

Bibliometrics: Atmospheric Properties and Structure

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ABSTRACT

Research on atmospheric properties and structure and air quality has become a topic of increasing interest due to the increasing impacts of climate change and environmental degradation. This study aims to analyze publication and citation trends related to atmospheric topics from 2014 to 2024, with a focus on the distribution of research topics, country contributions, and journal sources. Bibliometric analysis was conducted using the Scopus database with the Publish or Perish application, to identify publication patterns, productivity growth, and a significant decrease in the number of citations after 2020. The results show that China and the United States are the main contributors to the number of atmospheric publications, with topics dominated by air pollution emissions and changes in atmospheric chemical composition. However, since 2020, there has been a sharp decline in productivity and citations that coincides with changes in global scientific policies and priorities. These findings provide important insights into the dynamics of atmospheric research, and suggest the need for new strategies to maintain the relevance and sustainability of research in this field. This study is expected to contribute to steering atmospheric research in a direction that is more responsive to global environmental challenges.

KEYWORDS : atmospheric properties, atmospheric structure, air quality



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INTRODUCTION

Perubahan iklim dan degradasi kualitas udara telah menjadi isu global yang semakin mendesak dalam beberapa 120rasti terakhir. Dampak aktivitas manusia terhadap atmosfer, emisi gas rumah kaca, serta perubahan komposisi kimia dan fisik atmosfer menjadi perhatian utama dalam penelitian lingkungan di berbagai belahan dunia. Kajian-kajian ini tidak hanya penting dalam memahami fenomena atmosferik yang kompleks, tetapi juga krusial dalam upaya mitigasi dan adaptasi terhadap dampak lingkungan yang semakin meluas. Oleh karena itu, studi tentang atmosfer dan kualitas udara telah berkembang pesat, baik dari segi volume maupun kualitas publikasi ilmiah.

Dalam kurun waktu 2014 hingga 2019, produktivitas penelitian tentang atmosfer mencapai puncaknya, dengan banyaknya publikasi yang berfokus pada karakteristik fisik dan kimiawi atmosfer, emisi polusi udara, dan dampak perubahan iklim. Negara-negara seperti China dan Amerika Serikat menunjukkan kontribusi signifikan dalam penelitian ini, di mana kedua negara tersebut mendominasi publikasi ilmiah terkait. China, khususnya, mengalami lonjakan publikasi dengan topik yang berkaitan dengan inventarisasi sumber pencemaran, polusi udara, dan teknologi pemanfaatan atmosfer, menunjukkan komitmennya dalam mengatasi masalah lingkungan.

Namun, mulai tahun 2020, tren produktivitas publikasi mengalami penurunan yang signifikan, diikuti oleh penurunan tajam dalam jumlah sitasi. Penurunan ini menimbulkan pertanyaan penting mengenai faktor-faktor yang memengaruhi produktivitas penelitian di bidang atmosfer. Analisis lebih lanjut diperlukan untuk memahami dinamika ini dan untuk mengeksplorasi bagaimana penelitian atmosfer dapat dikembangkan lebih lanjut.

Penelitian ini bertujuan untuk menganalisis tren publikasi dan sitasi terkait topik atmosfer dalam satu dekade terakhir. Dengan memetakan distribusi topik, asal negara, dan sumber jurnal, penelitian ini bertujuan untuk mengidentifikasi tren dominan dalam penelitian atmosfer, serta menyusun rekomendasi bagi peningkatan kualitas dan relevansi penelitian di masa depan.

METHODS

Penelitian ini menerapkan metode bibliometrik dengan tujuan mengidentifikasi, meninjau, dan mengevaluasi seluruh penelitian yang relevan untuk menjawab pertanyaan yang telah ditentukan. Proses penelitian ini meliputi beberapa tahapan, yaitu perumusan pertanyaan penelitian, pencarian literatur, penetapan kriteria inklusi dan eksklusi, seleksi literatur, penyajian data, pengolahan data, serta penarikan kesimpulan.

Research Question

- Berapa jurnal scopus dengan penelitian sifat dan struktur atmosfer yang ditemukan dalam rentang 2014-2024?
- Bagaimana trend perkembangan jumlah jurnal scopus dengan penelitian sifat dan struktur atmosfer dalam rentang 2014-2024?
- Berapa jumlah sitasi tentang dari jurnal scopus dengan penelitian sifat dan struktur atmosfer dalam rentang 2014-2024?
- Negara mana saja yang meneliti tentang sifat dan struktur atmosfer dari jurnal scopus dalam rentang 2014-2024?
- Apa saja kelompok fokus penelitian tentang sifat dan struktur atmosfer dari jurnal scopus dalam rentang 2014-2024?

Search Process

Proses pencarian dilakukan pada database scopus dengan aplikasi Publish or Perish. Kata kunci yang digunakan adalah "atmospheric properties" dan "atmospheric characteristics" dengan membatasi jurnal dari tahun 2014 sampai 2024.

Inclusion and Exclusion Criteria

Pada tahap ini yaitu ditentukan kriteria dari data yang ditemukan, apakah data tersebut layak digunakan sebagai sumber data untuk penelitian atau tidak. Berikut ini merupakan kriteria sebuah data dikatakan layak menjadi sumber data penelitian yaitu :

- Data yang diperoleh dalam rentang waktu 2014-2024.
- Data diperoleh dari database scopus melalui aplikasi Publish or Perish.
- Data yang digunakan hanya berhubungan dengan "atmospheric properties" dan "atmospheric characteristics".

Quality Assesment

Pada tahap ini data yang telah ditemukan akan dievaluasi berdasarkan kriteria berikut:

- Data yang dipilih hanya type Article.
- Data dengan type Conference Paper, Letter, Book, dan Review dihilangkan.
- Data yang dipilih hanya jurnal dengan sitasi lebih dari 60.

RESULTS AND DISCUSSION

Jurnal diurutkan berdasarkan sitasi terbanyak dari tahun 2014-2024. Dari 50 jurnal yang sesuai kriteria tidak ditemukan jurnal yang terbit pada tahun 2022 – 2024.

Tabel 1. Jurnal yang sesuai dengan kriteria

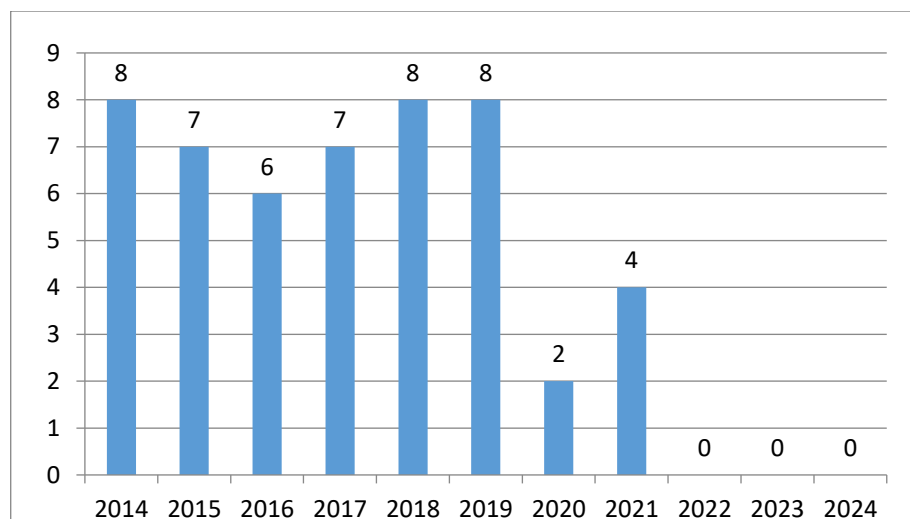
No	Cites	Authors	Title	Year
1	650	L. Cai [1]	Characteristic of microplastics in the atmospheric fallout from Dongguan city, China: preliminary research and first evidence	2017
2	415	J.J. Rutz [2]	Climatological characteristics of atmospheric rivers and their inland penetration over the western united states	2014
3	242	H. Lee [3]	Effect of solar radiation on the optical properties and molecular composition of laboratory proxies of atmospheric brown carbon	2014
4	239	A. LaPotin [4]	Adsorption-Based Atmospheric Water Harvesting: Impact of Material and Component Properties on System-Level Performance	2019
5	181	H. Tian [5]	Atmospheric emission inventory of hazardous trace elements from Chi'a's coal-fired power plants-temporal trends and spatial variation characteristics	2014
6	175	S. Pathak [6]	Atmospheric influence upon crystallization and electronic disorder and its impact on the photophysical properties of organic-inorganic perovskite solar cells	2015
7	164	W. Wang [7]	Synoptic-scale characteristics and atmospheric controls of summer heat waves in China	2016
8	161	L. Bi [8]	Accurate simulation of the optical properties of atmospheric ice crystals with the invariant imbedding T-matrix method	2014

9	159	K. Cheng [9]	Atmospheric emission characteristics and control policies of five precedent-controlled toxic heavy metals from anthropogenic sources in China	2015
10	153	S.Y. Yu [10]	Characteristics and oxidative potential of atmospheric PM 2.5 in Beijing: Source apportionment and seasonal variation	2019
11	149	Z.Q. Li [11]	Comprehensive study of optical, physical, chemical, and radiative properties of total columnar atmospheric aerosols over China: An overview of sun-Sky radiometer observation network (SONET) measurements	2018
12	145	J. Tan [12]	Chemical characteristics and source of size-fractionated atmospheric particle in haze episode in Beijing	2016
13	144	K. Szewc [13]	Atmospheric deposition of microplastics in the coastal zone: Characteristics and relationship with meteorological factors	2021
14	137	S. Hua [14]	Atmospheric emission inventory of hazardous air pollutants from Chi'a's cement plants: Temporal trends, spatial variation characteristics and scenario projections	2016
15	130	D. Ji [15]	Characteristics of atmospheric organic and elemental carbon aerosols in urban Beijing, China	2016
16	124	D. Turner [16]	Information content and uncertainties in thermodynamic profiles and liquid cloud properties retrieved from the ground-based Atmospheric Emitted Radiance Interferometer (AERI)	2014
17	116	Y.Z. Tian [17]	Estimation of the direct and indirect impacts of fireworks on the physicochemical characteristics of atmospheric PM10 and PM2.5	2014
18	111	I.J.M. Crossfield [18]	Trends in atmospheric properties of neptune-size exoplanets	2017
19	108	M.A. Lamjiri [19]	Hourly storm characteristics along the U.S. West Coast: Role of atmospheric rivers in extreme precipitation	2017
20	105	Y. Chen [20]	Seasonal light absorption properties of water-soluble brown carbon in atmospheric fine particles in Nanjing, China	2018
21	102	L. Xu [21]	Characteristics and sources of atmospheric mercury speciation in a coastal city, Xiamen, China	2015
22	99	B. Guan [22]	Hydrometeorological characteristics of rain-on-snow events associated with atmospheric rivers	2016
23	99	X. Guan [23]	Spatial distribution, temporal variation, and transport characteristics of atmospheric water vapor over Central Asia and the arid region of China	2019
24	98	B. Guan [24]	Tracking Atmospheric Rivers Globally: Spatial Distributions and Temporal Evolution of Life Cycle Characteristics	2019
25	95	Y. Ding [25]	The abundance and characteristics of atmospheric microplastic deposition in the northwestern South China Sea in the fall	2021
26	93	B. Burningham [26]	Retrieval of atmospheric properties of cloudy L dwarfs	2017

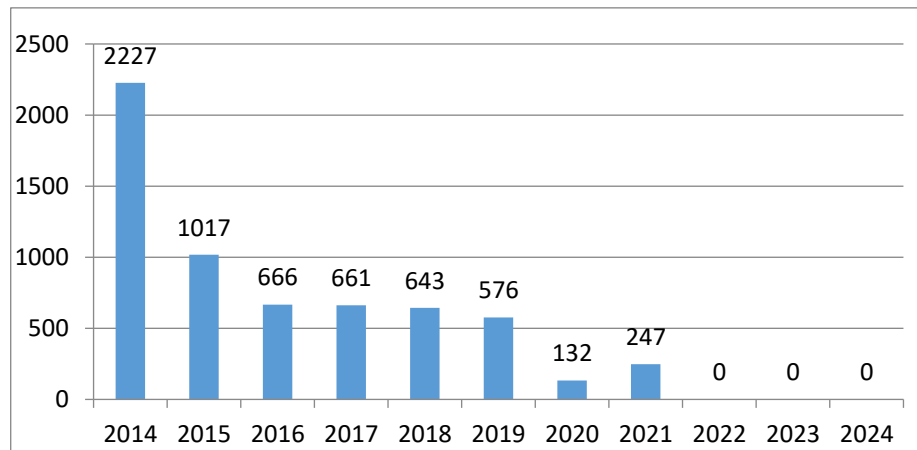
27	89	Y.M. Qin [27]	Chemical characteristics of brown carbon in atmospheric particles at a suburban site near Guangzhou, China	2018
28	88	Y. Wang [28]	CO ₂ hydrogenation over heterogeneous catalysts at atmospheric pressure: From electronic properties to product selectivity	2021
29	85	S. Muhammad [29]	Atmospheric net particle accumulation on 96 plant species with contrasting morphological and anatomical leaf characteristics in a common garden experiment	2019
30	84	C. Liu [30]	The levels, variation characteristics, and sources of atmospheric non-methane hydrocarbon compounds during wintertime in Beijing, China	2017
31	82	H. Wang [31]	Effects of atmospheric ageing under different temperatures on surface properties of sludge-derived biochar and metal/metalloid stabilization	2017
32	80	M.R. Line [32]	Uniform Atmospheric Retrieval Analysis of Ultracool Dwarfs. II. Properties of 11 T dwarfs	2017
33	80	P. Chen [33]	Characteristics and sources of polycyclic aromatic hydrocarbons in atmospheric aerosols in the Kathmandu Valley, Nepal	2015
34	79	C. Li [34]	Dynamic changes in optical and chemical properties of tar ball aerosols by atmospheric photochemical aging	2019
35	78	H. Zhu [35]	Characteristics and sources of atmospheric volatile organic compounds (VOCs) along the mid-lower Yangtze River in China	2018
36	75	D.J.H. Cant [36]	Surface properties of nanocrystalline PbS films deposited at the water-oil interface: A study of atmospheric aging	2015
37	75	S. Kotthaus [37]	Atmospheric boundary-layer characteristics from ceilometer measurements. Part 1: A new method to track mixed layer height and classify clouds	2018
38	74	M. Wei [38]	Characteristics of atmospheric bacterial and fungal communities in PM _{2.5} following biomass burning disturbance in a rural area of North China Plain	2019
39	73	A.P.S. Hettiyadura [39]	Chemical composition and molecular-specific optical properties of atmospheric brown carbon associated with biomass burning	2021
40	72	X. Xu [40]	Effect of the Asian Water Tower over the Qinghai-Tibet Plateau and the characteristics of atmospheric water circulation	2019
41	72	P. Chen [41]	Yak dung combustion aerosols in the Tibetan Plateau: Chemical characteristics and influence on the local atmospheric environment	2015
42	71	M. Pandolfi [42]	A European aerosol phenomenology - 6: Scattering properties of atmospheric aerosol particles from 28 ACTRIS sites	2018
43	71	D. Topping [43]	UManSysProp v1.0: An online and open-source facility for molecular property prediction and atmospheric aerosol calculations	2016

44	68	H. Cano [44]	Effect of Cu, Cr and Ni alloying elements on mechanical properties and atmospheric corrosion resistance of weathering steels in marine atmospheres of different aggressivities	2018
45	66	X. Xie [45]	Light-absorbing and fluorescent properties of atmospheric brown carbon: A case study in Nanjing, China	2020
46	66	Y.J. Liu [46]	Seasonal variation of physical and chemical properties in TSP, PM10 and PM2.5 at a roadside site in Beijing and their influence on atmospheric visibility	2014
47	63	X. Han [47]	Atmospheric stability and topography effects on wind turbine performance and wake properties in complex terrain	2018
48	62	C. Wu [48]	The characteristics of atmospheric brown carbon in Xi'an, inland China: Sources, size distributions and optical properties	2020
49	61	J. Jing [49]	Observation and analysis of near-surface atmospheric aerosol optical properties in urban Beijing	2015
50	61	E. Rauscher [50]	The atmospheric circulation and observable properties of non-synchronously rotating hot Jupiters	2014

Pada gambar dibawah terdapat tiga puncak produktivitas publikasi jurnal, yaitu pada tahun 2014, 2018 dan 2019, di mana jumlah publikasi mencapai 8 buah. Ini mengindikasikan adanya periode intensif dalam kegiatan penelitian dan penulisan pada tahun-tahun tersebut. Setelah mencapai puncak pada tahun 2019, terjadi penurunan yang cukup signifikan pada tahun 2020, di mana jumlah publikasi hanya 2 jurnal. Penurunan ini cukup mencolok dan perlu dianalisis lebih lanjut untuk mengetahui penyebabnya. Sebelum penurunan drastis pada tahun 2020, jumlah publikasi cenderung stabil di angka 7-8 jurnal. Hal ini menunjukkan adanya konsistensi dalam kegiatan penelitian dan publikasi. Setelah tahun 2020, jumlah publikasi terus menurun hingga mencapai 0 pada tahun 2022, 2023, dan 2024. Ini mengindikasikan adanya tren penurunan yang mengkhawatirkan dalam produktivitas publikasi.



Gambar 1. Total jurnal yang dipublikasi per tahun



Gambar 2. Total sitasi jurnal per tahun

Terjadi lonjakan signifikan pada tahun 2014 dengan jumlah sitasi mencapai 2227. Ini menunjukkan adanya publikasi yang sangat berpengaruh dan banyak dikutip pada tahun tersebut. Kemungkinan besar publikasi pada tahun 2014 memiliki kualitas yang sangat baik dan relevan dengan perkembangan ilmu pengetahuan pada saat itu, sehingga banyak dikutip oleh peneliti lain. Setelah mencapai puncak pada tahun 2014, jumlah sitasi mengalami penurunan yang cukup drastis dan terus berlanjut hingga tahun 2024 di mana jumlah sitasi menjadi 0. Meskipun terjadi tren penurunan, terdapat beberapa fluktuasi kecil dalam jumlah sitasi dari tahun ke tahun. Secara umum, grafik menunjukkan penurunan yang signifikan dalam jumlah sitasi sejak tahun 2014. Hal ini mengindikasikan adanya penurunan dalam kualitas atau relevansi publikasi. Untuk meningkatkan jumlah sitasi, perlu dilakukan upaya untuk meningkatkan kualitas penelitian, mempromosikan publikasi, dan melakukan evaluasi secara berkala.

Tabel 1. Pengelompokan berdasarkan sumber jurnal

Source	TAHUN											Jumlah
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Accounts of Chemical Research						1						1
ACS Nano		1										1
Aerosol and Air Quality Research	1											1
Astronomical Journal				2								2
Atmospheric Chemistry and Physics	1			1	2	1	1					6
Atmospheric Environment			2		2	1		1				6
Atmospheric Research		1	1									2
Bulletin of the American Meteorological Society					1							1
Chemosphere		1		1			1					3

susul *Astronomical Journal*, *Atmospheric Research* dan *Geophysical Research Letters* menerbitkan masing-masing 2 jurnal. Sumber yang lainnya dari tahun 2014 hingga 2024 menerbitkan masing-masing 1 jurnal.

Tabel 2. Pengelompokan berdasarkan negara

Negara	TAHUN											Jumlah
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Belgium						1						1
China	3	5	4	3	5	4	2	2				28
Israel						1						1
Poland								1				1
Spain					2							2
UK		2	1		1							4
USA	5		1	4		2		1				13
TOTAL	8	7	6	7	8	8	2	4	0	0	0	50

Tabel diatas menyajikan 50 jurnal berdasarkan asal negara penulis utama. China sebagai negara dengan jumlah sitasi tertinggi secara keseluruhan, menunjukkan kontribusi yang signifikan dalam penelitian dan publikasi ilmiah, China menjadi negara terbanyak yang mempublikasi jurnal dengan jumlah 28 dari rentang tahun 2014-2024. Amerika Serikat menjadi negara di urutan kedua, menunjukkan dominasi Amerika Serikat dalam penelitian global, terutama dalam bidang-bidang tertentu. Amerika Serikat menjadi negara terbanyak kedua setelah China untuk publikasi jurnal dengan jumlah 13 dengan rentang waktu yang sama yaitu 2014-2024. Kemudian diikuti oleh UK dengan jumlah jurnal 4 dan Spain dengan jumlah jurnal 2. Selanjutnya negara-negara lain seperti Belgium, Israel dan Poland menghasilkan 1 jurnal dalam rentang 2014-2024.

Tabel 3. Pengelompokan topik bahasan dengan negara peneliti berdasarkan tahun

TOPIK	TAHUN												Jumlah
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024		
Dampak Aktivitas Manusia pada Atmosfer													
China	1						1						2
Emisi Atmosfer dan Inventarisasi Sumber Pencemaran													
China	1		1		1								3
Belgium							1						1
Energi Terbarukan dan Teknologi Lingkungan													
USA							1						1
UK		1											1
Fenomena Atmosferik dan Sifat-sifat Meteorologi													
USA	1		1	1		1							4
China			1										1

Karakteristik Kimia dan Fisik Atmosfer												
USA								1				1
China		1	2	2				1				6
Kimia Atmosfer dan Pengaruh Lingkungan												
China			1									1
Pengaruh Fenomena Atmosferik dan Regional												
Spain			1									1
China	1	1										2
Pengaruh Kimiawi dan Fisika Atmosfer terhadap Lingkungan												
Spain					1							1
USA	1			1								2
China	1											1
Perubahan Iklim dan Komposisi Atmosfer												
Israel								1				1
UK		1										1
USA		1		1								2
Polusi Udara dan Karakteristik Aerosol												
UK						1						1
Poland									1			1
China		1	1	1			2	1				6
Sumber dan Distribusi Polusi												
China		1					1		1			3
Teknologi Pemanfaatan dan Pemodelan Atmosfer												
China						2			1			3
USA	2	1										3
UK						1						1
TOTAL	8	7	6	7	8	8	2	4	0	0	0	50

Sebagian besar penelitian berfokus pada aspek-aspek atmosfer, seperti kualitas udara, perubahan iklim, dan dampak aktivitas manusia terhadap atmosfer. Hal ini menunjukkan bahwa isu-isu lingkungan, khususnya yang terkait dengan atmosfer, menjadi perhatian utama para peneliti di berbagai negara. China merupakan negara dengan jumlah publikasi terbanyak, menunjukkan dominasi dalam penelitian di bidang atmosfer dan lingkungan. Hal ini dapat mengindikasikan investasi yang besar dalam penelitian lingkungan di China atau adanya kebijakan yang mendukung penelitian di bidang ini. Amerika Serikat merupakan negara kedua menyumbang jumlah publikasi yang signifikan, menunjukkan peran penting Amerika Serikat dalam penelitian lingkungan global. Negara-negara eropa seperti Inggris dan Spanyol juga memiliki kontribusi yang cukup signifikan, menunjukkan minat yang tinggi terhadap penelitian lingkungan di Eropa.

CONCLUSION

Penelitian ini membahas artikel yang dipublikasikan antara tahun 2014 hingga 2024 berfokus pada isu-isu lingkungan, khususnya yang berkaitan dengan atmosfer. Dominasi penulis dari China dan Amerika Serikat mengindikasikan bahwa kedua negara ini memiliki peran penting dalam penelitian global, khususnya dalam bidang atmosfer. Setelah mencapai puncak produktivitas pada tahun 2018 dan 2019, terjadi penurunan drastis pada jumlah publikasi mulai tahun 2020, dengan tidak ada publikasi sama sekali pada tahun 2022 hingga 2024. Penurunan ini mungkin disebabkan oleh perubahan prioritas penelitian atau faktor eksternal lainnya seperti pendanaan atau kebijakan penelitian. Tahun 2014 mencatat lonjakan signifikan dalam jumlah sitasi, menunjukkan kualitas tinggi dari beberapa publikasi pada tahun tersebut. Namun, setelah itu, terjadi penurunan secara bertahap dalam jumlah sitasi hingga mencapai nol pada tahun 2024. Ini bisa menandakan penurunan dalam relevansi atau kualitas penelitian di periode-periode berikutnya.

China menunjukkan dominasi dalam publikasi jurnal atmosfer, diikuti oleh Amerika Serikat. Negara-negara Eropa seperti Inggris dan Spanyol juga memiliki kontribusi yang signifikan. Penelitian tentang atmosfer sangat beragam, meliputi perubahan iklim, polusi udara, emisi atmosfer, dampak aktivitas manusia, serta karakteristik fisik dan kimiawi atmosfer. Fokus penelitian ini bergeser dari aspek kimia dan fisika atmosfer pada awal periode ke topik dampak aktivitas manusia dan perubahan iklim pada tahun-tahun berikutnya. Meskipun produktivitas dan sitasi jurnal menurun dalam beberapa tahun terakhir, penelitian di bidang atmosfer masih menunjukkan signifikansi besar, terutama terkait isu-isu lingkungan global.

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