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Impact of climate change research at a South African tertiary institution: Monitoring and evaluating research dissemination and policy influence using Altmetric and Overton

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Abstract. Climate change is currently a main focus of many research related projects. It is important to monitor and evaluate the impact of this research to understand its dissemination and contribution. This study made use of two online platforms, Altmetric and Overton, to determine the academic, social and policy impact of climate change research associated with a South African tertiary institution. Comparisons between the two platforms and types of impact were made using correlations and paired t-tests. Results showed a high academic and policy impact, with lower online social attention. Online social impact did not predict academic impact however, a three-year delay was identified between online attention and policy inclusion. Findings suggested that research was disseminated and engaged with among many sectors and subject areas, highlighting an interdisciplinary impact resulting in real-world solutions.

Keywords. Altmetric, Climate change, Overton, Research dissemination, Research impact

1. Introduction

Climate change is a defining challenge of the 21st century and research on this topic has increased significantly in recent years [1, 2]. Tertiary institutions, which act as hubs of research and innovation, have a responsibility to act responsively towards these global trends [3]. It is important that these institutions not only produce academic knowledge but also disseminate it in a way that it reaches the general public. [4] stated that "a well-informed society can directly influence environmental policies that enable sustainable adaptive community practices." South African universities have successfully contributed towards climate change research [5, 6, 7, 8, 9] however, the extent to which the research is disseminated beyond academic circles and influences in policy decisions remains limited.

Monitoring and evaluating climate change research dissemination and policy influence aims at improving the adoption, adaption and sustainability of interventions and strategies [10]. Traditionally, bibliometrics were the favoured quantitative method to determine the impact of scientific publications as papers and books are the general products of science [11]. Although this is sufficient for determining the academic impact of research by including a measure of

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social impact the impact measurement is broadened to the non-academic audience [11, 12]. Altmetric is a digital tool that tracks the broader attention surrounding academic publications across a number of sources including social media platforms, news, blogs and Wikipedia [11]. The Altmetric Attentions Score (AAS) is a weighted score that reflects the quantity and quality of attention a research output has received online [13, 14]. The score does not equate to scientific quality but rather offers insights into the public visibility, engagement and societal reach of the research [14].

Furthermore, the integration of academic publications into policy documents is a powerful indicator of the impact of research on society [13]. Overton is a digital tool that focuses specifically on policy influence [13]. Overton is able to track how scientific outputs contribute to the development and implementation of policy thus bridging the gap between academics and governance, offering assessment of real-world policy impact [15]. In this study both Altmetric and Overton were used to determine the impact of climate change research conducted at a South African tertiary institution.

2. Methodology

To determine academic and societal research dissemination an Altmetric query was run for all research outputs from the full Altmetric database with keywords containing "climate change" affiliated with the specific South African tertiary institution [16]. Similarly, to determine policy influence an Overton query was run using the same key words "climate change" to search policy documents [17]. The results were refined by selecting only the specific institution and its associated academics. Resulting data from 2015-2025 were exported into Excel where it was cleaned and prepared for analysis in Statistical Package for the Social Sciences (SPSS). SPSS version 29 was used to describe the data using frequencies and measures of central tendency. Data were visually displayed using graphs and tables.

Societal interest was measured using the AAS score while academic impact was measured using the Dimensions citations (also attained from Altmetric). These numbers were quantified and combined to give a holistic view of research influence. A Spearman's rho correlation between AAS and Dimensions citations was run to determine whether societal attention predicts academic impact. Furthermore, policy influence was determined by the citations of the institutions research outputs within policy related materials, as identified by Overton. Finally, Almetric attention and Overton publications per year were compared using a paired *t*-test. To determine whether Altmetric attention in one year was followed by Overton policy citations in later years a cross-correlation was performed. Statistical significance was accepted at $p \leq 0{,}05$.

3. Results

3.1 Research dissemination

Altmetric results showed 93 total mentions for research outputs related to the institution. There were 40 unique research outputs of which 24 (60%) received online attention across 12 countries. Figure 1 shows the attention received over time.

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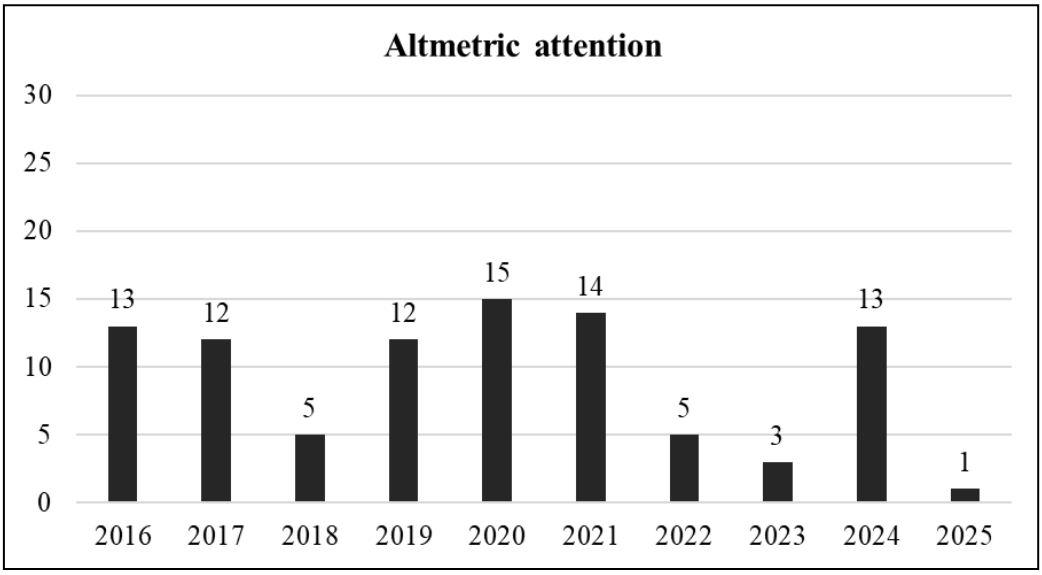

Figure 1: Altmetric attention for all research outputs related to the institution over the time period 2015-2025

All mentions were neutral positive. The type of online attention received is shown in Figure 2 with social media being the most prevalent. AAS ranged from 0-77, when these scores were quantified, most (83%) received little, or low attention (AAS of 0-5). The top five research outputs are shown in Table 1.

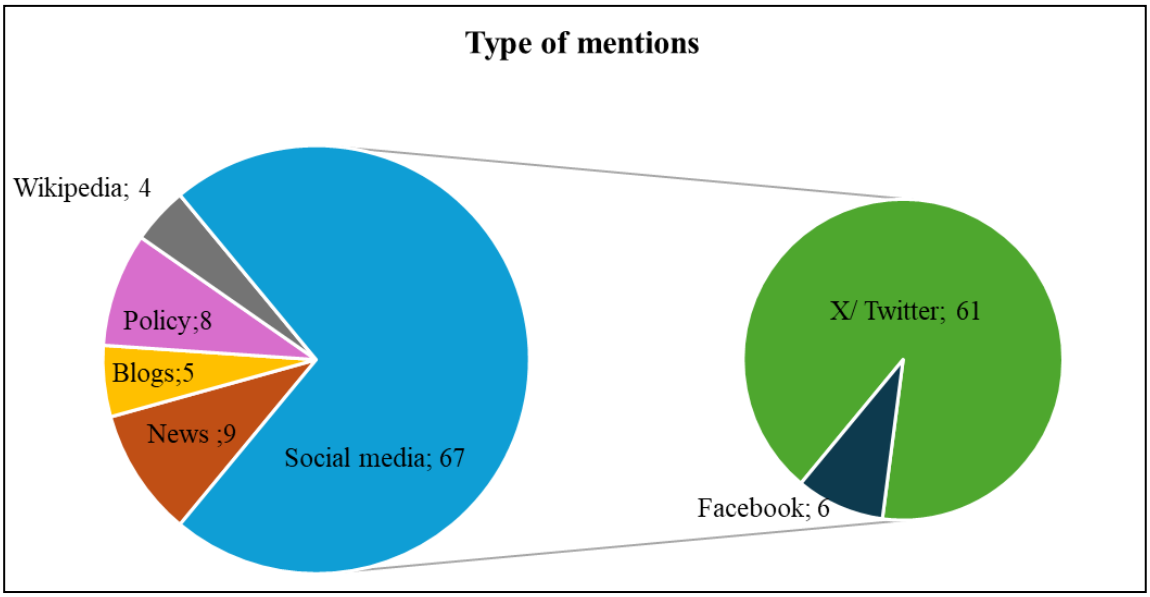

Figure 2: Source and number of mentions that Altmetric tracked for the research outputs

Dimension citations totalled 1274, with most outputs (58%) classified as having a good academic impact (21-100 citations). The holistic results showed that the majority of outputs (75%) had a low AAS but a high amount of Dimension citations, while 15% had both a high AAS as well as a high amount of Dimension citations. Spearman's rho correlation showed that

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there was a positive correlation between AAS and Dimensions citations however, this correlation was weak and not statistically significant, $\rho = 0{,}15$, $p > 0{,}05$.

A total of 34 subject areas were represented in the outputs, with Environmental Sciences, Climate Change Impacts and Adaption, and Earth Sciences being the most dominant (Table 2). In addition, many outputs (88%) were linked to Sustainable Development Goals (SDGs), with the most dominant being SDG 13 (Climate Action), followed by SDG 15 (Life on Land) and SDG 2 (Zero Hunger).

Table 1: Rank and AAS of the top 5 research outputs related to the institution

Rank	AAS	Research output reference
1	77	[18] P. C. THARAGA, A. S. STEYN, G. M. COETZER: Climate Change Impacts on Temperature and Chill Unit Trends for Apple (*Malus domestica*) Production in Ceres, South Africa. *Atmosphere*, 12(6), 740 (2021). https://doi.org/10.3390/atmos12060740
2	18	[19] M. MEKUYIE, A. JORDAAN, Y. MELKA: Understanding Resilience of Pastoralists to Climate Change and Variability in the Southern Afar Region, Ethiopia. *Climate Risk Management*, 20, 64–77 (2018). https://doi.org/10.1016/j.crm.2018.02.004
3	14	M. J. HANNAFORD, D. J. NASH: Climate, History, Society Over the Last Millennium in Southeast Africa. *Wiley Interdisciplinary Reviews: Climate Change*, 7(3), 370-92 (2016). https://doi.org/10.1002/wcc.389
4	12	[21] L. SCISCIO, H. TSIKOS, D. L. ROBERTS, L. SCOTT, Y. VAN BREUGEL, J. S. DAMSTE, S. SCHOUTEN, D. R. GROCKE: Miocene Climate and Vegetation Changes in the Cape Peninsula, South Africa: Evidence from Biogeochemistry and Palynology. *Palaeogeography, Palaeoclimatology, Palaeoecology,* 445, 124-37 (2016). http://dx.doi.org/10.1016/j.palaeo.2015.12.014
5	8	[22] R. MUTAMISWA, G. CHIKOWORE, C. NYAMUKONDIWA, B. T. MUDERERI, Z. R. KHAN, F. CHIDAWANYIKA: Biogeography of Cereal Stemborers and Their Natural Enemies: Forecasting Pest Management Efficacy Under Changing Climate. *Pest Management Science*, 78(11), 4446-57 (2022). DOI 10.1002/ps.7062

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3.2 Policy influence

A total of 107 policy documents either cited or mentioned climate change research linked to the related institution and associated authors. The majority of these documents were publications. Figure 3 shows the publications per year from 2015-2025.

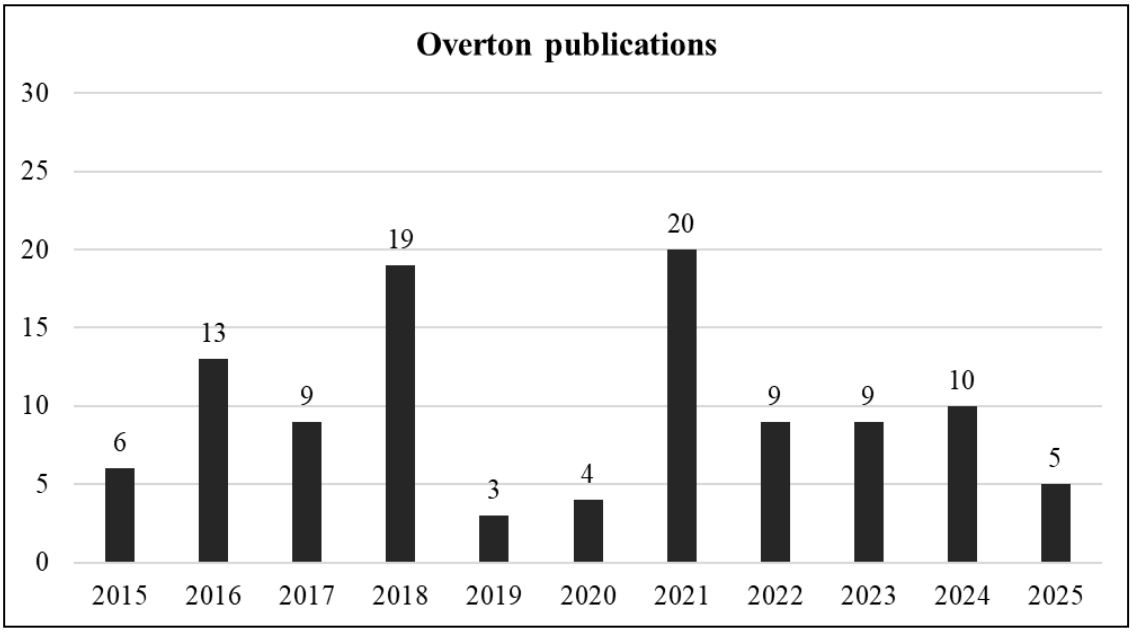

Figure 3: Publications from the institution associated with policy documents over the time period 2015-2025

Institution related climate change research was noticed in 11 countries with 22 sources (policy organisations or think tanks). The majority of policy documents were associated with Consultative Group on International Agricultural Research (CGIAR). Although most (69%) of the research was influencing third sector policy, 31% had uptake in the public sector. A total of 57 climate-relevant policy documents referencing research affiliated with the institution was associated with a single CGIAR policy source (2017 Annual Report to CGIAR Consortium: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCFAS)). Furthermore, the three most common policy subject areas identified were Economy, Business and Finance, Science and Technology, and Lifestyle and Leisure (Table 2). Many of the policy documents (85%) were aligned with SDG 2 (Zero Hunger) and 17% with SDG 13 (Climate Action).

Table 2. Comparison of the primary subject areas identified by Altmetric and Overton

Altmetric	**Overton**
Environmental Sciences	Economy, Business and Finance
Climate Change Impacts and Adaption	Science and Technology
Earth Sciences	Lifestyle and Leisure

There was no significant difference between the mean Altmetric attention (9,30 ± 5,19) and Overton publications (10,10 ± 5,80) for the time period 2015 - 2025, t = -0,34, p > 0,05. Cross-correlation analysis revealed that Altmetric attention showed a negative correlation with Overton policy citations at a one and two-year delay (r = -0,33 and -0,15 respectively). However, a statistically significant positive correlation was evident at a three-year delay (r = 0,71, p = 0,05).

4. Discussion and conclusion

Almetric and Overton successfully determined social, academic and policy impact of climate change research from a South African tertiary institution. Results showed a high academic impact and although many research outputs were both academically influential and socially visible, the majority of the outputs had not drawn broader online attention – indicating a low online social impact. However, the society impact based on policy influence was more positive with evidence of third and public sector policy attention, not only in South Africa but at an international level as well. It was noted that research that gained Altmetric attention was included in policy documents approximately three years later, indicating a delayed but meaningful influence of public attention on policy uptake. This observation supports the findings of [23, 24] who observed a similar lag into policy.

There was a strong indication of impact across sectors with Altmetric and Overton displaying notably different primary subject areas. In addition, the high number of policy documents linked to the CGIAR, the world's largest global agricultural innovation network [25], shows a high credibility and impact orientated network in global development. The fact that most of the documents linked specifically to [26], shows a high relevance in agriculture and food systems policies. This relevance was further highlighted with the alignment of research to SDGs, namely Climate Action and Zero Hunger, in both Altmetric and Overton.

In conclusion, climate change research conducted at this South African tertiary institution has had a meaningful impact on academic and policy level. Since 2015 the impact has been interdisciplinary with emphasis on applied and developmental contexts, ultimately contributing to real-world solutions. Further research is required into bridging the gap between climate change research and the public audience.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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