

Antarctic Science and the News Media

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Supervised Project

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1. Abstract

The University of Canterbury's 'Gateway Antarctica' is a leader in national and international Antarctic research projects. Research conducted by Gateway Antarctica, needs to be disseminated to the public, in order to inform citizens of advances in science, enhance public debate about science, and by doing so boosting the centres public profile. The aim of this study is to create a framework that Gateway Antarctica can use in the future in order to have their research published as news in mainstream New Zealand newspapers, by analysing articles published regarding Antarctic science and research to establish what news on these topics is most likely to be published.

The study used content analysis methodology. It coded one hundred and five articles between 1989 and 2011 across New Zealand metropolitan and regional newspapers, and found that the most common Antarctic science and research reported were 'climatological', 'glaciological' and 'geological'. The most common themes of the headlines and articles were 'scientific research' and 'climate change/rising sea levels' and this was done by applying the news values of 'dramatisation/sensationalism' and 'timeliness' to the articles. The science was most commonly framed by an event or an issue that was deemed important for public knowledge.

The New Zealand Press Association was the largest publisher of news on Antarctic science and research, and its closure in August 2011 is likely to have an impact on the future of the reporting in this area. The largest sources of information for journalists were University representatives and researchers, followed by non-tertiary scientists.

2. Introduction

Gateway Antarctica is the centre for Antarctic studies and research at the University of Canterbury, and plays a leading role in national and international Antarctic research projects. Gateway Antarctica will under its rationale “stimulate and support debate and dissemination of information through seminars/conferences/public events”.

Gateway Antarctica has asked for assistance in publishing research, completed by Wolfgang Rack in December 2011, in the mainstream New Zealand newspapers.

However the project identifies an underlying problem. Gateway Antarctica currently has difficulty gaining public attention for important research completed, and this project aims to find ways to address the question of why this is, and to develop ways to boost the centres public profile.

The scope of this project is restricted to newspapers only, due to time and length constraints. In order to assist with the publishing of any future Gateway Antarctica research, this paper will examine how Antarctic science and research is reported in New Zealand newspapers: the key themes; the scientific areas most frequently published; how the science is reported; and the way the science is framed.

With the results of this research, a framework will be established to assist Gateway Antarctica with the publication of any future research in mainstream New Zealand newspapers. It is thought that by exploring the themes indicated above in published Antarctic science news articles, a consistent set of factors will be discovered, that can be used to frame research from Gateway Antarctica into news articles for publication.

3. Aim:

The aim of this study is to understand how Antarctic Science and research is represented in newspaper media, and create a framework that Gateway Antarctica can use in the future in order to have their research published as news in mainstream New Zealand newspapers, raising the profile of Gateway Antarctica and the University of Canterbury.

4. Literature Review

The literature review will outline the media landscape in New Zealand detailing the removal of regulations regarding foreign and cross media ownership and the impacts this has on news content with the concentration of New Zealand media ownership.

The role of the media in society will be examined touching on the social responsibility of the media as the fourth estate in society, and its importance in assisting democracy. The idea that this may be compromised by concentration of media owners will be briefly examined in relation to this as news coverage becomes limited, due to lack of resources, personnel and outlets, under economic pressures arising from concentration.

Various aspects of how news is constructed will be detailed, in regards to what makes a story newsworthy and how an issue or event gets through gatekeepers into news content. This leads into the main issues of this research, the reporting of science in the media. Science communication literature will be outlined to understand how science is not often correctly reported, touching on the scientific education of journalists and the general public and the implications of this.

The final part of the review will examine how the news media report science, why they report it the way they do, why scientific reporting is undervalued and what themes commonly emerge. This will assist in creating the research methodology and coding categories, to interpret the results, and to establish how Antarctic Science and research is reported in newspaper media in New Zealand.

4.1 *The Role of the News Media*

John Fiske (cited in Abel, 2004) suggests that if citizens want to be informed about local, national and international issues and events, they often turn to the news media as the initial source of this information. The mass media has gradually developed into a vehicle of “publication and dissemination” of information (McQuail, 2010; 59).

Gilems, Hertzmen (2000, cited in Kenix, 2008) agree that the media have power in democratic societies because the general public rely on them as a source of information. The “traditional view” of a journalists role is that of an “independent observer” reporting news, but not adding their personal views to the content (Venables, 2002; 260). This role implies a form of social responsibility by journalists to inform citizens of important issues and events (Winter cited in Kenix, 2008). This social responsibility has led to the label of news media as the fourth estate.

The idea that the press acts as the fourth estate in society was theorised as early as 1888 by Carlyle, who claimed that the press serves as an independent power that is outside the control of parliament and the church (Thompson, 1995: Carlyle, 1888 cited in Jensen, 2010). Drummond (1938 cited in Jensen, 2010) argues that for democratic government to exist, journalists must be impartial in the selection of news. This is explained by Alger (1998) in that political democracy assumes that the general public is able to make informed decisions, but can be informed only if there is a marketplace of ideas and issues for public consideration.

McQuail explains the idea of social responsibility and the fourth estate, in that the media should set high standards, in regards to their obligations in society, in truth, accuracy, objectivity and balance (McQuail, 1987 cited in Ashworth, 2009). Furthermore, the media should be representative of the diversity in a society, giving all groups access to objective points of view on

current issues and events, as well as allowing them the right of reply (in forms of letters to the editor, and now online news sites allow the posting of public comments) (McQuail, 1987 cited in Ashworth, 2009).

Under the fourth estate model, the media also functions as a 'watchdog' on the government and public institutions, informing the public of government activities, by questioning, and then disseminating the information in the press (Bennett & Serrin, 2005).

By framing the news media as powerful and representative in democratic societies, this literature assumes the role of the news media as socially responsible, reporting accurately on all aspects of society, including science, which is outlined further on in the chapter.

4.2 New Zealand News Media Landscape: Newspapers and Television

Media scholars express concern that with the recent processes of concentration and conglomeration of media outlets, the media's role as the fourth estate has been weakened, as resources are pooled, with the sharing of information (Domingo et al, 2007). For example, readers may not know that they are reading an article published in *The Press*, which was written by a *Dominion Post* reporter and published the day before. From New Zealand's perspective, it can be argued that there is a less diverse range of news and opinions, as news is being recycled in order to cut costs (Norris, 2002).

Communication studies show the influence of ownership and control on media content, with less of an emphasis on public service, and a trend towards commercialism. Several studies have shown that there is a link between profit-driven news organizations and less substantive reporting (Arnold 2004: Hamilton 2004: McManus 1994: Zaller 1999 cited in Dunaway, 2008). Furthermore under these processes many have argued that news has been softened with less coverage of politics and economics, and more focus placed on human interest and entertainment stories (Comrie, 1999 cited in Norris, 2002).

New Zealand turned into the world's most deregulated broadcasting market in the late 1980's, after privately owned TV 3 was placed into receivership within six months of broadcasting. The government was eager to rescue the company and in 1989 introduced legislation that allowed foreign ownership of media outlets of up to 49%. This was eventually pushed up to 100% when the National government removed all restrictions on overseas ownership of media outlets (Comrie & Fountaine, 2005) and the Broadcasting Amendment Bill was passed in March 1991 (Norris, 2002).

The New Zealand news media landscape is largely owned by overseas investors. Fairfax owns nearly 50% of New Zealand's daily newspaper circulation (Rosenberg, 2008) and has dominance over the major metropolitan newspapers, owning *The Press*, *The Waikato Times*, and the *Dominion Post*, as well as online giant *stuff.co.nz*.

APN News and Media owns 42.4% of the daily newspaper circulation (Rosenberg, 2008) with the majority of this being the *New Zealand Herald* with a circulation of 170,707 (NAB, 2012). The *Otago Daily Times* is the only major New Zealand newspaper that is not owned by APN or Fairfax, rather family owned (Kenix, 2010).

There was only one television channel until 1975 when under state owned TVNZ, Network 2 arrived. Competition arrived for TVNZ in 1989, with the first privately owned free to air television network, TV3 going to air. In 1997, Canwest, owners of TV3 from 1991, established another

national channel, TV4, renamed in February 2011 as FOUR (TVNZ, 2012). TV One and TV 2 are currently state owned, with TV 3 and FOUR under overseas ownership by Australian's Ironbridge capital, under the parent company MediaWorks (Mediaworks, 2012).

Pay TV operator SKY television, owned largely by parent company News Corporation, was set up in 1990, and purchased free to air PRIME television in 2005 (Lealand, 2010). Prime operated from a news room in Sydney (which has recently moved to Albany) with a small amount of local news content sourced largely from international sources (Rosenberg, 2008).

The implications of foreign and cross media ownership are, amongst other things, that the news product has been commercialised and standardised with content being produced by one newsroom, and replicated through media outlets under an owners stable of publications (McGregor, 2002). Although New Zealand has a high number of media outlets in comparison to population, these publications are owned by a handful of foreign conglomerates (Sterne, 2010). The closure of the New Zealand Press Association (NZPA) in 2011 is an example of the homogenisation of news content.

The NZPA, for the past 131 years, has supplied national and international copy to New Zealand newspapers (Hannis, 2008). Fairfax withdrew their support of the NZPA, in favour of news created in their own newsroom, in April 2011 and the NZPA ceased publishing in August 2011. The NZPA employed around 40 journalists and published up to 1000 articles per day (New Zealand Herald, 2011). Three news services have grown out of the NZPA's closure, but all are Australian owned: APN News and Media and Fairfax, already large players in the New Zealand media market, as well as Australian News Agency AAP (Stone, 2011). Peter Dunne has been reported as saying "... having fewer media organisations can never be a good thing, and the public would now have an even greater dependence on commercial organisations such as Fairfax" (Dunne, 2011).

4.3 How is News Constructed?

Journalists are trained to follow two general rules – the six question formula (who, what, when, where, how and why) in order to be objective and report on only the facts, as well as the use of the inverted pyramid structure, where the body of the story is at the beginning of the article, so the reader is drawn in after reading the first few lines (Louw, 2010). This also stems from newsroom practices in that the least important information sits at the end of the article, in case space is limited, and the Editor needs to slice the bottom off the story minutes before print deadlines (Salleh, 2001).

Journalists consider themselves gatekeepers of news, "they stand between significant information and the public's awareness of it" (Morrisson, 2002; 57). They are in a position of power and value their role in the selection of what is deemed important and newsworthy (Morrisson, 2002). This selection of news has been theorised by many in order to understand how news is constructed and what are 'news values'.

Galtung & Ruge (1965) formulated the 'typology' of news, encompassing twelve factors that increase the likelihood of an item being selected as news (McGregor, 2002). These conditions are: "Frequency, threshold (intensity and intensity increase) unambiguity, meaningfulness (proximity and relevance) consonance, (predictability and demand) unexpectedness (unpredictability and scarcity) continuity and composition" (McGregor, 2002;

112 – 113) as well as four cultural factors, which refer to negativity, selling news, and the inclusion of an issue or event as news if it refers to an elite person or nation.

Shoemaker & Reese (1991, cited in Weigold, 2001) also claim that all news organisations rely on a set of factors when publishing news. These include: importance, human interest, conflict/controversy, the unusual, timeliness and proximity. Further research has confirmed that these criteria are also assigned to news regarding science (Weigold, 2001).

Robert Park theorized a series of factors that made news 'news'. McQuail (2010) cites Park in that news is timely – about very recent or recurrent events. Events that are reported on should be unusual and unexpected, and apart from this, news events are characterised by other values that are subject to likely audience interest.

Newspapers overtly inform readers as to which news is important by the placement of the article in the newspapers page or section. The most important stories are run at the front of the newspaper, or 'Section A' and generally, as most English readers read top to bottom, left to right, the most important stories are placed on the right hand page of the newspaper at the top left (Baran, 2008). Placement within sections is also relevant, as unless it was for example a major Rugby World Cup victory for the All Blacks, a general rugby story is likely to run in the Sport section of The Christchurch Press.

Published news is the end product of a formula of sorting and selecting issues and events that are believed to be newsworthy (Louw, 2010). The New Zealand Press Council (NZPC) in its annual report 2001, stated that news has to be "investigated and assessed for novelty, quirkiness, evidence of human frailty, or relevance to other issues and to the interests of the newspapers own readership" in order to qualify as news and make it through the (Louw, 2010; NZPC, 2001).

Although the end article is the result of the Journalist's own influences and their professional criteria of what should be disseminated to the public, their news articles are also influenced by their media outlets routine practices, the newspaper organisation and its responsibility to sell news to the people, external media forces such as commercial pressures, and finally broader ideological forces (Shoemaker & Reese; 1996 cited in Kenix, 2010).

It is these commercial pressures that have influenced the expectation that news should be entertaining. News is now often judged on its entertainment value, influenced (largely in regards to television) by the advertising dollar, and the ratings war, which is evident in New Zealand with free to air news bulletins on TV One, TV Three and to a lesser extent Prime (Schulz, 1998). News stories are pressured to deliver high ratings, and in New Zealand, the peplemeter system measures responses to individual news items, which create pressure to deliver more stories that rate high, rather than report on items that are only interesting to a certain set of people (Schulz, 1998).

4.4 Science Communication

We now turn to discuss how science fits into this picture of journalistic values and news selection, as science isn't, like general news, reported as it happens, rather journalists most commonly learn about scientific news, from press releases generated by a researchers' University, or the scientific journal in which the research will be published (Parthasarathy, 2006).

It is by this process, that journalists have an important role in disseminating these scientific breakthroughs to the general public (who would not learn otherwise), and others in the scientific community (Malone, Boyd & Bero, 2000). The news media are said to have an important role of passing on information to the general public in regards to scientific developments once they leave the education system (Malone, Boyd & Bero, 2000; Nelkin, 1995).

The dominant view of communication has been defined by McQuail (2010: 70) as the process of “transmission of a fixed quantity of information – the message, as determined by the sender or source”. Although this definition is clear, we need to understand the constraints that are placed on the senders which will be examined further in the chapter.

Weigold (2001) cites Friedman, Dunwood & Rogers (1986, xv) in that “science comprises not only the biological, life and physical sciences, but also the social and behavioural sciences and such applied fields as medicine, environmental sciences, technology and engineering” furthermore “science writing includes coverage of these fields as well as the political, economic and social aspects of science”.

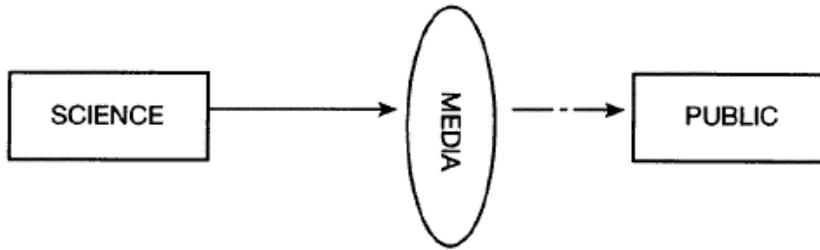
Journalists believe their role in regards to science is to make scientific research and theories more digestible for non-scientists, as well as creating an interest in science and technology (Gunter, Kinderlerer & Beyleveld, 1999 cited in Salleh, 2001).

Science communication has long been an area of communication studies, with the basic problem: mistranslation as outlined further in this chapter. Science is too specialised to be understood in its scientific form by the general public, unless it is revised into terms that are understandable and interesting. Only by rearranging these scientific theories and research into terms that are relevant to the public, can these ideas be communicated, usually by a journalist (Bucchi, 1996). Journalists also believe it is important to question scientists and open up debate, by presenting opposing scientific opinions in the same article, to maintain objectivity, and a balanced view of the issues at hand (Nelkin, 1995, cited in Zehr, 1999).

It is in this translation that the theories are distorted and mis-translated, by a lack of communication between scientists and journalists (Bell, 2001 cited in Kenix, 2008; Bucchi, 1996). This is partially due to the limits of time on journalists’ part (deadlines for daily newspapers being a factor), as well as their lack of formal scientific education (Bucchi, 1996). Kenix (2008) supports this argument, by citing International research findings claiming that the lack of accurate scientific reporting is due to a low level of scientific education amongst journalists (Wilson, 2000 cited in Kenix, 2008). It is important to acknowledge here, that scientists rely on journalists to disseminate their research to the public, which indirectly influences public policy. In essence, scientists need journalists, as much as journalists need scientists (Malone, Boyd & Bero, 2000).

Due to the assumed scientific illiteracy of the general public (Kenix, 2008) the reporting of science is dumbed down. A New Zealand study found that 10% of New Zealand adults were scientifically literate, and that 13% of NZ adults were attentive to, or interested in science (Billington & Bibby, 1991).

This in turn leads to the misrepresentation of these scientific ideas to the public, as well as a lack of appreciation or credibility given to scientific breakthroughs (Lewenstein, 1992 cited in Bucchi, 1996). A model of science communication is represented below, showing that the media are the gatekeepers and interpreters between the science and scientists and the general public (Bucchi, 1996: 377).



This is the ideal model of science communication: however it falls over as the message is often deviated due to distortion, in which the message is incorrectly translated to the public. (Bucchi, 1998: Hilgartner, 1990 cited in Ashworth, 2009). Various media scholars have created other sender, message, receiver models; however one particular model (Cloitre & Shin) has noted the contribution of public science discussion (the receiver) to the overall process.

Cloitre & Shin (cited in Bucchi, 1996) have theorised a continuum approach to science communication in that, the public are not the end of the spectrum, rather the contribution of public science discussion is an equally important part of scientific discourse. Bucchi gives the example of Sickle-cell anaemia, being diagnosed first in 1949, finally making its way to University textbooks in 1970, when it gained public attention in 1971 via television documentaries. Due to the public communication and awareness of the disease, research funds to study sickle-cell anaemia grew from one million, to ten million dollars by 1972, twenty three years after the disease was first diagnosed (Balmer cited in Bucchi, 1996).

4.5 News Media and the Reporting of Science

According to Hansen (cited in Rugar, 2002) the focus of science news is the occurrence and its impacts. Scientific stories are under-represented as they are boring, slow to investigate and have to be translated, which takes time - a value that is not associated with a fast paced newsroom.

Adding to this, Ashworth (2009) cites various sources in that if a journalist must write a scientific story, it is likely to be written on a topic that is relevant to their audience, and gives the example of medical or environmental issues, that are framed in terms of breakthroughs or revolutions. Often these breakthroughs or revolutions are misrepresented as Williams (1998: 4 cited in Salleh, 2001: 30) points out "Of the four big science stories of the year so far – asteroid impacts, human clones, cancer cures and impotence pills - three have turned out to be busts. Some Viagra wives may argue for all four".

Traditionally, coverage of scientific news is similar to the classic reporting of news in that it is driven by an event, a scientific meeting, or publication of research breakthroughs in a scientific journal (Corbett & Durfee, 2004). According to Wilkins (1993: 74), science coverage emphasizes discoveries and "firsts in science, is tied to discrete events, and emphasizes an elite group of scientists." What is missing in these science stories however is the social, economic and political contexts, as well as how the science is conducted (Nelkin, 1995 cited in Wilkins, 1993: Nelkin, 1995 cited in Corbett & Durfee, 2004).

A striking example of the journalist/scientist rift was demonstrated when the Nelson Mail Chief Reporter Martin De Ruyter visited Antarctica in the summer of 2005. On his first night, De Ruyter joined two scientists at the Tatty Flag – the Scott Base bar, and blogged later "We're in

the bar at Scott Base, drinking Heineken and talking science with two of the most boring men I have ever met. Never mind, the beer is \$1.70 a can..." Unfortunately this made its way to the notice board directly outside the Scott Base mess hall, needless to say, the reception at breakfast for De Ruyter was a frosty one (Arnold, 2011).

The following studies are highlighted in order to demonstrate that certain science in New Zealand tends to become news across all media platforms, if the science is something readers can relate to (Hansen, 1994). In a paper examining New Zealand newspaper reportage of the environment, Craig (2008) undertook a quantitative study of New Zealand environmental news in the country's metropolitan daily and Sunday newspapers. The study found that the most frequent key word was 'climate change' included in 13.8% of the keywords (118 out of 857 keywords, and 319 articles studied).

Craig (2009) conducted a similar study in regards to New Zealand television news and current affairs representation of the environment, in order to create a comparison. These results showed that the keyword 'climate change' was used in 6.5% of the television news and current affairs stories, (the sixth highest) with the keyword 'pollution' being first with a frequency of 12.1% (26 references out of 122 stories).

Craig (2009) explains that as well as the release of Intergovernmental Panel on Climate Change (IPCC) reports during the newspaper study (influencing the climate change stories) it is important to remember that the issue of climate change is included in newspapers more than on television as it needs more space for the communication of the details regarding the specifics of climate change, than a sixty second television news clip allows.

In 2000, Wilson completed a study of journalist's knowledge of global climate change, which concluded the many journalists did not know the basics of the science behind the Greenhouse effect (Corbett & Durfee, 2004). Journalists that used scientists as their primary information source or worked on scientific articles full time, were the most knowledgeable about climate change and the scientific process involved. Two earlier studies (1994 and 1974) also concluded that in comparison to general news, science articles had a greater number of inaccuracies (Corbett & Durfee, 2004).

The major problems with the reporting of science in the news media have been highlighted as the lack of journalist scientific education, leading to mistranslation of research, as well as news values constructing how the science is selected, and framed. Journalists tend to report on certain types of science as highlighted in this chapter, if they are tied to an event, a person or an issue, that their audience can relate to.

There is no substantial literature on the reporting of Antarctic science and research, therefore this study aims to analyse how New Zealand newspapers report Antarctic science and research, the most common science or research that is reported, whether it is tied to an event an issue or a person, the news values associated with the article, and the most common themes that emerge in newspaper discourse on Antarctic Science.

5. Research Question:

How is Antarctic Science and research reported in the New Zealand newspaper media?

This will be examined by looking at the following questions regarding the content of news articles about Antarctic science and research:

- 1) What themes are most commonly reported?
- 2) What themes occur most frequently in the headline?
- 3) Which newspaper most frequently publishes articles on Antarctic science and research?
- 4) Who are the most frequently cited sources of information?
- 5) What news values are commonly used for Antarctic science and research?
- 6) Which Antarctic science or research area most frequently receives media attention?
- 7) How is the science framed?

6. Method:

One of the most recent pieces of research in science communication is Ashworth's (2009) analysis of the media's portrayal of the GM debate. The methodology in Ashworth's thesis has been used as a basis for this content analysis.

6.1 Quantitative Content Analysis:

A content analysis design was used to conduct this research, as it is a formal approach to qualitative data (Hussey & Hussey, 1997). Content analysis is a methodology by which the researcher seeks to determine patterns and themes from written, spoken or published communication by a systematic and objective analysis (Zito cited in Berger, 2000).

Based on a basic communication model of sender – message – receiver, researchers can identify trends and patterns, by quantifying aspects of a piece of text. As it is a flexible method of research it can be adapted and moulded to suit the individual needs of each researcher, and there is now an enormous range of ways that content analysis can be used (White & Marsh, 2006). Content analysis enables the researcher to count the frequency of "specified characteristics or dimensions of texts, and through this to be able to say something about the messages, images, and representations of such texts to their wider social significance" (Hansen et al, 1998: 95 cited in Ashworth, 2009).

The analysed material is classified into pre-constructed coding units, created by the researcher (Hussey & Hussey, 1997) which is used to identify trends and patterns. Content analysis was used for this research because it is inexpensive, and creates quantitative data out of qualitative text, in order to establish patterns and trends (Berger, 2000). White & Marsh (2006, 30) have identified a procedure for Quantified Content Analysis, as detailed below in regards to this study.

1) Identify appropriate data or material:

The media selected was New Zealand regional newspapers. This was chosen due to time and length constraints, as well as access to television news content being largely difficult, in comparison to print content. Ashworth (2009) also points out that whilst television appears to now be the main source of news, newspapers were still regarded by New Zealanders as the most reliable and potentially credible source of news information (Roberts & Levine cited in Ashworth, 2009). Newspapers still attract the highest advertising revenue in New Zealand, indicating the value not only by advertisers, but by readers as well.

2) Determine sample method, and draw sample:

The sample of one hundred and five articles was established by completing keyword searches of 'Antarctic science' and 'Antarctic research' against New Zealand newspapers (no date range applied) in online newspaper databases Factiva and Newztext Plus. These keywords were chosen as the researcher needed to ensure the sample selected was relevant. It is in the interest of this research to analyse the way Antarctic science or research is presented in New Zealand Newspapers hence these key words were chosen (Ashworth, 2009).

Factiva was used as the primary database, and was cross referenced with a Newztext Plus search to ensure all articles were located. Any articles not located by Factiva, but located by Newztext Plus were included in the sample.

Articles which appeared in the results regarding history, adventure travel, tourism, Antarctic Treaty meetings, politics/claims were disregarded as the main theme of the article was not 'science or research'. Articles in which Antarctic science or research were mentioned, but this topic was not the primary focus of the article, were disregarded. Letters to the editor and opinion pieces were also not included as this research is focusing on news published by journalists. These types of news stories are often journalists' or others' viewpoints and raise different questions to those raised here about what, within journalistic ideals of objectivity and balance, are regarded as newsworthy (Kuypers cited in Ashworth, 2009).

If the same article appeared in two newspapers (under different headlines), it was coded for twice, as the sample did not include duplicate headlines. It is important to acknowledge this, as the most commonly coded for publication was the New Zealand Press Association, and articles written by the NZPA, and published later in a newspaper under the same headline, were automatically removed.

3) Establish coding schedule that assists research question:

A coding schedule was set up prior to the study taking place, and categories to code against were assigned that were relevant to the research question (White & Marsh, 2006).

This coding schedule coded material in terms of the following categories: (Appendix 1)

- Newspaper
- Science Reported
- Headline Themes
- Article Themes
- News Values
- Location
- How the Science was Framed
- Source of Information

The coding schedule allowed for multiple coding in case a newspaper article had more than one article theme or science type for example. It is important to note that in some cases, results add to over 100%, as each article may have been coded for more than once, when more than one category was evident.

- 4) Code data: One hundred and five articles were identified between 1989 and 2011, and were coded over two days.
- 5) Check for reliability of coding and adjust where appropriate: A pilot of twenty articles was completed to ensure the coding categories established were suitable, and was adapted to include categories that were not in the original coding schedule.

6.2 Limitations of Method

Factiva and Newztext Plus do not inform what section of the newspaper an article was placed, and do not display photos that were printed with the article. The Newztext Plus database holds articles from 1995 until the present day, with the exception of the New Zealand Herald which appeared in 1998 (Ashworth, 2009). Factiva was used as the primary source to ensure accuracy.

The New Zealand Press Association was included in the coding schedule as Factiva and Newztext Plus located these articles in the results sample. The news agency was included also, as it is still a representation of published news copy, even though the article is published first by the NZPA, and supplied to national newspapers, and online news providers such as Yahoo!Xtra and tvnz.co.nz.

The keyword searches located only one hundred and five articles that were specifically linked to Antarctic science or Antarctic research, between 1989 and 2011. On average that equates to approximately five per year, this appears to be a gross under-representation. This could be a potential limitation of the research method, as the search could be broadened to include 'Antarctic + scientists', or 'Antarctic + study' to widen the net for more Antarctic science related stories.

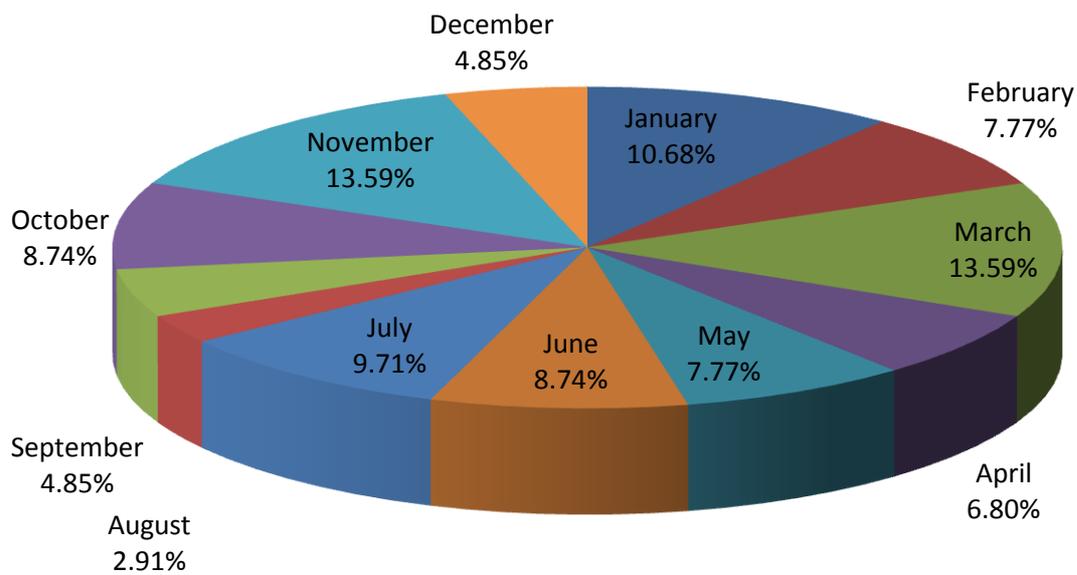
A large amount of the articles located (22%) were published in 2009. This is a limitation of content analysis as often news is concentrated at certain times. 78% of these articles were glaciological science and research and 70% of these articles were about climatological science and research. This is likely to be skewed due to a large amount of scientific papers regarding Antarctic drill core findings undertaken in 2006, and 2007 by the multi-national ANDRILL project, being published in 2009. Craig (2009) details that there was a release of Intergovernmental Panel on Climate Change (IPCC) reports during his newspaper study, which would have had a large impact on this result also.

7. Results

Results by Month:

The reporting of Antarctic science and research was not spread evenly across the year, suggesting some time factors are at work either in newspapers' gatekeeping or in the release of information to them. The months in which the largest numbers of the Antarctic science and research articles appeared between 1989 and 2011, were November and March, with 14% respectively. January and July were the next most common months, with 10%. The least reported in month was August with only 3% of the articles being published.

Percentage of Newspaper articles regarding Antarctic Science or Research by Month



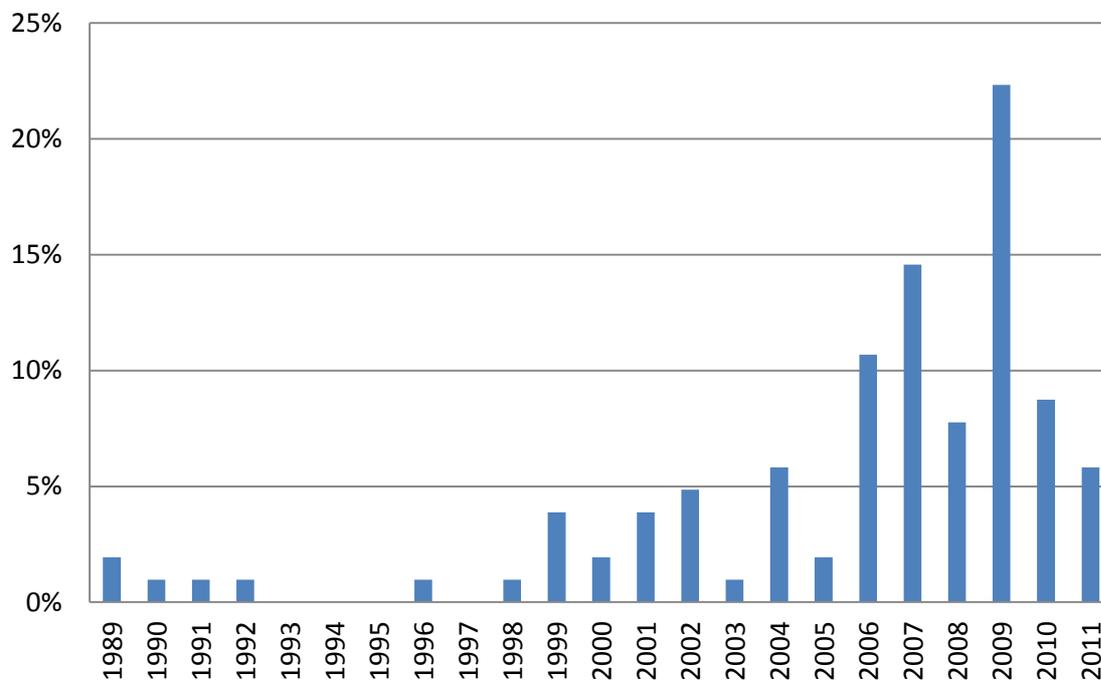
Results by Year:

Reporting also appears to be generally rising over time, with high peaks in 2009 (22%) and 2007 (14%). The content analysis did not locate any articles on Antarctic science or research in 1993/1994/1995 or 1997.

Of the 23 articles published in 2009, these were spread reasonably evenly across June (17%), February (17%), March (13%), November (13%) and January (13%). Of these articles, 43.54% were coded against the New Zealand Press Association, and 17% against the New Zealand Herald, and The Dominion Post.

Of the 15 articles published in 2007, 27% were published in May /June, and 13% in July. These concentrations correlate to an extent to the overall month-by-month breakdowns above.

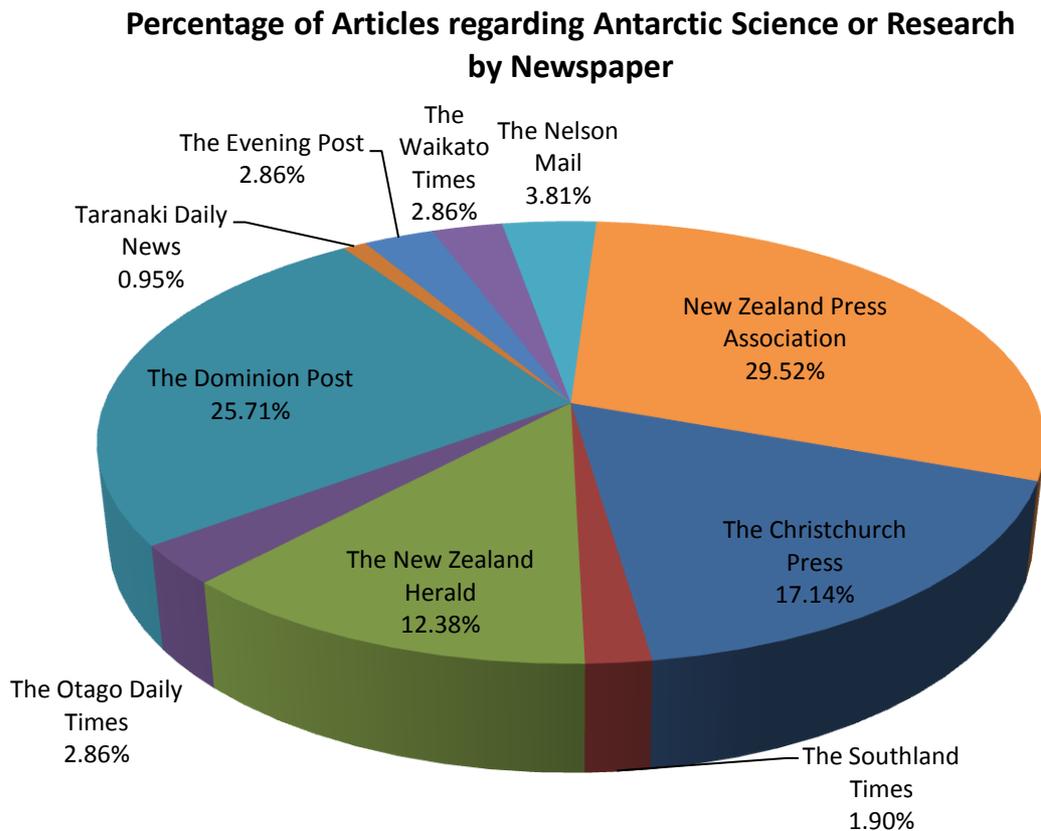
**Percentage of Articles regarding Antarctic Science
or Research by Year**



Newspapers:

The New Zealand Press Association published the largest amount of articles regarding Antarctic science and research at 30%.

The Newspaper that most commonly ran articles on Antarctic science and research was The Dominion Post with 26%, followed by The Press with 17% and the New Zealand Herald at 12%. Most other newspapers carried very few articles. This may be due to the absence of science reporters or science-oriented staff although it could be that the high NZPA coverage masks coverage by regional newspapers, which may have been deleted by Factiva as duplicates.

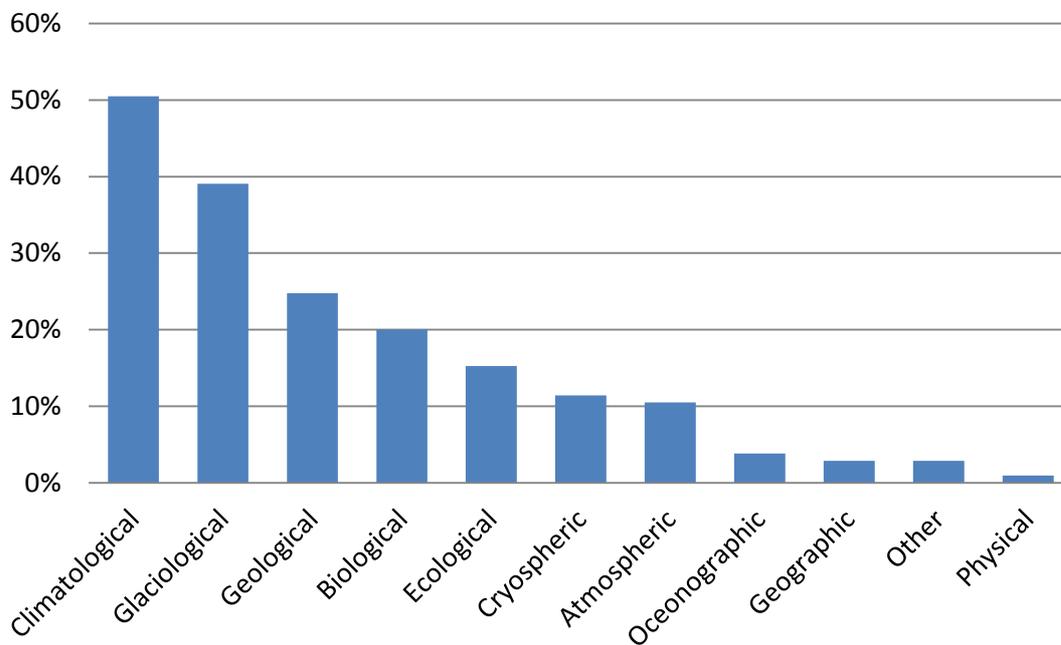


Science/Research Discipline:

The most commonly referenced science/research type was 'climatological' with 50% of the articles mentioning this area. This was followed by 'glaciological' with 39%. 'Geological' science or research, 'biological' and 'ecological' were reported with moderate frequency, while other areas rarely made the news.

Not surprisingly, of all the articles coded for 'climatological' science/research, the main theme was 'climate change/rising sea levels' with 26%, followed by 'scientific research' at 19%, and 'ice sheets/ice shelf' at 15%. The 'warning' theme only came across 7.5% of the time.

**Science /Research Discipline of Newspaper Articles
regarding Antarctic Science or Research**

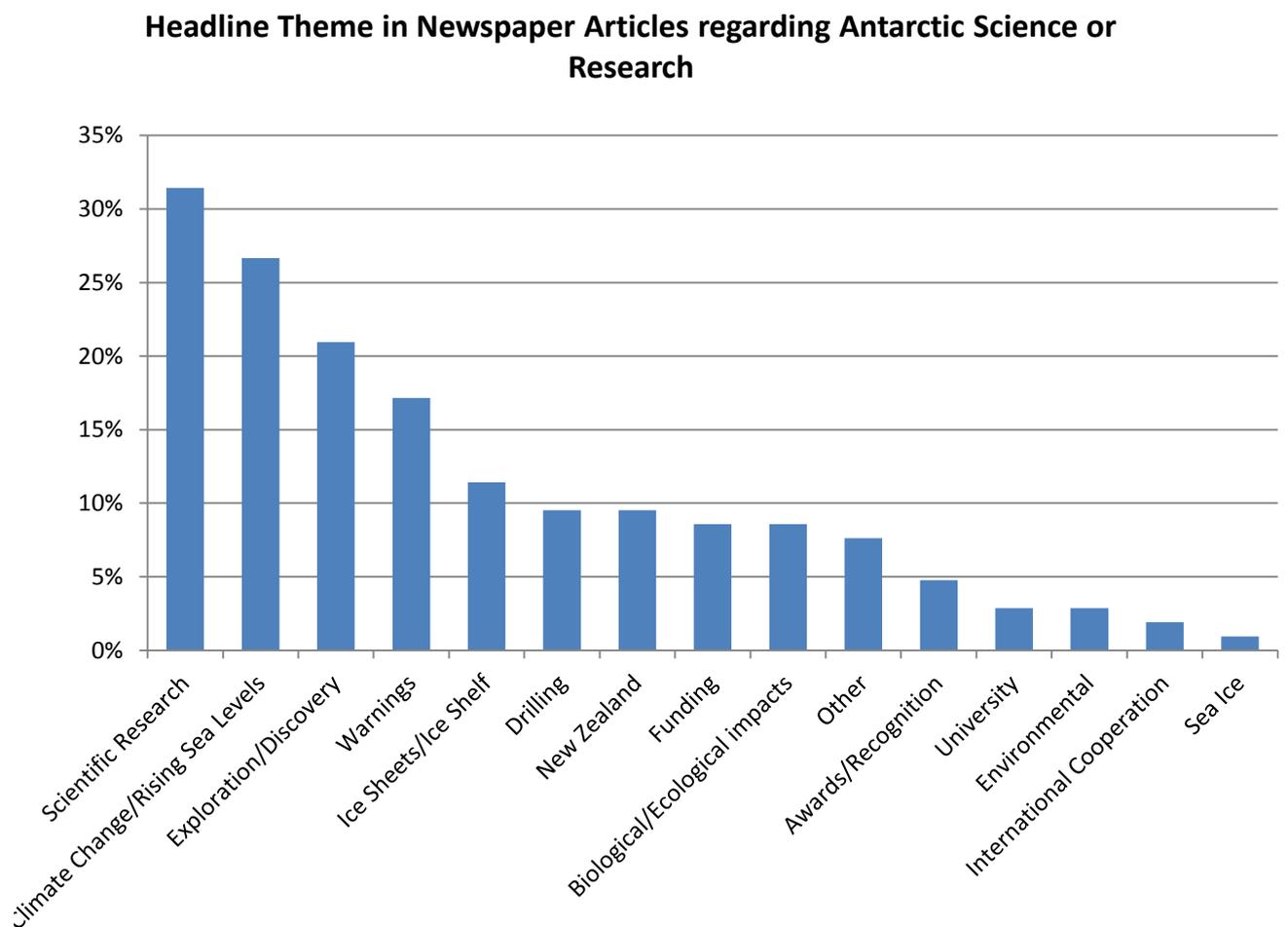


Headline Theme:

It was also important to study how these scientific disciplines were treated as news. The first aspect of this treatment studied was the focus of the headlines. 'Scientific research' was the most common headline theme, with 31%, followed by 'climate change/rising sea levels' as the second most common theme with 27% and 'exploration/discovery' the third at 21%.

Of the articles coded as headline 'scientific research', 33% of these had an article theme of 'scientific research', 17% 'climate change/rising sea levels' and 13% 'ice sheets/ ice shelf'. The coding of headline theme vs. article theme was conducted to establish if journalists use a certain headline, to engage readers into the story, which was of a different theme.

Of the articles coded as headline 'climate change/sea levels rising' 31% of these had an article theme the same as the headline, 18.6% had the theme 'ice sheets/ice shelf' and 15% contained 'warnings' as an overall theme.

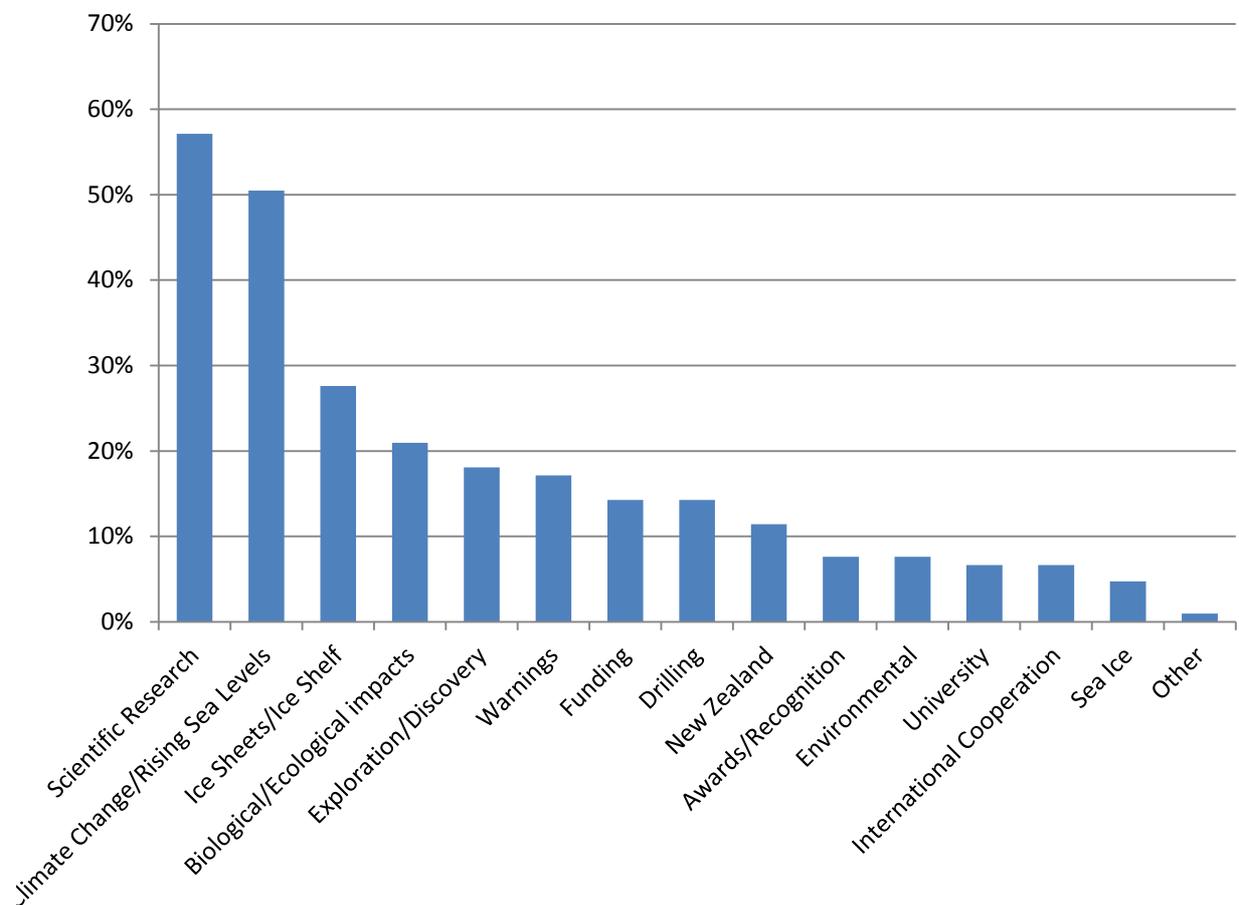


Article Theme:

The most common article theme was again 'scientific research' with 57% followed by 'climate change/rising sea levels' with 50%. The next most popular theme was 'ice sheets/ice shelf' with 28%.

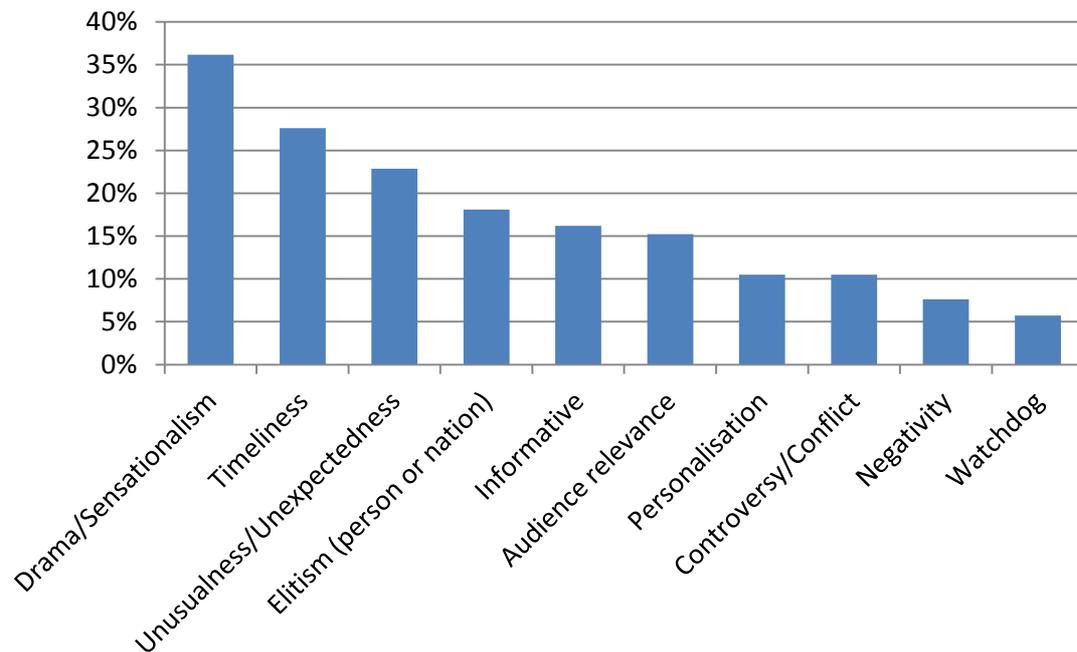
The least common headline and article themes were 'sea-ice' and 'international cooperation', however it was important to include these in the categories as ANDRILL is a multi-national drilling project that has been ongoing for the past 6 years, and sea-ice is an area in which measurements of its thickness can provide insight into climate change.

Article Theme in Newspaper Articles regarding Antarctic Science or Research



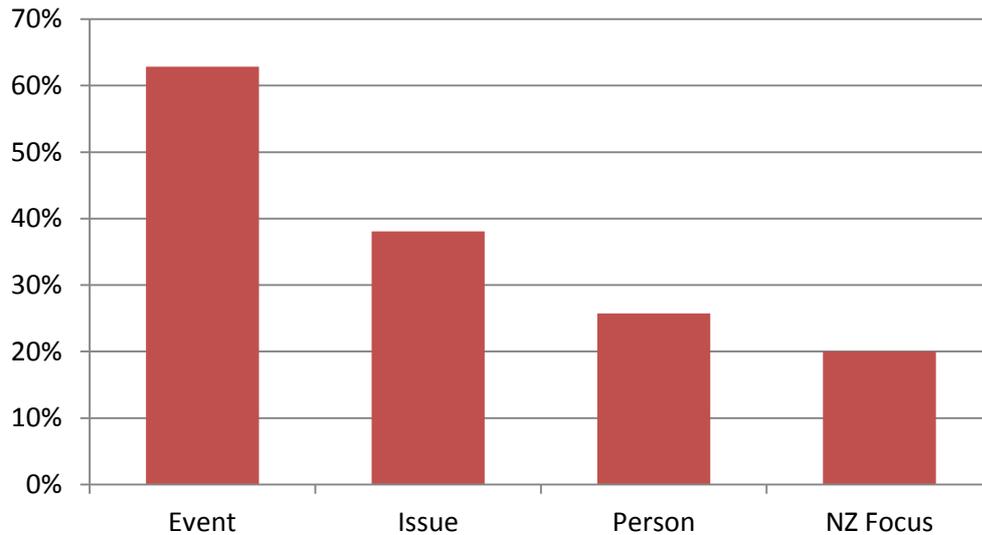
News Values:

As is typical in news coverage generally, the news values most commonly associated with these articles were 'drama/sensationalism' with 36% of the articles dramatising the science that was occurring. This was followed by 'timeliness' at 28% and 'unusualness/unexpectedness' at 23%. The least common news value used was the 'watchdog' function of the newspapers, at 6%.

News Values in Newspaper Articles regarding Antarctic Science or Research

How the Science was Framed:

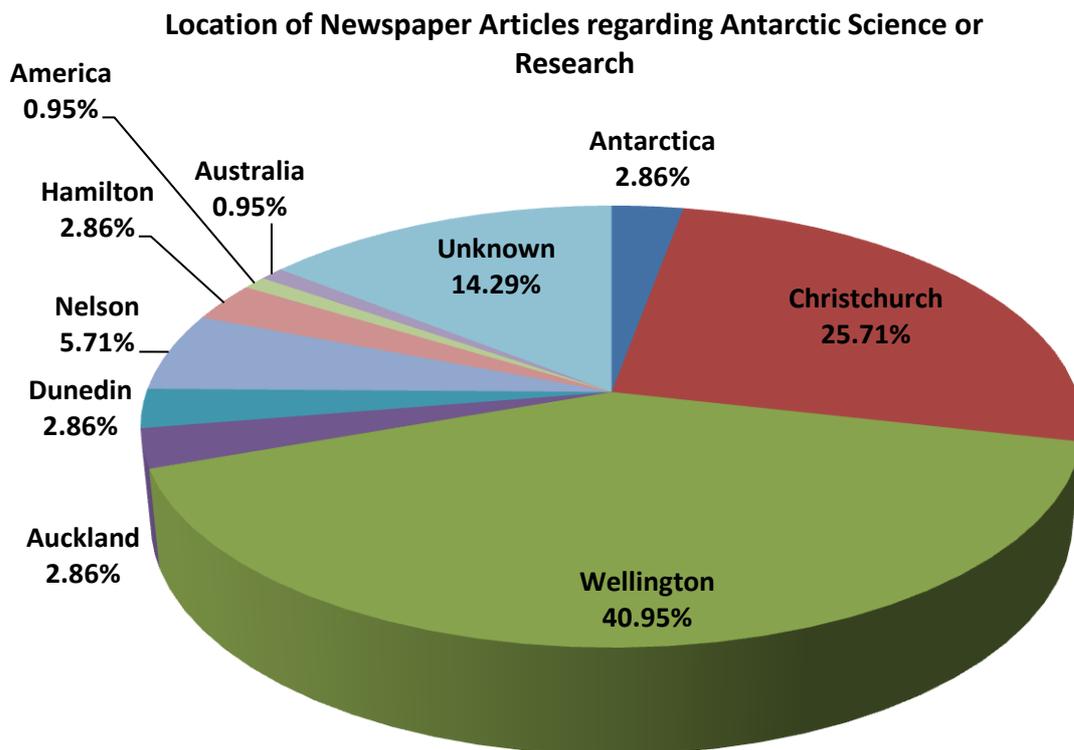
The timeliness news value is echoed in the predominant framing of the news as event-focused. Overall frame was coded against 4 values: the most common value was tying the science to an event (63%) an issue (39%) a person (25%) and a New Zealand focus (20%).

**How the science was framed in Newspaper Articles
regarding Antarctic Science or Research**

Location:

The location of the news reflects both the location of two of the major newspapers covering the topic and the location of major sources (see next page). 41% of the articles were written about Antarctic research and science from Wellington and 26% from Christchurch. The least common location was America and Australia with 1%.

The result of 3% for Antarctica is surprising, if not humorous, although upon further consideration seems logical as the cost to send reporters to Antarctica is out of the question for most New Zealand newspapers.

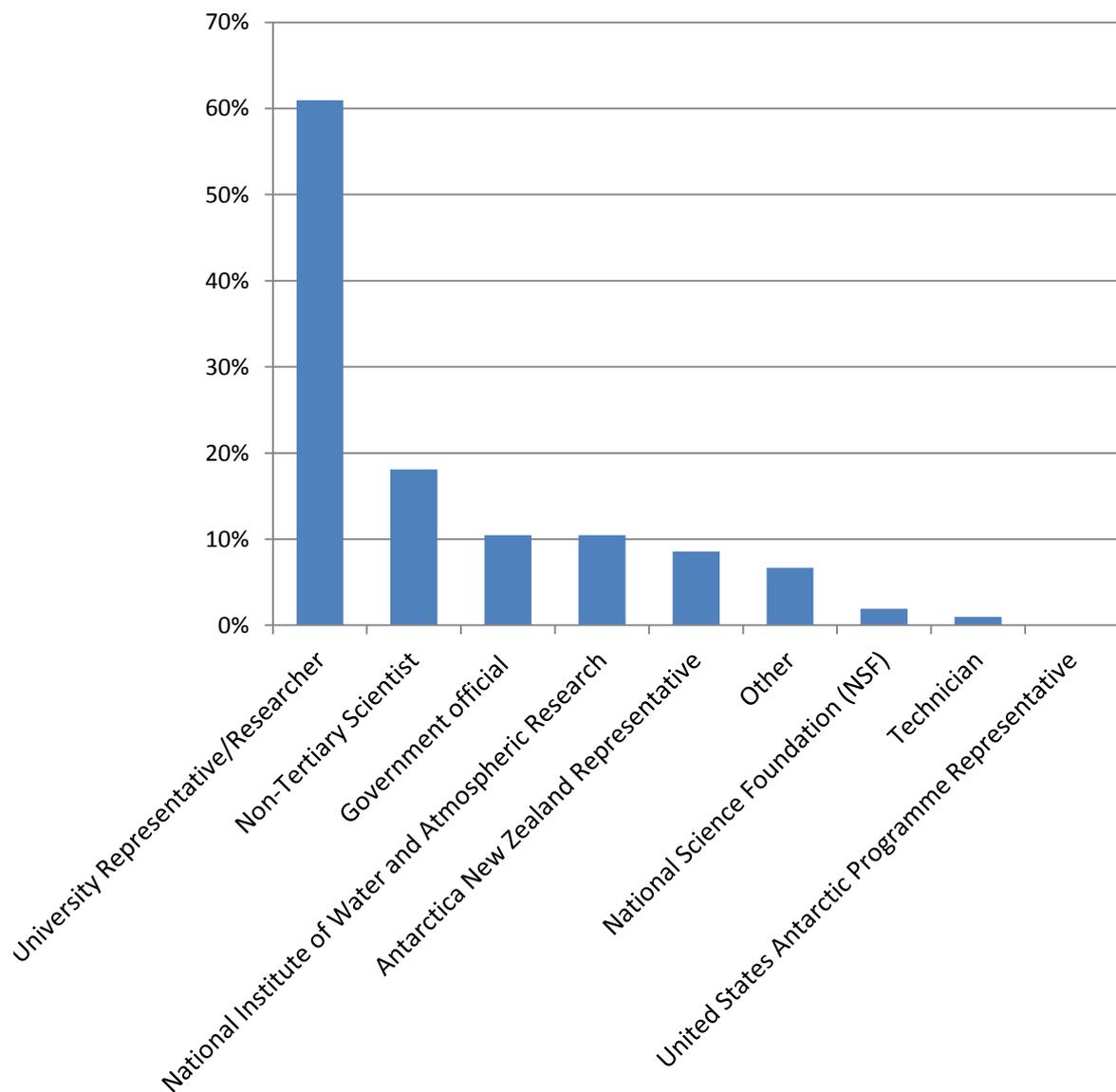


Source of Information:

The source category contained a very clear finding. The most commonly cited source of information was a 'University representative or researcher' with 61% of the articles relying on a University as a source of information.

The next most common was a 'non-tertiary scientist' with 18%, and the least common, the 'United States Antarctic Programme' USAP with 0%.

Source of Information for Newspaper Articles regarding Antarctic Science or Research



The New Zealand Press Association:

The New Zealand Press Association wrote the largest number of stories in the sample. It published 31 articles on Antarctic science and research, the majority being published in February, June and July at 16% each.

The results for the NZPA differ from the general results in that Wellington was the location for 74% of these articles on Antarctic research and science (compared to 41%), and Christchurch second with 19%.

The main science/research type was 'climatological' with 58% of the articles mentioning this discipline, followed closely by glaciological at 55% and geological at 26%.

The most common headline theme for articles published by the NZPA was 'scientific research' at 48%, and 'climate change/rising sea levels' at 35%.

The most common article theme was also 'scientific research' with 68%, and 'climate change/rising sea levels' with 52%, and 'ice sheets/ice shelf' at 42%.

The news values that these articles used were 'timeliness' 39%, 'drama/sensationalism' 32%, and 'elitism' at 29%. In comparison to general results, drama/sensationalism was the most commonly used news value at 36%, and 'timeliness' second at 27%.

The science was framed by an event (68%), an issue (42%) and with a New Zealand focus (23%).

The main sources of information for the NZPA, were University representative/researcher (55%) non-tertiary scientist (35%) and government official (16%).

The Dominion Post:

Of the 27 articles published in The Dominion Post regarding Antarctic science and research, 19% were published in March, and 11% in January, April, October and November respectively.

The major science/research type was 'climatological' with 52%, followed by 'glaciological' with 48%.

The most common headline theme was 'exploration/discovery' with 41%, as well as 'climate change/rising sea levels' at 33%. The third most common headline themes were 'ice sheets/ ice shelf', and 'scientific research' with 19% respectively. This differs from the overall study's most common headline theme being 'scientific research' at 31%, and 'exploration/discovery' third at 21%.

The most common article themes were 'climate change/rising sea levels' with 74% and 'scientific research' at 41%. 'Ice sheets/ice shelf' and 'exploration/discovery' were also popular themes with 30% each.

As with The Press, the most common news value was 'drama/sensationalism' with 44% dramatising the article, and this was followed by 'unusualness/unexpectedness' at 37%. The least common utilised news value was the media's role as a 'watchdog' with 0%.

Not surprisingly the articles focused on Wellington as the location of Antarctic science and research with 48%, and Christchurch second with 22%.

Of the science and research reported, 67% was framed around an event, 37% around an issue and 22% around a person, or a New Zealand focus.

The main source of information was a University representative or research with 70%, followed by a non-tertiary scientist with 15%.

The Press:

Of the 18 articles that were published by The Press regarding Antarctic science or research, 17% were published in January, March and October respectively. The least common months were February and December with no published articles. This is slightly different to overall results with January and November being the largest months at 13.5%.

The most commonly reported science/research was 'climatological', with 50% followed by 'biological' 39% and 'ecological' 28%.

The most common headline theme was 'scientific research' with 33%, and 'exploration /discovery' and 'warnings' both with 17%. 'Climate change/rising sea levels', the second most common overall headline theme, came in third at 11% as well as 'biological/ecological impacts', and 'funding'.

The most common article theme was again 'scientific research' with 61% followed by 'biological/ecological impacts' at 44% and 'climate change/rising sea levels' at 39%.

The news values that The Press employed were 'drama/sensationalism' at 39%, and 'timeliness' with 28% (i.e. reporting on something that has recently occurred, or is about to occur).

Of the science reported, 56% of the articles were framed as an 'event', or an 'issue' respectively, and 33% regarding a person.

The main source of information was a University representative or researcher with 67%, followed by 22% quoting an Antarctica New Zealand representative.

The New Zealand Herald:

Of the 13 articles that The New Zealand Herald has published on Antarctic science and research, 31% of these were published in November, and 15% in March, May and July respectively.

The major science or research type was 'climatological' with 46%, followed by 'atmospheric' at 31%, and 'biological', 'glaciological' and 'geological' at 15% each.

The New Zealand Herald's main headline theme for these articles was a 'New Zealand focus' with 31% (this differs from general results as at less than 10% overall). This was followed by 'climate change/rising sea levels', 'awards/recognition' and 'scientific research' with 23% respectively.

The main article themes were 'scientific research' with 54% and 'climate change/rising sea levels' at 46% similar to general results.

Again, the main news value was 'drama/sensationalism' with 38%, followed by 'controversy/conflict' with 23%. The 'controversy/conflict' news value does not come across high in the overall results, so this is an interesting finding.

The science was framed by an event largely with 62%, a person 38% and an issue 38%.

The main source of information for the New Zealand Herald's articles on Antarctic science and research was a University representative/researcher at 46%, followed by a government official at 23%. This differs from overall results in that a government official was only used a source 10% of the time.

8. Discussion

The research question asks: How is Antarctic Science reported in the New Zealand Newspaper Media? The results will be discussed, by addressing the issues raised in the research section, as well as discussing the impact that the closure of the New Zealand Press Association may have on reporting of Antarctic science and research. The under-representation of certain sciences and the likely causes will be examined, as well as the apparent lack of reporting of Antarctic science and research in regional newspapers. The impact of ANDRILL and the IPCC reports on the results will be discussed with the inflation of articles in 2009, influencing the stories on climate change and rising sea levels. The source of information will also be discussed as this uncovers a form of passive journalism.

Newspapers:

The question “Which newspaper most frequently publishes articles on Antarctic science and research?” has provided an interesting result. 30% of the articles coded were produced by the New Zealand Press Association. The NZPA closed its doors in August 2011, and one can argue that this is likely to have large impact on the reporting of Antarctic science and research. If we look at the reporting of these areas in regional newspapers (not major metropolitans) we see that Antarctic science and research is under-reported with The Nelson Mail publishing 3.81% of these articles, The Otago Daily Times (2.86%) The Waikato Times (2.86%) the Southland Times (1.90%) and the Taranaki Daily News (0.95%). As Factiva removes duplicates, the articles written by the NZPA and published by these regional newspapers were not included in the sample, which may therefore overstate the effect. Nevertheless there is a significant risk here for public knowledge about Antarctic science.

The New Zealand Press Association, for the past 131 years, has supplied national and international copy to New Zealand newspapers (Hannis, 2008) and without this service, the question of who will be reporting scientific news for these regional newspapers has to be asked. Without the NZPA supplying this news to regional newspapers that are unable to have journalists on the ground outside of their region, this could have an impact on the reporting of Antarctic science and research to these regions.

The newly formed Fairfax News Service, has access to 400 reporters in New Zealand, and operates under a copy sharing model, which was demonstrated in the literature regarding cross media ownership (Stone, 2011). As Factiva removes duplicates, articles that were run in multiple Fairfax or APN newspapers, were removed if the headline was duplicated. This warrants a future study into the homogenisation of (not only) Antarctic science and research copy across Fairfax or APN publications, to see if the regional newspapers are being serviced by these new newsrooms, with access to news regarding Antarctic science and research.

The Dominion Post ran the second largest number of articles on Antarctic science and research at 26%. This is not surprising as Wellington’s Victoria University has a strong Antarctic Research Centre within their Faculty of Science. The ARC focuses on “researching the field of Antarctic earth sciences concentrating on past climate history and processes and their influence on NZ and global climate” (ARC, 2012).

The Christchurch Press published the third largest number of Antarctic science and research articles, and again this is not a surprising result with the University of Canterbury’s Gateway Antarctica being located in Christchurch, as well as Antarctica New Zealand and the United States Antarctic Programme run logistically from Christchurch. The researcher was

surprised however by these results as there was a personal expectation that The Christchurch Press would run more stories on the subject due to these three major geographic connections.

Science:

The question, of which Antarctic science or research most frequently receives media attention, shows a clear trend towards 'climatological'. Not surprisingly this is followed by 'glaciological' at 39%, as newspaper articles have anecdotally, blamed climate change for the breaking off of icebergs and shrinking of glaciers and ice sheets in the same article. This supports Craig's (2008) study on newspaper reporting of the environment in the 'climate change' was the most commonly coded for keyword, indicating that certain 'science' tends to become news if the science is something readers can relate to, or something news organisations understand and can confidently and frequently report on (Hansen, 1994).

It is important to note here that it appears that a large amount of scientific research that is *not* 'climatological', 'glaciological' or 'geological' is under-represented. Although these three science types are the most commonly reported on, this does not mean that the other eight types of science/research are not occurring; rather they are under-represented in New Zealand newspapers. We do not have access to baseline figures of what 'Antarctic science/research' is being completed, however from personal experience, Arrival Heights Laboratory at Scott Base appeared to be undertaking a large amount of 'cryospheric' science, which was only coded for in 11% of the articles. This could be due to 'cryospheric' science and research being a large part of 'climatological' science or research, however the science being framed as 'climatological' in order to increase audience understanding.

The question of how the science is framed has shown clear results, with a majority of the news being tied to an event or issue at 63% and 39%. Literature has shown that traditionally, coverage of scientific news is similar to the classic reporting of news in that it is driven by an event, a scientific meeting, or publication of research breakthroughs in a scientific journal (which is often the discovery of an issue) (Corbett & Durfee, 2004). This also fits with other media scholars theories in that news is timely – about recent or recurring events, especially events that are unusual or unexpected (such as a giant iceberg calving in Antarctica).

Article and Headline Themes:

Two questions of this study will be addressed in this section - what themes are most commonly reported, as well as what themes occur most frequently in the headline. Results were fairly similar for both aspects, with 'scientific research' and 'climate change/rising sea levels' being the most common headline and article themes. The result of 'scientific research' is not surprising as the key words were 'Antarctic science' and 'Antarctic research' in order to sample articles that would be relevant to the study; this indicates that the articles sourced in the sample were relevant. Although the results for article and headline were similar, 'scientific research' was coded for 57% of the time in article theme, but only 31% of the time for headline theme. This indicates that perhaps a different headline theme was used to draw in readers, and can be tied to the news values of drama and sensationalism as under commercial pressure, the news has to be sold.

'Climate change/rising sea levels' was the second most common theme in the headline as well as the article (26%, and 50% respectively) is significant as the results are similar to Craig's (2008) study of New Zealand newspaper reporting of the environment. The study found that the most frequently cited keyword was 'climate change' in 13.8% of the newspaper articles (118 out

of 857 keywords, and 319 articles studied). If we interpret this as how many times the keyword appeared out of the number of articles, 'climate change' is mentioned in 37% of the time. This study was however conducted on New Zealand's major metropolitan and Sunday newspapers, rather than this study's focus on New Zealand major metropolitans and regional newspapers, excluding Sundays.

An aspect which is relevant to this aims of this study, is that the theme of 'University' was not common in headlines or articles. This suggests that although a University may be responsible for the research, the theme of the article is largely focused on the research they have undertaken, and breakthroughs and science that have occurred. Another aspect relevant to the aims of this study is that the 'New Zealand' theme also did not code highly against articles or headline themes. It was initially thought that by tying an article to New Zealand research, or a New Zealand event, the news story would be personalised and interesting to a New Zealand reader. This is an interesting finding as it suggests that newspapers believe there is enough newsworthiness in a science story without having to wave the New Zealand flag.

News Values:

The most popular news value employed in regards to Antarctic science and research news was 'drama/sensationalism' at 36%. This was done by dramatising the headline, examples include "Human extinction 'imminent'", "Oil-soaked chicks found" and "Sea level threat from melting ice". This can be associated with the pressures on news to be entertaining as well as informative. In Galtung and Ruges 1965 study of foreign news factors predicting coverage, drama and action in the account of events was a large factor of influence (McQuail, 2010). McQuail (2010) gives the example of the media dramatising news, in which the media planned for the coverage of London demonstrations against the Vietnam War, to be violent and dramatic, characteristics which did not match the event whatsoever. Research showed that audience perception of the event, matched how the media portrayed it rather than what had actually occurred. This aspect of news values runs the risk of disregarding information significant for public knowledge, if it isn't dramatic enough.

It is important to highlight here that the overall results show that 'drama/sensationalism' were the most common news value, however looking at the results for the NZPA, the most common news value was 'timeliness'. In comparison, the most common news value for The Dominion Post, The Christchurch Press and The New Zealand Herald was 'drama/sensationalism'. These results indicate that perhaps the NZPA were, as independent reporters, applying different news values because they weren't writing for a particular publication rather an independent news agency with different journalistic ideals.

'Drama / sensationalism' was followed by 'timeliness' at 28%, which is to be expected as the science was most commonly framed by a recent event or issue, and these events would be reported on immediately after, during, or prior to its occurrence, or after the issue had surfaced. Scholars of news values argue that news is timely and should be about very recent or recurrent events, supports this, and furthermore these events should be unusual and unexpected (McQuail, 2010).

Shoemaker & Reeses' (1991, cited in Weigold, 2001) model also claims that news organisations should publish news that is timely, and unusual, hence 'unusualness / unexpectedness' at 23% was the third most common news value, which is also not surprising, as Antarctic research and science is not something that any member of the public can be involved in. This is good news for Antarctic science reporting as it indicates that Antarctica is still seen as a

place of discovery for the public as well as scientists. Personal experience has found that scientists and researchers that carry out Antarctic related studies consider themselves as part of a special and fortunate group, who are proud of their connection to this unusual continent.

A surprise of this research is that the news values of 'controversy/conflict' and 'negativity' were not largely associated with these articles. When thinking of Antarctic science and research, the idea of conflict and controversy does not immediately come to mind as all activities undertaken in Antarctica must be in accordance with The Protocol on the Environmental Protection to the Antarctic Treaty. The Protocol places the protection of the environment as the most important aspect of any activity undertaken further than 60 degrees south, as well as a complete ban on mineral exploration and exploitation (The Protocol on the Environmental Protection to the Antarctic Treaty, 1991). As it is the researchers' belief that these issues would be the main area of conflict and controversy for scientific activities, and all Treaty parties have signed and ratified the Protocol, perhaps conflict does not occur because of this underlying agreement.

Personalisation also rated low against news values (10%), this is again good news for Antarctic science as it indicates that the science is able to stand on its own as newsworthy, without having to attach it to a story about a scientist or researcher, to make it interesting.

The least most common news value used was the 'watchdog' function of the newspapers, at only 6%. This was surprising, as the media is often theorised as the fourth estate ensuring the government is held accountable to the public. As Antarctica New Zealand is funded logistically by the government to the tune of \$13 million per year, it was initially thought that there would be more reporting of this expenditure. Although this news value was only 6% however, 15% of the articles had a theme of 'funding', so it seems this may be reported in a different way rather than overtly appearing as a watchdog.

Source of Information:

A positive result of this study, for Gateway Antarctica, is that the most commonly cited source of information was a University representative or researcher (61%). This is most likely because these Universities (Victoria and Canterbury) are where a majority of New Zealand science and research regarding Antarctica occurs. Journalists most commonly learn about scientific news, from press releases generated by a University, or the scientific journal in which the University's research is being published (Parthasarathy, 2006). There is also a negative implication of this in that it indicates passive journalism, rather than independent science reporting: when journalists do not understand what the scientists have written, they won't report it. This result is important for Gateway Antarctica as any information sent to the media needs to be written in a way, that a journalist without any scientific experience can understand and interpret.

Interestingly, Antarctica New Zealand (ANZ) was only used as a source of information less than 10% of the time, but this is likely to be due to Antarctica New Zealand in Christchurch being the logistics arm of the operation. A government official was used as a source also only 10% of the time, and this was most commonly in stories about 'scientific research' at 37%, and 'funding' 26%.

A significant result of this study is that the United States Antarctic Programme (USAP) was not a source of information. USAP and ANZ run a joint logistics operation, and there are anecdotally 2/3rd support staffs, for the 1/3rd scientists in Antarctica. This suggests that there is

a narrow range of articles written with scientific research findings constantly in the news, as opposed to issues around undertaking the science, which requires huge logistical efforts.

Of the articles coded against The Christchurch Press, 39% were written by Journalist John Henzell. There were no significant findings in regards to The Dominion Post or The New Zealand Herald journalists, but the only journalist appearing against NZPA articles was Kent Atkinson, however this was only in 13% of the articles, and the only reporter appearing in the NZPA article bylines. Literature has found that journalists who use scientists as their primary information source or worked on scientific articles full time, were the most knowledgeable about climate change and the scientific process involved (Corbett & Durfee, 2004). In regards to Gateway Antarctica it would be beneficial to send press releases to a newspaper's dedicated science reporter, to ensure accuracy and interest in reporting.

Other Significant Findings:

The keyword searches located only one hundred and five articles that were specifically linked to Antarctic science or Antarctic research, on average that equates to five per year which appears to be grossly under-represented. Science related news appears to be a minute amount of newspaper content and one can imagine that Antarctic science or research will be a small proportion of this. This could also indicate that the way the science is sourced by reporters – largely from universities, is represented in a way that is too technical for journalists without a science background, and leads to a gross under-reporting of Antarctic science and research.

The impact of ANDRILL – an international scientific collaboration aiming to “Drill deep into Antarctic sediment to reveal past glacial history and to predict Earth’s future climate” (ANDRILL, 2012) which commenced in 2006, can clearly be seen in these results, in that 69.9% of the articles regarding Antarctic science and research were published between 2006 and 2011. New Zealand is one of the five nations involved in the project, and the continual results of this project have been published by the New Zealand newspaper media. This indicates that if the issue or event is of large enough scale, reporting will follow, and one way to increase likelihood of publication would be to attach a news story to this, or to go to the same reporter.

The largest year for Antarctic science and research articles was 2009, with 22% of the articles since 1989 being published, and over 40% were written by the NZPA. As mentioned, Craig's study on newspapers was affected by the release of IPCC reports, which may have also had a bearing on these results (Craig, 2009). Again, it will be worth a study in the future to see the impact of the closure of the NZPA on the reporting of Antarctic science and research with results such as these.

9. Conclusion:

The research question asks “How is Antarctic science and research reported in New Zealand newspapers?” The results of this study have established a set of factors in which the inclusion of certain values may increase the likelihood of an article regarding Antarctic science or research being published by New Zealand newspapers.

Many categories were coded multiple times which suggest that there isn't one magic science or research, news value or article theme that guarantees publication of Antarctic science or research. From the results of this study we can see that there are certain science types, themes, and news values commonly associated with Antarctic science and research newspaper articles.

‘Scientific research’ and ‘climate change/rising sea levels’ were the most common themes for both the articles and the headlines, which although not surprising, is a significant result when the aim of the study is to identify what themes Gateway Antarctica need to include in press releases in order to increase the likelihood of publication in New Zealand newspapers.

‘Climatological’ science or research was the most common discipline across the one hundred and five articles. This supports Ashworth (2009) who argues that if a journalist is going to write a scientific story, it is likely to be written on a topic that is relevant to their audience. Climate change is an issue that affects everybody, although not all citizens may understand it; it is the role of the news media to inform the public about scientific information once they have left the education system (Malone, Boyd & Bero, 2000; Nelkin, 1995). The result that 61% of the information sourced from a University representative or researcher, further supports the role of the news media in informing the public regarding scientific information, as this education will not occur anywhere else for most citizens other than from the news media. This does however raise the issue of narrow source dependence in that reporters appear to be receiving large amounts of information from the universities, or contacting the universities for further information.

The results of this study support the literature on the reporting of science in that the story was framed by an event or an issue that was unusual or unexpected as well as being timely, and Antarctic science certainly fits this frame. ‘Timeliness’ was the most common news value used by the NZPA, however overall, ‘drama/sensationalism’ was the most common news value applied, which supports the idea that news is now more than ever expected to be entertaining (Schulz, 1998). With so many options available for news in New Zealand, publications need to have an extra edge on their competitors, and research suggests that science does not interest a majority of readers (Billington & Bibby, 1991) hence the dramatisation of the topic. This does raise the issue that there is possibly a high bar for stories on Antarctic science to be included as news, if they aren't entertaining, which could be why the sample was small.

A significant result of this study is the large amount of influence the NZPA has had on the publication of Antarctic science and research. With the closure of this New Zealand news agency, the future of scientific reporting in general will be a topic that would make an interesting study.

10. Framework

The results of this study suggest the inclusion of the following values will increase the likelihood of an article regarding Antarctic science or research being published by New Zealand newspapers:

- 1) Article Theme: Scientific research, climate change/rising sea levels.
- 2) Headline Theme: Scientific research or climate change/rising sea levels, and exploration / discovery.
- 3) Newspaper: With the absence of the NZPA, the newspapers publishing the largest amount of articles regarding Antarctic science and research were The Dominion Post, and The Press (both Fairfax) and the New Zealand Herald, suggesting major metropolitans have the resources to report on scientific topics, rather than regional newspapers.
- 4) Source of information: University researcher or representative.
- 5) News values: Drama and sensationalism, as well as timeliness, and unusualness/unexpectedness.
- 6) Framing of the science: The science needs to be framed by a recent event or an issue.
- 7) The results of this study have also suggested that press releases need to be written in a way that journalists without a scientific background can interpret and publish as news.
- 8) If journalists with a scientific background are employed at a New Zealand newspaper, it would increase the likelihood of publication if the press release was sent to this reporter, and by doing so, increase the potential for frequency of future publications.
- 9) Another way to increase the likelihood of publication is to tie the research to a major event such as ANDRILL that is frequently receiving coverage.

11. Appendix

Coding schedule:

Newspaper

- 1 The Christchurch Press
- 2 The Southland Times
- 3 The New Zealand Herald
- 4 The Otago Daily Times
- 5 The Dominion Post
- 6 Taranaki Daily News
- 7 The Evening Post
- 8 The Evening Standard
- 9 The Manawatu Standard
- 10 The Waikato Times
- 11 The Nelson Mail
- 12 NZPA

Science Type

- 1 Biological
- 2 Atmospheric
- 3 Oceanographic
- 4 Glaciological
- 5 Geographic
- 6 Cryospheric
- 7 Geological
- 8 Ecological
- 9 Climatological
- 10 Physical
- 11 Social Sciences
- 12 Other

Headline Theme/Article Theme

- 1 Funding
- 2 Ice Sheets/Ice Shelf
- 3 Sea Ice
- 4 Drilling
- 5 New Zealand Focus
- 6 Warnings
- 7 Climate Change/Rising Sea Levels
- 8 University
- 9 International Cooperation
- 10 Awards/Recognition
- 11 Exploration/Discovery
- 12 Environmental
- 13 Scientific Research
- 14 Biological/Ecological impacts
- 15 Other

News Values

- 1 Personalisation
- 2 Negativity
- 3 Controversy/Conflict
- 4 Elitism (person or nation)
- 5 Unusualness/Unexpectedness
- 6 Drama/Sensationalism
- 7 Timeliness
- 8 Informative
- 9 Audience relevance
- 10 Watchdog
- 11 Other

Location

- 1 Antarctica
- 2 Christchurch
- 3 Wellington
- 4 Auckland
- 5 Dunedin
- 6 Taranaki
- 7 Nelson
- 8 Hamilton
- 9 America
- 10 Australia
- 11 Unknown

How the Science was Framed

- 1 Event
- 2 Issue
- 3 Person
- 4 NZ Focus
- 5 Other

Source of Information

- 1 Non-Tertiary Scientist
- 2 Technician
- 3 Government official
- 4 University Representative/Researcher
- 5 United States Antarctic Programme Representative
- 6 Antarctica New Zealand Representative
- 7 National Science Foundation (NSF)
- 8 National Institute of Water and Atmospheric Research
- 9 Other

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