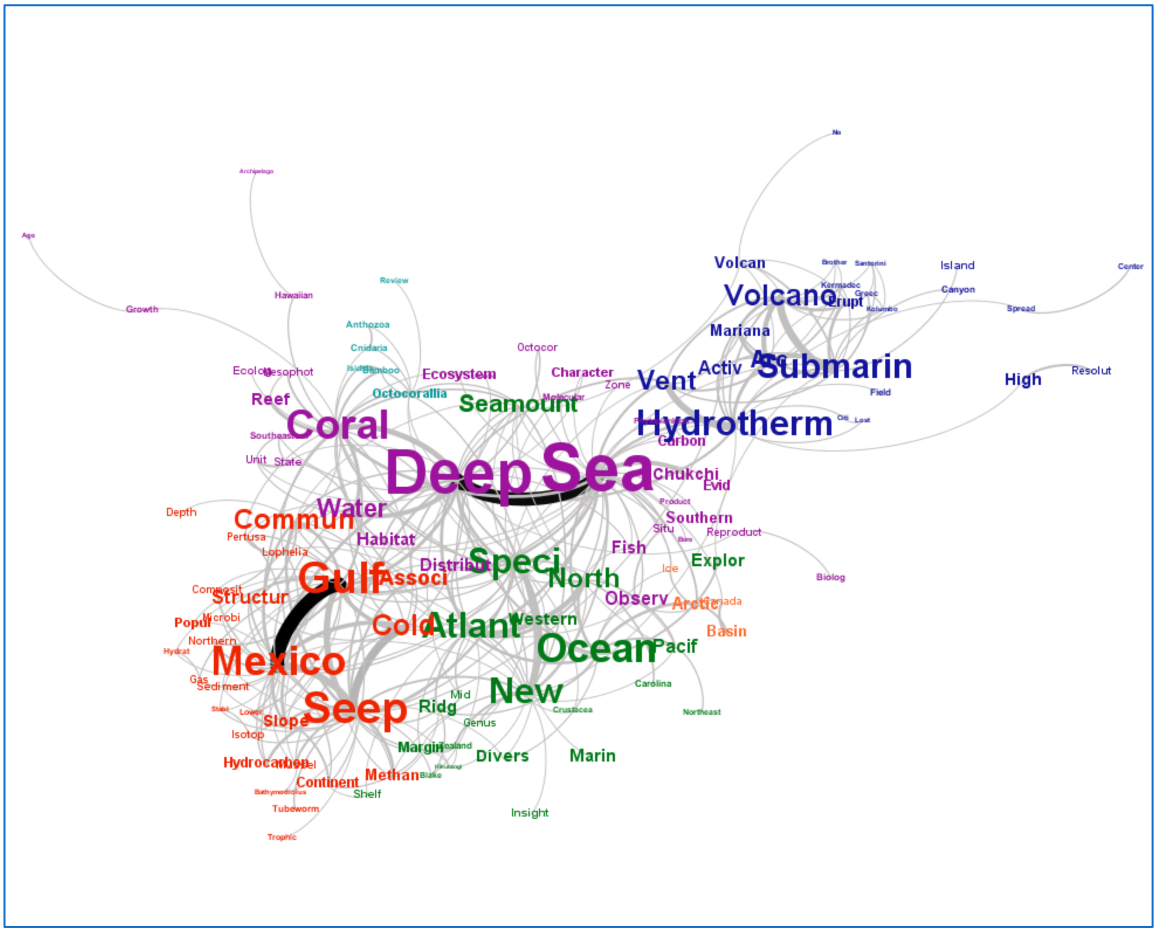

Figure 15: Word co-occurrence network map of the 119 words most commonly co-occurring in the titles of OER-supported journal articles. Words were truncated (i.e. word endings like '-es', '-al', and '-ity' were removed) to increase word matching accuracy and stop words (words that carry little meaning 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 65 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).

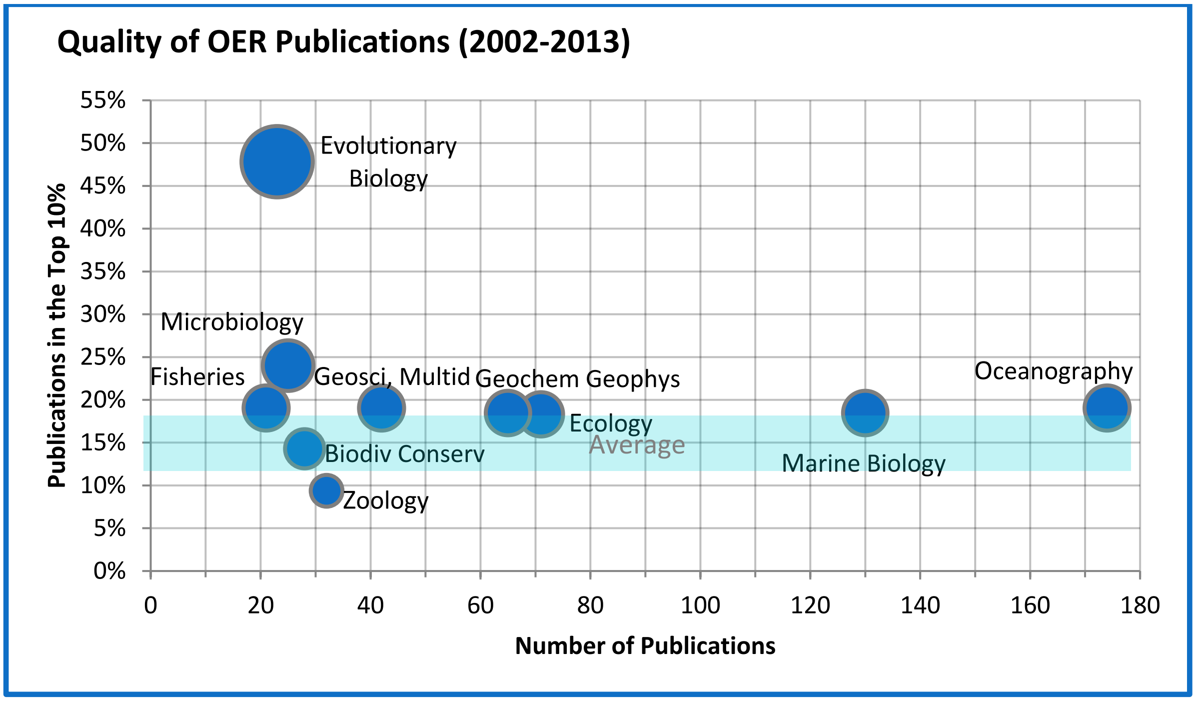

Figure 16: Bubble chart showing the percentage of OER-supported publications in ten subject categories that had citation counts ranking in the top 10% of all publications in WoS that were published in the same categories during the same years (2002-2013). Bubble size indicates the percentage of OER-supported 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 88% of the articles published during 2002-2013 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 2012 or 2011 are listed.

2012

Goldstein MC, Rosenberg M, Cheng LN. 2012. Increased oceanic microplastic debris enhances oviposition in an endemic pelagic insect. Biology Letters 8(5):817-820. doi:10.1098/rsbl.2012.0298

Robinson PW, Costa DP, Crocker DE, Gallo-Reynoso JP, Champagne CD, Fowler MA, Goetsch C, Goetz KT, Hassrick JL, Huckstadt LA et al. . 2012. Foraging Behavior and Success of a Mesopelagic Predator in the Northeast Pacific Ocean: Insights from a Data-Rich Species, the Northern Elephant Seal. Plos One 7(5):e36728. doi:10.1371/journal.pone.0036728

Osborn KJ, Kuhnz LA, Priede IG, Urata M, Gebruk AV, Holland ND. 2012. Diversification of acorn worms (Hemichordata, Enteropneusta) revealed in the deep sea. Proceedings of the Royal Society B-Biological Sciences 279(1733):1646-1654. doi:10.1098/rspb.2011.1916

Nomikou P, Carey S, Papanikolaou D, Bell KC, Sakellariou D, Alexandri M, Bejelou K. 2012. Submarine volcanoes of the Kolumbo volcanic zone NE of Santorini Caldera, Greece. Global and Planetary Change 90-91:135-151. doi:10.1016/j.gloplacha.2012.01.001

Robinson, P. W., Costa, D. P., Crocker, D. E., Gallo-Reynoso, J. P., Champagne, C. D., Fowler, M. A., . . . Yoda, K. (2012). Foraging Behavior and Success of a Mesopelagic Predator in the Northeast Pacific Ocean: Insights from a Data-Rich Species, the Northern Elephant Seal. Plos One, 7(5), e36728. doi: 10.1371/journal.pone.0036728

White, H. K., Hsing, P. Y., Cho, W., Shank, T. M., Cordes, E. E., Quattrini, A. M., . . . Fisher, C. R. (2012). Impact of the Deepwater Horizon oil spill on a deep-water coral community in the Gulf of Mexico. Proceedings of the National Academy of Sciences of the United States of America, 109(50), 20303-20308. doi: 10.1073/pnas.1118029109

2011

Auster PJ, Gjerde K, Heupel E, Watling L, Grehan A, Rogers AD. 2011. Definition and detection of vulnerable marine ecosystems on the high seas: problems with the "move-on" rule. ICES Journal of Marine Science 68(2):254-264. doi:10.1093/icesjms/fsq074

de Ronde CEJ, Massoth GJ, Butterfield DA, Christenson BW, Ishibashi J, Ditchburn RG, Hannington MD, Brathwaite RL, Lupton JE, Kamenetsky VS et al. . 2011. Submarine hydrothermal activity and gold-rich mineralization at Brothers Volcano, Kermadec Arc, New Zealand. Mineralium Deposita 46(5-6):541-584. doi:10.1007/s00126-011-0345-8

Lesser MP, Slattery M. 2011. Phase shift to algal dominated communities at mesophotic depths associated with lionfish (Pterois volitans) invasion on a Bahamian coral reef. Biological Invasions 13(8):1855-1868. doi:10.1007/s10530-011-0005-z

Ludwig KA, Shen CC, Kelley DS, Cheng H, Edwards RL. 2011. U-Th systematics and Th-230 ages of carbonate chimneys at the Lost City Hydrothermal Field. Geochimica et Cosmochimica Acta 75(7):1869-1888. doi:10.1016/j.gca.2011.01.008

McFadden CS, Benayahu Y, Pante E, Thoma JN, Nevarez PA, France SC. 2011. Limitations of mitochondrial gene barcoding in Octocorallia. Molecular Ecology Resources 11(1):19-31. doi:10.1111/j.1755-0998.2010.02875.x

Resing JA, Rubin KH, Embley RW, Lupton JE, Baker ET, Dziak RP, Baumberger T, Lilley MD, Huber JA, Shank TM et al. . 2011. Active submarine eruption of boninite in the northeastern Lau Basin. Nature Geoscience 4(11):799-806. doi:10.1038/ngeo1275

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Abramo G, D'Angelo CA, Cicero T. 2012. What is the appropriate length of the publication period over which to assess research performance? Scientometrics 93(3):1005-1017. doi:10.1007/s11192-012-0714-9

Blondel VD, Guillaume JL, Lambiotte R, Lefebvre E. 2008. Fast unfolding of communities in large networks. Journal of Statistical Mechanics-Theory and Experiment October 2008:P10008. doi:10.1088/1742-5468/2008/10/p10008

Borner K, Chen CM, Boyack KW. 2003. Visualizing knowledge domains. Annual Review of Information Science and Technology 37:179-255. doi:10.1002/aris.1440370106

Borner K, Sanyal S, Vespignani A. 2007. Network science. Annual Review of Information Science and Technology 41:537-607. doi:10.1002/aris.2007.1440410119

Bornmann L, de Moya Anegón F, Leydesdorff L. 2012. The new Excellence Indicator in the World Report of the SCImago Institutions Rankings 2011. Journal of Informetrics 6(2):333-335. doi:10.1016/j.joi.2011.11.006

Boyack KW, Klavans R. 2010. Co-Citation Analysis, Bibliographic Coupling, and Direct Citation: Which Citation Approach Represents the Research Front Most Accurately? Journal of the American Society for Information Science and Technology 61(12):2389-2404. doi:10.1002/asi.21419

Costas R, van Leeuwen TN, van Raan AF. 2011. The "Mendel syndrome" in science: durability of scientific literature and its effects on bibliometric analysis of individual scientists. Scientometrics 89(1):177-205. doi:10.1007/s11192-011-0436-4

Hirsch JE. 2005. An index to quantify an individual's scientific research output. Proceedings of the National Academy of Sciences of the United States of America 102(46):16569-16572. doi:10.1073/pnas.0507655102

Kessler MM. 1963. Bibliographic coupling between scientific papers. American Documentation 14(1):10-25. doi:10.1002/asi.5090140103

Leydesdorff L, Bornmann L, Mutz R, Opthof T. 2011. Turning the tables on citation analysis one more time: Principles for comparing sets of documents. Journal of the American Society for Information Science and Technology 62(7):1370-1381. doi:10.1002/asi.21534

Mane KK, Borner K. 2004. Mapping topics and topic bursts in PNAS. Proceedings of the National Academy of Sciences of the United States of America 101(S1):5287-5290. doi:10.1073/pnas.0307626100

National Science Board. 2012. Science and Engineering Indicators 2012. Arlington VA: National Science Foundation (NSB 12-01).

Newman MEJ. 2001. The structure of scientific collaboration networks. Proceedings of the National Academy of Sciences of the United States of America 98(2):404-409. doi:10.1073/pnas.021544898

Sci2 Team. 2009. Science of Science (Sci2) Tool. Indiana University and SciTech Strategies.

Waltman L, Calero-Medina C, Kosten J, Noyons ECM, Tijssen RJW, van Eck NJ, van Leeuwen TN, van Raan AFJ, Visser MS, Wouters P. 2012. The Leiden ranking 2011/2012: Data collection, indicators, and interpretation. Journal of the American Society for Information Science and Technology 63(12):2419-2432. doi:10.1002/Asi.22708