A Bibliometric Analysis of NOAA Weather Program Office-supported Publications: 2017–2021

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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 funding from NOAA's Weather Program Office (WPO). This report was produced using data retrieved from InCites and Web of Science (WoS) on January 13, 2023 covering articles published from calendar years 2017–2021.

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 WPO-supported articles from peer-reviewed journals not indexed by WoS or from other sources such as book chapters, conference proceedings, or technical reports. The articles analyzed in this report were derived from award identification numbers provided by WPO.

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.

PERFORMANCE

General performance metrics for WPO-supported articles 2017–2021.

Summary Metrics

Indicator	Number
Total number of articles	201
Total number of times of articles above have been cited	1,949
Mean citations per article	9.7
Median citations per article	6
Percentage of articles cited at least once	93%
h-index of 2017–2021 WPO-supported articles	21
Percentage of articles in the top 10%*	11.44%

Table 1. Common Bibliometric Indicators calculated for WPO-supported peer-reviewed articles. An *h*-index of 21 indicates that this group of 201 articles includes 21 articles that have each received 21 or more citations. *Percentage of documents in the top 10% is calculated based on the number of articles that ranked in the top 10% of publications in Web of Science based on citations by category, year and document type; 11.44% of WPO-supported articles published 2017–2021 ranked in the top 10% of all articles in the same category published in the same year. Articles are assigned to subject categories by WoS based on the journal in which the article appeared.

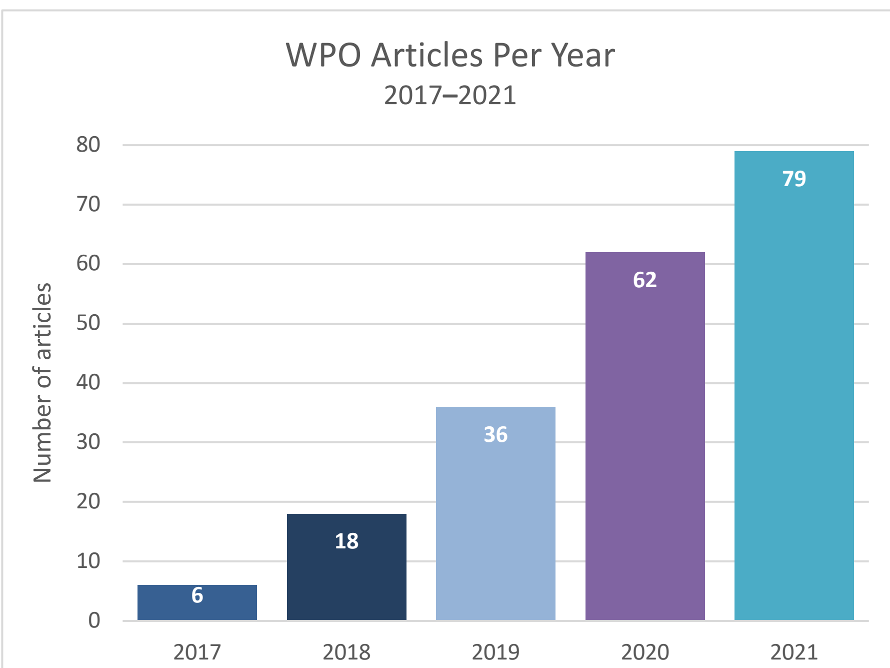

Figure 1. Number of WPO-supported articles published annually, 2017–2021.

Table 2. Top-cited WPO-supported articles 2017–2021	Times cited	Category Normalized Citation Impact
Tong, D. Q., et al. (2017). Intensified dust storm activity and Valley fever infection in the southwestern United States. *Geophysical Research Letters*, *44*(9), 4304-4312. https://doi.org/10.1002/2017gl073524	107	5.8742
Beck, H. E., et al. (2021). Evaluation of 18 satellite- and model-based soil moisture products using in situ measurements from 826 sensors. *Hydrology and Earth System Sciences*, *25*(1), 17-40. https://doi.org/10.5194/hess-25-17-2021	78	21.0824
Mariotti, A., et al. (2020). Windows of Opportunity for Skillful Forecasts Subseasonal to Seasonal and Beyond [Article]. Bulletin of the American Meteorological Society, 101(5), E608-E625. https://doi.org/10.1175/bams-d-18-0326.1	72	7.7715
Wang, Y. M., & Wang, X. G. (2017). Direct Assimilation of Radar Reflectivity without Tangent Linear and Adjoint of the Nonlinear Observation Operator in the GSI-Based EnVar System: Methodology and Experiment with the 8 May 2003 Oklahoma City Tornadic Supercell [Article]. Monthly Weather Review, 145(4), 1447-1471. https://doi.org/10.1175/mwr-d-16-0231.1	68	3.1766
Herman, G. R., & Schumacher, R. S. (2018). Money Doesn't Grow on Trees, but Forecasts Do: Forecasting Extreme Precipitation with Random Forests. Monthly Weather Review, 146(5), 1571-1600. https://doi.org/10.1175/mwr-d-17-0250.1	64	3.5876
Merryfield, W. J., et al. (2020). Current and Emerging Developments in Subseasonal to Decadal Prediction. Bulletin of the American Meteorological Society, 101(6), E869-E896. https://doi.org/10.1175/bams-d-19-0037.1	63	6.8001
Clark, A. J., et al. (2018). THE COMMUNITY LEVERAGED UNIFIED ENSEMBLE (CLUE) IN THE 2016 NOAA/HAZARDOUS WEATHER TESTBED SPRING FORECASTING EXPERIMENT. Bulletin of the American Meteorological Society, 99(7), 1433-1448. https://doi.org/10.1175/bams-d-16-0309.1	53	2.915
Schumacher, R. S., & Rasmussen, K. L. (2020). The formation, character and changing nature of mesoscale convective systems [Review]. Nature Reviews Earth & Environment, 1(6), 300-314. https://doi.org/10.1038/s43017-020-0057-7	37	1.5186
Gowan, T. M., Steenburgh, W. J., & Schwartz, C. S. (2018). Validation of Mountain Precipitation Forecasts from the Convection-Permitting NCAR Ensemble and Operational Forecast Systems over the Western United States. Weather and Forecasting, 33(3), 739-765. https://doi.org/10.1175/waf-d-17-0144.1	35	1.962

Lahmers, T. M., Gupta, H., Castro, C. L., Gochis, D. J., Yates, D., Dugger, A., Goodrich, D., & Hazenberg, P. (2019). Enhancing the Structure of the WRF-Hydro Hydrologic Model for Semiarid Environments. Journal of Hydrometeorology, 20(4), 691-714. https://doi.org/10.1175/jhm-d-18-0064.1	33	2.4632
Schwartz, C. S., Romine, G. S., Sobash, R. A., Fossell, K. R., & Weisman, M. L. (2019). NCAR's Real-Time Convection-Allowing Ensemble Project. Bulletin of the American Meteorological Society, 100(2), 321-343. https://doi.org/10.1175/bams-d-17-0297.1	33	2.4632
Tang, Y. H., et al. (2017). A case study of aerosol data assimilation with the Community Multi-scale Air Quality Model over the contiguous United States using 3D-Var and optimal interpolation methods. Geoscientific Model Development, 10(12), 4743-4758. https://doi.org/10.5194/gmd-10-4743-2017	31	1.7019
Cintineo, J. L., et al. (2018). The NOAA/CIMSS ProbSevere Model: Incorporation of Total Lightning and Validation. Weather and Forecasting, 33(1), 331-345. https://doi.org/10.1175/waf-d-17-0099.1	28	1.5696
Vergopolan, N., Chaney, N. W., Beck, H. E., Pan, M., Sheffield, J., Chan, S., & Wood, E. F. (2020). Combining hyper-resolution land surface modeling with SMAP brightness temperatures to obtain 30-m soil moisture estimates. Remote Sensing of Environment, 242, 15. https://doi.org/10.1016/j.rse.2020.111740	27	2.5126
Karstens, C. D., et al. (2018). Development of a Human-Machine Mix for Forecasting Severe Convective Events. Weather and Forecasting, 33(3), 715-737. https://doi.org/10.1175/waf-d-17-0188.1	27	1.5135
Hill, A. J., Herman, G. R., & Schumacher, R. S. (2020). Forecasting Severe Weather with Random Forests. Monthly Weather Review, 148(5), 2135-2161. https://doi.org/10.1175/mwr-d-19-0344.1	25	2.6985
Duda, J. D., Wang, X. G., Wang, Y. M., & Carley, J. R. (2019). Comparing the Assimilation of Radar Reflectivity Using the Direct GSI-Based Ensemble-Variational (EnVar) and Indirect Cloud Analysis Methods in Convection-Allowing Forecasts over the Continental United States. Monthly Weather Review, 147(5), 1655-1678. https://doi.org/10.1175/mwr-d-18-0171.1	23	1.7168
Guzman, O., & Jiang, H. Y. (2021). Global increase in tropical cyclone rain rate. Nature Communications, 12(1), 8. https://doi.org/10.1038/s41467-021-25685-2	23	5.5981
Jones, T. A., et al. (2020). Assimilation of GOES-16 Radiances and Retrievals into the Warn-on-Forecast System. Monthly Weather Review, 148(5), 1829-1859. https://doi.org/10.1175/mwr-d-19-0379.1	22	2.3746

Zhang, Y. J., Stensrud, D. J., & Zhang, F. Q. (2019). Simultaneous Assimilation of Radar and All-Sky Satellite Infrared Radiance Observations for Convection-Allowing Ensemble Analysis and Prediction of Severe Thunderstorms. *Monthly Weather Review*, *147*(12), 4389-4409. https://doi.org/10.1175/mwr-d-19-0163.1	22	1.6421

Table 2: List of twenty (20) most highly cited articles referencing WPO-supported research published 2017–2021. The trophy symbol indicates that a paper received enough citations to place it in the top 1% of its academic field on a highly cited threshold for the field and publication year. The Category Normalized Citation Impact (CNCI) is an indicator developed by WoS meant to provide insight into the impact of a publication irrespective of age, subject or document type. The CNCI of a document is calculated by dividing the actual count of citing items by the expected citation rate for documents with the same document type, year of publication and subject area. CNCI values above 1 are considered above average.

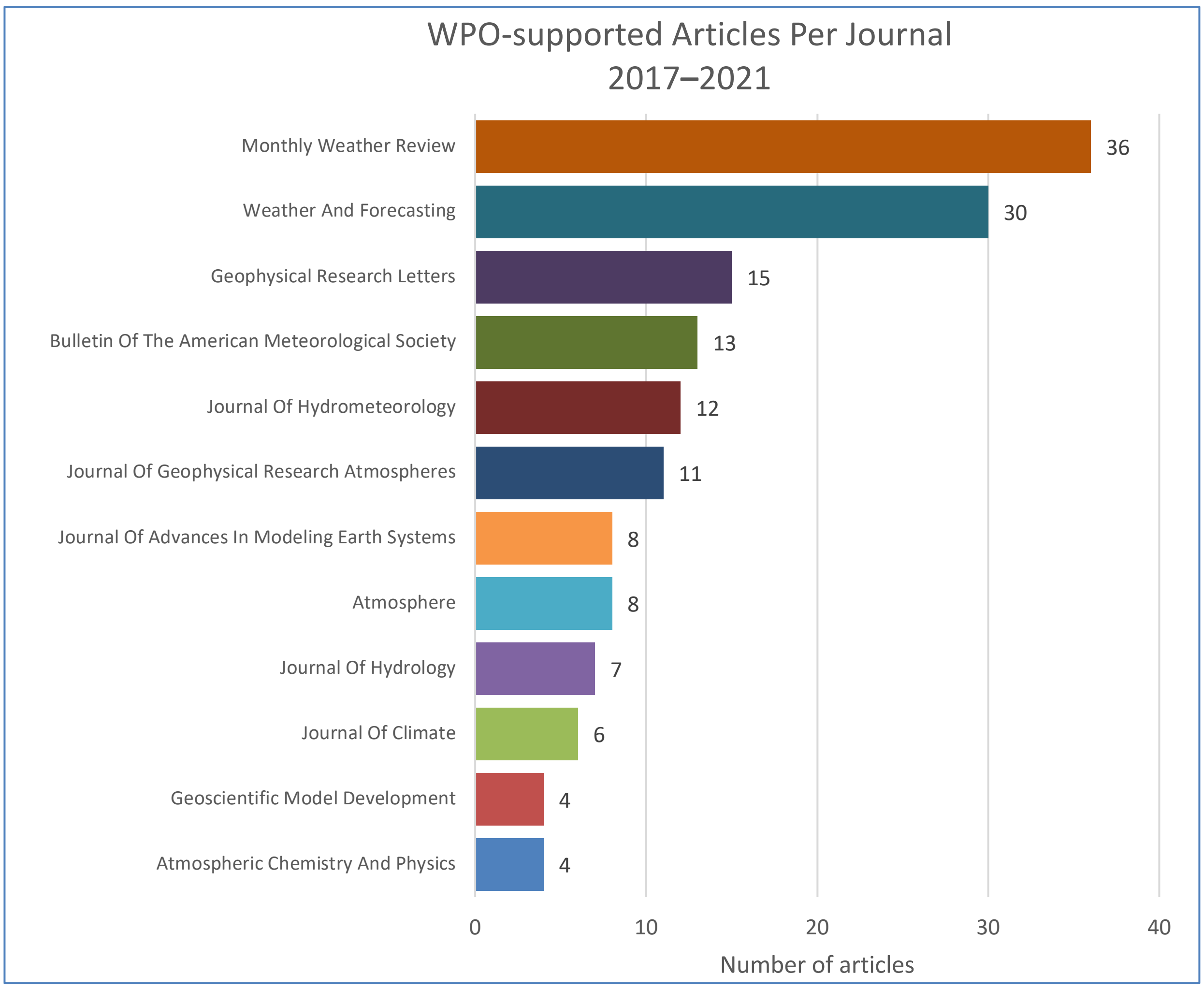

Figure 2. Journals in which WPO-supported research has been published four or more times 2017–2021. WPO-supported articles were published in 45 titles 2017–2021.

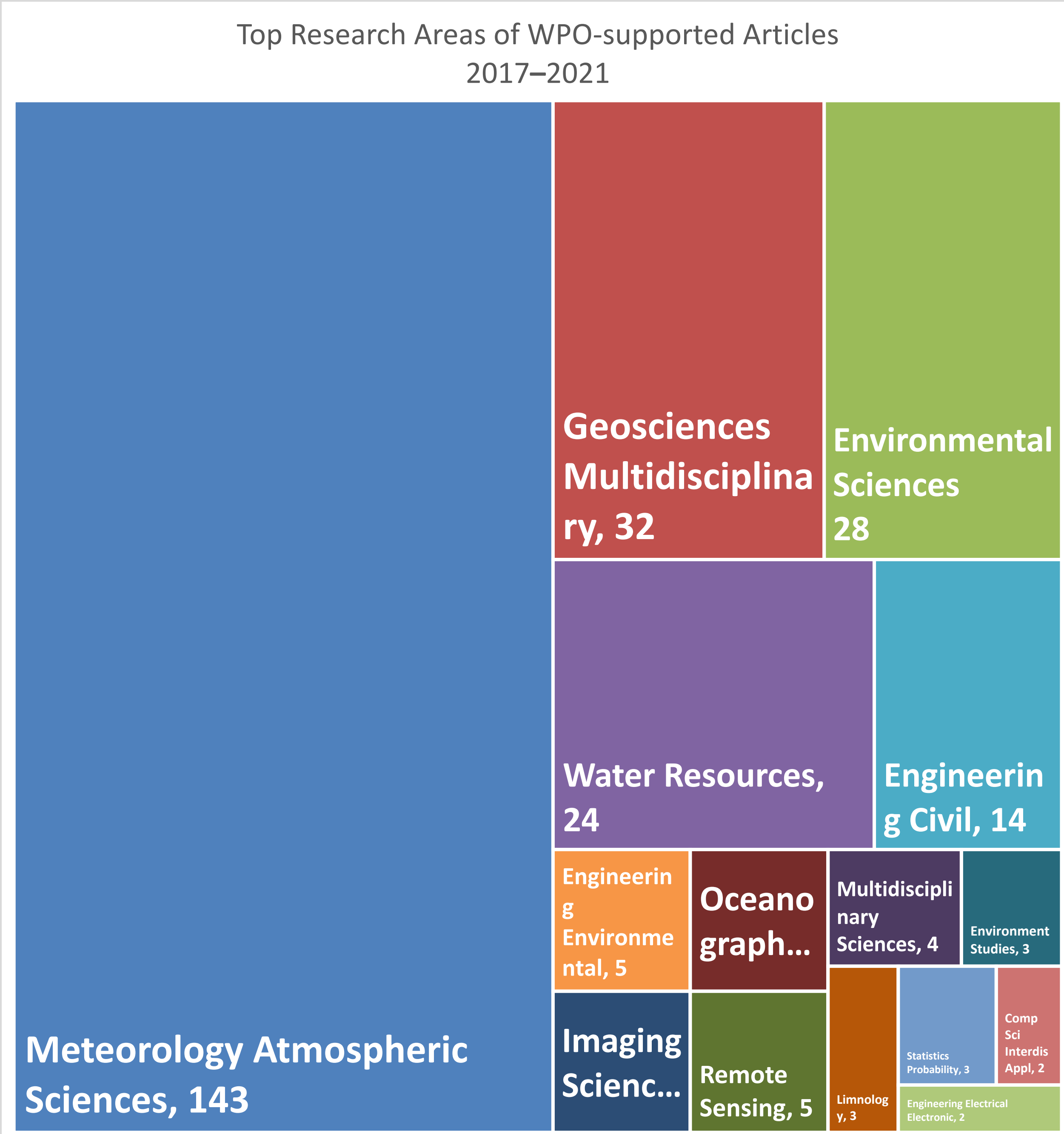

Figure 3. WPO-supported articles appeared in journals categorized in 25 distinct research areas as defined and assigned by Web of Science. The top fifteen research areas by number of publications are presented here. Articles are assigned to subject categories by WoS based on the journal in which the article appeared. These subject categories are not mutually exclusive meaning a single article may be counted in multiple categories.

COLLABORATION

This section explores coauthor and institutional relationships.

Institution	Number of occurrences
NOAA	79
NCAR	47
University Of Oklahoma System	46
Colorado State University	27
University Of Colorado System	18
University Of Texas System	15
University Of Texas Arlington	13
NASA	12
George Mason University	11
State University System Of Florida	10
University Of California System	9
University Of Miami	9
University Of Wisconsin System	9
University System Of Maryland	9
University Of Arizona	8
Florida International University	7
NASA Goddard Space Flight Center	7
United States Department Of Defense	7
Princeton University	6
State University Of New York SUNY System	6

Table 3. Top institutional affiliations of collaborating authors on WPO-supported articles 2017–2021.

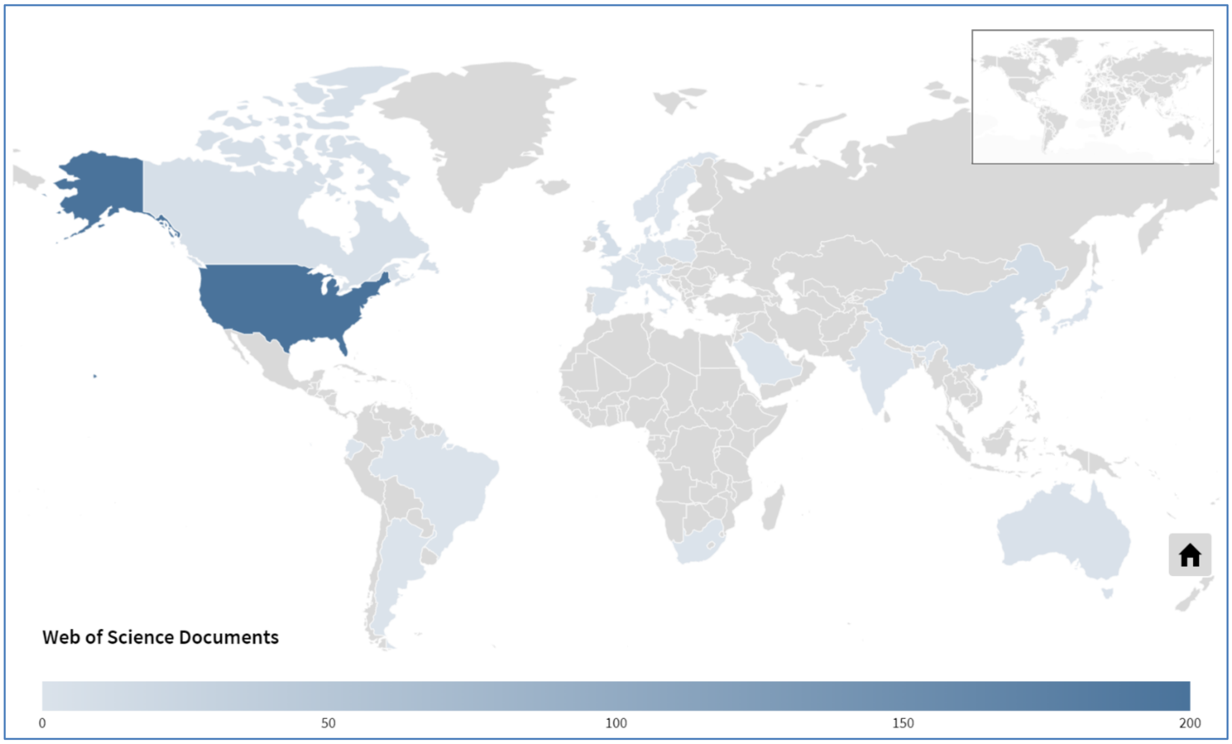

Figure 4. Geographic map illustrating international collaborations on WPO-supported articles published 2017–2021.

IMPACT

This section analyzes the 1,558 publications citing 201 WPO articles for insights into the value and impact of WPO research.

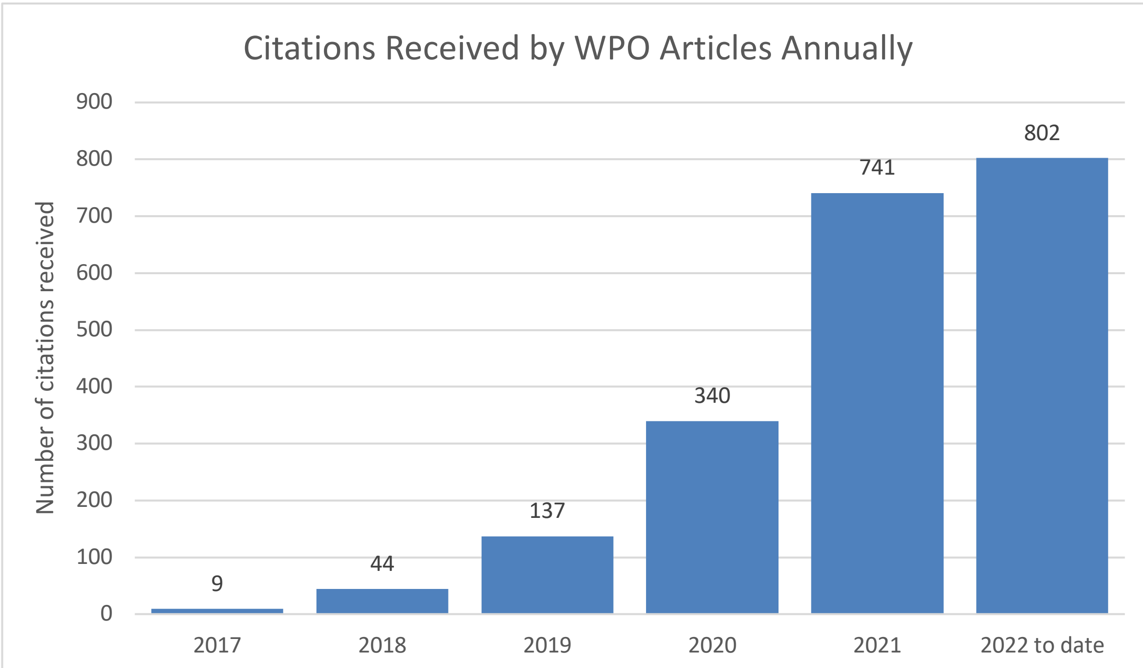

Figure 5: Non-cumulative number of citations received by this set of WPO-supported articles 2017–2021.

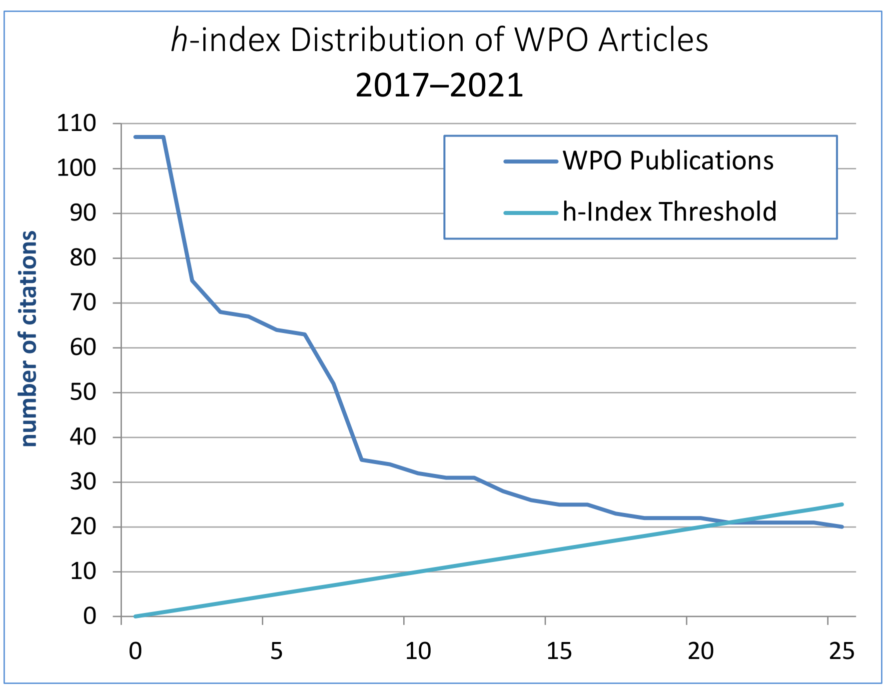

Figure 6: Distribution curve showing the citation counts of the 25 most highly cited WPO-supported articles 2017–2021. The straight line indicates the *h*-Index threshold (slope: y = x). The intersect point of the two curves (21) is the *h*-Index of WPO articles.

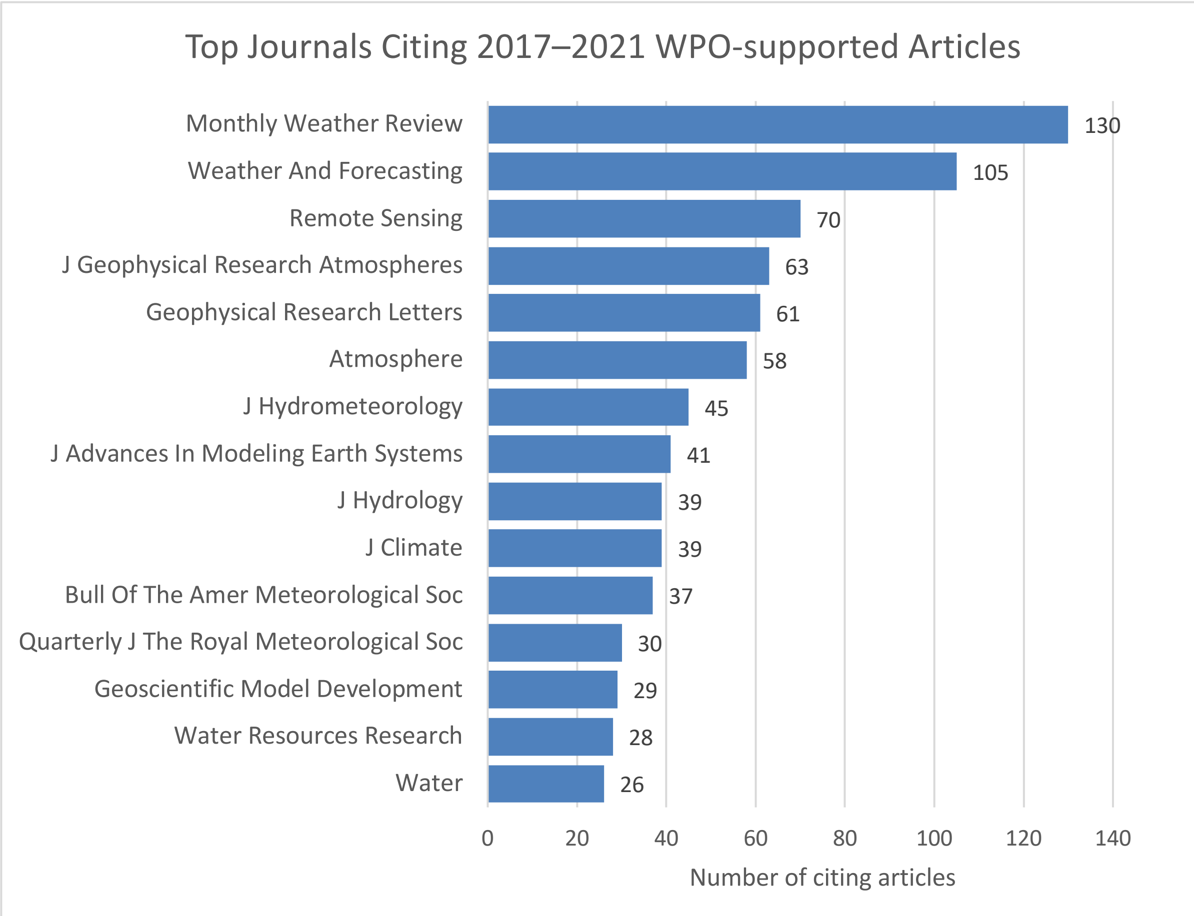

Figure 7: The 201 WPO-supported articles analyzed in this report have been cited in 256 distinct titles since publication. The top fifteen (15) titles are shown here.

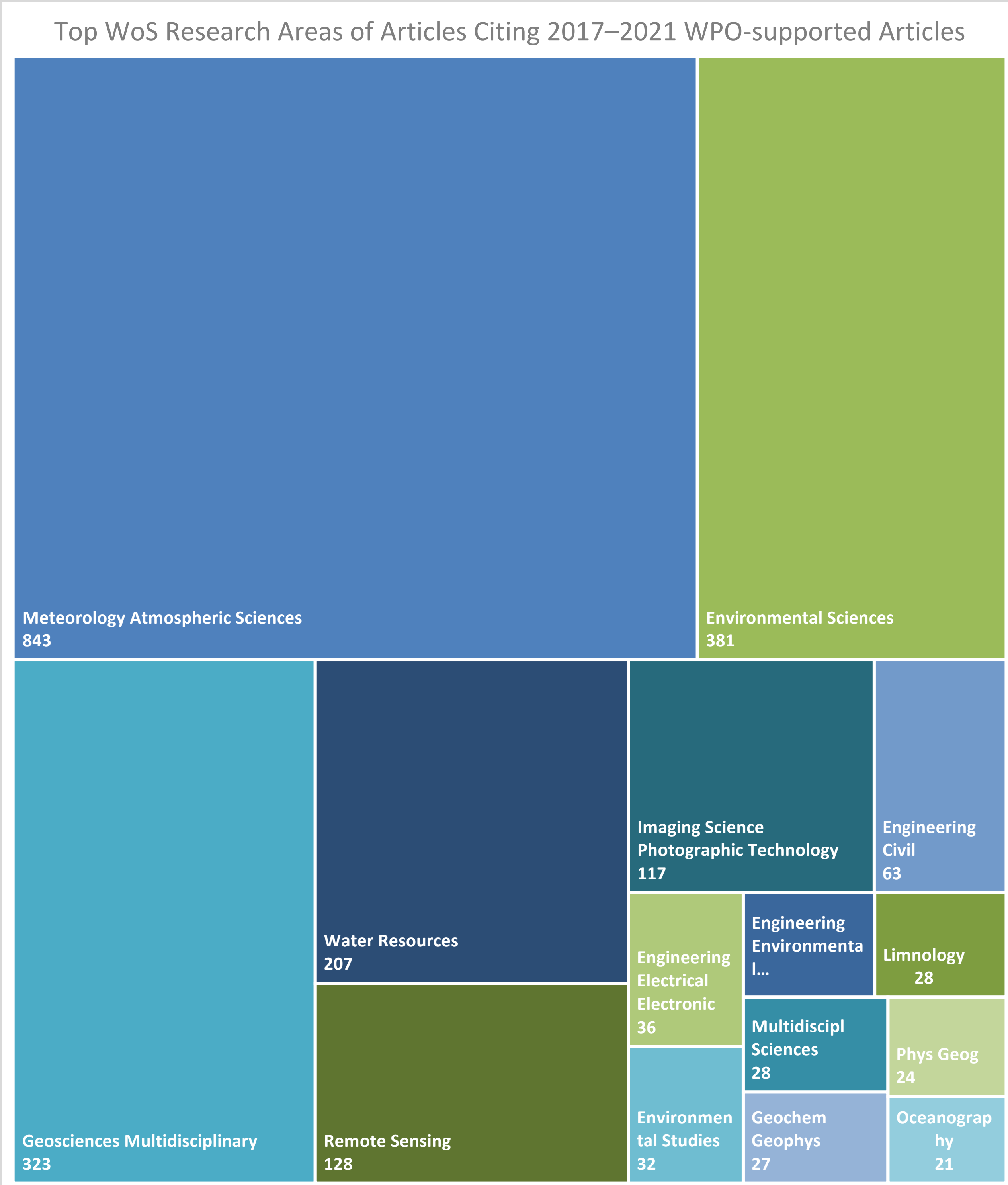

Figure 8: The fifteen (15) most commonly published in Web of Science (WoS) research areas in which these WPO-supported articles were published. Articles are assigned to subject categories by WoS based on the journal in which the article appeared. These subject categories are not mutually exclusive meaning a single article may be counted in multiple categories.

Figure 9: The 201 WPO-supported articles analyzed in this report have been cited by authors affiliated with more than 1,500 organizations. The top twenty of these organizations are shown here.

APPENDIX 1: RESPONSIBLE USE OF BIBLIOMETRICS

When used alongside other evaluative measures, bibliometrics can be a useful tool for evaluating research. However, all bibliometric indicators have limitations and should not be used out of context or applied without a full understanding of their intended use. No single metric can provide a rounded overview of research performance and so a responsible use of metrics requires using multiple metrics and providing context for those metrics. It can be helpful to think of a bibliometric analysis as a story where each indicator is a plot point. Additionally, bibliometrics should not be used as the sole basis for decision-making or for evaluating the work of either an individual or group.

Some Pros & Cons of Bibliometrics

Pros

- Quantitative, objective and reproducible
- Easy to understand and easily updated
- Fully scalable - from individual- to country-level

Cons

- Datasets, particularly from standard databases like Web of Science (WOS), may represent only a portion of existing publications
- Most indicators are skewed and are vulnerable to manipulation by authors & publishers. For example, *h*-index highly favors authors with longer careers
- Indicators don't necessarily mean what we think they mean (e.g. a high citation count may be the result of "negative" citations, rather than an indicator of quality)

For additional reading on the responsible use of bibliometrics:

Aksnes, D. W., L. Langfeldt, & P. Wouters. 2019. Citations, Citation Indicators, and Research Quality: An Overview of Basic Concepts and Theories. SAGE Open, 9. doi:10.1177/2158244019829575.

Barnes, C. 2017. The h-index debate: An introduction for librarians. The Journal of Academic Librarianship 43:487-494, doi:10.1016/j.acalib.2017.08.013.

Belter, C.W. 2015. Bibliometric indicators: Opportunities and limits. Journal of the Medical Library Association. 103(4):219-221. doi:10.3163/1536-5050.103.4.014.

Clarivate Analytics. 2020. InCites benchmarking & analytics: Responsible use of research metrics. http://clarivate.libguides.com/incites_ba/responsible-use. Accessed 12/16/2020.

Haustein, S., V. Lariviere. 2015. The use of bibliometrics for assessing research: Possibilities, limitations and adverse effects. In: Welpe IM, J. Wollersheim, S. Ringelhan, M. Osterloh, eds. Incentives and performance. Springer, Cham. Pg. 121–139. doi:10.1007/978-3-319-09785-5_8.

Hicks, D., P. Wouters, L. Waltman, S. de Rijcke and I. Rafois. 2015. Bibliometrics: The Leiden Manifesto for research metrics. Nature 520:420-531. doi:10.1038/520429a.

Pendlebury, D.A. 2010. White paper: Using bibliometrics in evaluating research. Thomson Reuters, Philadelphia, PA. https://lib.guides.umd.edu/ld.php?content_id=13278687.

APPENDIX 2: METHOD AND SOURCES

This report provides a bibliometric analysis of publications supported by funding from the NOAA Weather Program Office (WPO) published between January 2016 and December 2021. For our data source, we used publications showcasing research identified as being funded by WPO. These efforts are courtesy of the NOAA Central Library bibliometrics team using our own search string and a list of award identification numbers provided by WPO. However, because WoS analytical tools were used in this bibliometric analysis, WPO-supported publications that do not appear in WoS have been omitted from the data set. Bibliographic citations and citation data were downloaded from WoS and Clarivate InCites.

Although we have included citation data through January 2023 in our data set, it is generally agreed that publications must be at least two years old for citation reporting to be meaningful. Therefore it should be noted that the citation data for the more recent publications is preliminary and is most likely not indicative of their eventual impact.

Publication and citation data were downloaded from Web of Science and InCites on January 13, 2023. Because of slight differences in indexing schedules and algorithms, citation data can vary slightly between WoS and InCites. The full publication list and data sets are from Sarah.Davis@noaa.gov.