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Global Aurora Research: A scientometric analysis of research output during 2006-2015

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ABSTRACT

This study analyses the auroral research output from all over the world during 2006-2015 and highlighted the growth, most prolific countries, sub-disciplines, most prolific journal and most prolific institutions. Data for this study retrieve from Science Citation Index-Expanded by following key term strategy for particular study period 2006-2015. Total 7606 data retrieve in this study. USA got the first rank with highest publication (3495). Astronomy Astrophysics traced as the highest contributing sub-discipline followed by Cell biology and Oncology. University of California contributed the highest publications in this field and got first rank in institutions. Journal of Geophysical Research Space Physics traced as most preferable journal for researcher in this field followed by Annales of Geophysics.

Key Words: Scientometrics, CAGR, Aurora

1. INTRODUCTION

The Aurora is luminosity scaused by collisions between electrically charged particles released from the sun that enter the earth's atmosphere and collide with natural atmosphere. The lights are seen in the auroral oval situated between 70 to 80^0 latitude in northern and southern hemispheres. Auroras that occur in the northern hemisphere are called 'Aurora Borealis' or 'northern light' and auroras that occur in the southern hemisphere are called 'Aurora Australis' or 'southern lights'. The Auroral displays can appear in many colours like red, yellow, blue, violet and green (although green is the most common) and in many forms like arcs, rippling curtains or shooting rays that light up the sky with an incredible glow. Auroras are the result of collisions between gaseous particles (in the Earth's atmosphere) with charged particles (released from the sun's atmosphere). Auroras are a spectacular sign that our planet is electrically connected to the sun.

The dancing lights of the aurora provide spectacular views on the ground, but also capture the imagination of physicist who study incoming energy and particles from the sun. NASA's suits of helophysics spacecraft track how events on the sun affects near Earth space, including several missions dedicated to auroral studies. NASA and several other organizations and scientists are engaged in researches on aurora because auroras are one symptom of a larger space weather system in which solar material and radiation can affect Earth's own magnetic environment and block radio communications, disturb onboard satellite computers, or at their worst cause electrical surges in power grids. Bibliometric /scientometric studies are appropriate to trace the total research output on aurora globally. In this performance evaluation age this kind of study are very helpful to trace our weaknesses and strength.

Publication profile is an indicator of the scientific activity of a country. Many important observations can be derived by studying scientific publication through their bibliographic features such as name and affiliation of author. During the last few years, several scientometric study has been increasingly used to evaluate research performance of countries, institutions and nations as a whole. Jain & Garg (1992) evaluated Laser research in India, Joshi et al.(2010) forest fungal research, Garg et al. (2013) Japanese Encephelitis research, Dwivedi, S. et al.(2015) organic chemistry research of India, Dwivedi, Sandhya(2016) global allergy research.

2. OBJECTIVE

The specific objectives of the study are as follows:

- To study the growth pattern of aurora research output of world during 2005-2014.
- To study the most prolific countries involved in aurora research.
- To examine the sub-discipline aurora research.
- To examine most prolific institutions.
- To map the highly productive journals

3. METHDOLOGY

Data for this study retrieved from Web of Science, Science Citation Index –Expanded (a product of Thomson Reuters). Data retrieved with the help of topic search selection for the period of study2006-2015. Data downloaded on excel sheets on various key terms "ionosphere-magnetosphere coupling" OR "auroral electrodynamics" OR "plasma sheet boundary layer", then removed the duplicate data. Complete bibliographic detail like document type, author, affiliation are downloaded for each data. Data arranged country wise and analysed with the help of scientometric tools. Total 7606 data retrieved in this study.

4. ANALYSIS

4.1 Pattern and growth of research output

Auroral research shows increase in publications during period of ten year. Minimum 573 publications observed in 2006 and maximum publications in 2014 (873). The graph shows continuous increase from 2006 to 2008 and from 2008 to 2015 graph shows up and down in alternate year.

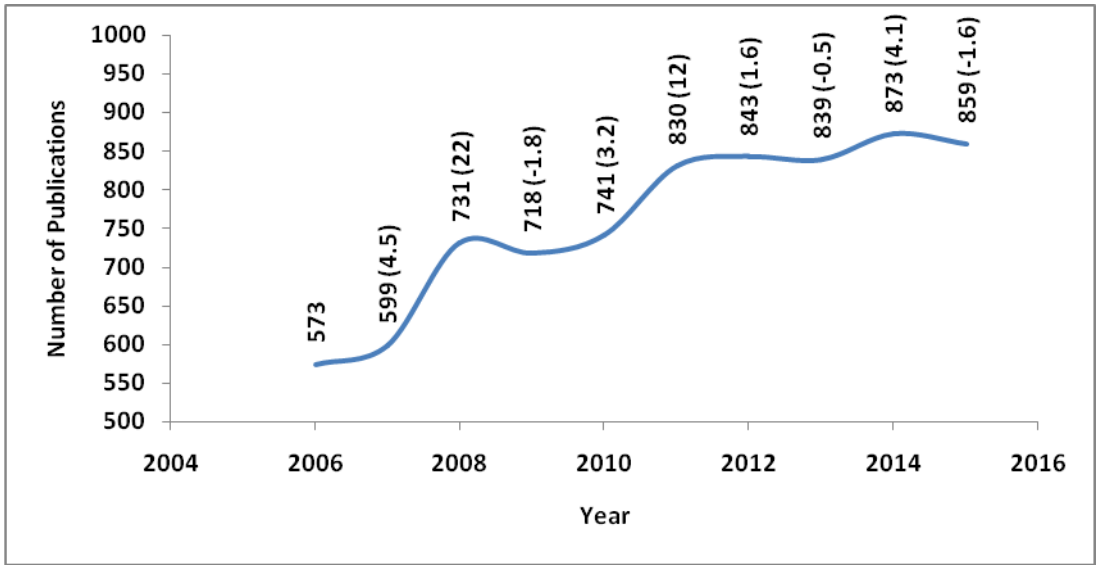

Fig. 1--Growth pattern of aurora publication output

Growth rate is being measured with Compound Annual Growth Rate (CAGR) (*Choi et al., 2011*). The mathematical formula of CAGR is as below:

$$CAGR = \left(\frac{EndingValue}{BeginingValue} \right)^{1/n-1} - 1$$

Table 1 describes the (CAGR) compound annual growth rate yearly. This table indicates maximum growth observed in year 2008 and negative growth observed in 2009, 2013 and 2015.

Table 1: Yearly CAGR

Year	No. of Publications	CAGR
2006	573	
2007	599	4.54
2008	731	22.04
2009	718	-1.78
2010	741	3.2
2011	830	12.01
2012	843	1.57
2013	839	-0.47
2014	873	4.05
2015	859	-1.60

4.2Prolific Countries

Table 2 lists the most prolific countries in aurora research. Table shows USA got the first rank with 3495 publications and 68120 citations followed by England (910) and Japan (793). Table also shows that England has tenth position in citations. India scored 15th rank with 182 publications.

Table 2: Prolific countries with number of papers

Countries	No. of Publications	Citation
USA	3495	68120
England	910	1744
Japan	793	13749
Peoples R China	751	7227
Germany	672	14428

France	554	8594
Canada	403	4982
Italy	351	8263
Russia	280	2227
Spain	242	3620

4.3Sub-discipline

Table 3 shows the top 10 sub-disciplines. Most of the publications in auroral research come under the astronomy/astrophysics followed by cell biology with 1489.

Table 3: Top ten sub-disciplines

Sub-discipline	**No. of Publications**
Astronomy Astrophysics	1559
Cell Biology	1489
Oncology	1184
Biochemsitry Molecular Biology	1011
Geology	655
Meteorology Atmospheric Sciences	588
Pharmacology Pharmacy	434
Geochemistry Geophysics	311
Genetics Heredity	273
Engineering	225

4.4Prolific journals

Table 4 shows the top 10 journals used for publishing the papers. Maximum (828) papers are published in *Journal of Geophysical Research-Space Physics* followed by *Annales of Geophysics* with 277 publications.

Table 4: Top 10 publishing journals

Journals	**No. of Publications**
Journal Of Geophysical Research space Physics	828
Annales of Geophysics	277
Cell Cycle(USA)	168
Geophysical Research Letters(USA)	156
Journal of Atmospheric and Solar Terrestrial	128

Physics	
Plos One (USA)	127
Journal Of Cell Biology (USA)	124
Journal Of Biological Chemistry (USA)	107
Molecular Biology Of Cell	100
Journal of Cell Science (UK)	97
Advances in Space Research (UK)	96

4.5 Prolific Institution

Table 5 shows the top 10 publishing institutions. University of California System, USA published maximum 526 publications followed by Centre National De La Recherche Scientifique CNRS, France with 297 publications.

Table 5: Top ten institutions

Institution	**No. of Publications**
University of California System, USA	526
Centre National De La Recherche Scientifique CNRS, France	297
University of London, UK	262
University of California Berkeley, USA	231
John Hopkins University, USA	223
Chinese Academy of Sciences, China	216
National Aeronautics Space Administration NASA, USA	202
University College London, UK	199
Max Planck Society, Germany	195
John Hopkins University Applied Physics laboratory, USA	183
Russian Academy of Sciences, Russia	182

4.6 Prolific Authors

Table 6 shows the list of prolific authors. *Angelopoulos, University of California , USA* published maximum 99 papers and also scores maximum citation (1983), followed by *Reme, University Tolouse, France* with 54 publications.

Table 6. Prolific Authors

Authors	Address	No. of pub	Citation

Angelopoulos V.	University California, Los Angeles, USA	99	1983
Reme, H.	University Tolouse, France	54	693
Cowley, S.W.H.	University Leicester, England	41	832
Gerard, J.C.	University Leige, Belgium	53	1276
Grodent, D.	University Leige, Belgium	50	1142
Frey, H.U.	University California Berkeley, USA	47	416
Milan, S.E.	University Leicester, England	48	516
Donovan E	University Calgary, Canada	45	663
Lyons, L.R.	University California Los Angels, USA	42	580
Miyoshi, Y.	Nagoya University, Japan	41	519

5. CONCLUSIONS

- Maximum (873) publications published in 2014 and minimum 573 publications are reported in 2006. Maximum growth 22.04 observed in the year 2008, while negative growth observed in 2009, 2013 and 2015
- USA published maximum 3495 publications followed by England 910. India scored 15th rank with 182 publications. Astronomy/Astrophysics has maximum number (1559) of papers.
- Journal Geophysical Research-Space Physics is the most popular journal in the concern field.
- University of California System (USA) published maximum (526) papers in auroral physics.
- *Angelopoulos, University of California , USA* published maximum 99 papers and also scores maximum citation (1983)

6. ACKNOWLEDGEMENT

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7. REFERENCES

[1]. Jain, A. and Garg K.C. (1992). Laser research in India: scientometric study and model projections. Scientometrics, 23(3), 395-415.

[2]. Joshi, K., Kshitij, A. and Garg K.C.(2010). Scientometric proile of global forest fungal research. *Annales of Library and Information Stuies*, 57, 130-139.

[3]. Dwivedi, S., Kumar, S. and Garg, K.C. (2015) Scientometric profile of organic chemistry research in India during 2004-2013, *Current Science*, 109(5): 869-877.

[4]. Choi, Dong Geun, Lee, Hesang, Sung, Tae-Kyung(2011). Research profiling for 'standarization and innovation'. Scientometrics, 88: 259-278. doi:10.1007/s11192-011-0344-7

[5]. Dwivedi, Sandhya (2016). Global allergy research during 1994-2013: a scientometric study. *Annales of Library and Information studies*, 63, 16-23.

[6]. Garg, K.C., Dwivedi, Sandhya. & Kumar, S. (2013). Scientometric profile of vectorborn diseases: a case study of global Japaneses Encephelitis Research. *SRELS Journal of Information Management*, 50, 543-554.

