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Refereed article

Comparing Unique Title Coverage of Web of Science and Scopus in Earth and Atmospheric Sciences

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Abstract

The current journal titles in earth and atmospheric sciences, that are unique to each of two databases, Web of Science and Scopus, were identified using different methods. Comparing by subject category shows that Scopus has hundreds of unique titles, and Web of Science just 16. The titles unique to each database have low SCImago Journal Rank Indicators (Scopus) and Impact Factors (Web of Science), thus indicating that the unique titles play a minor role within this discipline. An author affiliation search reveals that both databases cover most of the important literature in earth and atmospheric sciences. In subject searches, the titles unique to each database depend upon the specific topic searched. Most of the earth and atmospheric sciences doctoral-granting institutions in the United States subscribe to Web of Science rather than Scopus, while

some institutions apparently consider these databases complementary, and subscribe to both of them, in spite of their high subscription costs. Our method of comparing large numbers of titles among different databases needs only a word processor and is readily applicable to any subject area or applicable even to the entire lists of journals in any set of databases.

Introduction

Research institutions in the sciences, applied sciences, and engineering need subject-specific scholarly databases, especially the venerable and large ones, such as Chemical Abstracts for chemistry; BIOSIS Previews for the life sciences; MEDLINE and Excerpta Medica for medicine; INSPEC for physics, computer science, and electrical engineering; and Compendex for the remaining fields of engineering.

Research institutions also need general interdisciplinary scholarly databases to access areas not included in the subject specific databases to which they subscribe. The two major choices now are Thomson Reuters' Web of Science, and Elsevier's Scopus. Web of Science includes three products: Science Citation Index Expanded, Social Sciences Citation Index, and Arts & Humanities Citation Index. Web of Science subscribers can choose one, two, or all three of these products. Scopus covers these three areas in one combined database.

Our aim is to provide an additional evaluation tool for potential subscribers to these databases which will enable them to readily see the individual journals unique to each database. The present study contributes to the existing literature by examining the unique current journal title coverage found in Web of Science and Scopus for earth and atmospheric sciences. This topic has not been previously explored.

We analyzed our data using readily available spread sheets and a word processor rather than a previous method that employed Perl scripts and a relational database manager on a Microsoft SQL server (Gavel and Iselid 2008). We selected one area, earth and atmospheric sciences, to use this field as a case study. This method is applicable to any subject area or even to the entire lists of journals in any set of databases.

Earth and atmospheric sciences is a suitable field for exploration because researchers seeking journal articles in this field are likely to need such broad databases as Web of Science and Scopus due to their multidisciplinary nature (Appendix 1). Earth and atmospheric scientists study the interactions between the atmosphere, oceans, living things, land surface dynamics, land and sea ice, and biosphere by examining the evidence from the past and predicting future changes and probable consequences. Earth and atmospheric sciences, unlike the other fields mentioned above, has no one single database that covers the entire discipline (Kristick 2002; Joseph 2007; Zellmer 2011). Instead there are numerous databases that tend to specialize in one or a few areas of earth and atmospheric sciences.

As of July 2011 Scopus covers 17,500 peer-reviewed journals (SciVerse Scopus 2011) and a total of 19,010 active titles, which include 18,042 journals, 414 trade journals, 303 book series, and 251 conference proceedings. Web of Science as of July 2011 covers 8,355 journals in Science Citation Index Expanded, 2,938 journals in Social Sciences Citation Index, and 1,641 journals in Arts &

Humanities Citation Index (Thomson Reuters 2011). Some journals appear in more than one of these indexes. A small number of non-journal titles such as conference proceedings and book series are also included. Web of Science does not identify its entries as to their type: (i.e., journals, books, or proceedings), while Scopus does. Consequently, when we use the term "journal," or the term "title," we mean any active serial in both Web of Science and in Scopus.

Even though Scopus includes more journals than Web of Science, Gavel and Iselid (2008) reported that Web of Science covered 1,467 journals not included in Scopus as of 2006. They did not attempt to list the specific journals unique to each database. Five years later, these databases still have substantial unique coverage. JISC Collections (formerly called Joint Information Systems Committee) has an Academic Database Assessment Tool (JISC Collections 2011) that allows comparison of title coverage in many scholarly databases. Comparing Web of Science to Scopus, in July 2011 this tool reports 8,421 journals unique to Scopus, and 874 journals unique to Web of Science. This tool does not list specific journal titles.

Google Scholar, the third multidisciplinary contender scientific database, has not been included in this study because its list of journals is not publicly available as it is for Web of Science (Thomson Reuters 2011) and Scopus (SciVerse Scopus 2011). Google Scholar is only suitable for bibliographic studies conducted at the article level (e.g.,Bauer & Bakkalbasi 2005).

There is no set price for subscriptions to Scopus. It is sold at an annual subscription fee, and the price varies according to the size of the institution (SciVerse Scopus 2011a). Pricing information for Web of Science is available only by submitting a request to Thomson-Reuters (Thomson Reuters 2011a). Dess (2006) discusses the cost considerations of these two expensive databases. Given the high cost of Web of Science and Scopus, we would not expect to see a large number of institutions subscribing to both of these databases. If most major research institutions do already subscribe to both Web of Science and Scopus, this would indicate that the need for both is widely recognized and obvious, and that most institutions have the financial means to acquire both of these products. If that were true, comparing these two databases would then not really be necessary. To see who is subscribing to these databases, we examined academic institutions in the United States that grant doctoral degrees in the earth and atmospheric sciences.

Literature Review

Web of Science was the only multidisciplinary database for over half of a century that could perform cited reference searching so that one could see which articles cite a particular article or author to track prior research and monitor current developments. Scopus, which became the second multidisciplinary database to offer citation searching, was launched in November 2004.

Scopus and Web of Science have been compared in many studies. Any discussion of this literature has to take into consideration that both Scopus and Web of Science are continuously evolving, always changing, and adapting to the needs of their users.

Based upon their coverage and functionality, many authors like LaGuardia (2005), Burnham (2006), Fingerman (2006), Goodman & Deis (2005; 2007), and Vieira & Gomes (2009), suggested that these databases are complementary and that a library that can afford both should buy both. If a

library can only afford one database, the selection choice depended upon the needs of each individual institution (Burnham 2006).

Another set of articles have tended to focus on the journal title lists in each database, pointing to the apparent deficiencies of one database in comparison with the other. The definition of journal coverage overlap and its historical analysis has been reviewed by Gluck (1990). Bosman et al. (2006) conducted a fairly detailed evaluation of Scopus versus Web of Science. Their study compared the active journal title lists of Web of Science and Scopus to 22 subject databases. The focusing of Scopus on the scientific, technical, and medical (STM) and social sciences literature, and its poor coverage of arts and humanities literature was confirmed by its higher number of sources in 18 of those lists of journals (Bosman et al. 2006, pages 14-20). Gavel and Iselid (2008) compared the active journal title lists of Web of Science and Scopus, with five scientific databases to identify the journal title overlap and number of unique titles. Their results indicated that 84% of Web of Science titles are indexed by Scopus and only 54% of Scopus titles are indexed by Web of Science. Comparing the Scopus STM journal titles (from the subject categories: Life Sciences, Physical Sciences, Health Sciences, and multidisciplinary area) with the Web of Science STM journal titles (using journal lists from Science Citation Index Expanded, Current Chemical Reactions, and Index Chemicus), they found 5,352 unique titles in Scopus and 424 unique titles in Web of Science (Gavel & Iselid 2008, Table IV).

Moya-Anegón et al. (2007) compared Scopus's coverage to Ulrich's with regard to a series of variables such as journal subject, geographical origin, publisher, and the language of publication. That study concluded that Scopus is balanced in terms of subject areas and languages when compared with Ulrich's Core, and that Scopus has quite a homogenous global representation in nearly all areas except arts and humanities. The geographical distribution of publishers indexed by Scopus is similar to that in Ulrich's, although journals published from the United Kingdom, Netherlands and Germany were over represented. In Scopus 15% of journals are published in languages other than English, as opposed to 26% of Ulrich's Core.

Other studies used sample searches to identify journal sources for a particular subject in the database. This method can take into account the years of coverage, and pointed to incomplete indexing when comparing the two databases for the same period of time. In one such study Baykoucheva (2010) used three drug keyword searches in Medline, Scopus, and Web of Science to demonstrate the increased retrieval obtained with Scopus for drug literature journals. However the analysis of the top 20 journal titles in each database showed significant differences, not only in the number of retrieved articles for the same title due to incomplete indexing, but also with regards to unique titles included in each of the databases searched (Baykoucheva 2010).

Mikki (2010) examined Web of Science and Google Scholar with respect to their degree of coverage of 29 authors working in climate and petroleum geology. Google Scholar covers 85% of the content indexed in Web of Science.

Methods

To determine what proportion of earth and atmospheric doctoral-granting institutions are subscribing to each of these databases we looked at all of the doctoral-granting institutions listed by

the Carnegie Foundation for the Advancement of Teaching (2011), choosing only those institutions that offer this doctoral degree. Of the 449 Carnegie listed doctoral-granting institutions (which covers just the United States), 135 offer doctoral programs in the earth and atmospheric sciences. Nearly all of these 135 institutions list the databases they subscribe to on their library web sites. A few provide their database subscription lists only to members of the institution and require logging on to see this information. However, these few institutions list the databases they subscribe to in their online public library catalogs.

We examined earth and atmospheric sciences journals covered in each of these databases using several complementary methods. Since Scopus includes all of the sciences, arts, and humanities in one combined database, we compared the journal coverage of Scopus to the journals included in all three sections of Web of Science, keeping in mind that we could expect few earth and atmospheric sciences journals to appear in Social Sciences Citation Index, and even fewer or none to appear in Arts & Humanities Index.

Both Scopus and Web of Science classify their journals by subject category. Science Citation Index Expanded classifies their currently covered journals into 174 subject categories (Thomson Reuters 2011b), Social Sciences Citation Index into 56 categories (Thomson Reuters 2011c), and Arts & Humanities Index into 28 categories (Thompson Reuters 2011d). Each of these subject categories has scope notes describing them. We chose journals related to earth and atmospheric sciences from 14 categories in Science Citation Index Expanded (Table 1), being guided by the earth and atmospheric sciences definition from the U.S. Geological Survey (Appendix 1). None of the categories within Social Sciences Citation Index and Arts & Humanities Index fit within earth and atmospheric sciences. While the total number of entries in these categories is 749, many journals appear in more than one category, so there are 580 unique journals in these 14 categories. These 580 Web of Science journals from the Table 1 categories were compared to all the active titles in Scopus.

Table 1. Web of Science subject categories analyzed
Engineering, Geological (30)
Geochemistry & Geophysics (80)
Geography, Physical (43)
Geology (47)
Geosciences, Multidisciplinary (167)
Limnology (19)
Meteorology & Atmospheric Sciences (70)
Mineralogy (28)
Mining & Mineral Processing (22)
Oceanography (60)
Paleontology (50)
Remote Sensing (24)

Soil Science (33)
Water Resources (76)
(The numbers in parentheses are the number of journals in that category)

Scopus classifies their titles in two different ways. On their spreadsheet of titles, they classify their titles into 32 broad subject categories (SciVerse Scopus 2011b). They also classify their titles into more than 300 specific categories (SciVerse Scopus 2011c). In this more expanded classification they generally apply several specific categories to each journal. The only way to view these specific subject categories is to view the record for each journal, one at a time in the Scopus database, an impractical approach. Instead we used the broad category Earth and Planetary Sciences (the only appropriate category) of Scopus that was readily obtainable from the spread sheet of titles. The 853 active titles obtained here were compared to all of the titles in Web of Science.

To compare the earth and atmospheric titles in Web of Science to all of the active titles in Scopus, the titles from each of the chosen Web of Science categories were copied into a Microsoft Word document, inserted into a table, sorted alphabetically, then the extraneous data removed using Find and Replace. The spreadsheet containing the Scopus List of journal titles (SciVerse Scopus 2011b) was sorted into active and inactive titles by sorting the column with that designation. Only the active journal titles were kept and copied into a Microsoft Word document. The journals from the chosen Web of Science categories were merged into the Scopus list. The combined list was inserted into a table and then sorted alphabetically. By assigning a different font color to Web of Science and Scopus lists, unique and duplicate titles in each database were readily identified.

Comparing the active Earth and Planetary Sciences titles in Scopus to all of Web of Science titles was performed similarly. Each of the titles found to be unique to either Web of Science or to Scopus in this comparison of merged lists were then further examined to be certain that they were truly included in only one of these databases, and that they were currently being covered in these databases. Many titles, especially those which are non-English, often have variations in their names. Each of these questionable titles was checked in WorldCat for different known names.

These chosen Web of Science titles were compared to all active entries in Scopus because as we discuss below there is no analogous subject classification in Scopus that is comparable to the 14 Web of Science categories. Similarly, the chosen titles from Scopus were compared to all the titles in Web of Science in case there were some small chance that some earth and atmospheric sciences titles in Web of Science were not in one of the 14 chosen categories.

Finding where scientists in a field choose to publish, based on their corporate addresses in scientific publications complements other methods to determine the important journals in that field (De Bruin & Moed 1993; Barnett 2002). Both databases list and allow searching the affiliation field (Scopus) and address field (Web of Science) of all contributing authors. The analyzing feature of Web of Science allowed selecting the top 100 titles containing an earth and atmospheric sciences term as part of the author's address field. These 100 titles were compared to all of the active titles in Scopus. Similarly searching the author's affiliation field in Scopus retrieved the top 100 titles associated with an earth and atmospheric sciences term. These top 100 titles were then compared to

all of the active titles in Web of Science. These searches were limited to publication years 2000-2011.

Subject-specific searches on currently important topics in earth and atmospheric sciences are yet another way to reveal the vital journals in this field. Two common interest subject searches were performed: one on global warming, the second on oil spills. In addition we ran a very specialized search on the geology of the Pontide Arc, located in Eastern Turkey. This area is of great interest to researchers because of its rich concentration of minerals and petroleum, which if developed, may enhance the economy of Turkey. These common interest searches, as their names suggest, are the kinds of searches that may be important to undergraduate student researchers. On the other hand the specialized search is an example of a possible search important to researchers in earth and atmospheric sciences, because articles on this topic are highly cited. We searched both Web of Science and Scopus recovering references that included these search terms in their titles, abstracts, or keyword terms. For each of these searches, the top 100 titles from each database were chosen and titles unique to each database were noted. These searches were limited to publication years 2000-2011.

Results

The majority of the doctoral-granting institutions in the Earth and Atmospheric Science subscribe to only Web of Science and not to Scopus. Eighty-five institutions (63%) subscribe to all three parts of Web of Science and not to Scopus, as of July 2011. Five additional non-Scopus institutions subscribe to only Science Citation Index Expanded and Social Sciences Citation Index, and another non-Scopus institution subscribes to just Science Citation Index Expanded. Thirty-four institutions (25%) subscribe to Scopus and all three parts of Web of Science. Two other institutions that have all three parts of Web of Science have Scopus on trial. Only six of these 135 earth and atmospheric sciences doctoral-granting institutions (4.5%) subscribe only to Scopus.

Appendix 2 lists 340 earth and atmospheric sciences titles that are currently included in Scopus, but not currently covered in Web of Science. Also listed in this table is the SCImago Journal Rank Indicator for each title. Appendix 3 lists the 16 earth and atmospheric sciences titles that are currently included in Web of Science, but not currently covered in Scopus. Also listed in this table is the 2010 Impact Factor for each journal. Both tables show that each of these databases cover unique journals not found in the other, but Scopus has the definite advantage of breadth of coverage.

Note that Thomson Reuters offers additional titles that cover earth and atmospheric sciences, specifically conference proceedings and books via two separate products, which each require a separate subscription. These products, residing on the same platform (Web of Knowledge) as Web of Science, are Conference Proceedings Citation Index (Thomson Reuters 2011e) and the newly introduced Book Citation Index (Thomson Reuters 2011f).

To determine where authors affiliated with earth and atmospheric sciences institutions publish, the following search was performed in the Address field in Web of Science and in the Affiliation field in Scopus from the year 2000 to the present:

(earth OR geol* OR geosci* OR geophys* OR geofis* OR geochem* OR geochron* OR geomorph* OR atmos* OR climatol* OR meteor* OR weather OR mineralog* OR glaciol* OR hydrol* OR oceanic OR oceanog* OR undersea OR petrol* OR paleontol* OR stratig* OR usgs OR noaa) NOT (rare earth OR petroleum)

Using the sorting feature by number of articles, the top 100 titles in each of these databases were noted.

Every one of the top 100 titles in Web of Science is included in Scopus. The following ten titles which are in the top 100 titles in Scopus are not in any of the sections of Web of Science:

Atmospheric Chemistry and Physics Discussions
Eos
European Space Agency Special Publication ESA SP
Geological Society Special Publication
IAHS AISH Publication
International Geoscience and Remote Sensing Symposium IGARSS
Proceedings of SPIE the International Society for Optical Engineering
Przeglad Geologiczny
Seg Technical Program Expanded Abstracts
Special Paper of the Geological Society of America

As in the other subject searches, the search "global warming" OR "climat* change*" was also limited to the years 2000 to the present and to the top 100 titles in each database. This search covers a significant proportion of the literature in this field. The top 100 titles in Web of Science contain 45.8% of the total literature. All of the top 100 titles were included in both databases.

As in the global warming search, the oil spill search hedge (Science Watch 2010) was limited to the year 2000 to the present and the top 100 titles in each database. Here also, every one of the top 100 titles in Web of Science is included in Scopus. 32 titles unique to Scopus are listed in Table 2.

Table 2. Prominent titles unique in Scopus on oil spills
2005 International Oil Spill Conference Iosc 2005
2010 4th International Conference on Bioinformatics and Biomedical Engineering Icbbe
4th Wseas International Conference on Waste Management Water Pollution Air Pollution Indoor Climate Wwai 10
Advanced Materials Research
Battelle Press 9th International in Situ and on Site Bioremediation Symposium 2007
Chemical Engineer
Engineer
Environment Canada Arctic and Marine Oil Spill Program Technical Seminar AMOP Proceedings
European Space Agency Special Publication ESA SP

Exxon Valdez Oil Spill Restoration Project Final Report
Federal Register
Ground Water Management Petroleum Hydrocarbons and Organic Chemicals in Ground Water Prevention Assessment and Remediation Conference
Huanjing Kexue Environmental Science
In Situ and on Site Bioremediation 2009 Proceedings of the 10th International in Situ and on Site Bioremediation Symposium
International Conference on Health Safety and Environment in Oil and Gas Exploration and Production
International Geoscience and Remote Sensing Symposium IGARSS
International Oil Spill Conference Iosc 2008 Proceedings
Joint Conference on Water Resource Engineering and Water Resources Planning and Management 2000 Building Partnerships
Lecture Notes in Computer Science Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics
Marine Engineers Review
Marine Ornithology
Petroleum Economist
Petroleum Review
Pollution Engineering
Pollution Research
Proceedings of SPIE the International Society for Optical Engineering
Proceedings of the 30th Arctic and Marine Oilspill Program AMOP Technical Seminar
Proceedings of the 32nd AMOP Technical Seminar on Environmental Contamination and Response
Proceedings of the 33rd AMOP Technical Seminar on Environmental Contamination and Response
Proceedings of the 8th International in Situ and on Site Bioremediation Symposium
Proceedings of the International Conference on Offshore Mechanics and Arctic Engineering OMAE
Proceedings of the International Offshore and Polar Engineering Conference
Spill Science and Technology Bulletin
Water Studies
Wit Transactions on Ecology and the Environment
World Environmental and Water Resources Congress 2008 Ahupua A Proceedings of the World Environmental and Water Resources Congress 2008
World Environmental and Water Resources Congress 2010 Challenges of Change Proceedings of the World Environmental and Water Resources Congress 2010
Search strategy from Science Watch (2010)

The search "pontide OR pontides" was performed in each database with the same 2000-2011 date limit. We further limited the results to only the articles in earth and atmospheric sciences chosen from the Subject Areas tab in the Refine Results panel (242 articles) of Web of Science. These articles are contained in just 70 journals, with 37 of these journals containing just one article. Similarly, Scopus contains 232 articles in its earth and atmospheric sciences Subject Areas. These articles are contained in 73 titles, and 44 of these titles contain just one article on this subject. All of the 70 journals in Web of Science are covered by Scopus, while the following 8 titles in Scopus are not covered in Web of Science:

Geological Society Memoir
Geological Society Special Publication
Geoscience Frontiers
Revue De Paleobiologie
Special Paper of the Geological Society of America
Transactions of the Institution of Mining and Metallurgy Section B Applied Earth Science
Vestnik Sankt Peterburgskogo Universiteta Seriya Geologiya I Geografiya Yerbilimleri

Discussion

The majority of the earth and atmospheric sciences doctoral-granting institutions in the United States subscribe to Web of Science, which had the market advantage for over half a century. These higher education institutions are starting to recognize the value of Scopus, since over 25% are subscribing to Scopus, in addition to Web of Science. Numerous studies comparing the overall coverage or specific subject coverage in areas not including earth and atmospheric sciences failed to distinguish which database is a clear winner. The difficulty in making such an evaluation is due to the fact that these products "are continuously changing and improving, and that the relative advantage of using one source or the other would depend much on the particular subject area of interest" (Lopez-Illescas et al. 2008, page 305). A number of institutions subscribe to both of these databases, if they can afford to, because the literature asserts that these databases are complementary (Vieira and Gomes 2009).

In earth and atmospheric sciences Scopus contains over 300 unique titles while Web of Science only 16. On the other hand, the affiliation search demonstrated that both databases cover most of the important literature in this field. In the subject searches, the titles unique to each database depend upon the specific topic searched, when the search is within their common years of publication.

Both these databases undergo a rigorous assessment of the quality of journals indexed, although they follow different approaches. Journals are selected for Web of Science using a quantitative evaluation process (Testa 1998; Thomson Reuters 2011g), while Scopus uses the STEP: the Scopus Title Evaluation Platform (Kahler 2010). Thomson Reuters is selective in Web of Science's coverage in the sense that it only covers "the world's most important and influential research" (Thomson Reuters 2011g). For Scopus size matters, since it is the key to its salability in a market dominated by Web of Science (Kahler 2010). Scopus is interested in adding quality titles at a high

rate, and has streamlined the entire editorial process since 2008 by using STEP which is both a web-based and a numerical based system (Kahler 2010). Scopus has more unique titles than Web of Science because it follows a selection policy of global inclusion of journals (Kahler 2010, Figure 3.). On the other hand Web of Science has the advantage over Scopus with respect to years of coverage. Scopus has a shorter period of coverage, going back to 1960. In this regard Web of Science has a substantial advantage. Science Citation Index Expanded covers 1899 to present; Social Sciences Citation Index covers 1956 to present, and Arts & Humanities Citation Index covers 1975 to present.

The subject category method has some limitations. The first is that Web of Science classifies their titles into readily accessible subject categories, and each of these categories has detailed scope notes describing the criteria for each category. This classification enables focusing on earth and atmospheric sciences journals. As noted above Scopus has only 32 fairly broad subject categories, so their Earth and Planetary Science category cannot be expected to be precisely comparable to the 14 specific subject categories we selected from Web of Science. This Scopus category includes planetary sciences, which was not included in the selected Web of Science categories. Titles in Appendix 2 with the Scopus specific category Space and Planetary Science are noted with an asterisk. This Scopus earth and planetary sciences category also includes numerous titles in the social science aspects of geography. This is another category not in the selected Web of Science categories. Those titles with the Scopus broad category: specific category combination; "Earth and Planetary Science: Earth-Surface Processes", and "Social Sciences: Geography, Planning and Development" are noted on Appendix 2with a double asterisk. Gorraiz and Schloegl (2008) found similar limitations comparing journals from a specific subject category between the two databases when they compared the subject category "pharmacology, toxicology and pharmaceutics" in Scopus to the Web of Science categories: "pharmacology and pharmacy" and "toxicology".

The spreadsheet of Scopus titles (SciVerse Scopus 2011b) does not always list all of their currently covered journals, nor is it always updated when a journal changes its title, although most of the newly changed titles appear properly online in the database. The following titles are currently included in both Web of Science and Scopus, but do not appear on the Scopus spreadsheet: Andean geology (title change); Journal of operational oceanography; Photogrammetrie, Fernerkundung, Geoinformation; and Zeitschrift der Deutschen Gesellschaft für Geowissenschaften (title change). The title, European Journal of Environmental and Civil Engineering, has 127 articles in Scopus all with a publication year of 2010, although it does not appear either on the spreadsheet of titles, or among the Scopus sources. In addition the current publisher of this journal, Taylor & Francis, provides misleading information to the public by claiming that the journal is "indexed in Scopus" without specification of the limited publication year coverage which is only 2010. The title Bulletin of the Geological Survey of Canada is listed on both the spreadsheet of titles, and among the Scopus sources, as an active title, with 2009 being last year of publication. However, according to the 2011 EBSCO Serials Directory (EBSCO Publishing 2011) this publication is no longer available, which has been confirmed by its absence on the publisher's (Natural Resources Canada) web site in 2011. Consequently we had to disqualify several journals from Appendix 2, since they are no longer active. In spite of these shortcomings, this method enabled us to identify the journals in earth and atmospheric sciences in each of the databases.

The majority of the journals in Appendix 2 are scholarly or peer-reviewed journals, published by reputable and authoritative non-profit organizations, such as universities (e.g., Faculty of Agriculture, University of Zagreb, Croatia), societies (e.g., New Zealand National Society for Earthquake Engineering, New Zealand), museums (e.g., Queensland Museum, Australia), associations (e.g., American Association of Petroleum Geologists, United States), governments (e.g., Atomic Minerals Division, Department of Atomic Energy, Government of India), and scientific academies (e.g., Polish Academy of Sciences, Poland). Their main purpose is to make public the research undertaken under their auspices. There are also few titles published by for-profit publishers such as Elsevier, Springer-Verlag, Wiley-Blackwell Publishing Inc., or Taylor and Francis. The titles in Appendix 2 tend to be internationally oriented (e.g., International Journal of Environmental Studies, Central European Geology), while others cover national areas (e.g., Chinese Journal of Geochemistry, Irish Geography).

Bosman (2009) points out that the visibility, accessibility, and use of a journal influences the chance for its articles to receive citations. Although Bosman looked at a much narrower field-the society geography journals--many of his observations also apply to the titles in Appendixes 2 and 3. This similarity can be explained because the same threats, challenges, and solutions transformed the entire field of earth and atmospheric sciences of which geography is a part. Thus the low prestige of journals inAppendix 2 is related to low citation rates revealed by their low SCImago Journal Rank Indicators. There are however, a few titles which have higher SCImago Journal Rank Indicators: Cryosphere Discussions (0.081), Eos (0.088), GSA Today (0.101), and Journal of Island and Coastal Archaeology (0.115).

The SCImago Journal Rank Indicator represents the prestige of a journal and its importance to its field, based upon a combination of the quantity and the quality of citations it receives over a period of three years (González-Pereira et al. 2010). The SCImago Journal Rank Indicator has been compared with the Thomson Reuters Journal Impact Factor (Falagas et al. 2008) and shown to be another measure for ranking the impact of scientific journals. The Impact Factor is calculated by dividing the number of current year citations to the source items published in that journal during the previous two years (Thomson Reuters 2012). Contrary to the Impact Factor, the SCImago Journal Rank Indicator attributes different weights to citations depending upon the prestige of the citing journals, eliminating self-citations (SCImago 2007). The theory is that the citations issued by more important journals will be more valuable than the citations issued by less important journals. The importance of a journal is determined by the Google PageRank algorithm (Page et al. 1998). To give an idea of just how low or high the prestige of these journals are, here are several examples of top journals in earth and atmospheric sciences: Geology (0.253); Nature Geoscience (0.686); Paleoceanography (0.242); Soil Biology & Biochemistry (0.156); Climate Dynamics (0.203); and Water Research (0.234).

The low impact of some of the titles in Appendix 2 may be due their newness of inclusion in Scopus (e.g., Asian Journal of Information Technology). We have listed the coverage next to each title in both Appendix 2 and Appendix 3, since the coverage is important in the calculation of the Impact Factor (needs two consecutive years) and SCImago Journal Rank Indicator (needs three consecutive years). The data used to calculate SCImago Journal Rank Indicators has been licensed from the Scopus database, the same way the Journal Citation Reports (JCR) database uses the Web of Science data to calculate the Impact Factors.

70% of the titles in Appendix 2 are from publishers residing in the developed regions of the world (United Nations 2011) concentrated in countries such as the United States (18%), Netherlands (10%), Germany (9%), Japan (6%), and Canada (3%). Only 30% of titles come from the developing regions of the world (United Nations 2011) with the majority being published in China (12%), followed by Poland (6%), and Turkey (2%). A total of 41 countries are represented; most of them publish between one to three titles each.

Many of the titles in Appendix 2 are either annual or are irregularly published, as indicated by their coverage. Many journals published in Latin America are irregular because their editors/publishers have not received the institutional support necessary to maintain them (Johnson 2006). Salager-Meyer (2008) analyzed the main problems faced by journals from developing countries and the character of their research, noting a strong association between the scientific research output and national wealth.

We tried to determine the timeliness of publications of journals in Appendix 2 by checking the publishers' web sites. Some of the not-for profit publishers from developing countries lack web sites for their journals (e.g., Jeoloji Muhendisligi) or do not keep their web sites current (e.g., Geophysical Institute of the Slovak Academy of Sciences, Slovakia). At the same time we wanted to determine if Scopus is adding volumes/issues in a timely manner. However, we could not get satisfying answers to both these questions, for the reasons outlined above. Nevertheless, we made the following general observation regarding the titles in Appendix 2.

One hundred fifty-three titles in this table have a 2011 publication date. For 147 titles from this table the latest year covered is 2010. Eighty-one of these titles have publisher web pages indicating current issues. Of these 81 titles, 38 have issues with a 2011 year publication date. When these articles became available to the editors at Scopus cannot be determined, but Scopus lags in the indexing of these titles. Similarly for 40 titles from Appendix 2 the latest year in Scopus is 2009. Twenty-six of these titles have publisher web pages indicating current issues. Of these 26 titles, 12 have issues with a publication date after 2009. Similarly when these articles became available to the editors at Scopus cannot be determined.

Many journals from Appendix 2 are open access, such as, Atlantic Geology, Bulletin fuer Angewandte Geologie, Diqiu Kexue - Zhongguo Dizhi Daxue Xuebao, Foldtani Kozlony, and Fossils (Kaseki)

The text of articles not being in English can also impede use if English speaking researchers are not familiar with that particular language of the article and/or lack the means to have the article translated. Scopus insists all foreign journals must have English abstracts and references in the Roman alphabet, and indeed all journals inAppendix 2 comply with this requirement, with the exception of trade publications. Among the many languages of publication represented are: Chinese, Polish, French, German, Spanish, Portuguese, Italian, Russian, Lithuanian, Hungarian, Rumanian, Dutch, Slovak, Turkish, Bosnian, Korean, and Czech. In addition, many journals accept articles in several languages (e.g., Acta Universitatis Carolinae Environmentalica, Central European Geology). On the other hand many non-native English speaking countries publish in English (e.g., Bulletin of Glaciological Research (BGR) -Japan, ACS Agriculturae Conspectus Scientificus-Croatia, and Földrajzi értesíto - Poland). Even with this difficulty for English speaking

researchers, Scopus is providing a service to the earth and atmospheric sciences community by making the content of these publications available.

The journals unique to Web of Science (Appendix 3) share some of the same characteristics of journals unique to Scopus. They are also scholarly or peer reviewed, published by reputable and authoritative non-profit organizations, such as universities (e.g., School of Earth Sciences and Geography, Kingston University), societies (e.g., The Geochemical Society of Japan), museums (e.g., Museum Alexander Koenig, Germany), associations (e.g., European Geosciences Union), governments (e.g., The Mexican Institute of Water Technology), scientific academies (e.g., Polish Academy of Sciences), and also by for-profit publishers (e.g., Taylor & Francis). Unlike the journals unique to Scopus the prevalent language of publication is English, although a few journals are also published in multiple languages. Only two titles have the text entirely in a foreign language: Tecnologia y Ciencias del Agua (Spanish) and Rivista Italiana di Telerilevamento (Italian). However, they both have English abstracts and citations in the Roman alphabet.

Conclusions

Most of the earth and atmospheric sciences doctoral-granting institutions in the United States have not replaced Web of Science with Scopus. Some institutions consider these databases complementary and subscribe to both of them, in spite of their high subscription costs.

Our analysis shows that both databases have unique titles, with Scopus having hundreds of unique titles, and Web of Science just 16. Scopus' and Web of Science's unique titles have low SCImago Journal Rank Indicators and Impact Factors, respectively, indicating that they play a minor role within the discipline. The affiliation search demonstrates that both databases cover the major sources, in spite of each database having such different approaches to their journal selection process. In the subject searches, the titles unique to each database depend upon the specific topic searched, when the search is within their common years of publication.

This study determines unique coverage of earth and atmospheric sciences in these two multidisciplinary databases. It contributes to the knowledge in the large evaluation literature comparing Web of Science and Scopus. This study has a broader application by offering a quick and easy method for the analysis of lists of journals in specific subject areas or entire lists of journals in any set of databases.

The small number of titles unique to Web of Science (Appendix 3) can provide an estimate of timeliness. Of the 16 total titles here, two do not have 2011 publication year articles in the database; these titles have not yet published 2011 articles.

The titles in Appendix 3 have an international perspective due to their subject coverage, composition of editorial boards, and their authorship. Several journals are open source such as: Acta Geotechnica Slovenica, Atmospheric Measurement techniques, and Journal of Maps.

The journals in Appendix 3 have low Impact Factors demonstrating a base level of research influence within the discipline of earth and atmospheric sciences. The Impact Factor is subject specific and provides a measure of the prestige of a journal in relation to other journals in the same

subject area (Thomson Reuters 2012). To have an idea of just how low or high the Impact Factor of these journals is, these are the Impact Factors of several of the top journals in earth and atmospheric sciences: Geology (4.026), Nature Geoscience (10.392), Precambrian (4.116), Soil Biology & Biochemistry (3.242), Journal of Climate (3.513), and Water Research (4.546). In addition, a title change affects the Impact Factor for two years after the change is made, because the Web of Science does not unify the titles, unless they are in the same position alphabetically (Thomson Reuters 2012). In the first year after the title change, the impact factor is not available for the new title unless the data for old and new can be unified. In the second year, the impact factor is split. The new title may rank lower than expected and the old title may rank higher than expected because only one year of source data is included in its calculation (Thomson Reuters 2012). There is one example in Appendix 3 with this situation: Tecnología y Ciencias del Agua.

The titles unique to each database have a low impact (Web of Science) and prestige (Scopus). The validity of these research findings has been confirmed by similar results from analyses of other disciplines. A noteworthy example is the analysis of oncology journals unique to Scopus, and not covered by Web of Science, which tend to be "nationally oriented" (foreign) and "peripheral" (Lopez-Illescas et al. 2008, 244).

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Appendix 1

Earth and Atmospheric Sciences Sub-Disciplines

Appendix 1 (PDF)
http://www.istl.org/12-summer/refereed3-appendix1.pdf

Appendix 2

The earth and atmospheric sciences current journals unique to Scopus

Appendix 2 (PDF)
http://www.istl.org/12-summer/refereed3-appendix2.pdf

Appendix 3

Web of Science journals not currently covered in Scopus

Appendix 3 (PDF)
http://www.istl.org/12-summer/refereed3-appendix3.pdf