

Content Analysis of Journal of Solar Physics Publication During 2014-2018 from Springer Link Database

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Abstract

This paper attempts to highlight the quantitative assessment of status of the Journal by way of analyzing the various features of Journal of Solar Physics. During 2014-2018 a total of 1061 Articles were published in the Journal of Solar Physics by researchers in various countries.

Keywords: Authorship pattern; International collaboration pattern; Communication channels.

INTRODUCTION

Content analysis is a highly flexible research method that has been widely used in library and information science (LIS) studies with varying research goals and objectives. The research method is applied in qualitative, quantitative, and sometimes mixed modes of research frameworks and employs a wide range of analytical techniques to generate findings and put them into context. This article characterizes content analysis as a systematic, rigorous approach to analyzing

documents obtained or generated in the course of research. It briefly describes the steps involved in content analysis, differentiates between quantitative and qualitative content analysis, and shows that content analysis serves the purposes of both quantitative research and qualitative research. The authors draw on selected LIS studies that have used content analysis to illustrate the concepts addressed in the article. The article also serves as a gateway to methodological books and articles that provide more detail about aspects of content analysis discussed only briefly in the article.

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OBJECTIVES OF THE STUDY

The main objective of the study is to analyze the content Analysis of solar physics journal and quantitative assessment of status of the journal by way of analyzing the following features of journal.

1. To find out year wise growth of publications.
2. To find out geographical distribution of research output.



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3. To find out the authorship and collaboration pattern in the publication.
4. To find out the extent of international collaboration.
5. To find out the most productive authors in the field.
6. To find out organization wise distribution of publication.
7. To find out the channels of communications used by the scientists.
8. To find out the high frequency keywords appeared in the channels of communication.

HYPOTHESIS OF THE STUDY

1. Authorship trend is towards multiple authored papers.
2. USA is the high productive country.
3. Majority of the affiliated Institution are from USA.

ANALYSIS OF "JOURNAL OF SOLAR PHYSICS"

In views of the objectives of the present study, analysis of Journal of Solar Physics" is presented further (Journal of Solar Physics, 2018).

SCOPE & LIMITATION OF THE STUDY

Scope of study is restricted to the journal of solar physics published during 2014 to 2018. The papers presented in the journal are analyzed using content analysis technique.

The present study is limited to the total numbers of 1061 papers published during 2014 to 2018.

Year Wise Publication Productivity And Collaboration Rate

The word publication means the act of publishing. Productivity refers to measures of output form production processes, per unit of input. Collaboration is a recursive process where two or more people or organizations work together toward an intersection of common goals.

Table 1: Year wise Publication Productivity and Collaboration Rate

Year	Single Author Publication	Multi Author Publication	Total Publication	Collaboration Rates
2014	30	245	275	0.89
2015	16	194	210	0.92
2016	16	197	213	0.92
2017	23	173	196	0.88
2018	16	151	167	0.90
Total	101	960	1061	0.90

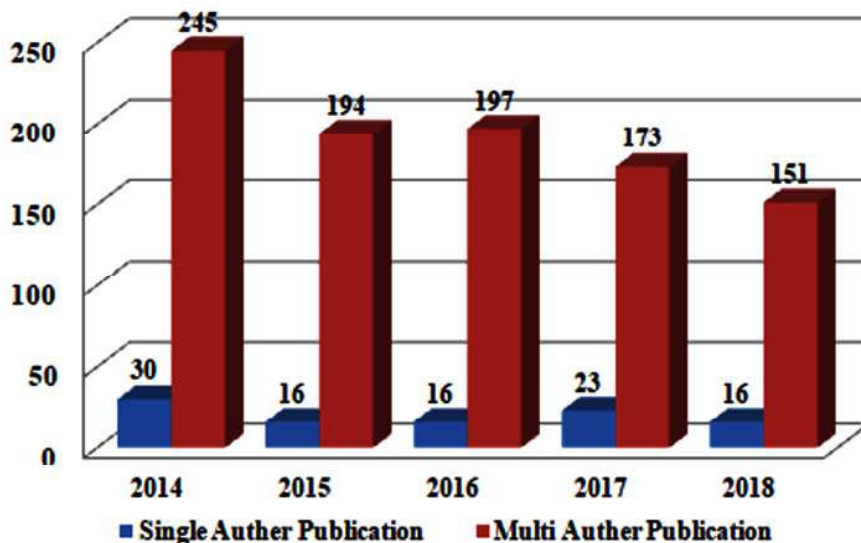


Fig. 1: Year wise Publication Productivity and Collaboration Rate

It can be observed from Table 1 & fig. 1 that during 2014-2018 a total of 1061 Articles were published in the Journal of Solar physics by researchers in various countries.

Geographical Distribution of Research Output

Geographical distribution of research output

means the article published from different Countries. In political geography and international politics, a country is a political division of a geographical entity. Frequently, but not exclusively, a sovereign territory, the term is most commonly associated with the notions of both state and nation, and also with government.

Table 2: Country wise Distribution of Articles

Sr. No.	Country	Publication	Percentage	Rank
1	USA	922	20.85	1
2	Russia	420	9.50	2
3	China	348	7.87	3
4	UK	313	7.08	4
5	India	276	6.24	5
6	France	254	5.74	6
7	Japan	193	4.36	7
8	Germany	150	3.39	8
9	Belgium	130	2.94	9
10	Spain	117	2.65	10

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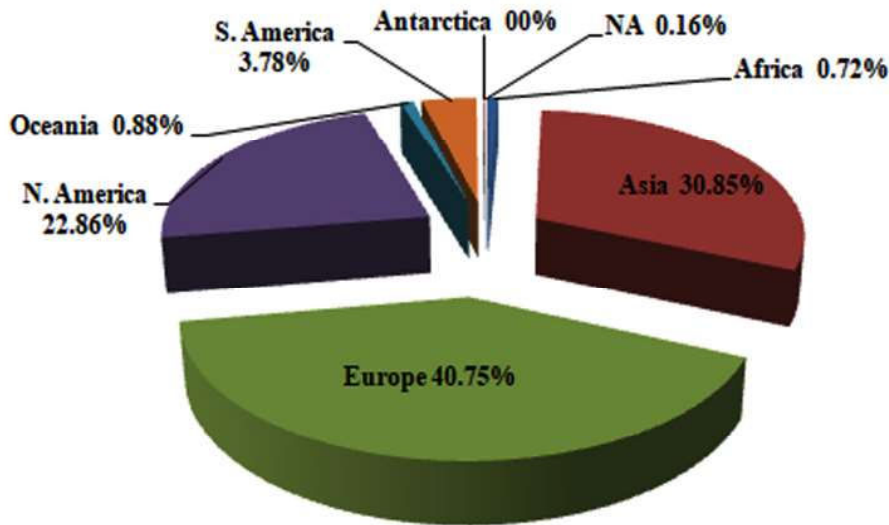


Fig. 2: Country wise Distribution of Articles

It can be observed from Table 2 and Fig. 2 that, there were as many as 70 countries carrying out research and produced 1061 articles. Table 5.2 provides ranked List of countries contributing to this field, the number of publications of each country and their share in percentages is the top producing country is USA with 922 publications (20.85%) of the total output. Therefore, the hypothesis, "USA is the high productive country" (Hypotheses No.2) is valid. It can be stated that USA being the publishing

country the output is more than other country.

Authorship and Collaboration Trend:

Gupta, D.K. Authorship is an observable phenomenon reflecting the contemporary scholarly practices clearly showing the communication, productivity and collaborative patterns and influences among researchers even though their quantities and qualities are not well understood. Collaboration in research is said to have taken

place when 2 or more persons work together on a scientific problem of project and effort, both physical and intellect.

Table 3: Authorship and Collaboration Trend

Year	Number of Papers With Various Authorship							Total
	Single	2	3	4	5	6	More than 6	
2014	30	61	53	46	28	19	38	275
2015	16	47	41	42	18	17	29	210
2016	16	46	54	37	20	17	23	213
2017	23	38	43	34	26	7	25	196
2018	16	26	29	32	19	16	29	167
Total	101	218	220	191	111	76	144	1061
%	9.52	20.55	20.74	18.00	10.46	7.16	13.57	100.00

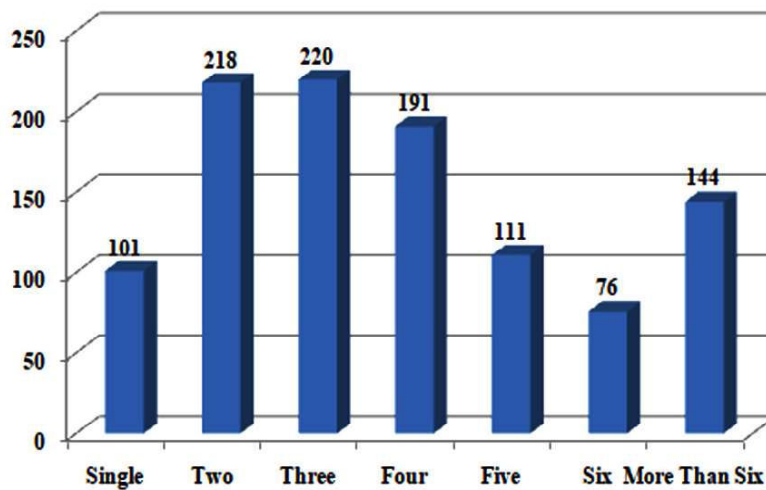


Fig. 3: Authorship and Collaboration Trend

It can be observed from Table 3 and Fig. 3 that, year wise authorship and collaboration trend is given in table 3 Authorship trend is towards multiple authored papers. Single authored papers accounted for 101 (9.52%). *Therefore, the hypothesis, "Authorship trend is towards multiple authored papers. (Hypothesis No.1) is valid.*

International Collaboration Pattern of Articles:

The International collaborative production of articles is the simultaneous action of many people who try to combine their ideas to make a new one. In fact collaborative is the process where two or more people work together toward a common goal and they don't required leadership.

Table 4: International Collaboration Pattern of Articles

Year	Single	Collaboration	Total No. of Publication
2014	204	71	275
2015	157	53	210
2016	171	42	213
2017	141	55	196
2018	119	48	167
Total	792	269	1061

The distribution of the collaboration of the various countries and their institutions respectively are given in the further table.

The distribution of the collaboration of the various countries and their institutions respectively are given in the further table. It can be observed

from the table 4 and table 4 that, out of 1061 articles, 269 articles are written in collaboration with International Institutions.

The country which has maximum collaboration is USA (224), Russia (118) China (115) UK (82), France and India (69) each, Brazil (44) Belgium (40) Germany (38) Argentina (36) Japan (34) Spain (31) Czech Republic and Greece (30) each, Austria (29), Italy and Poland (25) each, Korea (24) Croatia (22) Finland (21) Ukraine (20) Republic of Korea (16) Mexico (14) Switzerland (11) Saudi Arabia (10) each, Australia, Ireland and Slovenia (8), Canada(5), Denmark, Nepal, Portugal, and Romania (4) each,

Ethiopia, Hungary, Iran, Norway, Republic of Iran, Slovak Republic and South Korea (3) each, Bulgaria, South Africa, Trinidad and Tobago and Turkey (2) each, Algeria, Colombia, Egypt, Islands, Leuven, Madrid, Netherlands, Sweden, Taiwan, Netherlands, Wales (one) each, respectively.

Most Productive Author:

An author is defined both as "the person who originates or gives existence to anything" and as "one who sets forth written statements" in the Oxford English Dictionary.

Table 5: Most Productive Author

Sr. No.	Author	Country	Total	Percentage	Rank
1	Y. Yan	China	62	1.40	1
2	Janos Lichtenberger	Hungary	37	0.84	2
3	A. J. Vieau	France	29	0.66	3
4	M. Goto	Japan	28	0.63	4
5	C. A. Kletzing	USA	22	0.50	5
6	T. Yamamoto	Japan	20	0.45	6
7	N. Mujić	Bosnia and Herzegovina	19	0.43	7
8	M. Wiesmann	Norway	18	0.41	8
9	W. Schmutz	Switzerland	17	0.38	9
10	C. L. Li	C. L. Li	16	0.36	10
11	Joanne Choi	USA	16	0.36	10
12	Anatolyi Stepanov	Russia	15	0.34	11
13	E. Sanchez Diaz	France	15	0.34	11
14	Šimon Mackovjak	Slovak Republic	15	0.34	11
15	J. Trujillo Bueno	Spain	14	0.32	12
16	Theresa Lueftinger	Austria	13	0.29	13
17	D. Odstrčil	USA	13	0.29	13
18	D. Sluse	Belgium	13	0.29	13
19	H.-S. Yu	USA	12	0.27	14
20	M. Janvier	UK	12	0.27	14
21	T. Žic	Croatia	12	0.27	14
22	F. Y. Xu	China	12	0.27	14
23	I. Zouganelis	Spain	12	0.27	14
24	A. B. Sanin	Russia	12	0.27	14
25	Eleven Author 11x8	-	88	88.00	15
26	Ten Author 10x13	-	130	130.00	16
27	Nine Author 9x17	-	153	3.46	17
28	Eight Author 8x39	-	312	7.06	18
29	Seven Author 7x42	-	294	6.65	19
30	Six Author 6x76	-	456	10.31	20

31	Five Author 5x113	-	565	12.78	21
32	Four Author 4x196	-	784	17.73	22
33	Three Author 3x221	-	663	14.99	23
34	Two Author 2x213	-	426	9.63	24
35	Single Author 1x97	-	97	2.19	25
Total		-	4422	100.00	-

It can be observed from Table 5 that, the most productive authors are Janos Y. Yan (China) who had the highest number (62) of the publication, Janos Lichtenberger (Hungary), with (37) publication. A. J. Vieau (France) with 29 publications each. Eight Authors with 312 publications. Seven Authors with 294 publications. Six Authors with 456 publications. Five Authors with 565 publications. Four Authors with 784 publications. Three Authors with 663 publications. Two Authors with 426 publications. Single Authors with 97 publications.

Institutes wise distribution of articles published

Institution is a society or organization for the promotion of science, education etc. An institute is a permanent organizational body created for a certain purpose. Often it is a research organization (research institution) created to do research on specific topics. An institute can also be a professional body. In some countries institutes can be part of a university or other institution of higher education, either as a group of departments or an autonomous educational institution without a classic full university status such as a University Institute.

Table 6: Institutes wise distribution of articles

Sr. No.	Institute	No. of Publication	Percentage	Rank
1	Indian Institute of Astrophysics, Bangalore, India	55	1.24	1
2	Institute of Solar-Terrestrial Physics SB RAS, Irkutsk, Russia	53	1.20	2
3	Shandong Provincial Key Laboratory of Optical Astronomy and Solar-Terrestrial Environment, School of Space Science and Physics, Shandong University at Weihai, Weihai, China	51	1.15	3
4	NASA Goddard Space Flight Center, Greenbelt, USA	46	1.04	4
5	National Solar Observatory, Tucson, USA	44	1.00	5
6	Yunnan Observatories, Chinese Academy of Sciences, Kunming, China	42	0.95	6
7	W.W. Hansen Experimental Physics Laboratory, Stanford University, Stanford, USA	41	0.93	7

Truncated

It can be observed from Table 6 that, there were 4422 organizations involved in research activity. The organization that have contributed in the publication during 2014 - 2018. Indian Institute of Astrophysics, Bangalore, India topped the list with 55 publication, Institute of Solar Terrestrial Physics SB RAS, Irkutsk, Russia second number with 53 publication, Shandong Provincial Key Laboratory of Optical Astronomy and Solar-Terrestrial Environment, School of Space Science and Physics, Shandong University at Weihai, China is the Third rank 51 publication. Two Institutes with 277 publications each, Three Institutes with 127 publications each, Four Institutes with 84 publications each, Five institutes with 44

publications Six Institutes with 39 publications each, seven institutes with 31 publications each and 547 institutions with single publication each. Therefore the hypothesis "Majority of the affiliated institution are from USA (Hypothesis No.3) is valid".

Distribution of Literature In Various Channels of Communication

Channel, in communications, refers to the medium used to convey information from a sender (or transmitter) to a receiver. Researchers communicated their publication through variety of communication channels.

Table 7: Distribution of literature in various Channels of Communication

Sr. No.	Document Type	Number of Publication	Percentage
1	Original Paper	828	78.04
2	Sunspot Number Recalibration	36	3.39
3	Earth affecting Solar Transients	35	3.30
4	Waves in the Solar Corona	21	1.98
5	Solar Cycle 24 as seen by SDO	17	1.60
6	Solar Origins of Space Weather and Space Climate	17	1.60
7	New Eyes Looking At Solar Activity	16	1.51
8	Solar and Stellar Flares	16	1.51
9	Radio and Space based Observations	15	1.41
10	Radio Heliophysics: Science and Forecasting	15	1.41
11	Erratum	13	1.23
12	Editorial	9	0.75
13	Probing the Sun: Inside and Out	8	0.75
14	Memoirs	5	0.47
15	Correction	4	0.38
16	Invited Review	3	0.28
17	Obituary	3	0.28
Total		1061	100

It can be observed from table no. 07 that, Researchers communicated their publication through variety of communication channels, 828 (78.04%) of the Literature was published in Original Paper followed by Sunspot Number Recalibration 36 (3.39%), Earth affecting Solar Transients 35 (3.30%), Waves in the Solar Corona 21 (1.98%), Solar Cycle 24 as seen by SDO and Solar Origins of Space Weather and Space Climate 17 (1.60%), New Eyes Looking At Solar Activity and Solar and Stellar Flares 16 (1.51%), Radio and Space based Observations and Radio Heliophysics Science and Forecasting 15 (1.41%), Erratum 13 (1.23%), Editorial and Probing the Sun: Inside and Out 8 (0.75%), Memoirs 5 (0.47%), Correction 4 (0.38%), Invited Review and Obituary (0.28%) The total content journal of solar physics that is, Original Paper, Sunspot Number Recalibration, Earth

affecting Solar Transients, etc. is analyzed.

Distribution of Keywords

A word occurring natural language text of documents or its surrogate that is considered significant for indexing and information retrieval. Keywords are the words that are used to reveal the internal structure of an author's reasoning. Keywords are one of the best scientometric indicators to understand the graspinstantaneously the thought content of the articles and to find out the growth of the subject field. By analyzing the keywords appeared either on the title or article will help in knowing in which direction the knowledge grows. Keyword is a word that succinctly and accurately describes the subject discussed in a document.

Table 8: Keywords

Sr. No.	Keywords	Total	Percentage	Rank
1	Coronal mass ejections	97	2.52	1
2	Solar wind	77	2.00	2
3	Magnetic fields	60	1.56	3
4	Sunspots	60	1.56	3
5	Solar cycle	58	1.51	4
6	Solar cycle observations	56	1.45	5

7	Flares	55	1.43	6
8	Corona	48	1.25	7
9	Instrumentation and data management	44	1.14	8
10	Magnetic fields photosphere	43	1.12	9

Truncated

Journal of Solar Physics Founded in 1967, this has been the principal journal for the publication of fundamental research on the Sun for five decades. All aspects of solar physics are reported on. Coverage ranges from the internal structure of the Sun and its evolution to the outer corona and solar wind in interplanetary space. Solar Physics publishes papers on solar terrestrial physics and on stellar research as well, where they contribute directly to our understanding of the Sun.

The average numbers of articles published per year were 100. The highest numbers of Articles (275) were produced in 2014. There were as many as 70 countries carrying out research and produced 1061 articles. USA is the top producing country with 922 publications (36.98) of the total output. Authorship trend is towards multiple authored papers. Single authored papers accounted for 9.52 %. Out of 1061 articles, 76 articles (7.16%) are written in collaboration with International Institutions. The collaboration is observed with two countries and three countries. The most productive author is Y. Yan who had the highest number (62) of the publication. There were 4422 organizations involved in research activity. Researchers communicated their publication through variety of communication channels, 828(78.04%) of the Literature was published in Original Paper followed by Sunspot Number Recalibration 36(3.39%), Earth affecting Solar Transients 35 (3.30%), Waves in the Solar Corona 21(1.98%), Solar Cycle 24 as seen by SDO and Solar Origins of Space Weather and Space Climate 17(1.60%), New Eyes Looking At Solar Activity and Solar and Stellar Flares 16(1.51%), Radio and Space based Observations and Radio Heliophysics Science and Forecasting 15(1.41%), Erratum 13(1.23%), Editorial and Probing the Sun: Inside and Out 8(0.75), Memoirs 5(0.47%), Correction 4(0.38), Invited Review and

Obituary (0.28%), The total content journal of solar physics that is, Original Paper, Sunspot Number Recalibration, Earth affecting Solar Transients, etc. Keywords are one of that best scientometric indicators to understand the grasp instantaneously the thought content of the articles and to find out the growth of the subject filed. By analyzing the keywords appeared either on the title or article will help in knowing in which direction the knowledge grows. The high frequency keywords were Coronal mass ejections 97 (2.52%), Solar wind 77 (2%), Magnetic fields and Sunspots 60 (1.56%), Solar cycle 58 (1.51%), Solar cycle observations 56 (1.45), Table 8 gives a list of keywords appeared in the articles.

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