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Open Access in South Africa: Quantitative and Qualitative Perspective on the Development of Research Publications and its Impact over Two Decades

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ABSTRACT

Open Access (OA) has become a key driver for improving the accessibility, visibility, and impact of scholarly communication. Despite substantial progress, significant structural and financial inequalities continue to shape its implementation, particularly in the Global South. This study investigates the long-term development of the OA transformation in South Africa between 2000 and 2022. Specifically, it examines OA publishing patterns, citation impact, language of publication, Gold OA first authorship, and the implementation of institutional OA policies.

The study combines a bibliometric analysis of Web of Science (WoS) publication and citation data with a systematic evaluation of institutional OA policies. The results demonstrate substantial growth in both publication output and OA adoption, with South Africa exceeding the global average in the proportion of OA publications. Green OA consistently achieved the highest citation impact, while institutions with formal OA policies showed greater improvements in research impact than institutions without such policies. At the same time, high article processing charges and limited international visibility of Diamond OA journals remain important barriers to equitable participation.

By integrating bibliometric evidence with policy analysis, this study provides one of the first comprehensive assessments of the long-term development of OA in South Africa. It contributes empirical evidence on how different OA pathways and institutional policies influence research visibility and impact in a Global South context. The findings suggest that strengthening Green OA, improving the sustainability and international discoverability of Diamond OA, and promoting fair publishing agreements are key strategies for supporting an equitable and effective OA ecosystem.

Open Access (OA) hat sich zur zentralen Triebfeder für die Verbesserung der Zugänglichkeit, der Sichtbarkeit und des Impacts wissenschaftlicher Kommunikation entwickelt. Trotz erheblicher Fortschritte ist die Umsetzung von OA nach wie vor von erheblichen strukturellen und finanziellen Ungleichheiten geprägt, insbesondere im Globalen Süden. Diese Studie untersucht die langfristige Entwicklung der OA-Transformation in Südafrika im Zeitraum von 2000 bis 2022. Konkret werden darin das Publikationsverhalten im Bereich Open Access, der Impact von Zitierungen, die Veröffentlichungssprachen, die Erstautorschaft bei Veröffentlichungen in Gold-Open-Access-Zeitschriften sowie die Umsetzung institutioneller Open-Access-Richtlinien untersucht.

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Die Studie verbindet eine bibliometrische Analyse der Publikations- und Zitationsdaten aus dem „Web of Science" (WoS) mit einer systematischen Auswertung der institutionellen Open-Access-Richtlinien. Die Ergebnisse zeigen einen erheblichen Anstieg sowohl beim Output an Publikationen als auch bei der Nutzung von Open Access, wobei Südafrika beim Anteil der Open-Access-Publikationen über dem weltweiten Durchschnitt liegt. Green OA erzielte durchweg den höchsten Zitations-Impact, während Institutionen mit formellen OA-Richtlinien größere Verbesserungen in Bezug auf den Impact von Forschungsleistungen verzeichneten als Institutionen ohne solche Richtlinien. Gleichzeitig stellen hohe Publikationsgebühren und die begrenzte internationale Sichtbarkeit von Diamond-Open-Access-Zeitschriften weiterhin erhebliche Hindernisse für eine gerechte Teilhabe dar.

Durch die Verknüpfung bibliometrischer Belege mit der Analyse zu Open-Access-Richtlinien liefert diese Studie eine der ersten umfassenden Bewertungen der langfristigen Entwicklung von Open Access in Südafrika. Sie liefert empirische Belege dafür, wie verschiedene Open-Access-Modelle und institutionelle Richtlinien die Sichtbarkeit und den Impact von Forschung im Kontext des Globalen Südens beeinflussen. Die Ergebnisse deuten darauf hin, dass die Stärkung von „Green OA", die Verbesserung der Nachhaltigkeit und der internationalen Auffindbarkeit von „Diamond OA" sowie die Förderung fairer Publikationsvereinbarungen zentrale Strategien zur Unterstützung eines gerechten und effektiven Open-Access-Ökosystems sind.

KEYWORDS

Open Access, bibliometrics, research policy, publication impact, Global South, South Africa

Open Access, Bibliometrie, Forschungsstrategie, Publikations-Impact, Globaler Süden, Südafrika

1. Introduction

Since its inception, the Open Access (OA) movement has been working towards better international scholarly exchange. Thus, this leads to improving the findability and visibility of scholarly research, increasing citation rates, and promoting (inter)national cooperation. Nevertheless, high article processing charges (APCs) charged by commercial international publishers have led to imbalances in the publication and citation process of scientific findings–particularly at the expense of researchers not affiliated with institutions, early-career researchers and countries with limited resources (Vervoort et al., 2021).

In South Africa, limited funding, unequal internet access, lack of awareness, APC-based barriers imposed by publishers, questions about copyrights and a lack of guidelines are challenging the transition from the traditional subscription model to OA (Kodua-Ntim & Fombad, 2024; Czerniewicz & Goodier, 2014; Piron, 2023). Despite the challenging circumstances, South Africa is considered a pioneer in the development of regional OA platforms such as SciELO SA (https://www.scielo.org.za/), AmeliCA (https://amelica.org/index.php/en/home/) and the African Open Science Platform (https://aospea.org/).

The project "Die Wirksamkeit von Open Access im Globalen Süden erforschen – Erkenntnisse in die gelebte Praxis der TH Köln beispielhaft umsetzen (WO–TH K)" (Exploring the impact of open access in the Global South – implementing findings in the practical work of the TH Köln [WO–TH K])[2] therefore examines the effects and institutional measures for OA in South Africa. The aim is to provide an overview of the effects discussed in the literature, regional measures and empirical findings on the OA landscape–for example, on citation impact.

In this context, the following six research questions were developed specifically in relation to OA in South Africa:

[2] The project aims to achieve two key objectives: (1) To research the effectiveness of OA in the Global South (GS), particularly in Brazil, Mexico and South Africa, in order to compare it with the situation in Germany. (2) To implement the findings into the practice of promoting OA at the TH Köln and to examine their applicability to other universities.

(RQ1) How did research activity in South Africa (publication output) develop during the observation period from 2000 to 2022?

(RQ2) What is the impact of research in South Africa based on classic bibliometric citation indicators, and how has this developed over the observation period?

(RQ3) Which international journals does South Africa have access to?

(RQ4) In which language do authors in South Africa predominantly publish?

(RQ5) What is the proportion of Gold OA first authorships among South African researchers?

(RQ6) How has the institutional implementation of OA policies developed over time, and how does it align with data-driven trends in OA?

The article is divided into five chapters: this introduction, an overview of the current state of research, the study design, the results of the data evaluation and the policies, and our implications with the conclusion.

2. State of Research

According to Hulin (2024), South Africa is regarded less as a producer of scientific research publications and more as a consumer. This is not due to a lack of quality in the research, but rather to its lack of visibility. A study by Czerniewicz & Wiens (2013) shows that South African research was virtually invisible in search engines for a long time. However, OA can significantly increase the visibility and reach of research findings (Piwowar et al., 2018; Robinson-Garcia et al., 2020). Accordingly, OA is highly regarded in South Africa, as evidenced by numerous national and institutional initiatives. In the same year, South Africa joined the SciELO programme and published its own national collection from 2013 onwards. Since 2015, the National Research Foundation (NRF) has mandated that all government-funded projects must publish their research findings in OA. The Department of Science, Technology and Innovation (DSI) enshrined this requirement in law. In addition, the AfricArXiv preprint repository was founded in 2018. With 52 institutional repositories (OpenDOAR), South Africa occupies a leading position in Africa in the field of OA (Ezema & Onyancha, 2017b; Fox & Hanlon, 2015). As a result, South Africa's contribution to the global research output is around 1% in 2024 (Hulin, 2024), with universities accounting for approximately 90% of national publications. Around half of the publications indexed in the WoS on innovations in Africa appear in OA (Jauhiainen & Ouma Mugabe, 2024). The leaders in OA publishing in South Africa are the Stellenbosch University, the University of Cape Town, the University of KwaZulu-Natal, the University of Pretoria and the University of the Witwatersrand (Raju et al., 2015). Green OA dominates, while Diamond OA is only slightly prevalent, accounting for around 7–9% (Hulin, 2024). According to Czerniewicz & Goodier (2014), the reason for the dominance of the green route is that it is more cost-effective and enables greater visibility despite limited financial resources. As research currently stands, there is a lack of a comprehensive analysis of the data-driven trends in scientific output in South Africa over time, particularly with regard to the shift towards OA, i.e. the changing proportion of subscription-based publications and OA publications. The following research question emerges from this gap in literature:

(RQ1) How did research activity in South Africa (publication output) develop during the observation period from 2000 to 2022?

In addition to increased visibility, OA has an effect on the impact of research publications. While numerous studies support the idea of an open access citation advantage (OACA), the extent of this advantage varies (Wagner, 2010; McCabe & Snyder, 2014; Archambault et al., 2014; Tennant et al., 2016; Bautista-Puig et al., 2020). However, other research has found no significant citation benefit from OA alone (Dorta-González et al., 2017), instead highlighting factors such as selection bias and the advantages of early access to preprints (Moed, 2007; Craig et al., 2007). Consequently, it remains challenging to establish broad generalisations regarding the existence of OACA (Swan, 2010; McCabe & Snyder, 2014; Langham-Putrow et al., 2021). Furthermore, the studies conducted either focus on Africa as a whole, showing a clear OA citation advantage (Ezema & Onyancha, 2017a; Ajibade & Muchaonyerwa, 2023; Onyancha et al., 2024), or on individual South African journals. For instance, the transition of the South African Journal of Business Management

to OA resulted in an 8% increase in citations (Skelly, 2023). Studies by Verma & Sonkar (2021) identified the South African Medical Journal, HTS Theological Studies, PLOS One, and others as journals with a particularly high impact. However, there is a lack of extensive, differentiated studies on the development of OA in South Africa. This therefore raises the following question:

(RQ2) What is the impact of research in South Africa based on classic bibliometric citation indicators, and how has this developed over the observation period?

Another factor contributing to the increased visibility of research results is access to established international journals, as well as the growing number of open-access journals. OA has also contributed to the emergence of new structures within the publishing landscape, including the establishment of new journals, thereby influencing researchers' publication behaviour. Teixeira da Silva et al. (2019) stated that many African researchers prefer to publish in international journals with a high impact factor in order to increase their own impact and, consequently, their h-index. Local journals are mainly chosen for their regional relevance or SAPSE accreditation (Beer, 2005). With currently 169 titles, South Africa ranks second in Africa (Directory of Open Access Journals [DOAJ]: as of October 2025). Local journals typically provide free access and charge none or significantly lower APCs than international journals, such as PLOS One[3], whose APCs are essentially unaffordable for many researchers in the Global South (Czernie**wicz & Goodier,** 2014; Dijkstra et al., 2017). There is a lack of empirical research examining how the publication behaviour of South African researchers has changed in the context of OA. In particular, it remains unclear whether access to international journals has increased and whether this has, in turn, led to a greater tendency to publish in international journals. This gives rise to the following research question:

(RQ3) Which international journals does South Africa have access to?

Another important factor is the language used in scholarly publications, which can act as a barrier. English dominates around 94% of all WoS publications worldwide. In South Africa, the vast majority of OA journals indexed in the DOAJ also predominantly accept English submissions, with limited representation of Afrikaans, Xhosa, Southern Sotho, Venda and Zulu (Hulin, 2024). In fact, all OA journals are published in English, with only 21 accepting articles in Afrikaans and just two accepting articles in Xhosa (Hulin, 2024). Despite South Africa's lead in having 18 LOTE (Languages Other Than English) journals in Africa, only 16 research articles in the country's official languages were published between 2000 and 2020 (Naidoo et al., 2024). Institutional repositories also reflect this trend, with only 15 universities hosting Afrikaans documents (Bangani, 2018). An analysis of open science publications in Africa indexed in Scopus reveals that nearly 99% are published in English (Ankamah et al., 2025). However, this analysis was based on a limited data set of just 302 publications. Previous studies of language distribution have either focused on journal level or repository level. There is a lack of meaningful insights based on extensive publication data analysed over time, which raises the subsequent question:

(RQ4) In which language do authors in South Africa predominantly publish?

Apart from the aforementioned advantages of greater visibility and impact of OA publications, the transition to OA also has its drawbacks. In particular, publishing in internationally recognised Gold OA journals involves financial barriers, as Gold OA requires authors to pay article processing charges (APCs). Between 50% and 75% of Gold OA journals depend on APCs (Robinson-Garcia et al., 2020). In 2021, the first transformative agreements were concluded by SANLiC[4]. In particular, researchers from the Global South (GS) face considerable disadvantages compared to those in the Global North (GN), struggling to secure institutional funding or financial grants to cover APCs. Although some publishers grant waivers under transformative agreements for low- and middle-income countries, South Africa, as an upper-middle-income country, is usually excluded–only two universities receive discount on article processing charges (APC) for their publications with Springer Nature (Patronella Zulu & Twum-Darko, 2023). One possible approach to covering the APCs is to

[3] The average APCs for PLOS One are USD 2,382: https://plos.org/fees/.
[4] South African National Library & Information Consortium: https://sanlic.ac.za/.

enter into co-authorship arrangements with researchers from institutions or countries with greater financial resources. In a survey by Gallardo et al. (2024) 87% of the researchers surveyed from South Africa reported using co-authorship to share APC costs. For example, South African researchers had a higher share of payments by international co-authors (5.6%). Nevertheless, authors from the GS/periphery countries continue to pay APCs as frequently as their counterparts in Western countries (Kieńć, 2017). However, as research currently stands, there is a lack of data-based evidence showing a potential increase in co-authorship, which raises the following question:

(RQ5) What is the proportion of Gold OA first authorships?

The transition to OA is shaped by developments at multiple levels, including those of individual researchers, national governments, and research institutions. Therefore, the implementation of OA policies at both national and institutional levels represents a key mechanism for guiding this transformation. They provide the framework outlining the rights and responsibilities associated with the implementation of OA at institutions (Franz & Kindling, 2025; Huang et al., 2020). To date, there is a lack of research that compares the OA transition from the perspective of institutional measures with a publication data-based perspective on researchers' publishing behaviour. Accordingly, the following research question addresses this gap:

(RQ6) How did the implementation of OA policies at research institutions develop over time, and does this reflect the data-driven development of individual OA initiatives?

3. Study Design

Bibliometric indicators - particularly publication and citation metrics - serve as internationally recognised measures for research evaluation (Tunger et al., 2021; Palomares-Montero & García-Aracil, 2011) and therefore form the basis of the analysis of South African research. However, simple indicators such as the h-index or citation rate (CPP) do not adequately capture the complexity of scholarly communication because they do not account for structural differences or heterogeneous publication and citation behaviour across countries, institutions and disciplines. To enable fair comparisons, normalised indicators were therefore employed. Subject- and journal-based normalisation compensates for structural differences. While subject normalisation requires the assignment of publications to subject categories—which is challenging due to the lack of coherent disciplinary boundaries and the limited granularity or multiple assignment WoS categories—journal-based normalisation according to Archambault et al. (2011) provides a more robust basis for comparison. Accordingly, the weighted J-factor (Ball et al., 2009) was used as the principal impact indicator. It compares the citation rate of publications from a research institution with the average citation rate of publications of the same document type published in the same journal and the same year. A J-factor of 1 (100%) therefore indicates citation performance equivalent to the journal average all over the world.

The bibliometric evaluation was based on publication records retrieved from the WoS, one of the leading multidisciplinary citation databases, using a local installation of it: access to the database was provided by the Competence Centre for Bibliometrics, which also offers access to Scopus; however, both databases overlap by approximately 90% at the document level (Ball & Tunger, 2006). The analysis covered the period from 2000 to 2022 and included all publications with at least one author affiliated with a South African research institution. To ensure a consistent and comparable dataset, only scholarly document types relevant to research communication were included (document type "Article"), whereas non-scholarly publication types were excluded (e.g. document types "Proceedings Paper" or "Conference Abstract"). Based on these data, publication output, the proportion of OA publications, Gold OA first authorship and the weighted J-factor were calculated on country level to analyse temporal developments and research impact.

The analytical workflow comprised four consecutive steps. First, bibliographic records were extracted and prepared for analysis, i.e. the standardisation of institution names. Second, publications were classified according to their OA type assigned by using the WoS OA classification, distinguishing between Gold, Green, Hybrid, Bronze and Closed Access publications. Third, based on these data, publication output, the proportion of OA publications, Gold OA first authorship and

the weighted J-factor were calculated for the observation period.

Finally, the bibliometric findings were complemented by an evaluation of institutional OA policies in South Africa. The Registry of OA Repository Mandates and Policies (ROARMAP)[5] served as the primary source for identifying institutional policies and was supplemented by systematic searches of the websites of all South African universities and publicly funded research institutions to ensure the broadest possible coverage. Only officially adopted and publicly accessible OA policies were included. The policy analysis examined implementation dates, policy content and implemented OA measures. By combining bibliometric analysis with institutional policy evaluation, the methodological approach provides a transparent and reproducible framework for assessing the long-term development and impact of OA in South Africa.

4. Results of the Quantitative Analysis and Evaluation of the Policies

4.1 How did research activity in South Africa (publication frequency) develop during the observation period from 2000 to 2022?

The following section shows the development of the total publications in the WoS overall and in South Africa, alongside the proportion of OA publications. First, Figure 1 illustrates the temporal development of publications in the WoS overall and in South Africa between 2000 and 2022.

The evaluation of the WoS data shows a significant increase in publication activity during the observation period–both worldwide and in South Africa. Globally, the number of recorded

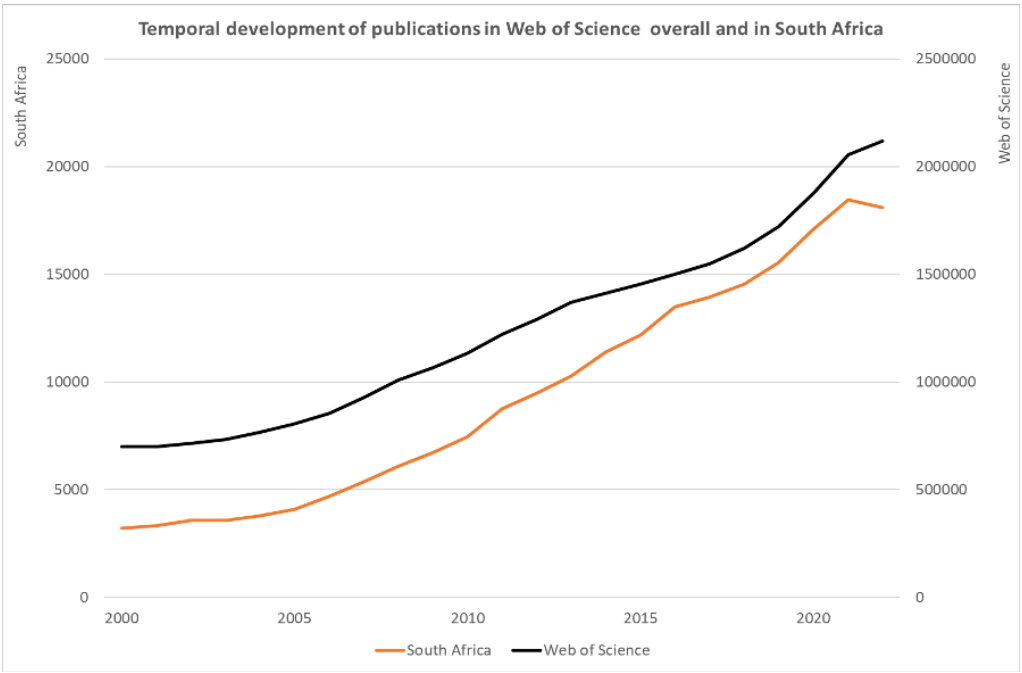

Figure 1: Temporal development of publications in the WoS overall and in South Africa between 2000 and 2022.

publications grew from around 700,000 (2000) to over 2.1 million (2022). South Africa's publications recorded a continuous, sometimes disproportionate growth: rising from 3,219 (2000) to a peak of 18,472 (2021), followed by a slight decline to 18,085 (2022). Both curves run largely parallel to each other and indicate a similar growth trend. Noteworthy is South Africa's stronger relative increase compared to the global average: The national share of all WoS publications has increased from 0.45% to 0.85%, almost doubling. The following section examines, in Figure 2, the development of OA publications published between 2000 and 2020 in South Africa, using global OA publications as a benchmark for comparison.

[5] This international register documents the OA requirements of research institutions. ROARMAP enables research institutions to register their OA policies and list specific details, e.g. date of introduction and individual measures. It subsequently uses this information to map the development of OA policy implementation worldwide on a country-specific basis, as well as the percentage introduction rate.

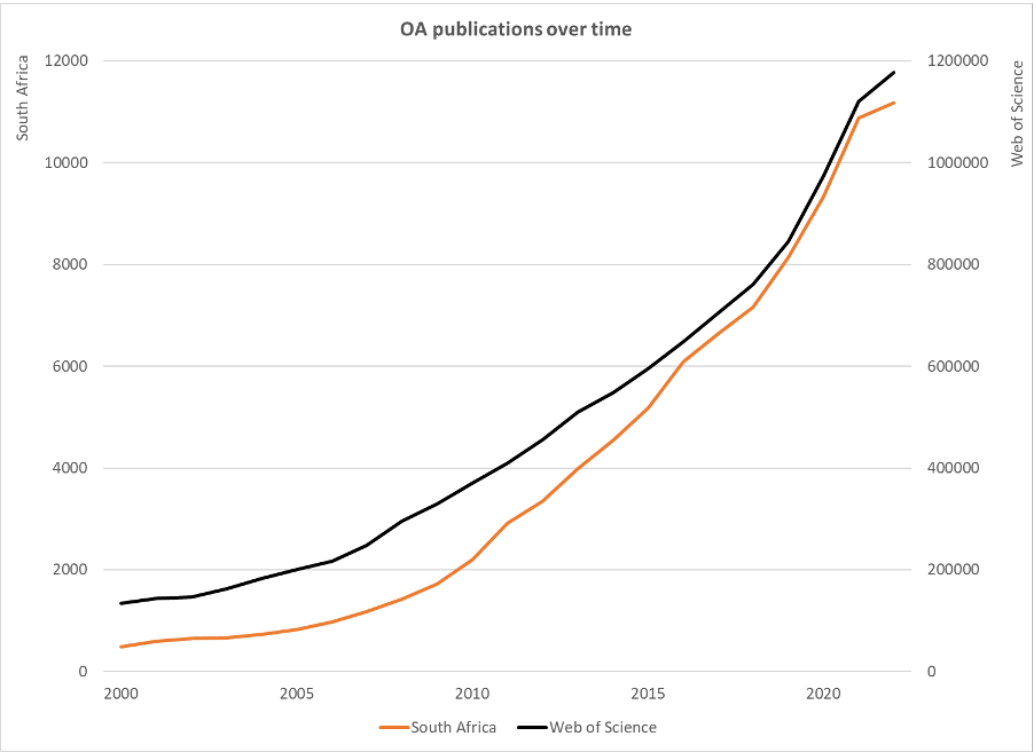

Figure 2: Development of OA publications between 2000 and 2020.

In the period between 2000 and 2022, OA publications increased significantly both in South Africa and worldwide, with an exponential trend in some cases. In South Africa, the number grew from 491 (2000) to 11,180 (2022). Globally, the number of gold OA publications increased from around 20,000 to around 700,000 during the same period. While South Africa grew relatively strongly, especially between 2010 and 2018, the global increase accelerated from 2018 onwards and exceeded South Africa's absolute growth. Since then, the curves have exhibited a near-parallel trajectory–an indication of a globally driven dynamic in the expansion of Gold OA.

The OA share over time (OA publications as a share of all publications from the country in the WoS) shows a continuous and significantly increase for South Africa: from around 15% (2000)–compared to around 20% worldwide–to 62% (2022). Since 2010, South Africa has consistently maintained a higher share than the WoS total. Figure 3 illustrates the temporal

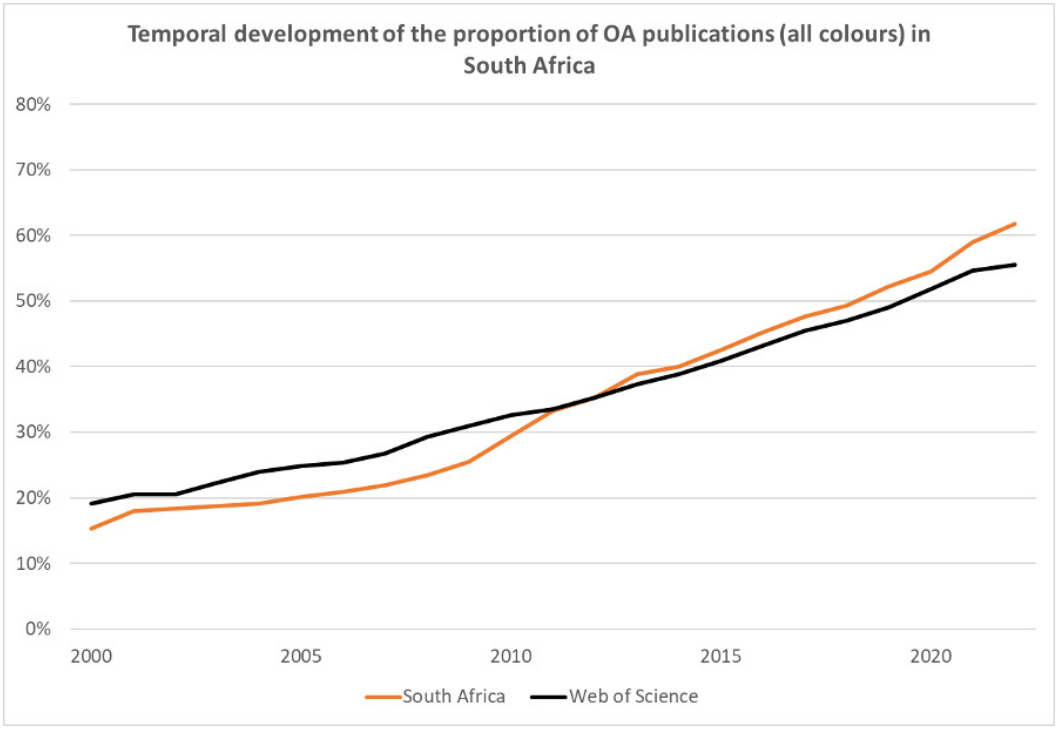

Figure 3: Temporal development of the proportion of OA publications (all colours) in South Africa.

development of the percentage shares of OA publications in South Africa and worldwide. The differentiation according to OA ways reveals varying conditions, costs and visibility: Gold OA is frequently associated with high APCs, especially in WoS- or Scopus-listed journals, which offer the highest visibility. Therefore, the Gold OA share is an important indicator. Until 2007, South Africa followed the global trend (0.5% → 3.5%). Since 2008, the trend decoupled: by 2022, the Gold OA share had risen to approximately 40% of all journal publications (global 33%). Thus, South Africa has been publishing successfully and visibly in WoS journals, despite the high APCs. Green OA publications are more widespread than Gold OA publications throughout the duration of the studied period, and in 2022 reached a share of around 50%, although the momentum has slowed in recent years. Nevertheless, this applies to both Gold and Green, South Africa's share exceeds the corresponding WoS benchmark. Figure 4 shows the individual shares of Gold OA and Green OA publications in South Africa and worldwide.

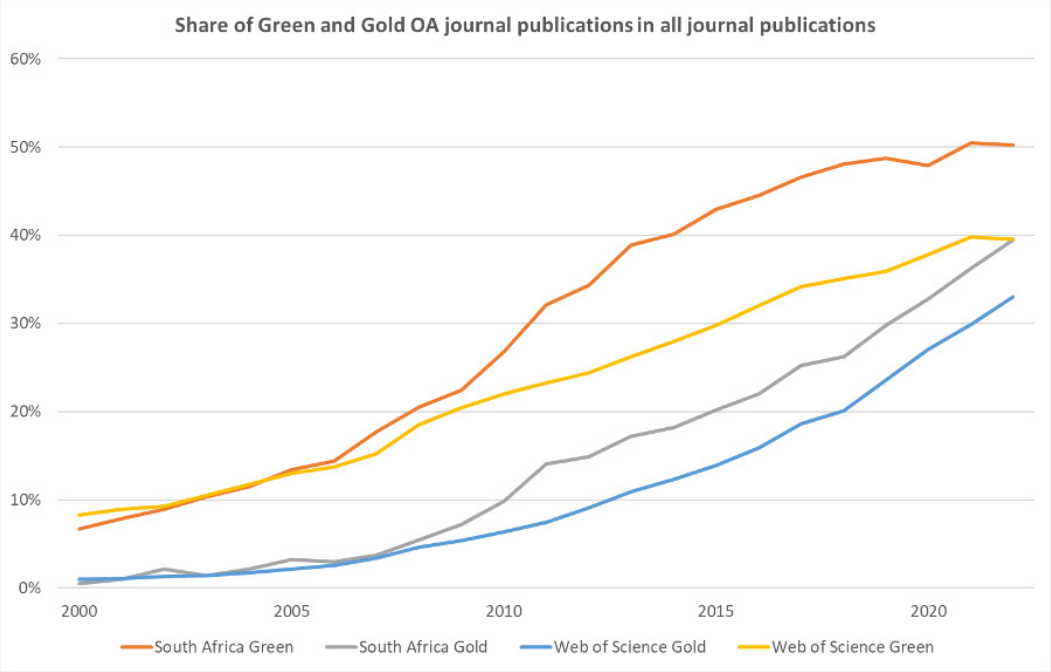

Figure 4: Share of Green and Gold OA journals publications in all journal publications.

The following section begins by examining the overall shares of the individual OA models within the WoS over the period from 2000 to 2024: the distribution of publication models in the Web of Science changed substantially between 2000 and 2024 (Figure 5). At the beginning of the observation period, scholarly publishing was dominated by Closed Access, accounting for approximately 80% of all publications. Over time, however, its share declined continuously, reaching around 44% by 2024. Despite remaining the single largest publication model, Closed Access was no longer the dominant model of dissemination when all OA models were considered collectively.

This development was primarily driven by the increasing adoption of Gold and Green OA. Gold OA remained negligible until the mid-2000s but expanded rapidly from around 2008 onwards, reaching approximately one quarter of all publications by the early 2020s. Green OA also exhibited sustained growth throughout the entire observation period, increasing from less than 10% in 2000 to nearly 20% by 2024. Together, these two models account for the majority of the overall increase in OA publishing.

In contrast, Bronze OA followed a different trajectory. While it represented a comparatively large share of publications at the beginning of the study period, its importance gradually diminished over time, falling to only a small proportion of the total output by 2024. Hybrid OA, although almost absent in the early years, increased steadily from the 2010s onwards and reached approximately 10% of all publications by the end of the observation period.

Overall, the results illustrate the profound transformation of scholarly communication over the past two decades. The continuous decline of Closed Access and the simultaneous expansion of the different OA models demonstrate the ongoing transition towards a publication system in which openly accessible research has become the predominant form of scientific dissemination. The slight increase in the proportion of Closed Access publications observed in 2024, accompanied by a corresponding decline in Gold OA, may indicate a temporary shift in publishing patterns rather than a reversal of the long-term trend. In Figure 5 we examine the proportion of each OA model in the WoS over time.

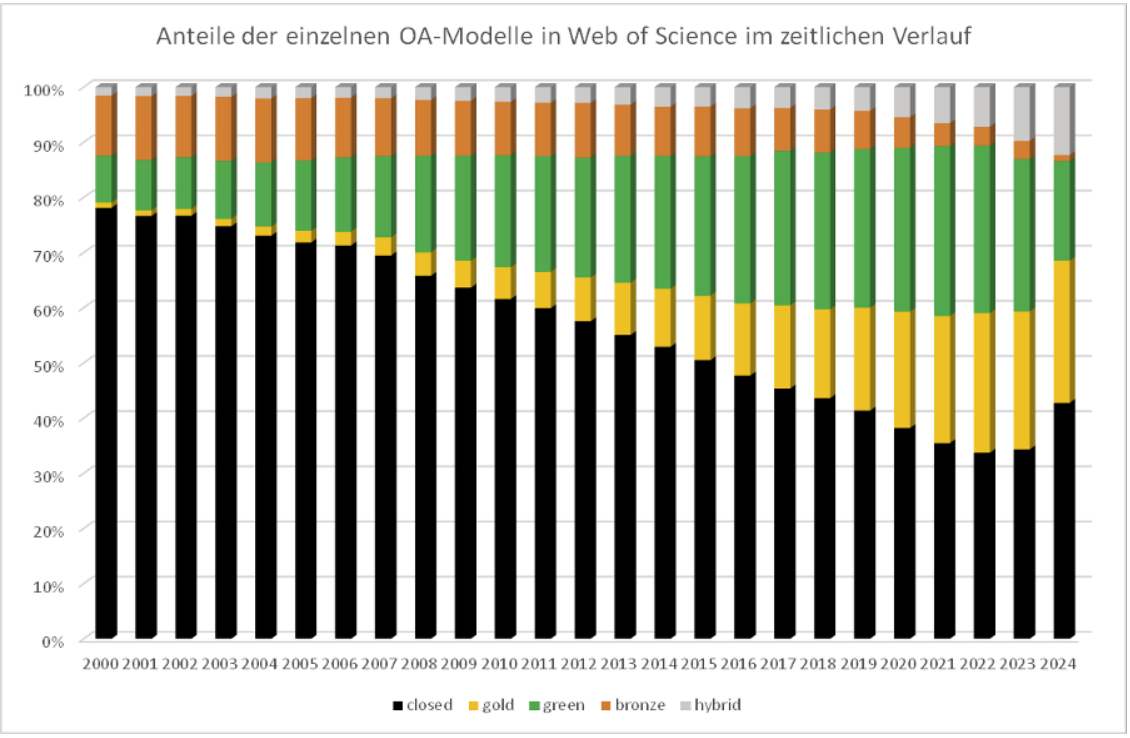

Figure 5: The proportion of each OA model in Web of Science over time.

Compared with the global trend shown in Figure 5, South Africa exhibits a substantially faster transition towards OA publishing (Figure 5a). While Closed Access remains the largest publication model worldwide in 2020, accounting for approximately 40% of all WoS publications, its share in South Africa has already declined to less than 30%. Consequently, OA becomes the dominant publication model considerably earlier and more pronounced in South Africa than at the global level. Although both figures demonstrate a continuous shift from subscription-based publishing towards OA, the South African publication system adopts this transition at a significantly higher pace. In contrast, Figure 5a examines the development of the individual relative OA shares over time in South Africa. The composition of OA also

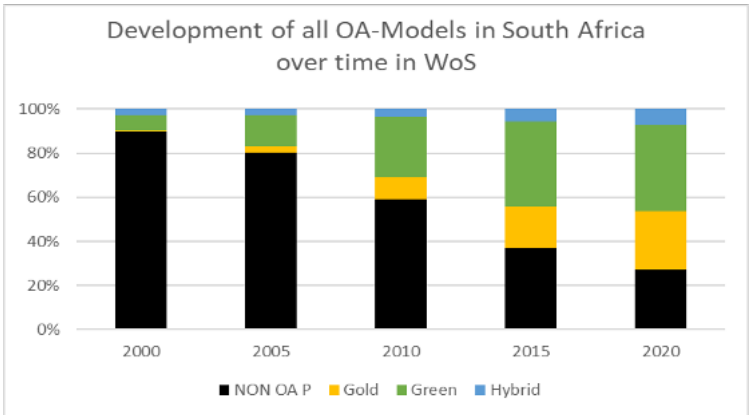

Figure 5a: Development of all OA models in South Africa over time in WoS.

differs between the global and the South African publication landscape. Whereas the worldwide increase in OA is driven by both Gold and Green OA, with Green OA remaining slightly below one fifth of all publications, South Africa is characterised by a particularly strong expansion of Green OA. By 2020, Green OA accounts for approximately 40% of all publications, making it the dominant OA model in the country. Gold OA also increases steadily and reaches around one quarter of all publications, while Hybrid OA remains of comparatively minor importance. These findings suggest that the growth of OA in South Africa has been driven primarily by repository-based dissemination, complemented by increasing publication in Gold OA journals, resulting in a substantially higher overall level of OA than observed in the global publication system.

4.2 What is the research impact in South Africa based on classic bibliometric citation indicators, and how has this developed over the observation period?

The impact of OA in South Africa is examined from several perspectives using the normalised journal factor (J-factor). Initially, an institutional comparison of the development of OA and closed publications demonstrates the impact of publications grew during the period 2000–2020, in line with a rising productivity. The calculation of the J-factor is based on a large volume of data, whilst as an indicator it is both very robust and resistant to fluctuations. For this reason, the J-factor is calculated only for every fifth year of publication, starting with the first year of observation in this study, namely 2000. As the J-factor is calculated at five-year intervals, its observation period ends, somewhat unusually, in 2020. The overall impact increased by around 12%. OA impact grew at an above-average rate of around 18%, while the impact of closed publications remained virtually stagnant over the period (+2%). Thus, OA publications generate higher overall impact, thereby confirming the positive effect of increased visibility. The following Figure 6 shows the development of the weighted J-Factor of all research institutions over time for OA publications vs. closed publications.

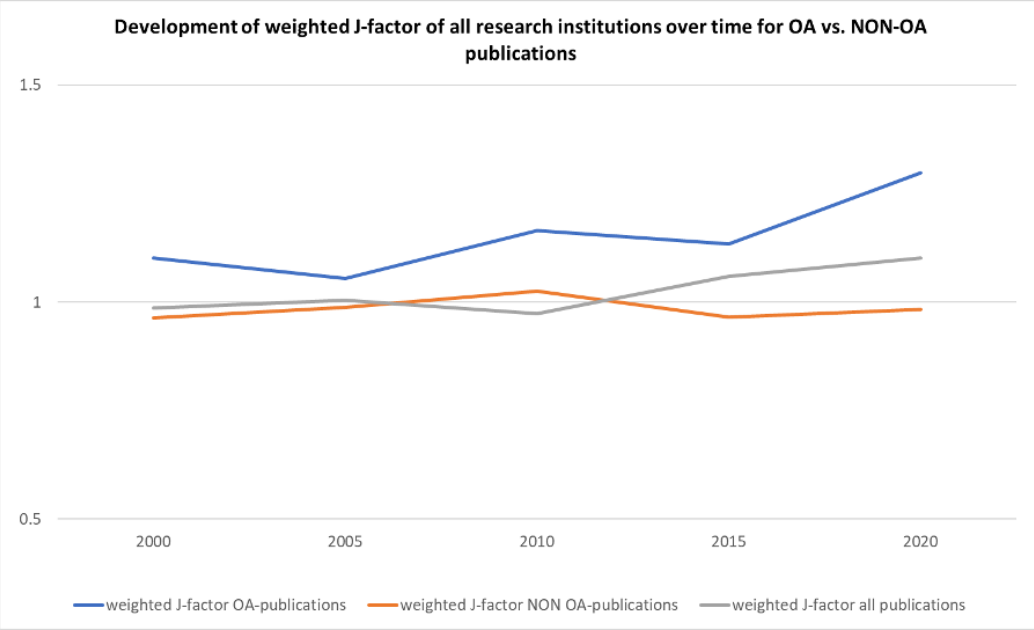

Figure 6: Development of weighted J-factor of all research institutions over time for OA vs. closed publications.

The following section differentiates and explains the development according to OA routes: in the period between 2000 and 2005, the impact of Gold OA publications increased by approximately 35%, whilst the impact of Green OA publications declined by around 7%. From 2005 to 2010, the impact of both OA routes increased (Green OA +11%, Gold OA +17%). From 2015 onwards, the impact of Green OA increased by 18%, while Gold OA remained virtually stagnant (~+1%). Overall, Green OA generated the higher impact over the entire period–plausibly due to multiple distribution channels (journal website and repository). Figure 7 shows the development of weighted J-factors of all research institutions over time for Green OA vs. Gold OA publications.

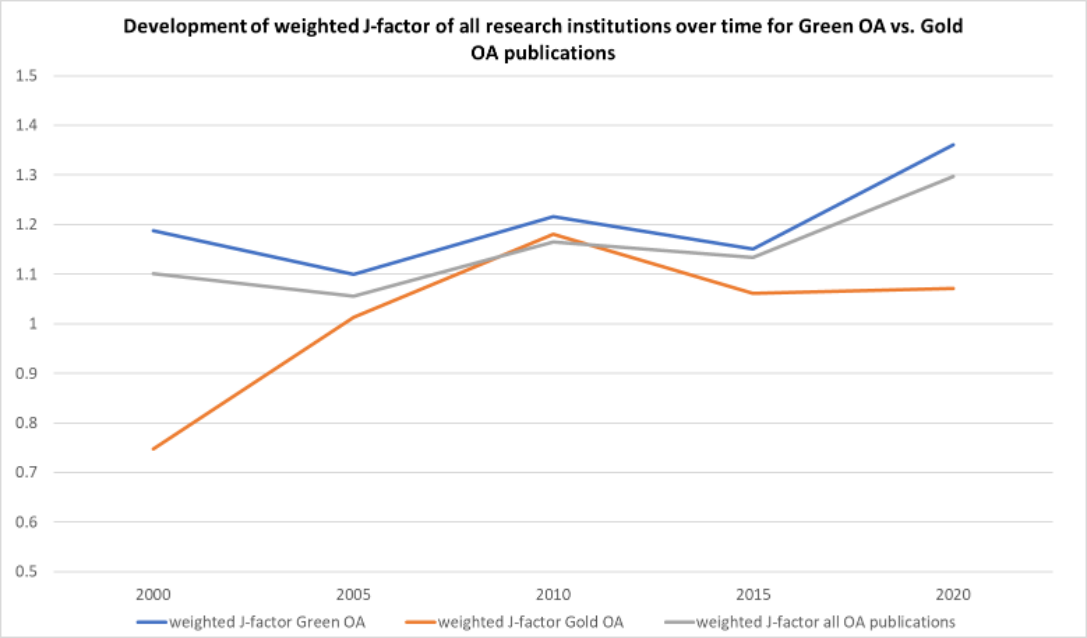

Figure 7: Development of weighted J-factors of all research institutions over time for Green OA vs. Gold OA publications.

4.3 Which journals does South Africa have access to?

There have been fundamental changes in South Africa's publication behaviour over the last 20 years: newly founded journals, particularly those that publish OA, now dominate WoS publications. PLOS One–one of the largest interdisciplinary OA journals–emerged as the most prolific publisher in 2022, with a total of 284 publications, closely followed by Sustainability with a publication count of 239.

All works in which South Africa is listed as the institutional affiliation of at least one author were counted, regardless of the first authorship. The analysis of the top journals and other titles shows that South Africa has access to high-ranking WoS journals and regularly publishes in them, especially in OA journals. This provides the country with a solid basis for international visibility. Table 1 presents the top 10 journals by publication count for South Africa in the WoS in 2000 and 2022.

Journal	2000	2022
SOUTH AFRICAN JOURNAL OF SCIENCE	**101**	88
SOUTH AFRICAN MEDICAL JOURNAL	**77**	0
WATER SA	**54**	26
MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY	**29**	175
BOTHALIA	**28**	9
JOURNAL OF THE SOUTH AFRICAN INSTITUTE OF MINING AND METALLURGY	**28**	0
SOUTH AFRICAN JOURNAL OF PSYCHOLOGY	**27**	20
ONDERSTEPOORT JOURNAL OF VETERINARY RESEARCH	**25**	8
SOUTH AFRICAN JOURNAL OF WILDLIFE RESEARCH	**25**	0
AFRICAN ENTOMOLOGY	**24**	7
JOURNAL OF THE SOUTH AFRICAN VETERINARY ASSOCIATION-TYDSKRIF VAN DIE SUID-AFRIKAANSE VETERINERE VERENIGING	**24**	0

Journal	2000	2022
PLOS ONE	0	**284**
SUSTAINABILITY	0	**239**
INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH	0	**236**
SCIENTIFIC REPORTS	0	**207**
MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY	29	**175**
HTS TEOLOGIESE STUDIES-THEOLOGICAL STUDIES	0	**173**
ENERGIES	0	**123**
SOUTH AFRICAN JOURNAL OF BOTANY	19	**121**
BMJ OPEN	0	**112**
MOLECULES	0	**111**

Table 1: Top 10 journals by publication count from South Africa in the WoS in 2000 and in 2022

The comparison of the top ten journals in 2000 and 2022 reveals a substantial shift in publication venues. In 2000, the leading journals published between 24 and 101 papers and included many locally or nationally oriented journals. By 2022, publication output had become concentrated in considerably larger journals, led by PLOS ONE (284), Sustainability (239), International Journal of Environmental Research and Public Health (236), and Scientific Reports (207). Several of these major publication venues had emerged or expanded in the context of the growth of OA publishing and recorded no publications in the dataset in 2000. At the same time, several journals prominent in 2000 had disappeared from the publication output by 2022. Overall, the comparison indicates a shift from smaller, often local or national publication venues towards larger, internationally oriented journals, many of them associated with the expansion of OA publishing.

4.4 In which language do authors in South Africa predominantly publish?

National languages play an ambivalent, yet strategically relevant role in the OA context. In terms of international visibility, English continues to dominate: English publications in high-ranking OA journals–especially Gold OA–achieve a larger audience reach, higher citation impact and enhanced visibility in global databases (WoS, Scopus).
However, the intensity of the preference for the English language can vary depending on the subject areas, especially in more regionally oriented subject areas. OA publications in the national language also strengthen social participation. Nevertheless, if they are not included in international journals but are indexed on national/regional platforms such as SciELO (Collection South Africa) or in university repositories, this can lead to a separation from the international discourse if comprehensive indexing does not take place.

An examination of the development in the WoS and SciELO reveals that in 2000, 94% of all publications were in English, and by 2022 this figure had risen to 98.8%. Even SciELO, which started in 2005 with a comparatively modest proportion of English publications (approximately 20%), has since witnessed a significant increase. Publishing in English is therefore effectively necessary for achieving international visibility; whereas publications in national languages primarily address local communities, and are often indexed by regional platforms. Figure 8 illustrates the development of the language shares in SciELO and the WoS between 2000 and 2020.

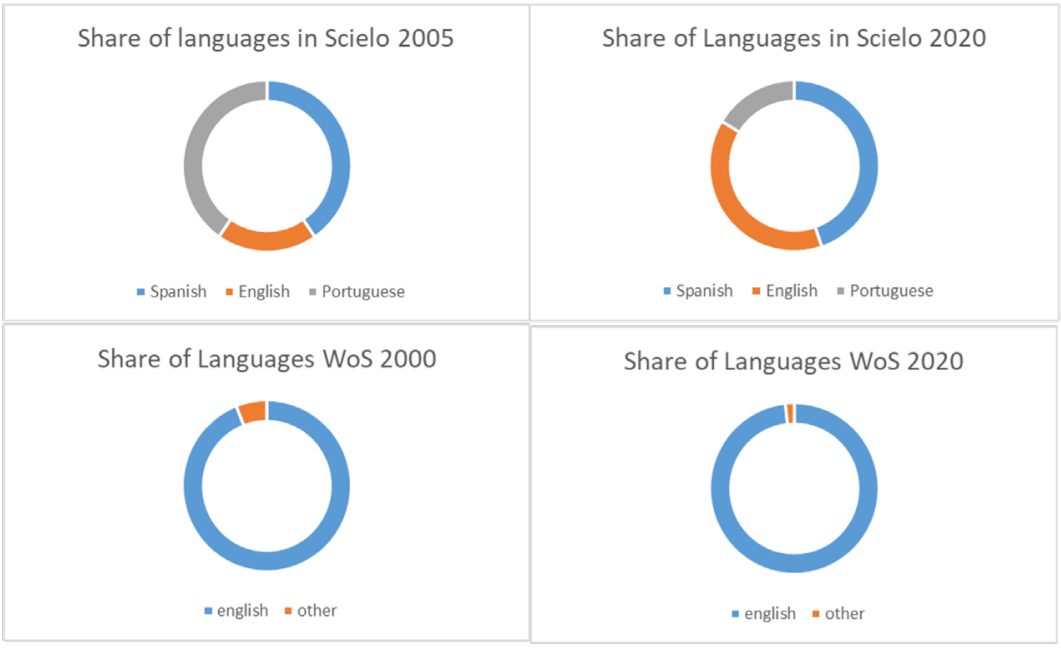

Figure 8: Share of languages in Scielo and the WoS.

4.5 What is the proportion of Gold OA first authorships?

First authorship of a publication means that the first author, designated as "corresponding author", is primarily responsible for both the publication process, and the payment of the APCs. In addition, first authorship plays a prominent role, as scholarly publications with multiple authors are invariably cited with the first authors' name, which promotes scientific reputation. For this reason, first authorship is essential for a scientist, but in the context of OA it also involves significant financial costs. The development of Gold OA first authorship in South Africa can be demonstrated by determining the percentage of first authors in Gold OA publications compared to the total number of first authors in all OA publications in South Africa. This reflects the extent to which the financial resources for paying Gold OA are available in South Africa. Since a solitary indicator has little significance, therefore there is a necessity to relate it to another indicator: for this purpose, the proportion of first authors in global Gold OA publications compared to the first authors of all OA publications in the WoS worldwide is set as the reference quantity.

South Africa is undergoing a dynamic catch-up process: in 2008, the share of Gold OA first authorship was 26%. By 2013, more than half of all OA first authorship were Gold OA; in 2022, the share was around 73%. In comparison with the overall performance of the WoS, South Africa's performance was above average for the entire period. South Africa has thus undergone a significant transformation over the past decade and a half, with Gold OA gaining in importance–despite ongoing financial obstacles. Figure 9 shows the proportion of Gold OA first authorships by South African authors among all OA first authorships.

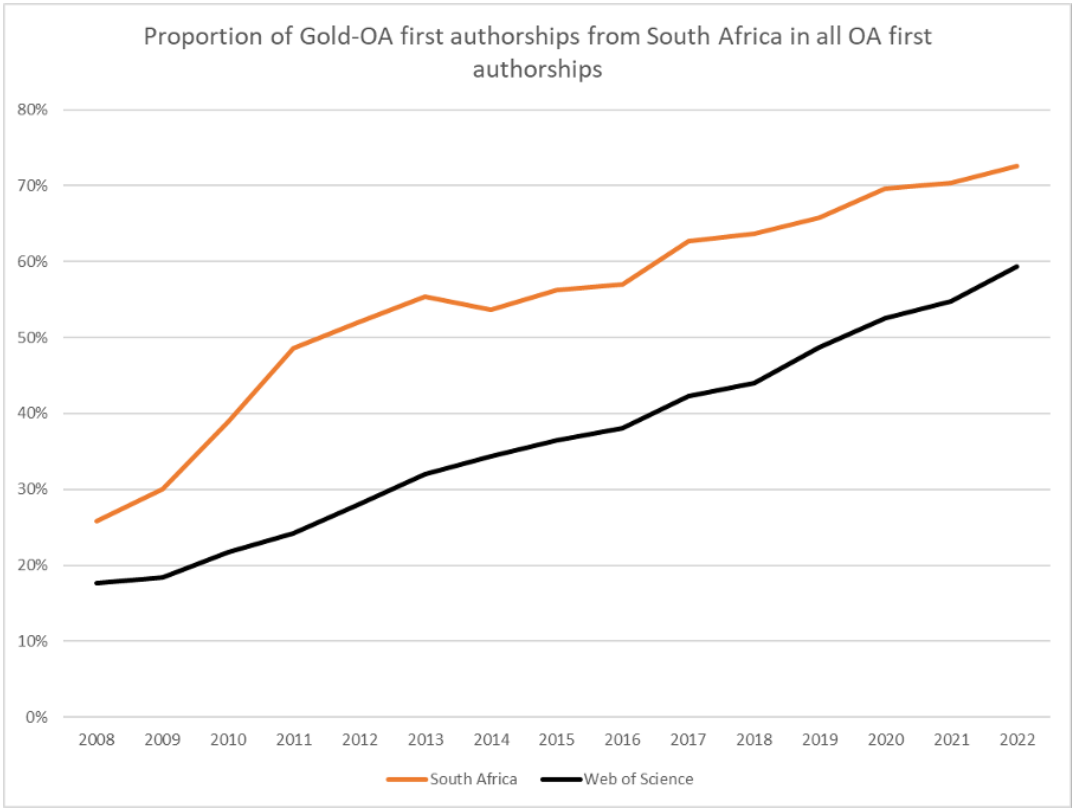

Figure 9: Proportion of Gold OA first authorships from South Africa in all OA first authorships.

4.6 How did the implementation of OA policies at research institutions develop over time, and does this reflect the data-driven development of individual OA initiatives?

The following analysis provides an overview of the development of OA policy implementation at South African research institutions over time. Figure 10 presents the change over time in the adoption of OA policies in South Africa, expressed as a percentage.

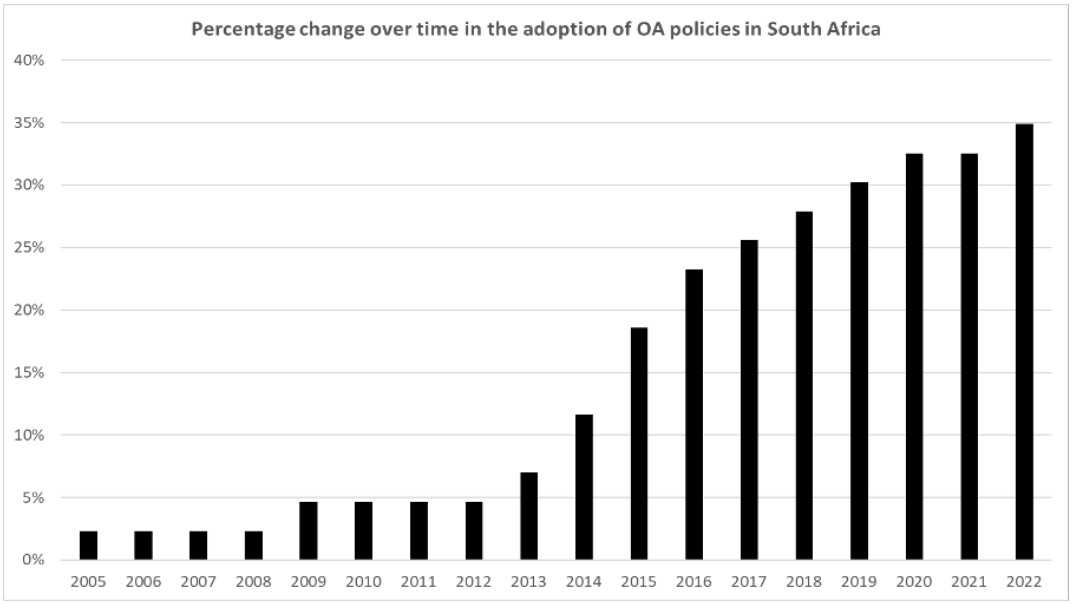

Figure 10: Percentage change over time in the adoption of OA policies in South Africa.

South Africa's first OA policy was introduced by the Council for Scientific and Industrial Research (CSIR) in 2005, followed by the first university OA policy at the University of Pretoria in 2009. By the end of 2016, 10 institutions (around 23% of all 42 institutions) had implemented an OA policy; the most recent policy introduction occurred in 2022. At present, around 35% of all institutions have publicly accessible OA policies; while an additional 37% provide OA-related information via their websites. Figure 11 shows the proportion of OA measures included in the OA policies of higher education institutions. These policies outline

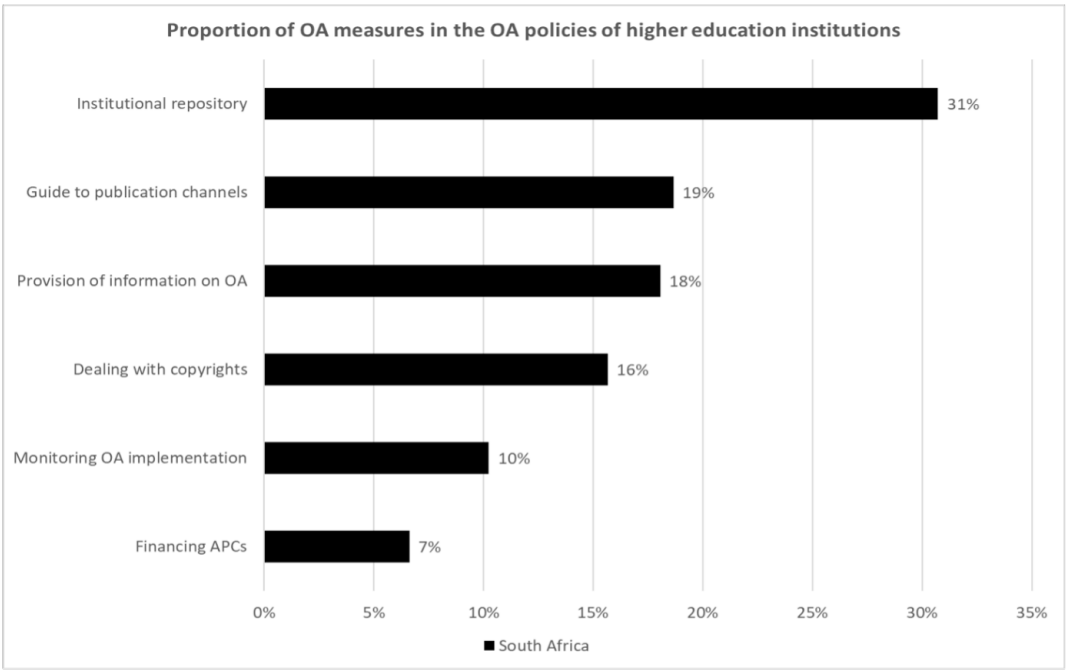

Figure 11: Proportion of OA measures in the OA policies of higher education institutions.

specific measures that individual institutions have undertaken to promote OA. The priority is the operation of institutional repositories (31%). Guidelines on publication channels, information provision and usage rights are close behind (19–16%), followed by monitoring (10%) and financing (7%).

The measures in detail: all institutions operate repositories; whilst 87% of policies emphasise compliance with relevant guidelines (quality standards, metadata, embargo periods, archiving permission). Under the section titled "Guide to publication channels", all policies require the deposit of publications (including metadata), and 47% additionally require the deposit of research data. Furthermore, 60% recommend OA publications in accredited peer-reviewed journals (as defined by the DoE/DHET criteria).

In terms of information provision, 40% emphasise support for repository submissions, while 20% focus on issues related to APCs. 67% recommend the use of Creative Commons licences[6] or the SPARC[7] Author Addendum; whereas 47% advise against comprehensive transfers of rights. 47% of institutions provide reviews of the implementation of OA measures, and around 60% explicitly mention periodic or continuous adjustments to their OA policy. With regard to the financing of research, 33% recommend including APC budgets in third-party funding applications, 27% offer publication funds, and 13% refer to transformative agreements. The absence of explicit mentions does not preclude the existence or development of such measures.

[6] Creative Commons (CC) is a non-profit organisation that provides six different ready-made and standardised free license agreements for the protection of authors' rights.
[7] The SPARC Author Addendum, on the other hand, is a legal instrument that gives authors the option of retaining their rights to their scientific publications as an addendum to their publishing contract.

5. Implications and Conclusion

The objective of this article is to examine the influence of South African OA initiatives on scholarly communication from several perspectives in order to draw sustainable conclusions regarding the identification of factors to consider when providing support for OA. The findings in accordance with the research questions are presented below:

(RQ1) How did research activity in South Africa (publication frequency) develop during the observation period from 2000 to 2022?

The development of publication frequency enables the drawing of conclusions about the dynamics and growth of scholarly production. Overall, South Africa has significantly expanded its publication activity and increased its international visibility: this is evidenced by a continuous increase in the total number of publications, nearly doubling its share of all WoS publications, alongside an above-average growth in OA publications. Particularly noteworthy is the rise in Gold OA, with South Africa now exceeding the global average. This suggests that, despite financial challenges such as limited funds to cover high APCs, South Africa is successfully publishing in high-ranking, internationally visible journals. Consequently, South Africa is positioning itself as an increasingly visible and competitive player in the global science system.

(RQ2) What is the research impact of South Africa's publications based on classic bibliometric citation indicators, and how has this developed over the observation period?

Bibliometric indicators, particularly citation metrics, were used to evaluate the impact, by measuring the extent to which research from South Africa is cited internationally. The analysis reveals a clear trend: OA publications achieve a higher overall impact, benefiting from increased visibility. Our findings thus align with the existing literature on the existence of OACA and extend the analysis of individual journals in South Africa (Ezema & Onyancha, 2017a; Ajibade & Muchaonyerwa, 2023; Onyancha et al., 2024) to encompass the total volume of publications and the development of OACA over time. It has also emerged that Green OA publications predominate in South Africa and achieve a higher citation impact than Gold OA publications due to their distribution across multiple channels. They are accessible both via the journals and additionally via repositories. Diamond OA, by contrast, has the lowest impact of all OA routes.

(RQ3) Which journals does South Africa have access to?

A key aspect is access to publications in scientific journals in South Africa. The study examined the extent to which researchers have access to specialist journals–an essential prerequisite for participation in global scholarly communication. The analysis indicates that there has been an increase in the accessibility of high-ranking WoS journals between 2000 and 2022, and that South African researchers are increasingly publishing in them. This enhances international visibility and generates a higher impact. However, it should be noted that high APCs continue to constrain the use of both renowned subscription and OA journals (Czerniewicz & Goodier, 2014; Dijkstra et al., 2017).

(RQ4) In which language do authors in South Africa predominantly publish?

The language of publication influences visibility, reach and potential citation frequency. Despite OA initiatives such as national databases (e.g. SciELO), local journals or LOTE journals, over 90% of publications from South Africa continue to be published in English. The data-driven analysis at publication level confirms the prevailing view that the English language dominates academic publications. This is attributed to the fact that researchers are motivated not only by altruistic considerations but also by career-related objectives. (e.g. reputation, employment, third-party funding) that are strongly impact-oriented (Mack, 2012). Given that English is widely spoken globally, whereas national languages tend to have a limited reach, accordingly, researchers prefer to publish in English.

[6] Creative Commons (CC) is a non-profit organisation that provides six different ready-made and standardised free license agreements for the protection of authors' rights.
[7] The SPARC Author Addendum, on the other hand, is a legal instrument that gives authors the option of retaining their rights to their scientific publications as an addendum to their publishing contract.

(RQ5) What is the proportion of Gold OA first authorships?

Additionally, cooperation activities and networks were examined by the percentage of first authorships in Gold OA publications in all OA publications from South Africa, in relation to the global share of first authorships in Gold OA publications in all OA publications worldwide. This reflects national publication strategies and provides indications of global inequalities concerning access to APC-based OA publishing. Although, according to the survey by Gallardo et al. (2024), 87% of the South African researchers surveyed use co-authorship to share the costs of APCs, the analysed publication data paints a different picture. During the observation period, the proportion of first authorships in Gold OA publications increased significantly. However, this progress must be assessed in a differentiated manner: Rising proportions may create increasing financial burdens related to APCs (especially with regard to possible price increases by publishers), which disproportionately affect researchers in the Global South. Since Gold OA is often associated with substantial APCs, a low proportion of Gold OA may indicate economic or institutional barriers rather than a lack of willingness to engage in OA. Accordingly, support measures (publication funds, transformative agreements, consortium models), alongside the strengthening of alternative OA models, are necessary to enable equitable visibility. For the advancement of OA, it is therefore crucial to consider both the quantity as well as the quality and fairness.

(RQ6) How did the implementation of OA policies at research institutions develop over time, and does this reflect the data-driven development of individual OA initiatives?

The evaluation of OA policies has shown the extent to which OA has been institutionally embedded in South Africa and which measures are predominantly applied. Around 35% of institutions have implemented OA policies over time, marking a significant institutional advancement, and representing an important milestone in the transformation toward OA. Furthermore, the presence of OA measures within the framework of institutional OA policies appears to increase their impact. Given the dominance of Green OA in South Africa, many institutions have extensive institutional repositories; the protection of authors' rights is also a high priority. Nevertheless, the financial conditions for the adoption of APCs remain a significant obstacle as only a limited number of institutions currently allocate budgets to cover publication fees.

Overall, OA is perceived by researchers as essential for reach, reception and social benefit, however, it often remains inaccessible due to high APCs. Diamond OA platforms (e.g. SciELO) are used, yet are still insufficiently indexed and recognised internationally, while hybrid options play a negligible role. Language is identified as a second major hurdle: although publishing in English maximises global visibility, it simultaneously marginalises locally relevant research in national languages and restricts inclusive access to knowledge. Collectively, these factors contribute to the risk of a "pay-to-be-seen" regime, whereby visibility remains purchasable, and OA only partially fulfils its promise of equitable access.

The following efficient policy paths can be deduced from the findings:

(i) **Green OA** with reliable rights retention, and self-archiving as a cost-effective model;
(ii) **Diamond OA** with professional quality assurance, sustainable funding, and international discoverability;
(iii) **equitable, transparent contract models** with cost control and effective OA targets.

This endeavour must be accompanied by robust data triangulation, reproducible analytical workflows, and an assessment of broader impacts. Should the aforementioned financial and language obstacles be dismantled, and indexing limitations overcome, OA in South Africa has the potential to fulfill its fundamental promise much more comprehensively: to ensure unhindered, equitable access to scientific knowledge, with a measurably higher impact.

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