



**STM**

A Joint Report Prepared by  
China Association for Science  
and Technology (CAST)  
and  
International Association  
of Scientific, Technical, and  
Medical Publishers (STM)  
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# **Open Access Publishing in China 2022**

Revision 1.1

## PREFACE I

With the rise of a new round of scientific and technological revolution and the widespread application of digital, networked and intelligent technologies, the penetration and integration of science and technology with economic, social, cultural and ecological civilization development has accelerated, and open cooperation has become an inevitable choice to deal with major scientific and technological problems and drive the development of human society forward. In this context, scientific research and academic communication have ushered in paradigm innovation, and the open science movement, represented by open access, has rapidly emerged and flourished, and its practice models have been enriched and improved. In November 2021, UNESCO released the *Recommendation on Open Science*, calling on countries around the world to commit to more open, transparent, collaborative and inclusive scientific practices, fully demonstrating that open science has become an international consensus.

China is a major research output country and an important participant in global open science. In recent years, China's scientific and publishing communities have been deeply involved in global open science practices, actively exploring open access articles, open shared data, open science facility construction and international cooperation in open publishing. From 2011 to 2021, the number of open access papers among the international papers published by Chinese researchers each year increased from 25,000+ to 238,000+ papers, accounting for an increase from 15.8% to 37.8%, with an average annual growth rate of 25.2%. As a joint organization of more than 200 scientific and technical societies, China Association for Science and Technology (CAST) is willing to work hand in hand with the global scientific and technical community to build a multifaceted synergistic mechanism, build a platform for scientific and technical journal exchange, carry out cooperation in academic publishing and dissemination, promote the transformation of open access publishing, and strive to enhance cross-border collaboration and diversified practices of open science.

The joint preparation of the report on *Open Access Publishing in China (2022)* (hereinafter referred to as "the Report") with the International Association of Scientific, Technical and Medical Publishers (STM) is an important initiative of CAST to promote the practice of open science. Adhering to the principles of independence and objectivity, both parties collected data, searched literature, analyzed problems and summarized laws in a practical manner, providing first-hand data and detailed information for all parties to comprehensively understand the evolution of international open access development and the progress in China.

Based on the systematic and in-depth investigation and analysis, the Report shows that the open access policies and practices of different countries and regions are distinctive, forming a colorful open access publishing ecosystem and facing a variety of practical problems. Stakeholders involved in open access should further deepen cooperation, bridge differences and build consensus, actively explore a more dynamic and sustainable open access publishing system, and establish a new model and mechanism for international academic governance in the open science environment.

Open science is not only a major revolution in scientific research paradigm and science and technology governance, but also a major opportunity to transform and upgrade the global academic publishing system. CAST will continue to unite the Chinese scientific and technical community and the journal publishing community to explore open access publishing solutions suitable for China. CAST will also always uphold the concept of openness, trust and cooperation, and join hands with the global academic and publishing communities to promote the culture of open science, advance the practice of open access, create an open sharing ecosystem, promote faster, wider and more comprehensively dissemination and utilization of data, results and knowledge, so that scientific research can benefit more countries and people, and make greater contributions to promoting the building of a community with a shared future for mankind.

Zhang Yuzhuo

Executive Vice President, Chief Executive Secretary  
of the China Association for Science and Technology (CAST)

## PREFACE II

As a global trade association, STM seeks to support members globally. We are keen to provide them and other stakeholders with new knowledge that builds bridges of understanding to enable successful solutions that truly meet the needs of researchers, wherever they are.

Across the globe, we see a growing movement towards open access to research publications and to open research practices more broadly. This transition is sometimes spoken about as if all nations and regions of the world are moving towards open access from the same starting point and assume a common trajectory and common solutions. Similarly, concepts associated with open access are used with the assumption that these are understood universally. Yet, there are important differences in the evolution of publishing practices that are important to understand and be sensitive to.

Researchers from China account for a growing percentage of the overall research output globally. Their research is being published both in domestic journals as well as those published outside of China, making China an important market for STM publishers. In 2021 STM and China Association for Science and Technology (CAST) signed a Memorandum of Understanding, which has led to a series of discussions in which CAST and STM have expressed a mutual desire to bridge gaps in knowledge. Among other commitments, the parties agree to share information about the state of the STM industry within China and globally and collaborate on development of industry reports when necessary. This report, *Open Access Publishing in China (2022)* represents one of the most important collaborative actions to date.

At the core of the report is a sincere desire to build understanding across geographies. It is a must-read for anyone seeking an up-to-date overview of open access publishing and concepts as these have evolved in North America and Europe and offers publishers and stakeholders outside of China an in-depth understanding of how native Chinese publishing and open access publishing has developed in China, how it has been understood and its trajectory. It further offers insight into the publishing practices of Chinese researchers. Although the report did not set out to draw a large number of conclusions or make recommendations, it does indicate that Chinese authors are gravitating to gold as the dominant open access publishing model. This will have important implications for publishers serving Chinese researchers.

STM is indebted to the team of STM and CAST editors who jointly collected data, carried out analysis, carefully reviewed literature and wrote the report. The many drafts leading up to this final version were translated back and forth between Chinese and English to ensure accuracy and to test clarity of concepts between cultures. Ultimately the report is not only a valuable source of information, but the process behind it also stands as a strong example of true collaboration and mutual respect across languages, geographies and cultures.

As CEO for STM it is an honor to share this report widely and look forward to further collaboration with China Association for Science and Technology (CAST).

Caroline Sutton  
CEO, STM

## EXECUTIVE SUMMARY

The scholarly communications ecosystem is complex, as is publishing the results of research for readers to access internationally. Costs of publishing and investment in the development of workflows for the benefits of researchers and the wider community must be recovered. Publishing models continue to evolve as the number of articles published as fully open access grows. Reimbursement for the cost of publication is moving from subscriptions and licenses at the journal level that allow the results of the research to be read, to charges by article to publish the results of the research. As open access publishing increases throughout the world, China is also transitioning to open access and its publishing organizations are experiencing similar changes and challenges as publishers internationally.

Following an Introduction on the reasons STM and CAST decided to collaborate on writing this Report and followed by some simple Conclusions, the Report is split into four sections summarized below.

### Open Access as Practiced Globally

This section charts the emergence of open access and the different approaches to open access, including definitions of open access publishing models and descriptions on how they are funded.

Open access refers to making published scholarly content available at no charge to the reader and protecting authors' rights under copyright licensing conditions that permit a set of re-uses whilst enabling publishers to continue making investments for the maintenance of the integrity of the scientific record. At the article level, Gold open access is when the version of record of an article is published on the journal's website and is open to read immediately. If the Accepted Manuscript or Version of Record, either immediately or after an embargo period, and not published through Gold open access, is made publicly accessible online through a repository or other online platform, this is referred to as Green open access. Bronze open access refers to an article that is free to read on the publisher's website based upon the publisher's choice.

There has been a global acceleration of the number of Gold open access articles, up to 30% in 2020. Data for China show the same trends. By August 2022, there were more than 18,000 open access journals listed in DOAJ.

A journal can be fully open access when funded by APCs or sponsored by an institution, a funder, or a scholarly society. For a hybrid journal, access to some articles is provided only to those with subscriptions or licenses while other articles are open access as chosen by their authors. APCs, transformative agreements, subscribe to open, and other emerging models are described as some of the mechanisms for funding the publishing of open access journals.

Encouragement and motivation to publish open access and with new journals predominantly being launched as open access, results in researchers increasingly selecting open access publishing.

However, according to a recent STM survey of researchers internationally, 62% had no knowledge or little understanding of the types of open access publishing and 68% had no knowledge or little understanding of available licensing options. Also, researchers are increasingly sharing their research results as preprints, a version of an article that has not undergone formal peer review nor publication in a peer-reviewed research journal but is made available in a repository or preprint server where it is open to read.

Copyright and author's rights underpin the protection of written works, ensuring that authors can have their works read, used, and distributed under the terms and conditions that they dictate. These rights are critical to ensuring the protection of the works and their integrity, as well as the integrity of the overall scholarly record. This Report introduces the subject of licenses in detail as well as describing the most used Creative Commons (CC) licenses.

In the final part of this section on the global practice of open access, AJOL in Africa, J-STAGE in Japan, ORE in Europe, and SciELO in South America are introduced as examples of national and regional open access platforms, along with DOAJ and Think. Check. Submit. as other initiatives. The National Open Access Roadmap in Australia, cOAlition S/Plan S in Europe, OSTP in the US, introduce some funder requirements along with UNESCO's recommendations on open science.

## **Open Access Publishing in China**

The launch of the Sciencepaper Online platform in 2003 started the open access journey in China through to 2021 when the Law of the People's Republic of China on Scientific and Technological Progress was revised for the second time requiring the promotion of the development of open science. After this history is described, detailed data is provided on open access growth between 2011 and 2021 against overall output from China and broken down by subject, institution, and SCIE journal quartile. According to SCIE data, the average annual growth rate of the number of Gold open access articles published by researchers from China was 25.2% from 2011 to 2021, against 14.7% of all articles. The total Gold open access articles in 2021 was 206,375, at 32% of the total output.

In a survey by CAST of reasons researchers in China submit their articles to open access journals, 47.62% believed that readership is increased, 44.29% gave increased speed of publications and 39.4% that it was a journal requirement. In contrast to the STM survey (as above), 58.65% of respondents stated that they had a better or well understood knowledge of open access.

The understanding of Gold, Green, and Diamond open access and hybrid journals is similar in China as used internationally. However, whereas internationally Bronze is used in relation to published articles, in China there is a category of Bronze journals with either all articles open for reading or with a hybrid mixture of articles.

CAST analyzed 4,963 journals published in China and data are presented in this Report on these journals. 1,810 are open access accounting for 36.47% of the total, of which 29.4% can be described under the Bronze category. There is further information in the Report on APC-supported publishing,

journals listed in DOAJ, and current transformative agreements.

In 2019, CAST, the Ministries of Finance, Education, and Science and Technology, the National Press and Publication Administration, CAS, and Chinese Academy of Engineering jointly launched the Excellence Action Plan of China's STM Journals (2019-2023). The plan covers scientific journals with the greatest international impact and includes the sub-categories of leading journals, key journals, emerging journals, high-start or high potential journals, cluster pilot projects, digital platforms, and programs for training and developing best practice of publishers and editors. Data about and explanations of each category and sub-categories are presented in the Report.

In 2018, the General Office of the State Council promulgated The Measures for the Management of Scientific Data, which proposed that "the scientific data from projects supported by government funding should be opened and shared with the society and relevant departments in accordance with the principle of openness as the norm and non-openness as the exception, ...", thus clarifying the responsibilities, principles, methods, and mechanisms of scientific data management. The section on China's open data tracks the implementation of data sharing, and specifically with journals listed in the Excellence Action Plan. There follows information on IRs, open resource, and open access publishing platforms in China.

Finally in this section, the Report provides data on China's international cooperation on open access. According to data from Web of Science 41.7% of the 152,901 articles published where authors from China collaborated with others internationally were open access. This was led by researchers from CAS. By the end of 2020, there were 428 English journals with a China Unified Serial Number (CN) and of these 351 (82.0%) cooperated with international publishers. The collaboration between CAST and international institutions and the history of their Forum for World STM Journals are also listed.

## **Research Integrity in Open Access Publishing**

The open science movement has had an important impact on the integrity of research. Trustworthy science is linked to transparency at all stages of design, execution, and reporting. This implies that more transparency, including in areas such as peer review, leads to more trustworthy science. But there have been less positive developments resulting from the open science movement. There is therefore a need for continued or even increased focus on research integrity as open access publishing increases.

In each of the areas covered, CAST has added a heading "Practice in China". China attaches great importance to research integrity and in recent years, has successively issued a series of policies, standards, and measures to strengthen the construction and governance of scientific research ethics. These have been documented in the Report.

Areas covered in this section are peer review, publication ethics, reusing previously published content, writing and editing services, trusted and predatory journals, version control, archiving,



publishing and research impact, and FAIR data management and sharing.

## **Collaboration in an Open Access Environment**

A selection of publishers operating internationally were asked to provide a short description of their collaborations in China. They all reported growing activities and increased initiatives in their publishing partnerships with organizations in China. They are as follows: AAAS, Brill, EDP Sciences, Elsevier, IEEE, IOP Publishing, KeAi, Oxford University Press, Royal Society of Chemistry, Springer Nature, Taylor & Francis, Wiley, and Wolters Kluwer .



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# INTRODUCTION

## Principles

The [China Association for Science and Technology \(CAST\)](#) and the [International Association of Scientific, Technical, and Medical Publishers \(STM\)](#) have agreed to jointly prepare this Report on scholarly communications and open access to inform their communities both within and outside of China about the evolution of open access, current practice, and issues for future consideration. For the community involved in scholarly publishing in China, the objective of this Report is to inform publishers and societies about open access publishing as it is practiced globally, contextualized by the evolution from other publishing models, and how publishers have collaborated to address and solve issues that have arisen as the transition to open access publishing has accelerated. Equally, this Report will inform STM members and other organizations of the emergence of open access publishing practice in China<sup>1</sup> and the different publishing models from which this growth has emerged.

It is hoped that through this joint initiative, CAST and STM can help journals in China navigate the transitions in open access and increase the partnerships between organizations publishing journals in China and publishers operating internationally.

CAST and STM have agreed that this Report be compiled around three basic principles that will ensure the success and growth of open access publishing in the future:

- Different models of publishing can operate in parallel, and research and scholarship are best served by allowing this diversity in publishing models. Data show that the research community prefers the engagement with their choice of journals where costs for publication are integrated with the publishing process, and the articles can be read openly thereafter. This diversity allows each community to utilize a model that provides for the necessary investment by publishers to continue to enable and improve services for the whole scholarly-communications ecosystem.
- Ensuring high quality publishing practice reinforces high standards of research integrity. Whilst processes to ensure the integrity of the published research output have evolved over time as required by the research community, publishers have been addressing the problems of integrity as they emerge from open access publishing, enabling solutions to the submission and publishing processes that will continue to foster the development of open science.
- Collaboration nationally and internationally by publishers in disseminating the results of research is in line with the practice of researchers globally who share their results and collaborate across geographical borders. These partnerships have been part of the publishing environment since the launch of the first journals. In parallel with the recent emergence of open access publishing, there has been an acceleration of these collaborations across many

<sup>1</sup> Reference to open access and publishing in China in this Report is to those in the Chinese mainland (not including Hong Kong, Macao, and Taiwan)

geographical boundaries, not least with journals published by organizations in China.

## **Contents**

Focused around the above three principles this Report is structured into four sections.

Section 1 describes the practice of open access from a global perspective, from the perspective of STM. It covers the emergence of open access, the issues that have been and will need to be addressed. Whilst the different open access publishing models are introduced, the section ends on Gold open access as the likely most practiced model for the future. This section was mainly authored by STM.

Section 2 covers open access publishing as practiced in China from the perspective of CAST. Whilst there is engagement by societies and institutions with global publishers, the evolution of publishing models has started from a different perspective and the section includes data on publishing practice in China. It was authored by CAST.

Section 3 focuses on how research integrity applies to open access publishing. Whilst the initial contribution was written by STM with some additional contributions from its members, CAST entries of specific practice of ensuring integrity of the published record of research have been added (in blue).

Section 4 includes contributions from 13 different STM publisher members describing publishing collaborations with publishing organizations, universities, research institutions, and societies in China, with comments on how these compare to similar collaborations elsewhere.

# 1. OPEN ACCESS AS PRACTICED GLOBALLY<sup>2</sup>

## 1.1 The Emergence of Open Access

Open access refers to the making available of published scholarly content (such as journal research articles, monographs, and conference proceedings) free of charge at point of use, with unrestricted access (that is, with no requirement to register or other copy- or access-control measures), and under copyright licensing conditions that permit a very wide set of re-uses to readers, whilst maintaining the integrity of the scientific record. We note that there is no such thing as ‘free’ publication, as there are significant costs in the development, production, dissemination, and preservation of any high-quality scholarly publication. A reader or library may access a document for free, but this simply means that another stakeholder in the process has paid for it.

The definition of open access can be traced to what are now commonly known as ‘the three B’s’. These B’s stand for the names of three cities; Budapest, Bethesda, and Berlin where three important statements were made. All three statements established that the open access model allows users to read, download, copy, distribute, print, search, or link to the full text of works, permitting use for any lawful purpose, as long as access to the material is possible. The three B’s differ slightly in focus and specific definitions of “open access”, differences which have been explored extensively elsewhere.

The 2002 [Budapest Open Access Initiative](#) identifies two routes to publishing open access. The first is by self-archiving which means posting a freely accessible version of a journal article, conference paper, or book online. The second is via open access journals. Both the 2003 [Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities](#) and the [Bethesda Statement on Open Access Publishing \(2003\)](#) added that supplemental materials should also be deposited and made available.

Open access has traditionally been considered a characteristic of individual outputs of a specific research project, rather than collections of such outputs. In other words, the property of an article rather than a journal, or of an individual monograph rather than a book series. The majority of journals are now what is known as ‘hybrid’, meaning that the journal provides authors with a choice whether to publish open access or not. Some articles within that journal will therefore be available to the institution or reader free of charge and others will require a subscription to access. There are also a growing number of ‘Fully Open Access’ journals, where all articles within that journal are published open access and accessible to the institution or reader without a subscription.

An increasing number of journals identify themselves as ‘transformative’. This term is used to describe a journal that has committed to transitioning to become fully open access. In these and other journals (referred to as hybrid journals), authors may be offered the choice between open access or subscription-based publication, based on their preference, funder, or institutional requirements. These

<sup>2</sup> This section draws on previously published content in *The STM Report 2018*. Available at [www.stm-assoc.org/2018\\_10\\_04\\_STM\\_Report\\_2018.pdf](http://www.stm-assoc.org/2018_10_04_STM_Report_2018.pdf)

journals, alongside many others, are actively engaged in creating viable mechanisms for making a sustainable transition to a more open access future.

## 1.2 Different Approaches to Open Access

The different approaches to open access can be considered in terms of **what**, **when**, and **where** it is made open. Taking peer-reviewed journal articles as examples, there are different options for “**what**” might be made available. These can be described as Journal Article Versions and are defined by the US National Information Standards Organization ([NISO](#)) as follows:<sup>3</sup>

- Author’s Original: Any version of a journal article that is considered by the author to be of sufficient quality to be submitted for formal peer review. The author accepts full responsibility for the article. May have a version number or date stamp. Content and layout as set out by the author.
- Accepted Manuscript: The version of a journal article that has been accepted for publication in a journal. A third party (the “publisher”) takes permanent responsibility for the article. Content and layout follow publisher’s submission requirements.
- Version of Record: A fixed version of a journal article that has been made available by any organization that acts as a publisher by formally and exclusively declaring the article “published”. This includes any “early release” article that is formally identified as being published even before the compilation of a volume issue and assignment of associated metadata, as long as it is citable via some permanent identifier(s). This does not include any “early release” article that has not yet been “fixed” by processes that are still to be applied, such as copy-editing, proof corrections, layout, and typesetting.

The **when** relates to the timing of making the article available, usually related to a publication date, such as:

- Prior to formal publication (either before or after peer review and/or acceptance)
- Immediately on publication
- Following some period after publication (this is known as an embargo period)

**Where** the article is made available can also vary, characterized in terms of three main options:

- A Publisher’s Platform: The Version of Record is branded and placed on the journal’s website, or any other publisher owned platform.
- An Open Access Repository: A version of a manuscript can be deposited in a repository and made publicly available either prior to or immediately on publication, or after an embargo period.
- Other Online Postings: Versions of articles may be posted online in a variety of other locations, such as author’s personal websites, academic social networks, and file-sharing sites. Such locations can be problematic because if improperly administered, such sharing

<sup>3</sup> [NISO RP-8-2008, Journal Article Versions \(JAV\): Recommendations of the NISO/ALPSP JAV Technical Working Group](#)

may contravene article licensing terms and copyright law. A coalition, that includes STM, has endeavored to promote responsible sharing through a website [How Can I Share It](#).

### 1.3 Open Access Publishing Models

The combination of **what** version of the article is published open access, **when** it is published and **where** it is located has over the years created a complex and contested typology of open access models. This is further complicated by the various business models that can be used to support the publishing, dissemination, and stewardship of the article and in many cases the curated collection of articles that makes up the journal. The open access and publishing communities have settled on a number of main models, although others could potentially exist as well. The four main publishing models are described in this section as well as hybrid journals.

#### Gold Open Access

When the Version of Record is published on the journal's website or any other publisher-owned platform and is made open immediately, this is known as the Gold model of open access publishing. Gold is the dominant model of open access publishing, granting immediate public access to millions of articles, constituting 30% of all articles output globally in 2020<sup>4</sup>. It has been widely embraced by scholarly publishers because it represents a sustainable means to deliver publishing services and thus maintain the integrity and quality of research articles. The financial model for covering the costs of publishing Gold open access is commonly associated with an Article Publishing (or Publication/Processing) Charge (APC), which is paid by either the author, their research institution or funder, although there are a variety of financial models that are currently in use.

#### Green Open Access

If the Accepted Manuscript or Version of Record, either immediately or after an embargo period, and not published through Gold open access, is made publicly accessible online through a repository or other online platform, this is referred to as Green open access. This practice is also referred to as 'self-archiving'. Access can be provided through a repository or other online platform. Repositories are often operated by research institutions to share versions of articles written by researchers at that institution, although there are also repositories operated by funders, publishers, or third parties. There are both generalist repositories, in which articles are collected regardless of subject, as well as a growing number of subject-based repositories. Repositories generally do not charge users a fee, and the costs of maintaining them are typically absorbed by the institution or organization where they are housed. The publishing costs of peer review, editing, and other services that have gone into the Accepted Manuscript or Version of Record and are reflected in the version made available under Green open access, and which promote the integrity of the scholarly record have generally been covered by subscriptions.

4 See Figure 1-1



## **Bronze Open Access**

In general usage, Bronze open access refers to an article that is free to read on the publisher website based on the publisher's choice. There are a variety of reasons such articles might be made free to read, for example a universal publisher policy (e.g., after an embargo expires), for a specific purpose (e.g., for content of broad interest or in response to an emerging health crisis), or on an ad-hoc basis. Sometimes the articles are made open access by voluntary action of the publisher (i.e., without payment of an APC or other action by the author) in an otherwise subscription journal, and other times this may be a journal or special volume of a journal that is fully open access. In some instances, these articles are free to read for only a limited period of time. These articles also may not have an explicit open license. In all of these senses, it may be unclear whether an article categorized as Bronze (regardless of definition) is truly or permanently open access.

For the purposes of this Report, we will use Bronze open access to refer to any article that is free to read on a publisher platform with no license or with a license that is not a Creative Commons license. This is consistent with the definition used by major bibliometric databases, including Scopus.<sup>5</sup>

## **Diamond (or Platinum) Open Access**

The Diamond or Platinum model refers to open access journals that do not rely on author-facing charges as a financial model to cover the journal's publishing costs. Diamond or Platinum journals might be sponsored by an institution, a funder, or a scholarly society.

Such reliance on sponsorship makes it difficult for Diamond journals to scale their operations, as higher submissions result in increased costs that will not necessarily be matched by increased revenues. Some journals of this type have tried other revenue sources such as advertising, or crowdfunding..

## **Hybrid Journals**

This term applies to a journal or publishing platform, rather than an article, which is funded by a combination of both subscription revenue and APCs. Access to all articles is provided to those with subscriptions, and individual articles may also be available at no cost to the general public when the author chooses to make them open access. After acceptance, hybrid journals provide authors a choice of how they wish to publish and broadcast their research.

## **Prevalence of Different Open Access Models**

Gold open access is the most prevalent type of open access for journal articles and Figure 1-1 shows that it is the Gold model that is evidently driving progress towards achieving global open access. It is highly likely that the number of global open access articles will overtake the number of subscription-based articles in the very near future.

<sup>5</sup> <https://blog.scopus.com/posts/scopus-filters-for-open-access-type-and-green-oa-full-text-access-option>

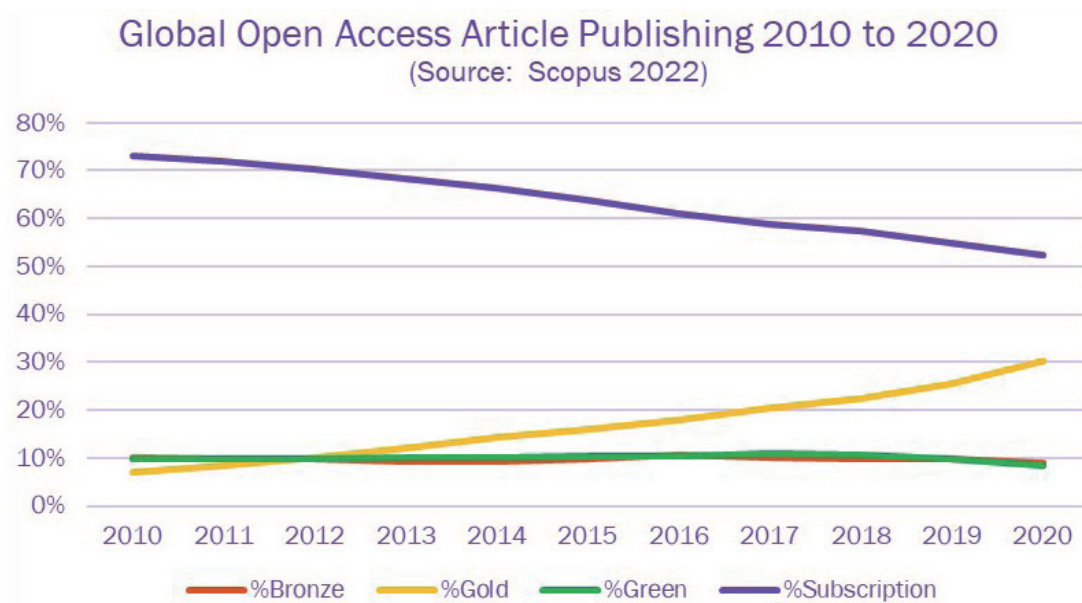


Figure 1-1 Open access uptake globally between 2010 and 2020 (Scopus, 2022)

According to Scopus data, the progress of open access in China is also driven by the Gold model, as shown below in Figure 1-2.

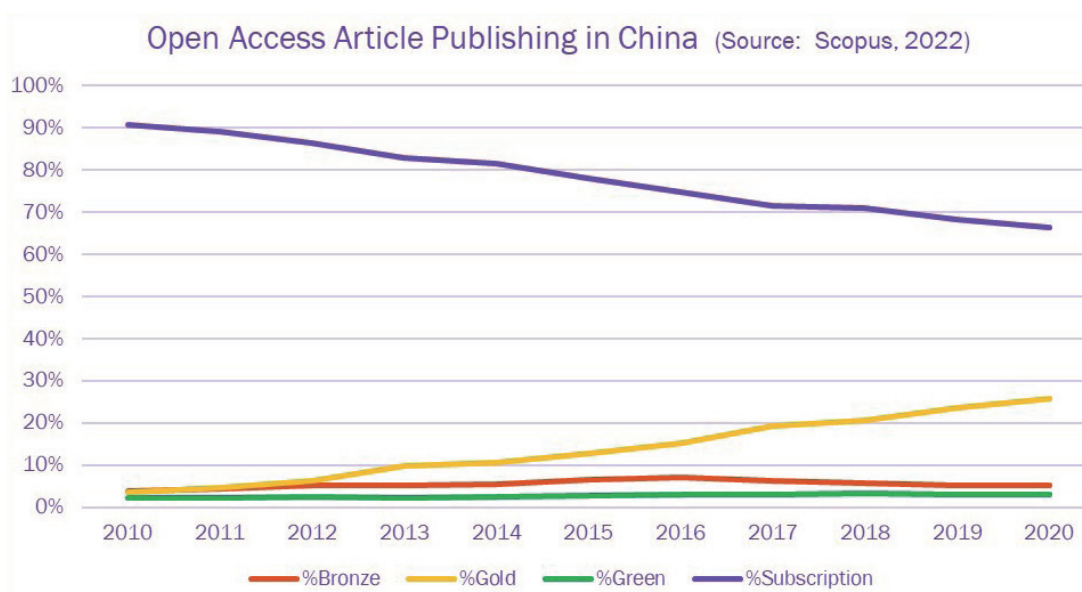


Figure 1-2 Open access publishing in China between 2010 and 2020 (Scopus, 2022)<sup>6</sup>

## 1.4 Funding Open Access

The publishing process required to produce a Version of Record includes a multitude of highly skilled tasks including coordination of soundness checks, plagiarism checks, evaluation of scope, peer review, editing, proofreading, and typesetting. There are also investments required to keep

<sup>6</sup> Note that Scopus includes Gold only articles with a Creative Commons license; articles with other licenses are categorized as Bronze, <https://blog.scopus.com/posts/scopus-filters-for-open-access-type-and-green-oa-full-text-access-option>

the journal running, such as promoting the journal, ensuring discoverability, platform maintenance and other services. Whether publishing open access or non-open access, these costs need to be addressed somewhere in the process. Where non-open access publishing is usually supported by subscriptions, which entitle readers to access material not otherwise available, open access publishing needs to be supported by other means.

The vast majority of Gold open access is enabled by APCs paid by the author, funder, or institution for publishing services. One of the advantages of Gold open access based on APCs is that payments scale with the growth in research outputs.

Journals using an APC payment include new launch open access journals and those flipped from subscription to Gold open access, for which many are in defined subject areas. They also include so-called ‘mega’ journals, publishing across broad subject areas, that took advantage of the scale of APC payments to support quick review and shorten processing times from submission to publication. They do not ask reviewers to judge the potential impact of the research and the decision to publish or reject is made solely on the basis of whether the research is sound. They tend to be very broad in scope because of this editorial policy, and have a different standard of peer review, which does include constraints about subject matter, novelty of research, or specific journal editorial policies. Examples of mega journals include *PLoS ONE* from the Public Library of Science (PLOS), *Scientific Reports* from Springer Nature, *ACS Omega* from the American Chemical Society, and *SAGE Open* from Sage.

Payment of APCs sometimes present challenges for authors, institutions, and publishers alike. Some publishers have therefore introduced alternative APC payment systems to reduce the high volume of low-value transactions associated with the APC model. Some examples are shown in Table 1-1. There are also other models which may or may not be directly related to APC transactions. These include a variety of types of institutional memberships, which entitle institution’s authors to publish for free or at a reduced rate, and prepayments, which allow for discounted advance purchase of a defined number of APCs. Some journals may also vary APC prices by differentiating between basic publishing service and additional paid-for services. Finally, some institutions have entered into “transformative agreements” (such as read-and-publish agreements) which may cover the APCs for any author from that institution as part of an annual payment.

APC payments are not the only model for supporting open access publishing. Other publishing models have also been developed or are in the process of developing. APCs and some of these other models are discussed briefly in the rest of this section.

### APCs

Generally, APCs are requested by journals at the point of publication, and authors arrange for payment, typically covered by their research funder or institution. Many research funders will reimburse publication charges, but even with broad funder support the details regarding the funding

arrangements within institutions and in other geographies remain to be fully worked out. A number of publishers have developed dedicated systems for payment and tracking of APCs, such as [Wiley's Open Access Dashboard](#), whilst others use services from [Copyright Clearance Center \(CCC\)](#) or other aggregators. There are also services that help institutions manage and understand their payments, such as [Oable](#) from [Knowledge Unlatched](#).

Table 1-1 Examples of author-based payment models

Model	Description	Examples
Article Publication Charge (APC)	Fee levied on acceptance to cover costs of publication and related services. Various discounts and waivers are common	Widespread
Page & other publication charges	Additional charges levied on top of basic APC, e.g., for manuscripts longer than specified limits, inclusion of color/rich media, etc.	<a href="#">Science Advances</a> (AAAS); <a href="#">American Astronomical Society</a> ; other journals
Prepayments	Block purchase of APCs in return for discounts	<a href="#">Taylor &amp; Francis</a> ; <a href="#">Wiley</a> ; others
Institutional memberships	A package of other relevant models such as institutional-based discounts, prepayment, bundling, offsetting, etc.	<a href="#">BMC</a> ; <a href="#">PLoS</a> ; <a href="#">Royal Society</a> ; others
Individual membership	Individuals purchase memberships for one-off fees (tiered); all coauthors must be members (up to maximum number); members required to participate (e.g., via peer review) to remain in good standing	<a href="#">PeerJ</a>
APCs supported by third party	Often intended as transitional support rather than a permanent model; discounted (or zero) APCs; supported by societies, institutions, foundations, etc.	Some BMC transfers-in; <a href="#">MedKnow</a> ; <a href="#">Sciendo</a> ( <a href="#">De Gruyter Open</a> )
Submission fees	Non-refundable fee payable on submission regardless of outcome of peer review, typically low value (e.g., USD 20-90 per article); a potentially viable model for high-rejection rate journals; submission fees have historically been used in some subscription-based journals, but Gold open access journals are increasingly exploring the option; at the same time these remain rare and several journals have done away with them in recent years..	Rare: <a href="#">Stem Cells</a> (hybrid), <a href="#">European Economic Review</a> (hybrid), <a href="#">Sleep</a> (hybrid), <a href="#">Acta Orthopaedica et Traumatologica Turcica</a> (open access), <a href="#">Cultural Anthropology</a> (open access);

APC prices may vary both based on the services provided and on the selectivity of the journal.

Selectivity affects the costs because of the additional investments necessary for selective peer and editorial review, as well as the need to cover review of articles that are not selected for publication. Figure 1-3 maps the APC prices (in Euros) for open access journals in 2018.<sup>7</sup>

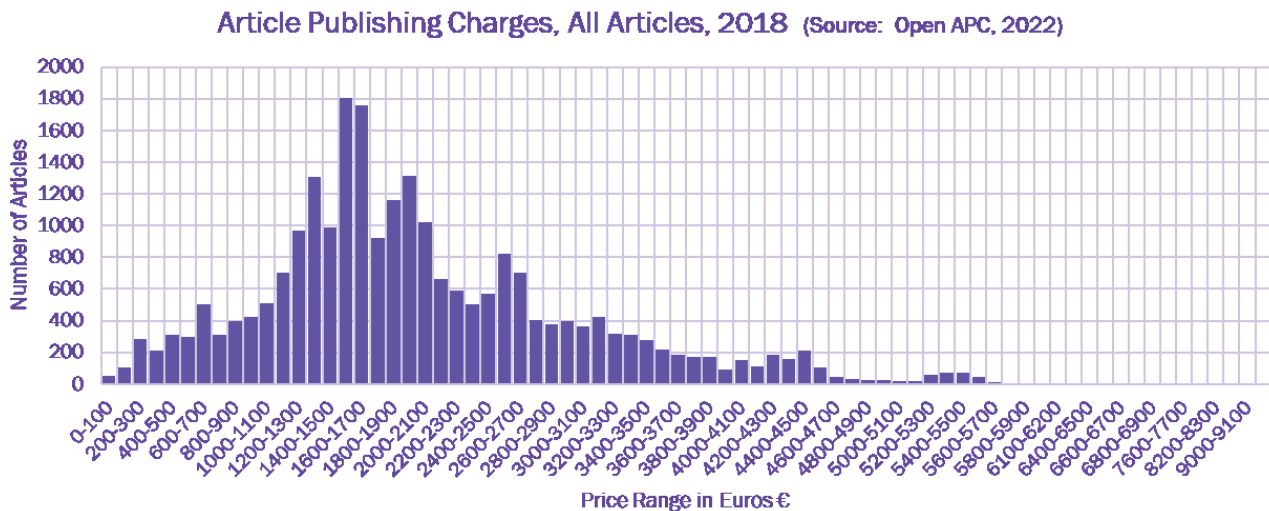


Figure 1-3 APC prices (in Euros) for open access journals in 2018

Arriving at a level of APC pricing which is considered appropriate for both research organizations and publishers as well as being responsive to market forces is hard and has been an obstacle to even wider adoption. Further challenges arise from the fact that a shift from subscriptions to APCs would result in a redistribution of costs from a large number of research consumers to a smaller number of research producers.

APCs should be distinguished from some other forms of supply-side payments (payments made on behalf of the author, rather than the reader) that are used in both open access and non-open access publishing. Some of these are described in Table 1-1 (based on a table in the 2018 STM Report<sup>8</sup>).

### Transformative Agreements

"Read and Publish" and "Publish and Read" agreements between institutions' libraries and publishers are transforming the licensing of subscription journals to open access, and hence are termed transformative agreements. First the institution and publisher agree a fee with a mixture of the previous subscription component (read) and an open-access component (publish). The institution can access the publisher's content (read) and the institution's researchers can publish their articles open access with no APCs (publish). Over time the subscription component will reduce and the open access component will increase, and the publishing service is compensated in a sustainable way.

<sup>7</sup> Open APC data, available at <https://treemaps.intact-project.org/apcdata/openapc/>. Accessed on 26 May 2022. Search terms: "View: 'Journal', year '1981', hybrid status 'All', Country 'All'. APC charges were applied to 24,276 articles in 2018. Articles' country of origin were Austria, Switzerland, the Czech Republic, Germany, Spain, Finland, France, UK, Hungary, Italy, Qatar, Serbia, Sweden, and USA

<sup>8</sup> Rob Johnson, Anthony Watkinson, and Michael Mabe, *The STM Report 2018*. Available at [www.stm-assoc.org/2018\\_10\\_04\\_STM\\_Report\\_2018.pdf](http://www.stm-assoc.org/2018_10_04_STM_Report_2018.pdf). p103

The agreements will be different for different publishers; some options include limits on the number of open access articles, inclusion or exclusion of specific journals, or inclusion of both hybrid and fully open access journals or only hybrid journals.

Read and Publish agreements describe a transaction where the institution pays for access but is allowed open access publishing by its researchers, whereas for Publish and Read the payment by the institution is for open access publishing whilst the rest of the publisher's journals are made open to read. Although these transformative agreements can be signed between a single university and individual publishers, such as the [California Digital Library](#) for the University of California, many are with consortia of libraries, such as the [National Science Library of the Chinese Academy of Sciences \(NSLC\)](#) in China, or even national agreements, such as [Projekt DEAL](#) in Germany.

With an increasing number of transformative agreements across several geographies, this adoption by publishers and libraries is aimed to create a transformation to open access, providing support for journals to transition from subscription or hybrid to fully open access as a majority of their articles become funded to become open. In the meantime, institutions, consortia, and regions will have more access to both open access and subscription articles.

### **Subscribe to Open**

Subscribe to open (known as S2O) is a publishing route where journals are published as subscription journals until a pre-determined level of subscription revenue is obtained, at which point all articles in the journal are made open access for the year – both articles published to date and those published for the rest of the year. Each year, existing customers continue to subscribe to the journal or journals and are invited to participate in an S2O offer, and if sufficient participation is obtained, the publisher opens the content covered by that years' subscription to all. This continues each year, and if the participation drops and the journal revenue becomes insufficient, the journal reverts to a subscription model. In some cases, access to backfile content may be included in the offer.

The [S2O Community of Practice](#) considers this a pragmatic approach for converting subscription journals to open access without reliance on either APCs or funding by organizations, as is the case for Diamond journals. Recognizing that different configurations of S2O will work for different mixes of publisher and subscriber, the Community of Practice provides variations of S2O adapted to different needs. First offered by four publishers with 24 journals in 2020, for 2023 12 publishers with 138 journals are offering the model. The largest publisher is [Annual Reviews](#) with 51 journals.

### **Other Emerging Models**

Publishers and other stakeholders are continually innovating to develop publishing models to support open access and other publishing activities. A key consideration for any new model is whether it is sustainable (that is, whether it can continue over a long term) and whether it is scalable (whether it can work for more than one particular setting). Transformative agreements themselves



were initially an experiment, and all models need to be tested for sustainability. Some experiments have been more successful than others, and others are still in early stages or even in development.

For example, for more than 10 years PeerJ has been experimenting with a membership model for open access publishing. Initially the only model offered by PeerJ, the publisher now offers a mix of options for publishing in its seven journals, including APC payments, institutional plans, and lifetime memberships.

As another example, in 2021 PLoS introduced two new models to sit alongside the payment of APCs. First, for *PLoS ONE* and four other journals Flat Fees for institutions were introduced in 2021, where an institution could publish unlimited numbers of open access journal articles for the payment of an annual fee determined by the history of publishing from the institution in the journals. Second, for *PLoS Medicine* and *PLoS Biology* a Community Action Publishing model<sup>9</sup> was established which is similar and gives unlimited open access publishing, with above threshold revenues redistributed as discounts.

A final example is the *Open Library of the Humanities* (OLH), which is supported by a library consortium model, where institutions commit to a membership in the form of a “Library Partnership Subsidy”. OLH is dedicated to publishing open access scholarship with no author-facing APCs. The OLH publishing platform supports academic journals from across the humanities disciplines, as well as hosting its own multidisciplinary journal.

## 1.5 Researchers’ Practice and Preferences in the Open Access Environment

As indicated previously, researchers are increasingly selecting open access publishing. This is due to a variety of influences, which include the following: publishers providing encouragement and more options for open access publishing; funders providing resources, encouragement, and sometimes requirements to publish open access; research organizations providing guidance and justification for more open access; and, in some cases, personal preference for open access on the part of researchers.

As noted previously, publishers and publishing organizations continue to provide a greater number and variety of outlets for open access, within both fully open access journals and hybrid journals. The vast majority of new journals today are launched as fully open access, and many publishers provide websites that give motivation and encouragement for open access publishing.<sup>10</sup> Section 4 outlines some publisher initiatives in China and on open access.

<sup>9</sup> <https://plos.org/resources/community-action-publishing/>

<sup>10</sup> See, for example, <https://www.wolterskluwer.com/en/expert-insights/authors-benefits-publishing-open-access>, <https://brill.com/page/oavisibility/visibility-and-marketing>, <https://www.acm.org/publications/openaccess>, <https://www.springernature.com/gp/open-research/about/benefits>



In recent years, funders have also been active in encouraging open science and open access practices. Section 1.9 outlines some policy initiatives in this area.

Research organizations and scholarly societies have over the years worked to support their members and the research community to advance open access. Some of these efforts have involved strong advocacy pieces, such as the 2021 [International Science Council](#) position paper, ‘*Science is a Public Good*’,<sup>11</sup> which posits that science is crucial to the advancement of society and that scientists have a responsibility to communicate their findings to the public. Library organizations have also been active in supporting and promoting open access.<sup>12</sup>

Despite these various influences and pressures encouraging open access, researchers themselves are generally ambivalent about open access. While some surveys indicate increasing support for open access publishing, surveys (sometimes the same survey) also suggest that open access is not a top priority for researchers when selecting a journal for submission of their articles. While 88% of respondents in a 2019 Taylor & Francis survey<sup>13</sup> indicated that there is value in making their articles more widely available, only 20% indicated that they would definitely submit to a fully open access journal. In that survey, having an open access option was not in the top 10 criteria for choosing a journal. In a 2018 Ithaka S+R survey of US researchers,<sup>14</sup> only four in 10 indicate open access characteristics of journals as highly influential in publication decisions. This is also the case for non-Western authors, where respondents to a 2018 Editage survey<sup>15</sup> listed open access as the least important criteria for selecting a journal. However, researchers also believe that open access publishing will become more important in the coming years. In a 2020 ACS survey,<sup>16</sup> 46% of researchers said it is important to publish open access today, but 66% said that it would be important to do so in the next 5 years. However, researchers also report significant confusion about open access, licensing, and various open access initiatives. 66% of respondents in the Taylor & Francis survey did not recognize any of 11 open access initiatives presented to them.

In a global survey of researchers undertaken by STM in 2022<sup>17</sup>, a majority of respondents indicated no or little understanding of the types of open access, licensing options, or specific funder requirements for open access (Figure 1-4).

11 [Science as a Global Public Good - International Science Council, 08/04/2021](#)

12 <https://guides.library.yale.edu/openaccess>

13 <https://authorservices.taylorandfrancis.com/researcher-survey-2019/>

14 <https://sr.ithaka.org/publications/2018-us-faculty-survey/>

15 [Author Perspectives on Academic Publishing: Global Survey Report 2018](#)

16 <https://acsopenscience.org/acs-2020-open-access-survey/>

17 Not yet published at time of writing. To be published on the STM website, [stm-assoc.org](https://stm-assoc.org) in September 2022

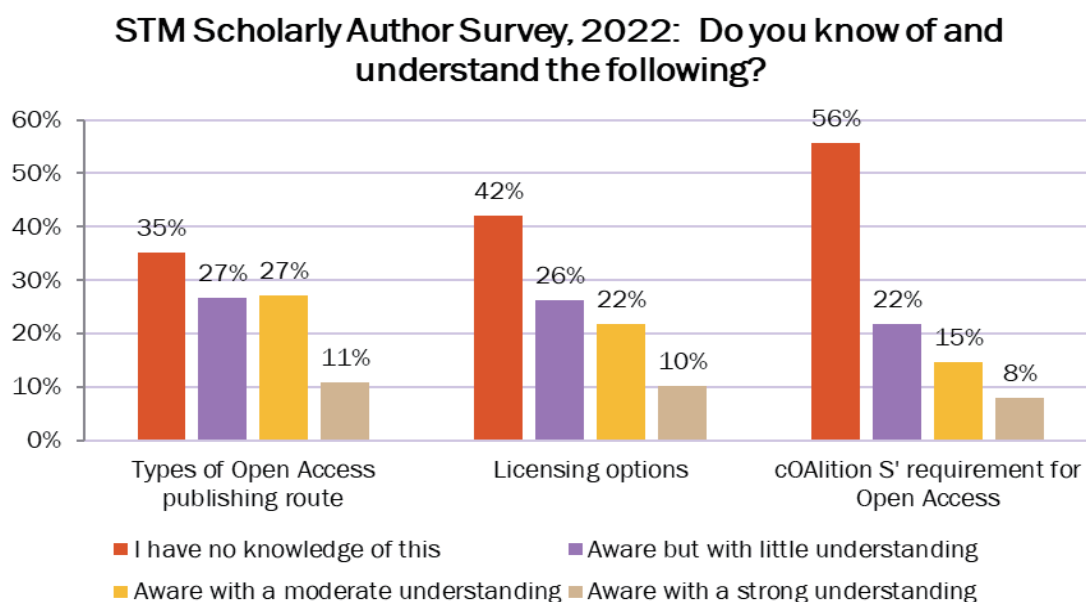


Figure 1-4 Researchers understanding of licensing options in open access. STM Survey, 2022<sup>18</sup>.

## 1.6 Preprints (see also Section 3.7)

A preprint is a version of an article that has not undergone formal peer review and publication in a peer-reviewed research journal. The preprint is made available, often as a non-typeset version, in a repository or preprint server and is free to read.

One of the earliest examples of researchers sharing preprints is in the field of physics through [ArXiv](#) (pronounced Ar-chi-ve). This early form of an article has seen increasing use in recent years. Elsevier, for example, has seen a 148% rise in the number of researchers publishing preprints on [SSRN](#), an early-stage research and preprint platform, over the past five years<sup>19</sup>. Many of the major scholarly publishers now offer their own preprint services and platforms in addition to the growing number of subject specific preprint platforms that have emerged over the last decade such as [ASAPBio](#), [BioRxiv](#), [SocArXiv](#), etc.

Preprints allow the research community to share information or indicative results very quickly and can also serve to indicate a direction of travel for a research project or facilitate feedback for authors before they submit to a journal. However, they also create a risk of misleading researchers, and even more so the public, due to the works not being reviewed or vetted before being shared.

Preprints historically have lacked a process for peer review, although some preprint servers are exploring adding comments or a review layer. This lack of a structured review process is what distinguishes preprints from a formal publication. There are therefore many concerns with respect

<sup>18</sup> Some percentages do not add up to 100% due to rounding

<sup>19</sup> Elsevier, "The Rise of Preprints", [Elsevier Connect](#). Accessed April 5, 2022

to preprints that relate to research integrity. Even when preprints are removed from a server, there is often no metadata concerning the removal. Various studies have shown that as much as 50% of preprints are never published in peer reviewed journals.<sup>20</sup> There is no data available on what percentage are never submitted to journals.

The global COVID-19 pandemic saw a surge in the use of preprints due to the need to share research as widely and as quickly as possible. Many studies have been made of the effectiveness of preprints related to the pandemic, which may provide additional evidence regarding the pros and cons of the use of preprints and early sharing of these preliminary versions of articles.

## 1.7 Licenses<sup>21</sup>

Copyright and author's rights underpin the protection of written works, ensuring that authors are able to have their works read, used, and distributed under the terms and conditions that they dictate. Similarly, these rights are critical to ensuring the protection of the works and their integrity, as well as the integrity of the overall system. A set of rights is automatically granted to the author simply by virtue of being the creator of the work. These rights can also be legally transferred to other individuals. Therefore, the rights holders in a work may be the author, a collection of authors or a third-party (such as a publisher) to whom the original rights holder has transferred rights. Depending on the laws of the jurisdiction in which the rights holder and user reside, the collection of rights held by the rightsholder may vary, but often include the right to approve or reject distribution of the work; to approve or reject the right to sell or resell the work; the right to modify, remix, or otherwise create "derivative" works; and many others.

For the rightsholder to provide any of these rights to another entity, there should be a license provided. Such a license can be provided to a specific entity (as in the example of a copyright transfer from author to publisher, or in an instance of an agreement between an author and a translator to create a translation of a work) or on a general basis (as in a general license to the public that provides a set of rights to any user). Such a general license means that a set of the rights usually reserved by the rightsholder is granted on a broad basis to the public. For example, the rightsholder of a work might allow any user to further redistribute their work, but not to sell the work. In this example, users would be able to share the work with others without further permission from the rightsholder (beyond that given by the license itself), but if the user wanted to sell it they would need to ask further permission from the rightsholder.

It should be noted that a work may contain sections with different authors and/or rightsholder, and the rightsholder can only provide a license to those parts of a work to which the rightsholder holds the rights. In particular if a work incorporates third-party works, it is not possible to license these re-used works under more permissive licenses than the original author /rightsholder permitted.

20 Roger C. Schonfeld and Oya Y. Rieger, "Publishers Invest in Preprints", *The Scholarly Kitchen*, 27 May 2020

21 In the Chinese version of the Report, this section has been shortened slightly but retains the key elements of the longer English text

In the case of scholarly works, and especially with respect to open access, this type of general licensing is very common, as reusability is a defining attribute of open access. General licenses may be applied to entire works, or to individual articles, book chapters, or even sections of works (noting, as above, that the rightsholder may differ for different parts of a work).

STM has provided some guidance on the principles and use for open access licensing in a resource available to the public - [Open Access Licensing - Making Open Access Licensing Work](#)<sup>22</sup>. In addition, individual publishers and third parties such as Creative Commons have created model licenses. These Creative Commons licenses were initially developed in the setting of creative arts, but are increasingly used in scholarly publishing<sup>23</sup>.

Not all licenses provide the same suite of rights to users without having to request them from rightsholders. Individual rightsholders may want to retain rights for a variety of reasons, or institutions or funders may mandate the use of certain licenses. Additionally, the increasing globalization of research and the development of mining tools have necessitated the need to consider which translations and data and text mining options to include or exclude from such licenses.

A description of options for providing or restricting certain use of scholarly works through licenses follows:

- Attribution: A requirement that any reuse of the work provides attribution to the original rightsholder/creator of the work.
- Noncommercial: A requirement that any reuse of the work is non-commercial in nature.
- No Derivatives: A requirement that the user not modify the work when reusing it.
- Share Alike: A requirement to use the same license on any reuse of the work that was applied to the work being reused.

To understand how these are used in practice, we present below the most commonly used licenses in scholarly communications under the Creative Commons scheme for licenses. As citing works is general practice in scholarly communications, most of the licenses used (whether using a Creative Commons license or another license) require attribution. So each of the below include the “by attribution” requirement. The most commonly used in scholarly publishing are the following:

- “By” Attribution (CC-BY): allows others to reuse for any purpose (i.e., to distribute, sell, remix, adapt, and build upon the material in any medium or format in any format), as long as attribution is given to the creator and rightsholder.
- “By” Attribution, No Derivatives (CC BY-ND): allows others to reuse the work for any purpose, as long as it is shared in its original form (without modifications or adaptation) and attribution is given to the creator and rightsholder.
- “By” Attribution, NonCommercial (CC BY-NC): allows others to reuse the work for any purpose, as long as the use is non-commercial and attribution is given to the creator and

<sup>22</sup> <https://www.stm-assoc.org/intellectual-property/licensing/open-access-licensing/>

<sup>23</sup> See [www.creativecommons.org/licenses](http://www.creativecommons.org/licenses)

rightsholder.

- “By” Attribution, NonCommercial, No Derivatives (CC BY-NC-ND): allows others to reuse the work for any purpose, as long as it is shared in its original form, the use is non-commercial and attribution is given to the creator and rightsholder.
- “By” Attribution, Share Alike (CC BY-SA): like CC BY, but with the additional restriction that the work that reuses the original is also shared under a CC BY license.
- “By” Attribution, NonCommercial, Share Alike (CC BY-NC-SA): like CC BY-NC, but with the additional restriction that the work that reuses the original is also shared under a CC BY-NC license.

Although not common for scholarly works, rightsholders can also make a Universal Public Domain Dedication, which allows rightsholders to give up their copyright and put their works into the worldwide public domain and allows re-users to distribute, remix, adapt, and build upon the material in any medium or format, with no conditions. In the Creative Commons license regime, this is referred to as the Creative Commons Zero (CC0) license.

It should also be borne in mind that, apart from the author’s economic rights, the author in most jurisdictions also enjoys so-called “moral rights”. These rights are non-transferable and sometimes have a longer term even than the term of copyright. Moral rights may include the right to claim authorship, the right to object to changes that denigrate the work or are prejudicial to the author’s reputation, and also “work integrity”, i.e., not have major changes to form or substance made to the work that would change its overall meaning or significance or artistic expression. The author also has the right to determine if and when and how a work is first released to the public, which in some countries is part of economic rights, in some part of moral rights and in some countries enjoys dual protection. CC and other licenses do not affect the application of moral rights.

Amongst open access scholarly journal articles, the CC BY license has been growing in use, now accounting for the majority of licenses that can be identified by type (see Figure 1-5). However, according to several surveys of researcher preferences, CC BY-NC-ND, which provides reuse rights but ensures that the integrity of the work is preserved and that it is not reused for commercial purposes without explicit permission from the rightsholder, is the preferred license for the majority of authors, even more so in social sciences and the humanities. This allows – consistent with the purpose of having licenses in the first place – authors to individually approve any further uses.

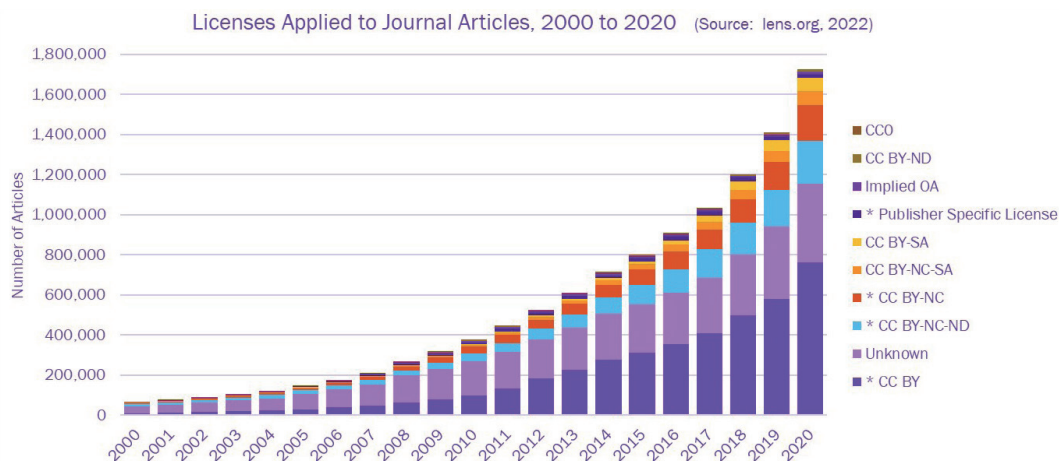


Figure 1-5 Open access license types for open access articles ([lens.org](https://lens.org), 2022)<sup>24</sup>

It is best practice to clearly articulate the licenses when a work is distributed, but not all works, or parts thereof, have a clear license attached when shared. Without a clear license, users may be unsure about their rights for sharing or reuse. STM has developed an initiative [How Can I Share It](#) to help users determine the reuse rights of scholarly works. Without a license, or with a lack of clarity as to license, users should ensure any reuse is approved by the rightsholder individually.

In general, licenses are agreements between the licensor (rightsholder, which may or may not be the publisher or author) and the user. The rightsholder remains free to issue in parallel other bespoke licenses. This practice is called “dual licensing”. This is the case for CC licenses as well as for many other license types.

## 1.8 International Open Access Initiatives

The scholarly communications open access ecosystem includes a vast community of organizations that contribute platforms, standards, certification, recommendations, and guidance that are important for the development and implementation of open access. These include publishers, of course, but also governments and their agencies, not-for-profit organizations, commercial entities, and alliances or coalitions of like-minded organizations. Within this wide grouping there is a range of and national or regional publishing platforms, and organizations offering services and solutions, with Open Science and open access policies set by governments, funding agencies, and research institutions.

This diversity of the ecosystem is an indication of the complexity of open access publishing and the need for ongoing investments and collaboration to make it work. Resources are needed not just for the publication, curation, sharing, and preservation of open access publications but also to promote the discoverability of articles, the identification of appropriate outlets for sharing of articles, and the promotion of scholarly integrity (see Section 3).

<sup>24</sup> Data available at <https://www.Lens.org>. Accessed on 7 June 2022. Search terms: Date; 01-01-00 to 31-12-20, Flags; Open Access, Has Abstract, Analytics Set, Identifier Type; Crossref, Publication Type; Journal Article, Open Access; Open Access Colour; Gold, Green, hybrid. \* indicates that where a range of licenses may have been applied to an article, the most restrictive license has been counted

In this section and the next, we provide some examples of organizations that are contributing to the implementation of open access. It should be noted that these examples are neither representative or comprehensive, and their inclusion here should not be seen as an endorsement of their activities by either STM or CAST. They are presented simply to provide an indication of some of the activity by these kinds of players in working to make open access work.

In this section we provide examples of infrastructure that helps identify appropriate open access outlets and provide opportunities for open access sharing of articles. In Section 1.9 we will similarly provide examples of significant funder and government policies. Later, in Section 4, some individual publishers have provided some examples of their collaborative contributions. In each of these sections, the inclusion of one example or omission of another should not be interpreted as an endorsement of any of these organizations or activities and should be understood as non-comprehensive and not representative.

### **African Journals Online (AJOL)**

African Journals Online ([AJOL](#)) was founded in 1998 to increase the visibility of African research and to stimulate the regional publishing sector. As of 15 August, it hosts nearly 600 titles from 35 different countries across the continent; Nigeria and South Africa contribute the largest number of titles (244 and 100 respectively), but there are also collections from Ethiopia, Tanzania, Uganda, Zimbabwe, Egypt, and Algeria. AJOL's establishment was facilitated by the International Network for the Availability of Scientific Publication ([INASP](#)) with external funding but now runs as a non-profit organization based in South Africa. Just over 300 of the titles on the platform are open access.

Usage of the AJOL titles has steadily increased over the past 5 years, and May 2022 saw over 2.2 million article downloads (compared to just under 700k in May 2017). All research disciplines are covered and participating journals are required to comply with a stringent set of quality criteria such as peer review, a functional editorial board, ISSN and transparent ownership. All journals must be published in Africa and at least half of each editorial board should be based in Africa.

AJOL is the most widely used platform for African research and participates in industry initiatives such as [Research4Life](#), [CrossRef](#), [Committee on Publication Ethics \(COPE\)](#), and [Directory of Open Access Journals \(DOAJ\)](#).

### **Directory of Open Access Journals**

The [Directory of Open Access Journals \(DOAJ\)](#)<sup>25</sup> is a 'community-curated online directory that indexes and provides access to high quality, open access, peer-reviewed journals'.

Full details of the basic criteria for inclusion can be found [here](#), but in summary Journals included in the DOAJ must fulfill the following criteria:

- Actively publish at least 5 research articles per year

<sup>25</sup> [Directory of Open Access Journals, DOAJ, https://doaj.org/](#). Accessed on 8 August 2022



- Have been published for at least a year
- Fully open access using CC or equivalent licenses
- The journal must have its own dedicated URL and homepage that is accessible from any location
- Articles must be available individually

On 1 August 2022, DOAJ included 18,058 open access journals, from 130 countries and in 80 languages, with 12,524 noted as journals without APCs. The number of open access journals recorded by Web of Science (sci/ssci/esci/a&hci, 2021) was 18,675, and by Dimensions was 19,196.

## J-STAGE

J-STAGE is a platform for scholarly publications in Japan, developed and managed by the Japan Science and Technology Agency (JST). It was launched with the aims of rapidly circulating articles, strengthening international dissemination of information, and promoting the publication of open access content. As of 15 August, J-STAGE hosts 5.4 million articles from 3,607 journals. Over 90% of articles on J-STAGE are free to read with the remainder available on subscription. Open access articles display a Creative Commons (CC) license and so can be reused under the terms of the license. JST has also launched ‘J-STAGE Data’ for datasets, and ‘Jxiv’ for preprints.<sup>26</sup>

## ORE

Open Research Europe (ORE) is an open access publishing platform for the publication of articles reporting on grants of the Horizon 2020 and Horizon Europe funding programs across all subject areas. It was officially launched in March 2021. The platform is one venue for beneficiaries to comply with Horizon2020 and Horizon Europe open access terms of their funding. The platform is based on the F1000 technology and publishing solution. It basically functions as an open access publisher. In addition to all articles being published open access, ORE also mandates an open data policy and applies open peer review under what is known as a “post publication peer review model”. This means that submitted articles undergo a number of checks to ensure the soundness of the submission. If a submission is sound and meets submission criteria it is published and then undergoes peer review. All reviews are made publicly available. As of 13 April 2022, the platform showed a total of 203 articles in the browsing function.

## SciELO

Scientific Electronic Library Online (SciELO) is an international scholarly communication program implemented through a decentralized network of national collections of peer-reviewed journals from 17 countries, collectively known as the SciELO network. As of December 2019, the network jointly published 1,200 journals and about 50,000 new articles per year.

All collections follow the SciELO Publishing Model, which provides for Gold open access to the full text of articles in various formats, and, for articles published after 2015, under a CC BY license.

<sup>26</sup> “J-STAGE Overview”, accessed 28 March 2022, <https://www.jstage.jst.go.jp/static/pages/JstageOverview/-char/en>

All articles are indexed with metadata and bibliographic references and aimed to be discoverable and interoperable with other bibliographic indexes and systems.

According to SciELO, “SciELO’s key contribution is the recognition of its journals’ relevance to the advancement of research from a global perspective as they communicate basic and, mainly, applied research related to national issues. In one aspect, SciELO serves the academy, and, in another aspect, informs public policies, professional communities, education curricula and public issues”.<sup>27</sup>

SciELO was initially supported by the São Paulo Research Foundation (FAPESP) and the Brazilian National Council for Scientific and Technological Development (CNPq), along with the Latin American and Caribbean Center on Health Sciences Information (BIREME). Brazil still operates and funds the secretariat for the overall program and central IT infrastructure, but the governance, management, funding and operation of individual journals and programs, including the IT infrastructure, are the responsibility of each country participating in the network.

### **Think. Check. Submit.**

Think. Check. Submit. is a resource to help researchers identify reputable journals in which to publish. It is a simple checklist that researchers can use to assess the credentials of a journal or a publisher. The 3-step approach encourages researchers to ‘Think’ about whether the journal to which they are submitting their research is a trusted journal, to ‘Check’ the journal against a set of criteria to ensure it is right for their work, and to ‘Submit’ their work only if the journal adheres to certain standards and criteria.

The campaign was developed with the support of a coalition from across the scholarly communications community. While it is not exclusively related to open access publishing, it arose particularly to address concerns about potential deceptive practices in the open access setting.

## **1.9 National and Regional Funder Requirements**

As noted in Section 1.8, this section provides some examples of prominent and potentially relevant funder requirements but is not representative nor comprehensive. The inclusion of a particular region should not be seen as an endorsement of any of these policies, nor should omission be seen as commenting on policies in other regions.

### **Australia - National Open Access Roadmap**

In June 2021, the Office of the Chief Scientist (OCS) of Australia proposed developing a single, national open access strategy for Australia. Three desired outcomes of the strategy were stated as follows:

- To improve Australia’s return on investment in the research sector
- To maintain Australia’s global position in science, research and innovation
- To increase industry access to leverage science and research investment to support economic

<sup>27</sup> SciELO, “The SciELO Publication Model as an Open Access Public Policy”, *SciELO in Perspective*, 18 December 2019, <https://blog.scielo.org/en/2019/12/18/the-scielo-publication-model-as-an-open-access-public-policy/>

recovery and growth

A review and consultation process followed, including outreach and engagement with multiple stakeholders and the solicitation of comments on the strategy and potential plans. Currently some potential plans for the implementation of a National Open Access Roadmap are undergoing financial analysis. Representatives from every aspect of the scholarly communications ecosystem have been invited to participate in the discussions and consultation, and the various national ministries that fund research endeavors are supportive. A key message from the OCS has been to acknowledge the value and ongoing role of publishers, and the need to ensure the continued viability of scholarly communication systems in any final plan.<sup>28</sup>

### Europe - cOAlition S/Plan S

On 4 September 2008 a group of national research funding organizations launched cOAlition S, a voluntary group of funders that commit to 'Plan S', a set of 10 principles<sup>29</sup> for “accelerating the transition to full and immediate open access to scientific publications”. This initiative was born from a cooperation between the leadership of the participating funding organizations and the European Commission. In August 2022 cOAlition S has 20 national and seven charitable and international funders and research organizations. It is important to note that this is not a government or policymaking authority, and it has no ability to bind signatory funders to any particular action. Any funder that wishes to implement its commitment will do so subject to its own authority and governance restrictions. It is also important to note that this does not include any particular group of funders, and that funders have been added to or left the coalition since its founding, so the makeup of the group is changeable.

The main goal of cOAlition S is that from 2021 onwards all scholarly publications on the results from research funded by public or private grants provided by their member organizations must be published in open access journals, on open access platforms, or made immediately available through open access repositories without embargo. The plan does not advocate any particular open access publishing model, however some of the current models are not acceptable according to the guidelines of Plan S and may not be compliant with specific funder policies.

### UNESCO Recommendation on Open Science

The UNESCO Recommendation on Open Science<sup>30</sup> was issued in 2021 to advance open science, which is defined in the recommendation as an inclusive construct that combines various movements and practices aiming to make multilingual scientific knowledge openly available, accessible and reusable for everyone, to increase scientific collaborations and sharing of information for the benefits of science and society, and to open the processes of scientific knowledge creation, evaluation, and

<sup>28</sup> **Unlocking the academic library; Open Access**, <https://www.chiefscientist.gov.au/news-and-media/unlocking-academic-library-open-access>

<sup>29</sup> **Plan S Principles**, [https://www.coalition-s.org/plan\\_s\\_principle](https://www.coalition-s.org/plan_s_principle)

<sup>30</sup> **UNESCO Recommendation on Open Science**, accessed 28 March 2022, <https://unesdoc.unesco.org/ark:/48223/pf0000379949.locale=en>

communication to societal actors beyond the traditional scientific community. In the recommendation, UNESCO encourages Member States to adopt policies which advance the practice of open science amongst researchers in their state. These open science practices include open access publishing, and also include open data and other practices of sharing in research.

UNESCO recommends that to foster open science globally, Member States should promote and reinforce international cooperation among all open science actors and are encouraged to participate in international scientific collaborations. It describes international collaboration as one of the integral practices of open science and the most important driving factor for an intensive exchange of scientific knowledge and experience.

### US Public Access Policy

In 2013, the White House Office of Science and Technology Policy (OSTP) issued a memorandum on Expanding Access to the Results of Science and Technology Research<sup>31</sup> that directed all US science funding agencies with over \$100 million in annual research and development (R&D) expenditure to develop a policy to provide access to publications and data related to projects funded by the federal government. Over the next several years, more than 20 Federal departments and agencies that fund research developed and implemented such policies, which, under the direction of the policy memorandum, are regularly reviewed and updated<sup>32</sup>.

Although the details of each agency's policy differ, they each require that researchers who receive funding from a federal agency make any article that reports on funded research available to the public no later than 12 months after publication. In addition, each agency encourages (to varying degrees) funded researchers to make any data produced during funded research available to the public as well, or at least make clear to the public how and under what conditions such data will be made available.

Access to publications and data are provided through a variety of means depending on agency policy and disciplinary approaches. Solutions to provide access often involve public-private partnerships. For example, the non-profit [CHORUS](#) helps agencies provide access to the best available versions of articles that report on federally funded research. As another example, access to data is provided through non-governmental repositories - including general repositories like [Figshare](#) and subject-specific repositories like [PANGAEA](#) for Earth and Environmental Science enabled through community adopted standards and infrastructure like [DataCite](#) and [Scholix](#).

On 25 August 2022, OSTP issued a further memo, known as the Nelson memo, amending requirements of federally funded agencies. The obligations will apply to all agencies whatever their R&D expenditure and all peer-reviewed scholarly publications are to be publicly accessible immediately on publication. There are other modifications to requirements on data, digital repositories, and research integrity. Agencies are required to publish policy development plans by December 2024, with an effective date no later than one year later.

<sup>31</sup> <https://obamawhitehouse.archives.gov/blog/2013/02/22/expanding-public-access-results-federally-funded-research>

<sup>32</sup> [https://www.whitehouse.gov/wp-content/uploads/2022/02/2021-Public-Access-Congressional-Report\\_OSTP.pdf](https://www.whitehouse.gov/wp-content/uploads/2022/02/2021-Public-Access-Congressional-Report_OSTP.pdf)

## 2. OPEN ACCESS PUBLISHING IN CHINA

### 2.1 The Emergence and Development of Open Access in China

China's open access movement can be traced back to the establishment of the academic exchange platform Sciencepaper Online<sup>33</sup> in 2003. Over the past 20 years, China has acted in line with the open access policies and practices, and has signed and implemented important international open access initiatives. The Law of the People's Republic of China on Scientific and Technological Progress, revised in December 2021 requires the promotion of the development of open science, marking that China has officially adopted open science, including open access, as one of the development directions of national science and technology. The major open access developments are illustrated in Figure 2-1.

- 2003 - The Center for Science and Technology Development of the Ministry of Education launched the program Sciencepaper Online.
- 2004 - In May the [National Natural Science Foundation of China](#) (NSFC) and the [Chinese Academy of Sciences](#) (CAS) signed the Berlin Declaration on Open Access to Knowledge in the Science and Humanities<sup>34</sup>.
- 2005 - In June, the International Symposium on Open Access Strategies and Policies of Scientific Information, co-sponsored by CAS and the [International Academy of Sciences](#) (IAP) and organized by the National Science Library of the Chinese academy of Sciences (NSLC), was held in Beijing. In July, the China University Library Directors' Forum released the Wuhan Declaration on Library Cooperation and Information Resource Sharing<sup>35</sup>, which suggested that university libraries in China should begin to share their websites of literature resources.
- 2006 - In July, the Ministry of Science and Technology (MOST) and the Ministry of Finance jointly issued the Interim Measures for the Administration of the National Sci-tech Support Plan<sup>36</sup>, requiring "the establishment of standardized and sound project data and sci-tech report archives" and "entrusting sci-tech information service institutions to establish the project data and achievement database of the supported plans, to realize information disclosure and resource sharing". Since then, China has gradually developed its open access policy, open access knowledge base, and open access platforms in a steady manner.
- 2008 - CAS launched the Grid Construction Plan of Institutional Knowledge Base<sup>37</sup>.
- 2009 - [China Science and Technology Resource Sharing Network](#)<sup>38</sup> went online.
- 2010 - In October, CAS, and the German [Max Planck Institute](#) jointly held the 8th Berlin Conference on Open Access in Beijing. In October of the same year, [China Open Access](#)

<sup>33</sup> <http://www.paper.edu.cn/templates/introduction.shtml>

<sup>34</sup> [https://www.cas.cn/zt/jzt/gjjlt/zgkxydgmpxhhz30zn/xwbd/200405/t20040525\\_2665775.shtml](https://www.cas.cn/zt/jzt/gjjlt/zgkxydgmpxhhz30zn/xwbd/200405/t20040525_2665775.shtml)

<sup>35</sup> <http://sim.whu.edu.cn/info/1073/4178.htm>

<sup>36</sup> [https://www.safea.gov.cn/xxgk/xinxifenlei/fdzdgnr/fgzc/gfxwj/gfxwj2010before/200607/t20060731\\_143610.html](https://www.safea.gov.cn/xxgk/xinxifenlei/fdzdgnr/fgzc/gfxwj/gfxwj2010before/200607/t20060731_143610.html)

<sup>37</sup> <http://ir.las.ac.cn/handle/12502/5651>

<sup>38</sup> <https://www.escience.org.cn>

Journals (COAJ) went online.

- 2012 - NSLC organized 23 research institutes and university libraries to establish the working groups for promoting institutional repositories and arXiv services in China and announced that China Open Access Promotion Week would be held in October every year<sup>39</sup>. In the same year, Peking University Institutional Repository and National Social Sciences Database, a public welfare journal database, were released.
- 2014 - In May, China's open sharing policy and construction of open sharing system were ushered in by the Statement of the Chinese Academy of Sciences on Open Access to Papers Published by Publicly Funded Research Projects and the Statement of the NSFC on Open Access to Research Papers Published by Funded Projects<sup>40</sup>. In the same month, the 2014 Global Research Council Summit was held in Beijing. In the Summit, Chinese Premier Li Keqiang, on behalf of the Chinese government, clearly expressed support for establishing an open access mechanism for scientific knowledge funded by public finance<sup>41</sup>.
- 2015 - NSFC issued the Implementation Rules of Open Access Policy for Basic Research Repository<sup>42</sup>, launched its basic research repository, and collected the full text of the articles funded by the NSFC, and provided open access services to the public.
- 2016 - Confederation of China Academic Institutional Repository (CHAIR)<sup>43</sup> was established and CAS launched the preprint platform of research articles - ChinaXiv; In the same year, the Ministry of Education issued the Action Plan for Promoting the Transfer and Transformation of Sci-tech-achievements in Colleges and Universities<sup>44</sup>, which proposed to open research data, articles, research facilities, instruments and equipment and other innovative resources to innovation and entrepreneurship groups, and provide science and technology achievement information, so as to strengthen the opening and sharing of innovation resources in colleges and universities.
- 2017 - In July, the NSLC signed the Global Open Repository Network Cooperation Agreement<sup>45</sup> on behalf of the working group for promoting the institutional repository in China. In October, both the NSLC and the National Science and Technology Library (NSTL) signed the letter of intent of Open Access 2020 Initiative<sup>46</sup>.
- 2018 - China issued the Measures for the Management of Scientific Data<sup>47</sup> to "further strengthen and standardize the management of scientific data, ensure the safety of scientific

39 [http://www.las.cas.cn/news/fwcx/202112/t20211202\\_6286103.html](http://www.las.cas.cn/news/fwcx/202112/t20211202_6286103.html)

40 <http://scitech.people.com.cn/n/2014/0516/c1007-25024469.html>

41 [http://www.gov.cn/guowuyuan/2014-05/27/content\\_2688219.htm](http://www.gov.cn/guowuyuan/2014-05/27/content_2688219.htm)

42 <https://ir.nsfc.gov.cn/policies>

43 <http://chair.calis.edu.cn/pages/detail.html?id=db30a7c8-12d3-4383-82b2-fee844cf5f3>

44 [http://www.moe.gov.cn/srcsite/A16/moe\\_784/201611/t20161116\\_288975.html](http://www.moe.gov.cn/srcsite/A16/moe_784/201611/t20161116_288975.html)

45 Gu Li-ping. Preface for thematic section[J]. *Chin J Med Libr Inf Sci*, 2021, 30(3): 1-2

46 [https://www.cas.cn/yx/201710/t20171027\\_4619514.shtml](https://www.cas.cn/yx/201710/t20171027_4619514.shtml)

47 [http://www.gov.cn/zhengce/content/2018-04/02/content\\_5279272.htm](http://www.gov.cn/zhengce/content/2018-04/02/content_5279272.htm)



data, improve the level of openness and sharing, and better support national sci-tech innovation, economic and social development and national security".

- 2019 - CAST and other three state departments jointly issued the Suggestions on Deepening Reform and Cultivating World-class STM Journals, emphasizing the need to expand channels of open cooperation and to deepen international peer cooperation.
- 2020 - By 31 January 2020 organizations in China had signed the Open Access 2020 Initiative; On January 31, 2020, China Academic Journals (CD Edition) Electronic Publishing House Co., Ltd, together with the Chinese Medical Association Publishing House Co., Ltd, the Chinese Preventive Medicine Association, the Chinese Medical Doctor Association, launched the Online open access platform for COVID-19 through CNKI; The Academic Exchange Platform for Research Achievements in Prevention, Control, Diagnosis and Treatment of Novel Coronavirus Pneumonia was jointly established by MOST, the National Health Commission, CAST, and the Chinese Medical Association (CMA). The platform shared the latest research articles relating to COVID-19, and was recommended and linked by WHO, World Medical Association, and the international publisher platforms. The National Open Platform for STM Journals has been upgraded and launched online.
- 2021 - On 24 December, the Law of the People's Republic of China on Scientific and Technological Progress<sup>48</sup> was revised for the second time, which requires promoting the development of open science.

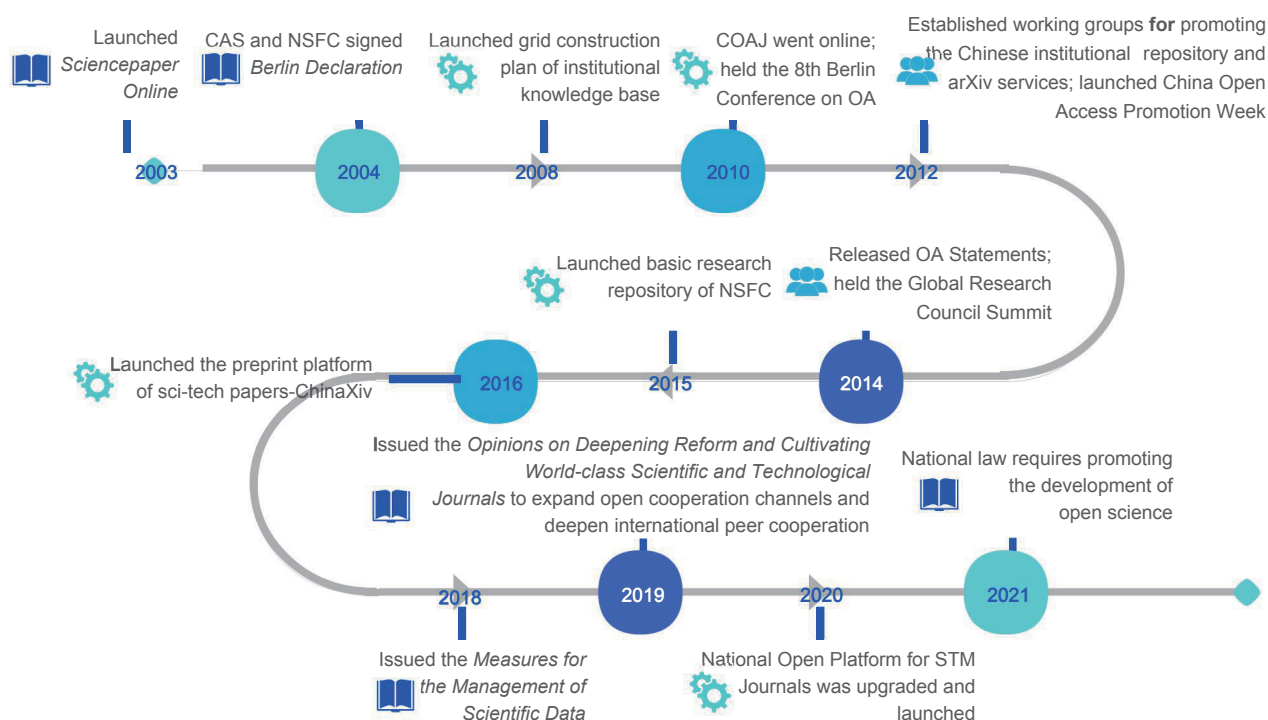


Figure 2-1 Open access history in China

48 [https://www.most.gov.cn/xxgk/xinxifenlei/fdzdgnr/fgzc/flfg/202201/t20220118\\_179043.html](https://www.most.gov.cn/xxgk/xinxifenlei/fdzdgnr/fgzc/flfg/202201/t20220118_179043.html)



## 2.2 International Open Access Articles Published by Researchers from China

In recent years, the number of open access articles published by researchers around the world has increased rapidly. Based on 2011 to 2021 data from the [Web of Science](#) the following can be concluded, as shown in Figure 2-2 and Table 2-1:

1. Global researchers published 17,117,459 articles<sup>49</sup> of which 7,450,989 were open access, accounting for 43.5% of the total.
2. The proportion of global open access articles has been increasing from 33.3% in 2011 to 50.3% in 2021.
3. Global open access articles increased from 397,344 to 1,084,565, with an average annual growth rate of 10.6%.
4. The number of Gold open access articles increased from 128,831 (accounting for 32.4% of all open access articles) in 2011 to 817,685 (accounting for 75.4% of all open access articles) in 2021, with an average annual growth rate of 20.3%.

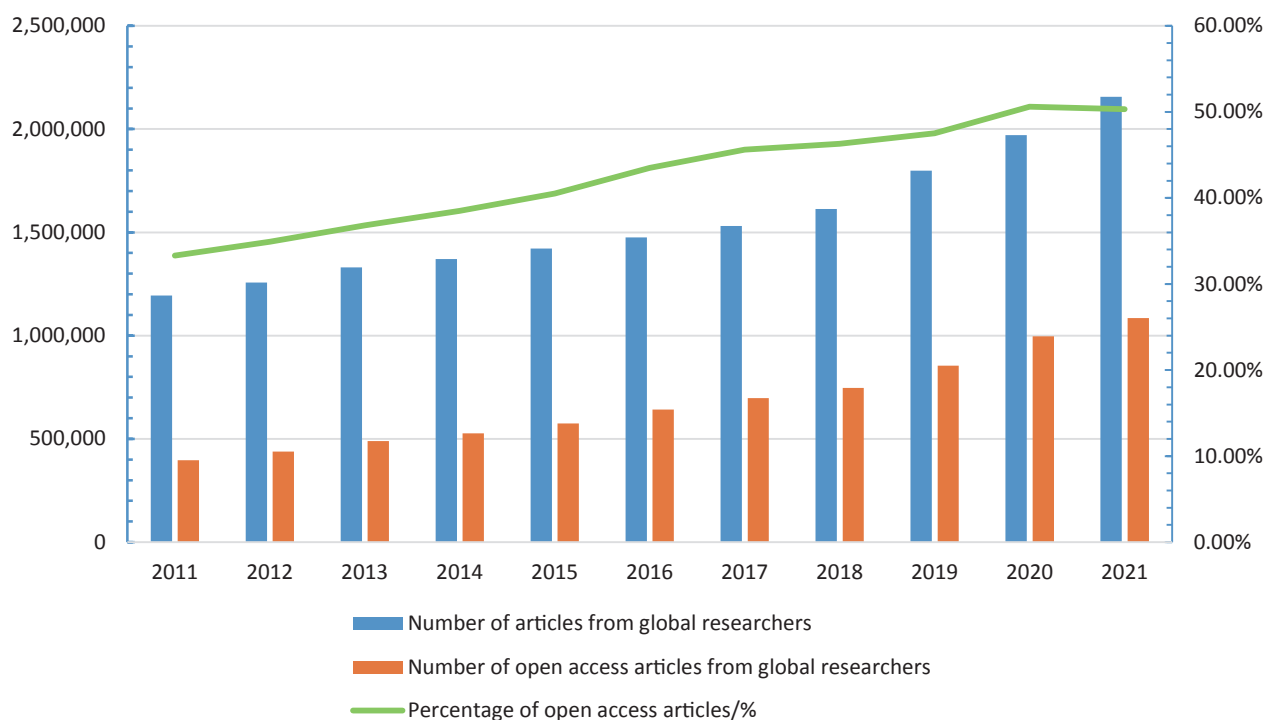


Figure 2-2 Open access articles published globally (2011—2021)

49 Data source: SCIE, literature type: Articles and Reviews

Table 2-1 Open access articles published globally(2011—2021)

Year	Number of articles from global researchers	Number of open access articles from global researchers	Percentage of open access articles	Open access type			
				Gold open access articles	Proportion (%)	Non-Gold open access articles	Proportion
2011	1,193,573	397,344	33.3%	128,831	32.4	268,513	67.6%
2012	1,257,661	438,701	34.9%	161,600	36.8	277,101	63.2%
2013	1,330,264	489,521	36.8%	202,502	41.4	287,019	58.6%
2014	1,370,539	527,503	38.5%	243,054	46.1	284,449	53.9%
2015	1,421,772	575,255	40.5%	273,364	47.5	301,891	52.5%
2016	1,476,035	642,606	43.5%	315,834	49.1	326,772	50.9%
2017	1,530,336	697,339	45.6%	373,225	53.5	324,114	46.5%
2018	1,612,546	746,513	46.3%	424,918	56.9	321,595	43.1%
2019	1,798,173	854,721	47.5%	531,690	62.2	323,031	37.8%
2020	1,971,035	996,921	50.6%	678,070	68.0	318,851	32.0%
2021	2,155,525	1,084,565	50.3%	817,686	75.4	266,879	24.6%

### Significant Increases for China from 2011 to 2021

As for China, based on 2011 to 2021 data from Web of Science the following conclusions can be drawn:

- Researchers from China published 3,819,228 articles<sup>50</sup> of which 1,182,163 were open access, accounting for 31.0% of the total.
- The number of articles published in Web of Science listed journals by researchers from China in 2021 was 630,960, of which 238,771 were open access, accounting for 37.8%.
- The proportion of open access articles in China has been increasing at a faster rate than the overall level of publishing. Among these Gold open access articles have shown the most prominent growth.
- China's open access articles increased from 25,235 to 238,771, with an average annual growth rate of 25.2%.
- The number of Gold open access articles increased from 14,454 (accounting for 57.3% of all open access articles) to 206,375 (accounting for 86.4% of open access articles), with an average annual growth rate of 30.5%. These data are shown in Figures 2-3 and 2-4 and Table 2-2.

<sup>50</sup> Data source: SCIE; literature types Article and Review; and the address of the authors includes China

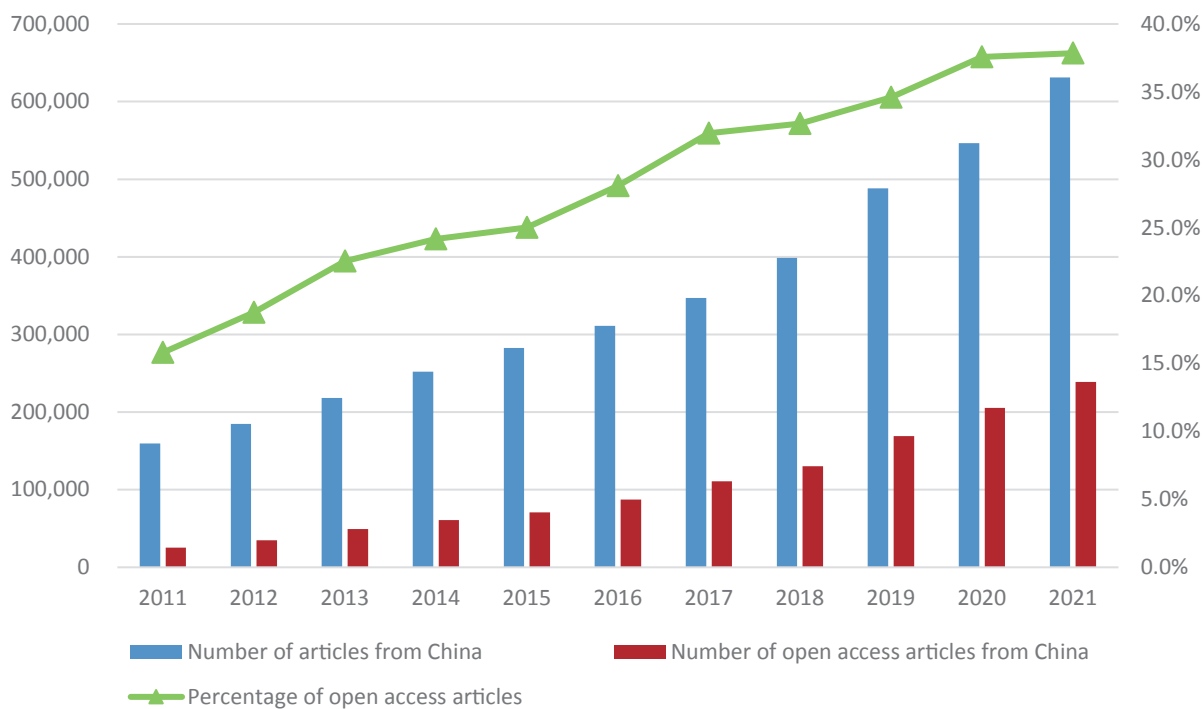


Figure 2-3 Articles in Web of Science listed journals and open access articles with authors from China published, 2011—2021

Table 2-2 Open access articles published from China, 2011—2021

Year	Number of articles by researchers from China	Number of open access articles by researchers from China	Percentage of articles that are open access	Open access type			
				Gold open access articles	Proportion	Non-Gold open access articles	Proportion
2011	159,640	25,235	15.8%	14,454	57.3%	10,781	42.7%
2012	184,736	34,671	18.8%	21,919	63.2%	12,752	36.8%
2013	218,156	49,193	22.5%	34,609	70.4%	14,584	29.6%
2014	251,967	60,903	24.2%	44,151	72.5%	16,752	27.5%
2015	282,528	70,674	25.0%	51,858	73.4%	18,816	26.6%
2016	311,052	87,373	28.1%	65,065	74.5%	22,308	25.5%
2017	346,840	110,861	32.0%	86,767	78.3%	24,094	21.7%
2018	398,694	130,196	32.7%	102,652	78.8%	27,544	21.2%
2019	488,114	168,857	34.6%	138,467	82.0%	30,390	18.0%
2020	546,595	205,429	37.6%	171,673	83.6%	33,756	16.4%
2021	630,906	238,771	37.8%	206,375	86.4%	32,396	13.6%

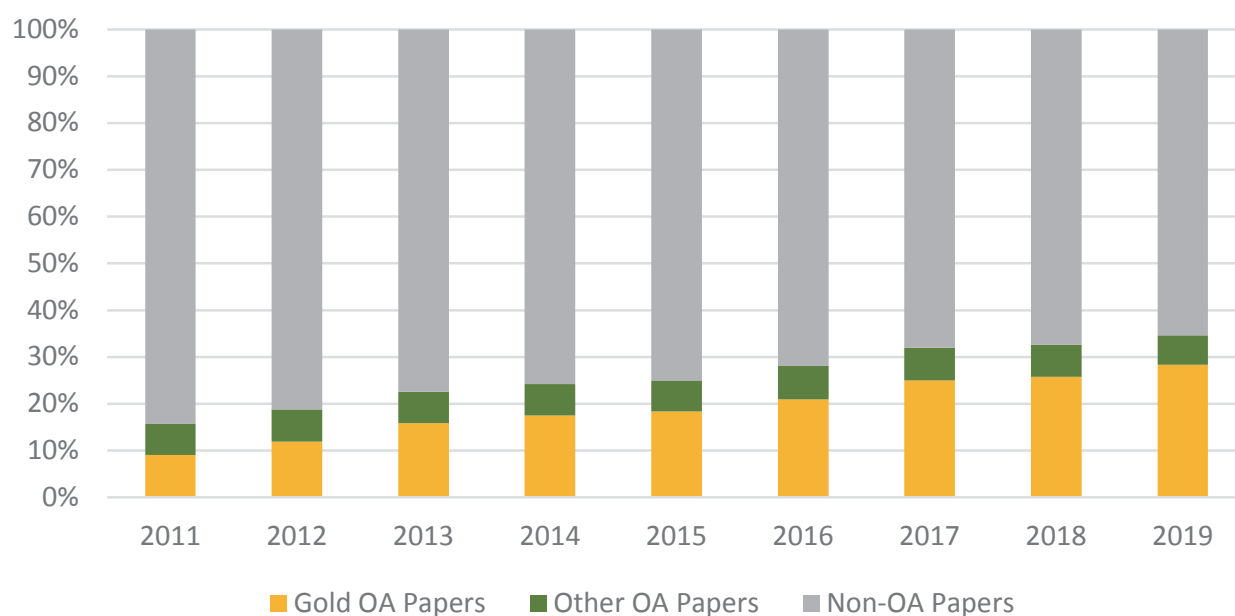


Figure 2-4 Changes in the proportion of open access articles by authors from China

Table 2-3 shows the number of articles published in journals listed in the Science Citation Index Expanded (SCIE) by authors from China from 2011 to 2020 (according to the quartile distribution of SCIE journals in 2020; the related data were downloaded in June 2021). The average annual growth rates of articles published in Q1, Q2, Q3, and Q4 journals were 17.9%, 15.5%, 11.5%, and 8.9%, respectively. Table 2-4 shows the number of open access articles published in journals listed in the SCIE by quartile by authors from China from 2011 to 2020. The average annual growth rates of articles published in Q1, Q2, Q3, and Q4 journals were 28.5%, 28.5%, 33.1%, and 29.0%, respectively.

Table 2-3 Quartile distribution of SCIE articles published by authors from China, 2011—2020

Year	Q1 articles		Q2 articles		Q3 articles		Q4 articles	
	Number of articles	Growth rate	Number of articles	Growth rate	Number of articles	Growth rate	Number of articles	Growth rate
2011	58,508		45,020		31,187		21,821	
2012	66,182	13.1%	54,683	21.5%	36,185	16.0%	24,718	13.3%
2013	83,376	26.0%	67,249	23.0%	41,876	15.7%	28,195	14.1%
2014	98,329	17.9%	77,320	15.0%	47,347	13.1%	30,487	8.1%
2015	116,907	18.9%	85,306	10.3%	54,279	14.6%	32,961	8.1%
2016	144,126	23.3%	98,666	15.7%	61,131	12.6%	38,747	17.6%
2017	157,390	9.2%	99,918	1.3%	59,658	-2.4%	35,644	-8.0%
2018	188,511	19.8%	120,749	20.8%	67,858	13.7%	40,134	12.6%
2019	224,333	19.0%	151,046	25.1%	74,929	10.4%	45,221	12.7%
2020	258,283	15.1%	163,986	8.6%	83,349	11.2%	47,029	4.0%

Table 2-4 Quartile distribution of SCIE open access articles published by authors from China, 2011—2020

Year	Q1 articles		Q2 articles		Q3 articles		Q4 articles	
	Number of articles	Growth rate	Number of articles	Growth rate	Number of articles	Growth rate	Number of articles	Growth rate
2011	7,198		7,271		2,535		1,507	
2012	9,720	35.0%	10,756	47.9%	3,991	57.4%	3,020	100.4%
2013	12,821	31.9%	15,508	44.2%	6,296	57.8%	5,794	91.9%
2014	17,108	33.4%	18,120	16.8%	8,014	27.3%	6,168	6.5%
2015	23,483	37.3%	19,516	7.7%	10,753	34.2%	7,250	17.5%
2016	33,378	42.1%	22,934	17.5%	15,556	44.7%	8,320	14.8%
2017	38,535	15.5%	30,507	33.0%	15,216	-2.2%	8,374	0.6%
2018	44,781	16.2%	39,990	31.1%	21,172	39.1%	10,154	21.3%
2019	55,259	23.4%	57,977	45.0%	25,931	22.5%	11,967	17.9%
2020	69,023	24.9%	69,649	20.1%	33,131	27.8%	14,926	24.7%

Figure 2-5 shows the proportion of open access articles of the total for each quartile. Among the Q2 articles, open access articles had the highest proportion, reaching 42.5% in 2020, followed by the Q3 articles accounting for 39.7% of the total. More than 70% of open access articles are distributed in Q1 and Q2 journals, with little change between 2011 and 2020 as Figure 2-6.

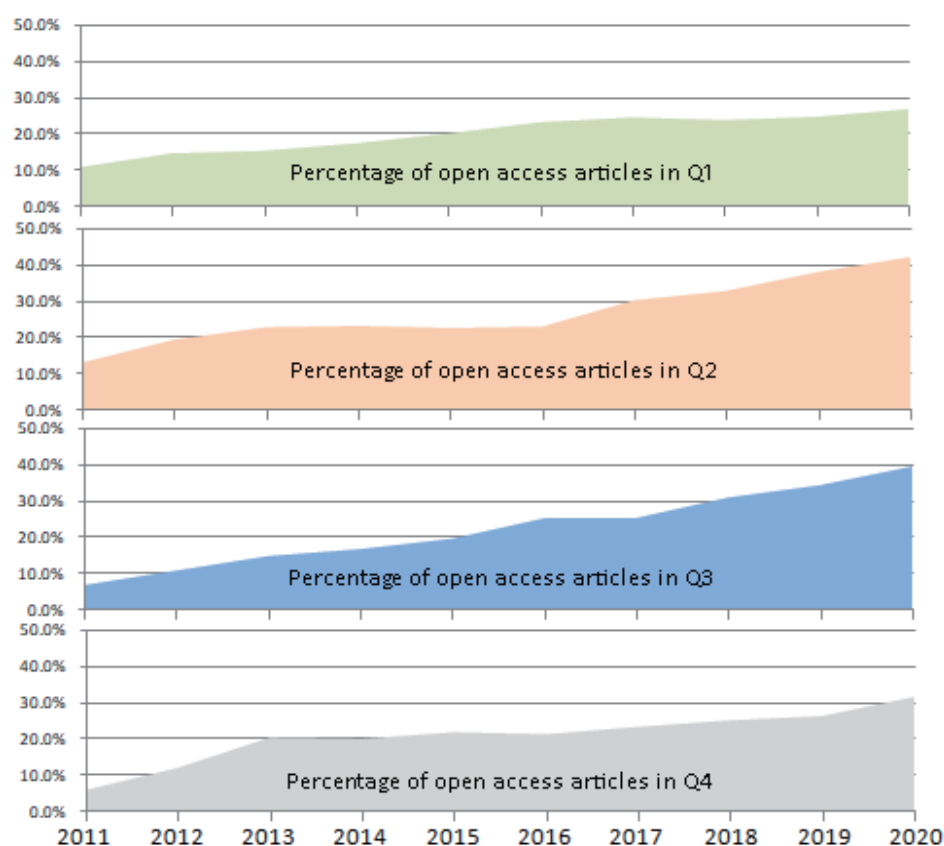


Figure 2-5 Percentage of open access articles from China in SCIE listed journals by quartile, 2011—2020

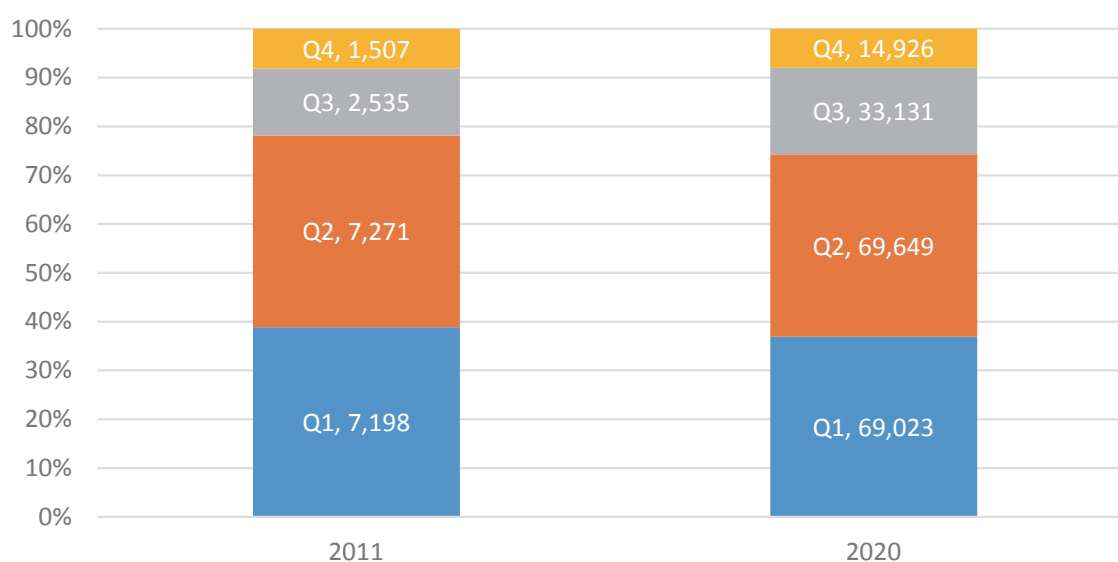


Figure 2-6 Distribution of open access articles by researchers from China in SCIE listed journals by quartile in 2011 and 2020

### Discipline Distribution of Journals Publishing Open Access Articles by Researchers from China

For the open access articles published by Chinese authors from 2011 to 2021, according to different disciplines (when a journal belongs to multiple disciplines, the data were added for each

discipline), the top 20 disciplines of open access articles by researchers from China are shown in Table 2-5. The top 5 disciplines are as follows: multidisciplinary sciences; oncology; engineering, electrical and electronics; materials science, multidisciplinary; and chemistry multidisciplinary.

Table 2-5 Top 20 disciplines of open access articles by researchers from China

Discipline	Number of open access articles	Number of articles	Open access article ratio
Multidisciplinary Sciences	111,538	121,479	91.8%
Oncology	82,799	140,368	59.0%
Engineering, Electrical & Electronic	79,492	253,941	31.3%
Materials Science, Multidisciplinary	78,203	423,197	18.5%
Chemistry, Multidisciplinary	70,205	251,464	27.9%
Medicine, Research & Experimental	60,457	103,724	58.3%
Physics, Applied	56,884	243,941	23.3%
Environmental Sciences	55,386	191,602	28.9%
Cell Biology	53,965	89,173	60.5%
Computer Science, Information & Systems	49,476	94,724	52.2%
Biochemistry & Molecular Biology	48,888	142,700	34.3%
Telecommunications	47,461	93,264	50.9%
Biotechnology & Applied Microbiology	35,735	86,079	41.5%
Pharmacology & Pharmacy	34,930	104,145	33.5%
Medicine, General & Internal	34,632	45,004	77.0%
Nanoscience & Nanotechnology	31,909	156,951	20.3%
Optics	29,950	107,215	27.9%
Mathematics	29,389	64,549	45.5%
Mathematics, Applied	28,654	84,785	33.8%
Physics, Multidisciplinary	27,406	71,363	38.4%

### Distribution of Chinese Institutions Publishing International Open Access Articles

The institutions that have published the most open access articles are shown in Table 2-6. The top five are: CAS, University of Chinese Academy of Sciences, Shanghai Jiao Tong University, Peking University, and Zhejiang University.



Table 2-6 Top 20 institutions publishing open access articles in China<sup>51</sup>

Institutions	Number of open access articles	Number of articles	Open access article ratio
CAS	148,405	495,414	30.0%
University of Chinese Academy of Sciences	46,898	152,315	30.8%
Shanghai Jiao Tong University	43,096	116,180	37.1%
Zhejiang University	39,276	112,869	34.8%
Tsinghua University	29,201	97,383	30.0%
Peking University	39,562	93,938	42.1%
Sun Yat-sen University	34,094	80,308	42.5%
Fudan University	33,152	77,322	42.9%
Huazhong University of Science and Technology	25,374	75,033	33.8%
Sichuan University	24,037	73,466	32.7%
Shandong University	23,477	68,252	34.4%
Central South University	22,497	66,955	33.6%
Xi'an Jiaotong University	17,897	65,461	27.3%
University of Science and Technology of China	18,824	63,259	29.8%
Jilin University	19,053	62,793	30.3%
Harbin Institute of Technology	12,205	61,505	19.8%
Nanjing University	19,936	60,288	33.1%
Wuhan University	20,563	56,210	36.6%
Tongji University	16,422	52,949	31.0%
Tianjin University	10,441	51,030	20.5%

## 2.3 Attitudes Towards Open Access by Researchers in China

In June and July 2022, the CAST team conducted a survey to investigate the attitudes of researchers in China towards open access. A total of 1,768 valid questionnaires were collected. The survey showed that a majority of the respondents (81.56%) supported open access, with 16.23% of the respondents having a very good understanding of open access and 42.42% having a moderate understanding (Figure 2-7). This is in contrast to the STM survey as shown in Figure 1-4.

<sup>51</sup> If an article has more than one institution, each institution is added to the data

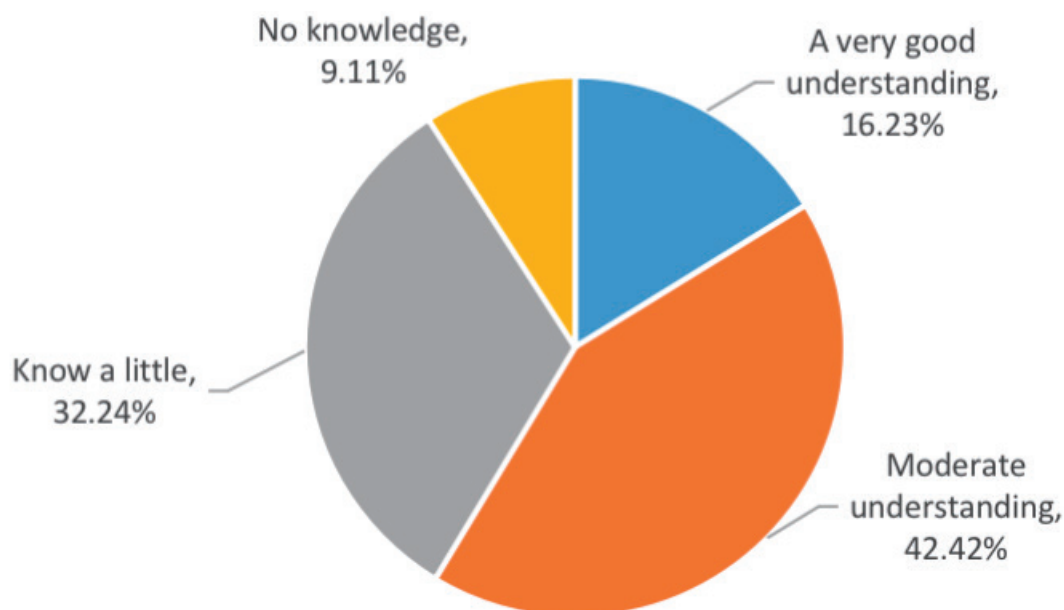


Figure 2-7 Knowledge of open access among researchers in China

The specific reasons given by respondents for choosing open access journals are mainly to expand readership, and to accelerate the publication and dissemination of their research findings (Figure 2-8). The proportion of researchers who are willing to contribute to traditional subscription journals (63.91%) and hybrid open access journals (65.84%) are similar, while 35.63% are willing to contribute to Gold open access journals and only 5.32% are willing to contribute to journals where embargo periods exist before articles can be made openly available.

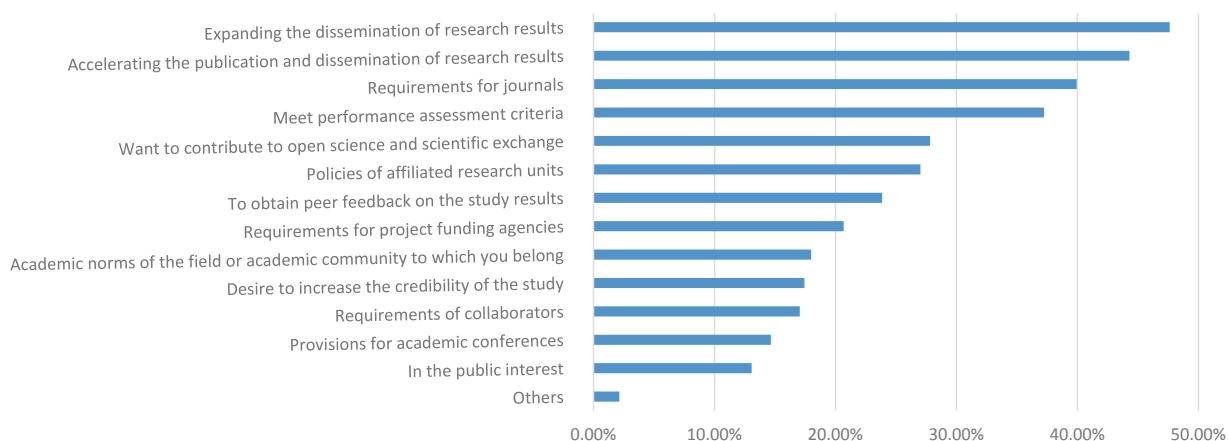


Figure 2-8 Reasons for researchers in China to contribute to open access journals

For responses about the level of APCs that they would pay, 66.35% of respondents would accept a charge below 5,000 RMB, 28.88% 5,000-10,000 RMB, and less than 5% a charge over 10,000 RMB <sup>52</sup> (Figure 2-9).

52 1 RMB ≈ 0.15 USD, as at 1 August 2022 Day of meeting

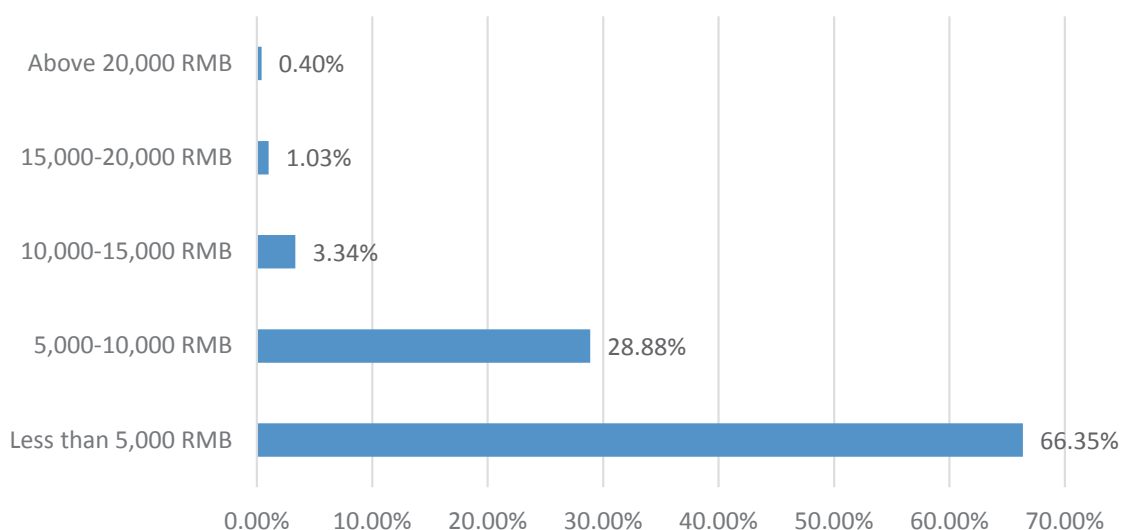


Figure 2-9 Acceptable range of APCs among researchers in China

## 2.4 China's Open Publishing Models

The open access research journals published in China can also be classified as Gold, Diamond, and hybrid as described in Section 1.3. Additionally in China there are journals classified as Bronze where content is made publicly accessible by the publisher. This category is further subdivided into fully open access Bronze journals and hybrid Bronze journals in which only some of the articles published are open access. It should be noted that in this category CC licenses have not been applied to the articles.

- Fully open access Bronze journals (free full-text Journal): refers to a journal that provides free reading and downloading of the full text of all papers on its website immediately or with a delay after publication of an issue.
- Hybrid Bronze journals (partial free full-text journals): refers to a journal that provides free reading and downloading of the full-text of some papers on their website immediately or with a delay after publication of an issue.

### Current Open Access Publishing of Scientific Journals in China

As shown in Figure 2-10, the CAST team has recently investigated 4,963 journals that had been listed in the *Blue Book on China's Scientific Journal Development (2021)*. Of these there are 1,810 open access journals, accounting for 36.47% of the total scientific journals in China. Among them, there are 227 Gold open access journals, accounting for 4.57% of the total; 101 hybrid journals, accounting for 2.04%; Diamond open access journals are the least, with only 23 journals, accounting for 0.46%; there are 1,459 Bronze journals, accounting for 29.40%. The remaining 1,012 journals cannot be confirmed due to lack of sufficient information.

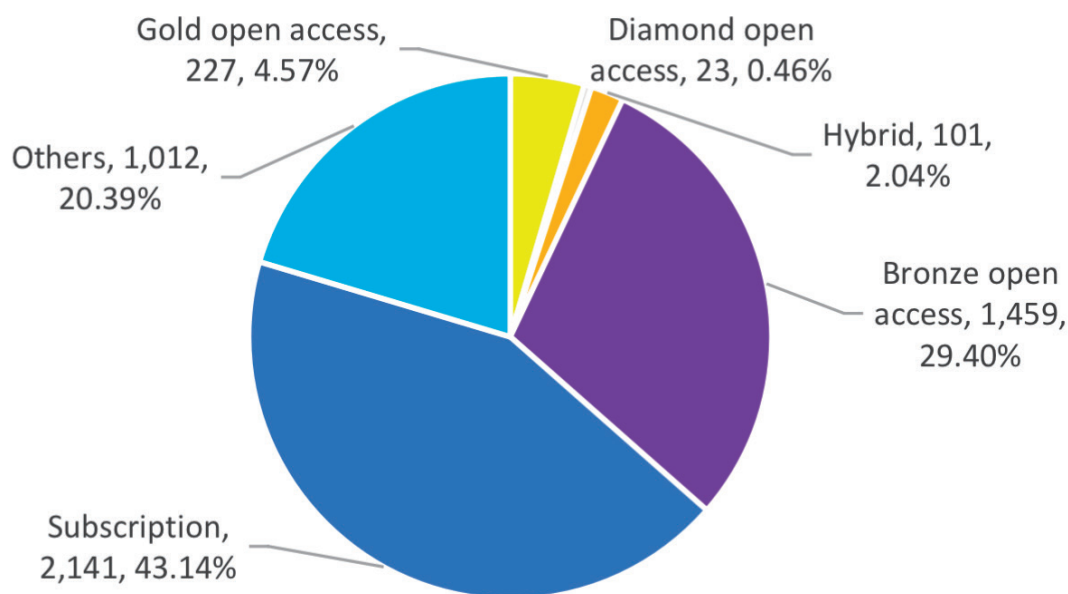


Figure 2-10 Distribution of scientific journals in China by publishing model

English journals account for the majority of hybrid open access journals. Totally 99 hybrid journals are in English, with only two in Chinese. The majority of Bronze open access journals are in Chinese (1,321), followed by 73 dual-language Chinese and English journals, and 64 English journals.

### Current Open Access Publishing of High Impact Scientific Journals in China

China Science Citation Database (CSCD) is one of the scientific journal databases with great academic impact in China. By the end of 2021, CSCD covered 1,262 scientific journals published in China, accounting for about 25% of the total number, including 245 English journals and 1,017 Chinese journals. The source journals of CSCD are selected every two years; the selection adopts a combination of quantitative and qualitative methods, with the quantitative data coming from CSCD and the qualitative evaluation made by invited domestic experts. The 1,262 source journals of CSCD cover all disciplines, and cross database retrieval can be achieved with Web of Science via ISI Web of Knowledge.

By the end of March 2022, the 1,262 CSCD source journals included 141 Gold open access and 83 hybrid, accounting for 17.7% of the total; there are 753 Bronze journals with all open articles and 76 with partially open full text, accounting for 65.7% of the total, as shown in Table 2-7. Among the 1,262 source journals, 83.4% (1,053) were made fully open access or partially open access with no charge for access. In particular, Bronze fully open journals account for 59.7% (753) of the total, which is a characteristic of China's high impact scientific journals, as shown in Table 2-7.

Languages. Among the 245 English journals covered by CSCD, 40.0% were Gold open access and 17.1% Bronze; hybrid and Bronze journals with partial open content were 33.9% and 2.4%, respectively; and 93.5% of English journals adopted one of the four open access models. Among the

1,017 CSCD journals published in Chinese, 81.0% adopted one of the four open access models (see Table 2-7).

Discipline distribution. Mathematics CSCD journals had the highest proportion (32.3%) among Gold open access and hybrid journals, followed by bioscience (30.1%) and chemistry (29.6%). Among the Bronze journals, 84.4% in the field of environmental science were fully open or hybrid, followed by 79.4% in the field of agricultural science and 74.3% in multi-disciplinary journals.

Volume of articles published. In 2020, the 894 Gold open access journals covered by CSCD, and Bronze fully open journals published a total of 168,300 articles, accounting for 77.1% of the total in that year, slightly higher than the proportion of the two types of journals (70.8%).

Institution distribution.<sup>53</sup> Among the journals sponsored by the national-level societies under the supervision of CAST, 15.0% were Gold open access or hybrid journals and 71.1% were Bronze. Among the journals supervised by CAS, 24.7% were Gold open access or hybrid, and 67.4% were Bronze journals. Among university journals, 19.5% were Gold open access or hybrid and 65.7% Bronze.

Table 2-7 Open access publication statistics of 1,262 CSCD-indexed research journals

Journal Language	Gold	Hybrid	Bronze - fully open	Bronze - hybrid	Subscription
English	98	83	42	6	16
Chinese	43	-	711	70	193
Total/proportion	141/11.2%	83/6.6%	753/59.7%	76/6.0%	209/16.6%

## Open Access Status of Journals Supported by the Excellence Action Plan of China's STM Journals

In 2019, CAST, the Ministries of Finance, Education, and Science and Technology, the National Press and Publication Administration, CAS, and Chinese Academy of Engineering jointly launched the Excellence Action Plan of China's STM Journals (2019—2023)<sup>54</sup>. The plan covers scientific journals with the greatest international impact and includes the sub-categories leading journals, key journals, emerging journals, high-start or high potential journals, cluster pilot projects, digital platforms, and programs for training and developing best practice of publishers and editors.

### Leading, Key, and Emerging Journals

Twenty-two journals were selected for the leading journal category, and cover prioritized research fields. Twenty-nine journals were nominated as key journals because of their current status and future potential. The remaining 199 emerging journals were selected because of their focus on basic

<sup>53</sup> The nearly 5,000 journals are scattered across various universities (under the administration of the Ministry of Education or the provinces), research institutes (under the CAS or other ministries), or societies (either under CAST or managed in a vertical or horizontal fashion). See: YAN Shuai. STM Publishing in China[J]. Editorial Office News,2015(12):13-16.DOI <http://dx.doi.org/10.18243/eon/2015.8.12.3>

<sup>54</sup> [https://www.cast.org.cn/art/2019/9/19/art\\_458\\_101785.html](https://www.cast.org.cn/art/2019/9/19/art_458_101785.html)

research, engineering, and technology and their perceived potential.

Of the total 245 journals<sup>55</sup> (five popular science journals are not counted), Bronze journals are the largest number<sup>56</sup>, accounting for 34%, which are mainly journals in Chinese. This is followed by hybrid journals, accounting for 25%, which are all in English. Gold open access and Diamond open access journals are mainly English journals. Only 9% are subscription journals (Figure 2-11). The data show that the English journals supported by the Excellence Action Plan are proactively responding to the open access movement, and journals in Chinese are also actively supporting international open access plans, but there is a lack of unified standards. From the perspective of current content availability, there is great potential for transformation to open access for journals published in the Chinese language.

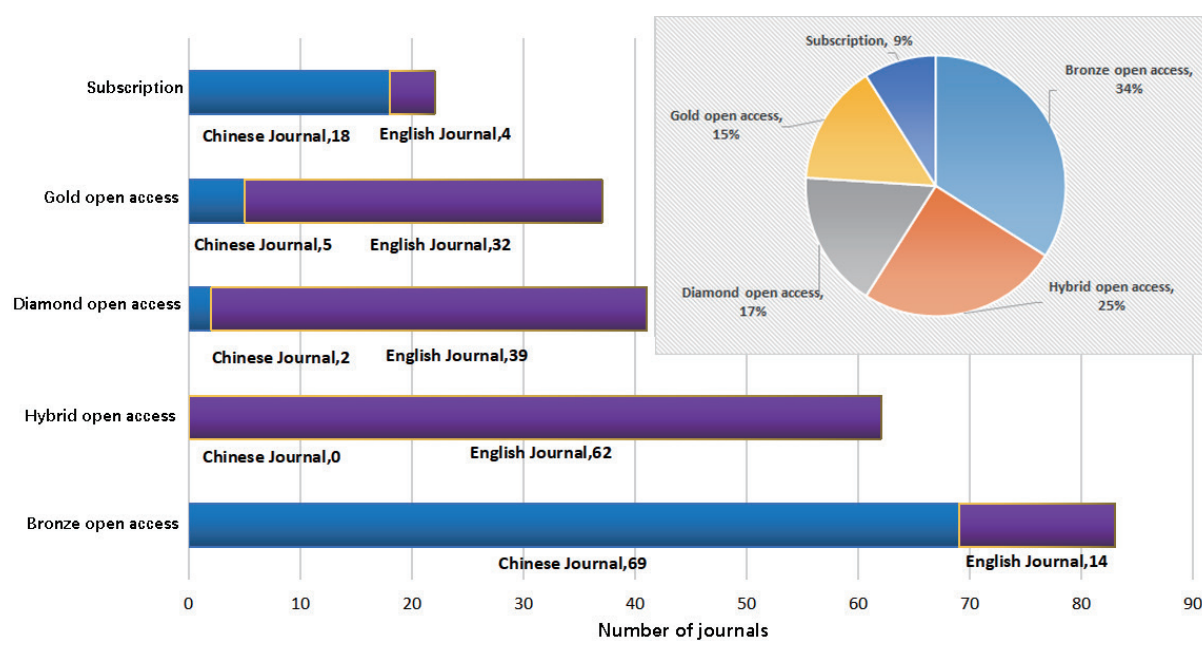


Figure 2-11 Open access models and language of journals supported by the Excellence Action Plan

Except for two Gold open access journals and one hybrid journal that do not charge APCs,<sup>57</sup> the APCs of hybrid journals are mostly between 16,000 RMB and 21,000 RMB (~ US\$2,500-3,300) with a median of 17,107 RMB. For Gold open access journals the APC range is between 9,000 RMB and 13,000 RMB (~US\$1,400-2,100), with a median of 12,500 RMB. In addition, the APCs of journals published in Chinese are lower than in English journals. The five Chinese Gold open access journals (*Acta Geodaetica et Cartographica Sinica*, *Journal of China Coal Society*, *Biotechnology Bulletin*,

<sup>55</sup> Data collected 25 March 2022

<sup>56</sup> Most journals do not explicitly support green open access, and other modes coexist in a few journals. For example, *Molecular Plant* supports open access and open archiving at the same time, which is included in the category of hybrid journals

<sup>57</sup> CAST team collected the APCs of journals other than Bronze open access and subscription journals. If a journal is indexed by DOAJ, its APC data is directly collected from the DOAJ database (DOAJ indicates the APC of its indexed journals), and the APC data of other journals are from the official websites. When the journal's APCs are different for different regions (for example, the hybrid journal cooperated with Springer usually has three charging standards of USD, GBP, and Euro), CAST converted into RMB and took the average value. For the journals where APCs are charged by page, CAST team took the most recent issues, calculated the average number of pages, to get an average APC per article

*Journal of Plant Nutrition and Fertilizer* and *Acta Agronomica Sinica*) with the highest charge for a single article charge of 6,480 RMB (~ US\$ 1,000). And of the five Gold open access journals with the lowest fees, four are Chinese journals (Figure 2-12).

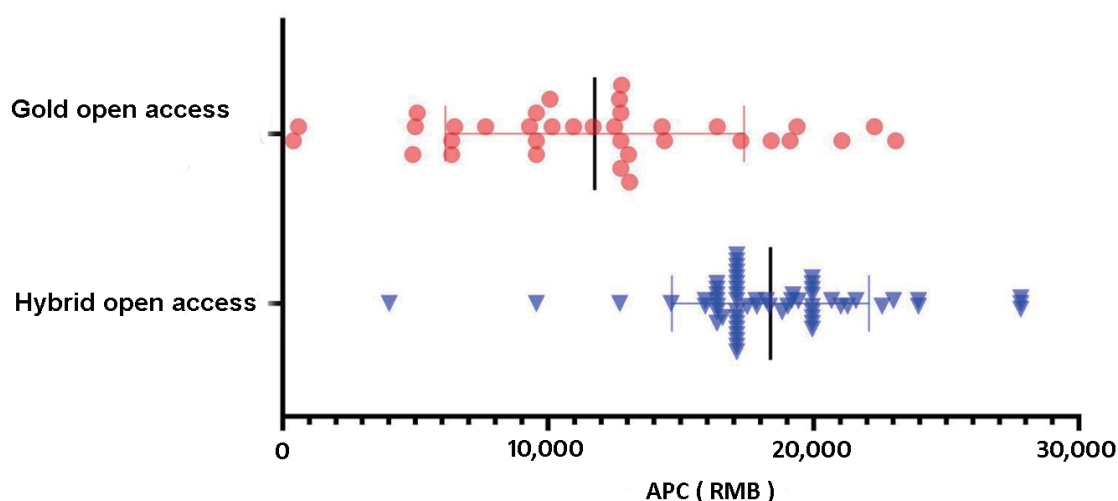


Figure 2-12 APC distribution of Excellence Action Plan journals

### High-start Journals

According to the original design of the Excellence Action Plan, from 2019 to 2021, every year 30 new English titles had been selected to be supported as high-start or high potential journals. From 2022, every year the number of high-start journals will be increased to fifty.

The high-start or high potential journals of the Excellence Action Plan basically were chosen because of their potential based on the research fields covered, the journal management practice in place and potential for publishing in English. These journals have mostly adopted an open access model. As of 25 March 2022, CAST team analyzed 30 high-start journals showing that, except for *Unmanned Systems* which is labeled as a hybrid journal, others are all Gold open access. Half of these 30 journals are included in DOAJ. For those journals with APCs, these ranged from zero to US\$3,500. Many journals adopted the strategy of free APCs for a limited initial period so as to attract contributions. According to the introductions on their official websites, APCs are subsidized by the publishing institutions. The major co-publishers of high-start journals include KeAi, Wolters Kluwer, Elsevier, and others.

### DOAJ-indexed Chinese journals

There are not so many journals from China that have been indexed by DOAJ. According to the statistics in early April 2022, only 179 journals are listed in DOAJ (excluding those published from Hong Kong, Macao, and Taiwan). China's journals included in DOAJ are mainly published in English, accounting for 69%, and 22% were published in Chinese, with the remaining 9% published in dual



language (Figure 2-13). More than half of the 179 journals are Diamond journals. Ninety-three journals do not charge APCs, 38 journals need an APC of less than 5,000 RMB , 41 journals need 5,001-10,000 RMB, six need 10,001-20,000 RMB , and only one needs more than 20,000 RMB (Figure 2-14).

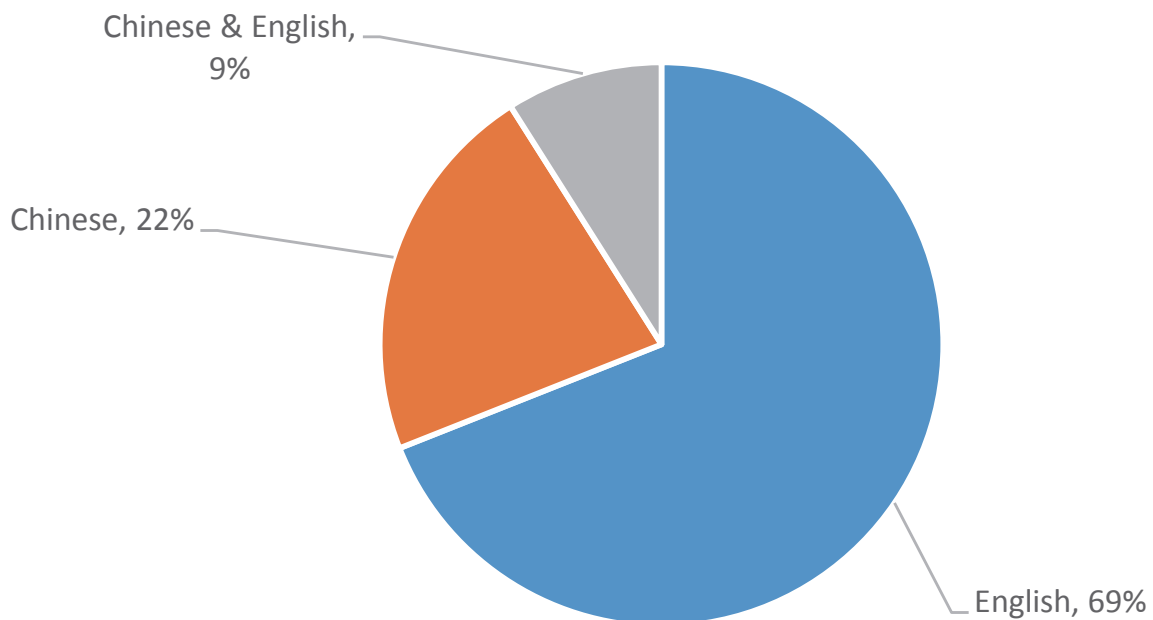


Figure 2-13 Language of DOAJ-indexed Chinese journals

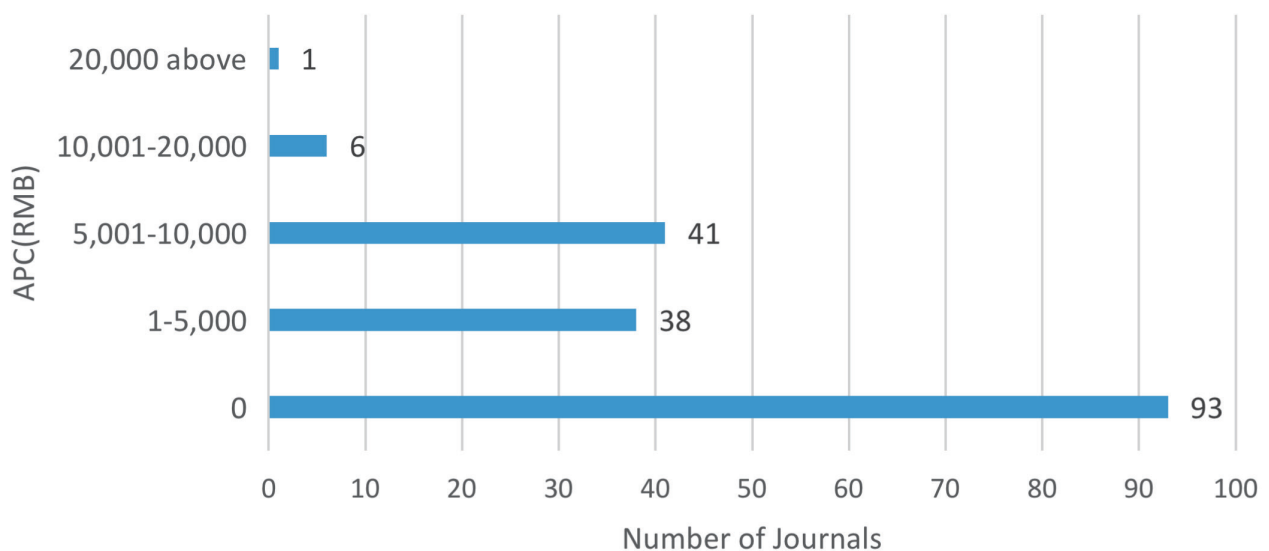


Figure 2-14 APCs of DOAJ-indexed Chinese journals

### APC payment services

About 35 publishers in China are working with [RightsLink](#) (CCC). None are strictly based in China, but several of these publishers do have publishing partnerships in China. On the authors' side, many authors from China use RightsLink to pay their APCs. In 2021, [China Educational Publications Import and Export Corporation Ltd](#) launched SocoPay service, which fully supports the purchase of

single articles and cross-border convenient payment services for Chinese users. At present, nearly 100 academic institutions in China are using the SocoPay service for various academic payment needs, including APCs.

### China's Open Publishing Transformative Agreements

The signing of the first open publication transformative agreement was in May 2020 by Chinese institutions. Since then, by August 2022 eight transformative agreements have been signed, including six Read and Publish agreements, one Publish and Read agreement, and one Subscribe-to-Open agreement (as shown in Table 2-8).

The specific terms of the eight transformative agreements are slightly different. The agreements range from 1 year to open-ended, all being valid in 2022. For the reading component, the eight agreements support institutions reading all the relevant publisher's journal articles; for the publishing component, the agreements differ from institution to institution.

Table 2-8 China's transformative agreements

Start date	Chinese institutions	International publishing organizations	Years of cooperation
2020	NSLC	Oxford University Press (OUP)	3
2021	Chinese Academy of Medical Sciences	Karger	3
2021	NSLC	Association for Computing Machinery (ACM)	5
2021	Shanghai Jiao Tong University	Cambridge University Press (CUP)	1
2022	Tsinghua University	International Water Association (IWA)	open-ended
2022	Tsinghua University	ACM	3
2022	Tsinghua University	CUP	1
2022	Institute of Microbiology, CAS	Microbiology Society (MS)	2

## 2.5 China's Open Data

### Management of Scientific Data in China

Scientific data is one of the important outputs of scientific research and a strategic resource to support scientific research and innovation activities. The Chinese government attaches great importance to scientific data management, and the system of laws and regulations for the open sharing of scientific data is improving day by day.

In 2018, the General Office of the State Council promulgated *the Measures for the Management*

of *Scientific Data*<sup>58</sup>, which proposed that "the scientific data from projects supported by government funding should be opened and shared with the society and relevant departments in accordance with the principle of openness as the norm and non-openness as the exception, ...", thus clarifying the responsibilities, principles, methods, and mechanisms of scientific data management<sup>59</sup>. Local governments and institutions at all levels immediately issued detailed rules for implementation.<sup>60</sup> Since then, the construction of legislation and supporting policies for scientific data sharing has accelerated in China. A series of laws and regulations have been issued successively, including Regulations of the People's Republic of China on the Administration of Human Genetic Resources (July 2019), Biosafety Law of the People's Republic of China (April 2021), Data Security Law of the People's Republic of China (June 2021), and Laws of the People's Republic of China on the Protection of Personal Information (August 2021). A legal and regulatory guarantee system for open sharing of scientific data has gradually formed on the premise of ensuring national security and personal privacy<sup>61</sup>, and significantly to promote the sound and healthy development of scientific data sharing in China.

### Data Sharing of China's Scientific Journals

In the global wave of open science, China's scientific Journals pay increasingly more attention to the transparency and repeatability of research. In 2020, CAST developed a data storage and application service platform related to scientific and technological articles, aiming to construct world-class research journals, serve the submission, storage, and application of scientific data, and promote the sharing and use of scientific research data. This formed into a data policy framework and a series of standards for the related data in published articles. The platform will be used in more than 500 scientific journals supervised by CAST and journals covered by Excellence Action Plan, so as to further promote the sharing of scientific data of China's research journals.

In June 2021, the CAS set up the requirements for the management of article related data for more than 400 journals in its charge and launched special projects for journals during the *14th Five-Year Plan* period, urging many journals to pay attention to and explore the practice of scientific data sharing.

In 2022, CAST initiated projects to carry out research on the open and sharing standards of scientific data and the construction of supporting capacity of data warehousing services. In April 2022, the National Press and Publication Administration included scientific data management and sharing of academic journals in an annual check of journals published in 2021<sup>62</sup>.

58 Notice of the General Office of the State Council of the People's Republic of China on the Printing and Distributing of Measures for the Management of Scientific Data [EB/OL]. (2018-04-02) [2022-04-02]. [http://www.gov.cn/zhengce/content/2018-04/02/content\\_5279272.htm](http://www.gov.cn/zhengce/content/2018-04/02/content_5279272.htm)

59 WANG Ruidan et al. Thoughts on Strengthening and Standardizing the Management of Scientific Data in China[J]. *China Science & Technology Resources Review*, 2018, 50(2):1-5

60 GAO Yuwei, et al. A comparative study of the implementation rules of the Measures for the Management of Scientific Data - an example of the 11 officially published rules[J]. *China Science and Technology Resource Review*, 2019, 51(3):1-10+17

61 LI C. et al. Tracing the Footsteps of Open Research Data in China[J]. *Learned Publishing*, 2022(35):46-55. <https://doi.org/10.1002/leap.1439>

62 Notice of the State Press and Publication Administration on the verification of periodicals for the year 2021 [EB/OL]. (2022-04-02) [2022-04-02]. <https://www.nppa.gov.cn/nppa/contents/279/103765.shtml>

### Data Policy of the Most Representative Scientific Journals in China

Taking journals selected by the Excellence Action Plan as examples, according to the statistics (see Table 2-9)<sup>63</sup>, by the end of 2021, 81.8%, 55.2%, and 34.2% of the first batch of 250 leading journals, key journals, and emerging journals respectively (high-start or high potential journals are not included due to different progress of new launches) have formulated their data policies, of which 36.3%, 3.4%, and 2.5% respectively adopted mandatory requirements. Where policies are in place, the journals' authors were required to store the data in the designated data repository, provide the identification, availability statement and reference format of the data, review the data to a certain extent, and take the sharing of data as the premise of article publication.

Some journals encourage data sharing and take the submission of data as a general recommendation, but not as a necessary condition for the publication of articles; some journals adopt strong recommendations and give guiding suggestions from the aspects of data identification, availability statement and reference, and the authors decide the sharing protocol at their own discretion.

Sixty percent of the Excellence Action Plan journals are English language journals, and most of them cooperate with international publishers. It is found that most journals choose to implement data policies consistent with their own journals based on the unified policies of their publishers, such as *Acta Geochimica*, *Ecosystem Health and Sustainability*. In contrast, few Chinese language journals in the Excellence Action Plan formulate data policies by themselves. However, there are some problems, such as unclear data policy statements on the official website, inconsistent data policy formulation standards, different requirements for data availability statements, and data citation.

In March 2022, the journal *Data Analysis and Knowledge Discovery*<sup>64</sup> launched the Interim Measures for Public Preservation and Sharing of Papers Supporting Data, which is the first relatively complete data policy for Chinese journals. The supporting data of all accepted articles will be kept for a long time on the public access data platform selected by the journal after the manuscript is accepted, and open access is authorized according to the requirements of the journals.

63 KONG Lihua, XI Yan, JIANG Lulu. Open Sharing and Publishing Policies for Research Data of Scientific Journals[J]. Chinese Journal of Scientific and Technical Periodicals, 2022, 33(2): 192-199

64 [https://manu44.magtech.com.cn/Jwk\\_infotech\\_wk3/CN/2096-3467/home.shtml](https://manu44.magtech.com.cn/Jwk_infotech_wk3/CN/2096-3467/home.shtml)

Table 2-9 Data policy of journals selected by Excellence Action Plan

Journal type	Number of selected journals	Journal data sharing (publication) policy			
		Encourage data sharing	Strongly recommended	Mandatory/ specific requirements	No related policies
Leading Journals	22	7	3	8	4
Key Journals	29	10	5	1	13
Emerging Journal	199	52	11	5	131

Generally speaking, Chinese journals started late in formulating their data policies, and the proportion of journals or funders taking data sharing as a condition for publication or funding is low.

### Scientific Data Journals

*China Scientific Data*, China's first scientific data research journal, was launched in August 2015. Chinese journals began to explore new methods for the protection of scientific data property rights, promoting scientific data publication, and data citation. By the end of April 2022, the journal has published 459 articles. It is the only academic journal in China to specialize in publishing scientific data in multi-disciplinary fields. In specific disciplines, China has also launched some data journals, such as *Journal of Global Change Data & Discovery*, *Big Earth Data*, and *Data Intelligence*. At the same time, some academic journals (such as *Advances in Atmospheric Sciences*, *Biodiversity Science*, *Chinese Journal of Plant Ecology*, *Chinese Physics B*, *CIESC Journal*, etc.) have incorporated data articles to explore data publishing.

### Data Sharing of Articles Published in SCIE-indexed Journals with Authors from China

According to the SciVal data<sup>65</sup> (Figure 2-15), about 2.19% of the articles published by authors from China from 2016 to 2020 shared scientific data whereas about 1.90% of the articles published in the same period around the world shared scientific data. There are still only a few articles sharing data, but there is a significant growth with the five-year compound growth rate of about 15.71%. In addition, many researchers from China began to publish data articles and open high-quality scientific data for global sharing. According to the core collection of Web of Science<sup>66</sup> (Figure 2-16), a total of 915 data articles published by researchers from China from 2016 to 2020 were included, and the number of articles published in 2020 alone reached 315.

<sup>65</sup> Data source: SciVal, type: data, 2001–2020; acquisition date: 2 April 2022

<sup>66</sup> Data source: Web of Science, type: data article, 2016-2020; the address of the author includes China; acquisition date: 2 April 2022.

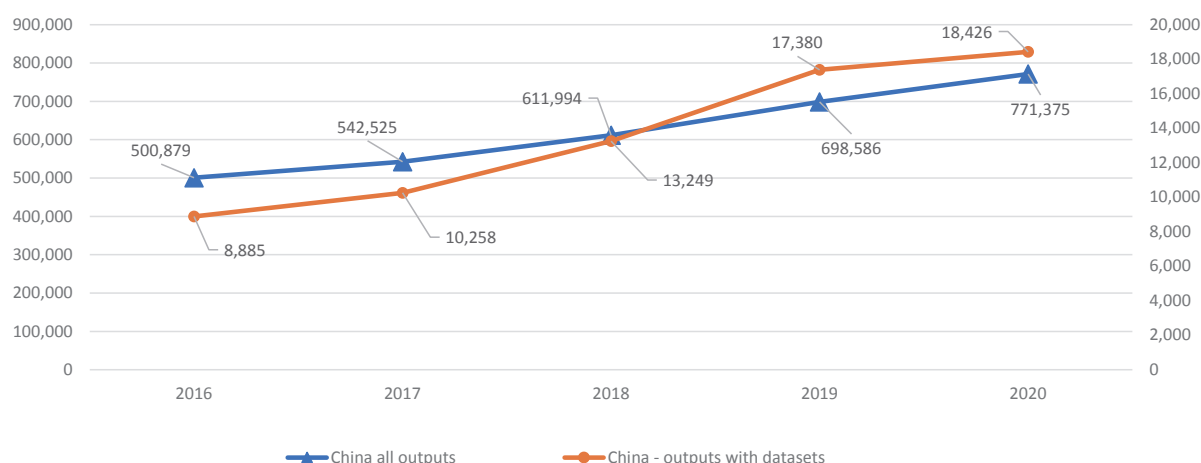


Figure 2-15 Articles and articles with data published by researchers from China from 2016 to 2020

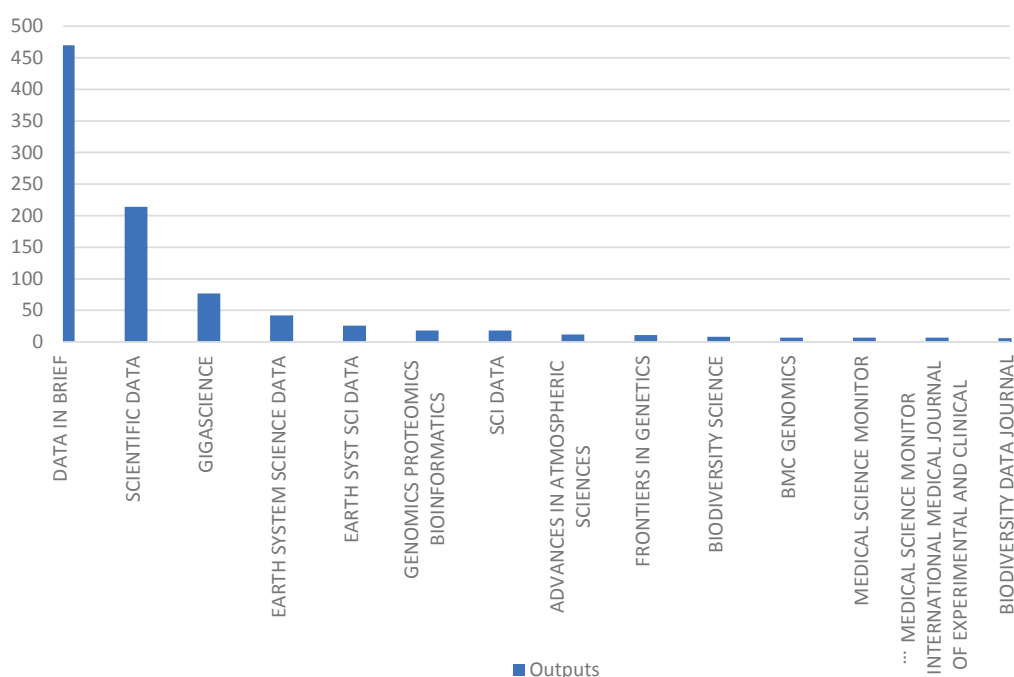


Figure 2-16 Journals publishing data articles by researchers from China in the core collection of Web of Science from 2016 to 2020

## 2.6 China's Open Online Platforms

Open platforms in China can be divided into four categories: institutional repositories, open resource platforms, open access publishing and communication platforms, and preprint platforms<sup>67</sup>. (The following data was collected by CAST team at the end of April 2022.) Institutional repositories are generally hosted by scientific research institutions, with various digital content created by its members as part of their research, with the objective to exchange and share academic information

<sup>67</sup> Refer to the classification of open platforms in the *Blue Book on China's Scientific Journal Development (2021)*, see: *Blue Book on China's Scientific Journal Development (2021)*[M], Beijing: Science Press, 2021:143-145

between international scholars and institutions. The open resource platforms provide users with centralized, convenient search, statistics, downloading and other services at no cost, and promoting the sharing and utilization of open resources. Open access publishing platforms publish open access articles whilst preprint platforms are similar to those available globally, publishing preprints.

### **Institutional Repositories (IRs)**

There are three institutional repository alliances in China: Confederation of China Academic Institutional Repository for Colleges and Universities, the Chinese Academy of Sciences Institutional Repositories Grid for the CAS, and the Open Repository of National Natural Science Foundation of China (NSFC-OR) for NSFC achievements.

CAS Institutional Repositories Grid (CAS IR GRID) was established in 2009. It was supported by NSLC and includes journal articles, conference articles, dissertations, patents, award-winning achievements, monographs, presentation reports, research reports, anthologies, etc. CAS' 114 research institutes have completed their IRs.

Confederation of China Academic Institutional Repository (CHAIR) was jointly initiated by some Chinese university libraries organized by the China Academic Library & Information System (CALIS) in 2016. Among the 51 member institutions of the alliance, 21 university libraries have linked their institutional repository on the platform and provide public access.

For the research results supported by Chinese foundations, the Open Repository of National Natural Science Foundation of China (NSFC-OR) is the most representative platform. NSFC-OR was constructed by NSFC in 2015, collecting and saving the metadata and full text of the articles of their funded research. As of the end of April, the platform has published 836,067 articles, involving 1,415,844 authors and 2,233 research institutions.

By the end of May 2022, 65 Chinese institutional repositories were included in the OpenDOAR. This is only 7.1% of the 919 repositories in the USA, accounting for 1.1% of the total 5,864 in the world.

### **Open Resource Platforms**

For those focusing on journals from China, the main platforms are Sciencepaper Online and the National Open Platform for STM Journals<sup>68</sup>. Sciencepaper Online was set up by the Center for Science and Technology Development of the Ministry of Education in 2003 and included 850 journals (both Chinese and English journals) with 1.3 million documents. The National Open Platform for STM Journals was upgraded by Institute of Scientific and Technological Information of China (ISTIC) in 2020, and includes 1,325 journals with 8.92 million articles by the end of April, 2022.

For those focusing on the integration of resources in the institutional libraries, Chinese Open Research Cloud (CORC) is a representative. It was supported by a project of the NSLC, and was constructed by Lanzhou Information Center, CAS in 2017, based on the 114 institutional repository

<sup>68</sup> Data source: DOAJ. <https://doaj.istic.ac.cn/>



of CAS IR GRID, with the institutional repository of 122 universities, and 49 other scientific research institutions (such as provincial and municipal scientific academies and research institutes) have been added.

For those focusing on international open access articles, the main platforms are GoOA, Socolar, etc. GoOA was constructed in 2013 by the NSLC, and contains more than 2,500 open access journals and their full texts from 144 leading publishers. Socolar was constructed by China Educational Publications Import and Export Corporation Ltd in 2006 and contains 1,048 open access repositories (including 10.39 million articles) and 31,972 academic journals from more than 100 countries and nearly 7,000 publishers around the world by the end of April, 2022. 11,827 are open access journals, with a total of 15.34 million open access articles.

For those focusing on China's social science journals, National Social Science Database (NSSD) is the most representative platform. NSSD was launched by the Chinese Academy of Social Sciences in 2013. It is the largest open access platform for social sciences in China, allowing the open sharing of academic resources and providing strong basic support for academic research. It includes 2,118 journals with 11.4 million articles<sup>69</sup> by the end of April, 2022.

MOST is now constructing a new platform - the National Unified Sharing and Open Platform for Sci-tech Literature and Information. In accordance with the national medium- and long-term planning and design, based on the national metadata strategy, the long-term preservation of digital resources of Chinese and foreign science and technology literature will be comprehensively implemented; the fragmentation and correlation of knowledge elements to form an open knowledge system will be promoted.

### **Open Access Publishing Platforms**

The Excellence Action Plan aims to promote open publishing and communication and to create a good open publishing ecosystem in China. To encourage linking and the sharing of resources globally and locally, five cluster pilot projects and three platforms were proposed. As of the end of July 2022, four platforms from the five clustering projects have been already in operation. Details of those launched are listed in Table 2-10.

<sup>69</sup> [http://www.lib.cass.org.cn/zy/zjzy/201807/t20180703\\_4493591.shtml](http://www.lib.cass.org.cn/zy/zjzy/201807/t20180703_4493591.shtml)

Table 2-10 Open access publishing and communication platforms in China

Names of platforms	First year of construction	Projects in Excellence Action Plan	Platform sponsor	Website
Frontiers Journals	2006	Clustering	Higher Education Press	<a href="https://journal.hep.com.cn">https://journal.hep.com.cn</a>
SciEngine	2016	Clustering	Science Press	<a href="https://www.sciengine.com">https://www.sciengine.com</a>
International platform for digital operation of science and technology journals	2019	Digitalizing	CNKI	Service platform, no website
International platform for digital production of science and technology journals	2019	Digitalizing	Founder Group Corp.	Service platform, no website
SciOpen	2019	Digitalizing	Tsinghua University Press	<a href="https://www.sciopen.com">https://www.sciopen.com</a>
Clp Publishing	2019	Clustering	Chinese Laser Press	<a href="https://www.researching.cn">https://www.researching.cn</a>
MedNexus	2021	Clustering	CMA	<a href="https://www.medNexus.org">https://www.medNexus.org</a>

### Preprint Platforms

There are four main preprint platforms in China: the Sciencepaper Online (online first) of the Center of Science and Technology Development of the Ministry of Education, the China Preprint Service System jointly constructed by the ISTIC and [the National Science and Technology Library \(NSTL\)](#), the CAS Science and Technology Paper Pre-Publication Platform (ChinaXiv), and the Biomedical Scientific Papers Preprint System (biomedRxiv) of the Institute of Medical Information, Chinese Academy of Medical Sciences.

[China Science and Technology Paper Online](#) (Sciencepaper online) has been in operation since 2003. By the end of April, 2022, 104,246 preprints have been published online.

[China Preprint Service System](#) was jointly constructed in 2004. Now the content has been incorporated into the NSTL web service system.

[CAS Science and Technology Paper Pre-publication Platform](#) (ChinaXiv) was constructed by NSLC. There are seven sub-platforms, including the preprint platforms of [Institute of Psychology, CAS \(PsyChinaXiv\)](#), [Chinese Society of Biotechnology](#), [Institute of Rock and Soil Mechanics, CAS](#), [Center for Chinese Linguistics PKU](#), [China Library and Information Archives](#) (Trial), the Academic

Preprint Platform of Guizhou Province (Trial), and [NursRxiv](#), the Online First Platform of Nursing Preprint Papers. It has partnerships with 29 journals and through the platform researchers can search the preprint policies of nearly 26,000 journals globally.

[Biomedical Scientific Papers Preprint System](#) (biomedRxiv) was created by the Institute of Medical Information, Chinese Academy of Medical Sciences in May 2020, and was used to quickly release and store the latest research results in the biomedical field in China. It involves 20 first-class disciplines including COVID-19, basic medicine, clinical medicine, preventive medicine, traditional Chinese medicine, oncology, etc., and more than 160 second-class disciplines..

## 2.7 China's International Cooperation on Open Access

### International Cooperation Open Access Articles Published by Authors from China in Web of Science Journals

According to the data from the Web of Science, the number of international cooperation articles published by China increased from 38,565 in 2011 to 152,901 in 2021, with an average annual growth rate of 14.8%.<sup>70</sup> The number of international cooperation open access articles published by authors from China increased from 11,271 in 2011 to 63,691 in 2021, with an average annual growth rate of 18.9%. The proportion of these articles that are open access has been increasing, from 29.2% in 2011 to 41.7% in 2021 (See Table 2-11.)

From 2011 to 2021, China's total international cooperation open access articles were 395,731, including 11,041 highly cited articles<sup>71</sup>, accounting for 2.8% of the total, and slightly higher than the overall level of Chinese cooperation articles (2.5%).

Table 2-11 Open access articles published by authors from China through international cooperation from 2011 to 2021

Year	International cooperation articles	Open access articles	Proportion of open access articles
2011	38,565	11,271	29.2%
2012	44,310	14,097	31.8%
2013	52,631	17,801	33.8%
2014	60,969	21,725	35.6%
2015	70,139	26,101	37.2%
2016	80,601	32,721	40.6%
2017	92,031	39,778	43.2%
2018	107,421	46,700	43.5%
2019	128,660	57,068	44.4%

<sup>70</sup> Data source: SCIE; document type: Article and Review; the address of the author includes China; the classification of disciplines is also based on Web of Science

<sup>71</sup> Highly cited articles: Articles of various disciplines in China have been cited in the past 10 years, ranking among the top 1% of international articles in the world. See: statistical report of Chinese scientific and technological papers in 2021 [R]. Beijing: Institute of Scientific and Technical Information of China, 2021

2020	143,215	64,325	44.9%
2021	152,901	63,691	41.7%

The data about institutions with international cooperation open access articles in China are shown in Table 2-12. The top three institutions are the CAS, Peking University, and Shanghai Jiao Tong University. The top three foreign institutions are the [League of European Research Universities](#) (LERU), the University of California System, and the [French National Centre for Scientific Research](#) (CNRS).

Table 2-12 Chinese institutions publishing international cooperation open access articles

Institutions	Articles	Proportion	Cooperation institutions	Articles	Proportion
Chinese Academy of Sciences	66,597	16.8%	League of European Research Universities	32,872	8.3%
Peking University	18,703	4.7%	University of California System	25,008	6.3%
Shanghai Jiao Tong University	16,854	4.3%	Centre National de la Recherche Scientifique	16,429	4.2%
University of Chinese Academy of Sciences	16,445	4.2%	United States Department of Energy	15,745	4.0%
Tsinghua University	15,601	3.9%	Udice French Research Universities	14,186	3.6%
Zhejiang University	14,318	3.6%	Harvard University	13,043	3.3%
Fudan University	12,361	3.1%	University of Texas System	12,709	3.2%
Sun Yat-sen University	12,269	3.1%	University of London	11,306	2.9%

China's open access articles through international cooperation have a wide discipline distribution, with the following five disciplines having the most: multidisciplinary, material science multidisciplinary, engineering electronics and electrical, environmental science and chemistry multidisciplinary (See Figure 2-17).

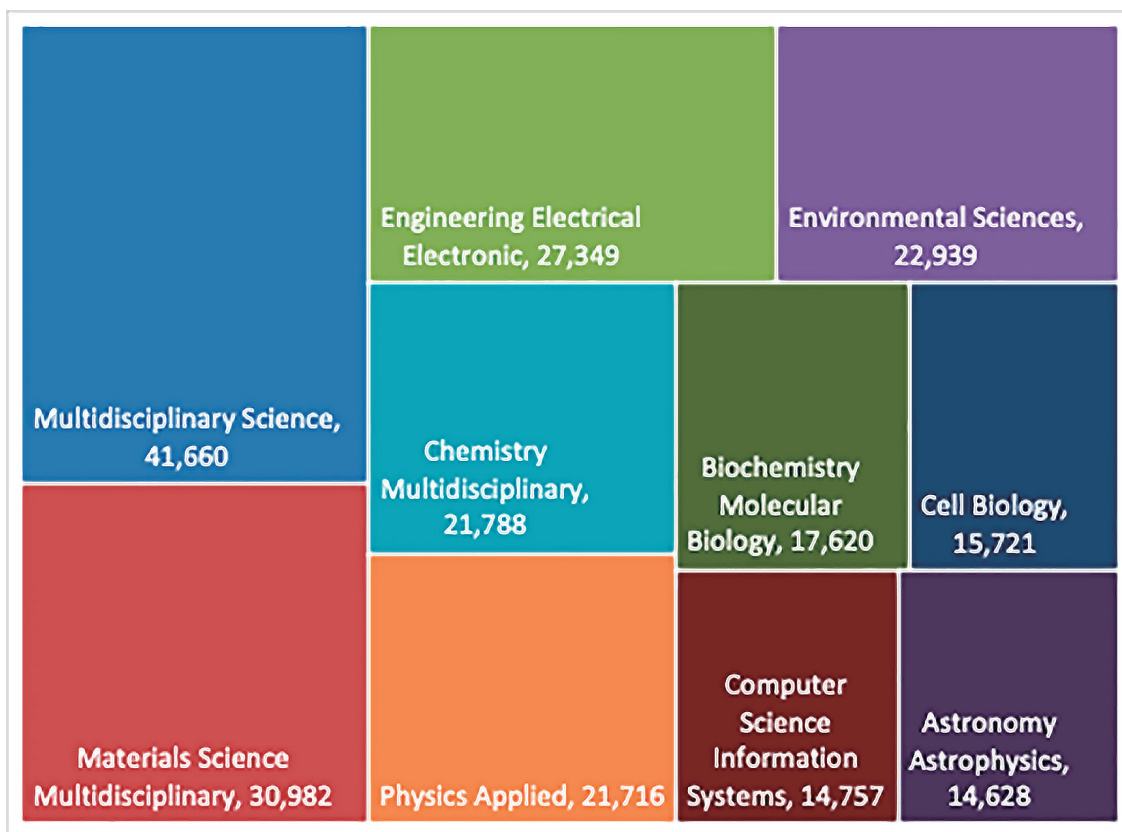


Figure 2-17 Top 10 disciplines of international cooperation open access articles in China

### International Cooperation Publishing and Open Access of English journals in China

By the end of August 2022, there are 428 English journals<sup>72</sup> with a China Unified Serial Number (CN)<sup>73</sup> numbers and sponsored by Chinese institutions. A CN number is a unified domestic serial number assigned by China's National Press and Publication Administration. Journals with a CN can apply for an ISSN. Table 2-13 shows data for journals cooperating with international publishing platforms.

<sup>72</sup> English journals whose sponsors were in China but had no CN number were not counted.

<sup>73</sup> If the journal creation application is approved by the competent central government, a unified domestic serial number (called a CN) will be assigned. Regulations dictate that a journal with a CN can go to the ISSN China Center to apply for an ISSN. See: Yan Shuai. STM Publishing in China[J]. Editorial Office News, 2015(12):13-16. DOI: <http://dx.doi.org/10.18243/eon/2015.8.12.3>

Table 2-13 Cooperation of English journals with a CN sponsored by Chinese institutions with international publishing institutions

International institutions	Number of journals	Proportion
Springer Nature	133	31.07 %
Elsevier	59	13.79 %
KeAi	53	12.38 %
Wiley	16	3.74 %
Wolters Kluwer	13	3.04 %
Oxford University Press	11	2.57 %
IEEE	10	2.34 %
IOPP	8	1.87 %
Global Science Press	7	1.64 %
AAAS	7	1.64 %
Taylor & Francis Group	6	1.40 %
World Scientific Publishing	4	0.93 %
De Gruyter	4	0.93 %
Other international platforms	20	4.67 %
No international cooperation (self-built platform)	64	14.95 %
No international cooperation (no websites or platform)	13	3.04 %
Total	428	100 %

Springer Nature is in the leading position among the international publishers cooperating with China's English journals publishing 133, followed by Elsevier and KeiAi with 59 and 53 respectively.

Among the 428 English journals in China, 208 were included by SCI or SSCI, covering 201 subject divisions, with 2020 impact factors (IF) in JCR as follows (some journals are listed in two

or more subject divisions at the same time, as shown in Figure 2-18): 84 in Q1 (41.8%), 79 in Q2 (39.3%), 53 in Q3 (26.4%), and 19 in Q4 (9.5%). In addition, one journal was included by A & HCI and 66 journals were included by ESCI. There are still 153 (35.7%) journals not included in the Web of Science. There are 325 journals indexed by Scopus and 103 (24.1%) are not included.

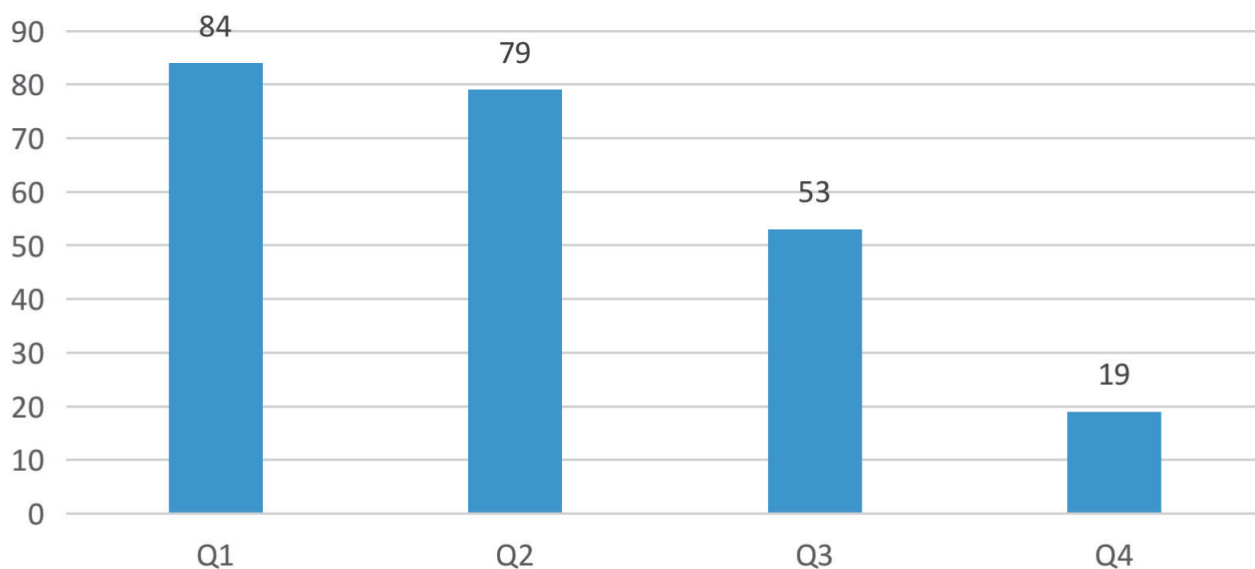


Figure 2-18 Quartile distribution of China's English language scientific journals indexed in SCIE

Among the 428 English journals, there are 271 fully open access journals (including those with overseas cooperation platforms where it is clearly stated that articles can be downloaded from domestic self-built websites), accounting for 63.3% of the total. There are 122 hybrid journals accounting for 28.5%. Thirty five journals are subscription, at only 8.2%.

## 2.8 International Cooperation and Exchange of CAST

- Hosting the Forum for World STM Journals. From 2018 to 2022, CAST has held five sessions of the Forum for World STM Journals, building an exchange platform for domestic and foreign scientific journals, discussing the mission and future of scientific journals, and conducting in-depth discussions on research foci such as open access, open data, open science, open evaluation, and collaborative governance of research integrity.

Year	Theme of the Forum for World STM Journals
2018	Openness, sharing and development—better journals, better science
2019	Future of STM journal and restructuring of academic communication system
2020	Connection · mutual learning · participation—new mission of STM journals in the era of big data
2021	Promoting open science: sharing, win-win and sustainable
2022	Open science for an open future



- Cooperation Memorandums with International Institutions. CAST has signed cooperation memorandums with STM, [Springer Nature](#), [American Association for the Advancement of Science \(AAAS\)](#), [The Institution of Engineering and Technology \(IET\)](#), [John Wiley and Sons Inc](#), and more in an effort to promote the development of scientific journals and academic exchanges and mutual learning.
- CAST takes the lead in establishing an open science promotion consortium. In response to the UNESCO recommendation on open science, China will actively integrate into global open science practice, improve the openness and sharing of scientific literature and data, and to deeply participate in global science and technology governance.
- Holding high-level international training and exchanging activities for scientific journals and open science seminars. Cooperating with international publishers such as Springer Nature, Taylor Francis, and John Wiley etc., CAST launched a series of cutting-edge courses on open science, peer review, ethics, and science communication, having trained thousands of participants. CAST also held forums on open science and open-source innovation, exploring specific measures to promote open science.
- The number of publishing professionals from China who work for an international journal association/society is increasing, and they are making great efforts to promote China's academic publishing in the world, enhancing exchanges and improving the ability of international governance.

### 3. RESEARCH INTEGRITY IN OPEN ACCESS PUBLISHING

(This section is written by representatives of STM with additional Practice in China comments as noted by CAST.)

#### 3.1 The Continued Focus on Research Integrity in Open Access Publishing

Science, in the words of the renowned physicist Richard Feynman, is the belief in the ignorance of experts. Scientific progress is fueled by debate, skepticism, and challenging the status quo. In that sense, science is never settled. Trust in science is therefore not the result of scientists always being right (which they are not and couldn't possibly be) but is the outcome of the process taking place in a reliable, honest, independent, and impartial way. This integrity is threatened by a wide range of forces: unethical attempts to advance careers, external agencies changing the original explanation or conclusions of the researchers' commercial interests, as well as the negative impact of ideology, and politics on universities and researchers. This wide variety of threats implies that the responsibility of research integrity is shared by all stakeholders in the scholarly ecosystem: funders, governments, universities, repositories, publishers, and of course researchers themselves.

Regardless of the publishing model, publishers make important contributions to research integrity through the editorial process (e.g., the screening for plagiarism, image and data manipulations, conflicts of interest, the validation of author identities), the peer review process, and building and maintaining a permanent record of scholarly information. In addition, publishers ensure that the publication process is transparent, predictable, correctible, and accountable. Publishers have invested in workflows, technology, and systems to help reinforce this integrity over time.

In order to bolster the efforts of publishers, STM launched the STM Integrity in early 2022. Its mission is to equip the scholarly communication community with data, intelligence, and technology to protect research integrity. More information about the initiative can be found at the [STM Integrity Hub](#).

The open science movement has had an important impact on the integrity of research on various levels. Trustworthy science is linked to transparency at all stages of design, execution, and reporting. This implies that more transparency, including in areas such as peer review, leads to more trustworthy science. But the open science movement has also led to less positive developments. The open access model led to the emergence of predatory publishers, publishers that exploit researchers' need to get published and lure them into submitting articles to journals that are only launched to make money out of publishing fees.

The next sections will highlight the contributions of publishers and what issues have emerged because of open access, and how protocols have changed and been strengthened within open access workflows. These sections will also reference organizations and directories that are relevant to publishers and journals in the area of open science and research integrity.

## Practice in China

China attaches great importance to scientific research integrity. In recent years, China has successively issued a series of policies, standards, and measures to strengthen the construction and governance of scientific research ethics, and with cooperation of multiple departments, to improve the implementation of higher practices of research ethics.

The main regulations and important measures issued since 2018 are shown in Figure 3-1. In 2018, the General Office of the Communist Party of China Central Committee and the General Office of the State Council issued *Several Opinions on Further Strengthening the Construction of Scientific Research Integrity*<sup>74</sup>, which clearly advised investigating and dealing with serious violations of the requirements of scientific research integrity. MOST was responsible for the supervision of frauds in natural science articles, adhered to zero tolerance and established a lifelong investigation system. Subsequently, in 2018, MOST established the Department of Science and Technology Supervision and Integrity Construction. In 2019, a total of 20 national institutions, including MOST, the Publicity Department of the Communist Party of China Central Committee, the Supreme People's Court of The People's Republic of China, the Supreme People's Procuratorate of the People's Republic of China, the National Health Commission (NHC), etc., jointly issued the rules for *The Investigation and Handling of Scientific Research Integrity Cases (Trial)*<sup>75</sup>, which specifically defined scientific research dishonesty, defined the division of responsibilities of the investigated, the units involved, the superior competent departments and other personnel, and made clear requirements for the handling measures of scientific research dishonesty.

Since 2020, the NSFC has issued decisions on the handling of cases involving misconduct in batches to strengthen deterrence. In 2020, MOST implemented *The Interim Provisions on the Handling of Violations in Scientific and Technological Activities*<sup>76</sup>, which defined methods for handling plagiarism, embezzlement, tampering with other people's scientific and technological achievements, fabricating scientific and technological achievements, and infringing other people's intellectual property rights.

On 3 June 2021, NHC opened a "Column on Medical Research Integrity" on its official website to release the investigation and results of medical research integrity cases in some institutions. MOST, together with the member units of the Joint Conference on the Construction of Scientific Research Integrity<sup>77</sup>, established a notification mechanism for scientific research integrity cases. On 30 July 2021 the revision of China Scientific Research Integrity Network<sup>78</sup> was completed and officially put into operation, and the investigations organized by relevant departments on the scientific research

74 Google translation published by the Xinhua News Agency, Beijing, 30 May 2018 - [https://wcrif.org/images/2019/PDF/opinions\\_of\\_further\\_strengthening\\_v1.pdf](https://wcrif.org/images/2019/PDF/opinions_of_further_strengthening_v1.pdf)

75 <https://www.nsfc.gov.cn/csc/20340/20289/46016/index.html>

76 [http://www.gov.cn/zhengce/zhengceku/2020-08/09/content\\_5533566.htm](http://www.gov.cn/zhengce/zhengceku/2020-08/09/content_5533566.htm)

77 [http://www.gov.cn/gzdt/2007-02/27/content\\_535028.htm#:~:text=%E8%81%94%E5%B8%AD%E4%BC%9A%E8%AE%AE%E7](http://www.gov.cn/gzdt/2007-02/27/content_535028.htm#:~:text=%E8%81%94%E5%B8%AD%E4%BC%9A%E8%AE%AE%E7)

78 <https://www.orichina.cn/index.html>

integrity cases such as paper fraud and paper trading were re-released. The Amendment of Law of the People's Republic of China on Scientific and Technological Progress<sup>79</sup> was passed on 24 December 2021, with clauses added or revised for establishing and improving the scientific research integrity system and scientific and technological supervision system, the establishment of scientific and technological project integrity archives and scientific research integrity management information system, the establishment of national scientific and technological ethics committee, the strengthening of the construction of academic journals, the improvement of scientific research articles and scientific and technological information exchange mechanism, and the promotion of the development of open science and scientific and technological exchanges and dissemination.

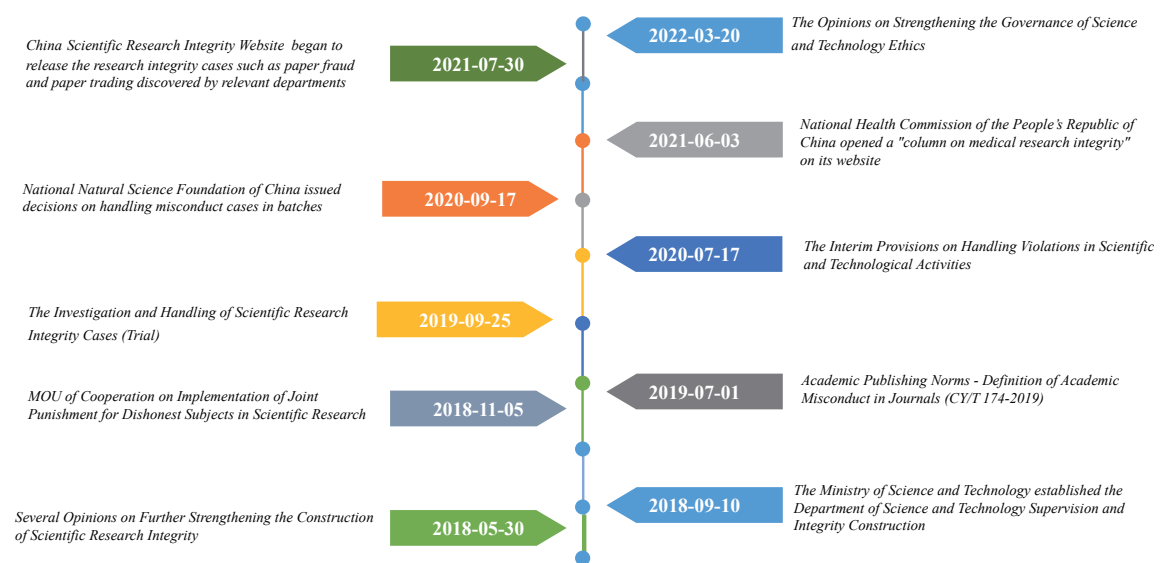


Figure 3-1 Summary of relevant regulations and important measures of scientific research integrity in China in recent 5 years

### 3.2 Peer Review

Peer review is the evaluation of work by one or more people with similar competencies as the producers of the work (peers). In the context of article publications, it means that peers assess the suitability of the manuscript for publication in a particular journal. Peer review is seen as an important selection and vetting process, and as such an integral part of ensuring research integrity.

In an open access environment, peer review continues to evolve, including through the emergence of new, so-called 'open review' models. Although open peer review is seen as a major pillar of open science, it has neither a standardized definition nor an agreed schema. In fact, a systematic study by Ross-Hellauer 2017, has revealed 122 different meanings of the term (Ross-Hellauer 2017)<sup>80</sup>. Open review is for example used in the context of open identities (authors and

79 <http://www.npc.gov.cn/npc/c30834/202112/1f4abe22e8ba49198acdf239889f822c.shtml>  
80 Ross-Hellauer 2017, "What is Peer Review? A Systematic Review", <https://f1000research.com/articles/6-588>

reviewers are aware of each other's identity); open reports (review reports are published alongside the relevant article); and open interaction (direct reciprocal discussion between author(s) and reviewers, and/or between reviewers is allowed and encouraged).

Motivated by the need for more transparency about the review process and to bring more consistency in the terminology in which various peer review models are described, STM started a [Peer Review Terminology Project](#). This terminology is intended to be used at both journal and article level, informing readers, authors, editors, and reviewers what review models (whether open or traditional, whose suitability is very much dependent on specific research areas) are used for journals. A peer review terminology that is used across publishers will help make the peer review process for articles and journals more transparent and enable the community to better assess and compare peer review practices between different journals. The STM's Peer Review Terminology is currently being formalized as an ANSI/NISO Standard. STM recommends that journals adopt the peer review terminology, and transparently communicate to the users of journals what kind of review models are used for journals.

### Practice in China

In recent years, journals in China have also been exploring and practising open peer review. [Acta Psychologica Sinica](#) and [China Scientific Data](#) have tried a review method between anonymous review and open review.<sup>81</sup>

## 3.3 Publication Ethics

Publication ethics relates to those standards of ethical behavior by all parties involved in the act of publishing: the author, the journal editor, the peer reviewer, the publisher, and the relevant organization for society-owned or sponsored journals.

With regard to the publication ethics of publishers and editors, COPE is a leading organization. COPE was founded in 1997, and is committed to educating and supporting editors, publishers and those involved in publication ethics with the aim of moving the culture of publishing towards one where ethical practices become a normal part of the publishing culture. Its members are primarily editors, but also publishers and related organizations and individuals.

COPE publishes recommended core-practices, the policies and practices journals and publishers need to reach the highest standards in publication ethics, including in open access publishing. These are included with advice, guidance (including flowcharts) for day-to-day practice, education modules and events on topical issues, to support journals and publishers to fulfill their policies. The topics covered are very diverse and reflect the breadth of publication ethics: allegations of misconduct, authorship and contributorship, complaints and appeals, conflicts of interest, data and reproducibility, ethical oversight, intellectual property, journal management, the peer review processes, and post-

81 See: WANG J Y. A Review of Open Review for Science and Technology Publishing[J]. Publishing Journal, 2020, 28(4): 95-104

publication discussions. COPE also offers e-learning courses.

Membership of COPE is tied to a minimum set of criteria<sup>82</sup> that journals will be assessed against when they apply for membership.

### Practice in China

In October 2019, China's National Science and Technology Ethics Committee<sup>83</sup> was officially established. Since then, three subcommittees on artificial intelligence, life sciences, and medical sciences have been successively established. In 2021 the Law of the People's Republic of China on Science and Technology Progress made clear provisions on science and technology ethics, and instructed relevant departments to launch a number of science and technology ethics governance systems. In 2022, the General Office of the Communist Party of China Central Committee and the General Office of the State Council issued the Opinions on Strengthening the Governance of Science and Technology Ethics<sup>84</sup>, requiring that the publication, dissemination, and application of research results involving sensitive issues of science and technology ethics should comply with relevant regulations and be rigorous and prudent.

CAST has continuously strengthened the construction of publishing ethics. It has successively organized the scientific and technological journals of the national societies to sign a Joint Statement on Strengthening the Scientific Ethics of Scientific and Technological Journals and Academic Atmosphere<sup>85</sup>, jointly issued the Code of Conduct on "Five Don'ts" for Publishing Papers in International Academic Journals<sup>86</sup> and compiled the Code of Ethics for Publishing Scientific and Technological Journals<sup>87</sup>. On 15 February 2022, 211 national societies affiliated with CAST jointly issued the Convention on Academic Publishing Ethics of the National Societies of the China Association for Science and Technology<sup>88</sup>, focusing on the whole process of research article publishing from the perspective of the academic community, and proposing that scientific researchers, journal editors, and reviewers strengthen their self-discipline to ensure the objectivity and impartiality of the publishing process and the authenticity and reliability of scholarly publishing. In addition, CAST is actively promoting the establishment of the China Science and Technology Ethics Society.

## 3.4 Reusing Previously Published Content

To illustrate the basis, purposes, and significance of their research, verify their research results, and look into the future, researchers can and should reuse previously published content reasonably

82 Principles of Transparency and Best Practice in Scholarly Publishing, COPE. <https://doi.org/10.24318/cope.2019.1.12>

83 <https://www.most.gov.cn/xwzx/twzb/fbh22032301/>

84 Published by People'sDaily Online. China issues guideline to ensure use of science and technology for good purposes - <http://en.people.cn/n3/2022/0331/c90000-10078128.html>

85 [http://www.gov.cn/jrzq/2012-04/10/content\\_2110210.htm](http://www.gov.cn/jrzq/2012-04/10/content_2110210.htm)

86 [http://las.cas.cn/dj/lzsjc/201605/t20160527\\_4611327.html](http://las.cas.cn/dj/lzsjc/201605/t20160527_4611327.html)

87 [http://www.gov.cn/xinwen/2019-09/26/content\\_5433624.htm](http://www.gov.cn/xinwen/2019-09/26/content_5433624.htm)

88 [https://cast.org.cn/art/2022/2/16/art\\_43\\_179196.html](https://cast.org.cn/art/2022/2/16/art_43_179196.html)

and in compliance with certain rules. Unfortunately, academic misconduct such as plagiarism is a common occurrence. How researchers use or interrogate previously published work is covered by the licenses (see Section 1.7) that apply to the published articles and the data deposited and a robust reference system that is inbuilt in the publishing process.

Plagiarism is defined as occurring when someone uses words, ideas, or work products attributable to another identifiable person or source without attributing the work to the source from which it was obtained, in a situation in which there is a legitimate expectation of original authorship. Plagiarism is traditionally the most frequently encountered form of scientific misconduct, and several tools are in the market that can screen submissions for this type of misconduct<sup>89</sup>. Most tools are developed for the English language. Integrating plagiarism screening tools is common practice at journals and is highly recommended.

### Practice in China

English journals in China mainly use [CrossCheck](#) for article checking, while journals published in Chinese mainly use the domestic scientific misconduct detection system—[Academic Misconduct Literature Check \(AMLC\)](#) of [CNKI](#) for screening and prevention. As of 30 April 2022, there were 4,133 scientific journals using the AMLC, accounting for 83% of the total 4,963 China's scientific journals.

## 3.5 Writing and Editing Services

Many authors for whom English is not their primary language make use of language editing services to ensure the language in their article is of a sufficient level for it not be an impediment for acceptance in an international journal. Several agencies exist that provide these services for authors, such as Editage, American Journal Experts, and Enago. Authors can also directly work with language editors or make use of services provided by their institutions.

Language editing agencies should not be confused with paper mill companies. Paper mills are profit oriented, unofficial, and potentially illegal organizations that produce and sell fraudulent manuscripts that seem to resemble genuine research. Publishers are increasingly screening incoming submissions and retracting publications coming from paper mills. Although there is no objective way to discern a paper mill versus a bona fide editing agency, any agency that offers publications for sale, or offers to produce or fundamentally rewrite articles on the level of something else than language should be treated with suspicion.

COPE and STM undertook a study with [Maverick Publishing Specialists](#), using data from publishers, to understand the scale of the problem of paper mills. The study also involved interviewing stakeholders - research investigators, publishers, and [Retraction Watch](#). The report was published in

<sup>89</sup> The TeSToP working group of the European Network for Academic Integrity has performed one analysis of such tools, available at <https://plagiat.htw-berlin.de/software/softwaretest-2020/>



June 2022.<sup>90</sup> It gives an overview of this growing problem, explains how paper mills work, why they work and what the research and publishing sector can do about it.

### Practice in China

In July 2020, ISTIC and Springer Nature jointly released the *Blue Book of the Pitfall of Using a Third Party Editing Agencies in Scholarly Publishing*<sup>91</sup> (2020 Edition), which provides specific guidelines for researchers to distinguish acceptable services from unacceptable ones when using third-party services in academic publishing, so as to help researchers improve the efficiency of third-party services and avoid the problems of scientific integrity and publishing ethics due to improper services.

## 3.6 Trusted and Predatory Journals

As mentioned in Section 3.1 above, the introduction of the open access model led to the emergence of predatory publishers, publishers that exploit researchers' need to get published and lure them into submitting articles to journals that are only launched to make money out of publishing fees. But it is also incumbent on other publishers to maintain an independent editorial policy, and not to let commercial considerations play any role on the acceptance policy of a journal.

There is no definite, widely accepted list of predatory publishers, and it is often challenging for authors to determine whether they are dealing with these illicit organizations. For this reason, STM, together with other organizations, launched a website 'Think. Check. Submit' (see Section 1.8) helping researchers identify trusted journals and publishers for their research. Through a range of tools and practical resources, this international, cross-sector initiative aims to educate researchers, promote integrity, and build trust in credible research and publications.

DOAJ aims to increase the visibility, accessibility, reputation, usage and impact of quality, peer-reviewed, open access scholarly research journals globally, regardless of discipline, geography, or language, by means of a publicly available directory. DOAJ is a co-author of the *Principles of Transparency and Best Practice in Scholarly Publishing* that provide the basis of the DOAJ basic criteria for inclusion.

### Practice in China

In 2018, China issued *Several Opinions on Further Strengthening the Construction of Scientific Integrity*<sup>92</sup>, proposing an early warning mechanism for academic journals. After that, some Chinese universities and research institutions set up their own "Journal blacklist". In 2020 and 2021, NSLC released the annual Early Warning List of International Journals<sup>93</sup> (for Trial Implementation).

90 Paper Mills Research - <https://publicationethics.org/node/55256> or <https://doi.org/10.24318/jtbG8IHL>

91 Published jointly by ISTC and Springer Nature, 2020

92 [http://www.gov.cn/zhengce/2018-05/30/content\\_5294886.htm](http://www.gov.cn/zhengce/2018-05/30/content_5294886.htm)

93 [http://www.igg.cas.cn/xwzx/kjz/202101/t20210101\\_5849507.html](http://www.igg.cas.cn/xwzx/kjz/202101/t20210101_5849507.html)

### 3.7 Version Control

(Contributed by Todd Carpenter, Executive Director, NISO)

Years ago, article-based content was primarily only available via one source, the published and printed copy of a journal. Occasionally, a typed copy of a manuscript might be shared from one colleague to another, to get feedback as the author developed their ideas. This sharing of pre-publication articles was generally private, and unpublished articles almost never saw wide distribution. There really was no need for a terminology to describe the status of a work, apart from published or unpublished.

As digital publishing grew, authors found ways to expand the ways in which scientific literature could be shared. The first repository of articles explicitly for sharing prior to publication was arXiv which launched in 1991, providing a platform where primarily the physics community could share articles prior to publication for vetting and input on projects under development. Eventually, the popularity of these preprint repositories grew with other sites supporting different communities launching, such as SSRN for the social sciences, BioRxiv for biological sciences, and ChemRxiv in chemistry. There are now nearly 70 public repositories.

In an open access environment, with increased options for prepublication distribution, there needed to be a method for readers to distinguish the version of the content that they were viewing. In 2005, this led a group of publishers and librarians to develop the Journal Article Versions (JAV) terminology as a recommended practice within the National Information Standards Organization (NISO)<sup>94</sup>. This terminology defined seven stages in the journal publication process: Author's Original (AO), Submitted Manuscript Under Review (SMUR), Accepted Manuscript (AM), Proof (P), Version of Record (VoR), Corrected Version of Record (CvOR), and Enhanced Version of Record (EVoR).

The Recommended Practice, a consensus output rather than an official standard, also outlined use cases showing application of the recommended terms. These stages were initially focused around the value that publishers added to the publication process. For readers, it is important to understand the rigor and review that an item might have gone through. It is also important for citation purposes, because wherever possible, citation to the Version of Record, is preferred. Finally, the version of the article might be important for understanding whether the journal article version is available for sharing or republication. For example, the JAV is a core feature of the newly launched, Article Sharing Framework developed by STM<sup>95</sup>.

Since 2008, when the terminology was published, much has changed in the ecosystem for sharing literature. Preprints are now a common item in the scholarly literature, with articles often only being released as preprints. Other articles go through post-publication peer review, which is not well captured in the existing terminology. Also, there are other post-publication statuses that

94 NISO RP-8-2008, "Journal Article Versions (JAV)", Recommendations of the NISO/ALPSP JAV Technical Working Group. National Information Standards organization (2008). ISBN: 978-1-880124-79-6

95 Article Sharing Framework: A Framework for Responsible Sharing. International Association of STM Publishers (2021) <https://www.stm-assoc.org/asf/>

are increasingly important, such as withdrawn or retracted, which are not captured by the initial vocabulary. In November 2020, the NISO Voting Members approved a new project<sup>96</sup>, which began in early 2021, to address the addition of new terms to the vocabulary. The group will also explore questions such as DOI assignment, and whether separate DOIs should be assigned to different versions and how these different identifiers should ideally be connected. This project is expected to produce a draft for public comment in late 2022, with final publication in early 2023.

### Practice in China

Chinese research journals are also actively exploring version control, e.g., CNKI Online-first. As of 30 April 2022, a total of 2,286 academic journals have been published online first through CNKI, involving 563,525 articles and 84,498,612 downloads. The number of days ahead of the initial publication on the internet is 75.08 days. It included 1,606 science and technology journals, which accounted for 70%, involving 483,734 articles and a total downloads of 64,859,535, with 85.42 days ahead of the initial publication for each journal.

## 3.8 Publishing and Research Impact

(Contributed by Melinda Kenneway, CEO, [Kudos](#))

It is self-evident that open access makes research more widely available, but this is just a first step towards it being read and applied – which is the foundation for research impact.

Research impact is defined as “provable change [benefit] of research in the real world”, by Julie Bayley – Director of Research Impact Development at the University of Lincoln<sup>97</sup>. The National Institute of Health in the US defines impact as “the likelihood for the project to exert a sustained, powerful influence on the research field(s) involved”<sup>98</sup>. The National Science Foundation defines impact as “the potential [for your research] to benefit society and contribute to the achievement of desired society outcomes”<sup>99</sup>.

Professor Mark Reed, in the Research Impact Handbook<sup>100</sup>, goes on to define ten types of research impact: understanding and awareness, attitudinal, economic, environmental, health and well-being, policy, other forms of decision-making and behavioral change impacts, cultural, other social, capacity/preparedness.

With growing competition for research funding worldwide, funders are increasingly looking at impact potential as a factor in deciding which projects and institutions to finance. Several countries have in recent years introduced impact assessment criteria as a means for allocating government

96 Update of Recommended Practice for JAV (RP8-2008) Planned. NISO Website (November 2020). <https://www.niso.org/niso-io/2020/11/update-recommended-practice-jav-rp8-2008-planned>.

97 “Chasing the ‘impact unicorn’ - myths and methods in demonstrating research benefit.” Julie Bayley Blog, July 2019. <https://juliebayley.blog/2019/07/>

98 “Definitions of Criteria and Considerations for Research Project Grant (RGP/R01/R03/R15/R34) Critiques.” NIH, Grants and Funding, March 2016. <https://grants.nih.gov/grants/peer/critiques/rpg.htm>

99 “Chapter III- NSF Proposal Processing and Review.” NSF, January 2013. [https://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg\\_3.jsp](https://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg_3.jsp)

100 The Research Impact handbook (2nd edition), Fast Track Impact (July 2018).

funding. These include the UK (via the Research Excellence Framework), Australia, Italy, France, and Belgium.<sup>101</sup> In the UK, impact assessment drives 25% of £2b in university funding.<sup>102</sup> It is not just government funding that is increasingly being allocated by impact measures, many other funding bodies are adopting impact assessment in deciding which projects to fund. European funding via Horizon 2020 and beyond require a detailed exploitation and dissemination plan and the US National Science Foundation requires a statement of the potential broader impacts that a project will lead to as part of the grant submission. Others are beginning to follow, requiring researchers to allocate budget within their grant applications to cover impact and communication with audiences outside of academia – policy makers, people working in industry, educators and so on.

More generally, this is growing recognition of the need to engage the public more actively in research discussions and outcomes. A survey<sup>103</sup> exploring global attitudes about science found that 88% of people think that scientists should share information in language that is easy to understand. In a survey of people with chronic diseases<sup>104</sup>, 50% use scientific journals as a source of information. COVID-19 has further driven public interest in research. Governments, public health experts, and individuals rely on rapidly emerging scientific data to make decisions that have major economic, public health, and personal impact. The highly technical language of research articles isn't optimal for research discovery and understanding amongst broad audiences.

### Practice in China

China's research Journals continue to explore the dissemination of relevant achievements of journal articles to the public. In 2015, *Cell Research* published a research article on the origin of dogs by Zhang Yaping<sup>105</sup>, academician of the CAS. The article attracted the attention of the *Washington Post*, the *Los Angeles Times*, and other international media. In 2020, another article by Zhang Yaping<sup>106</sup> on the origin of chicken was published, and it was called "milestone progress" by the review article published by *Science*.

*National Science Review* made full use of various media to enhance the display and popularity of academic achievements, held 22 online lectures in 2020 and 2021, with a total audience of nearly 640,000 people, and made full use of the platforms such as the blog of the overseas cooperative publisher Oxford University Press, Twitter, and Facebook to promote articles. The research results of the *Institute of Vertebrate Paleontology and Paleoanthropology*, CAS on the possible preservation of DNA in Late Cretaceous dinosaur fossils were commented and forwarded by users from more than 10

101 The Metric Tide: <https://responsiblemetrics.org/the-metric-tide/>

102 The Stern Report: Research Excellence Framework Review: <https://www.gov.uk/government/publications/research-excellence-framework-review>

103 <https://multimedia.3m.com/mws/media/1665444O/3m-sosi-2019-global-findings.pdf>

104 <https://link.springer.com/article/10.1177/2168479017738723>

105 WANG, GD., ZHAI, W., YANG, HC. et al. Out of southern East Asia: the natural history of domestic dogs across the world. *Cell Res* 26, 21–33 (2016). <https://doi.org/10.1038/cr.2015.147>

106 WANG, MS., THAKUR, M., PENG, MS. et al. "863 genomes reveal the origin and domestication of chicken". *Cell Res* 30, 693–701 (2020). <https://doi.org/10.1038/s41422-020-0349-y>

countries on Twitter and Facebook, and the relevant videos were watched more than 10,000 times on YouTube.

*Horticulture Research* has established 17 academic communities, employing mainstream social media at home and abroad. There are 11,000+ followers in their WeChat communication groups; 35 author sharing meetings have been held; and the number of participants on its live broadcast platform has exceeded 130,000+ person times. *Horticulture Research* has successfully initiated and hosted eight sessions at International Horticultural Research Conferences in China, USA, UK, and Italy since 2014, with more than 15,000 people from more than 80 countries and regions having registered for the conferences; moreover, the numbers of Facebook and Twitter followers are both in the top three of its field.

### 3.9 Archiving

(Contributed by Alicia Wise, Executive Director, [CLOCKSS](#))

As important as providing access may be for the current moment, preservation for the long-term is essential to scholarly integrity. Providing open access may be either a support or a hindrance to the effort for long-term integrity, but it needs to be thoughtfully applied to ensure it happens.

Long-term preservation requires active management to ensure that the content remains healthy, especially in the face of changing technology, disk failures, hacking, and worse. Sadly, failure to preserve at all (or until it is too late) is the key challenge. According to the [ISSN International Centre](#), by the end of 2021, there were c. 2.8 million ISSNs issued and nearly 300,000 were assigned to digital resources. Fewer than c. 69,000 of these titles are fully preserved (archived in at least one of the three independent digital archives). No one even knows the equivalent figures for books.

Reputable journals have preservation policies and practices, but many journals – particularly those without sustainable sources of funding – may not have policies or the resources to ensure long-term preservation. For example, studies by Mikael Laakso and others found that hundreds of open access journals have disappeared entirely from the web in the last 20 years, and that more than 7,000 titles registered with DOAJ have no preservation policy or archive in place.<sup>107</sup> In response, the [JASPER](#) project as a partnership between [CLOCKSS](#), DOAJ, the [ISSN International Centre's KEEPERS registry](#), the [Internet Archive](#), the [Public Knowledge Project Preservation Network \(PKP-PN\)](#), and [LOCKSS](#) created a content pipeline from DOAJ to Internet Archive to CLOCKSS and are providing encouragement and support to enable publishers to archive these titles.

In the 1990s concerns began to crystallize about the long-term preservation of digital information. Traditionally libraries have preserved materials in print format, but in the digital age libraries often license access to books and journals that are only available digitally and stored remotely from them and for access over the web. Although convenient for immediate access and usability, this can create

<sup>107</sup> M. LAAKSO, M. MATTHIAS, N. JAHN. Open is not forever: A study of vanished open access journals. *Journal of the Association for Information Science and Technology*, Feb. 2021. <https://doi.org/10.1002/asi.24460>

real challenges for long-term preservation, access, and use. If a publisher ceases to publish, or the library cancels their license, or if the publisher's website is down then the content that a library has paid to access is no longer available.

Under the leadership of organizations such as the [Commission on Preservation and Access](#), [OCLC](#), and the [Research Libraries Group](#) (RLG), academic libraries began to systematically explore how digital preservation of academic resources could be accomplished. Various projects launched in the late 1990's, and some of these have led to the development of preservation services.

CLOCKSS launched as a project in 1999, led by [Stanford University](#) working in partnership with international research libraries and academic publishers and has since evolved to become an independent charity jointly governed by libraries and publishers united to protect scholarly content. To date CLOCKSS has been entrusted to preserve nearly 50 million journal articles and more than 350,000 books. There are concerted efforts to welcome more book publishers and from all geographies, small and large.

At CLOCKSS scholarly content is archived in a network of carefully controlled servers distributed around the world at leading academic institutions, and the nodes in this network are in constant contact to check and if necessary, restore the authenticity to the content protected within. When content entrusted to CLOCKSS permanently disappears from the web, it is made accessible to everyone. Other preservation providers are discoverable here, in the [KEEPERS registry](#) provided by the International ISSN Agency.

### Practice in China

In 2021, with the support of the Ministry of Finance and MOST of the People's Republic of China and the participation of more than 200 major libraries across the country, the National Digital Preservation Program<sup>108</sup> was jointly established by the National Science and Technology Library (leading role), NSLC, ISTIC, and [Peking University Library](#). The program preserves the main science and technology databases of 68 publishing houses at home and abroad in China, which provides important support for China's science innovation and educational development.

## 3.10 Data Management and Sharing (FAIR)

As well as open access, an important pillar of open science is ensuring data is Findable, Accessible, Interoperable, and Reusable (FAIR)<sup>109</sup>. FAIR research data is a crucial part of making research more open, robust, and reproducible. In addition to being critical to scientific integrity and a component of good research practice, sharing FAIR data also paves the way for new technologies such as artificial intelligence to access data, opening up new discoveries in science and research.

Publishers play an important role in making research data FAIR. The published article is an essential hub for the sharing, linking, and citing of research data and other research outputs. It

<sup>108</sup> <http://www.ndpp.ac.cn/>

<sup>109</sup> <https://www.nature.com/articles/sdata201618>



enriches the published content, making more research data findable and accessible within the scholarly ecosystem, including and beyond the underlying data to articles<sup>110</sup>.

Publishers have made concrete contributions to more FAIR data by means of three things:

- Rolling out journal data policies.
- Implementing [Data Availability Statements](#) in articles.
- Implementing [Scholix](#) by submitting data citation information using [Crossref](#)' schema.

At [Share-Link-Cite](#) from STM Research Data, publishers can find more information, instructions and tips on how to implement journal data policies, data availability statements, and Scholix - all important components of making research data more FAIR and open.

### Practice in China

MOST and the Ministry of Finance have set up 20 national scientific data centers and 31 national biological germplasm and experimental resource banks in the fields of high-energy physics, earth system, astronomy, space, ecology, and agriculture, and they have become important carriers for the management and sharing of scientific resources and played a positive role in China's scientific resource management. CAS commenced the set-up of a scientific data center system in 2019 and has established the scientific data center system of "1 General center + 18 Discipline centers + 13 Institute level centers". At the same time, the data platform constructed by China is actively integrated into the international open science practice and contributes to global open science. The general public data storage and sharing platform Science Data Bank (ScienceDB)<sup>111</sup>, built by the CAS, was launched in 2015 to provide free online data storage, long-term preservation and acquisition, sharing and publishing services to global researchers and journals.

By the end of March 2022, the platform has not only provided convenient services for data sharing between researchers and journals from China, but also data storage and access services for researchers in more than 160 countries and regions; It has been recommended by more than 10,000 scientific journals published by publishers such as Springer Nature, Cell Press, Elsevier, Taylor & Francis, etc. For construction of scientific data repositories of professional domain, Genome Sequence Archive (GSA)<sup>112</sup> and National Tibetan Plateau Data Center (TPDC)<sup>113</sup> are also increasingly providing services to researchers globally.

In 2019, Chinese Medical Case Repository (CMCR)<sup>114</sup> was constructed by [Chinese Medical Association Publishing House Co., Ltd](#), which was funded by CAST. CMCR is a digital platform integrating case submission, peer review, storage and release, clinical evaluation and auxiliary diagnosis and treatment, providing a case-study preprint storage scheme, and an evaluation scheme for clinical diagnosis and treatment for medical workers at all levels. By the end of April 2022, CMCR included 76,887 articles and 121 video articles, with 907,801 downloads and 9,981,002 readings.

<sup>110</sup> <https://onlinelibrary.wiley.com/doi/epdf/10.1002/leap.1434>

<sup>111</sup> <https://www.scidb.cn/en>

<sup>112</sup> <https://ngdc.cnca.ac.cn/gsa/>

<sup>113</sup> <http://data.tpdca.ac.cn/en/>

<sup>114</sup> <http://cmcr.yiigle.com/index>



## 4. COLLABORATION IN AN OPEN ACCESS ENVIRONMENT

(These contributions were invited and were written by the publishing organizations themselves.)

There are many partnerships between learned societies and associations, institutes, and universities, and societies with publishers globally across many geographies, but alas no directory or single source of these arrangements. There is an accelerating number of partnerships between publishers and societies/institutions launching open access journals or flipping to fully Gold open access around the world. A range of publishers, from large to small, commercial to institution and society sponsored, have been asked to submit short contributions describing examples of their partnering or collaborating around the world and how partnerships and collaborations with Chinese societies, publishers and journals are developing, talking about the similarities and differences, contextualizing activity in China with international experience.

These contributions are included below in alphabetical order of publishing houses as submitted by the publishers.

### **American Association for the Advancement of Science (AAAS)**

A part of the AAAS mission and values is a belief in science without borders and advancing science through serving society. For over a decade these beliefs have helped to guide AAAS/Science on a path within China to find partners and collaborators. Partners that share similar values, as we work together to develop programs in areas such as scientific publishing, education, policy, diplomacy, and science communication.

As our relationships within China grew stronger there were many requests for consulting services in gaining a better understanding of the scholarly journal publishing landscape. AAAS realized that there was a need for a full-time office in China and over eleven years ago our office in Beijing was opened. This allowed us to have an ear to the ground to further develop workshops requests in topics such as best practices in peer review publishing, marketing a scientific journal, publishing a truly international scientific journal like *Science*, platform reviews and other publishing centric topics.

After many years of running workshops for authors and providing consulting services, China Association of Science and Technology (CAST) reached out to us and discussed the possibility of launching a new International scientific journal. AAAS/*Science* was already exploring the possibility of developing the Science Partner Journal program (SPJ).

SPJ program was launched in late 2017 by AAAS, the nonprofit publisher of the *Science* family of journals. The program features high-quality, online-only, open access publications produced in collaboration with international research institutions, foundations, funders, and societies. Through these collaborations, AAAS furthers its mission to communicate science broadly and for the benefit of all people by providing top-tier international research organizations with the technology, visibility, and publishing expertise that AAAS is uniquely positioned to offer as the world's largest general science

membership society.

*Research*, a publication produced in collaboration with the CAST, became the first journal in the SPJ program.

## **Brill**

In the last few years, Brill has proactively engaged with various institutions in China in building partnerships for open access journals and book series in the humanities and social sciences. Among these are Beijing Normal University, Wuhan University, and the Dalian University of Foreign Languages. We have found it helps to focus on the mutual ambition between the institution and Brill, that the title becomes an established and excellent brand in its field – as measured by indexation in Scopus and Web of Science among others.

Open access is a key driver of these ambitions. It maximizes visibility and accelerates citations, which in turn helps the journal not just to be indexed, but also to quickly gain a following in the research field. We found this is the most important reason for Chinese institutions to take an interest in open access.

**To achieve these goals, some of the key elements in the publishing strategy include:**

- Diversity. The editorial board of the title should be international and diverse. Likewise, authorship should be diverse. We have conversations with the institution early on in the process to dovetail expectations. It's essential, from Brill's perspective, to prevent that a title is a platform for output exclusively from that institution. To make sure the title has a lasting impact, global copy flow is necessary. This is one of our key parameters for any open access collaboration with a research center.
- Peer review. We work closely with the editorial board and representatives of the institution to implement a blind review process, to ensure that all research published in the journal is of outstanding quality. This, in turn, helps to accelerate citations, can guarantee inclusion in the key indexes, and thus further contributes to increasing visibility and impact.
- Branding. The research institution is always a clear part of the branding and marketing, e.g., in logos, on the cover, on the website, etc. This gives the institution and the research it publishes international visibility. As the journal brand grows, so does the visibility and prestige of the institution in that particular research field.
- Publishing support. We provide in-depth publishing support and foster a relationship both with the editors as well as other stakeholders in the institution to learn about the research culture in China. This helps us make sure we can align our services with their needs.

## **EDP Sciences**

EDP Sciences is a publisher of research journals, books, and conference proceedings based in France. EDP Sciences was founded in 1920 by well-known scientists such as Marie Curie, Louis de

Broglie, Jean Perrin, etc., and was later owned and managed by well-known societies such as the French Physical Society, the French Optical Society, the French Chemical Society, and the French Society for Industrial and Applied Mathematics. EDP Sciences' mission is to serve scholars and scientific publishing worldwide. Since 2013, EDP Sciences has actively promoted the transformation to open science and open access and has developed numerous open access projects including:

- The creation of Gold open access journals
- The conversion of subscription journals into open access journals
- More recently, the implementation of the [Subscribe-to-Open model](#)

For a long time, EDP Sciences has established and enjoyed good cooperative relations with a range of Chinese associations and publishers. At the end of 2019, [EDP Sciences become a member of the China Science Publishing & Media Co., Ltd \(CSPM/Science Press\)](#) family which belongs to the Chinese Academy of Sciences (CAS). Over the years, EDP Sciences has cooperated with Chinese publishers and scholars to actively promote open access mainly in the following areas:

1. [Launching Gold open access journals](#): Together with Science Press, EDP Sciences has cooperated with Chinese publishers and scholars to promote the Gold model of open access by launching new, open access journals. For example, two new journals co-published this year, [National Science Open \(NSO\)](#) and [Security and Safety \(S&S\)](#), have also been selected for the Excellence Action Plan of China's STM Journals — High-start Journals, supported by CAST (the China Association for Science and Technology). NSO is a comprehensive, English journal covering the natural sciences with a focus on the development of interdisciplinary subjects. It is published under a Gold open access model. S&S is an innovative OA journal, focusing on the intersection of cyber security and functional safety. Both journals have established an international editorial board led by academicians of the Chinese Academy of Sciences and the Chinese Academy of Engineering. Articles are published in Chinese and English through EDP Sciences and the [SciEngine](#) platform of CSPM to accelerate the global visibility and impact of journal articles while maintaining information security.

2. [Hosting journals in open access models](#): EDP Sciences is also actively helping Chinese journals to host and disseminate their articles on its platforms via an open access model, making them more visible and well-known all over the world. For example, [the Journal of North Western Polytechnical University](#), a Chinese journal, has been hosted in Gold open access on the EDP Sciences platform since 2018. Its visibility and citations have greatly improved and it is now indexed by Google Scholar, ADS, and DOAJ. EDP Sciences also provides hosting services for Chinese and English journals in China, such as the [Wuhan University Journal of Natural Sciences](#). In addition, EDP Sciences is able to take advantage of the cooperation with the [SciEngine](#) platform to promote its own journals in China.

3. [Promoting open access book publishing](#): EDP Sciences actively cooperates with CSPM and other publishing houses in China to translate high-quality Chinese books into English and/or French

for publication and distribution in the international market. For example, EDP Sciences cooperated with CSPM to publish the English version of the *Blue Book on China's Scientific Journal Development* from the China Association for Science and Technology (CAST) and promotes the English Edition as an open access title.

4. Publishing open access conference proceedings: *Web of Conferences* (WOC), managed by EDP Sciences, is an open access platform devoted to the publication of scientific conference proceedings. The platform offers high quality services for the publication and dissemination of conference proceedings in 6 areas (EPJ, BIO, E3S, ITM, MATEC and SHS). More than 110,000 articles have already been published in open access, and around 20,000 articles are published every year, of which around 30% are from China. We look forward to providing open access services for conference proceedings to more authors in China and around the world.

As an international, academic publisher, EDP Sciences has always been committed to providing high-quality publishing and dissemination services to researchers and associations around the world, as well as providing them with high-quality academic content. At the same time, as a member of CSPM, EDP Sciences is committed to providing Chinese researchers and associations with more localized, secure and reliable open access publishing solutions. This helps Chinese researchers to enhance their international communication and influence, and promotes academic exchanges and cooperation on technological innovation between China and the world.

## **Elsevier**

Elsevier started to publish Chinese societies journals in 2005 and up until today, we have around 100+ titles in partnership with 70+ institutions, half of which are open access titles. Around 49 titles are selected into the *China STM Journal Excellence Action Plan (2019 – 2023)* and most of these are open access titles. We are proud to have brought many of these titles quickly into an international standing, supporting journal owners in their focus on indexing, international impact, international collaboration and alignment with the high standards of the National Press and Publication Administration (NPPA) and China's academic community.

In China, we have observed two main different types of journals:

- Researcher driven: Journal ideas come from practising researchers and usually have an international editorial board with deep insights into the discipline. The priority is quality and impact. The source of funding is mainly from research grants or institutions.
- Institution driven: Journal ideas come from multiple origins, including policy focus, management interest, with consultation with practising researchers. The priority is compliance with NPPA guidelines and quality/impact. The source of funding is multiple resources, primarily government administered investments, university presses and university departments.

We have also observed some contrast between China and EU/US markets regarding society-based partnership models, particularly in open access. In China, for many the customer preference

remains to pay for the institutionally subsidized Diamond open access model. A slowly growing but still minority share is adopting the author-paid Gold open access model. In the broader global market, especially in the top half of the quality tiers, there has been much faster and more comprehensive adoption of Gold open access. In terms of journal development impact, the high level of central funding in China enables institutionally subsidized open access publishing and early-stage growth but before long the per-article cost model disincentivizes growth and limits revenue generation for reinvestment in the journal. By comparison, the broader market tends to have an ambition to be self-funded much earlier, so will look for author paid revenue earlier. By being more flexible in balancing revenue, volume and quality, they move from generating cost to generating surplus to invest back into accelerating their journal's submissions and editorial development.

## **IEEE**

IEEE has been working with domestic publishers in China for over a decade. In 2012, IEEE collaborated with Tsinghua University Press's journal *Tsinghua Science and Technology*, and with Beijing Institute of Aerospace Information in their *Journal of Systems Engineering and Electronics*. These two subscription journals subsequently flipped to fully Gold open access in 2013 and 2018, respectively. Since then, IEEE has expanded its partnership with domestic journals in China through its online hosting agreements. IEEE currently hosts and broadens the dissemination of 16 third-party journals from China on its IEEE Xplore platform, 13 of which are fully open access.

In 2021, the volunteer boards governing IEEE Publications and IEEE Technical Activities jointly approved an expanded program for journal partnerships in China. In addition to providing online hosting services in IEEE Xplore, the new program offers the full range of publishing production services and commercial support, and an opportunity to partner with IEEE's technical societies and councils which can provide domain expertise and worldwide community engagement.

The objective of the program is to expand awareness and dissemination to the emerging scholarly publishing sector in China and engage the operational expertise of IEEE's publishing program and the deep expertise and network of IEEE's technical communities in hopes of building a stronger network of scientific and technical communication across the globe — a cornerstone of IEEE's stated mission "to advance technology for the benefit of humanity".

## **IOP Publishing**

IOP Publishing (IOPP) supports open access publishing through a variety of models around the world. In Europe, open access is most commonly offered through transformative agreements supported by major research funders. This model is also gaining momentum in North America and [our unlimited open access agreement](#) with the Canadian Research Knowledge Network (CRKN) demonstrates this trend. As of July 2022, IOPP now has agreements with 290 institutions in 14 countries.

In China, IOPP supports a diversity of open access models. One example is SCOAP3, the Sponsoring Consortium for Open Access Publishing in Particle Physics. As part of our long-term partnership publishing four flagship journals with the Chinese Physical Society (CPS), articles in the journal *Chinese Physics C* are published through SCOAP3 without any fees for authors and are available to read and reuse under a Creative Commons CC-BY license. This international collaboration in the high-energy physics community converts subscription-access articles to open access. Like most European transformative agreements, the SCOAP3 participants redirect the funds previously used to pay subscriptions into a common pool which is then used to fund payment for open access publishing. We see continued growth in the number of articles published open access under this model.

Another model deployed by IOPP to enable open access in China is the Diamond or sponsored route to open access. IOPP publishes two sponsored fully open access journals on behalf of Chinese institutions: *International Journal of Extreme Manufacturing* owned by the Institute of Machinery Manufacturing Technology, China Academy of Engineering Physics and *Materials Futures* owned by the Songshan Lake Materials Laboratory. These journals offer immediate access to the content published in the journals without the payment of a subscription fee or license. Authors pay no APC, and all the costs of publishing research are met by the owners that sponsor open access publishing.

IOPP is keen to explore this model of open access with partners in other parts of the world and hopes that these examples provide insight into how they may develop.

## **KeAi**

KeAi is a unique joint venture between China Science Publishing and Media Ltd (cspm) and Elsevier focusing on open access journal publishing. Based in Beijing, KeAi shares first-class research outputs from China and the globe with the international research community to benefit society. KeAi has become the largest open access publishing service provider in China in terms of number of journals. Partnership journal is an iconic feature of KeAi, as among the 130 journals KeAi is publishing, two thirds are partnered with Chinese research communities (one thirds are KeAi-owned titles), including academic societies, universities, research institutes, publishing houses, and research-intensive corporations.

KeAi has been witnessing the rapid growth of research outputs in terms of both quantity and quality, journal boom, and open access acceleration in China. Open access publishing model helps China to better promote research outputs globally, compared with the subscription model. Most China-owned new journals choose an open access model because it contributes to enlarge their international discoverability and impact. Though open access is not mandated by Chinese institutions, more and more authors from China are embracing open access because it drives citations and leads to greater international influence. However, some open access journals show concerns that APCs could not cover the costs if the funding could not continue after the starting stage of new journals.



There are three reasons why Chinese research community chooses KeAi to publish partnership journals. First, the brands and reputation of parent companies-CSPM and Elsevier, and KeAi could offer service supported by its parent companies, including ScienceDirect, Editorial Manager, and production. Second, with understanding of the Chinese research community, KeAi has been forging its unique core competence in meeting the special needs of Chinese partners by providing strategic advice on journal development, data analysis of the journal and subject, international impact promotion program, and indexation application assistance. Third, KeAi communicates better with partners – in Chinese language, and is more flexible in partnership models and more efficient in decision-making and daily operation.

*Fundamental Research* (FR) is among the most important partnership journals of KeAi. FR is the only official NSFC English journal. Launched in 2021, it is a platform that publishes premium research across all scientific disciplines, especially major outputs funded by NSFC, aiming to become a world class journal. NSFC chose KeAi as its publisher and attracted instant attention from the Chinese research community and was indexed by Scopus within one year. Moreover, KeAi has fostered strategic co-operations with Xi'an Jiaotong University, Chongqing University and Shandong University, providing support in various publishing offers.

## **Oxford University Press**

Oxford University Press (OUP) is a department of the University of Oxford, furthering the University's objective of excellence in research, scholarship, and education by publishing worldwide. We publish over 500 journals, covering the disciplines of medicine, life sciences, social sciences, humanities, mathematics, physical sciences, and law. The majority of our journals are published on behalf of and in collaboration with scholarly and professional societies.

OUP is the largest university press publisher of open access research. We publish over 100 Gold open access journals internationally – around 20% of our overall list. Most of our Gold open access journals were launched as open access, but we also publish multiple titles which ‘flipped’ from subscription models. In addition, we have almost 400 ‘hybrid’ journals - where open access is optional for authors. We have concluded 30 ‘Read and Publish’ agreements with library consortia and institutions worldwide which have greatly increased the opportunities available for authors to publish open access in our journals.

Our collaboration with China-based journals dates back to 2005, and has developed significantly since then – currently we publish over 20 journals with China-based organizations, almost all of which are Gold open access. Working with the owners of our China-based journals, we have converted several subscription journals to open access in recent years. For example, *National Science Review* and *Journal of Molecular Cell Biology* both flipped to Gold open access in 2019, and *Journal of Plant Ecology* flipped to Gold open access in 2022. These journals have thrived since their successful conversions to open access – their readership, impact, and usage have expanded, and we have



ensured their long-term sustainability to support their further development.

In May 2020, NSLC and OUP signed the first Read and Publish agreement in China. This deal opened more opportunities for authors from China to publish open access with OUP, along with giving researchers at the participating CAS institutions access to the prestigious OUP journals collection.

### **Royal Society of Chemistry (RSC)**

China partner journals can trace back to the 90s, but large-scale collaborations with international publishers happened in the past 15 years or so. It started with the English versions of university official journals or Chinese journals flipping to English language-wise. It then moved on to launch brand new STM journals in English via collaboration between a Chinese organization and one of the established international Publishers. Open access was not yet a must-have back then. Soon after that, it went into a fast-developing period when hundreds of new specialist journals were created, and open access was almost taken for granted as the mode for publishing those journals. The core of ‘partnership’ in most of the partner journals in China is actually publishing service with the Chinese organization obtaining full ownership. However, there are exceptions with the Chinese organization and the international Publisher co-owning the journals.

The Royal Society of Chemistry publishes China partner journals too but does that as an integral part of its overall scientific content strategy. The RSC partners with the Chinese Chemical Society and three academic organizations to have published *Organic Chemistry Frontiers* (2014), *Inorganic Chemistry Frontiers* (2014), and *Materials Chemistry Frontiers* (2017), respectively. The Frontiers journal series was launched to serve the publishing needs of their respective research communities and was launched at a time when open access was not yet a norm for new launches. They play a key role in the RSC’s hybrid journals portfolio. As the needs of the community evolve and shift towards more accessible content, the partners in this unique collaboration aim to continue listening to and meeting those needs, and are open to opportunities of transition to open access. In 2022, the RSC launched a flagship gold open access journal in chemical engineering, *Industrial Chemistry & Materials*, with the Institute of Process Engineering, Chinese Academy of Sciences.

The Royal Society of Chemistry is a pioneer and leader in publishing accessible Chemistry content. We accelerate our transition to open access. We currently have 25% of our journals as Gold open access. Our flagship journal *Chemical Science* is Diamond open access. We now have nearly 300 transformative open access agreements in place.

### **Springer Nature**

Springer Nature has been committed to opening up research for over 20 years. BMC published its first open access content in 2000, while the pioneering Springer Compact agreements paved the way for today’s Transformative Agreements. In 2021 Springer Nature became the first publisher to publish one million research articles and reviews open access. Springer Nature has the world’s most

comprehensive open access portfolio and has committed to making half of its published output open access by 2024.

China has long embraced open science, with CAS and NSFC amongst the earliest signatories to the *Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities*, and more and more Chinese researchers have recognized the benefits of making research freely accessible to everyone. Springer Nature has played an active role in meeting Chinese researchers' needs for publishing open access by providing them with various open access options and high-quality platforms. Out of all the 1 million open access articles Springer Nature published 2005–2021, China and USA have each accounted for 15%, higher than any other country; in the last 3 years (2019–2021), China has published the most Springer Nature open access content, accounting for 17%.

Springer Nature, as the largest open access book publisher and pioneer in open access book models, has published over 1,500 open access books since the launch of its open access books program in 2012, with its book chapters having been downloaded over 200 million times. In China, a growing number of authors who chose to [publish books](#) via open access have received the benefits of open access publishing, as in the case of *Representation Learning for Natural Language Processing*, an open access book by Professor Liu Zhi-yuan of Tsinghua University that has been downloaded more than 330,000 times globally since published by Springer in 2020.

In 2019, Springer Nature formed its first organizational level open access partnership in China by signing a MOU with China Geological Survey to jointly explore collaborations in open access book series publishing and database and has since actively developed cooperation with more Chinese universities and research institutes in open access book publishing.

For China, Springer Nature has also been an active and reliable partner for publishing high-quality open access academic journals since 2011. This partnership now covers the publication of 65 Gold open access journals, across all disciplines and play an important role in helping China develop related disciplines and serve community needs. Springer Nature is currently China's largest journal partner for the Excellence Action Plan of China's STM Journals, with six of its partner journals in China included among the top-ranked champion journals of the program. 38% have received impact factors and a few of them have gained a leading position in their different fields internationally.

Taking *Infectious Diseases of Poverty* as an example, the journal that was launched in partnership with the National Institute of Parasitic Diseases at China CDC, based on the WHO's One Health concept. Thanks to its first-mover advantage in open access and forward-looking strategy, in a matter of ten years it has transformed into a journal with truly international impact. Its articles originate from more than 100 countries and regions and are widely accessed in more than 120 countries and regions. Additionally, Springer Nature publishes five NPJ journals, part of the prestigious *Nature Portfolio*, in collaboration with preeminent Chinese institutions to publish high-quality open access research.

Springer Nature has also been assisting China with its journey toward open science through

additional fruitful partnerships. In 2018, an agreement with the NSLC provided Chinese researchers with easy and convenient access to Springer Nature's Gold open access journals and books via NSLC's GoOA platform. In 2021, Springer Nature and the Institute of Scientific and Technical Information of China forged a partnership to establish a joint lab to further China's research in open science.

However, open access is still not regarded as a top priority globally when authors decide about where to publish and there is low awareness amongst researchers about the benefits of open access. Springer Nature would work together more closely with all key stakeholders in China to advocate, promote, educate, and make the technical changes needed to measure and showcase the benefits of open access and continues to contribute to and join in China's endeavor to advance open science.

It is worth mentioning that research<sup>115</sup> shows that 83% of researchers prefer the final published version of record over the accepted manuscript and preprint both for general reading and for citing in their research, increasing support for immediate gold open access. And evidence from further research<sup>116</sup> indicates that gold open access articles achieve greater impact compared to subscription articles. Springer Nature sees full (Gold) open access as the best, most complete and most sustainable route to achieving the goal of having all primary research immediately available.

On the other hand, we have seen that transformative agreements can make the process of choosing open access significantly easier for authors, enabling countries to actively transition to open access. Springer Nature currently has in place 17 national transformative agreements, and has expanded them from Europe to developing countries, including Egypt and Colombia, as we see interest growing there.

## **Taylor & Francis**

Taylor & Francis (T&F) believes that open science is the best way to amplify and communicate research that delivers change and ultimately improves lives. Our experience has shown that the best way to meet open science ambitions is through interactions with stakeholders from across the research ecosystem, who together can co-create new practices and approaches that work for the benefit of science.

T&F has been investing heavily in building workflows and systems that make research outputs more discoverable, connected, and usable – and for researchers and the consumers of research wherever they are. As a publisher, one of our key roles is to make sure that research is disseminated in ways that maximize the potential for research to have impact. We are working as part of a range of cross-publisher and industry initiatives focused on driving adoption of best practice standard persistent identifiers (PIDs). We are experimenting with new technologies, including AI / Natural Language Processing tools in our workflows and content system (e.g. Contextualised Copyediting

<sup>115</sup> <https://www.springernature.com/gp/open-research/version-of-record>

<sup>116</sup> <https://www.springernature.com/gp/open-research/about/oa-effect-hybrid>

service and [Journal Suggester](#) tool). We are also experimenting with more open forms of peer review across our journal portfolio, including via F1000 – through which we can provide greater visibility and credit for the work that reviewers contribute to the scholarly record.

When it comes to open data, T&F are signatories of the [FAIR principles](#) and the [Joint Declaration of Data Citation Principles](#). We were also one of the first of the large publishers to join the [Initiative for Open Citations \(I4OC\)](#). We have created and launched our own [data-sharing policies](#) – creating a spectrum of data- and material-sharing options, with the aim of increasing the number of journals with policies that actively support and facilitate data sharing, increasing the volume of data deposit, and expanding the opportunity for the use and reuse of data and vital research resources (including through the ability to cite data and materials).

Publishers can play an important role in supporting capacity development, including offering training to researchers around reviewing, publishing, and responsible research practices. T&F has developed an extensive training programs across a wider range of research practice for authors, reviewers, and editors, and offers guidance and advice to partners including learned societies and professional member organizations, such as our popular [How Researchers Changed the World](#) series, accompanied by online learning programs that researchers can follow at their own pace. We provide several training modules to early career researchers, focusing on Open Research, Publishing Ethics and Writing for Scholarly Audiences. We also employ a dedicated Publishing Ethics and Integrity team, serving as a center of excellence within T&F and providing expert advice and support on ethical, research integrity, publishing ethics and policy matters.

China-centric examples of innovation in terms of new fields, new forms of content, and new publishing pathways:

In 2008, T&F launched [International Journal of Digital Earth \(IJDE\)](#) in partnership with the [Aerospace Information Research Institute of the Chinese Academy of Sciences \(AIR-CAS\)](#) and the [International Society for Digital Earth \(ISDE\)](#). We extended this long-standing collaboration in 2017 with the launch of [Big Earth Data \(BEDJ\)](#), the first interdisciplinary open access journal that promoted the sharing, processing, and analysis of ‘big data’ relating to the Earth’s systems. This partnership was designed to create a clear publishing pathway for important outputs from the [Big Earth Data Science Engineering Program \(CASEarth\)](#), a Strategic Priority Research Program (Class A), which began in 2018 with the aim of develop a data-sharing platform for big data and cloud services in the Earth Sciences, and supports the newly formed [International Research Center of Big Data for Sustainable Development Goals \(CBAS\)](#) through our partnership with Institute Director and Editor-in-Chief of BEDJ and IJDE, CAS Academician Professor GUO Huadong. *Big Earth Data* supports an [Open & FAIR data-sharing policy](#) to promote FAIR principles within the Earth Sciences community, and publishes original research on the collection, management, handling, and analysis of big data, as well as [short data articles](#), which increase the discovery and value of data sets stored in a repository.

F1000 has also developed a range of open research publishing solutions aimed at providing a publishing model, specifically providing a route to deliver rapid publication, supporting the publication of a diversity of article options from across the research life cycle. In China, F1000 has collaborated with Beihang University to develop the first open access publication platform that is dedicated to 'Digital Twin' technologies. It also contracted with AUBO (Beijing) Intelligent Science and Technology Co. Ltd on a platform dedicated to the research and application of collaborative robots.

## **Wiley**

Wiley is a global leader in research and education, unlocking human potential by enabling discovery, powering education, and shaping workforces. As one of the world's leading open access publishers, Wiley remains focused on facilitating the open access movement across the globe. Currently, Wiley has over 450 fully gold OA journals and over 1,400 hybrid journals, covering more than 120 disciplines. Besides, we have open access agreements with more than 40 partners globally, which has greatly promoted open science and the dissemination of research outputs. In China, Wiley is the council member of Open Science Promotion consortium (OSPC), we are giving full access to our scale and capabilities to support China's exploration towards open access, empowering China research to achieve a greater impact around the world. Furthermore, as the global leading society publisher, nearly 60% of more than 1,700 Wiley journals are co-publishing with society partners. By leveraging advanced technologies and global best practice, Wiley has been working with the Chinese partners closely to jointly explore diversified paths to help build up world-class journals and societies with Chinese characteristics. It is our great honor to establish strategic partnerships with the most influential Chinese societies, such as the Chinese Medical Association Publishing House, the Chinese Chemical Society, Higher Education Press and Tsinghua University Press, etc. In the meantime, we also work closely with fast-growing societies in China. By providing in-depth publishing support, advanced platform, and publishing solutions and services, we help the Chinese societies to shape their long-term development strategies and amplify their academic impact globally.

In 2020, Wiley signed a strategic partnership with the Chinese Medical Association Publishing House (CMAHP) to strengthen its publishing capability and presence in the medical field on the global stage by providing world-class publishing platforms and services. CMAHP and Wiley will jointly launch multiple open access journals in a long period of time to facilitate scientific communications between China and the West and enhance China journals' global importance. In one year, MedCentral, the hosting and dissemination platform co-built by CMAHP, and Wiley has been released and six journals including four new open access journals and two existing journals have been successfully launched or transferred.

In the physical science field where Wiley has a reputable brand and dominant strength, Wiley has established a premium brand Mat+ for China and partnered with Chinese universities to co-publish four journals including *InfoMat*, *EcoMat*, *SusMat*, and *SmartMat* covering information technology

materials, green energy and environmental materials, sustainable development materials, and intelligent materials.

What is worth mentioning, *InfoMat*, a new open access flagship journal, aims to provide a high-level research exchange platform for global researchers. Focusing on information technology materials, it links academics with industrial research and drives scientific advancement in the field. By obtaining its first impact factor of 25.405 in 2021, which is the third year since the journal launched. Combining Wiley's experience in publishing with the local partner's strong subject expertise and good reputation in the scientific community, *InfoMat* is a successful case of international cooperation. Thanks to a dedicated global editorial team led by Editor-in-Chief Prof. Yanrong Li, an Academician and university President, this journal offers authors professional peer review services as well as a fast review turnaround. Utilizing the open access model, articles are immediately free to read, download, and cite once published with a rapid publication speed, especially during the first three years when APCs were waived. Moreover, driven by a series of special issues on hot topics during its launching period, *InfoMat* quickly attracted a number of researchers' interest and support. The journal engages authors with Wiley's editor-driven referrals project, and its development is always guided by Wiley's advanced data analysis support.

Wiley has also partnered with the [Institution of Engineering and Technology \(IET\)](#) in the UK to publish electrical engineering and computer science journals in China, including [High Voltage](#), [Chinese Journal of Electronics](#) and [CAAI Transactions on Intelligence Technology](#), in association with a number of major Chinese institutions such as the [China Electric Power Research Institute \(CEPRI\)](#) and the [Chinese Institute of Electronics](#). Working in partnership, Wiley and the IET have successfully transitioned the majority of these titles to the Gold open access model as well, supporting the discovery and impact of research in these fields. Wiley and the IET remain actively engaged in forming new partnerships and developing new titles such as [Energy Conversion and Economics](#), launched in association with the State Grid Economic and Technological Research Institute (SPERI) in 2020.

## **Wolters Kluwer**

As one of the leading publishers in medicine and nursing, Wolters Kluwer started STM publishing in China since 2012. Initially, it was publishing 40+ open access titles in China under its Medknow journal portfolio. From 2018, Wolters Kluwer's focus on medical publishing in China moved to its premium Lippincott portfolio. Wolters Kluwer Lippincott currently publishes 19 titles through its partnerships with influential academic societies, universities, and institutes in China, including the CMA, Peking University, Zhejiang University, Shandong University, etc. All of the journals are fully open access, and among them, 13 journals have been selected and funded by China Association for Science and Technology.

Aligned with China's strategy on research journal publishing, Wolters Kluwer aims to help Chinese local publishing partners produce high-standard international open access journals. Given



that most of the journals published by Wolters Kluwer China are in their infancy (launched in recent five years), Wolters Kluwer pays special attention to building a highly effective workflow for new open access journals' onboarding and development. This includes training for new editors by introducing the best publishing and editorial practices and experiences from publishers and editors from Wolters Kluwer's well-established open access journals; customized publishing and editorial services covering languages, ethics, data analysis, etc.; and global and local marketing support. Utilizing Wolters Kluwer's unique marketing channels, exposure of Wolters Kluwer's China journals has been greatly increased and the readership has a high international level - more than half of the paper views and downloads are from countries and locations beyond China.

Besides investing more and exploring collaborations in open access publishing in China, Wolters Kluwer also actively promotes open access and medical research to the academic communities and audience. In terms of open access publishing research, Wolters Kluwer built two joint labs in 2021 with the ISTIC and NSLC, dedicated to the studies on open access journal development and research evaluation for the subjects of medicine and healthcare. On the community and audience level, Wolters Kluwer organizes webinars in collaboration with leading universities and hospitals to help doctors and medical researchers to better understand open access journals and to improve their skills in research design and academic article writing and publishing.



## CONCLUSIONS

This Report has provided an explanation of open access publishing broadly (Section 1) and in the specific Chinese context (Section 2). We hope that it will help increase the awareness of publishing practice for those working in scholarly communications around the world. Readers can draw their own conclusions on the similarities and the differences between publishing practice and trends within China and elsewhere. We note, as is shown in Figure 1-1 from Scopus data, there is an accelerating growth in Gold open access journal articles globally and a similar acceleration in open access articles from China in the international literature, as shown in Figure 1-2 from Scopus data and Figure 2-3 from CAST data. Globally, 30% of articles were Gold open access in 2020, with a slightly lower percentage in articles from China in international journals. In addition to these trends towards Gold open access, Section 2 illustrates how the adoption of open access models by journals published in China is being encouraged through various national initiatives.

### **Integrity in Open Access**

As discussed in Section 3, the efforts of publishers to promote research integrity are as important, if not even more important, in open access publishing. The various activities in publisher workflows, in the management of peer review, in the creation of infrastructure and tools for cross-community information sharing are all critical to preserving trust and validity of the scholarship communicated in the research ecosystem. Those organizations publishing within China and the broader scholarly communications community are equally concerned to ensure the highest integrity in published output as elsewhere in the world.

### **International Collaboration Between Organizations Inside and Outside China**

There exists a substantial level of collaboration between societies, institutions, and publishers globally which has contributed to the comprehensive development and improvement of publishing of research and to ensure a high level of trust in the scholarly communications ecosystem. Over the last 30 years, the partnerships between international publishers and those involved in publishing in China has been accelerating. A wide variety of case-studies (as presented in Section 4) illustrate a range of such collaborations which have been of significant benefit for researchers working in China as well as for global scholarship. Both CAST and STM believe that such mutually beneficial collaborations should continue, and are committed to working together to that end.

STM and CAST signed an MOU in 2021 so that together the two organizations could broaden exchange and collaboration and learn from each other. This Report is one further step in the development of that collaboration, sharing ideas and best practice in open access publishing. Both organizations agree that the dialogue, particularly in open science more broadly, is beneficial to all engaged in such efforts.

### **An Outlook on China's Open Access Publishing from CAST**

The data in this Report show that open access publishing in China has developed rapidly and China has become an important part of the global open access publishing ecosystem. However, China still has great potential in open access publishing, especially for its considerable number of scientific journals in Chinese language. Therefore, CAST will actively develop domestic open access policies, standards, and infrastructure, and make effort on the establishment of an open access publishing system suitable for China.

# APPENDIX

## I List of Links Included in the Report

These are listed in alphabetical order of the organization referenced and were accessed on August 12, 2022.

Note that in the text above, usually only the first mention of an organization or publication is linked with a URL (if available) and not necessarily subsequent mentions.

### A

[The Academic Exchange Platform for Research Achievements in Prevention, Control, Diagnosis and Academic Misconduct Literature Check \(AMLC\)](#)

[Pneumonia](#)

[ACS Omega](#)

[Acta Agronomica Sinica](#)

[Acta Geochimica](#)

[Acta Geodaetica et Cartographica Sinica](#)

[Acta Orthopaedica et Traumatologica Turcica](#)

[Acta Psychologica Sinica](#)

[Advances in Atmospheric Sciences](#)

[Aerospace Information Research Institute](#)

[African Journals Online \(AJOL\)](#)

[American Association for the Advancement of Science \(AAAS\)](#)

[American Astronomical Society](#)

[American Journal Experts](#)

[Association for Computing Machinery](#)

[Annual Reviews](#)

[ArXiv](#)

[ASAPBio](#)

### B

[Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities](#)

[Bethesda Statement on Open Access Publishing \(2003\)](#)

[Biodiversity Science](#)

[Big Earth Data](#)

[Big Earth Data Science Engineering Program \(CASEarth\)](#)

[Biotechnology Bulletin](#)

[BioRxiv](#)

[Blue Book of the Pitfall of Using a Third Party Editing Agencies in Scholarly Publishing](#)

[Blue Book on China's Scientific Journal Development \(2020\)](#)

*Blue Book on China's Scientific Journal Development (2021)*

BMC

Brill

Budapest Open Access Initiative

## C

*CAAI Transactions on Intelligence Technology*

CAS Institutional Repositories Grid ([CAS IR GRID](#))

California Digital Library

CAS Science and Technology Paper Pre-publication Platform ([ChinaXiv](#))

*Cell Research*

*Horticulture Research*

Center for Chinese Linguistics PKU

China Academic Library & Information System ([CALIS](#))

China Academic Journals (CD Edition) Electronic Publishing House Co., Ltd

China Association for Science and Technology ([CAST](#))

China Cyberspace Endogenous Safety & Security Technology and Industry Alliance ([CCES](#))

China Educational Publications Import and Export Corporation Ltd

China Electric Power Research Institute ([CEPRI](#))

China Geological Survey

Chinese Institute of Electronics

China Library and information Archives

China Open Access Journals ([COAJ](#))

China Preprint Service System

China Science and Technology Resource Sharing Network

*China Scientific Data*

ChinaXiv

China Science and Technology Paper Online ([Sciencepaper online](#))

Chinese Academy of Engineering

Chinese Academy of Medical Sciences Biomedical Scientific Papers Preprint System ([biomedrxiv](#))

Chinese Academy of Sciences ([CAS](#))

Chinese Academy of Social Sciences

*Chinese Journal of Electronics*

*Chinese Journal of Plant Ecology*

Chinese Medical Association ([CMA](#))

Chinese Medical Association Publishing House Co., Ltd

[Chinese Medical Doctor Association](#)

[Chinese Open Research Cloud \(CORC\)](#)

[Chinese Physics B](#)

[Chinese Preventive Medicine Association](#)

[Chinese Society of Biotechnology](#)

[CHORUS](#)

[CIESC Journal](#)

[CLOCKSS](#)

[CNKI](#)

[Copyright Clearance Center \(CCC\)](#)

[Commission on Preservation and Access](#)

[Committee on Publication Ethics \(COPE\)](#)

[Confederation of China Academic Institutional Repository \(CHAIR\)](#)

[CrossCheck](#)

[CrossRef](#)

[Cultural Anthropology](#)

## **D**

[DataCite](#)

[Data Intelligence](#)

[Directory of Open Access Journals \(DOAJ\)](#)

## **E**

[EcoMat](#)

[Ecosystem Health and Sustainability](#)

[Editage](#)

[EDP Sciences](#)

[Elsevier](#)

[Enago](#)

[Energy Conversion and Economics](#)

[European Economic Review](#)

## **F**

[14th Five-Year Plan](#)

[F1000](#)

[French National Centre for Scientific Research \(CNRS\)](#)

[Figshare](#)

[Fundamental Research](#)

## **G**

[Global Science Press](#)

[GoOA](#)

## H

[High Voltage](#)

[Horizon Europe](#)

[Horticulture Research](#)

[How Can I Share It](#)

## I

[IEEE](#)

[Infectious Diseases of Poverty](#)

[InfoMat](#)

[Institute of Medical Information](#)

[Institute of Rock and Soil Mechanics, CAS](#)

[Institute of Scientific and Technological Information of China \(ISTIC\)](#)

[Institute of Psychology, CAS](#)

[Institution of Engineering and Technology \(IET\)](#)

[Institute of Vertebrate Paleontology and Paleoanthropology, CAS](#)

[International Academy of Sciences \(IAP\)](#)

[International Association of Scientific, Technical, and Medical Publishers \(STM\)](#)

[International Journal of Digital Earth](#)

[International Network for the Availability of Scientific Publication \(INASP\)](#)

[International Research Center of Big Data for Sustainable Development Goals \(CBAS\)](#)

[International Science Council](#)

[International Society for Digital Earth \(ISDE\)](#)

[Internet Archive](#)

[IOP Publishing](#)

[ISSN International Centre](#)

[ISSN International Centre's KEEPERS registry](#)

## J

[JASPER](#)

[Journal of China Coal Society](#)

[Journal of Global Change Data & Discovery](#)

[The Journal of North Western Polytechnical University](#)

[Journal of Plant Nutrition and Fertilizer](#)

[J-STAGE](#)

[Jxiv](#)

## K

[Knowledge Unlatched](#)

[Kudos](#)

## **L**

[Latin American and Caribbean Center on Health Sciences Information \(BIREME\)](#)

[League of European Research Universities \(LERU\)](#)

[LOCKSS](#)

## **M**

[Max Planck Institute](#)

[Maverick Publishing Specialists](#)

[MedKnow](#)

[Microbiology Society \(MS\)](#)

## **N**

[National Council for Scientific and Technological Development \(CNPq\)](#)

[National Press and Publication Administration](#)

[National Science and Technology Library \(NSTL\)](#)

[National Science Library of the Chinese Academy of Sciences \(NSLC\)](#)

[National Science Review](#)

[National Social Sciences Database \(NSSD\)](#)

[National Natural Science Foundation of China \(NSFC\)](#)

[NISO](#)

[NursRxiv](#)

## **O**

[Oable](#)

[OCLC](#)

[Office of the Chief Scientist \(OCS\)](#)

[Open Access Licensing - Making Open Access Licensing Work](#)

[OpenDOAR](#)

[Open Library of the Humanities \(OLH\)](#)

[Open Repository of National Natural Science Foundation of China \(NSFC-OR\)](#)

[Open Research Europe \(ORE\)](#)

[Oxford University Press](#)

## **P**

[PANGEA](#)

[PeerJ](#)

[Peer Review Terminology Project](#)

[Peking University](#)

[Plan S](#)

[PLOS](#)



[PLOS Biology](#)

[PLOS Medicine](#)

[PLOS ONE](#)

[Principles of Transparency and Best Practice in Scholarly Publishing](#)

[Projekt DEAL](#)

[Public Knowledge Project Preservation Network \(PKP-PN\)](#)

## **R**

[Research4Life](#)

[Research Libraries Group \(RLG\)](#)

[Retraction Watch](#)

[RightsLink \(CCC\)](#)

[Royal Society](#)

[Royal Society of Chemistry \(RSC\)](#)

## **S**

[S20 Community of Practice](#)

[SAGE Open](#)

[São Paulo Research Foundation \(FAPESP\)](#)

[Scholix](#)

[Science Advances](#)

[Sciencepaper Online](#)

[Sciendo \(De Gruyter Open\)](#)

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