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Literature Analysis

How to

February 2020 | Version 0.3



ELECTRICAL
POWER SYSTEMS
TU GRAZ

The author does not guarantee the completeness and correctness of the information. Typing errors and changes reserved.

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1 Introduction

This “*How to...*” should be used as a practical user guide for basic bibliometric analysis to identify field of research in the reader’s research area. A literature analysis helps to defend your own research and gives a short answer on the question “*Why are you doing research in the field of...*”

In Figure 1 the research loop is depicted. To identify a research gap helps to focus and to defend your thesis.

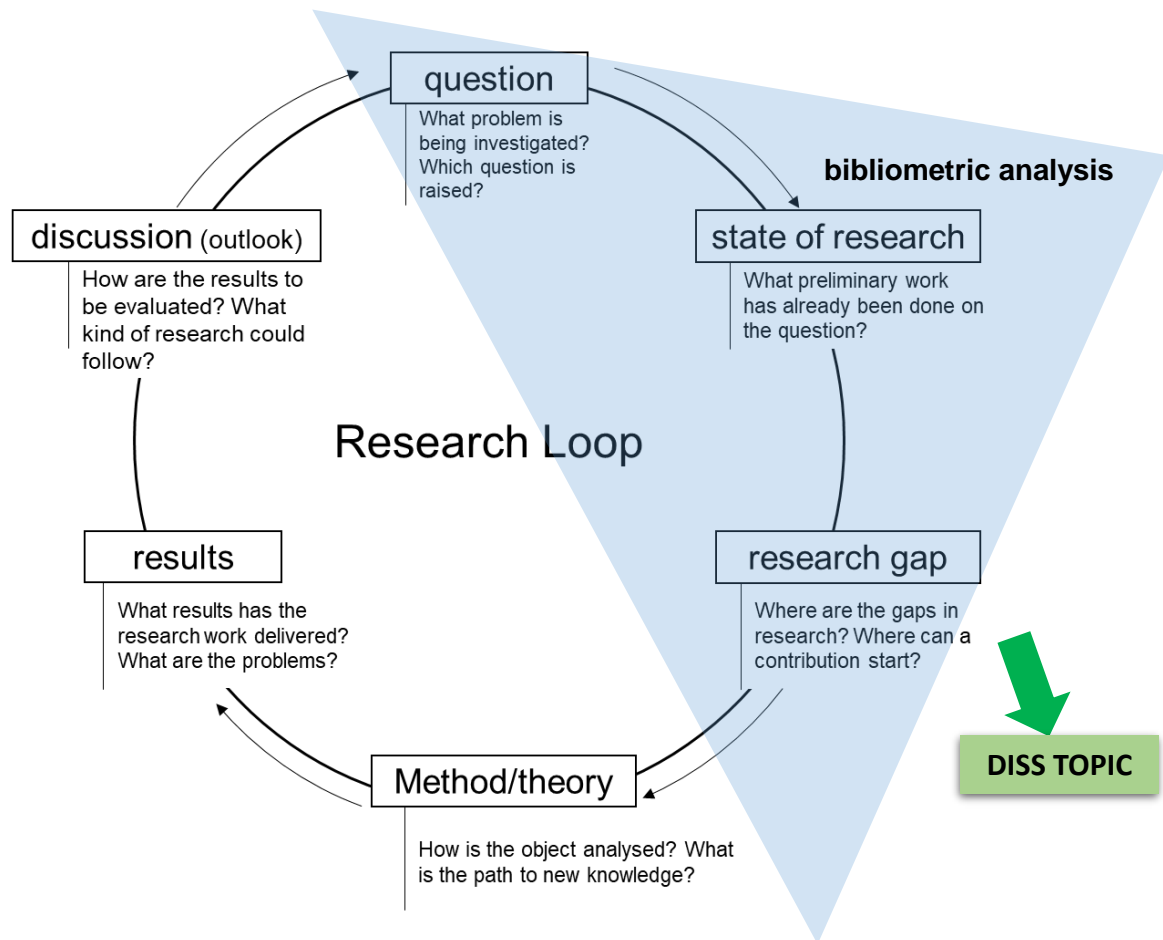


Figure 1: Research Loop

(© Schreibportal Uni Leipzig, <http://home.uni-leipzig.de/schreibportal/wp-content/uploads/2014/01/forschungskreislauf-neu.png>)

2 Bibliometric Analysis

2.1 What is a bibliometric analysis?

A bibliometric analysis is the use of statistical methods to analyse literature (articles, books, ...). For example, how many article are published by Graz University of Technology per year.

2.2 Research Question(s)

- Think about concise phrases, words or statements that your thesis deal with.
- For the justification that your question is previously unanswered, refer to the state of the art chapter/section.
- Describe why it is worthwhile to answer this question(s), by highlighting the advantages if these questions are answered.

2.3 Select key words

Table 1 shows the organization of search key words for three different topics. The number of combining topics can change from research topic to research topic.

Table 1: Search terms and structure – project search

		Topic 1	Topic 2	Topic 3
Name / Designation		Power networks	Transformer	Space Weather
	Synonyms	Power grid Power system		
Category		1) Power transmission network 2) Current Traction network	1) Power Transformer 2) Instrument Transformer	Geomagnetism
	Synonyms	2) railway traction network 2) railway traction system 2) railway traction grid	2) CT Current transformer 2) VT Voltage transformer	
		GIC Geomagnetically Induced Currents LFC Low Frequency currents Quasi DC	Saturation (Effects)	CME Coronal Mass Ejection
	Sub-category	Synonyms GMD Geomagnetic Disturbances Geomagnetic Storms	(Core) Saturation Half-Cycle Saturation Magnetizing Current DC Bias Magnetic Flux Magnetic curve Noise Vibration Direct Current	Solar Flares Geomagnetic Storms Solar activity Kp-Index NOAA K-Index
Category		Power Quality		Geomagnetically Induced Currents
	Synonyms			
	Sub-category	1) Harmonics 2) Reactive Power Demand		Plane-wave method
Category		Load Flow Analysis		
	Synonyms			
	Sub-category	DC Load Flow AC Load Flow Plane-wave method		
	Synonyms			
Category		DC Countermeasures		
	Synonyms	DCC DC Compensation DCBD DC Blocking Device		
	Sub-category			
Category	Synonyms			

*numbering shows different (sub-)categories

2.4 Select appropriate data base

To find an appropriate data base (1) check available literature (theses, book, papers,...) which journals, papers and books they are refer to. (2) Look for a data base, which is most likely to indexing most of the pre-reviewed literature.

In order to find as much related literature as possible with the least effort, check if your selected data base(s) indexing all the major literature and conferences (3). Most of the data bases offer a list of indexing literature sources. For example, Scopus is indexing more than 38,000 journals, including IEEE.

2.5 Boundaries for literature research and bibliometric analysis

To find an appropriate set of literature you probably need to define some boundaries for your literature research. The following boundaries should give you an idea for possible limitations.

Language

If you do a bibliometric analysis you don't read the papers, you are only processing the meta data of the literature. Therefore, you don't need to read the publications and you can include literature in languages you can't read. If you plan to also read the literature, it might be helpful to limit the search to languages you can read.

Year of publication

If special events or the availability of the technique is known, limit the years of publication to prevent to many literature matches.

Meta data to be searched

Select the meta data field which should be searched. For example, article title, abstract and key words or full-text.

Exclude phrases

Exclude phrases/words which are not related to your literature research or bibliometric analysis. Sometimes the same wording is used in more than one research field, but with different meanings.

Wildcards

Use available wildcards your search engine is offering you. With the wildcards you can include one word with different suffixes or word which are written different in other regions of the world. For example, *organization* (AE) and *organisation* (BE): *organi*ation*. For more information regarding wildcards, check the help in your data base.

3 Scopus, IEEE, Citavi and Excel for your bibliometric analysis

3.1 User Accounts

- Scopus: Sign in via University Account (see Figure 2)

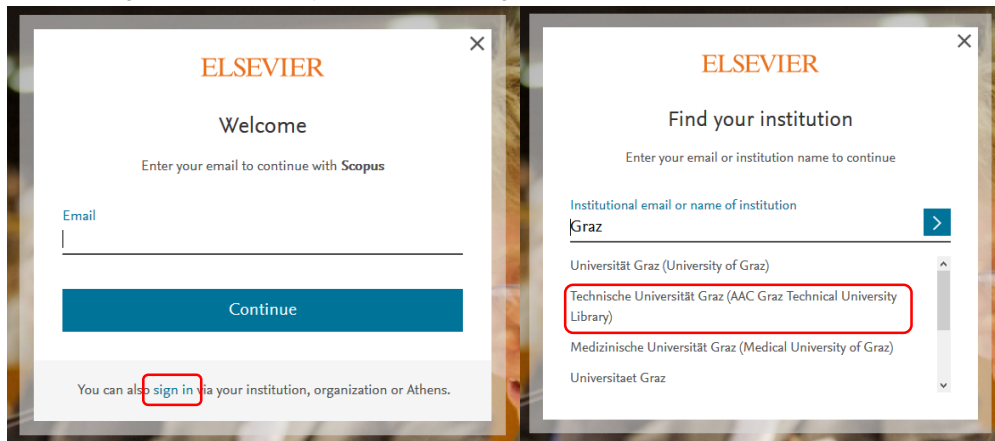


Figure 2: Scopus - Institution sign-in

- Citavi: Shareware - up to 100 title. You can get a full license from university.

3.2 Process Search Results manually

- 1.) Save all search results as .bib and/or as .ris-file
- 2.) Import .bib file in Citavi
- 3.) Export all titles from Citavi in an Excel file
 - a. Select data columns to be exported
- 4.) Process data in excel
 - a. use 2D-Bar diagram
 - b. use *Data > Sort & Filter* for an appropriate data representation
 - c. use *Data > Text to Columns* to give each author name one cell
 - d. use *Data > Remove Duplicates*
 - e. use function *COUNTIF()* (ZÄHLENWENN) to count results
- 5.) Create network plots, use VSOviewer (import .ris-file)

Interesting diagrams could be:

- Documents per year
- Documents per affiliation
- Documents per author
- Documents per sponsor
- Documents per countries
- Documents per language
- Documents per journal
- Documents per source
- Documents per subject area
- Number of used words in the title/abstract
- Number of used key words

3.3 Scopus with offered analysis

Scopus can be used to do a quick search result analysis. Figure 3 shows the Scopus homepage and the button *Analyse search results*.

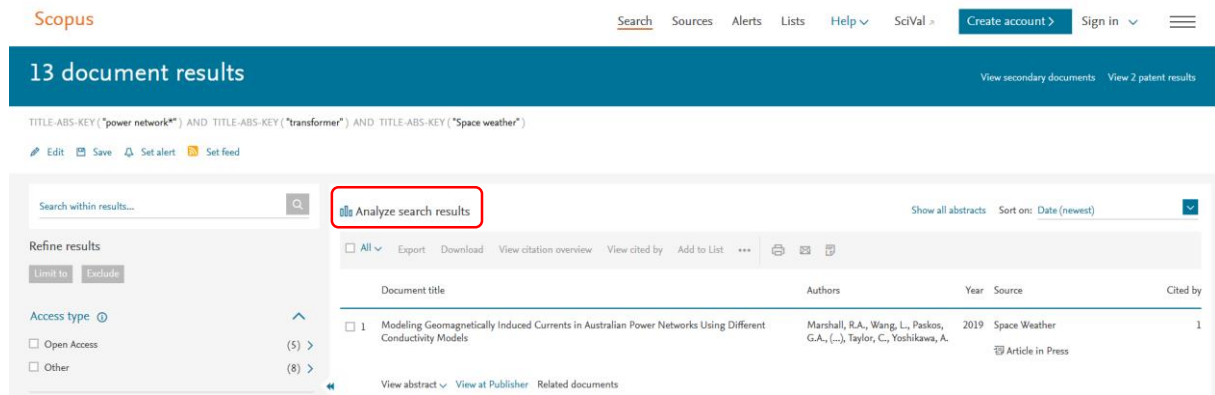


Figure 3: Use Scopus for a quick search result analysis

Figure 4 depicts the view on the Scopus *Analyse search results* window. To download the charts of the analysis, click on *Export* and select the desired file format (.csv or .zip). **Fehler! Verweisquelle konnte nicht gefunden werden.** depicts the downloaded analysis results of the affiliations of the authors from the search. The charts are downloaded as .jpeg, .png, .svg and .pdf.

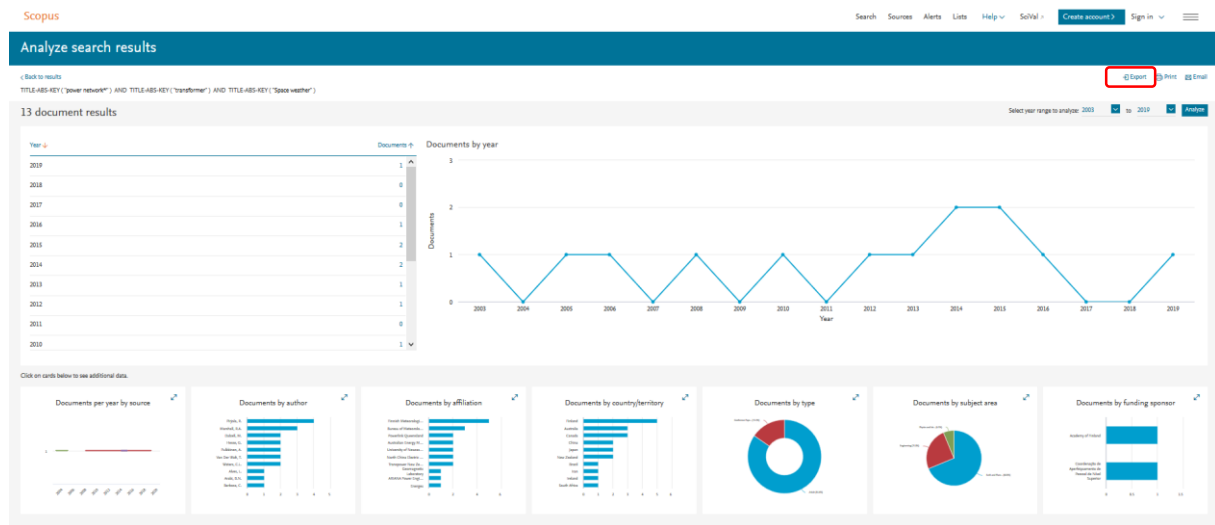



Figure 4: Scopus analyse search results view

3.3.1 Metrics in Scopus

Metrics should give an idea to the reader how much impact/reputation a publication/author has. Table 2 give overview of the metrics used by Scopus.

Table 2: Metrics used in Scopus

Metric	Range / Meaning	Meaning
Field-Weighted Citation Impact	>1	document is cited more than expected
Citation benchmarking	x th percentile	99 th = document is in the top 1 % globally
PlumX 	Green Purple Yellow Blue red	Usage Captures (readers, Bookmarks) Mentions (reviews, comments) Social Media Citations
Prominent percentile		Shows current momentum of a topic

3.3.2 A Bibliometric Analysis with Scopus – An Example

This section an example bibliometric analysis is performed regarding ***Low-Frequency Currents and Power Transformers***.

Table 3 show the oragnisation of key words and search terms. In Figure 5 the search results in Scopus are depicted. In the red box the corresponding keywords of the search results can be displayed. Those key word can give a hint for further search keys.

- Use *View secondary documents* – these results have limited access on Scopus
- Use *View xxx patents results* – related patents

Table 3: Search terms and structure - power transformers and the effect of LFC; measurement system

			Topic 1	Topic 2
Name / Designation			Power Transformer	Low-Frequency Currents
			Synonyms Power grid Power system	LFC
Category	Sub-category	Synonyms	1) Power Transformer* 2) Instrument Transformer*	Geomagnetically Induced Current*
			2) CT Current transformer 2) VT Voltage transformer	GIC, Induced Current*
			Saturation (Effects)	
			(Core) Saturation Half-Cycle Saturation Magnetizing Current DC Bias DC Bias Current DC-Bias DC Biased DC Magnetic Bias Bias Voltage Magnetic Flux Magnetic curve Noise Vibration* Direct Current	
Category	Sub-category	Synonyms	Power Quality	LFC Source*
			1) Harmonics 2) Reactive Power Demand	Classification, Class
Category	Sub-category	Synonyms	1) harmonic distortion 2) Reactive Power Loss, non-active power demand,	
			DC Countermeasures	
			DCC DC Compensation, Direct Current Compensation DCBD DC Blocking Device Mitigation, Compensation	
Category	Sub-category	Synonyms		

Wildcard: *

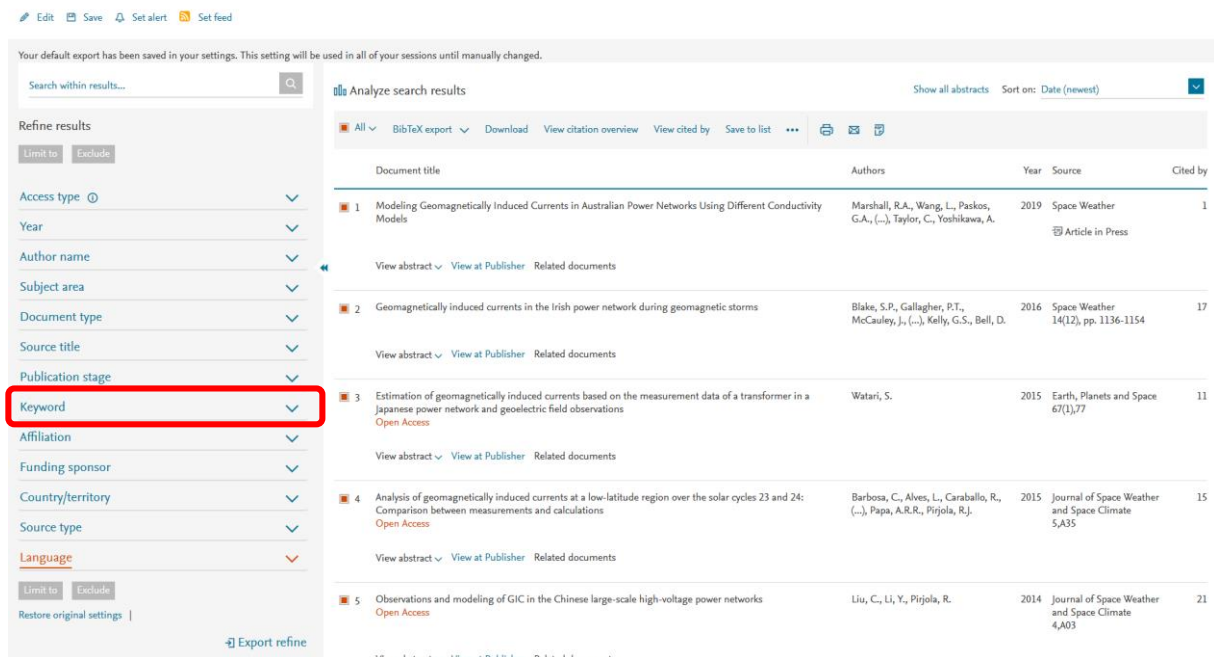


Figure 5: Search results from Scopus

Publications per Year

Total documents found: 321. This is the basis for this section. Figure 6 depicts the number of publications per year of the searched key 8. From Figure 6 we can conclude, that the interest in this topic increase significantly from year 2010 on. This could probably correlate with the solar cycle 24, started in 2008 with low activity. After 2010 the activity increased

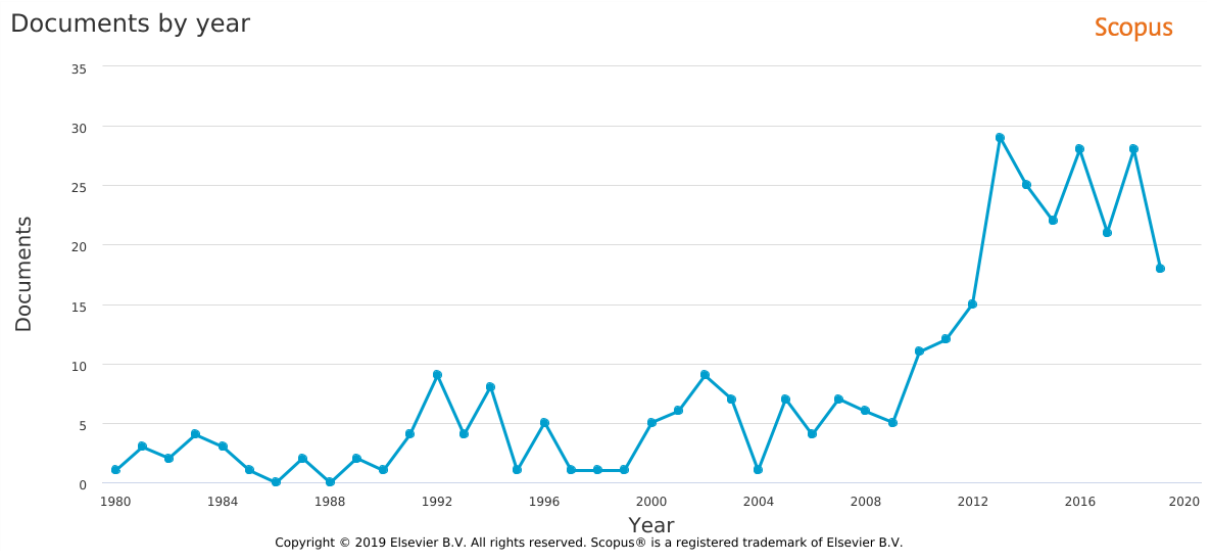


Figure 6: Publication related to LFC and power transformers (search key *8)

Publications per Author

Figure 7 depicts the 15 most publishing authors regarding search key 8. This figure can give a hint for co-authorship or joint research projects.

Documents by author

Compare the document counts for up to 15 authors.

Scopus

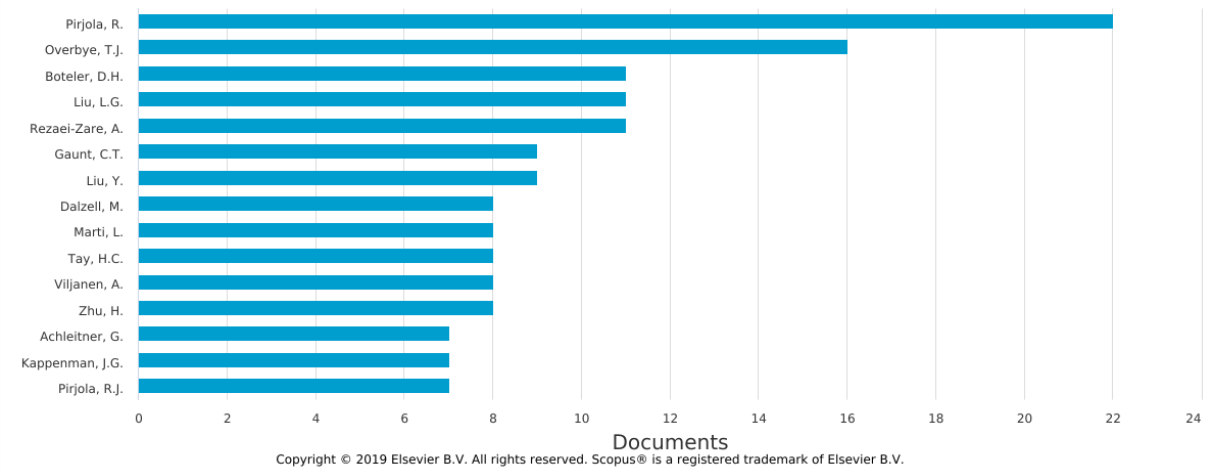


Figure 7: Publications per Author

Journals

In Figure 8 the number of published documents per source are depicted. The most documents are published in in *Space Weather* and *IEEE Transaction On Power Delivery*. Therefore, these two sources should give preference to upcoming publications.

Documents per year by source

Compare the document counts for up to 10 sources. Compare sources and view CiteScore, SJR, and SNIP data

Scopus

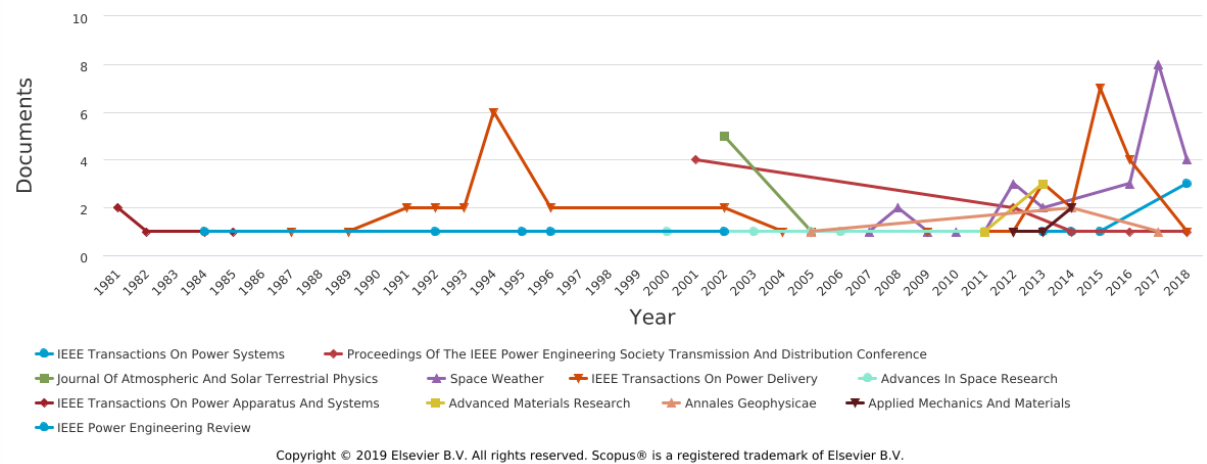


Figure 8: 15 most popular sources

In Figure 9 the number of documents per journals are depicted. From 2012 until 2019 the following journals published documents related to LFC and power transformers: *Journal of Space Weather and Space Climate*, *Journal of Applied Research And Technology*, *Journal of Electrical Engineering*, *Journal of Physic Conference Series*, *Journal of Astronomy And Space Science*. Therefore, the author(s) should aim for a publication in the *Journal Of Space Weather and Space Climate* or *Journal of Physic Conference Series*.

Documents per year by source

Compare the document counts for up to 10 sources. Compare sources and view CiteScore, SJR, and SNIP data

Scopus

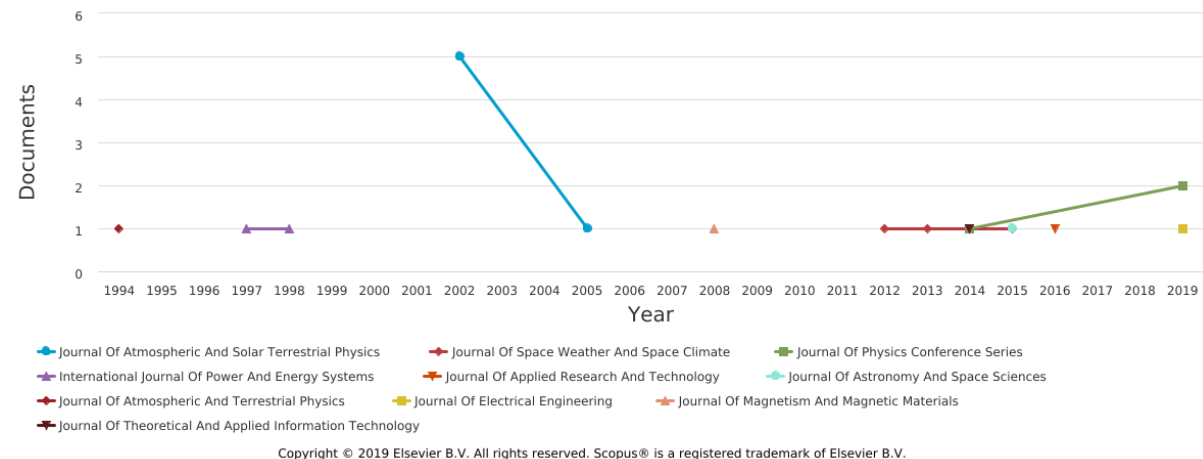


Figure 9: 15 most popular Journals

Table 4: Highly ranked Journals related to Figure 8

Document	Cite Score	SJR	SNIP
IEEE Transactions On Power Delivery	5.75	1.844	2.385
IEEE On Power Systems	8.94	3.14	2.888
Space Weather	3.14	1.185	1.578
Proceedings Of The IEEE Power Engineering Society Transmission And Distribution Conference	1.12	0.326	0.478
Journal of Atmospheric And Solar Terrestrial Physics	1.71	0.633	0.977
Advances In Space Research	1.97	0.589	1.186
IEEE Transaction On Power Apparatus And Systems	-	-	-
Advanced Materials Research	0.08	0.121	0.179
Annales Geophysicae	1.62	0.781	0.81
Applied Mechanics and Materials	0.07	0.112	0.0
IEEE Power Engineering Review	-	0.17	1.13

Affiliations

In Figure 10 the number of documents per affiliation are depicted (English publishing affiliations). The high ranking affiliations should be considered for a joint research project because of their interest in the searched research field.

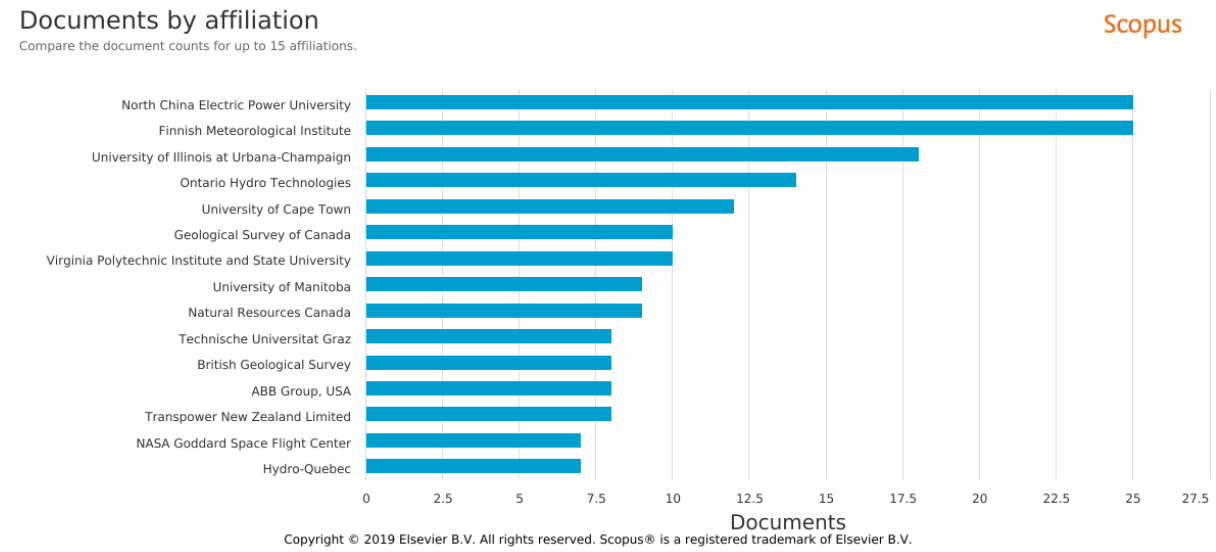


Figure 10: 15 most popular affiliations

In Figure 11 the number of documents per affiliations from Europe are depicted. For a joint research project, the Finnish Meteorological Institute or the British Geological Survey should be considered.

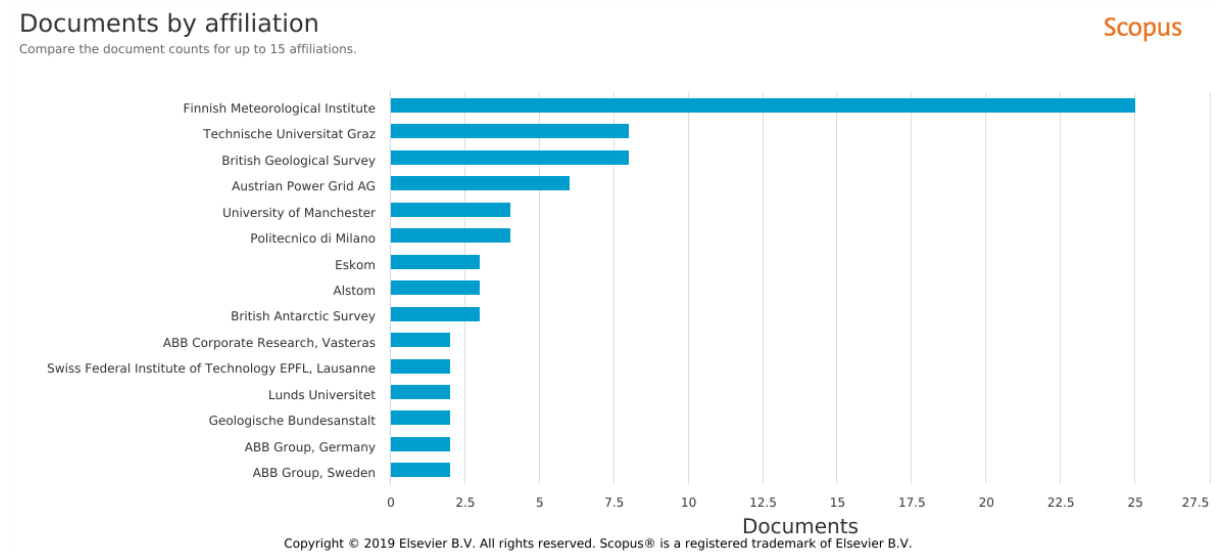


Figure 11: 15 most popular affiliation in Europe

For the following three geographical areas the three most publishing affiliations with the last publication year in brackets are listed below.

Affiliations for possible cooperation world-wide:

1. North China Electric Power University (2019)
2. Finnish Meteorological Institute (2016)
3. University of Illinois at Urbana-Champaign (2018)

Affiliations for possible cooperation in Europe:

1. Finish Meteorological Institute (2016)
2. British Geological Survey (2018)
3. University of Manchester (2018)

Countries

In Figure 12 the number of documents per country are depicted. The high ranking countries are the United States, Canada followed by China. From this figure we can conclude which countries are interested in this research topic and where further publication could come from or should be searched.

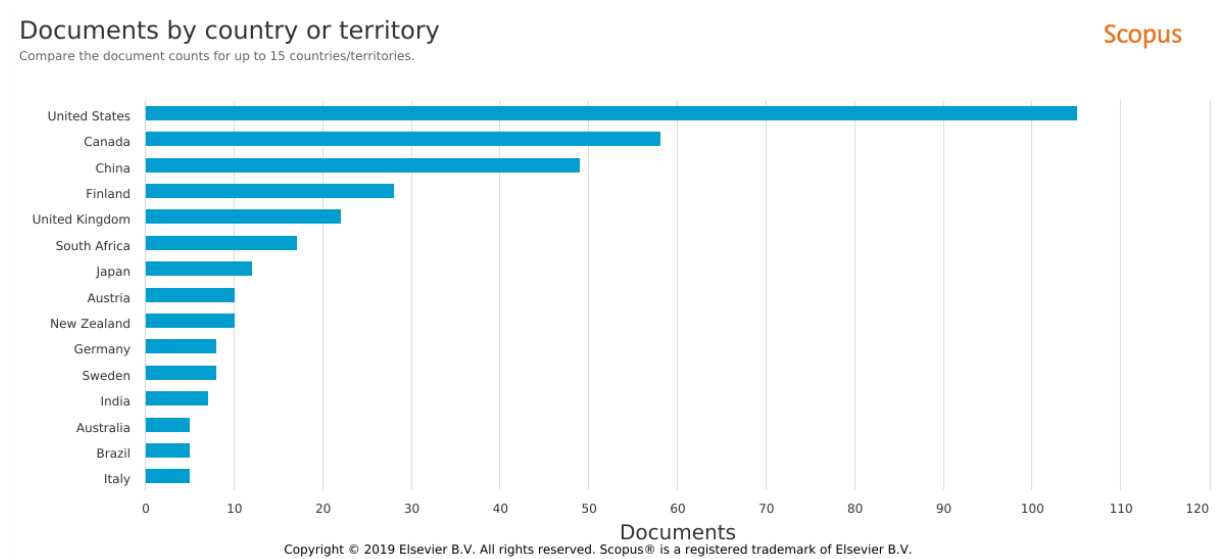


Figure 12: 15 most publishing countries

In Figure 13 the number of documents by European countries are depicted. Only Finland and the United Kingdom are publishing more documents in the present research field as Austria. We can conclude for the future, that more documents are published by these countries.

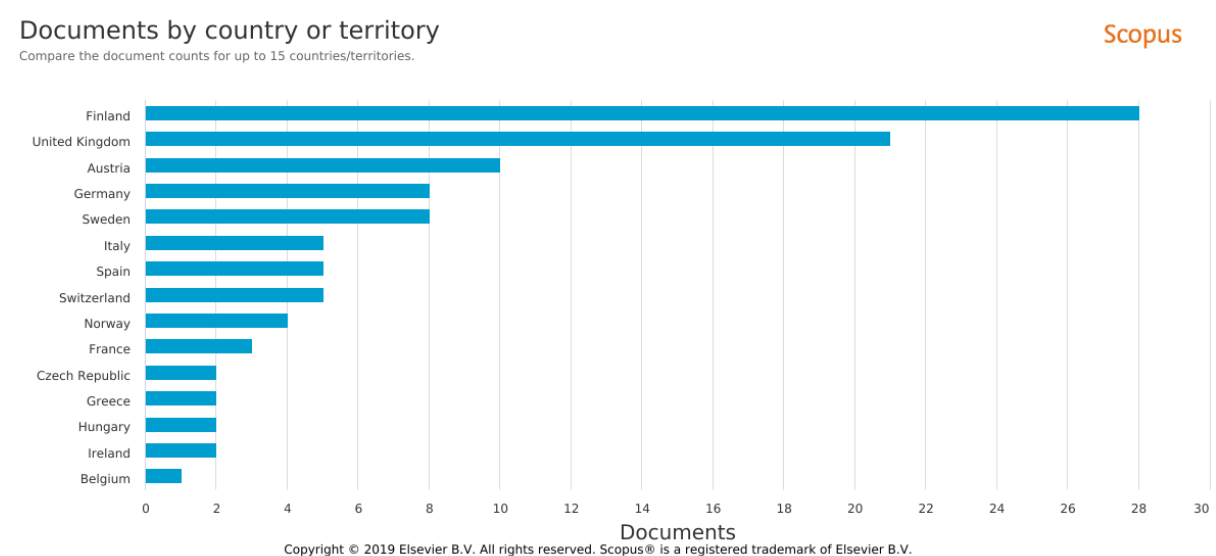


Figure 13: 15 most publishing countries from Europe

The most publishing countries in the world are:

1. United states
2. Canada
3. China

The most three publishing European countries are:

1. Finland
2. United Kingdom
3. Austria

Subject Areas

319 documents excluding the following subjected areas: Agricultural and Biological Sciences; Biochemistry, Genetics and Molecular Biology. Form Figure 14 we can conclude, that most documents (41.2 %) are related to engineering. For new publications the subject areas with lower percentage could be more interesting, due to lower number of publications.

Documents by subject area

Scopus

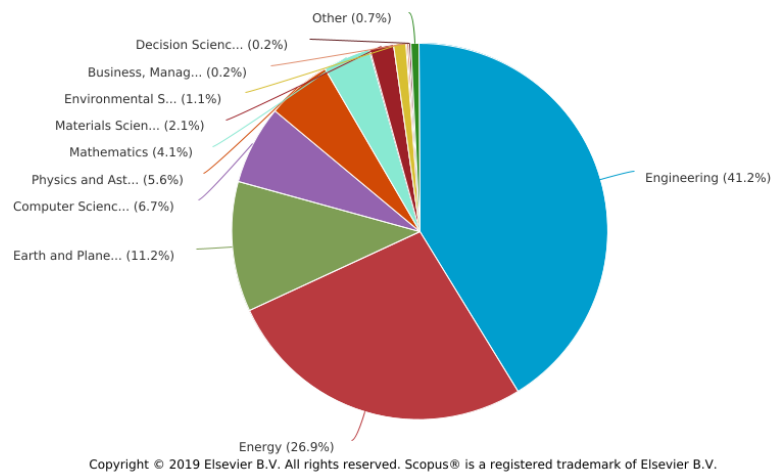


Figure 14: documents by subject area

Funding Sponsors

Figure 15 depicts the number of documents and the related sponsors. This figure can give a hint where to apply for further research project and joint research.

Documents by funding sponsor

Compare the document counts for up to 15 funding sponsors.

Scopus

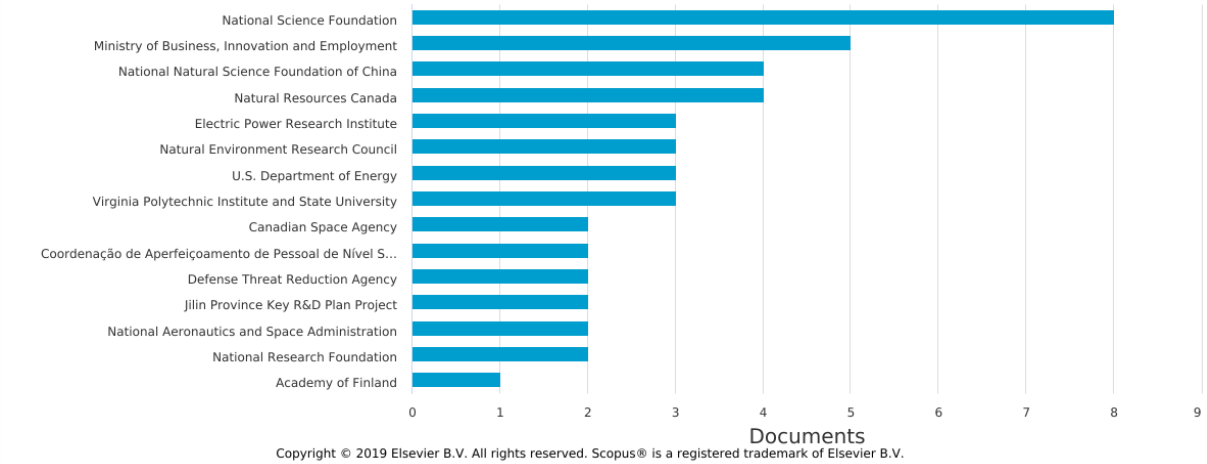


Figure 15: 15 most funding organizations

3.4 Presentation of search results and conclusions from the results

Project Research Areas

Only results in English are considered (basis: 321 documents), due to readability. Table 5 lists the number of publications related to the topics in the field of *Low Frequency Currents* and at the same time are related to the topics in the field of *power transformers*. The green marked fields show a low number of publications are show the research gap. Research work and publications should consider these fields.

Table 5: Research Areas and corresponding # of publication

		Low Frequency Currents		
		GIC	GIC OR Source	GIC OR Source OR Classification OR Class
Power Transformers	Monitoring OR Measurement OR Experiment	103 ^{*1}	14 ^{*18}	15 ^{*19}
	Experiment*, Monitoring, Measurement* AND Reactive Power OR Non-active Power	21 ^{*2}	14 ^{*30}	1 ^{*20}
	Power Quality OR Reactive/Apparent Power OR Harmonic*	110 ^{*3}	9 ^{*29}	9 ^{*21}
	Compensation OR Measurement*	87 ^{*4}	11 ^{*28}	13 ^{*22}
	Compensation* OR Mitigation*	31 ^{*5}	2 ^{*27}	3 ^{*23}
	Compensation*	7 ^{*9}	0 ^{*16}	0 ^{*17}
	Compensation* OR Mitigation* OR Modelling OR Simulation*	15 ^{*6}	19 ^{*26}	21 ^{*24}
	Experiment OR Monitoring OR Measurement, AND (Noise OR Vibration*)	10 ^{*7}	3 ^{*25}	3 ^{*25}
	Noise OR Vibration	16 ^{*13}	5 ^{*12}	5 ^{*12}
	Asymmetric*	10 ^{*14}	1 ^{*15}	1 ^{*15}

Legend | #: <10 10-20 21-50 >51

In the following figures the author and key word network are depicted. From these figures we can visualize the co-author network and the active years. Also the related key words are depicted and their actuality. From these figure we can adapt our key words for further literature analysis.

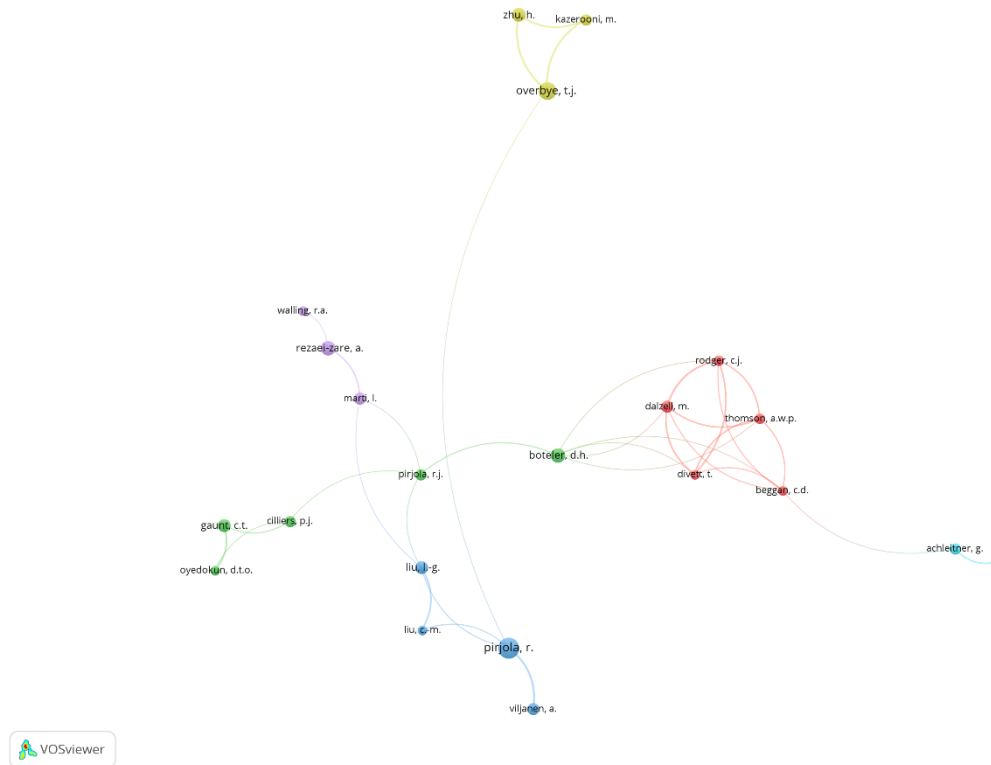


Figure 16: Example author network in VSOviewer

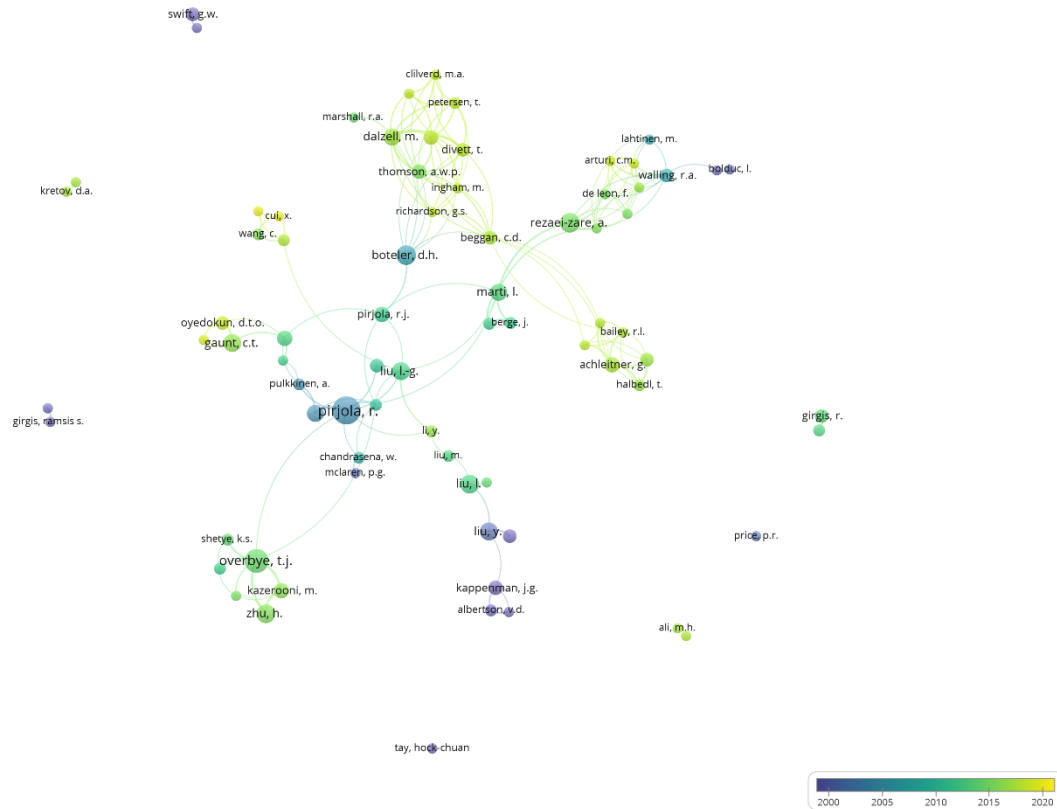


Figure 17: Authors and their most publishing years

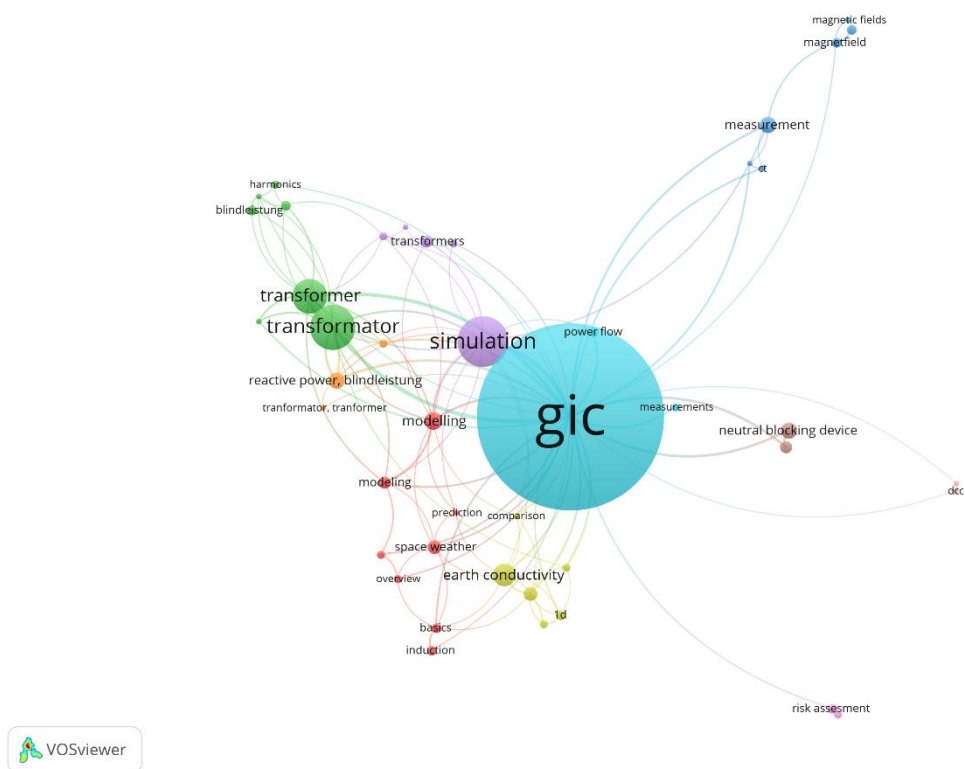


Figure 18: Example key word network in VSOviewer

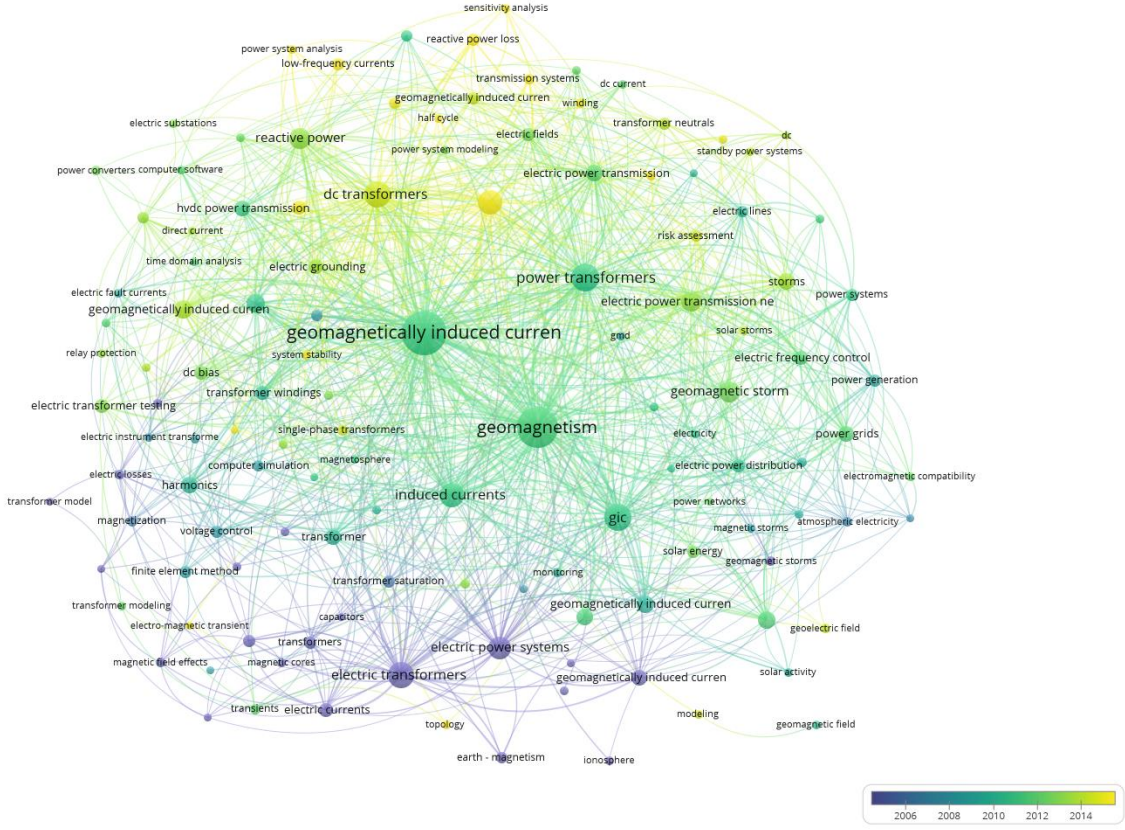


Figure 19: Key words and their most common used years of publication

4 Helpful Web Links

- Austrian standards | <http://lamp.tugraz.at/~karl/php/dbdetail3.php?nav=2,4,339,0>
(→ “effects 2.0”; if you can’t find a standard there write an email to order.bibliothek@tugraz.at)
- IEEE | [IEEE Wildcard Help](#)
- SpringerLink | <https://link.springer.com/>
- Springer DozentenPLUS (2 free books per semester (hard cover) | <https://www.springer.com/de/dozenten/dozentenplus>
- De Gruyter | <https://www.degruyter.com/>
- GoogleScholar | [GoogleScholar Wildcard Search Tips](#)
- Citavi “Literaturrecherche” | [Citavi Wildcard Searching](#)
- E-Cigré | <https://e-cigre.org/>
- Österreichische Bibliothekenverbund | <https://www.obvsg.at/>
- KIT Bibliothek | <https://www.bibliothek.kit.edu/cms/suchen-finden.php>
- TU Graz Library Search | <http://tugraz.summon.serialssolutions.com/#!/>
- ScienceDirect | www.sciencedirect.com
- Elsevier | <https://www.elsevier.com>
- Deutsche Nationalbibliothek | https://dnb.de/DE/Home/home_node.html
- ND LTD | <http://search.ndltd.org/> (PhD thesis database)
- ResearchGate | <https://www.researchgate.net/>
- Course on TUG: Finding scientific literature and publishing your texts | LV-No.: 940.930 (winter term seminar)
- Comparison of literature management tools:
[http://mediatum.ub.tum.de/node?id=1127579/](http://mediatum.ub.tum.de/node?id=1127579)
- academic.microsoft.com | quick overview of top authors, top journals, top conferences, top institutions
- Elektronische Zeitschriftenbibliothek | <https://rzblx1.uni-regensburg.de/ezeit/>

5 Helpful Software

Table 6: Software tools

Program	Use	Remarks
Citavi	Literature organisation; Word Plug-In, BibTex export to LaTeX	Share-Ware: up to 100 titles; full version: unlimited titles → free for TUG members/students
Visio	Drawing electrical circuit; IEAN-Shape bib on server	
LaTeX	e. g.: TeXstudio, MikeTex 2.9	
MindjetManager	Create MindMaps on the computer → use for brainstorming	
Microsoft Project	Organize your work and identify dependencies	
VOSviewer	Visualize the author network	Requires .RIS-file (can be created by Citavi)

6 Tips for your Publication

- Always use the same name (your name) in all publication. For example, Mustermann, M. and not ones Mustermann, K.. M. or Mustermann, M. K. In bibliometric analysis different wordings of your name will count as different authors.
- Citavi: Check if the author uses only one name. For example, Mustermann, M. or Mustermann, Max. If both names are used, Citavi treat them as two different authors.