

**Jadranka Stojanovski<sup>1\*</sup>, Nedjeljko Frančula<sup>2</sup>, Miljenko Lapaine<sup>3</sup>**

<sup>1</sup> University of Zadar, M. Pavlinovica bb, 23000 Zadar, Croatia.

e-mail: jstojanovski@unizd.hr; Ruper Bošković Institute, Bijenička c. 54, 10000 Zagreb, Croatia. e-mail: jadranka.stojanovski@irb.hr

**\* Corresponding author**

<sup>2</sup> Faculty of Geodesy, University of Zagreb, Kačićeva 26, 10000 Zagreb, Croatia.

E-mail: nfrancul@geof.hr

<sup>3</sup> Faculty of Geodesy, University of Zagreb, Kačićeva 26, 10000 Zagreb, Croatia.

E-mail: mlapaine@geof.hr

# INDEXING OF MAPPING SCIENCE JOURNALS

**ABSTRACT.** Bibliometric analyses based on citations are most often at the forefront where scientific publications are concerned. A fact often neglected is that the visibility and availability of scientific publications are basic prerequisites for future reading, citation and influence. Journal visibility can be significantly improved by providing open access and availability through popular online databases. In this study, we investigated 112 mapping science journals to determine the visibility of scientific publications in a smaller interdisciplinary field. In addition to other data, we collected data on open access, indexing, subject areas within the *Web of Science* and *Scopus* bibliographic databases and the number of journals in these databases. The coverage of mapping science journals in 14 bibliographic databases was analyzed. Only 11% of the titles from the journals analyzed were indexed in 10 or more databases. *Google Scholar*, *Scopus*, *Bibliotheca Cartographica* and *GEOBASE* include most mapping science journals, while only 19 are included in *Web of Science*. A comparison indicates more thorough coverage of an individual journal in *Web of Science* than in *Scopus*. Only a few mapping science journals appear in the *Directory of Open Access Journals*, despite the large number of open access mapping science journals available. Adding subject categories within databases does not facilitate finding mapping science journals, which are dispersed among numerous, mostly inadequate categories in the *Web of Science* and *Scopus* databases.

**KEYWORDS:** indexing, mapping science, scientific publication, bibliographic database

## INTRODUCTION

Scientific publishing, especially periodical publishing, has been extremely dynamic ever since it began. Journals are the most numerous representatives, varying in the characteristics such as frequency of publication, number of years of issue, editorial policy, types and number of published papers, scope of discipline, peer-review process and popularity. Efforts to estimate the number of currently active journals have been the subject of several published papers. The number of journals published increased slowly at first, and there were only

10 scientific journals being published in the mid 18th century [Hook, 1999]. De Solla Price estimated that 100,000 journals would be published between 1665 and 2000 [de Solla Price, 1961]. The central ISSN office in Paris registered 1,749,971 periodicals up to 2013, but it is difficult to ascertain how many of them are still active. Using *Ulrich's Periodical Directory* and applying Bradford's law to Thomson Reuters citation databases, Mabe estimated the total number of active reviewed journals at 15,000–16,000 [Mabe, 2003]. By applying similar methodology in their study [Björk, Roos, & Lauri, 2008], the authors arrived at the figures of 23,750 for

active peer-reviewed journals, and 1,350,000 papers published in 2006. Larsen and von Ins compared various research results with their own data collected from analyzing journal growth in various index publications, and estimated the number of active reviewed journals at 24,000. At the same time, they concluded journal growth varies significantly from one field to another and that there has been an increase in other communication channels for publishing papers, such as conference proceedings, open archives and personal websites [Larsen & von Ins, 2010]. The most popular journal register, the aforementioned *Ulrich's Periodical Directory*, currently includes more than 335,000 journals (published by more than 90,000 publishers), of which 28,135 were active, reviewed journals in August 2012 [Harnad, 2012].

The increase in the number of scientific journals has made it difficult for scientists to navigate all this information. By the mid 19th century, the volume of information published meant it was impossible to keep up with everything written [Jones, Huggett, & Kamalski, 2011]. This phenomenon spurred the development of index and abstract publications, which condensed information about the large number of published papers. In the past 60 years, computer technology has ensured the rapid development of these publications in digital form, and online databases available online have become an indispensable source of published papers. Nowadays, online databases vary in volume and the range of information provided (bibliographic, full text, citation), data type (text, numeric, multimedia, etc.), the content included (journals, conference proceedings, books, book chapters, dissertations, etc.), the subjects they cover (thematic, multidisciplinary), the extent of the content index (selective, cover-to-cover), and level of access (subscription, open access). The line between various types of index publications, which was clear in the printed age, is becoming increasingly blurred. Hyperlinks have enabled index publications to become a part of the global dynamic and viral information space.

Studies about information behavior are providing evidence of constant changes in the way scientists obtain the information they need [Bates, 2010], while bibliographic indexing and bibliographic databases are powerful tools that enable the organization of, and navigation through, the huge quantity of scientific research published [Jones et al., 2011]. Longitudinal studies of scientists' reading habits showed they depended exclusively on printed index and abstract publications in printed form, tables of contents (TOC) and other information systems in 1977. In contrast, in 2005, most scientists (93%) were using "electronic sources", 63% were referring to index and abstract publications in printed form and available online, while 14% were using web search engines such as Google, Yahoo, and others [Tenopir, King, Edwards, & Wu, 2009].

Some bibliographic databases, especially those with a long history, or maintained by prestigious institutions, enjoy a high reputation among the scientific community, so the selection criteria for including journals are generally accepted and taken to indicate the quality journals and published papers. Indexing in popular and reputable bibliographic and citation databases, and citation frequency, are currently important indicators of the visibility and impact of journals. The field of the earth sciences, including geodesy, and the field of geography, including cartography, has changed dramatically over the last two decades, and new disciplines have appeared, influenced by computer technology implementation, showing a high level of interdisciplinarity. "The goal of Modern Geodesy is nothing less than to monitor changes in a range of physical processes in the solid earth, the atmosphere, and the oceans in order to improve our understanding of this fragile, precious and stressed planet" [Rizos, 2011]. Because of the complexity of the emerging terminology in this area, for the purpose of this research, the term "mapping science" will be used, which includes surveying, geodesy, cartography, spatial data infrastructures, cadastre, photogrammetry and remote

sensing. In mapping science, journals are still the main channel of scientific communication, distributed across various, changing disciplines and often difficult to identify and read.

In an attempt to define the body of mapping, we selected one hundred active science journals publishing the majority of papers in this field. The publishers of selected mapping science journals are in about 30 countries, primarily Germany, the United States, and Poland. Half the journals are published in English, the official langue of scientific communication, while less than half are available in open access (OA), which ensures free access and the potential use of published research results [Frančula, Stojanovski & Lapaine, 2012]. The specific characteristics of mapping science journals provided the main motivation for continuing research in this topic, and the research questions in this paper included the following. What is the visibility of mapping science journals based on their indexing in the corresponding thematic, most consulted, multidisciplinary bibliographic databases? How do open access journals affect the visibility of the materials published? How are mapping science journals classified within multidisciplinary databases? Is mapping science journal classification aligned with journal scope, and does it contribute to journal visibility? According to our sources, no research papers have been published analyzing mapping science journals in such a comprehensive way.

## RESEARCH SCOPE

Although more than two-thirds of searches conducted by search engines are done using Google [OCLC, 2010], where scientific publications are concerned, the main source of information is still bibliographic databases produced by various expert associations and commercial companies [Tenopir et al., 2009]. Most scientific publications are papers published in journals, and the criteria for their inclusion vary from one database to another. Most producers of bibliographic databases

require basic editorial standards, such as timeliness, international editorial boards, international authors, and so on [Roales-Nieto & O'Neill, 2012], while some databases are concerned with relevance to the field, journal citations, the reputation of the members of the editorial board or authors, and so on. Some database producers include all the published papers in a selected journal ("cover-to-cover"), while others select papers or types of papers based on the discipline covered by the database, frequently limiting the selection to original scientific and review papers.

Inclusion in subject and multidisciplinary databases is certainly an important factor contributing to journal visibility, because researchers rarely visit only one journal's website. Depending on the discipline, researchers focus on databases that cover their particular areas of interest well, or multidisciplinary databases that include tens of thousands of journals by several thousands of publishers. All researchers aim to find the simplest, fastest way to get an overview of all papers published in their field, and typically want to be able to filter content according to a variety of criteria, most often qualitative. Furthermore, researchers consider the criteria applied by database producers in selecting journals ensure the quality of the content. Therefore, it is important for a journal to be included in as many subject and multidisciplinary databases as possible, in order to improve usage and increase visibility, along with potential citations and journal impact. When selecting a journal in which to publish their papers, researchers also consider the journal's reputation, especially regarding tenure and promotion decisions [Caron, Roche, Goyer, & Jatou, 2008]. In many academic communities, the quality of papers written by a researcher or employee is evaluated according to the estimated quality of journals in which they are published, and journal indexing and citation in particular databases is considered a significant journal quality criterion.

In spite of the rapid development of mapping science and the relevance of these

issues to all scientists, not much research has been published in this field. One of the most recent papers addresses identifying and evaluating the *GI Science* journal by applying the Delphi method [Caron et al., 2008]. An overview of some cartography and GIS journals in English was compiled by David Y. Allen, specifically concerning open-access trends and the historical development of some cartographic journals [Allen, 2005].

## METHODOLOGY

In a previous study [Frančula et al., 2012], we considered mapping science journals to be those that are active, have an International Standard Serial Number (ISSN), and include content covering at least one branch of mapping science, based on the official classification of scientific areas, fields, and branches [“Croatian ordinance on scientific and artistic areas, fields and branches,” 2009], which places mapping science within the technical sciences and includes the following branches: cartography, photogrammetry and remote sensing, maritime, satellite and physical geodesy, applied geodesy and geomatics. All mapping science journals that did not publish any issues in 2011 and 2012 were considered inactive and were excluded from the body of mapping science journals. Using this methodology, 105 mapping science journals were selected. To make the list of journals more accurate, for the purposes of this research, seven additional mapping science journals were added that did not satisfy the criteria defined in the previous research or that were unavailable at the time. These included *Studies in Surveying and Mapping Science* (first issue published in 2013), *Revista Cartographica* (previously considered inactive), *Geomatika* = *Geomatics*, *Vestnik Sibirskoj gosudarstvennoj geodezičeskoj akademii* (*Vestnik SGA*), *Geomatics and Information Sciences of Wuhan University* (previously considered inactive), *Geprofi* (previously did not have an ISSN) and the Chinese *Journal of Geomatics* (data previously unavailable). This brought the total number of mapping science journals to 112.

To begin with, the inclusion of the selected journals in well-known subject databases in this field was checked (*GEOPHOKA*, *Bibliographia Cartographica* and *VINITI*). Next, we checked journal indexing using the *Dialog Classic* interface, which enabled access to several hundred databases by searching the “Journal” field. According to the number of papers found for the body of mapping science journals, we selected the most relevant subject databases (*GEOBASE*, *GeoRef*, *Inspec*, *Ei Compendex*, *Cambridge Scientific Abstracts* (*CSA*), and *PASCAL*). Indexing in the *Directory of Open Access Journals* (*DOAJ*) was registered, and based on our previous research, we identified a large number of mapping science journals whose content was provided in open access. Journal lists of relevant databases were consulted to register possible discrepancies in journal titles. Finally, we checked the presence of each journal in the three most popular multidisciplinary databases, *Scopus*, *Web of Science* (*WoS*) and *Google Scholar* (*GS*), and recorded the number of papers. We searched by “Source Title” in *Scopus*, by “Publication Name” in *WoS*, and by “Return articles published in” in an advanced search of *GS*. Categories of data for individual journals were taken from *Scopus* (*Subject Area*) and *WoS* (*Web of Science Categories*). The *Current Contents* database was included in the research due to its popularity in the Croatian research community, as some disciplines consider journals indexed by *Current Contents* better than those indexed in *WoS*, because they are subject to more rigorous criteria set by the Thomson Reuters editorial board. The data concerning indexing were not taken directly from the journal’s description, because they often proved outdated or incorrect, including cooperative library catalogues, tools for distributed searching and other irrelevant data.

For each journal, we recorded its title, ISSN, publisher, country of publication, open access (OA) status and indexing data (Appendix 1). Data on language, the scientific fields covered by the journal (*journal scope*), its subject area within *Scopus*, and *WoS* and

the number of papers in *Scopus*, *WoS*, and *GS* were also collected for each journal and included in the analysis. Data were collected from 1 April to 20 July 2013.

The limitations of this research primarily concerned the inability to search *GS* accurately. Although *GS Advanced search* enables searching by journal title, it is not possible to search by ISSN and consult the list of journal titles in *GS*, which made it impossible to obtain results for journals with the same titles (the Polish and Lithuanian journals *Geodesy and Cartography* and the Indian and Chinese publications *Journal of Geomatics*). We managed to identify the Lithuanian journal in *GS* by its previous title *Geodezija ir kartografija*. The journals *Globe* and *Coordinates* were impossible to identify by searching a huge number of publications with “globe” or “coordinates” in their titles. While searching, issues arose with journal titles including special characters, and were addressed by conducting multiple searches. We also detected transliterations of non-English journals titles, and obsolescence of key data such as journal title, publisher, and ISSN in certain databases. Most databases do not contain functional data on changes in journal titles, which would provide unifying data for journals that have changed their titles. As a result, we used the journals’ current titles.

## INDEX PUBLICATIONS FOR THE FIELD OF MAPPING SCIENCE

The relevant index publications for the field of mapping science are primarily subject-specific databases, which cover this particular subject very well. They also include discipline-specific databases which include disciplines associated with mapping science, as well as general interest databases, which include all scientific areas.

**GEOPHOKA** (*GEOdäsie*, *PHOtogrammetrie*, *KArtographie*) is a bibliographic database which records papers from all fields of mapping science. It can be found at the German Federal Agency for Cartography and

Geodesy website (*Bundesamt für Kartographie und Geodäsie*), and has been produced since 1984. It contains bibliographic data for approximately 65,000 papers, of which only 100 were published in 2013. Comparing this with the predicted increase of 1,300 records per year could indicate the database is obsolescent. According to the list of publications, *GEOPHOKA* indexes 92 publications, including 48 mapping science journals.

In 1957, the German Cartographic Society launched the bibliographic publication *Bibliotheca Cartographica*, which has been published since 1974 as *Bibliographia Cartographica*, and its editorial board is linked to the *Staatbibliothek zu Berlin-Preussischer Kulturbesitz*. It used to be published once a year with 2,000–4,000 recorded papers. The online version has been available since 2007 and contains bibliographic data taken from journals published since 1989, while older papers can only be found in printed copies. *Bibliographia Cartographica* online contains bibliographic data for about 29,000 papers from journals and conference proceedings, and about 5,400 monographs. Around 80 international journals are regularly indexed, recording only selected papers associated with cartography, including 59 mapping science journals.

**GEOBASE** (Elsevier) is a multidisciplinary database which indexes about 2,000 international serial publications covering current research focused on developmental research, geoscience, ecology, geomechanics, physical geography, demogeography and oceanography. *GEOBASE* contains about 2.1 million bibliographic entries, ranging from 1973 to the present day. Its particular characteristic is good coverage of literature in languages other than English, and other types of publications, such as books, proceedings and reports.

**GeoRef** is produced by the American Geosciences Institute, and includes 3.4 million entries dating from 1933 to the present day. *GeoRef* is a bibliographic database focused

on geosciences: areal geology, economic geology, engineering geology, environmental geology, extraterrestrial geology, geochemistry, geochronology, geophysics, hydrogeology and hydrology, marine geology and oceanography, mathematical geology, mineralogy and crystallography, paleontology, petrology, seismology, stratigraphy, structural geology, and surficial geology. GeoRef includes all the publications of the U.S. Geological Survey, papers from 3,500 journals in 40 languages, and books, maps and reports. The *GeoRef* indexing policy is selective, including only papers associated with geology and related sciences.

*Inspec* is produced by the Institution of Engineering and Technology (IET) and includes more than 13 million entries associated with physics, astronomy, electrical engineering, electronics and computer science. Papers for this database are selected from 5,000 journals, 1,600 of which are indexed cover to cover, and 2,500 conference proceedings, books, reports, dissertations, etc.

*Ei Compendex* (Elsevier) is focused on engineering and related fields, and it includes 5,600 journals and 2,500 proceedings. More than 15 million entries range from 1970 to 2013, and the publications included come from more than 64 countries.

CSA databases, which used to be known as *Cambridge Scientific Abstracts* and *CSA Illustrata*, have been owned by ProQuest and available via *CSA Illumina* and other interfaces since 2007. CSA includes a set of databases, and we found mapping science journals in *Advanced Technologies Database with Aerospace, Aqualine, Aquatic Science & Fisheries Abstracts (ASFA), Ceramic Abstracts, Earthquake Engineering Abstracts, Environmental Engineering Abstracts, Mechanical & Transportation Engineering Abstracts, Meteorological & Geostrophysical Abstracts, Oceanic Abstracts, Pollution Abstracts* and *Water Resources Abstracts*.

*PASCAL* covers the core scientific literature in science, technology and medicine and has a special emphasis on European publications. It contains more than 17 million entries from 1973 to 2013, from 3,085 international journals, proceedings, dissertations, books, patents, etc. *PASCAL* is produced by the *Institut de l'Information Scientifique et Technique* of the *Centre National de la Recherche Scientifique* (INIST-CNRS).

*VINITI* is produced by the Russian Academy of Science and primarily covers natural and technical sciences. *VINITI* is the largest Russian database and has a long history, including more than 25 million documents from 1952 to 2013, from more than 100 countries, written in 60 languages. *VINITI* is the abbreviated name of the "All Russian Institute for Scientific and Technical Information". The database is especially valuable because of its unique content, which includes so-called "grey literature" – proceedings, technical reports, etc. *VINITI* is an open access (OA) database available to the global research community.

*Scopus* (Elsevier) is currently one of the largest bibliographic and citation databases, established in 2004, and includes bibliographic descriptions of papers dating back to 1823, while citations are recorded from 1996. According to the comprehensive available list of included journals, *Scopus* indexes more than 31,000 publications, including about 21,000 active journals. *Scopus* employs a special subject classification, which consists of 27 main subject areas and 307 subject categories. *Scopus's* classification has five general categories, "General" and four branch categories [Guerrero-Bote & Moya-Anegón, 2012]:

- *Life Sciences* (3,950 journals): *Agricultural and Biological Sciences; Biochemistry, Genetics and Molecular Biology; Immunology and Microbiology; Neuroscience, Pharmacology, Toxicology and Pharmaceutics.*
- *Physical Sciences* (6,350 journals): *Chemical Engineering; Chemistry; Computer Science;*

*Earth and Planetary Science; Energy; Engineering; Environmental Science; Materials Science; Mathematics; Physics and Astronomy.*

- *Social Sciences (5,900 journals): Arts and Humanities; Business, Management and Accounting; Decision Sciences; Economics, Econometrics and Finance; Psychology; Social Sciences.*
- *Health Sciences (6,200 journals): Medicine; Nursing; Veterinary; Dentistry; Health Professions.*

**Web of Science (WoS)** includes three citation indexes: *Science Citation Index Expanded*, *Social Science Citation Index* and *Arts and Humanities Citation Index*, and is published by Thomson Reuters. Nowadays, it includes about 12,500 journals from all fields of science, although biomedicine and natural sciences are represented better, as are journals from North America. Citation has been recorded since 1955, which gives it an advantage over other citation databases. *Web of Science* employs own subject classification which includes five general areas:

- *Life Sciences & Biomedicine*
- *Physical Sciences*
- *Technology*
- *Arts & Humanities*
- *Social Sciences.*

These top five areas branch out into 250 disciplines.

**Current Contents (CC)** produced by Thomson Reuters was well known in its weekly printed version published by the Institute of Scientific Information (ISI), featuring the latest information on papers from the most prominent journals. It has lost popularity in the digital age (integrated with WoS), but it is still very popular in Croatia, due to its more rigorous selectiveness, and is

considered to include the most relevant scholarly journals from all scientific fields. The database currently includes about 9,500 journals, all of which are also included in the WoS database.

The Beta version of **Google Scholar (GS)** was launched in 2004, offering free, multidisciplinary access to scientific information, and one of its authors said, "I would like Google Scholar to be a place that you can go to find all scholarly literature – across all areas, all languages, all the way back in time". [An interview with Anurag Acharya, Google Scholar lead engineer, 2006]. GS includes various publications, such as journal papers, dissertations, books, proceedings, preprints, abstracts and technical reports from all disciplines. The greatest objection to GS is the lack of transparency concerning editorial policies, which means its harvest is unknown, but it is clear that GS includes an increasing amount of content by commercial publishers and database producers, e.g. ACM Portal, Taylor & Francis, Springer, Cambridge, Wiley, Blackwell, American Chemical Society (ACS), Oxford University, Sage, Emerald, Nature Publishing, Association for Computing Machinery, IEEE, American Institute of Physics, Royal Society of Chemistry, University of Chicago, ERIC, JSTOR, Project MUSE, BioMed Central, Proceedings of the National Academy of Sciences, American Medical Association, Public Library of Science [Chen, 2010; Walters, 2007; White, 2006] and many others, including well established open access (OA) models for communicating research results, such as arXiv.org [Bernius, 2013], SciELO [Packer, 2009] and the Croatian Portal of Open Access Scientific Journals HRCAK [Stojanovski, Petrak, & Macan, 2009]. GS also tracks citations of included papers and has gradually been able to compete with commercial citation databases such as *Scopus* and WoS. Algorithms for removing duplicates are very efficient, so one of the most valuable aspects of GS is the ability to view and access a particular paper via various fee and free repositories, archives and databases. Search options are very limited, as

are the possibilities of using search results, which cannot easily be sorted or stored in any standard bibliographic formats. Although a more detailed bibliographic record and improved searching would be desirable, its simplicity satisfies the requirements of most users.

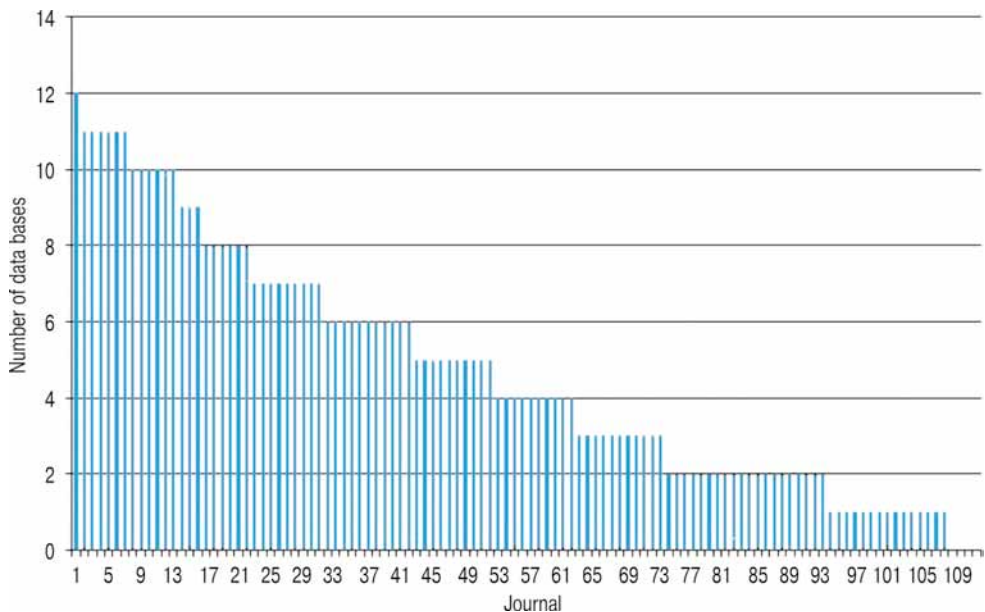
## RESULTS AND DISCUSSION

### *Indexing of mapping science journals in 14 databases*

According to our data, one mapping science journal is indexed in 12 of the 14 databases analyzed (*Photogrammetric Engineering and Remote Sensing*), six are included in 11 databases (*Acta Geodaetica et Geophysica*, *Cartographic Journal*, *Journal of Geodesy*, *Journal of Surveying Engineering*, *Photogrammetric Record* and *Studia Geophysica et Geodaetica*), six are included in 10 databases (*Geodetski list*, *Geodetski vestnik*, *Geoinformatica*, *Geomatica*, *ISPRS Journal of Photogrammetry and Remote Sensing* and *Survey Review*), 18 are included in nine to seven databases, 21 are included in six or five databases, and 56 are included in four to one databases. Only four of the 112 journals

were not included in any of the databases analyzed (Fig. 1).

The majority of mapping science journals (94) are included in *GS* (Table 1). Although *GS* has been criticized for its non-transparent policy, insufficient volume and structure of bibliographic entries, poor search quality, issues with diacritical signs [Harzing, 2010], overblown results, incomplete journal content, inability to identify authors and citations, inclusion of “dubious” material without scientific value, and the presence of “bibliographic absurdities” due to poor interpretation of metadata [Jacsó, 2005], this comprehensive database contains valuable information, is easy to use and its content can compete with that of many subscription-based information services [Chen, 2010; Clermont & Dyckhoff, 2012; Delgado-López-Cózar & Cabezas-Clavijo, 2013; Mayr & Walter, 2008; Meier & Conkling, 2008], so it provides a good insight into mapping science. In some cases, journal titles appear mismatched, and the list of journals included is not available with ISSN, which makes it impossible to distinguish journals with the same name. In addition, it makes it more difficult to search shorter



**Fig. 1. Representation of mapping science journals in 14 bibliographic databases analyzed.**



**Table 1. Distribution of mapping science journals according to bibliographic databases**

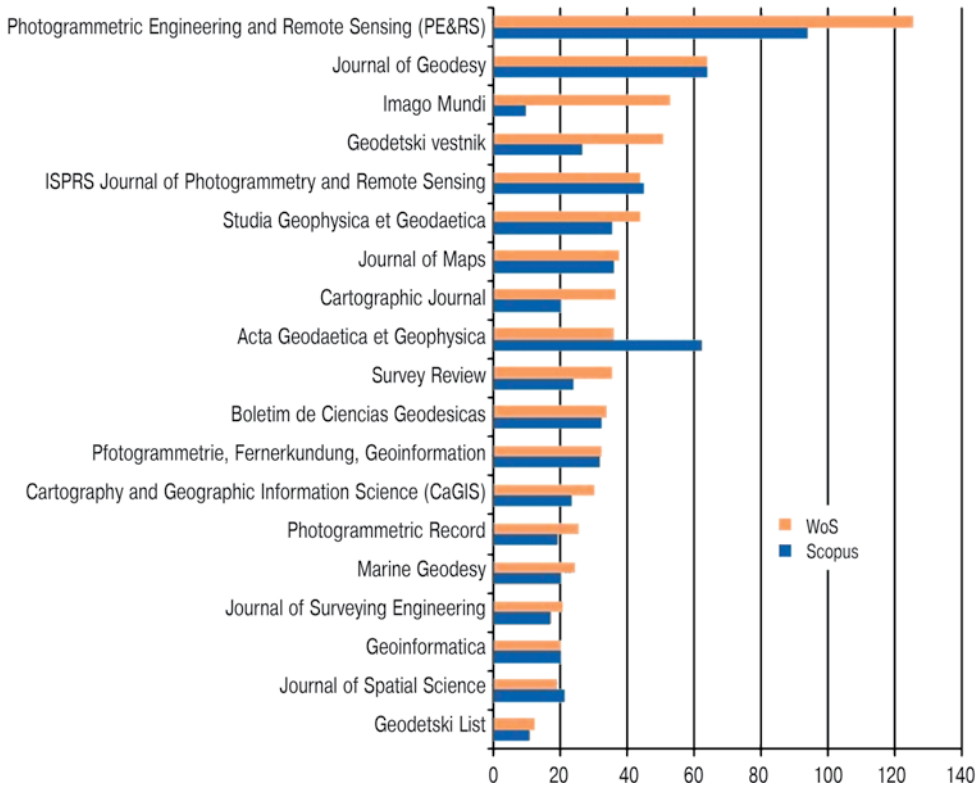
Database	# of journals	Database	# of journals
GS	94	CSA	30
Scopus	59	PASCAL	19
BC	59	WoS	19
GEOBASE	52	Inspec	16
GEOPHOKA	48	Compendex	13
GeoRef	48	CC	13
VINITI	42		

journal titles which may be a part of longer journal titles, especially with frequently used words. Although we attempted to detect such cases, the numbers of papers found in GS should be accepted with reserve.

The journals *Photogrammetric Engineering and Remote Sensing* (2,620 papers) and *Studia Geophysica et Geodaetica* (2,540 papers) are the most represented in GS, while as many as 25 journals are represented by fewer than

10 papers (Fig. 2), and we were unable to find any information for six journals, as their titles were too short or generic. GS includes a total of 30,386 papers from mapping science journals, with the average journal represented by 323 papers.

Scopus has better coverage of individual journals, indexing 57 mapping science journals, with *Photogrammetric Engineering and Remote Sensing* (3,664), *Geomatics and*

**Fig. 2. Average number of papers per year in WoS and Scopus databases.**

*Information Science of Wuhan University* (3,382) and *Studia Geophysica et Geodaetica* (2,026) the most represented. Three journals are represented by an exceptionally low number of papers in *Scopus*: *Nachrichten der Niedersächsischen Vermessungs- und Katasterverwaltung* (1), *Polski Przegląd Kartograficzny* (3) and *Geodezija i kartografija* (5). Mapping science journals are represented in *Scopus* by a total of 31,628 papers, meaning the average journal is represented by 555 papers.

WoS indexes only 19 mapping science journals, with *Photogrammetric Engineering and Remote Sensing* (5,253) and *Studia Geophysica et Geodaetica* (2,129) the most represented. The least represented journals have over 100 indexed papers, so we can conclude the database's coverage is more comprehensive. WoS contains the fewest papers from mapping science journals (15,204), but it includes an average of 800 papers per journal, which is more than *GS* and *Scopus*.

In subject databases, most mapping science journals are included by subject-specific and discipline-specific bibliographic databases like *Bibliographia Cartographica* (59), *GEOBASE* (52), *GEOPHOKA* (48), *GeoRef* (48) and *VINITI* (42). About ten *Cambridge Scientific Abstracts* (CSA) databases include 30 mapping science journals, *PASCAL* 19, *Inspec* 17, and *Compendex* 13 (Table 1). Considering the out of date of some subject-specific databases (*Bibliographia Cartographica*, *GEOPHOKA*), it is clear that multidisciplinary databases are better at covering mapping science where newer publications are considered, and *GEOBASE* is the subject database which best covers mapping science.

### **Coverage and language comparison between Scopus and WoS**

If we compare the year ranges and numbers of papers for the 19 journals indexed by *Scopus* and *WoS*, it can be seen that *Scopus* indexes a total of 447 years (14,715 papers), and *WoS* 328 years (15,204 papers). Although coverage in *WoS* is more equable in terms of time spans and existing indexing breaks

(Table 2), it was somewhat surprising to discover that *WoS* coverage was not significantly better, considering *Scopus* is a relatively new database, only launched in November 2004.

Research into *Scopus* coverage indicates gaps in the cases of certain journals. Even though the editorial board has been working on this issue for some time [Meho, 2009], the problem is still present. Regardless of the longer time spans in *Scopus*, the total number of indexed papers is greater in *WoS*, as is the average number of papers per year for individual journals (Fig. 2). If we look in more detail at four journals indexed in the same time period in both databases, *Journal of Surveying Engineering* (1983–2013), *Journal of Maps* (2005–2013), *ISPRS Journal of Photogrammetry and Remote Sensing* (1989–2013) and *Journal of Geodesy* (1995–2013), we can see that only one, *ISPRS Journal of Photogrammetry and Remote Sensing* has a slightly higher number of papers in *Scopus* than in *WoS*. Regarding all the mapping science journals included in both databases, *Scopus* has a significantly better coverage only for *Acta Geodaetica et Geophysica*. Although the numbers are slightly in favor of *WoS*, considering *WoS* as a product with a long, detailed history (we used the *WoS* time span covering 1955 to present), we expected much better coverage from this database.

Another 40 *Scopus* journals are covered in the range from 3,382 papers (for *Geomatics and Information Science of Wuhan University*) to one (for *Nachrichten der Niedersächsischen Vermessungs- und Katasterverwaltung*). In addition, ten mapping science journals were identified in *Scopus* which are currently considered inactive, presumably due to irregular publication and/or poor citations (years of journals with data in *Scopus* are in parentheses): *AVG – Allgemeine Vermessungs-Nachrichten* (1979–1980, 1988–1994), *ACSM Bulletin* (1989–1996), *Caert Thresoor* (1982–1991), *Geodeticky a kartograficky obzor* (1978–1980, 1982–1989), *Geodezia es Kartografia* (1979–1981, 1988–1989, 1991–1992, 1995–2007), *Geodezija i Kartografija* (1979), *Kart og*

Table 2. Mapping science journals coverage in *Scopus* and *WoS* databases

Journal	<i>Scopus</i> year range	<i>Scopus</i> # years	<i>Scopus</i> # papers	<i>WoS</i> year range	<i>WoS</i> # years	<i>WoS</i> # papers
Acta Geodaetica et Geophysica	2003–2013	11	681	2007–2013	7	249
Boletim de Ciencias Geodesicas	2005–2013	9	291	2008–2013	6	203
Cartographic Journal	1979–2013	35	701	1988–2013	26	939
Cartography and Geographic Information Science (CaGIS)	1997–2013	17	397	2009–2012	4	121
Geodetski list	1979–1983, 1985, 2008–2013	12	128	2007–2011	7	86
Geodetski vestnik	1992–2013	22	583	2007–2013	7	355
Geoinformatica	1997–2013	17	337	2001–2013	13	262
Imago Mundi	1977–1986, 1988–1990, 1994–1997, 2001, 2005–2013	27	253	2009–2012	4	211
ISPRS Journal of Photogrammetry and Remote Sensing	1989–2013	25	1114	1989–2013	25	1099
Journal of Geodesy	1995–2013	19	1207	1995–2013	19	1211
Journal of Maps	2005–2013	9	322	2005–2013	9	336
Journal of Spatial Science	2004–2013	10	211	2007–2013	7	134
Journal of Surveying Engineering	1983–2013	31	528	1983–2013	31	642
Marine Geodesy	1979–1994, 1996–2013	34	676	1980–1989, 2003–2013	21	510
Photogrammetric Engineering and Remote Sensing (PE & RS)	1975–2013	39	3664	1972–2013	42	5253
Photogrammetric Record	1979–2013	35	660	1983–2013	31	779
Photogrammetrie, Fernerkundung, Geoinformation	2009–2013	5	157	2008–2013	6	194
Studia Geophysica et Geodaetica	1957–2013	57	2026	1965–2013	49	2129
Survey Review	1980, 1982–2013	33	779	2000–2013	14	491

Plan (1978–1979, 1982–1989), *Nachrichten der Niedersächsischen Vermessungs- und Katasterverwaltung* (1978), *Photogrammetric Journal of Finland* (1978–1979, 1982, 1984, 1986, 1989–1992), *Polski Przegląd Kartograficzny* (1982) and *Przegląd geodezyjny* (1979–1981).

Among the journals indexed in *WoS*, only three (16%) publish papers in a language other than English (Croatian, Portuguese and Slovenian). *Scopus* indexes 22 (55%) journals which publish papers in a language other than English. Among 53 journals not indexed by *Scopus* and *WoS*, 19 (36%) publish papers in English, and 34 (64%) in other languages – 10 in German, five in French, three in Russian, and 16 in other languages. *WoS* includes only a limited number of mapping science journals in languages other than English,

while more than half the mapping science journals indexed by *Scopus* are not in English.

### Open Access

We had expected to find the majority of open access journals in *GS*, according to earlier research [Neuhaus, Neuhaus, Asher, & Wrede, 2006], and this proved to be correct. Out of 47 open access mapping science journals, 41 can be found in *GS*, which is 44% of the total *GS* mapping science journals. However, deeper probing reveals data less favored by *GS*, e.g. 12 journals are represented by 10 or less papers. To be crawled by *GS*, journal web sites should meet some technical requirements, but many open access journals are not following the *GS* guidelines for publishers. We noticed that the fifth most

represented open access journal, according to the number of papers, was *Cartography and Geoinformation*, whose contents are harvested from the central Croatian scientific journals portal HRCAK, which includes about 340 open access journals at the present. *GS* is harvesting more easily aggregators that host many journals on a single website.

GEOPHOKA includes 19 open access journals (40% of all indexed mapping science journals), Bibliographia Cartographica 22 (37%), CSA 11 (37%), VINITI 13 (31%), Scopus 18 (31%), GEOBASE 15 (29%), GeoRef 13 (27%), El Compendex 3 (23%), WoS 4 (21%), PASCAL 3 (16%), Current Contents 1 (8%), and Inspec 1 (6%) respectively.

We were surprised that only eight of the 47 mapping science journals were registered in the Directory of Open Access Journals (DOAJ). The reason for this probably lies in the criteria for inclusion set by DOAJ; the editorial board and affiliations are listed as well as a detailed review procedure, instructions for authors, a clear, detailed open access policy, requiring at least five papers published each year, access to metadata, full text and references without restrictions, registration with SHERPA/RoMEO, etc. DOAJ and its advisory committee have worked systematically to improve journals' editorial policies. For a number of open access mapping science journals, the lack of vital information on their websites was observed. Very often, an entire volume is available as a single document, instead of individual papers. The way mapping science journals display their content is often according to the printed form, while the digital version is not adapted for online usage and screen reading.

### **Subject classification**

The classification of publications within the subject categories used by various index publications can be objected to on many grounds. The subject categories for *WoS* and *Scopus* were analyzed in detail for the purposes of this research. These two classification schemes are the most popular, especially *WoS*, which is often used in bibliometric

analyses. In addition, subject categories in both *WoS* and *Scopus* are attributed to journals, not papers [Waltman & van Eck, 2012]. Thus, in contrast to databases with more specialized coverage, such as INSPEC, where papers are directly assigned to categories, under the *WoS* or *Scopus* classification model, journals are classified into categories, while papers are assigned to source categories through indirect assignation [Gómez-Núñez, Vargas-Quesada, Moya-Anegón, & Glänzel, 2011]. This is certainly inadequate for interdisciplinary fields [Herranz & Ruiz-Castillo, 2012; Waltman & van Eck, 2012] such as mapping science. In addition, although both the *WoS* and *Scopus* subject classifications include all scientific fields and are similar in volume (250 *WoS*, 307 *Scopus*), they vary significantly by content, so it is frequently impossible to match *WoS* and *Scopus* subject categories.

Categorization analysis according to scientific disciplines indicates that mapping science journals are categorized in *Scopus* and *WoS* databases in different categories. Some journals are categorized in more than one category, which makes finding and comparing them difficult. Since most mapping science journals have data on journal scope, a simple text analysis was conducted which identified the most frequent terms used by editorial boards to described their journals' subject coverage: *geodesy, cartography, surveying, remote sensing, photogrammetry, GIS, mapping, land, geoinformation, spatial, geographic, geodetic, maps, geomatics*, etc., while the most frequent phrases were *remote sensing, geographic information systems, land management, spatial data*, etc. Journal scope was not available for seven mapping science journals.

Both *Scopus* and *WoS* employ their own classification schemes, starting with several general categories which branch out into subcategories. The *WoS* scheme has two, while the *Scopus* scheme has three hierarchical levels. Their production and maintenance is exclusively related to database coverage and is not at all transparent, and thus cannot be compared with classification schemes such as those used by *LCC* (*Library of Congress Classification*) or

MESH (*Medical Subject Headings*), which are produced by expert teams, and for which each term is described in detail, and continuous and systematic work is carried out to introduce new terms and remove obsolete ones. The classification schemes used by WoS and Scopus cannot be matched even at the top level of general categories. *Scopus* employs a hierarchical taxonomy of subject categories which consists of five general categories: *General*, *Physical Sciences*, *Health Sciences*, *Social Sciences* and *Life Sciences*, while *WoS* also employs five general categories: *Life Sciences & Biomedicine*, *Physical Sciences*, *Technology*, *Arts & Humanities* and *Social Sciences*. While there are some similarities among the general categories, there are none among the subcategories. Within the *Physical Sciences* category, used by both databases, *Scopus's* taxonomy contains ten, and *WoS's* twenty scientific disciplines, only two of which overlap: *Chemistry* and *Mathematics*.

The second level of *Scopus's* classification scheme contains 27 scientific disciplines, with mapping science journals categorized in eight of them:

*Physical Sciences*: *Computer Science* (6), *Earth and Planetary Sciences* (53), *Energy* (1), *Engineering* (10), *Environmental Science* (12) and *Physics and Astronomy* (1), and *Social Sciences*: *Business*, *Management and Accounting* (1) and *Social Sciences* (11).

The third level of subject categories in the *Scopus* classification scheme contains 307 categories. The discipline *Earth and Planetary Sciences*, where the greatest number of mapping science journals are categorized, contains 12 categories. Among 53 journals categorized in this discipline, only 30 have a category assigned to them, while others are simply assigned to *Earth and Planetary Sciences (all)* (Table 3). We did not discover the reason why subject categories were overlooked. Even if a journal covered all the fields included in *Earth and Planetary Sciences*, it might simply be labeled as "miscellaneous".

For journals indexed by *Scopus*, the categorization of 16 mapping science journals

**Table 3. Example of distribution of mapping science journals at the third hierarchical level of the *Earth and Planetary Sciences* subject category (*Scopus*)**

Earth and Planetary Sciences (all)	# of journals
<i>Earth and Planetary Sciences</i> (miscellaneous)	7
Atmospheric Science	1
Computers in Earth Sciences	6
Earth-Surface Processes	7
Economic Geology	0
Geochemistry and Petrology	2
Geology	1
Geophysics	4
Geotechnical Engineering and Engineering Geology	0
Oceanography	1
Palaeontology	0
Space and Planetary Science	1
Stratigraphy	0

in the categories *Earth and Planetary Sciences (miscellaneous)* and *Geography, Planning and Development* is justified. However, it is difficult to understand why *Cartography and Geographic Information Science* is categorized under *Business, Management and Accounting: Management of Technology* and not under *Earth and Planetary Sciences (miscellaneous)* and *Social Sciences: Geography, Planning and Development*. Furthermore, the *ISPRS Journal of Photogrammetry and Remote Sensing* is only categorized under *Information Systems*, but not under *Earth and Planetary Sciences (miscellaneous)*. The same is true for *Geodetski vestnik*, which is categorized under *Geography, Planning and Development*, but not under *Earth and Planetary Sciences (miscellaneous)*. It is also unclear why only five mapping science journals are included in *Computers in Earth Sciences*, which should contain most mapping science journals, or why this category containing only 17 journals even exists, since nowadays each subject category should have a "Computers in..." subcategory. All authors publishing papers in *Earth Sciences* journals use computer technology in their research. The usefulness of the category is further undermined by the

fact that it does not include the *Computers & Geosciences* journal, which specializes in applying computers in geosciences.

We found several mapping science journals indexed by *Scopus*, had no subject categories, even at the top level, for unknown reasons: *GIM International*, *International Journal of Geoinformatics* and *Journal of the Korean Society of Surveying Geodesy Photogrammetry and Cartography*.

As with *Scopus*, the *WoS* categorization does not include a mapping science category, so mapping science journals are categorized in 12 different categories, which differ significantly from those in *Scopus*. The categories include: *Engineering, Civil; Geochemistry & Geophysics; Geosciences, Multidisciplinary; Geography; Geography, Physical; Geology; History; History & Philosophy of Science; History of Social Sciences; Imaging Science & Photographic Technology; Oceanography and Remote Sensing*. Groups *Geography, History, History & Philosophy of Science* and *History of Social Sciences* are within *Social Science Edition*, and all other categories are within *Science Edition*. Only the *Journal of Maps* is included in both. Sometimes it is difficult to ascertain why some journals are categorized in those categories, e.g. why *Geodetski vestnik* is assigned to *Geography (Social Science Edition)* and *Geodetski list* to *Remote Sensing (Science Edition)*. Both *Geodetski list* and *Geodetski vestnik* publish papers in all fields of mapping science, so categorizing them within *Geosciences, Multidisciplinary* would make the most sense. Both journals publish approximately the same number of papers about remote sensing, so categorizing them both under *Remote Sensing* would also be logical.

Categorizing all mapping science journals in one comprehensive subject group (e.g. *Mapping science*) would make them more visible. Equalizing *WoS* and *Scopus* classification schemes covering the same number of areas (first level) and subject categories (second level) would be a great advantage for all bibliometric studies [Gómez-Núñez et al., 2011]. Also, assigning subject

categories to papers and not only to journals would help locating mapping science papers.

## CONCLUSIONS AND FUTURE RESEARCH

If the criteria for visibility and ease of locating journals include open access and availability via popular topical and multidisciplinary databases, we can conclude there is a lot of room for improvement when it comes to mapping science journals. The inclusion of journals in topical and multidisciplinary online databases, most of which developed from printed index and abstract publications, is a prerequisite for easy location, but proof of serious, professional editorial work is also required with respect to improving editorial standards. Among the 112 mapping science journals selected, only 28% were indexed in more than half of the databases analyzed, while four journals were not found in. *Google Scholar* included the highest number of mapping science journals (94), while *Scopus*, *Bibliographia Cartographica*, *GEODATA*, *GEOPHOKA*, *GeoRef* and *VINITI* each included about fifty. Other databases included between 30 and 13 mapping science journals.

The journals most represented by numbers of papers in *Google Scholar*, *Scopus* and *Web of Science* were *Photogrammetric Engineering and Remote Sensing*, *Geomatics and Information Science of Wuhan University* and *Studia Geophysica et Geodaetica*. The analysis indicates that *Web of Science* has continuously covered the included journals; *Scopus* has gaps in its coverage, and *Google Scholar* covers many titles (25) insufficiently (fewer than 10 papers).

Among 47 open access mapping science journals, only eight featured in the *Directory of Open Access Journals (DOAJ)*, which may be attributed to the high criteria set by DOAJ. Open access journals were well represented in *GS*, *GEOPHOKA*, *Bibliographia Cartographica*, *CSA*, *VINITI* and *Scopus* (over 30% of all mapping science journals included). A detailed analysis of open access mapping science journals indicated a lack of vital information on their

websites, as well as the strong influence of printed version of journals, manifest in the formats of digital versions of journals which have not been adapted for online use. Regarding journal language, it could be seen that *Scopus* also indexes many journals which publish papers in languages other than English.

Categorizing mapping science journals within the subject categories assigned in citation databases like *WoS* and *Scopus* does not contribute to their visibility. The interdisciplinary nature of mapping science journals results in their dispersion among numerous subject categories in applied classification schemes. A comparison of the subject areas assigned to journals by database indexers with the subject areas which editorial boards communicate to potential authors,

indicates that database administrators should certainly consult *journal scope* when attributing subject areas. In addition, using a unified subject designation such as “mapping science” would facilitate finding mapping science journals. Assigning subject categories at the level of papers could also provide higher visibility for research in this area, as well as enable better bibliometric studies.

Future research will focus on the analysis of metric indicators of the body of mapping science journals, including Journal Impact Factor (JIF), SCImago Journal Rank (SJR), SNIP, Eigenfactor Score, h-index, etc., as well as altmetrics indicators. In addition, mapping science journals will be compared with journals from other disciplines, in order to observe their characteristics and specifics. ■

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Appendix 1. Journals included in the research with corresponding indexing data

Journal title	ISSN	Publisher	Country	OA	DOAJ	GEOB	GeoR	Comp	Insp	PASC	CSA	VINI	GEOP	BC	Scop	WoS	CC	GS
ACSM Bulletin	0747-9417	American Congress on Surveying and Mapping	USA	Yes	0	0	1	0	0	0	0	0	1	0	1	0	0	1
Acta Geodaetica et Cartographica Sinica	1001-1595	Cehui Chubanshe	China	Yes	0	1	0	0	0	0	1	1	1	1	1	0	0	1
Acta Geodaetica et Geophysica	2213-5812	Springer; Akadémiai Kiadó	Hungary	No	0	1	1	1	1	0	1	1	1	1	1	1	0	1
AVN = Allgemeine Vermessungs-Nachrichten	0002-5968	Wichmann-Verlag	Germany	No	0	1	1	0	1	0	1	0	1	1	1	0	0	1
Applied Geomatics	1866-9298	Springer	Germany	No	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Artificial Satellites	0208-841X	Verita	Poland	Yes	0	0	0	1	0	0	1	1	1	0	1	0	0	1
Association of Canadian Map Libraries and Archives Bulletin	0840-9331	Association of Canadian Map Libraries and Archives	Canada	Yes	0	1	1	0	0	0	0	0	0	1	1	0	0	1
Boletim de Ciencias Geodesicas	1413-4853	Universidade Federal do Paraná	Brazil	Yes	1	1	1	0	0	0	1	1	0	0	1	1	0	1
Bollettino della Associazione Italiana di Cartografia	0044-9733	Associazione Italiana di Cartografia	Italy	No	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Bulletin du Comité Français de Cartographie	0755-7647	Comité français de cartographie	France	No	0	0	1	1	0	0	0	0	0	1	0	0	0	1
Bulletin of the Geospatial Information Authority of Japan	2185-3681	The Geospatial Information Authority of Japan (GSI)	Japan	Yes	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Bulletin of the Society Cartographers	1469-5170	Society of Cartographers	Great Britain	No	0	1	1	0	0	0	0	1	0	1	1	0	0	1
Caert Thesoor	0167-4994	Barent Langenes Foundation	The Netherlands	No	0	1	0	0	0	0	0	0	0	1	1	0	0	1
Cartes & géomatique	2119-9825	Comité Français de Cartographie	France	No	0	0	0	0	0	1	0	0	0	1	0	0	0	0

Continue

Journal title	ISSN	Publisher	Country	OA	DOAJ	GEOB	GeoR	Comp	Insp	PASC	CSA	VINI	GEOP	BC	Scop	WoS	CC	GS
Cartographic Journal	0008-7041	Maney Publishing	Great Britain	No	0	1	1	0	0	1	1	1	1	1	1	1	1	1
Cartographic Perspectives	1048-9053	North American Cartographic International Society	USA	Yes	0	1	1	0	0	0	0	1	0	1	1	0	0	1
Cartographica Helvetica	1015-8480	Verlag Cartographica Helvetica	Switzerland	No	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Cartographica: The International Journal for Geographic Information and Geovisualization	0317-7173	University of Toronto Press	Canada	No	0	1	1	0	0	1	0	1	1	1	1	0	0	1
Cartography and Geographic Information Science (CaGIS)	1523-0406	International Cartographic Association (ICA)	USA	No	0	1	1	1	0	0	0	1	0	1	1	1	1	1
Contributions to Geophysics and Geodesy	1335-2806	Versita	Poland	Yes	0	1	1	0	0	0	0	1	0	0	1	0	0	1
Coordinates: A monthly magazine on positioning, navigation and beyond	0973-2136	Centre for Geo-information Technologies (CGIT)	India	Yes	0	0	0	0	0	0	0	0	1	0	0	0	0	1
e-Perimtron	1790-3769	Hellenic National Centre for Maps and Cartographic Heritage	Greece	Yes	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Flächenmanagement und Bodenordnung (FuB)	1616-0991	Chmielorz	Germany	No	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Geo: connexion	1476-8941	GeoConnexion Ltd.	Great Britain	No	0	1	0	0	0	0	0	0	0	0	1	0	0	1
Geo-Info	1572-5464	Geo-informatie Nederland	The Netherlands	Yes	0	1	0	0	0	0	0	0	0	1	1	0	0	1
Geo-spatial Information Science	1009-5020	Wuhan University, Taylor & Francis	China	No	0	1	1	0	1	0	1	1	1	1	1	0	0	1
Geodesy and Cartography	2029-6991	Taylor & Francis Co-Published with Vilnius Gediminas Technical University	Lithuania	No	0	1	0	1	0	0	1	1	1	0	1	0	0	1

Journal title	ISSN	Publisher	Country	OA	DOAJ	GEOB	GeoR	Comp	Insp	PASC	CSA	VINI	GEOP	BC	Scop	WoS	CC	GS
Geodesy and Cartography	2080-6736	Polish Academy of Sciences	Poland	Yes	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Geodetičsky a kartografický obzor	0016-7096	Český úrad zeměměřický a katastrální	Czech	Yes	0	0	0	0	0	0	0	0	1	1	1	0	0	0
Geodetska služba	1451-0561	Republički geodetski zavod Srbije	Serbia	Yes	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Geodetski glasnik	1512-6102	Savez udruženja građana geodetske struke Bosne i Hercegovine	Bosnia and Herzegovina	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geodetski list	0016-710X	Hrvatsko geodetsko društvo	Croatia	Yes	1	1	1	0	0	0	1	1	1	1	1	1	0	1
Geodetski vestnik	0351-0271	Zveza geodetov Slovenije	Slovenia	Yes	1	1	1	0	0	0	1	1	1	1	1	1	0	1
Geodetski Žurnal	1451-2602	Savez geodeta Srbije i Savez geodetskih inženjera i geomatara Srbije	Serbia	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geodezia es Kartografia	0016-7118	Kartografiai Vallalat	Hungary	No	0	1	1	0	0	1	0	1	1	1	1	0	0	1
Geodezija i kartografija	0016-7126	Kartgeocentr – Geodezizdat	Russia	No	0	1	0	0	0	1	0	1	1	1	1	0	0	1
Geoinformatica	1384-6175	Kluwer Academic Publishers	The Netherlands	Yes	0	1	0	1	1	1	1	1	0	0	1	1	1	1
Geoinformatics	1387-0858	CMedia B.V.	The Netherlands	Yes	0	0	1	0	0	0	1	0	1	1	0	0	0	1
Geoinformation issues = Problemy Geoinformacii	1689-6440	Institute of Geodesy and Cartography, Warsaw	Poland	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Geomatica	1195-1036	Canadian Institute of Geomatics	Canada	No	0	1	1	1	0	1	1	1	1	1	1	0	0	1
Geomatics and Environmental Engineering	1898-1135	Akademia Gorniczno-Hutniczej im. Stanisława Staszica w Krakowie	Poland	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Continue

Journal title	ISSN	Publisher	Country	OA	DOAJ	GEOB	Geor	Comp	Insp	PASC	CSA	VINI	GEOP	BC	Scop	WoS	CC	GS
Geomatics and Information Science of Wuhan University	1671-8860	Wuhan University	China	No	0	1	1	0	1	0	0	1	0	1	1	0	0	1
Geomatics Workbooks	1591-092X	Laboratorio di Geomatica – Politecnico di Milano – Polo di Como	Italy	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Geomatik Schweiz = Géomatique Suisse = Geomatica Svizzera	1660-4458	Sigimedia	Switzerland	Yes	0	0	0	0	0	0	0	0	1	1	0	0	0	1
Geomatika = Geomatics	1691-4341	Riga Technical University	Latvia	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Géomatique Expert	1620-4859	CiMax	France	No	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Geprof	2306-8736	Informacionnoe agentstvo GROM	Russia	Yes	0	0	0	0	0	0	0	1	0	0	0	0	0	1
GIM International	1566-9076	Geomares Publishing	The Netherlands	Yes	0	1	1	0	0	0	1	1	1	0	1	0	0	1
GIS-Business	1430-3663	Wichmann Verlag	Germany	No	0	1	0	0	0	0	0	0	1	1	1	0	0	1
Globe	0311-3930	Australian and New Zealand Map Society	Australia	No	0	0	1	0	1	0	0	0	0	1	0	0	0	n.a.
Globe Studies	0436-0664	The International Coronelli Society	Austria	No	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Godišnjak Geodetskog društva Herceg-Bosne	1840-3816	Geodetsko društvo Herceg Bosne	Bosnia and Herzegovina	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Imago Mundi	0308-5694	Taylor & Francis, Routledge	USA	No	0	1	1	0	0	0	0	1	0	1	1	1	1	1
Information Bulletin	0049-7282	Western Association of Map Libraries	USA	No	0	0	1	0	0	0	0	0	0	1	1	0	0	1
International Journal of Geoinformatics	1686-6576	Asian Institute of Technology	Taiyland	No	0	1	1	0	0	0	0	1	0	0	1	0	0	1
ISPRS International Journal of Geo-Information	2220-9964	MDPI AG	Switzerland	Yes	1	0	0	1	0	1	1	0	0	0	0	0	0	1

Journal title	ISSN	Publisher	Country	OA	DOAJ	GEOB	GeoR	Comp	Insp	PASC	CSA	VINI	GEOP	BC	Scop	WoS	CC	GS
ISPRS Journal of Photogrammetry and Remote Sensing	0924-2716	Elsevier	The Netherlands	No	0	1	1	0	1	0	1	1	1	0	1	1	1	1
Izvestija VUZov. Geodezija i aerofotostemka	0536-101X	MILGAIK	Russia	Yes	0	0	1	0	0	0	0	1	1	1	0	0	0	1
Journal of Applied Geodesy	1862-9016	Walter de Gruyter	Germany	No	0	1	0	0	1	0	1	0	1	0	0	0	0	1
Journal of Geodesy	0949-7714	Springer	Germany	No	0	1	1	0	1	1	1	1	1	0	1	1	1	1
Journal of Geodetic Science	2081-9919	Versita	Poland	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Journal of Geomatics	1007-3817	Wuhan University	China	No	0	1	1	0	1	0	1	1	0	1	1	0	0	1
Journal of Geomatics	0976-1330	Indian Society of Geomatics	India	No	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Journal of Map and Geography Libraries	1542-0353	Taylor & Francis	USA	No	0	1	1	0	0	0	1	0	0	1	1	0	0	1
Journal of Maps	e1744-5647	Taylor & Francis	USA	No	0	0	1	0	1	0	0	1	0	0	1	1	1	1
Journal of Spatial Science	1449-8596	Taylor & Francis	USA	No	0	1	1	0	0	1	0	0	0	0	1	1	0	1
Journal of Surveying Engineering	0733-9453	American Society of Civil Engineers	USA	No	0	1	1	1	1	1	1	1	0	0	1	1	1	1
Journal of the Geodetic Society of Japan	0038-0830	Geodetic Society of Japan	Japan	No	0	1	1	0	0	0	0	1	1	0	1	0	0	1
Journal of the Korean Society of Surveying Geodesy Photogrammetry and Cartography	1598-4850	Korean Society of Surveying Geodesy Photogrammetry and Cartography	Republic of Korea	repo- nato	0	1	0	0	0	0	0	1	0	0	1	0	0	1
Kart & Bildteknik = Mapping and Image Science	1651-792X	Kartografiska Sällskapet	Sweden	Yes	0	1	0	0	0	0	0	0	0	1	1	0	0	1
Kart og Plan	0047-3278	Fagbokforlaget	Norway	No	0	1	0	1	0	0	1	0	1	1	1	0	0	1

Continue

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Kartografické listy	1336-5274	Cartographic Society of the Slovak Republic	Slovakia	No	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Kartografija i Geoinformacije = Cartography and Geoinformation	1333-896X	Hrvatsko kartografsko društvo	Croatia	Yes	1	1	0	0	0	0	1	0	1	1	1	0	0	1
Kartographische Nachrichten	0022-9164	Kirschbaum Verlag	Germany	No	0	1	1	0	0	0	0	0	1	1	1	0	0	1
LSA VERM – Zeitschrift für das Öffentliche Vermessungswesen des Landes Sachsen-Anhalt	1435-2338	Landesaamt für Vermessung und Geo-information Sachsen-Anhalt	Germany	No	0	0	0	0	0	0	0	0	1	1	0	0	0	0
M@ppemonde	1769-7298	Maison de la géographie	France	Yes	1	1	0	0	0	1	0	1	0	1	1	0	0	1
Maanmittaus	0047-5319	Helsinki, Valtioneuvoston kirjapaino	Finland	Yes	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Map : Journal of the Japan Cartographers Association	0009-4897	Japan Cartographers Association	Japan	No	0	0	1	0	0	0	0	0	1	1	0	0	0	0
Marine Geodesy	0149-0419	Taylor & Francis	USA	No	0	1	1	0	0	1	1	1	0	0	1	1	1	1
Mitteilungen der DWW-Landesvereine Hessen e.V. und Thüringen e.V.	0949-7900	DWW Hessen und Thüringen	Germany	Yes	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Mitteilungen des DWW-Bayern e.V.	1613-3064	DWW Landesverein Bayern	Germany	No	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Mitteilungen des DWW-Landesvereins Baden-Württemberg	0940-2942	DWW Landesvereine Baden-Württemberg	Germany	No	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Nachrichten aus dem öffentlichen Vermessungswesen (NOEV)	1863-4176	Innenministerium des Landes Nordrhein Westfalen	Germany	Yes	0	0	0	0	0	0	0	0	1	1	0	0	0	0

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Nachrichten der Niedersächsischen Vermessungs- und Katasterverwaltung	0487-5370	Niedersächsische Vermessung und Katasterverwaltung	Germany	No	0	1	0	0	0	0	0	0	1	0	1	0	0	0
Nordic journal of surveying and real estate research	1459-5877	The Finnish Society of Surveying Sciences	Finland	Yes	0	0	0	0	0	0	0	0	1	1	0	0	0	1
Österreichische Zeitschrift für Vermessung und Geoinformation	1605-1653	Österreichische Gesellschaft für Vermessung und Geoinformation	Austria	No	0	0	1	0	0	0	0	0	1	0	0	0	0	1
Photogrammetric Engineering and Remote Sensing (PE & RS)	0099-1112	American Society of Photogrammetry and Remote Sensing	USA	No	0	1	1	1	1	1	1	1	1	0	1	1	1	1
Photogrammetric Journal of Finland	0554-1069	The Finnish Society of Photogrammetry and Remote Sensing	Finland	Yes	0	1	1	0	0	0	0	0	0	0	1	0	0	1
Photogrammetric Record	0031-868X	Remote Sensing and Photogrammetry Society	Great Britain	No	0	1	1	1	1	1	1	1	0	0	1	1	1	1
Photogrammetrie, Fernerkundung, Geoinformation	1432-8364	Schweizerbart Science Publishers	Switzerland	No	0	0	0	0	0	0	0	1	1	1	1	1	0	1
Polski Przegląd Kartograficzny	0324-8321	Polskie Towarzystwo Geograficzne. Oddział Kartograficzny	Poland	No	0	1	1	0	0	1	0	0	0	1	1	0	0	1
Portolan, The	1096-1925	Washington Map Society	USA	No	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Professional Surveyor Magazine	0278-1425	Flatdog Media, Inc.	USA	Yes	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Przegląd geodezyjny	0033-2127	Stowarzyszenia Geodetów Polskich	Poland	No	0	1	0	0	0	1	1	0	1	1	1	0	0	0

Continue

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Publication in Geomatics = Geomatikai Közlemények	1419-6492	Geodetic and Geophysical Institute, Hung. Acad. Sci	Hungary	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Reports on Geodesy	0867-3179	Warsaw University of Technology / Faculty of Geodesy and Cartography	Poland	Yes	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Revista Brasileira de Cartografia	0560-4613	Sociedade Brasileira de Cartografia, Geodesia, Fotogrametria, e Sensoriamento Remoto	Brazil	Yes	1	0	1	0	0	0	0	0	0	1	0	0	0	1
Revista cartografica	0080-2085	Instituto Panamericano de Geografia e Historia	Mexico	No	0	0	1	0	0	0	0	0	0	1	0	0	0	1
Revue Francaise de Photogrammetrie et de Teledetection	1768-9791	Société Française de Photogrammétrie et de Télédétection	France	No	0	0	0	1	0	1	0	1	0	0	1	0	0	1
Revue Internationale de Géomatique	1260-5875	Hermès Science	France	No	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Roczniki Geomatyki = Annals of Geomatics	1731-5522	Polskie Towarzystwo Informatyki Przeszyczeńnej	Poland	No	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Sheetlines	0962-8207	The Charles Close Society	Great Britain	Yes	0	0	0	0	0	0	0	0	0	1	0	0	0	1
South African Journal of Geomatics	2225-8531	CONSAS Conference	Republic of Suthafrica	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Studia Geophysica et Geodaetica	0039-3169	Springer	Germany	No	0	1	1	0	1	1	1	1	1	0	1	1	1	1



Continue

Journal title	ISSN	Publisher	Country	OA	DOAJ	GEOB	GeoR	Comp	Insp	PASC	CSA	VINI	GEOP	BC	Scop	WoS	CC	GS	
Studies in Surveying and Mapping Science	2328-6245	American Society of Science and Engineering	USA	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Survey Review	0039-6265	Maney Publishing	Great Britain	No	0	1	1	0	1	0	1	1	1	0	1	1	1	1	1
Surveying and Land Information Science (SaLIS)	1538-1242	American Congress on Surveying and Mapping	USA	No	0	1	0	0	0	0	0	1	0	1	1	0	0	0	1
Topografía y cartografía	0212-9280	Colegio Oficial de Ingenieros Técnicos en Topografía de Madrid	Spain	No	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0
Vermessung Brandenburg	1430-7650	Landesvermessung und Geobasisinformation Brandenburg	Germany	Yes	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
Vestnik Sibirskoj gosudarstvennoj geodezičeskoj akademii (Vestnik SGGGA)	1818-913X	Sibirskaja gosudarstvenaja geodezičeskaja akademija	Russia	No	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
XYZ	0290-9057	Association Française de Topographie	France	No	0	0	1	0	0	0	0	0	1	1	0	0	0	0	1
ZfV – Zeitschrift für Geodäsie, Geoinformation und Landmanagement	1618-8950	Deutscher Verein für Vermessungswesen e.V.	Germany	Yes	0	1	0	0	0	0	0	1	1	1	1	0	0	0	1



**Jadranka Stojanovski** is assistant professor at University of Zadar, Department for Information Sciences. She graduated in Physics from University of Zagreb, Faculty of Science, and holds master's degree and doctoral degree in information sciences. She led and took part in many projects focused on research in Croatia like Croatian Scientific Bibliography CROSBI, Centre for Online Databases, Who's Who in Science in Croatia, SESTAR – Repository of Scientific Equipment, Repository of Croatian Open Access Journals HRCAK, and others. She is also involved in the continuous education, and has taught numerous lectures and workshops on database retrieval, bibliometrics, digital libraries, open access to the scientific information, etc. Her present research is focused on scholarly publishing, open data and publications management, open science, assessment of the research impact, and other main bibliometric issues. She has published more than 60 papers.



**Nedjeljko Frančula** is professor emeritus at the Faculty of Geodesy, University of Zagreb. While working on the application of computers for solving geodetic and cartographic problems for more than 30 years, he introduced digital cartography into the undergraduate and postgraduate studies at the Faculty of Geodesy in Zagreb. He has been a full member of the Croatian Academy of Engineering in Department of Civil Engineering and Geodesy since 1998. In March 2008 he has been named Member Emeritus. He published about 500 scientific and professional papers.



**Miljenko Lapaine** studied Mathematics and graduated from the Faculty of Science, University of Zagreb. He completed the postgraduate studies in Geodesy in the field of Cartography at the Faculty of Geodesy in Zagreb by defending his Master's thesis A Modern Approach to Map Projections. He obtained his PhD from the same Faculty with a dissertation entitled Mapping in the Theory of Map Projections. He has been a full professor since 2003. Prof. Lapaine is the chairman of the ICA Commission on Map Projections, a founder and president of the Croatian Cartographic Society and the executive editor of the Cartography and Geoinformation journal. He has published more than 800 papers, several textbooks and monographs.