

**The iconographic discourse of climate science, examined through the press
coverage of Spanish daily newspapers**

Emilia Lopera

Research Unit on Scientific Culture

Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas

(CIEMAT)

emilia.lopera@ciemat.es

Carolina Moreno

Department of Theory of Language and Communication

University of Valencia

carolina.moreno@uv.es

Abstract

This paper explores the iconography of media coverage in regard to climate science through an analysis of selected Spanish daily newspapers – *El País*, *El Mundo*, *Abc* and *Expansión* – from 2004 to 2010. A content analysis of their iconographic elements explores further, how the Spanish press rhetorically manages the power of images to build its discourse on climate change, its causes, its consequences, the involved social agents and even its victims. According to the results, three out of four news stories on climate science were illustrated by some iconographic element, mainly photographs (61%) along with computer-generated imagery (CGI) (22%). The most frequent photos showed the so-called "frozen universe rhetoric" of climate change, with pictures of ice, snow and glaciers, symbolizing a fragile world in danger of melting due to rising temperatures. These findings support the argument that the image rhetoric may have improved the communication of climate change information from the scientific sphere to the public one despite certain weak points: a limited use of the most informative CGI

in comparison to the more extensive use of photographs showing impacts and people. Previous research revealed that these visual themes make climate change more relevant to the audience, but tend to undermine the feeling of personal efficacy. This work on the iconographic discourse of climate science news is part of a broader research, focused on analyzing media coverage of climate change science in the Spanish daily press.

Introduction¹

One of the strengths of iconographic elements is that they tend to have a powerful significance beyond written communication both standing alone and as a complement to linguistic messages. Visuals also have the capacity to overcome certain educational and cognitive barriers as well as reach a wide audience. Thanks to these particular attributes, iconographic discourse may foster social inclusion and public engagement on science policies. This paper aims to contribute to this field research, falling in line with specific literature on public understanding of climate change science.

Broader research focused on analyzing media coverage of climate change science in the Spanish daily press (Lopera, 2013; Lopera and Moreno, 2014) has revealed a research gap in the iconographic discourse of climate science in Spain. Previously, visual communication was an underestimated factor in the sociology of environmental issues (DiFrancesco and Young, 2010). Perhaps for this reason, the visual representation of climate change in the media has been much less studied than that of written content. However, there are some interesting contributions to be seen in the role played by imagery in both public understanding and engagement with climate change in other countries (DiFrancesco and Young, 2010; Doyle, 2007; O'Neill, Boykoff, Niemeyer, and Day, 2013; O'Neill and Nicholson-Cole, 2009; Slocum, 2004; Smith and Joffe, 2009).

Among the main findings of this paper was the fact that visual communication relied heavily on photographs (61%). A “frozen universe rhetoric” dominated what

¹ This article is the result of ongoing research financially supported by two projects approved by the Spanish Ministry of Economy and Competitiveness: *Politics of scientific culture: Analysis of the political and social dimensions of scientific culture* (political and social dimensions of scientific culture [FF12011-24582] and Analysis of institutional campaigns on Human Papillomavirus vaccination) and Analysis of institutional campaigns on Human Papillomavirus vaccination (CSO2011-25810).

previous literature had called the “pictorial language of climate change” (Doyle, 2007), with most photos showing images of ice, glacier and snow. The climate science story was told through this powerful symbol of a fragile Earth in danger of melting. Particular consideration was also given to the image of the polar bear as a victim of the consequences of the phenomenon. In comparison, computer generated imagery (CGI) mostly showing geographical distribution of data with maps of Spain, Europe, the Mediterranean Sea and Arctic Ocean, etc. (22%) appeared to be less emotional and more informative. Additionally, synchronic and diachronic analysis revealed interesting differences in the use of imagery between newspapers and in year to year comparisons.

Methodology

The three leading Spanish general information newspapers – *El País*, *El Mundo*, and *Abc* – and the leading national business and financial daily – *Expansión* – according to the Spanish Bureau of Broadcast measurement (Oficina de Justificación de la Difusión, 2014) were selected for the research. This research covered a period of seven years, from 2004 to 2010, a period when the attention paid to climate change by the Spanish press reached its historical high (Lopera and Moreno, 2014).

This study explored a sample of 203 news stories selected by stratified systematic random sampling from a population of 1,215 units of analysis. As in previous works on climate change coverage (Antilla, 2005; Boykoff and Boykoff, 2004; Carvalho and Burgess, 2005; McComas and Shanahan, 1999; Trumbo, 1996), the population was obtained by applying Boolean keyword searches in a news database (Mynews.com) –*greenhouse effect or global warming or climate or IPCC or snowmelt or CO2 or carbon dioxide*.

Based on the encoding of iconographic categories and subcategories (see Figure 1), a content analysis was applied to the entire sample from both synchronic and diachronic approaches.

On the one hand, the synchronic framework aimed at a systematic comparison of the imagery of climate science in selected Spanish newspapers. On the other hand, tracing the evolution of the power of visual communication in climate science coverage allowed for an examination of the historical continuity of iconographic elements supporting linguistic communication.

Results

Results indicated that three out of four news stories on climate science are illustrated by some iconographic element (75%); mainly photographs (61%) along with CGI (22%). Despite the iconographic discourse mainly expressed through photos, CGI provided more detailed information on many variables of the climate system such as the average temperature of oceans and atmosphere, rainfall levels and the rate of greenhouse gas (GHG) emissions, etc. (see Figure 1).

Categories and subcategories analysed		
Photographs	Animals Earth images from space and extreme weather events Energy facilities and greenhouse gases sources Ice sheet, glaciers and snow People Plants (flora) Other	
Computer generated images (CGI)	Graphs and charts (data evolution over time)	Artic ice melting Frequency of hurricanes Glacier surface Plant life Sea level increase
	Maps (geographical distribution of data)	Average temperatures (atmosphere and oceans) Rainfall levels Rate of greenhouse gas emissions
		Available water resources Desertification increase Habitat of animals Snow cover Weather extreme events Wind speed
	Illustrations (complex phenomena and processes)	Application of renewable energy sources Biological cycles Depiction of CO ₂ capture technologies Greenhouse effect Impact of climate change on Polar Jet Stream Operation of the Gulf Stream Operation of the North Atlantic Ocean Stream Origin and development of hurricanes Rotation and translation of the Earth

Figure 1

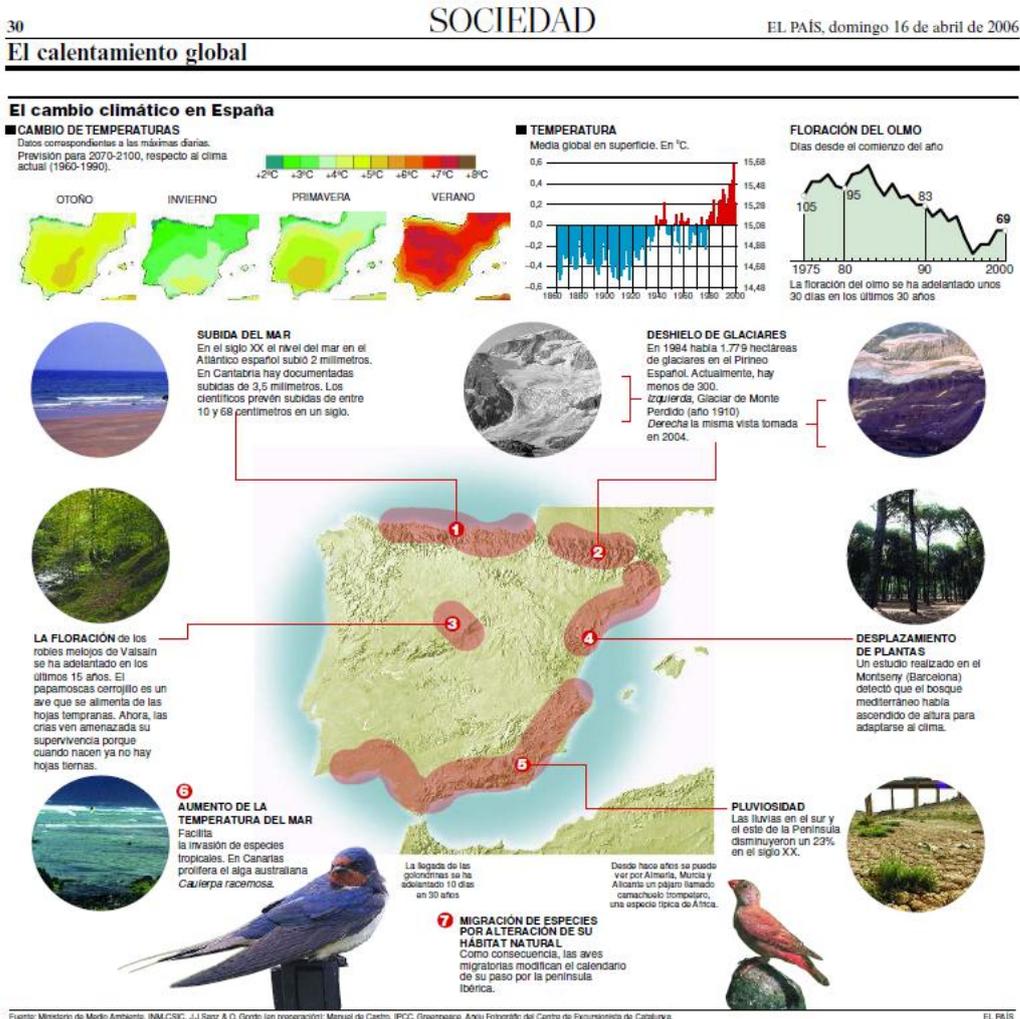
According to our findings, the so-called “frozen universe rhetoric” was most frequently deployed in photographs (25%). In this context, ice sheets, snowy landscapes and glacier images depicted a cold universe as the opposite of a world becoming warmer due to climate change (see Figure 2). Secondly, 22% of the pictures often showed people, mainly politicians and scientists, but also average citizens, as victims of the current consequences of the phenomenon. These latter news stories were based on a human-interest approach subject to the application of journalistic biases (Boykoff, 2007). Imagery of people ranked slightly ahead of images of Earth from space – very similar to those taken during the Apollo Space program in 1968 and 1972 (Cosgrove, 1994) – and the impacts of extreme weather events (21%).

The fourth place in the photo ranking corresponded to pictures of animals (18%), especially polar bears (see Figure 2), a species dubbed “the climate change mascot” in the Spanish press (González, 2007). This animal has become a charismatic species that makes nature appear exotic and distinct (Slocum, 2004). One of the least frequent images was that of energy and industrial facilities as well as other sources of GHG (i.e. cars, planes, etc.) (8%). This result suggests that the articulation of iconographic public discourse barely included anthropogenic causes of climate change.



Figure 2

Concerning the characterization of CGI, nearly half of the cases (45%) were maps of Spain, Europe, the Antarctic Continent and the Mediterranean Sea. These visual elements were used to represent the geographical distribution of variables such as the availability of water resources, increasing desertification and the habitat of certain animals. (see Figure 3). Secondly, 33% of the CGI were graphs depicting the evolution and relationship between two variables (i.e. GHG emissions to the atmosphere and rising temperatures). Finally, complex phenomena and processes related to climate change (i. e. origin and evolution of hurricanes, CO2 capture technologies.) were visually communicated by means of illustrations (22%).



El cambio climático cambia España

Las plantas adelantan la floración y las aves alteran sus migraciones debido al calentamiento

RAFAEL MENDEZ, Madrid Hace siete años, los vecinos del ción natural del clima? Los expertos señalan que parece más lo un estudio detectó que en el macizo del Montseny se pueden ver tamiento son abrumadoras". Las temperaturas máximas en España La mano que empuja el péndulo son los gases de efecto invern-

Figure 3

When comparing the use of iconographic elements made by each newspaper, the synchronic content analysis revealed that the highest percentage of news was published without any visual support (31%) corresponded to *El Mundo*. In terms of reports with visual support, *Expansión* and *Abc* stood out for including more photos than other media (76% and 71%, respectively) while CGI had a greater presence in 4% of all stories published. The climate science story in *Expansión* was primarily told using images of Earth from space and those showing the impacts of extreme weather events (38%). By contrast, the most frequent subject in *El Mundo* was that of animals (28%), whereas the recurrent subject in *Abc* was people, appearing in a quarter of all images.

The findings of the diachronic analysis revealed that at least 60% of the news stories published were supported by some iconographic element in every year of the selected period. These figures reached 80% of press coverage in 2006 and 2008 and around 90% in 2009 and 2010. Overall, it can be said that the growing media interest in climate science was evident not only through an increase in the amount of annual coverage, but also by an increase in the volume of news stories illustrated with photos or CGI.

By comparing diachronically the appearance of the types of iconographic elements, it can be found that the climate science story was essentially told through photographs, to such an extent that photos were the exclusive visual element in 2009 and 2010. Moreover, in previous years, at least 40% of the articles included photographs. In regard to the prevalent subject, the results were inconsistent over the course of the period studied. In fact, the dominant theme was changing as follows: while in 2004, most photos showed images of Earth from space and impacts of extreme weather events, people were the recurrent subject in 2005. What we called the “frozen universe rhetoric” took a leading position in 2006 and 2009, offering an array of ice, glacier and snow imagery. The prevalence of Earth and extreme weather events photos returned in 2007 and 2008. Finally, in 2010, people and the “frozen universe rhetoric” obtained the same relevance.

The findings also indicated that CGI was much less used by the Spanish newspapers than photos year after year, reaching a peak (35%) in 2007, one of the three years of record-breaking reporting that reached its climax in terms of media attention paid to climate science in Spain (Lopera and Moreno, 2014). During these three years,

the most frequent CGI were maps showing geographical distribution of different variables such temperature, rainfall, rates of GHG, water resources, and animal habitats.

Discussion

Some interesting parallels can be drawn between the dominant imagery on climate science discourse in Spanish newspapers and the prevalent imagery revealed by opinion polls in Spain (Meira et al., 2013).

"What is the first thought or image that comes to your mind when you hear about climate change?" Such an open-ended question was included in the questionnaire of a recent survey on public perception about climate change in Spain (Meira et al., 2013). According to this survey, almost half of the respondents identified images of different consequences of climate change compared to only 14% who mentioned images related to the causes. Similar results arose after applying framing analysis to the press coverage of climate science in Spain (Lopera and Moreno, 2014).

Within the collective imagery of consequences among Spanish citizens, the most mentioned images were melting icecaps and glaciers (Meira et al., 2013), which coincided with the most frequent subject in press photographs, as explained above. Moreover, some connection was also found between the low relevance of pollution sources within the collective imagery revealed by the Spanish survey and the limited appearance of such visual elements in news coverage.

In the international context, recent research has demonstrated that climate imagery focused on consequences increases the sense of importance surrounding the issue (saliency), but undermines feelings of being able to do something about climate change (self-efficacy) (O'Neill et al., 2013). According to these authors, an iconographic discourse showing mainly images of climate impacts, instead of pictures of energy futures, offers a much less solution-oriented scheme of action.

Conclusions

This synchronic and diachronic study revealed that the rhetoric of the image complemented the communication of information from the scientific sphere to that of the public, about a phenomenon as complex as climate change. Adding visual support, the Spanish press illustrated the characteristics of climate change, a complex global

problem characterized by a high amount of scientific and technical information and whose cause-effect relationship is not obvious.

However, the imagery of climate science in the Spanish press presented certain weaknesses: 1) Limited use of the more informative and explanatory iconographic elements – CGI –, especially in years with low media attention. 2) The main theme in photographs was the “frozen universe rhetoric,” symbolizing a fragile world in danger of melting as a result of climate change, mainly due to rising temperatures.

After comparing discourse on climate change coverage in text and imagery, remarkably consistent results were found regarding the dominant subjects: both in linguistic and visual communication, the consequences of climate change were primary. Unfortunately, imagery of climate impacts plays a key role in undermining feelings of self-efficacy, a problematic tendency when addressing climate change phenomena. From a practical approach, these findings should be taken into account in designing new communication strategies.

References

Antilla, L. (2005), "Climate of scepticism: US newspaper coverage of the science of climate change", *Global Environmental Change-Human and Policy Dimensions*, 15(4), 338-352.

Boykoff, M. T. (2007), "Flogging a dead norm? Newspaper coverage of anthropogenic climate change in the United States and United Kingdom from 2003 to 2006", *Area*, 39, 470-481.

Boykoff, M.T., and Boykoff, J.M. (2004), "Balance as bias: global warming and the US prestige press", *Global Environment Change*(14), 125-136.

Carvalho, A., and Burgess, J. (2005), "Cultural circuits of climate change in UK broadsheet newspapers, 1985-2003", *Risk Analysis*, 25(6), 1457-1469.

Cosgrove, Denis (1994), "Contested global visions: one world, whole Earth and the Apollo space photographs", *Annals of the Association of American Geographers*, 84, 270-294.

DiFrancesco, Darryn A., and Young, Nathan (2010), "Seeing climate change: the visual construction of global warming in Canadian national print media", *Cultural Geographies*, 18(4), 517-536.

Doyle, Julie (2007), "Picturing the clima(c)tic: Greenpeace and the representational politics of climate change communication", *Science as Culture*, 16(2), 129-150.

González, Ricard. (2007, 10 de septiembre). Predicen la desaparición de dos tercios de los osos polares antes de 2050. *EL MUNDO*, p. 38.

Lopera, E. (2013), *La comunicación social de la ciencia del clima en la prensa española: texto y contexto*. Tesis doctoral. Departamento de Teoría de los Lenguajes y Ciencias de la Comunicación. Universidad de Valencia., Valencia.

Lopera, Emilia, and Moreno, Carolina (2014), "The uncertainties of climate change in Spanish daily newspapers: content analysis of press coverage from 2000 to 2010", *JCOM*, 01(A02).

McComas, K., and Shanahan, J. (1999), "Telling stories about global climate change - Measuring the impact of narratives on issue cycles", *Communication Research*, 26(1), 30-57.

Meira, Pablo Ángel, Arto, Mónica, Heras, Francisco, Iglesias, Lucía, Lorenzo, Juan José, and Montero, Pablo (2013), *La respuesta de la sociedad española ante el cambio climático 2013*, Madrid: Fundación Mapfre.

O'Neill, Saffron J., Boykoff, Maxwell, Niemeyer, Simon, and Day, Sophi A. (2013), "On the use of imagery for climate change engagement", *Global Environment Change*, 23, 413-421.

O'Neill, Saffron, and Nicholson-Cole, Sophie (2009), "Fear won't do it: Promoting positive engagement with climate change through visual and icononic representations", *Science Communication*, 30(3), 355-379.

Oficina de Justificación de la Difusión (2014), "Control de diarios impresos". Available at: <http://www.introl.es/medios-controlados/>, accessed on 10 March 2014.

Politic and social dimensions of scientific culture (FF12011- 24582) and Analysis of institutional campaigns on Human Papillomavirus vaccination., This article is the result of an ongoing research financially supported by two projects approved by the Spanish Ministry of Economy and Competitiveness: Politics of scientific culture: Analysis of the.

Slocum, Rachel (2004), "Polar bears and energy-efficient lightbulbs: strategies to bring climate change home", *Environment and Planning D*, 22, 413-438.

Smith, Nicholas W., and Joffe, Helene (2009), "Climate change in the British Press: The role of the visual", *Journal of Risk Research*, 12(5), 647-663.

Trumbo, C. (1996), "Constructing climate change: claims and frames in US news coverage of an environmental issue", *Public Understanding of Science*, 5, 269-283.