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Impact of Open Access on Journal Indices of Geology Journals

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***Abstract* - The aim of the present study is to analyze the open access status of geology journals and the impact of open access status on journal indices. This paper intends to measure journal indices for open access journals in geology, and compare them with the indices of non-open access journals in geology. The question of whether publishing in the open access mode is beneficial to authors is examined. The data was collected from Scopus Source List on 10th February 2022. Geology journals were filtered from this. Open Access journals covered by Scopus are recognized as Open Access if the journal is listed in the Directory of Open Access Journals (DOAJ) and/or the Directory of Open Access Scholarly Resources (ROAD). For each journal, we extracted different scientometric indicators and then compared these scientometric indicators with respect to the journals' status as Open Access or Non-Open Access. Upon analyzing the difference between 50 OA and 184 non-OA journals with sufficient metric values in Scopus Source List, no significant differences were found between Geology OA and non-OA journals in the indices like citescore, citation count, scholarly output, percent cited, SNIP, SJR and percentile. Publishing in Open Access and non-Open Access journals in Geology will yield citations.**
***Keywords:* Bibliometrics, Open Access (OA), Citation, Geology, DOAJ, Hybrid Journals**

I. INTRODUCTION

Open access (OA) journals allow free (access to/availability of) academic articles, they enable any user to read, search, download, share, use them for indexing, print the full texts, or utilize them as data for software without being charged (BOAI, 2002). OA journals are journals whose articles are available and reusable worldwide free of charge and without restrictions, immediately on publication. In terms of quality, there is supposed to be no difference between open access and closed access (i.e., subscription base) journals, but the lackluster peer review process in many OA journals have often been exposed (Bohannon, 2013).

The main difference between open and closed access journals lies in the free availability and reusability of the former and in the way they are funded (http//open-access.net/en/community/open-access-tage/open-access-days2021-bern). There is a claim that with the emergence of OA journals the visibility and the impact of the published papers of the authors are high, though this is debated by some (Antelman, 2004). All predatory journals are open access, and find a place in Beall's list, Manca's list, Cabell's blacklist, and Strinzel blacklist, thereby placing the OA movement under a shroud of suspicion. OA journals listed in Beall's list show a strong tendency towards a decline in their article output (2012-20) as well as very low citations, when compared to OA journals that are covered by SCOPUS (Moed *et al.*, 2021).

The so-called Guerilla Open Access initiatives like Sci-Hub has brought in additional complications to the scholarly journal publishing industry that is dominated by just nine major publishers. But Sci-Hub has demonstrated that despite the successful OA initiatives, there is a huge population of users who still does not have seamless access to OA as well as non-OA papers (Greshake 2017). OA also often faces accusations of 'double-dipping' where authors pay for making content open, but publishers still place a pay wall to access the content (Pinfield and Johnson, 2018). Despite this handicap, several OA journals have high standing, and in this study, we aim to analyze the OA status of Geology journals and the impact of OA status on different journal indices.

II. RESEARCH OBJECTIVES

1. To identify the publishers of OA and non-OA journals in Geology.
2. To determine the mean scientometric indicators of OA and non-OA journals in Geology.
3. To find out whether there is significant difference between OA and non-OA journals with regard to their scientometric indicators.

III. MATERIALS AND METHODS

A. Data Collection

Data was collected about included journals from Scopus Source List on 10th February 2022. The list was filtered to extract the Geology Open Access journals covered by Scopus which are recognized as OA if the journal is listed in the Directory of Open Access Journals (DOAJ) and/or the Directory of Open Access Scholarly Resources (ROAD).

B. Variables (Scientometric Indicators)

For each journal, the following variables were extracted

1. *CiteScore:* CiteScore measures average citations received per document published in the journal.
2. *CiteScore Percentile:* CiteScore Percentile indicates the relative standing of a journal in its subject field. For example, a journal that has a CiteScore Percentile of 96% is ranked according to CiteScore as high or higher than 96% of titles in that category. A title will receive a CiteScore Percentile for each subject area in which it is indexed in Scopus.
3. *Citation Count:* Citations received in one year (*e.g.* 2020) for the documents published in the previous three years (*e.g.* 2017-2019).
4. *Scholarly Output:* Sum of documents published in the journal title (*e.g.* 2020) in the three years prior to the year of the metric (*e.g*. 2017-2019).
5. *Percent Cited:* The proportion of documents published in a period (*e.g.* 2017-2019) that have received at least one citation in a subsequent year (*e.g.* 2020).
6. *SCImago Journal Rank:* SCImago Journal Rank measures weighted citations received by the journal. Citation weighting depends on subject field and prestige (SJR) of the citing serial.
7. *Source Normalized Impact per Paper (SNIP):* Source Normalized Impact per Paper measures actual citations received relative to citations expected for the journal's subject field.
8. *SCImago Quartiles:* Quartile 1 (Q1) = 99th – 75th CiteScore percentile. Quartile 2 (Q2) = 74th – 50th CiteScore percentile. Quarter 3 (Q3) = 49th – 25th CiteScore percentile and Quartile 4 = 24th – 0 CiteScore percentile.

C. Statistical Analysis

The SPSS version 22.0 was used for analysis. As scientometric data follows non-normality (the distribution of the data was assessed with a Kolmogorov-Smirnov test) non-parametric Mann--Whitney test was used to analyze the difference between scientometric indicators and status (OA or non-OA) of the journals. Mean was used with Standard Deviation (SD) to describe the scientometric indicators. For inferential analysis median value is given with quartile values (Q1-Q3) (25% to 75%).

IV. RESULTS

According to the 2020 Scopus report, there are 356 Geology journals listed along with their citation-based scientometric indicators. Publisher-wise analysis of 356 Geology journals is given in Table I. Fifty six (15.73%) journals were found to be OA and 300 (84.27%) journals were non-OA status. Elsevier publishes 28, Springer Nature 16, Wiley-Blackwell and Taylor & Francis 12 each and Science Press 9 journals. Other publishers together publish 279 journals. The table also shows that the major renowned publishers are publishing only a small percent of OA journals in the Geology subject field.

TABLE I FREQUENCY OF OA AND NON-OA JOURNALS AMONG THE MOST PROLIFIC GEOLOGY JOURNAL PUBLISHERS

Publishers	Journal Status		Total
	OA	Non-OA	
Elsevier	3(10.71)	25(89.29)	28(100)
Science Press	0(0)	9(100)	9(100)
Springer Nature	3(18.75)	13(81.25)	16(100)
Taylor & Francis	1(8.33)	11(91.67)	12(100)
Wiley-Blackwell	1(8.33)	11(91.67)	12(100)
Others	48(17.20)	231(82.80)	279(100)
Total	56(15.73)	300(84.27)	356(100)

Values are number of journals with percentages in parentheses

For metrics analysis, only 234 journals with sufficient metric values in Scopus Source List 2020 were considered. These 234 journals include 50 OA and 184 non-OA journals. Thus six OA journals and 116 non-OA journals were excluded from the study. Table II details the minimum, maximum, mean and standard deviation of scientometric indicators of the selected 234 Geology journal indices. Table III and IV show the descriptive statistics (mean (Q2), Q1 (25th quartile) and Q3 (75th quartile) values of scientometric indicators of 50 OA and 184 non-OA journals, respectively.

No significant differences were between Geology OA and non-OA journals (Table V) in the following indices.

1. CiteScore (P = 0.960): with a median of 1.95 (25–75%: 0.9–4.125) for OA, and a median of 2 (25 – 75%: 0.9 – 4.2) for non-OA journals.
2. Citation Count (P=0.412): with a median of 239 (25 – 75%: 72.50 – 1007.25) for OA, and a median of 292.50 (25 – 75%: 70.25 – 1400.75) for non-OA journals.
3. Scholarly Output (P=0.088): with a median of 109 (25 – 75%: 58.75 – 263.75) for OA, and a median of 156.50 (25 – 75%: 67.5 – 475.5) for non-OA journals.

4. Percent Cited (P=0.820): with a median of 62 (25 – 75%: 47.75 – 70.25) for OA, and a median of 59.50 (25 – 75%: 39 – 76) for non-OA journals.
5. SNIP (P=0.274) with a median of 0.79850 (25 – 75%: 0.54900 – 1.24650) for OA, and a median of 0.74650 (25 – 75%: 0.41425 – 1.12000) for non-OA journals.
6. SJR (P=0.844): with a median of 0.44100 (25 – 75%: 0.21850 – 0.70325) for OA, and a median of 0.41750 (25 – 75%: 0.22425 – 0.78025) for non-OA journals.
7. Percentile (P= 0.886): with a median of 56.50 (25 – 75%: 31.25 – 75.25) for OA, and a median of 53 (25 – 75%: 29.25 – 77.75) for non-OA journals.

TABLE II DESCRIPTIVE STATISTICS FOR METRICS OF SELECTED 234 GEOLOGY JOURNALS

Variables	N	Minimum	Maximum	Mean	Std. Deviation
CiteScore	234	10	17.60	2.8393	2.63933
Citation Count	234	2	32721	1468.12	3347.822
Scholarly Output	234	5	2782	325.64530	449.964145
Percent Cited	234	5	94	56.842	21.5481
SNIP	234	.000	3.345	.84974	.554072
SJR	234	.000	3.611	.62359	.603876
CiteScore Percentile	234	2	99	52.90	28.177

TABLE III DESCRIPTIVE STATISTICS FOR METRICS OF 50 OA GEOLOGY JOURNALS

Metrics	Cite Score	Citation Count	Scholarly Output	Percent Cited	SNIP	SJR	Cite Score Percentile
N	50	50	50	50	50	50	50
Median(Q2)	1.9500	239.00	109.00000	62.000	.79850	.44100	56.50
Percentiles25(Q1)	.9000	72.50	58.75000	47.750	.54900	.21850	31.25
75(Q3)	4.1250	1007.25	263.75000	70.250	1.24650	.70325	75.25

TABLE IV DESCRIPTIVE STATISTICS FOR METRICS OF 184 NON OA GEOLOGY JOURNALS

Metrics	Cite Score	Citation Count	Scholarly Output	Percent Cited	SNIP	SJR	Cite Score Percentile
N	184	184	184	184	184	184	184
Median(Q2)	2.0000	292.50	156.50000	59.500	.74650	.41750	53.00
Percentiles25(Q1)	.9000	70.25	67.50000	39.000	.41425	.22425	29.25
75(Q3)	4.2000	1400.75	475.50000	76.000	1.12000	.78025	77.75

TABLE V MANN-WHITNEY U TEST

Metrics	Journal Status		Z value	P value
	OA	Non-OA		
Cite Score	117.93	117.38	0.051	0.960
Citation Count	110.54	119.39	0.820	0.412
Scholarly Output	103.02	121.43	1.706	0.088
Percent Cited	119.43	116.98	0.227	0.820
SNIP	126.79	114.98	1.094	0.274
SJR	115.83	117.95	0.197	0.844
Cite Score Percentile	118.93	117.11	0.168	0.866

Table VI compares the top 10 OA and non-OA journals in Geology in respect of their SJR value. The SJR of non-OA journals ranges from 1.899 to 3.611, citation count from 1630 to 32721, scholarly output from 196 to 1864 and IF ranges from 4.004 to 10.164, whereas the SJR of OA journals ranges from 0.805 to 2.653, citation count ranges from 177 to 2774, scholarly output ranges from 53 to 631 and IF ranges from 0 to 6.053.

TABLE VI COMPARISON BETWEEN THE 10 HIGHEST-RANKED OA AND NON-OAJOURNALS ACCORDING TO SJR INDEX

OA Status	Journals	SJR	Citation Count	Scholarly Output	Impact Factor	Scopus Coverage	Country
Non-OA	Remote Sensing of Environment	3.611	32721	1864	10.164	1969	USA
	Gondwana Research	2.859	8633	729	6.051	1997	USA
	Journal of Metamorphic Geology	2.639	1630	196	4.850	1983	UK
	Geology	2.609	9258	1076	5.399	1973	USA
	Engineering Geology	2.441	11555	1288	6.755	1965	Netherlands
	Precambrian Research	2.358	8552	1149	4.725	1974	Netherlands
	Bulletin of the Geological Society of America	2.197	3312	485	4.799	1890	USA
	Rock Mechanics and Rock Engineering	2.140	9936	1108	6.730	1983	Austria
	International Journal of Coal Geology	2.048	7807	688	6.806	1980	Netherlands
	Lithos	1.899	9188	1522	4.004	1968	Netherlands
OA	Geochemical Perspectives Letters	2.653	1059	113	5.567	2015	France
	Elements	2.011	2283	269	6.053	2013	USA
	Geosphere	1.879	2105	367	3.298	2005	USA
	Lithosphere	1.737	1282	232	3.375	2009	USA
	GSA Today	1.606	461	53	-	1991	USA
	Solid Earth	1.194	1756	387	3.337	2010	Germany
	Geologie en Mijnbouw/Netherlands Journal of Geosciences	0.914	342	59	3.263	1970	Netherlands
	Solid Earth Sciences	0.836	177	46	-	2016	China
	Earth, Planets and Space	0.835	2774	631	2.363	1993	Switzerland
	Petroleum	0.805	1494	197	-	2015	China

V. DISCUSSION

It is observed that the number of Geology OA journals in Scopus is comparatively low (56, 15.73%) when compared with that of non-OA journals (300, 84.27%) in Geology. Major publishers like Elsevier, Springer, Taylor & Francis and Wiley-Blackwell contribute only a small percent of OA journals in Geology. Piwowar *et al.,* (2018) found that at least 28% of the scholarly literature is OA (19 million in total; 2015 data) and growth is driven by Gold and Hybrid access. Geology OA publishing may thus be lesser than the world average. Moreover it has been demonstrated by Greshake (2017) that most of the downloads from Sci-Hub are of papers from chemistry, physics and medicine, and no Geology journal figures in the top-20 journals from which Sci-Hub users download papers.

Although the median number of cite score, citation count, scholarly output by non-OA Geology journals are slightly higher than that of OA Geology journals, the other scientometric indicators like percent cited, SNIP, SJR and cite score percentile are similarly slightly higher for OA Geology journals than that of non-OA Geology journals. Even though there are some minor differences in respect of scientometric indicators for OA and non-OA journals, the non-parametric Mann-Whitney U-test shows no significant difference between OA and non-OA Geology journals with respect to their scientometric indicators (Table V).

Journal reputation is one of the significant criteria adopted by the majority of authors in publishing their valuable research papers. Table VI compares the ten highest- ranked OA and non-OA Geology journals according to the SJR index. The non-OA journals have a comparatively better SJR value than of OA journals. The SJR value of non-OA journals ranges from 1.899 to 3.611. The same trend is also visible in the Impact Factor (IF) values. The IF values of non-OA Geology journals range from 4.004 to 10.164. In comparison, the IF of OA Geology journals are less than 7. Moreover, three journals have no IF value.

VI. LIMITATIONS OF THE STUDY

The study has several limitations. The publishing model discussed here is the gold OA model, where the journal makes the article openly available at its website, and the author has only the option of publishing in OA model. The other form of publishing, known as the hybrid model, where journals allow authors to choose to publish in either OA or not, is not discussed here. Moreover, non-OA journals can sometimes be available free of charge for researchers in large institutions that subscribe to these journals, a factor that influences higher citation for non-OA journals.

VII. CONCLUSION

The advancement of science is the responsibility of scientists engaged in scientific research and scholarly communication. Open Access publications should be encouraged by the funding bodies by bearing the cost of OA publishing of their institutional scientists. The major publishers like Elsevier, Springer Nature, Science Press, Wiley-Blackwell and Taylor and Francis should come forward to increase their number of OA journals in the subject field of Geology. Publishing in Open Access and non-Open Access journals in Geology will yield citations irrespective of the nature of access.

REFERENCES

[1] S. A. AIRyalat, A. A. Nassar, F. Tamimi, E. Al-Fraihat, L. Assaf, R. Ghareeb, M. Masoudi, and M. Al-Essa, "The impact of open-access status on journal indices: Oncology journals," *Journal of Gastrointestinal Oncology*, Vol. 10, No. 4, pp. 777-782, 2019.

[2] S.A. AIRyalat, A. A. Nassar, F. Tamimi, E. Al-Fraihat, L. Assaf, R. Ghareeb, M. Masoudi, and M. Al-Essa, "The impact of open-access status on journal indices: Respiratory and Pulmonology journals," *Current Respiratory Medicine Reviews*, Vol. 15, No. 1, pp. 1-6, 2019.

[3] S.A. AlRyalat, M. Saleh, M. Alaqraa, Y. Alkayed, M. Abaza, H. A. Saa, and A. Alshamiry, "The impact of the open-access status on journal indices: a review of medical journals," [version 1; peer review: 3 approved, 1 approved with reservations]. *F1000Research*, Vol. 8, No. 266, 2019. [Online]. Available: https://doi.org/10.12688/ f1000research.17979.1.

[4] K. Antelman, "Do open-access articles have a greater research impact? *College and Research Libraries*," Vol. 65, No. 5, pp. 372-382, 2004. [Online]. Available: https://doi.org/10.5860/crl.65.5.372.

[5] J. Bohannon, "Who's Afraid of Peer Review? *Science*," Vol. 342, No. 6154, pp. 60-65, 2013. DOI: 10.1126/science.342.6154.60.

[6] "Budapest Open Access Initiative (BOAI)", *Interlending & Document Supply*, Vol. 30, No. 2, 2002. [Online]. Available: https://doi.org/10.1108/ilds.2002.12230bab.012.

[7] B. Greshake, "Looking into Pandora's Box: The Content of Sci-Hub and its Usage [version 1; peer review: 2 approved, 2 approved with reservations]." *F1000Research*, Vol. 6, No. 54, pp. 1-17, 2017. [Online]. Available: https://doi.org/10.12688/f1000research.11366.1.

[8] L. Malkawi, N. Al-Ryalat, E. Al Hadidi, D. Serrieh, and S. A. AlRyalat, "The impact of open access status on journal *indexes of Radiology journals*, 2019. DOI: doi.org/10.2214/AJR.19.21215.

[9] H.F. Moed, C. Lopez-Illescas, V.P. Guerrero-Bote, and F. de Moya-Anegon, "Journals in Beall's list perform as a group less well than other open access journals indexed in Scopus but reveal large differences among publishers Learned Publishing, 2021. DOI: 10.1002/leap.1428.

[10] S. Pinfield, and R. Johnson, "Adoption of open access is rising - but so too are its costs," *Impact of Social Sciences Blog.*2018. [Online]. Available: https://blogs.lse.ac.uk/impactofsocialsciences/2018/01/22/ adoption-of-open-access-is-rising-but-so-too-are-its-costs.

[11] H. Piwowar, J. Priem, V. Larivière, J. P. Alperin, L. Matthias, B. Norlander, A. Farley, J. West, and S. Haustein, "The state of OA: a large-scale analysis of the prevalence and impact of Open Access articles," *PeerJ6:e4375,* 2018. [Online]. Available: https://doi.org/10.7717/peerj.4375, http//open-access.net/en/ community/open-access-tage/open-access-days2021-bern.