



Antarctic representation in print media during the emergence of COVID-19

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Abstract: Like every other continent in the world, Antarctica has been affected by the COVID-19 pandemic, in an imagined as well as a practical sense. Antarctica is a mediated experience; that is, most of us experience the place through films, novels, music, visual arts and the media. We present an analysis of media articles from eight countries over three time periods - pre-COVID-19 outbreak (October–December 2019), shortly after the pandemic hit the headlines (March–May 2020) and when the virus was established (October–December 2020) - to discover how COVID-19 may have changed Antarctic discourse. Our study shows that representations of Antarctica have been affected by the pandemic, in some instances reinforcing existing ideas and in other cases bringing new ideas to the fore. Based on our findings, we believe that COVID-19 has begun to change representations of Antarctica, stepping us away from the prevailing Antarctic hero narrative and providing a more contemporary understanding of the Antarctic experience. We argue that this may increase our motivation to engage with Antarctic issues, with associated implications for future global stewardship of the region.

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Introduction

Since its outbreak, COVID-19 has had an unprecedented impact across the globe, and in late 2020 the virus finally reached Antarctica. One of seven coronaviruses found in humans, COVID-19 emerged in China in December 2019. A year later, 36 people at the Chilean Bernardo O'Higgins research station, located at Cape Legoupil on the Antarctic Peninsula, tested positive for the virus. This included 26 army personnel and 10 civilian contractors undertaking maintenance at the station. The potential implications of COVID-19 having arrived in Antarctica were unknown (and are only now becoming slowly clearer), but it was clear that it could impact upon a range of areas, from planning and logistics of human activity to Antarctic wildlife through cross-species transmission.

The Antarctic COVID-19 Research Project established by the Scientific Committee on Antarctic Research (SCAR) has endeavoured to measure the impact of the pandemic on Antarctic research and governance and to identify challenges for the future of the continent due to this impact. The study presented here is part of this larger project, which involves more than 40 researchers

from all over the world investigating topics including wildlife, tourism, decision-making, perceptions and Antarctic futures. In this paper, we present an analysis of the impact that the global pandemic has had on how the global public (using media as a proxy) has engaged with the southern continent.

Antarctica as a mediated experience

Antarctica is important to the world due to its profound effect on Earth's climate and ocean systems, its unique and largely undisturbed flora and fauna and its role in international peace and cooperation. It is also a place that has fuelled our cultural imagination through films, novels, music and the visual arts (Nielsen & Philpott 2018). For all of these reasons (and more), the global public has developed - and maintained - an ongoing relationship with Antarctica, a place most of us will never visit, leaving our perceptions wholly mediated.

Antarctica and the media have been in partnership since the 'Heroic Era', during which the continent's exotic reputation was first used 'to entice media audiences' (Nielsen 2016). Heroic Era expeditioners were acutely aware of the need to promote their expeditions through

book deals and the newspapers of the time. The Norwegian Roald Amundsen famously arrived in Hobart, Australia's southernmost capital, after travelling to the South Pole, only to sequester himself inside a hotel room sworn to secrecy, as the rights to his story had been sold to a London newspaper.¹ Since then, mediated representation of Antarctica has been examined through analysis of film, literature, music, advertising (Nielsen 2017, Leane 2018, Philpott & Leane 2021) and other forms of mass media,² which make up a global industry. We 'live in mediatised times' (Cottle 2006), and the public receives most of its information and entertainment through the media (O'Shaughnessy & Stadler 2005), which has a powerful role in shaping public opinion through its agenda-setting role (McCombs & Shaw 1972) and its construction of ideas of reality (Couldry & Hepp 2018). The power of media to set the agenda is well researched and highlights media's role in telling the public not only *what* issues to think about, but also *how* important those issues are (McCombs 2002), whether through traditional or legacy media, such as newspapers, radio and television, or through new media, including social media and online news. The extent to which mainstream media has lost its 'gatekeeping' power because of the rise of social media is contested (Shoemaker 2020). Instead of viewing various media forms as operating in silos, there is a case to view each form as part of a wider media ecology, thereby influencing each other (Nilsson & Christensen 2019). Importantly, the texts distributed through the media do not exist in a vacuum but are subject to professional practices and organizational structures within different media organizations,³ and they occur in broader political, economic, social and cultural institutional contexts (Schudson 2002).

Antarctica has been described as 'the most mediated place on Earth' (Glasberg 2012), and given the extreme physical barrier of the continent's remoteness and harshness, assessing the role of media in contributing to public understanding of Antarctica is particularly relevant.

Public engagement with Antarctica

The way in which Antarctica is mediated will influence how the 'global public' (i.e. people around the world) engages with the continent. Media has been positively correlated with many core elements of engagement, such as interest, knowledge and participation, although it can also foster

cynicism, apathy, ignorance and disengagement (Carpini 2004). To date, the continent's inaccessibility and its complex, high-level governance structures have combined to limit what we might call grassroots public engagement with Antarctic issues. In this environment, public influence has largely been exerted through two main channels: through the activities of environmental non-governmental organizations (Clark 1994) and as consumers, with the latter largely focusing on the commercial activities of Southern Ocean fisheries (Bialek 2003) and Antarctic tourism (Schillat *et al.* 2016). Some national programmes, such as the Chilean Antarctic Institute, have developed more formalized structures for public participation (Chilean Government 2015), but on a global front initiatives such as these are still relatively rare and in their early stages.

Against a backdrop of continuing neoliberal governance of the global economy, public engagement with areas of global commons, such as Antarctica, becomes increasingly important for ensuring ongoing stewardship of such areas. By stewardship, we mean ongoing preservation, protection and conservation for current and future generations, as well as for Earth as a whole system - be it through the act of contributing towards public policymaking or through taking individual action. At a time when the level of public concern over nature and the environment has reached unprecedented levels (in developed countries at least; Carrington 2019, Hayhow *et al.* 2019), it is imperative that we understand how the public are engaging with the global commons. Media representation provides an indicator of the key messages the global public are receiving and thus the types of issue they may engage with.

The term 'Antarctic ambassadorship' has tended to be used to represent an individual's connection to Antarctica and their subsequent advocacy, although there is limited and inconclusive research on this topic (Alexander *et al.* 2019). But what about those that have never visited the continent and their role in Antarctic stewardship? Residents of Antarctic gateway cities have been found to feel a strong sense of connectedness with Antarctica (environmental and sociocultural), which inspires a sense of the need to play a custodian role in the future of the continent (Roldan 2020, Leane *et al.* 2021, Salazar *et al.* 2021). Indigenous peoples also have strong connections with the continent, not just in the form of participation in exploration and science, but also in a contemporary cultural connection sense, also encompassing notions of stewardship (Wehi *et al.* 2021). Global engagement with the icy continent is much more difficult to elucidate; however, it is evident in (prior to COVID-19) increasing tourism numbers (Palmowski 2020), with their focus on Antarctic ambassadorship, and engagement with Antarctic documentaries, which have a role in forging ecocultural identities (Nielsen 2020).

¹The 'scoop' was finally published in Australia's *Sydney Morning Herald* on Monday 11 March 1912, after it had been published in London's *Daily Chronicle*.

²'Media' refers to the media industry and the communication technologies used to transmit information and entertainment.

³This is of particular relevance in this research project, which included analysis of advertorials as well as news, features and travel stories.

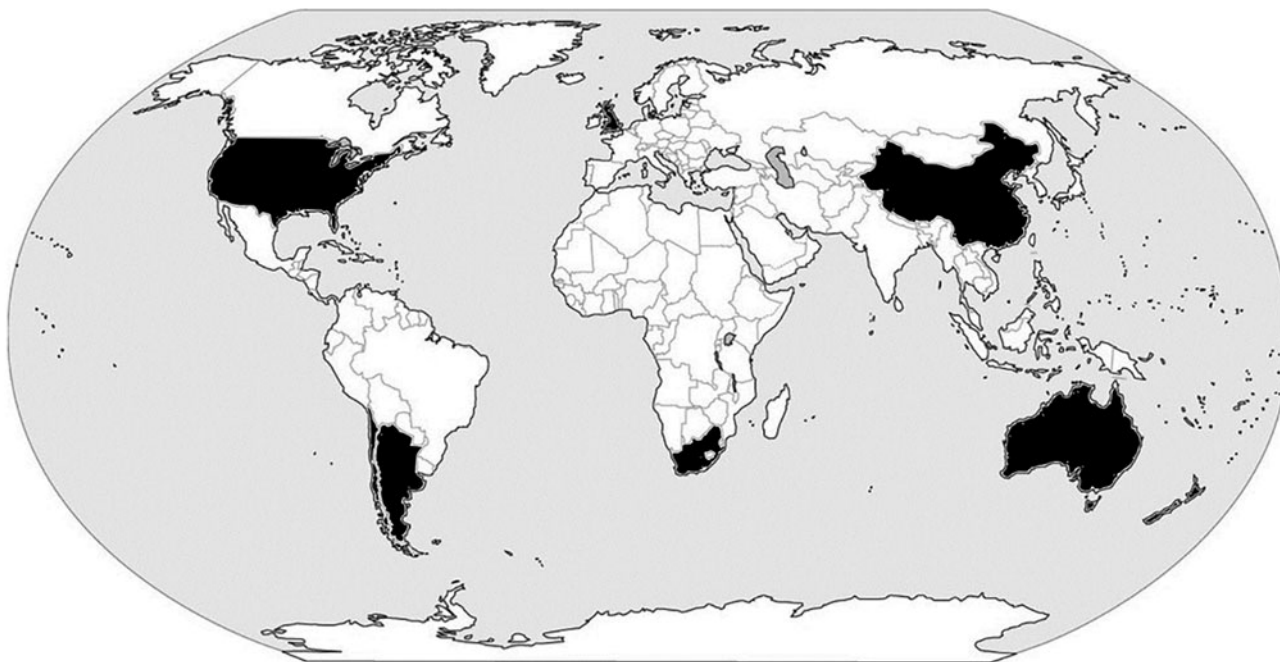


Fig. 1. Countries from which print media were analysed (in black).

As an extreme event, COVID-19 has had many impacts on Antarctica, particularly in terms of cancelled research and tourism operations, as well as cancelled international meetings to discuss governance of the region (Frame & Hemmings 2020). It has been suggested that this global disruption will result in a temporary decrease in human activity in the region, which may in turn lead to a reduction in environmental impacts, although also a reduced capacity to respond to environmental incidents (Hughes & Convey 2020). There has, however, been little consideration of how representations of Antarctica may affect the public imagination and how the public imagination may, in turn, affect future global public stewardship of the region.

As such, in this study we consider three research questions:

- How is COVID-19 impacting on depictions of Antarctica as a protected environment, an internationally governed space, a workplace, an object of scientific investigation and a travel destination?
- Which ideas, analogies and metaphors related to Antarctica is COVID-19 reinforcing and which is it challenging?
- How are public health strategies such as lockdown and isolation being mediated through the Antarctic experience?

Methods

If it is through the media that we gain a 'sense of living in a world, a horizon of world events' (Couldry 2012: 25),

then it is particularly pertinent to examine media representations of Antarctica, which is physically inaccessible for the majority of humankind. As the most mediated place on Earth (Glasberg 2012), the global public has engaged with the continent through newspaper reports and diaries from the Heroic Era, through to film, literature, television, radio and other forms of mass media in contemporary times (see Leane 2004, 2012a, 2012b, 2018, Nielsen 2016, Philpott & Leane 2021).

In this paper, we seek to address questions about public engagement with Antarctica through an analysis of print media representations during three periods covering time frames prior to the COVID-19 outbreak (October–December 2019), shortly after the pandemic hit the headlines (March–May 2020) and a later period when the virus was established (October–December 2020) in order to discover how media discourse about Antarctica may have changed.

Newspaper as a mass media platform was chosen for its immediacy and accessibility, allowing for prompt and timely analysis. No doubt film, literature and other forms of mass media will, in time, produce content that reflects the impact of COVID-19 on the continent, but that does little to help with answering these important questions now. Hence, print media was chosen for this study.

An interdisciplinary team examined a selection of print media from eight countries (Fig. 1), including the five countries that are home to Antarctic Gateways - Australia, New Zealand, South Africa, Argentina and Chile - along with China, the USA and the UK, three

Table I. Articles per country per period.

Country	Period 1	Period 2	Period 3
Argentina	136	122	191
Australia	172	150	57
Chile	158	17	57
China	210	90	74
New Zealand	97	43	62
South Africa	14	17	6
UK	800	558	642
USA	593	590	497

powerful players in Antarctic geopolitics (the latter two having been heavily involved in Antarctic affairs even prior to the initial signing of the Antarctic Treaty and the former one as an emerging power in the region). We chose these countries largely based upon the research team's language capabilities extending to English, Spanish and Mandarin. While we acknowledge that multiple languages are spoken within each of these countries, our scope of enquiry was limited to English for Australia, New Zealand, South Africa, the UK and the USA, Spanish for Argentina and Chile and Mandarin for China.

Data collection

We conducted a search using two online print media databases: 1) Huike (WiseSearch) for our Chinese data and 2) Thomson Reuters for the remaining seven countries. A systematic search strategy was employed

using the term 'Antarctica' and searching in the time periods identified above.

The articles were scanned to identify those that were potentially eligible for inclusion. The following criteria for exclusion from the review were applied: 1) where identical copies of articles were published in multiple papers through syndication deals, only one copy of the article was included, 2) obituaries were removed and 3) guides relating to scheduling and programming (i.e. for museum exhibitions/television documentaries) were also removed.

We identified some limitations to this method of data collection. Firstly, Thomson Reuters has a higher level of coverage in some countries than others. This is particularly the case when comparing Thomson Reuters' access to local media in the gateway countries. For example, while the database includes publications such as *The Mercury* (the main source of print media in Hobart, Australia's gateway city), it does not include any publications from the Chilean gateway city of Punta Arenas, nor from Ushuaia, its Argentinian counterpart. This means that the data cannot be considered fully representative. In addition, Thomson Reuters was unable to process acute accents for the Spanish search (e.g. the 'á' in *Antártica*). This forced us to modify the search to 'Ant*rtida' in Argentina and 'Ant*rtica' in Chile. We also recognize that there are limitations to relying on print media as a way of engaging publics, particularly given the rise of social media, but we do note the attempt by the print industry to expand their offerings into the digital space, with most articles identified also available online.

Table II. Key themes per country per period. The term 'Antarctic attributes' refers to, for example, temperature, isolation and remoteness.

Country	Period 1	Period 2	Period 3
Argentina	Hercules accident Antarctic sovereignty	No COVID-19 in Antarctica Cruise ship outbreaks Isolation as inspiration	Climate change Bernardo O'Higgins outbreak COVID-19 impacts on expeditions
Australia	Travel destination Climate science and research Antarctic attributes	COVID-19 impacts on tourism COVID-19 impacts on expeditions Climate science and research Antarctic attributes	COVID-19 impacts on expeditions Climate science and research Antarctic attributes
Chile	Hercules accident Climate change	Climate science and research COVID-19 impacts on expeditions Isolation as inspiration	Chilean Antarctic sovereignty Bernardo O'Higgins outbreak COVID-19 impacts on expeditions
China	CHINARE expedition Logistical support and infrastructure	No COVID-19 in Antarctica COVID-19 emergency measures Climate science and research Antarctic tourism	Bernardo O'Higgins outbreak Control of COVID-19 in Antarctica
New Zealand	40th anniversary of Mount Erebus crash Travel destination Climate science and research	COVID-19 impacts on tourism	Travel destination Measure of distance
South Africa	Climate science and research 60th anniversary of Antarctic Treaty	No COVID-19 in Antarctica Arts and culture references Antarctic attributes	Travel destination COVID-19 impacts on tourism COVID-19 impacts on tourism
UK	Climate science and research	No COVID-19 in Antarctica Antarctic attributes	COVID-19 impacts on expeditions
USA	Climate science and research Antarctic exceptionalism	Antarctic attributes No COVID-19 in Antarctica	Pfizer vaccine temperature

Data analysis

Data were imported into QSR International's *NVivo12* software. *NVivo* is a computer-assisted qualitative data analysis software that facilitates coding and retrieval. Coding allowed for the reduction of large amounts of qualitative data into smaller 'packages' (Cope 2005). This study used a thematic analysis method (Braun & Clarke 2006). Thematic analysis is a method that is used to identify, analyse and report patterns within data. A theme captures something important about the data in relation to the research question and represents a patterned response within the dataset, but it is down to the researcher's judgement as to what is considered a theme (Braun & Clarke 2006). An inductive approach to thematic coding was undertaken, meaning that the themes identified are strongly linked to the data themselves (i.e. no pre-existing coding framework was used). This approach involved four steps (as described in Braun & Clarke 2006):

- 1) Generating initial codes
- 2) Collating codes into potential themes
- 3) Reviewing themes
- 4) Defining and naming themes

All authors were involved in coding the data. To assist with inter-coder reliability, regular discussions were held regarding which initial codes were used for certain phrases/topics, and codebooks were shared to enable the reviewing and defining of themes.

Again, we should note a limitation regarding analysing such a large amount of data: this only allowed us to examine findings with broad brush strokes and not to go into any specific depth on single topics.

Results

A total of 5355 articles were analysed (Table I). The coverage in terms of type of article included news, features, travel pieces, advertorials, opinion pieces and letters to the editor.

An overview of the key themes identified in each of the countries over the three time periods is presented in Table II. This is followed by a more detailed, rich description of the data from each country.

Argentina

A total of 449 references were included in the Argentinian analysis. In period one, the Chilean C-130 Hercules accident in the Drake Passage dominated with > 60 references in December 2019 alone. Coverage of the search-and-rescue mission tended to focus on the Drake Passage's stormy and unpredictable conditions. The role of international cooperation in the search-and-rescue efforts also featured, running counter

to themes of Argentinian Antarctic sovereignty (> 20) referenced in the coverage of incoming president Alberto Fernández's inauguration, as well as the increased tension between Argentina and the UK over the Falkland Islands/Malvinas.

In Period 2, a focus on COVID-19 was clear, with most coverage referencing Antarctica as the 'only place without' the virus. Antarctic expeditioners were held up as a source of inspiration, with several articles suggesting that residents experiencing the isolation of lockdown should look south to find strategies for coping. At the same time, however, Argentinian media featured coverage of outbreaks on Antarctic cruise ships (11). Headlines such as *Casi 1000 chinos que viajan en un crucero en Ushuaia y provocaron alarma en la población* [Close to 1000 Chinese travelling on a cruise in Ushuaia provoke alarm in the population] depicted Antarctic tourism, and in particular Chinese Antarctic tourism, as posing a threat to gateway city residents. Likewise, a series of articles claiming that COVID-19 thrives in cold temperatures painted Antarctica as a site of special vulnerability to the virus. While Period 1 stressed the role of international cooperation in relation to the Hercules accident, Period 2 saw references to diminished international contact in Antarctica due to COVID-19 restrictions (8).

Climate change was a chief focus of Antarctic coverage in Period 3, with iceberg A68 and its impending collision with South Georgia being a key driver for this prominence. COVID-19-related Antarctic coverage continued to depict the continent as the 'only place without', although this changed following the outbreak at Bernardo O'Higgins base in December. Period 3 also saw an increased focus on the impacts of COVID-19 on expeditions, partially due to coverage on the launch of the 2020–2021 summer season, but also due to the closure of the long-running school at Esperanza Base. Punta Arenas and its role as Chile's Antarctic gateway again received prominent coverage, this time through references to its role in articles about the COVID-19 outbreak in Chile's Magallanes region.

Australia

In Australia, during the three periods analysed, the majority of mentions of Antarctica in print media related to the continent as a travel destination. During the first period ($n = 215$), prior to the COVID-19 outbreak, media discourse was dominated by articles in the travel sections and travel advertorials promoting the details of upcoming Antarctic cruises, along with reviews of recent visits to the continent. On other occasions, travelling to Antarctica was described as a 'dream trip', a 'bucket list' item or a New Year resolution. Only 5 of the 73 articles that mentioned Antarctic tourism were news stories.

Once the pandemic hit, the narrative during the second period ($n = 166$) changed to describe how the tourism industry had been impacted. Australians were stranded on cruises unable to dock in ports in South America: '... a dream cruise to Antarctica turned to horror for Highton grandparents Estelle and David Cameron, now stranded on a ship off the coast of South America', and the industry was virtually shut down overnight.

Articles in the third period ($n = 152$) continued to mention the impact of COVID-19 on the tourism industry, but this no longer dominated the narrative.

In addition to travel, references to climate science and research, including ice loss and sea-level rise, along with general mentions of the impact of climate change on Antarctica, were strongly featured in all three time periods: 'The biggest physical threat facing Antarctica is, of course, climate change'. If all references to Antarctic science are combined, regardless of type, science was the second most talked about feature of Antarctica across all time periods. The characterization of Antarctica as the coldest, most isolated and most remote continent on Earth is reinforced throughout all time periods, with many references to the 'icy continent' or 'frozen continent' and its extremes. The continent's isolation and remoteness were used during the outbreak to juxtapose the experience of expeditioners with Australians in lockdown back home. Finally, during the second and third periods, the impact of COVID-19 on Antarctic operations also emerged as a talking point: 'Not even Antarctica was spared from the impact of the COVID-19 pandemic, which forced everyone on station to stay for an additional summer'.

Chile

A total of 232 Chilean print articles were included in our analysis. In Period 1, again the 9 December Hercules disaster dominated, with more than 110 references out of the period's total of 158. Within this coverage, the Drake Passage was depicted as a place of unpredictable weather, huge waves, frigid cold, profound depths and historic shipwrecks, contributing to Antarctica's reputation for risk and extremity. There was also a focus on the role of international cooperation and technology in the search-and-rescue effort. Outside of the Hercules coverage, Period 1 contained 20 references to the impacts of climate change, largely centred on the proceedings of COP25.

Period 2 saw a significant drop in Antarctic media coverage, with only 17 references. Environment and science were the twin focal areas, again relating predominantly to climate change and the research surrounding it. Only five articles referenced COVID-19: two detailing its impacts on expeditions, one highlighting Antarctica's special vulnerability to the virus, another focusing on its status as

virus-free and a final article comparing Antarctic isolation with that experienced in lockdown.

The commemoration of 80 years of Chilean presence in Antarctica and the accompanying launch of a revised national Antarctic policy led to an increased focus on Chilean Antarctic sovereignty in Period 3. COVID-19-related coverage continued to be relatively low, with 5 articles describing Antarctica as one of the only remaining virus-free locations and a further 12 articles covering the subsequent outbreak at Bernardo O'Higgins base. Six articles focused on the impact that COVID-19 was having on expeditions, with descriptions of strict quarantine measures emphasizing Antarctica's vulnerability to the virus. Environmental coverage was reduced relative to the previous two periods and more distributed across varying issues, including overfishing and increased seismic activity.

China

In the first period, the 36th Chinese National Antarctic Research Expedition (CHINARE) departed for Antarctica, which dominated the print media ($n = 208$). This period was also one in which *Nanji* [Antarctica] was mentioned the most across all three periods ($n = 587$). Most of the CHINARE-related articles reported the main scientific tasks of this Antarctic expedition and some preliminary observation results (47): '... this expedition will focus on Antarctic climate change, ecological environment protection, etc., carry out marine environment survey ... and expand marine observation network, further study the role and impact of Antarctica in global climate change to enhance the understanding of Antarctica'. This expedition was the first time that China's new self-built icebreaker *Xuelong 2* [*Snow Dragon 2*] operated in tandem with the old one *Xuelong* [*Snow Dragon*], and so the mention of *Pobingchuan* [icebreaker] appears in almost every news report. Antarctic logistical support and infrastructures were also mentioned frequently (22), as were innovative technologies such as the application of an unmanned energy system and unmanned boat (20).

In the second period, most articles were associated with COVID-19 (55), and the most common types of sentence were 'Antarctica is the safest continent in the world at present' or 'Antarctica is the only continent in the world without COVID-19 cases' (25). Some articles reported Antarctic emergency measures for the ongoing investigation activities and station work, such as shelving or reducing summer research projects (7). During this period, there were also a few articles that referred to COVID-19 cases on two cruise ships to Antarctica and the impact of COVID-19 on tourism and scientific research. In addition to reporting some scientific activities and preliminary discoveries during China's

Antarctic expedition, there were also some reports on key scientific topics in Antarctica, such as climate change, sea-ice melting and sea-level rise. As opposed to the first period, there were several articles about Antarctic tourism (12), including the travel notes of tourists, the routes and expenses of Antarctic tourism, etc.

In the third period, most of the print media articles were related to COVID-19 (25). Now articles reported 'Antarctica used to be the safest place in the world (far away from COVID-19), but now there are cases'. Fourteen articles were related to the discovery of new cases in Chile's station. In addition to continued reporting on the key tasks of the 37th CHINARE, the media also reported on the addition of nucleic acid detectors on the icebreakers to strengthen the prevention and control of the epidemic in Antarctica.

New Zealand

The 40th anniversary of the crash of a New Zealand flight into the side of Mount Erebus in Antarctica resulted in a slew of articles focused on the disaster, dominating the country's print media during the first period examined ($n = 108$). The articles focused on ceremonies being held around New Zealand to commemorate the accident, along with interviews with the family and friends of those who were killed. Aside from this topic, there was a fairly even distribution of mentions between Antarctica as a tourist destination, Antarctic science (including climate science) and the cold and extremes of the continent: 'In freezing conditions, they were regularly battered by storms and winds ...'.

This narrative changed dramatically during the second period ($n = 46$) following the COVID-19 outbreak. The New Zealand print media was dominated by mentions of the impact of the virus on Antarctic tourism: 'Dream holiday turns into nightmare for 16 Kiwis stranded aboard ship'.

During the third period examined ($n = 63$), the narrative changed again, and mentions of Antarctica were more incidental, with numerous references to the continent as a place that people have been to: 'A trip to Antarctica has inspired Lorde to write her first book, *Going South*'; and as a measure of distance: 'stretching from Antarctica to Africa' and 'the next stop is Antarctica'.

South Africa

Despite Cape Town being an Antarctic gateway city, Antarctica received little attention in the print media during all three time periods. During the first time period ($n = 15$), climate change and climate science were the clear dominating focuses in South African newspapers. This included general mentions of climate change impacting Antarctica, ice loss and ocean warming: 'The

last five years have been the hottest ever recorded, Antarctica is melting three times as fast as a decade ago...'. This was followed by mentions of the Antarctic Treaty, specifically in relation to the 60th anniversary of its signing: 'This last Sunday, the 1st of December, we celebrated Antarctica Day - the 60th anniversary of the signing of the Antarctic Treaty by 12 nations ...'.

The second period ($n = 17$), which followed the outbreak, saw a focus on the continent as being COVID-19-free, along with arts and cultural references to Antarctica. For example, there were references to apocalyptic science fiction set in Antarctica, including the 1982 horror film *The Thing*.

During the third period ($n = 7$), no single theme dominated, as there was such a small number of mentions. Antarctica was spoken of as a continent of beauty and extremes and used as a measure of distance. It was also incidentally referred to as a place that someone had been to. Finally, the impact of COVID-19 on tourism and on Antarctic operations was mentioned.

UK

In the UK, over all three periods investigated, the focus of print media has been on climate change, the resultant changes to ice and the science and technology that focuses on understanding these changes: 'Scientists have seen this phenomenon already underway in Antarctica, where rising temperatures have caused increased snowfalls even as the ice sheets have steadily melted into the sea'.

In the second two periods (i.e. post-COVID-19), references to Antarctic attributes become more prominent. Such attributes include temperature, isolation and remoteness, amongst many others. In the UK media these attributes tend not to be linked to COVID-19, although the link becomes slightly more prevalent in the third period: 'Since last November the 34-year-old Swede has been working and living in isolation with five male colleagues at Troll - the Norwegian polar scientific research base - and she has watched the pandemic unravel from what she describes as her "little Antarctic bubble"'. References to COVID-19 arise in Periods 2 and 3, but it remains less of a focus (i.e. 32 articles as compared to > 100 relating to environmental change).

In Period 2, the UK print media mostly highlighted the lack of COVID-19 cases in Antarctica, whereas in Period 3 there was the recognition that COVID-19 had reached every continent, with some discussion on cases at the Chilean Bernardo O'Higgins base: 'Antarctica, the only continent to remain unscathed by the coronavirus pandemic, has reported its first Covid infections. Thirty-six people tested positive at the Chilean research base, the Chilean military said on Tuesday'.

In Period 3, the main COVID-19-related print media focus was on suspended tourism and research

operations, as well as the fact that the UK Antarctic Heritage Trust-run Port Lockroy could be affected: 'Antarctica's renowned "penguin post office" - closed this year due to the dearth of cruise ship visitors during the pandemic - could be at risk from a lack of funds'.

USA

In the first period, the US print media references to Antarctica were very clearly 'exceptionalist'. Many references to Antarctica took the following formats: 'Over the years, Pink Martini has performed on every continent except Antarctica'; or 'Who knew that every continent grows corn except Antarctica?'. In this period, there were several articles focused on climate change, the ozone hole and changes to Antarctic ice, but combined these topics comprised a similar number to those that only noted Antarctica's exceptionalism.

A real switch in focus became evident in the second period. There was less of a focus on exceptionalism and a move towards referring to other attributes such as the isolation and remoteness of the continent, recognizing the links between these and a lack of Antarctic cases, but also in a couple of instances that COVID-19 was putting us into a similar situation of isolation. In this period, COVID-19 became the fourth most referred to factor in Antarctic-related media articles, with a clear focus on situations related to COVID-19 cases identified on tourism cruise ships carrying American travellers, the need for passenger and crew quarantine and the changes to operational protocols: 'Although their ship was clean, the passengers and crew were blocked from disembarking by Chilean officials. The MS *Roald Amundsen* stayed docked in the bay there for two and a half days ... Chilean workers restocked their ship in the middle of the night wearing protective gear'.

By Period 3, COVID-19 had become the key focus of Antarctic-related US print media articles. This was mainly due to the links presented between the Pfizer vaccine and the temperature at which it must be kept: 'Indeed, the efficacy of Pfizer's vaccine, for instance, hinges on minus 70 degrees Celsius temperatures - a climate colder than winter in Antarctica'. By far the largest number of articles focused on this connection. By Period 3, articles discussing climate change, Antarctic environmental change and science and technology had substantially reduced in focus.

Discussion

How is COVID-19 impacting on perceptions of Antarctica as a protected environment, an internationally governed space, a workplace, an object of scientific investigation and a travel destination?

We identified a clear representation of the operational changes caused by COVID-19. In particular, the print

media has reported on suspended tourism and research operations as well as the stricter protocols that have been enforced within those operations that have continued. One impact of these protocols, as reported in Argentinian, Chilean and Chinese print media, has been reduced contact between bases of different countries in areas such as the Antarctic Peninsula. Dodds & Hemmings (2020) note the important role that face-to-face interaction plays in Antarctic diplomacy through platforms such as the Antarctic Treaty Consultative Meeting (ATCM) and Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) meetings, and they posit future instabilities in the Treaty System should these meetings need to be held online in the longer term. The interactions between members of different national programmes at bases on the Antarctic Peninsula are less formalized than their diplomatic counterparts, but they still have an undeniable role to play in fostering the international goodwill and cooperation that sit at the heart of the Treaty System. With COVID-19 reducing the opportunities for face-to-face interaction on the continent, it is worth asking whether social distancing on the Antarctic Peninsula will amplify any diplomatic distancing taking place in and around the corridors of power.

The depiction of Antarctica as a travel destination saw a change from somewhere that is a 'dream destination' - isolated and pure - to somewhere that had become almost 'contaminated' as the last place to be affected by COVID-19 (which is, of course, ironic given that any form of contamination is a perennial concern for Antarctica). Indeed, in the Argentinean media, Antarctic cruise tourism was perceived as a source of contagion. Given that the movement of cruise ships has the potential to be a major trigger of COVID-19 outbreaks (Ito *et al.* 2020), this is likely to have a huge impact on Antarctica as a tourism destination, as suggested elsewhere (see Hughes & Convey 2020). However, it is unlikely that this change in perception will last, particularly given that a reduction in visitors to the continent may, in turn, lead to a return to the perception of Antarctic isolation and purity.

Despite the emergence of COVID-19, the perception of Antarctica as an object of scientific investigation continued to feature throughout print media in some, but not all, countries analysed. Argentina, Australia, Chile, China, New Zealand and the UK continued to report on scientific research being conducted. This is not surprising given that science is considered the currency of Antarctica (Stoddart & Haward 2011). However, there was a marked drop in climate science articles in the third period examined in Australia and New Zealand - exactly 12 months after the first period - perhaps reflecting the impact of the pandemic on research outputs. Alternatively, this might suggest that public

appetite for COVID-19-related news has pushed climate news into the background.

Which ideas, analogies and metaphors related to Antarctica is COVID-19 reinforcing and which is it challenging?

We identified several themes relating to Antarctic attributes that have been reinforced through the pandemic. The standout attributes include temperature (the 'cold'), isolation (discussed further in the next subsection), purity and Antarctic exceptionalism.

Antarctica is the coldest place on Earth, with the lowest recorded air temperature on the surface of Earth measured at Vostok Station in Antarctica in 1983 (Turner *et al.* 2009). Antarctic temperature has been used as a metaphor in various ways over the years, particularly in reference to a location experiencing a colder than normal climate, but also, for example, with regards to the silencing of women explorers' voices (Blackadder 2015). After the development of COVID-19 vaccines, a new metaphor arose: the print media began to regularly refer to the need for vaccines to be kept in 'Antarctic temperatures'. This is ironic given that during the pandemic Antarctica experienced record high temperatures, hitting 18.3°C on 6 February 2020 (BBC News 2020).

While most of our sampled media served to reinforce notions of Antarctic purity (particularly prior to the December 2020 COVID-19 outbreak on the Antarctic Peninsula), it is worth highlighting one strand of narrative that ran counter to this, linked to the point on tourism above. Specifically, articles in Argentinian print media discussing outbreaks on cruise ships depict Antarctica not as a site of purity, but instead as a source of potential contagion, threatening gateway cities such as Ushuaia. As noted in the 'Methods' section, Thomson Reuters had limited access to print media in the South American gateway cities; hence, a further study specifically targeting local print media may be useful in determining whether COVID-19 might impact the Antarctic cruise industry's social license to operate from sites such as Ushuaia and Punta Arenas.

Although it has been argued that globalism is impacting Antarctica's exceptional status, as human activity increases and technology conquers the continent's natural defences (Hemmings 2009), the notion of 'Antarctic exceptionalism' continues to be preserved in the print media. The continent's geophysical and geopolitical isolation is highlighted in the print media in news articles, travel articles and even in incidental mentions throughout all of the time periods and in all of the countries analysed. The exceptional status of Antarctica, which was a feature of Heroic Era narratives, continues to be reinforced in European and North and South American media. Not only were these early

explorers on an exceptional continent, but their heroic deeds were also exceptional, and these perceptions continue in the media. For example, a study of representations of Antarctica in the Australian news media (Hunt 2020) has shown that the exploits of modern-day expeditioners continue to be framed as exceptional, as they 'battle the elements' in the coldest, driest and windiest place on Earth.

How are public health strategies such as lockdown and isolation being mediated through the Antarctic experience?

Post-COVID-19, the print media has often referenced that whilst in lockdown we have much to learn from Antarctic scientists who spend much time in isolation, particularly during the Antarctic winter. To some extent this is unsurprising given that submariners, astronauts and Antarctic researchers can provide excellent opportunities to study the effects of prolonged isolation and confinement (Choukér & Stahn 2020), and in many instances the former two have also provided advice on self-isolation (e.g. Fleming 2020). Furthermore, space analogue studies have been undertaken in Antarctica from the early 1990s (a relationship often referred to in the media analysed in this study; Lugg & Shepanek 1999). Based on research undertaken by psychologists who work with those returning from Antarctica, resources such as guides and short courses have been developed to assist those undertaking self-isolation (e.g. see <https://short-courses.utas.edu.au/courses/Social-Isolation>).

The pandemic has seen the narrative of the hardship and isolation experienced by Antarctic expeditioners brought to the fore through comparisons made in media with the COVID-19 lockdown. Scrutiny of health conditions, in particular the psychological impact of extended periods of isolation, has not been a feature of contemporary Antarctic discourse, it could be argued. Neilsen & Jaksic (2018) have found that recruitment advertising for expeditioners continues to centre on the tropes of the Heroic Era, with a focus on adventure. With Antarctica now being portrayed in the media as a place of harsh isolation comparable to that experienced during extended and repeated lockdowns during the pandemic, this new narrative may help to dispel - or at least clarify - outdated notions of the reality of life in Antarctica.

Conclusion

In late 2020, COVID-19 reached Antarctica - a place most of us will never visit. Yet we still 'experienced' that moment thanks to mediation by the mass media. As our analysis has shown, print media representations of Antarctica during the COVID-19 pandemic have strengthened

commonly used tropes such as exceptionalism, the cold, isolation and purity. However, these same representations have also linked features of our own pandemic experience closely to the reality of life in Antarctica, bringing the 'Antarctic experience' even more directly to our doorsteps. For example, we have learnt that our own experiences of isolation may not match our romanticized notions of isolation in Antarctica. We have also learnt that tourism, through which we hope to experience Antarctic purity, may in fact be detrimental to the environment and to our health if there are further COVID-19 outbreaks.

Whilst representations in the past have served to reinforce the distance between the public and the 'hero' expeditioner (and in some cases still do), the changing representations during COVID-19 may be stepping us away from the prevailing Antarctic hero narrative by providing a modernized understanding of the Antarctic experience. This will have implications for future global stewardship of the region because a more interconnected social and biophysical reality will more likely motivate us to engage with Antarctic issues. Links between Antarctic stewardship and personal connection to place, as well as the role of the media in mediating these, should therefore be a focus of future research in Antarctic studies.

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Author contributions

KAA: conceptualization, methodology, data curation, formal analysis, visualization, writing - original draft, writing - review and editing. KM: methodology, data curation, formal analysis, writing - original draft. LH: methodology, data curation, formal analysis, writing - original draft. MZ: data curation, formal analysis, writing - original draft.

Competing interests

The authors declare none.

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