

Almetrics Attention Score -2020 showing Three Articles in Earth Sciences: An Overview

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Abstract: Almetrics are alternative metrics used to measure the impact and attention that research articles receive in online spaces, including social media, news outlets, and other digital platforms. These metrics complement traditional citation-based metrics by providing insights into the broader societal impact and engagement with research beyond academic circles. In the Top 100 Almetrics ranking for the year 2020, there were three Earth Science research articles that received considerable online attention. Global human-made exceeds all living biomass, Attention Score 4483, Published in Nature Journal in December 2020, Citations 261. Multiple subglacial water bodies at the south pole of Mars unveiled by new Mars, Attention Score 4427, Published in Nature Astronomy Journal in September 2020, Citations 113. Record-Setting Ocean Warmth Continued in 2019, Attention Score 3954, Published in Advances in Atmospheric Sciences Journal in January 2020, Citations 119. Out of these three highly-attended articles, two were published in the prestigious Nature Journal, which indicates the high level of engagement and interest in research published in that journal. The Nature Journal is well-regarded in the scientific community, and its articles often gain significant attention due to their impact on various fields of science. Almetrics can be a valuable tool in assessing the broader impact of research beyond traditional citation metrics. They offer insights into how research is being shared and discussed online, which can be indicative of its societal and practical implications. While citation metrics remain important for evaluating scholarly influence, almetrics provide a more comprehensive view of the attention and reach of scientific publications in the digital age.

Keywords: Almetrics, Twitter Mention, Online Attention, Citations, Mendeley, News Outlet.

1. Introduction

Almetrics short for alternative metrics is a relatively new approach to measuring the impact and reach of scholarly research and other academic outputs beyond traditional citation-based metrics. While traditional metrics like citation counts have long been used as indicators of research influence, almetrics aim to complement these metrics by considering a broader range of online attention and engagement. The concept of almetrics gained popularity with the advent of digital publishing, social media, and online scholarly platforms. The new platforms have allowed researchers, policymakers, and the general public to engage with research outputs in various ways beyond traditional academic circles.

Almetrics encompass a diverse set of indicators that can capture different forms of attention and engagement, such as:

- Social media mentions; The number of times a research article or academic output is shared or discussed on platforms like Twitter, Facebook, LinkedIn, and others.

- Downloads: The number of times a document (e.g. journal article, conference paper) is accessed and downloaded from online repositories and databases.
- Blog posts and news articles: The number of times research is covered in blogs, news articles, and other media outlets.
- Policy and public engagement: Instances of research influencing policy-making decisions, public debates, or being used by practitioners in the field.
- Bookmarks and saves: The number of times a research output is bookmarked or saved on reference management platforms like Mendeley, Zotero, or CiteULike.
- Online discussions and Comments: The number and quality of discussions and comments on research outputs in platforms like Reddit, PubPeer, or academic social networks.
- Citations in non-academic works: References to scholarly research in patents, policy documents, or other non-traditional academic sources.

Altmetrics are considered valuable because they provide a more immediate and comprehensive understanding of the real-world impact and engagement of research beyond the academic community. They can capture broader societal impacts, public interest, and early attention to research outputs. Altmetrics are often seen as particularly useful for assessing the impact of research in fields like social sciences, humanities, and applied sciences, where the traditional citation-based metrics might not adequately capture the full influence of research.

2. Review of Literature

Stephen (2021) analyzed the results of the top three research papers of 2020 on the Internet Attention Score altmetric. The level 1 altmetric attention score of 34,775 for the article "The Proximal Origin of SARS-CoV-2" is a level 1 of three article and was published in the journal Nature. The Level 2 paper, with an altmetric score of 32,931, reads "The effectiveness of adding a mask recommendation to other public health measures to prevent SARS-CoV-2 infection among Danish mask users". Item number. # Altmetric's #3, which received 26,745 comments, is "dying in a leadership vacuum."

Stephen and Susheela (2019) analyzed the top three research papers in 2019 that received an Internet Attention Score altmetric score. The highest altmetric attention score was achieved for the article "Few-shot adversarial learning of Reality Neural Talking Head Models" with an attention score of 13,415 across a large number of tweets mentioned and published on arXiv in May 2019. In seven months, this has been of great interest among scientists. Monitoring by scientists escapes statistical significance with an attention score of 13,171 published in scientific journals with 272 citations. Third place for the article "Measles, mumps, rubella, vaccination and autism" published in the Annals of Internal Medicine with an attention score of 9339 on top-cited news sites (224). Of these three articles, two are related to the drug issue.

Piowar and Priem (2013) state that "the availability of legacy metrics expands publishing opportunities in new places and stimulates innovative research assessment strategies" (p. 10). It should be emphasized that they calculate indicators not based on the quality of authors and their work, but at the level of attention, audience, subscribers, opinions and reactions of those who read scientific works. By being used as a new impact assessment method, is comparable to other bibliometric methods, where it differs in advantages and disadvantages. On the positive side, elevation data can be obtained faster than bibliographic citations (Rasmussen and Andersen, 2013). It is also possible to follow other experts in the field, join interest groups and share stories and research (Galloway & Pease, 2013) and explore how researchers from different disciplines interact (Thelwall & Kousha, 2015).

Top Three Altmetric Attention Score Articles in 2020.

| | |
|--------------|--|
| Title | Global human-made mass exceeds all living biomass. |
| Authors | Emily Elhacham, Liad Ben-Uri, Jonathan Grozovski, Yinon M. Bar-On & Ron Milo |
| DOI | https://doi.org/10.1038/s41586-020-3010-5 |
| Published in | Nature Journal, December 2020. |
| Abstract | Humanity has become a dominant force in shaping the face of Earth ^{1,2,3,4,5,6,7,8,9} . An emerging question is how the overall material output of human activities compares to the overall natural biomass. Here we quantify the human-made mass, referred to as 'anthropogenic mass', and compare it to the overall living biomass on Earth, which currently equals approximately 1.1 teratonnes ^{10,11} . We find that Earth is exactly at the crossover point; in the year 2020 (± 6), the anthropogenic mass, which has recently doubled roughly every 20 years, will surpass all global living biomass. On average, for each person on the globe, anthropogenic mass equal to more than his or her bodyweight is produced every week. This quantification of the human enterprise gives a mass-based quantitative and symbolic characterization of the human-induced epoch of the Anthropocene. |
| Title | Multiple subglacial water bodies below the south pole of Mars unveiled by new MARSIS data |
| Authors | Sebastian Emanuel Lauro, Elena Pettinelli, Graziella Caprarelli, Luca Guallini, Angelo Pio Rossi, Elisabetta Mattei, Barbara Cosciotti, Andrea Cicchetti, Francesco Soldovieri, Marco Cartacci, Federico Di Paolo, Raffaella Noschese & Roberto Orosei |
| DOI | https://doi.org/10.1038/s41550-020-1200-6 |
| Published in | Nature Astronomy, September 2020. |
| Abstract | The detection of liquid water by the Mars Advanced Radar for Subsurface and Ionosphere Sounding (MARSIS) at the base of the south polar layered deposits in Ultimi Scopuli has reinvigorated the debate about the origin and stability of liquid water under present-day Martian conditions. To establish the extent of subglacial water in this region, we acquired new data, achieving extended radar coverage over the study area. Here, we present and discuss the results obtained by a new method of analysis of the complete MARSIS dataset, based on signal processing procedures usually applied to terrestrial polar ice sheets. Our results strengthen the claim of the detection of a liquid water body at Ultimi Scopuli and indicate the presence of other wet areas nearby. We suggest that the waters are hypersaline perchlorate brines, known to form at Martian polar regions and thought to survive for an extended period of time on a geological scale at below-eutectic temperatures. |
| Title | Record-Setting Ocean Warmth Continued in 2019. |
| Authors | Lijing Cheng , John Abraham , Jiang Zhu , Kevin E. Trenberth , John Fasullo , Tim Boyer , Ricardo Locarnini , Bin Zhang , Fujiang Yu , Liyang Wan , Xingrong Chen , Xiangzhou Song , Yulong Liu & Michael E. Mann . |
| DOI | https://doi.org/10.1007/s00376-020-9283-7 |
| Published in | Advances in Atmospheric Sciences, January 2020 |
| Abstract | Human-emitted greenhouse gases (GHGs) have resulted in a long-term and unequivocal warming of the planet (IPCC, 2019). More than 90% of the excess heat is stored within the world's oceans, where it accumulates and causes increases in ocean temperature (Rhein et al., 2013; Abram et al., 2019). Because the oceans are the main repository of the Earth's energy imbalance, measuring ocean heat content (OHC) is one of the best ways to quantify the rate of global warming (Trenberth et al., 2016; Von Schuckmann et al., 2016; Cheng et al., 2018). Following reports released in the previous two years (Cheng and Zhu, 2018; Cheng et al., 2019c), this article presents new OHC data for the year 2019. These data reveal that the world's oceans (especially the upper 2000 m) in 2019 were the warmest in recorded |

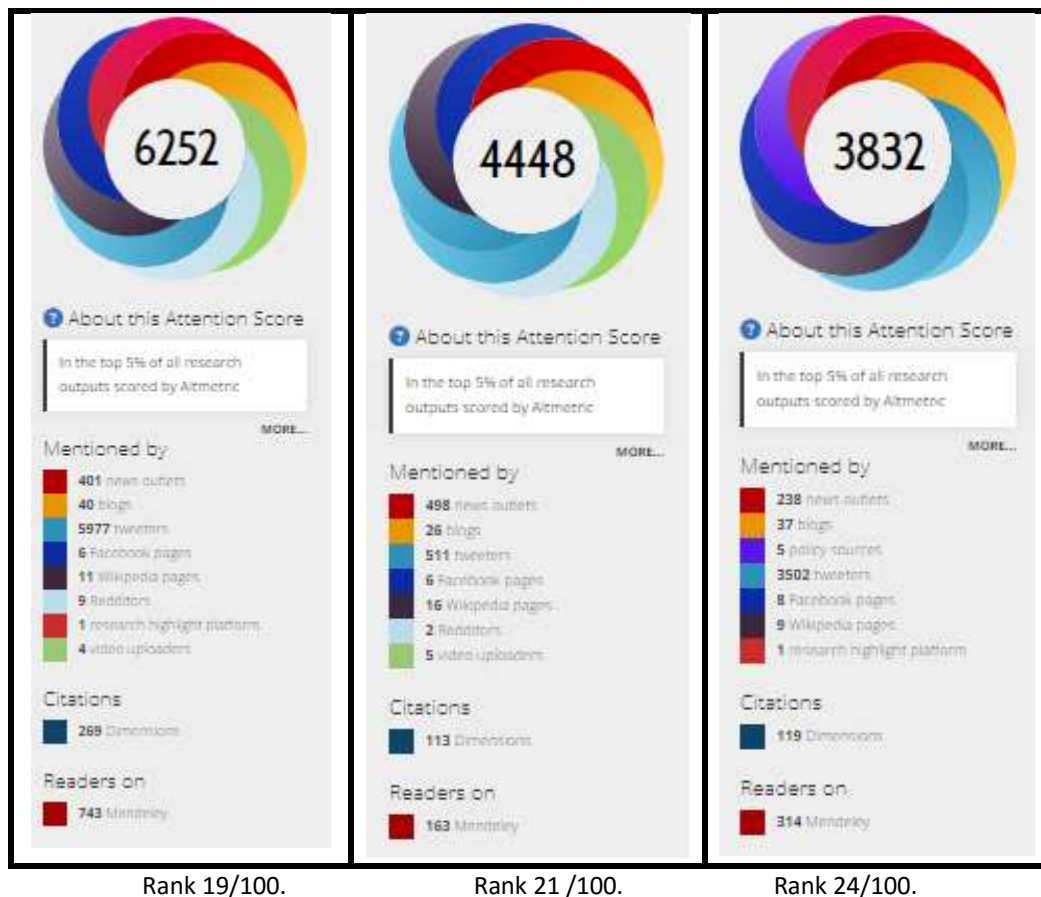
human history. Specifically, the ocean heat anomaly (0–2000 m) in 2019 was 228 Zetta Joules (ZJ, 1 ZJ=10²¹ Joules) above the 1981–2010 average and 25 ZJ above 2018.

Objectives

- To determine the altimetric attention value by displaying research papers in the three Earth Sciences 2020.
- Determine the altimetric attention value in the context of the three geosciences 2020.
- To determine the demographic mix of current online news.
- Analyze most of the Twitter demographics listed in these articles.
- Look at the Mendeley statistics quoted in this article.
- These articles are listed to indicate the professional status of Mendeley's readers.
- To find out, several social media outlets cited these research articles.

3. Methodology

To conduct this analysis, we gathered altmetric data from various online platforms, including Twitter, news outlets, and Mendeley. We also recorded citation counts from scholarly databases to supplement the altmetric scores. We selected the three Earth Science articles based on their high attention scores and relevance to the field.



This article of Global human-made mass exceeds all living biomass [Rank 19/100]. has been mentioned in 401 news outlets, 40 blogs, 5977 tweeters, 6 Facebook pages, 11 Wikipedia pages, 9 Redditors posts also with 1 research highlight platform,4 video uploaders,269 Dimensions 742 Mendeley readers. However, the score is 6252. This article of Multiple subglacial water bodies below the south pole of Mars unveiled by new MARSIS data.[Rank 21/100]. has been mentioned in 498 news outlets, 26 blogs, 511 tweeters, 6 Facebook pages, 16

Wikipedia pages, 2 Redditors ,5 Video uploaders ,113 Dimensions.163 mendeley readers. However, the score is 4448. This article of Record-Setting Ocean Warmth Continued in 2019 [Rank 24/100] has been mentioned in 238 news outlets, 37 blogs, 5 policy sources,3502 tweeters, 8 Facebook pages, 9 Wikipedia pages, 1 research highlight platforms ,119 Dimensions,314 Mendeley readers. However, the score is 3832.

Twitter Mention and Geographical breakdown.

Altmetric has categorized users based on their Twitter profiles and posting history for three different research articles, each with a different number of tweeters who shared the article:

Article with rank 19/100: This article was shared by 5,977 tweeters. Altmetric has likely categorized these users based on their posting history and profile information from Twitter. The Demographics tab on the details page of the article provides information about the user categories and geolocation data.

Article with rank 21/100: This article was shared by 511 tweeters. Similar to the first case, Altmetric has categorized these users based on their Twitter profiles and posting history, and the Demographics tab on the article's details page likely presents information about user categories and geolocation data.

Article with rank 24/100: This article was shared by 3,502 tweeters. Once again, Altmetric has categorized these users based on their Twitter activity and profiles, and the Demographics tab on the article's details page likely shows information about user categories and geolocation data.

The purpose of this categorization is to provide insights into the types of users who are engaging with these research articles on Twitter. This can include information about their academic backgrounds, fields of interest, geographical locations, and more.

| Country | Count | As% | Country | Count | As% | Country | Count | As% |
|----------------|-------|-----|----------------|-------|-----|----------------|-------|-----|
| | | | United States | 65 | 13% | United States | 445 | 13% |
| United States | 774 | 13% | United Kingdom | 22 | 4% | United Kingdom | 235 | 7% |
| United Kingdom | 349 | 6% | Thailand | 18 | 4% | France | 166 | 5% |
| Spain | 254 | 4% | Spain | 16 | 3% | Australia | 121 | 3% |
| France | 170 | 3% | France | 14 | 3% | Germany | 95 | 3% |
| Canada | 149 | 2% | Italy | 13 | 3% | Canada | 95 | 3% |
| Germany | 128 | 2% | Australia | 11 | 2% | Brazil | 66 | 2% |
| Australia | 120 | 2% | Saudi Arabia | 8 | 2% | Spain | 58 | 2% |
| Japan | 94 | 2% | Canada | 6 | 1% | Netherlands | 55 | 2% |
| India | 86 | 1% | Other | 65 | 13% | Other | 616 | 18% |
| Other | 988 | 17% | Unknown | 273 | 53% | Unknown | 1550 | 44% |
| Unknown | 2865 | 48% | | | | | | |

Rank 19/100

Rank 21/100

Rank 24/100

A geographic map of the tweeter, Altmetric Geolocation to generate users based on the information in their profiles on twitter. The Geo Key is a straightforward breakdown that comes from users who share an article in the world. The vast majority of the mentioned Twitter for 19/100 rank article comes under the Unknown category 48% (2865) twitter, followed by 17% (988) percent of Other, USA twitter 13%(774), United Kingdom twitter 6%(349), Spain Twitter 4%(254), France Twitter 3%(170), 2% Twitters from Canada, Germany, Australia, Japan countries and only 1% (86) of the twitter from India. 21/100 rank article comes under the Unknown category 53% (273) twitter, followed by 13% (65) percent of Other category and USA, 4%(22) twitter from United Kingdom and Thailand, 3%(16) twitter from Spain, France and Italy countries, 2%(11) twitter from Australia and Saudi Arabia, 1%(6) of the twitter from Canada. 24/100 rank article comes under the Unknown category 44% (1550) twitter, followed by 18% (614) percent of Other category, USA twitter 13%(445), United Kingdom twitter

7%(234), France twitter 5%(165), 3% Twitter from Australia, Germany, Canada, 2% Twitter from Brazil, Spain, Netherlands.

Twitter Demographic Breakdown

Twitter demographics based on Altmetric profiles. Altmetric is a tool commonly used to track and measure the online attention and engagement that scholarly articles receive. It appears you're using Altmetric's categorization to group Twitter users into different categories based on their interactions with scholarly literature. The categories are:

Member of the Public: This category includes individuals who do not appear to have a scholarly background. They may not engage with scholarly literature or journals. Their Twitter activity may be more general and not focused on academic or scientific topics.

Researcher: This category encompasses individuals who are familiar with scholarly literature. They may have a background in academia or research and often engage with scientific content. This category might include scholars, scientists, and other professionals in academic fields.

Practitioners: This category refers to individuals who work in clinical science or medical research. These could be doctors, clinicians, or researchers who are actively involved in clinical practice and research in the medical field.

Science Communicator: This category includes people who frequently engage with various types of scientific articles from different journals or publishers. They might not necessarily be researchers themselves but play a role in communicating scientific information to a broader audience.

When compiling your table of Twitter demographics, you would likely gather data on users' interactions with scholarly content, keywords in their posts, journals they link to, and followers lists to assign them to one of these categories. Keep in mind that this categorization is based on specific criteria and might not capture the full complexity of individuals' Twitter behaviour and interests.

| Type | Count | As% |
|--|-------|-----|
| Members of the public | 5104 | 85% |
| Scientists | 636 | 11% |
| Science Communicators (Journalists , bloggers , editors) | 169 | 3% |
| Practitioners (doctors , other healthcare professionals) | 67 | 1% |
| Unknown | 1 | <1% |
| Type | Count | As% |
| Members of the public | 410 | 80% |
| Scientists | 84 | 16% |
| Science Communicators (Journalists , bloggers , editors) | 13 | 3% |
| Practitioners (doctors , other healthcare professionals) | 4 | <1% |

| Type | Count | As% |
|--|-------|-----|
| Members of the public | 3088 | 88% |
| Scientists | 296 | 8% |
| Science Communicators (Journalists , bloggers , editors) | 84 | 2% |
| Practitioners (doctors , other healthcare professionals) | 33 | <1% |
| Unknown | 1 | <1% |

About 85% (5104) public members belong to the majority of twitter's Twitter demographic category, 11% (636) Tweets are Scientist, 3%(169) tweets are Science Communicators, 1% (67) tweets are Practitioners (doctors ,other healthcare professionals) mentioned for the article of Global human-made mass exceeds all living biomass [Rank 19/100]. Majority 80% (410) public members belong to s Twitter demographic category, 16% (84) Tweets are mentioned by scientist, 3%(13) tweets are Science Communicators are mentioned for the article of Multiple subglacial water bodies below the south pole of Mars unveiled by new MARSIS data. [Rank 21/100].About 88% (3088) public members belong to the majority of Twitter demographic category, 8% (296) Tweets are from scientist, 2% (84) twitter are from practitioners (such as doctors and other health care professionals) mentioned for the article of Record-Setting Ocean Warmth Continued in 2019 [Rank 24/100].In this view public category completely dominating other category tweeters of demographic category.

Mendeley Readers by Professional Status.

Mendeley, a research collaboration platform and academic database. Mendeley is known for its desktop, mobile, and web applications that assist researchers in organizing, sharing, and discovering new research articles. One notable feature of Mendeley is its integration with Altmetric. Altmetric is a service that tracks and measures the online attention and impact of scholarly research articles. Mendeley serves as the sole Altmetric provider to display comprehensive information about the dissemination of articles among readers. Users can access detailed information about the online engagement, discussions, and mentions that an article receives across various platforms. Mendeley and Altmetric demonstrates how technology can facilitate the sharing, discovery, and assessment of academic research in today's digital age.

| Readers by professional status | Count | As% |
|--------------------------------|-------|-----|
| Student>Ph.D. Student | 130 | 17% |
| Researchers | 114 | 15% |
| Student > Master | 75 | 10% |
| Student > Bachelor | 55 | 7% |
| Unspecified | 46 | 6% |
| Other | 159 | 21% |
| Unknown | 164 | 22% |

| Readers by professional status | Count | As% |
|--------------------------------|-------|-----|
| Student>Ph.D. Student | 31 | 19% |
| Student > Master | 24 | 15% |
| Student > Bachelor | 24 | 15% |
| Researcher | 17 | 10% |
| Professor | 6 | 4% |
| Other | 26 | 16% |
| Unknown | 35 | 21% |

| Readers by professional status | Count | As% |
|--------------------------------|-------|-----|
| Student>Ph.D. Student | 56 | 18% |
| Researchers | 46 | 15% |
| Student > Master | 31 | 10% |
| Student > Bachelor | 29 | 9% |
| other | 17 | 5% |
| Other | 42 | 13% |
| Unknown | 93 | 30% |

Regarding the demographic of Mendeley readers by professional status, most of the readers fall under the 22% of unknown category followed by 21% other category, 17% of Ph.D students followed by 15% of researchers , 10% Master Degree students for the rank of 19/100 article. For 21/100 rank articles mendeley readers 21% are in unknown category followed by 19% of Ph.D students, 16% of other category and 15% of Master & Bachelor Degree students, 10% of Researchers. For the article of 24/100 rank majority are comes under 30% of unknown category followed by 18% of Ph.D students , 15% of Researchers and 13% of other category , 10% of Master degree student Level. Only 9% of Bachelor Degree readers status.

Mendeley Readers by Discipline Wise

Mendeley, a reference management tool used by researchers to organize and share scholarly articles.

Unknown Discipline: This category likely includes readers who haven't specified their academic discipline or are associated with disciplines that aren't clearly defined.

Unspecified: Similar to the first category, this might include readers who haven't specified their discipline or have left it unspecified.

Social Science: This encompasses fields like sociology, anthropology, economics, political science, and other related areas that study human behavior and societies.

Computer Science: Readers in this category are likely interested in computer science, including topics like programming, algorithms, artificial intelligence, and more.

Psychology: This category includes readers interested in the scientific study of behavior and mental processes.

Decision Science: Decision science involves the study of how individuals and organizations make decisions and solve problems.

Others: This could refer to a variety of disciplines not explicitly mentioned in the list, such as natural sciences, humanities, engineering, and more.

| Readers by discipline | Count | As% |
|--------------------------------------|-------|-----|
| Environmental Science | 108 | 15% |
| Agricultural and Biological Sciences | 91 | 12% |
| Unspecified | 50 | 7% |
| Engineering | 43 | 6% |
| Earth and Planetary Sciences. | 37 | 5% |
| Other | 193 | 26% |
| Unknown | 221 | 30% |

| | | |
|--|--------------|------------|
| Earth and Planetary Sciences | 53 | 33% |
| Physics and Astronomy | 19 | 12% |
| Biochemistry , Genetics and Molecular Biology | 15 | 9% |
| Agricultural and Biological Sciences | 7 | 4% |
| Chemistry | 7 | 4% |
| Other | 23 | 14% |
| Unknown | 39 | 24% |
| Readers by discipline | Count | As% |
| Earth and Planetary Sciences | 59 | 19% |
| Environmental Science | 50 | 16% |
| Agricultural and Biological Sciences | 36 | 11% |
| Unspecified | 7 | 2% |
| Computer Science | 7 | 2% |
| Other | 44 | 14% |
| Unknown | 111 | 35% |

For the Article1: Global human-made mass exceeds all living biomass [Rank 19/100] Mendeley readers 30% of Unknown category followed by 26% of other category, 15% of Environmental Science , 12% of Agricultural and Biological Sciences ,7% of unspecified, 6% of Engineering and only 5% of Earth and Planetary Sciences.

For Article2: Multiple subglacial water bodies below the south pole of Mars unveiled by new MARSIS data.[Rank 21/100]. Mendeley readers 33% of Earth and Planetary Sciences followed by 24% of unknown category, 14% of other category, 12% of Physics and Astronomy, 9% of Biochemistry, Genetics and Molecular Biology and only 4% of Agricultural and Biological sciences and chemistry.

For the Article3: Record-Setting Ocean Warmth Continued in 2019 [Rank 24/100] Mendeley readers 35% of Unknown category followed by 19% of Earth and Planetary Sciences , 16% of Environmental Science, 14% of other category , 11% of Agricultural and Biological Sciences, and only 2% of Computer Science and unspecified.

The distribution of readership across different categories indicates the multidisciplinary nature of the research articles. Each article attracts readers from a variety of fields, including Earth and Planetary sciences, Environmental science, Agricultural and Biological Sciences and more.

In each of the articles, there's a significant percentage of readers in the "Unknown" category. This might indicate that some readers are not clearly associated with specific academic disciplines, or their affiliations are not accurately represented in the available data.

Research Output Tracks for Altmetric Attention Scores:

Altmetric Attention Scores are typically presented as a numerical value and are often accompanied by a colorful "donut" visualization that represents the volume and sources of attention a research output has received. The donut is divided into segments, each representing different sources of attention like tweets, news articles, policy documents. Categories of sources that Altmetric tracks for calculating Attention Scores:

Twitter: Number of tweets mentioning the research output, including retweets and replies.

Facebook: Number of times the research output is shared or mentioned on Facebook.

LinkedIn: Number of times the research output is shared or mentioned on LinkedIn.

Reddit: Number of times the research output is mentioned or discussed on Reddit.

News Articles: Number of news articles that mention the research output.

Blogs: Number of blog posts that discuss the research output.

Online Reference Managers and Forums:

Mendeley: Number of times the research output is added to Mendeley libraries.

Zotero: Number of times the research output is added to Zotero collections.

ResearchGate: Number of times the research output is mentioned or shared on ResearchGate.

Policy Documents: Number of times the research output is referenced in policy documents and government publications.

Wikipedia Mentions: Number of times the research output is cited in Wikipedia articles.

Online Reviews: Number of online reviews or comments about the research output.

Patents: Number of times the research output is cited in patent documents.

It's important to note that Altmetric Attention Scores provide a broader perspective on the impact of research by considering both scholarly and public engagement. However, these scores should not be considered a substitute for traditional citation-based metrics like journal impact factor or h-index, as they measure different aspects of research impact.

| Research Output Tracks | | |
|--|------------|-------|
| All Research Outputs | 24,079,335 | #513 |
| Outputs From Nature | 94,152 | #40 |
| Outputs From Similar age | 513,115 | #38 |
| Outputs from Similar age and From Nature | 850 | #3 |
| Research Output Tracks | | |
| All Research Outputs | 24,079,335 | #963 |
| Outputs From Nature Astronomy | 1,945 | #4 |
| Outputs From Similar age | 414,907 | #62 |
| Outputs from Similar age and From Nature | 82 | #4 |
| Research Output Tracks | | |
| All Research Outputs | 24,079,942 | #1274 |
| Outputs From Atmospheric Sciences | 916 | #3 |
| Outputs From Similar age | 457,812 | #39 |
| Outputs from Similar age and From Nature | 11 | #2 |

For the first article titled “Global human-made mass exceeds all living biomass” with a rank of 19/100, Altmetric has tracked a total of 24,079,335 research outputs from all sources. This article received attention from 513 locations. Its also highlighted that out of 94,152 research outputs tracked from the journal Nature, this article achieved a rank of 19/100. Additionally, this article’s Altmetric Attention score can be compared to 513,115 tracked outputs, where it obtained the 38th place. Furthermore, the article’s Altmetric Attention Score can be compared to 850 tracked outputs, and it secured the third place.

For the second article titled “Multiple subglacial water bodies below the south pole of Mars unveiled by new MARSIS data” with a rank of 21/100. Altmetric has tracked the same total of 24,079,335 research outputs from all sources. This article received attention from 963 locations. Its highlighted that out of 1,945 research outputs tracked from the journal Nature Astronomy, this article achieved a rank of 21/100. By comparing its Altmetric Attention score to 414,907 tracked outputs, the article secured the 62nd place. Moreover, when compared to 82 tracked outputs, it obtained the fourth place.

Lastly, for the article titled “Record-Setting Ocean Warmth Continued in 2019” with a rank of 24/100, Altmetric has again tracked 24,079,942 research outputs from all sources. This article received attention from 1,274 locations. It’s noted that out of 916 research outputs tracked in the field of Atmospheric sciences, this article achieved a outputs, the article secured the 39th place.

4. Findings

1. Altmetric Attention Score: The Altmetric Attention Score for the top the articles in Earth Science in 2020 are as follows:
 - Global human-made mass exceeds all living biomass: Score of 6252 Rank 19/100.

- Multiple subglacial water bodies below the south pole of Mars unveiled by new MARSIS data: Score of 4,448 Rank 21/100.
 - Record-Setting Ocean Warmth Continued in 2019: Score of 3,832, Rank 24/100.
2. Media Mentions: The top-ranked article on Global human-made mass has received mentions in 401 news outlets, 40 blogs, 5977 tweets, 6 Facebook pages, 11 Wikipedia pages, 9 Reddit posts, 1 research highlight platform, and 4 video uploads.
 3. Twitter Mentions: The majority of Twitter mentions for the top-ranked article on Global human-made mass (Rank 19) fall under the unknown category (48%), followed by other categories (17%), USA Twitted (13%), and only 1% from India. For the second-ranked article on Multiple subglacial water bodies on Mars (Rank 21), the majority of Twitter mentions also fall under the Unknown category (53%), followed by other categories (13%), USA Twitter (10%), and 1% from Saudi Arabia.
 4. Twitter Demographics: Approximately 85% of public members belong to the majority of Twitter's demographic category for the top-ranked article, while 11% of tweets are from scientists. For the second-ranked article, 80% of public members belong to the majority of Twitter's demographic category, with 16% of tweets from scientists. And for the third-ranked article, 88% of public members belong to the majority of Twitter's demographic category, with 8% of tweets from Scientists.
 5. Mendeley Readers: For the top-ranked article, the majority of Mendeley readers are from an unknown discipline (30%), followed by other disciplines (26%), Environmental Science (15%), and Earth and Planetary Science (5%). For the second-ranked article, the majority of Mendeley readers are from Earth and Planetary Sciences (33%), followed by an unknown discipline (24%), others disciplines (14%), Physics and Astronomy (12%), and only 4% from Agricultural and Biological Sciences and Chemistry. For the third-ranked article, the majority of Mendeley readers are from an unknown discipline (35%), followed by Earth and Planetary Sciences (19%), and Environmental Sciences (16%), and only 2% from Computer Science.

5. Conclusions

1. The top-ranked article on Global human-made mass has received significant attention across various media platforms, indicating its widespread impact and relevance.
2. Twitter mentions for the top-ranked article are predominantly from the Unknown category, suggesting that the topic has a diverse audience and reaches beyond specific demographics.
3. The majority of Mendeley readers for the top-ranked article are from unknown disciplines, indicating a broader interest in the topic across different academic backgrounds.
4. The Altmetric Attention Score provides a comprehensive way to assess the impact of research beyond traditional citation-based metrics, considering various media types and forms of engagement with the research output.
5. Professional Analysis has evolved further on engraved publications, and alternative metrics like Altmetric Attention Score provide a more complete picture of the reach and impact of research encompassing data, software, websites, videos, and other digital content produced during the research process.

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How to cite this article: **P. Susheela**, *Almetrics Attention Score -2020 showing Three Articles in Earth Sciences: An Overview*. *Asian. Jour. Social. Scie. Mgmt. Tech.* 2023; 5(6): 01-12.