



Quo vadis scientia? The tales of recent Croatian publications in geodesy and geophysics

Zvezdana Bencetić Klaić¹  and Ivica Vilibić^{2,3} 

¹ Department of Geophysics, Faculty of Science, University of Zagreb, Zagreb, Croatia

² Division for Marine and Environmental Research, Ruđer Bošković Institute, Zagreb, Croatia

³ Institute of Adriatic Crops and Karst Reclamation, Split, Croatia

Research publications are a key indicator in evaluations of both the careers of scientists and the performance of research institutions and science systems. However, unprecedented changes in publishing have been made in recent decades following the development of solutions that can be helpful in managing publications and the conjoined peer-review process. In that spirit, we performed a comparative study of research articles reported by the Croatian Committee of Geodesy and Geophysics between two 4-year periods, 2019–2022 and 2015–2018, focusing in particular on the changes in journals and publishers between these periods. Apparently, there is a dramatic change in articles between these two periods, directed toward publishers that have much shorter evaluation times, such as MDPI and Frontiers. In almost all subcategories, the percentage of articles in the MDPI increased several times, reaching approximately 65% in hydrology and physical limnology and 30% in geodesy. We argue that these changes are worsening the reliability of science, driven by the national rules that favor the ‘publish or perish’ principle over the quality of research. Furthermore, we propose a way to cope with this problem at the national level, which should include a transition toward reliable publishers and peer-review assessments implemented during research evaluations.

Delving into the world of scientific publications

In the ‘circle of life’ within science, from getting the idea, planning and doing the research, analyzing the results and dissemination in the community, publications are key products upon which the quality assurance of science is based. In the majority of science systems, the quantity and bibliometric variables of publications, such as impact factors, are considered proxies for the quality of a scientist’s career (*e.g.*, Shao and Shen, 2012) and for the assessment of the performance of research-performing organizations or even research systems (Kulikowski et al., 2023). However, this is making publications vulnerable to different

manipulations and ‘greedy’ practices (Ioannidis and Thombs, 2019; You et al., 2022), such as artificial increases in journal impact factors through editorials, self-citations and delayed publishing (Shi et al., 2017; Wilhite et al., 2019), substantial shortening of the time needed for peer review (Shah et al., 2022), authorship for persons not deserving such a role (Cronin, 2001; Marušić et al., 2011), and publishing of preprints as papers in journals that were introduced during the COVID-19 pandemic (Añazco et al., 2021). In addition, open-access policies that were established before two decades enabled – although without intention – the occurrence of so-called ‘predatory’ (Mertkan et al., 2021) or ‘gray’ (Nicholas et al., 2023) publishers, recognizable by – among others – spam-based aggressive soliciting toward researchers (Beall, 2017) and even the recruitment of fake editors (Sokorowski et al., 2017). Therefore, maintaining the reliability of publications, *i.e.*, maintaining a structured, transparent and uncorrupted system of peer-review evaluations by a journal and a publisher, is a key element that keeps the science ‘above the water’ and allows for minimal manipulation by scientists or institutions.

The Croatian science community and its publications are not exempt from these practices, and they are characterized by a lower quality (in terms of journal impact factor) of articles compared to the world averages (Klaić and Klaić, 2004; Prpić, 2007). On the one hand, science in Croatia—at least science, technology, engineering and mathematics (STEM)—is supposed to follow global rules in science publishing, but on the other hand, career advancement in the Croatian system is almost exclusively based on bibliometrics of publications (Official Gazette, 2017). Indeed, to obtain a permanent position in a public research institute or university and even to advance to the top position within the system, the only national requirement (there might be additional institutional requirements) is based on a certain number of published papers indexed in the Web of Science Core Collection or Scopus. Such ‘Mr. Bean’s sheep counting’ rules are markedly setting ‘publish or perish’ pressure on Croatian scientists, who are then under pressure to lighten or dismiss the research integrity principles and to choose fast-publishing lanes for their research. This is the reason why the number of articles is increasing globally (Bornmann and Mutz, 2015) and why the number of articles from scientists with Croatian affiliation is increasing (*e.g.*, from ca. 40–60 in approximately 2010 to ca. 100–150 in the early 2020s in Journal Citation Reports (JCR) category ‘Geosciences, Multidisciplinary’). However, there are questions regarding their real contribution to discovering new knowledge on a research topic, as so-called disruptive science (defined as scientific advancements or innovations that fundamentally change existing paradigms, industries, or ways of thinking) has decreased in recent years (Park et al., 2023).

Interestingly, the Croatian journals are generally not evaluated as predatory, although they are from a small science community (Stojanovski and Marušić, 2017). This is because of the well-established and rigorous control system of science publishers (Hebrang Grgić and Guskić, 2019). This strongly con-

tradicts trends in the publications of Croatian researchers, which have been found to be strongly moving toward open-access and rapidly increasing the number of publishers, such as MDPI (Petrač et al., 2022). It seems that such an increase in Croatia is much stronger than that in other science systems perceived as well managed, such as the Finnish and Austrian systems (Petrač et al., 2022). Therefore, we question whether such a situation is present in the fields of geodesy and geophysics, two disciplines in which the national coordination umbrella is established under the International Union for Geodesy and Geophysics (IUGG) and the reporting of scientific activities and publications is traditionally published in the journal *Geofizika* (Orlić et al., 2015, 2019, 2023). In our humble opinion, the results we found are quite disturbing in terms of shaping directions and even questions about the meaning of the science activities that are carried out in some of these disciplines in Croatia.

Croatian publications in geodesy and geophysics reported for the 2015–2018 and 2019–2022 periods

Here, we present statistics on the journals and publishers of all the research articles cited in the 4-year reports by the Croatian Committee for Geodesy and Geophysics to the IUGG (2015–2018, Orlić et al., 2019, and 2019–2022, Orlić et al., 2023), which are based on articles with Croatian affiliation indexed in the Web of Science (WoS) database. In the reports, only WoS articles and peer-reviewed conference papers were included in the analysis. The information on publishers is extracted from the WoS database. If coming from the same cluster of companies, publishers are merged into one group: (i) Springer stands for Springer, Springer Int Publ AG, Springer Heidelberg, Springer London Ltd., Springer Basel and Springer Wien; (ii) Elsevier stands for Elsevier and Elsevier Sci Ltd.; and (iii) Wiley stands for Wiley and Wiley-V C H Verlag GmbH. In the reports, the articles are traditionally classified into six subcategories: geodesy, geomagnetism and aeronomy, hydrology and physical limnology, meteorology, physical oceanography and seismology. Table 1 presents the total number of

Table 1. Total number of peer-reviewed research articles and share of articles published in MDPI journals in each subcategory for the two time intervals.

Subcategory	Total number of articles		Share of MDPI articles (%)	
	2015–2018	2019–2022	2015–2018	2019–2022
Geodesy	104	216	5.8	31.5
Geomagnetism and Aeronomy	14	9	0.0	0.0
Hydrology and Physical Limnology	120	104	3.3	64.2
Meteorology	94	106	6.4	16.0
Physical Oceanography	86	93	3.5	6.5
Seismology	30	46	0.0	23.9

articles over different categories, while Figs. 1 to 5 present the top 10 journals and publishers in each of the categories in two 4-year periods, 2015–2018 and 2019–2022 (geomagnetism and aeronomy articles are not shown and discussed, because they contain a much smaller number of published articles).

For geodesy, most of the research articles between 2015 and 2018 (104 of them) were published in journals that came from traditional publishers, such as Springer, Taylor & Francis, Inc., and Elsevier, while a substantial number of articles were published in journals managed by Croatian publishers (*Geodetski list*, *Tehnički vjesnik – Technical Gazette*). Strikingly, the number of articles more than doubled between 2019 and 2022 (to 216), and currently, articles are mostly published in MDPI journals (*Remote Sensing*, *Applied Sciences*, *Land*, *Sustainability*). The percentage of articles published in MDPI among all publications increased from 6% to 32%. The number of articles in *Geodetski list* also increased, while the number of articles in the Springer and Elsevier journals decreased by 1.5 to 2 times compared to that in the 2015–2018 period.

For hydrology and physical limnology, both Croatian publishers (Hrvatske vode, Croatian Society of Civil Engineers-HSGI) and large international publishers (Springer, Taylor & Francis Ltd., Elsevier) attracted the majority of Croatian researchers between 2015 and 2018. The total number of published articles was

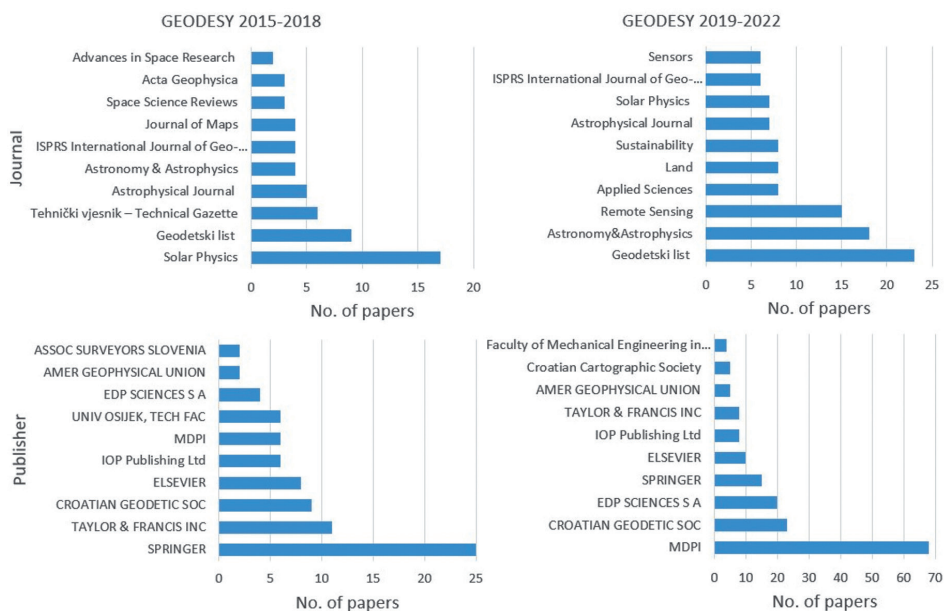


Figure 1. Top 10 journals (*upper panels*) and publishers (*bottom panels*) in which Croatian scientists published research articles in subcategory geodesy in the 2015–2018 (*left panels*) and 2019–2022 (*right panels*) periods.

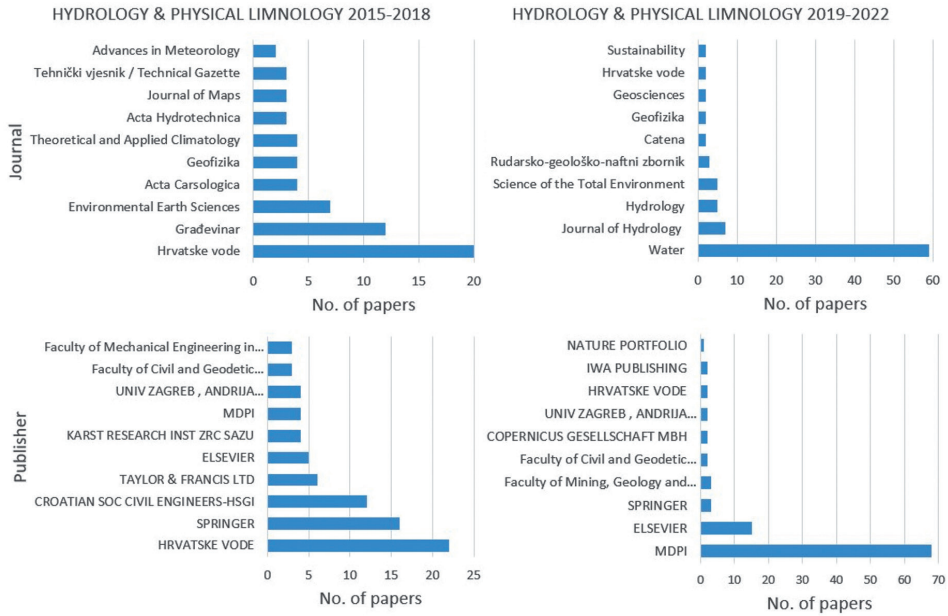


Figure 2. Same as in Fig. 1 but for the hydrology & physical limnology subcategory.

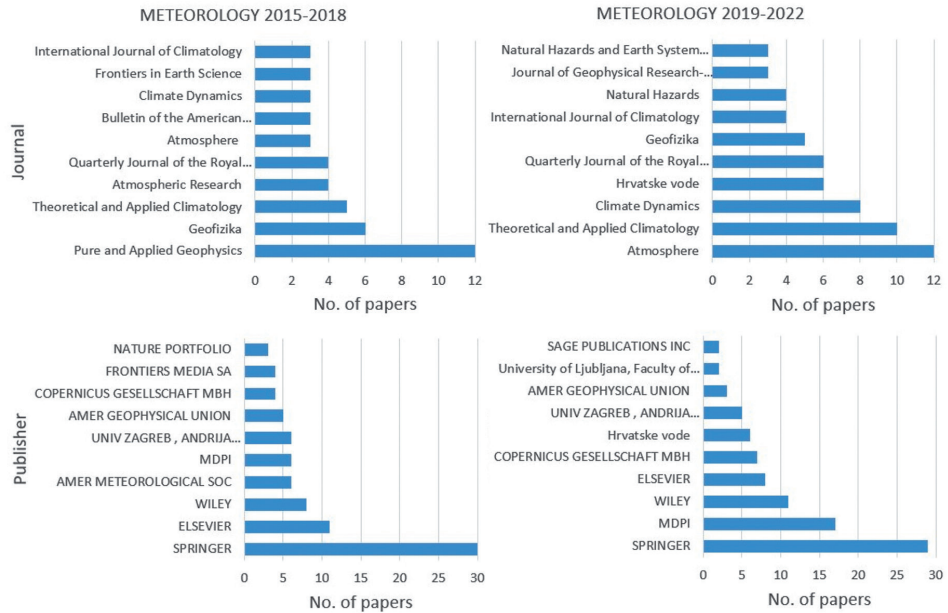


Figure 3. Same as in Fig. 1 but for the meteorology subcategory.

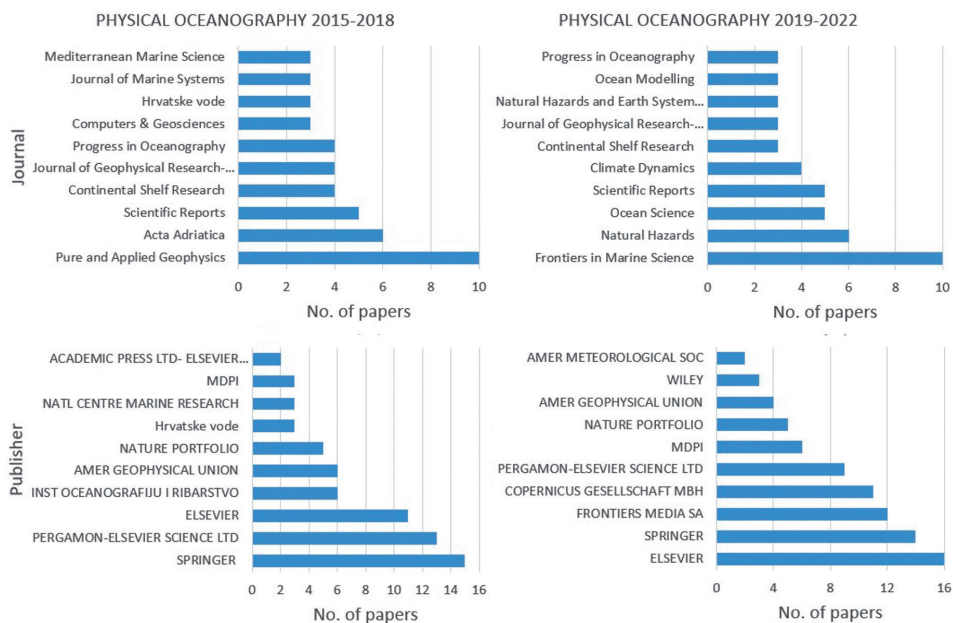


Figure 4. Same as in Fig. 1 but for the physical oceanography subcategory.

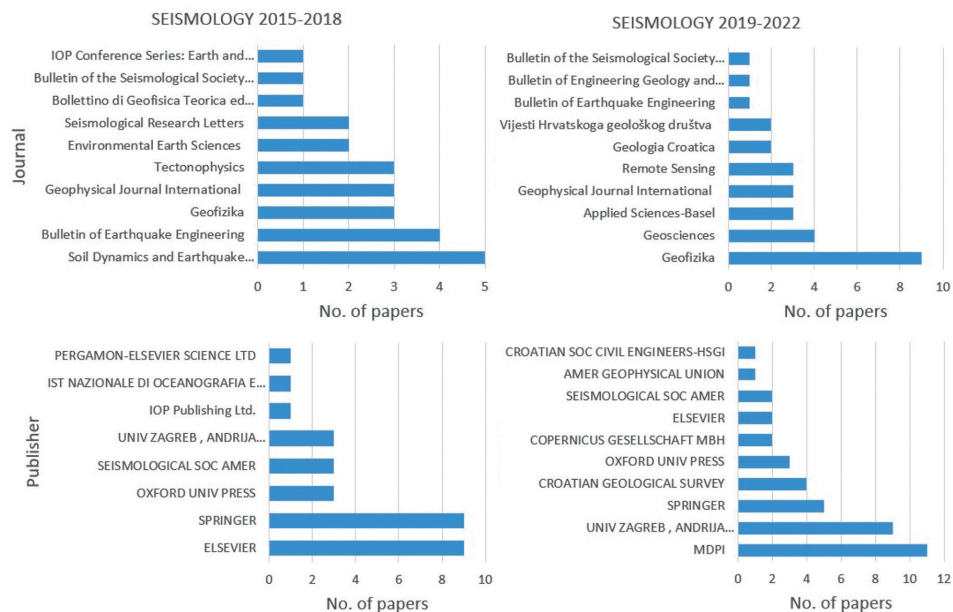


Figure 5. Same as in Fig. 1 but for the seismology subcategory.

120. However, the total number of papers decreased to 104 in the period from 2019–2022 in this subcategory, with MDPI and Elsevier being the only publishers exhibiting an increase. In particular, the number of articles published in MDPI journals increased to approximately 66% of the total number of articles, most of which were published in one journal, *Water*. Interestingly, the number of articles in the journal *Hrvatske vode* drastically decreased, which, aside from the fact that the journal is ranked by impact factor in the fourth quartile, may also be the result of changing the publishing policies of the journal. Nevertheless, such a dramatic change in publication preferences is presumably due to the change in career advancement criteria and requirements for academic positions in this subfield, considering that the researcher is obliged to have articles published in journals within the first and second impact factor quartiles in which the journal *Water* is listed.

For meteorology, the number of papers between the two periods increased slightly, from 94 to 106. Here, Springer, Elsevier and Wiley published most articles in their journals between 2015 and 2018, which changed slightly in the following 4-year period. Specifically, Springer still holds the leading position among publishers, but MDPI took the second position, in front of Wiley and Elsevier. The rank of the top journals has also changed; the MDPI journal *Atmosphere* took a lead between 2019 and 2022, with 12 papers published in it.

For physical oceanography, the overall number of papers also slightly increased between the two periods. Here, traditional publishers (Springer, Elsevier) maintain the first position in the number of published articles, while the third position in the 2019–2022 period was taken by Frontiers Media SA, particularly because of their journal *Frontiers in Marine Science*.

Last but not least, the number of research articles on seismology increased by approximately 50% in the 2019–2022 period compared with the previous period. Most of the articles were published in Elsevier, Springer and Oxford University Press journals between 2015 and 2018, particularly in the journals *Solid Dynamics and Earthquake Engineering*, *Bulletin of Earthquake Engineering* and *Geofizika*. In the 2019–2022 period, the journal *Geofizika* took the leading role, doubling its publications mostly following the two strong earthquakes in Croatia that occurred in March 2020 (the Zagreb Earthquake; Herak et al., 2021) and December 2020 (the Petrinja Earthquake; Herak and Herak, 2023). Regardless, MDPI journals (*Geosciences*, *Applied Sciences-Basel*) also played a leading role in this subcategory, while no MDPI publications were affiliated with Croatian scientists between 2015 and 2018.

In summary, several important changes in the number of research articles published by Croatian geodesists and geophysicists occurred between the 2019–2022 and 2015–2018 periods: (1) a slight-to-strong increase in the total number of articles (aside from hydrology and physical limnology) and (2) a strong increase in the number of publications in journals managed by publishers favoring fast

review processes and open access policy through the implementation of article processing charges (APCs), among which MDPI dominated, with an increase from 0–6% to 7–64% in all research articles.

Do we know where we are going (and why)?

These simple statistics on Croatian publications in geodesy and geophysics are, in our opinion, truly appealing for many reasons. First, we should recall what scientific publications are and why we are publishing papers. Is it to advance our careers, to get promotions, to get higher salaries, to get more projects and money for research, to ask for recognition on social networks, to feed our ego? Indeed, all of these reasons should be considered eligible reasons, as they are part of human nature, including the last one; to paraphrase: ‘He who is without *ego* among you, let him throw a stone at her first.’ However, all of these reasons should be of minor importance and suppressed (by a researcher or by a science system) when coming to the real reasons why we are doing research, and that is to get new, sharable and practical knowledge, for our mutual benefits and with an aim to better understand the world and manage everyday life. However, this ultimate goal of science easily vanishes when coming to practical implementations of how to measure the quality of science (with respect to the above goals), *i.e.*, when coming to procedures that any science system (including publishing) needs to establish to quantify these goals in a measurable form.

For a few centuries, scientific publications have been considered as tools for shaping science (Nwagwu and Onyacha, 2014). With the growth of knowledge, scientific publications have undergone substantial changes and growth in volume, amplified in recent decades with new technologies available for publishing research (Tennant, 2018; Teixeira da Silva and Yuki, 2022). Can humans adapt to all of these changes? Today, it is easy to publish your research very quickly and obtain credit for it; therefore, the following question arises: Is fast and excessive publishing ruining science? Park et al. (2023) show that so-called disruptive science, *i.e.*, science that substantially changes our knowledge and everyday life, has decreased in recent decades, mostly due to overpublishing. Therefore, what comments can we make regarding recent Croatian publications in geodesy and geophysics?

First, the total number of publications in geodesy and geophysics increased by approximately 30% in just 4 years, which is much greater than global rates of increase. For example, the number of papers in the WoS categories ‘Geosciences, Multidisciplinary’ and ‘Geochemistry & Geophysics’ increased at average rates of 5.5% and 4.5%, respectively, per year between 2013 and 2022. However, if we exclude geodesy articles from our analysis, the growth of the number of research articles is only 1% per year. In conclusion, the number of papers changed substantially only for geodesy articles, while the number of papers in other sub-categories did not increase substantially. Thus, why did the number of geodesy

papers rapidly increase? This might be related to a change in criteria for career advancement in 2017 (Official Gazette, 2017), which put more requirements on geodesy researchers compared to previous times (note: geodesy is listed under the technical sciences, while all other subcategories are listed under the natural sciences; Official Gazette, 2009). Indeed, the ‘publish or perish’ model for career advancement may be the major driver of such a change in the publication of geodesy articles in Croatia; however, more careful examinations should be performed on that topic.

However, this is not the only change and is not even the most dramatic change; it is merely an easily observable trend regarding research articles in geodesy and geophysics in Croatia between 2019–2022 and 2015–2018. Indeed, the most astonishing change can be seen in the change of publishers toward those who are rapidly managing peer-review processes, *i.e.*, MDPI and Frontiers. For example, the MDPI journal *Water*, in which more than 50 papers were published between 2019 and 2022, has a median of 15 to 16 days between submission and first decision (<https://www.mdpi.com/journal/water/stats>), while the whole editorial process – between the first submission and publication – normally lasts between 1 and 2 months. The statistics are similar for other MDPI journals, for example, for *Remote Sensing*, in which the publication time (from submission to publishing) is 67 days, which is 3–6 times faster than that in other journals dealing with the same topics (Zhang et al., 2019). On the other hand, Elsevier, Springer and other traditional publishers take much more time to complete the peer-review process. Knowing that peer review is carried out by researchers who are currently overloaded with many obligations and have no time to properly perform an increased number of requested reviews (Alhoori et al., 2023), such fast peer review may produce less detailed reviews of lower quality, as documented for COVID-19 papers (Capodici et al., 2023). Another problematic behavior of fast-publishing journals, of which both MDPI and Frontiers journals are examples, is the large number of editors who are handling the peer-review process, which for some journals may be more than a thousand (Oviedo-Garcia, 2021). For example, as of 27 February 2024, there were 924 editors in *Water* and 6170 editors in *Frontiers in Marine Science*, of which 1175 were Associate Editors handling the peer-review process. Such a large number of editors (being an editor is a quite demanding position and includes lots of responsibility) resembles the large science community, which – because not all researchers are capable of doing this job properly – is again potentially deteriorating the quality of the peer-review process, as even a small fraction of incompetent editors may substantially lower the quality of the peer-review process (Wang et al., 2016).

As all of the fast peer-review publishers use article processing charges for authors to pay for a publication, an easy conclusion can be reached—one can ‘buy a publication’ with some money if a publication is undergoing a lower-quality peer-review process. Therefore, money for publishing may ‘buy’ career advancement of a researcher, which, in turn, reduces his ‘investment’ in such publications

through increased salaries at higher career positions. For geodesy in Croatia, this model seems to work easier, as geodesists normally can more easily earn money than, for example, physical oceanographers (e.g., through their work outside science and academia). This appears to be a nice business model, but – to come back to the beginning of the discussion – where is the science in it? Indeed, all of this has nothing to do with the science.

How can these publishing trends change in Croatia (and in the rest of the world)? Obviously, career advancement criteria, the assessment of research-performing organizations, the evaluation of research projects and all other practices in science should minimize such potentially corrupt business models in publishing, *i.e.*, by constraining publications to journals in which peer-review procedures are following standards, not only as written on the journal's websites but also as implemented in reality (Hames, 2007). Indeed, such procedures, based on peer reviews and not purely bibliometrics, are implemented in some research systems, *e.g.*, in Finland (Research Council of Finland, 2024). In the authors' opinion, this approach should be as conservative as possible and should also be applied to high-ranking journals (in terms of impact factors); *i.e.*, the quality of the peer-review process should be the most important variable to consider, followed by the ranking (*e.g.*, bibliometric by impact factor) of a journal. This may be done at the institutional, national or international levels. In Croatia, the best approach would be to have such an approach at the national level; however, it is a question whether the national bodies that are responsible for defining the criteria are not corrupted in that respect; *i.e.*, there can be many researchers in the highest positions who can advance their career by following practices of fast, low-quality and easy publication. The same problems may arise at the institutional level (*e.g.*, in public research institutes, universities, or research-funding agencies). How to break this cycle is the key question. We hope that some people at the policy-making and decision-making levels in Croatian science will have the courage to break this cycle.

Acknowledgements – We thank academician Mirko Orlić for useful comments.

References

- Alhoori, H., Fox, E. A. Frommholz, I., Liu, H., Coupette, C., Rieck, B. A., Ghosal, T. and Wu, J. (2023): Who can submit an excellent review for this manuscript in the next 30 days? – Peer reviewing in the age of overload, *Proceedings of the ACM/IEEE Joint Conference on Digital Libraries*, 2023, 319–320, <https://doi.org/10.1109/JCDL57899.2023.00077>.
- Añazco, D., Nicolalde, B., Espinosa, I., Camacho, J., Mushtaq, M., Gimenez, J. and Teran, E. (2021): Publication rate and citation counts for preprints released during the COVID-19 pandemic: the good, the bad and the ugly, *PeerJ*, **9**, e10927, <https://doi.org/10.7717/peerj.10927>.
- Beall, J. (2017): What I learned from predatory publishers, *Biochem. Medica*, **27**, 273–278, <https://doi.org/10.11613/BM.2017.029>.
- Bornmann, L. and Mutz, R. (2015): Growth rates of modern science: A bibliometric analysis based on the number of publications and cited references, *J. Assoc. Inf. Sci. Tech.*, **66**, 2215–2222, <https://doi.org/10.1002/asi.23329>.

- Capodici, A., Salussolia, A., Sanmarchi, F., Gori, D. and Golinelli, D. (2023): Biased, wrong and counterfeited evidences published during the COVID-19 pandemic, a systematic review of retracted COVID-19 papers, *Qual. Quant.*, **57**, 4881–4913, <https://doi.org/10.1007/s11135-022-01587-3>.
- Cronin, B. (2001): Hyperauthorship: A postmodern perversion or evidence of a structural shift in scholarly communication practices?, *J. Am. Assoc. Inf. Sci. Tech.*, **52**, 558–569, <https://doi.org/10.1002/asi.1097.abs>.
- Hames, I. (2007): *Peer review and manuscript management in scientific journals: Guidelines for good practice*. Blackwell Publishing, New Jersey, 293 pp., <https://doi.org/10.1002/9780470750803>.
- Hebrang Grgić, I. and Guskić, M. (2019): Croatian scientists' awareness of predatory journals, *Int. J. Educ. Integrity*, **15**, 3, <https://doi.org/10.1007/s40979-019-0041-5>.
- Herak, M., Herak, D. and Orlić, N. (2021): Properties of the Zagreb 22 March 2020 earthquake sequence – Analyses of the full year of aftershock recording, *Geofizika*, **38**, 93–116, <https://doi.org/10.15233/gfz.2021.38.6>.
- Herak, M. and Herak, D. (2023): Properties of the Petrinja (Croatia) earthquake sequence of 2020–2021 – Results of seismological research for the first six months of activity, *Tectonophysics*, **858**, 229885, <https://doi.org/10.1016/j.tecto.2023.229885>.
- Ioannidis, J. P. A. and Thoms, B. D. (2019): A user's guide to inflated and manipulated impact factors, *Eur. J. Clin. Invest.*, **49**, e13151, <https://doi.org/10.1111/eci.13151>.
- Klaić, Z. B. and Klaić, B. (2004): Croatian scientific publications in top journals according to the Science Citation Index for the 1980–2000 period, *Scientometrics*, **61**, 237–257, <https://doi.org/10.1023/B:SCIE.0000041650.23093.87>.
- Kulikowski, K., Przytula, S. and Sulkowski, L. (2023): When publication metrics become the fetish: The research evaluation systems' relationship with academic work engagement and burnout, *Res. Evaluat.*, **32**, 4–18, <https://doi.org/10.1093/reseval/rvac032>.
- Marušić, A., Bošnjak, L. and Jerončić, A. (2011): A systematic review of research on the meaning, ethics and practices of authorship across scholarly disciplines, *Plos One*, **6**, e23477, <https://doi.org/10.1371/journal.pone.0023477>.
- Mertkan, S., Aliusta, G. O. and Suphi, N. (2021): Profile of authors publishing in 'predatory' journals and causal factors behind their decision: A systematic review, *Res. Evaluat.*, **30**, 470–483, <https://doi.org/10.1093/reseval/rvab032>.
- Nichols, D., Herman, E., Abrizah, A., Rodríguez-Bravo, B., Boukacem-Zeghmouri, C., Watkinson, A., Świgoń, M., Xu, J., Jamali, H. J. and Tenopir, C. (2023): Never mind predatory publishers ... what about 'grey' publishers?, *Prof. Inform.*, **32**, e320509, <https://doi.org/10.3145/epi.2023.sep.09>.
- Nwagwu, W. E. and Onyancha, B. (2014): Back to the beginning — The journal is dead, long live science, *J. Acad. Libr.*, **41**, 669–679, <https://doi.org/10.1016/j.acalib.2015.06.005>.
- Official Gazette (2009): Pravilnik o znanstvenim i umjetničkim područjima, poljima i granama, NN 118/2009 (in Croatian), https://narodne-novine.nn.hr/clanci/sluzbeni/2009_09_118_2929.html.
- Official Gazette (2017): Pravilnik o uvjetima za izbor u znanstvena zvanja, NN 28/2017 (in Croatian), https://narodne-novine.nn.hr/clanci/sluzbeni/2017_03_28_652.html.
- Orlić, M., Duplančić Leder, T., Vujnović, V., Herak, D., Denić-Jukić, V., Horvath, K., Grbec, B., Beg Paklar, G. and Herak, M. (2015): Report of the Croatian Committee of Geodesy and Geophysics on activities carried out between 2011 and 2014, *Geofizika*, **32**, 133–174, <https://doi.org/10.15233/gfz.2015.32.7>.
- Orlić, M., Duplančić Leder, T., Verbanac, G., Denić-Jukić, V., Klaić, Z. B., Grbec, B., Horvath, K., Beg Paklar, G., Herak, M., Herak, D. and Stipčević, J. (2019): Report of the Croatian Committee of Geodesy and Geophysics on activities carried out between 2015 and 2018, *Geofizika*, **36**, 171–224.
- Orlić, M., Pribičević, M., Duplančić Leder, T., Pavasović, M., Mandić, I., Oskoruš, D., Pavlič, K., Klaić, Z. B., Grbec, B., Horvath, K., Pasarić, M. and Markušić, S. (2023): Report of the Croatian Committee of Geodesy and Geophysics on activities carried out between 2019 and 2022, *Geofizika*, **40**, 207–307.
- Oviedo-Garcia, M. A. (2021): Journal citation reports and the definition of a predatory journal: The case of the Multidisciplinary Digital Publishing Institute (MDPI), *Res. Evaluat.*, **30**, 405–419a, <https://doi.org/10.1093/reseval/rvac020>.

- Park, M., Leahey, E. and Funk, R. J. (2023): Papers and patents are becoming less disruptive over time, *Nature*, **613**, 138–144, <https://doi.org/10.1038/s41586-022-05543-x>.
- Petrak, J., Škorić, L. and Macan, B. (2022): Under the hood – What is behind the large increase in articles by Croatian authors in MDPI journals?, *Kemija u industriji*, **71**, 309–315, <https://doi.org/10.15255/KUI.2022.007>.
- Pripić, K. (2007): Changes of scientific knowledge production and research productivity in a transitional society, *Scientometrics*, **72**, 487–511, <https://doi.org/10.1007/s11192-007-1760-6>.
- Research Council of Finland (2024): Responsible researcher evaluation, Academy of Finland, <https://www.aka.fi/en/research-funding/responsible-science/responsible-researcher-evaluation>, last accessed 27 February 2024.
- Shah, U. U., Mushtaq, R., Bhat, S. A. and Gul, S. (2022): Does publication history influence the integrity of the journals: studying publication timelines and their impact on journal metrics? *Online Inform. Rev.*, **47**, 765–781, <https://doi.org/10.1108/OIR-02-2022-0108>.
- Shao, J. F. and Shen, H. Y. (2012): Research assessment and monetary rewards: The overemphasized impact factor in China, *Res. Evaluatb*, **21**, 199–203, <https://doi.org/10.1093/reseval/rvs011>.
- Shi, D. B., Rousseau, R., Yang, L. and Li, J. (2017): A journal's impact factor is influenced by changes in publication delays of citing journals, *J. Assoc. Inf. Sci. Tech.*, **68**, 780–789, <https://doi.org/10.1002/asi.23706>.
- Sorokowski, P., Kulczycki, E., Sorokowska, A. and Pisanski, K. (2017): Predatory journals recruit fake editor, *Nature*, **543**, 481–483, <https://doi.org/10.1038/543481a>.
- Stojanovski, J. and Marušić, A. (2017): Does small equal predatory? Analysis of publication charges and transparency of editorial policies in Croatian open access journals, *Biochem. Medica*, **27**, 292–299, <https://doi.org/10.11613/BM.2017.032>.
- Teixeira da Silva, J. A. and Yamada, Y. (2022): Accelerated peer review and paper processing models in academic publishing, *Publish. Res. Q.*, **38**, 599–611, <https://doi.org/10.1007/s12109-022-09891-4>.
- Tennant, J. P. (2022): The state of the art in peer review, *FEMS Microbiol.*, **365**, 204, <https://doi.org/10.1093/femsle/fny204>.
- Wang, W., Kong, X., Zhang, J., Chen, Z., Xia, F. and Wang, X. (2016): Editorial behaviors in peer review, *SpringerPlus*, **5**, 903, <https://doi.org/10.1186/s40064-016-2601-y>.
- Wilhite, A., Fong, E. A. and Wilhite, S. (2019): The influence of editorial decisions and the academic network on self-citations and journal impact factors, *Res. Policy*, **48**, 1513–1522, <https://doi.org/10.1016/j.respol.2019.03.003>.
- You, T., Park, J., Lee, J. Y., Yun, J. and Jung, W. S. (2022): Disturbance of questionable publishing to academia, *J. Informetr.*, **16**, 101294, <https://doi.org/10.1016/j.joi.2022.101294>.
- Zhang, Y. Y., Thenkabail, P. S. and Wang, P. (2019): A bibliometric profile of the Remote Sensing open access journal published by MDPI between 2009 and 2018, *Remote Sens.*, **11**, 91, <https://doi.org/10.3390/rs11010091>.

Corresponding authors' addresses: Zvezdana Bencetić Klaić, University of Zagreb, Faculty of Science, Department of Geophysics, Horvatovac 95, 10000 Zagreb, Croatia; tel.: +385 1 4605 919, e-mail: zvezdana.bencetic.klaic@gfz.hr
Ivica Vilibić, Ruđer Bošković Institute, Division for Marine and Environmental Research, Bijenička cesta 54, 10000 Zagreb, Croatia; e-mail: ivica.vilibic@irb.hr

