

Contropedia: Case Study on Global Warming

Erik Borra (borra@uva.nl) and Esther Weltevrede (weltevrede@uva.nl)

August 2014

Introduction

In 2007, the Intergovernmental Panel on Climate Change (IPCC) released its fourth assessment report (AR4) from Working Group 1 (Solomon et al., 2007). It concerned the physical science basis of the natural and human drivers of climate change and finds that “warming of the climate system is unequivocal”, and that “most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations” (Solomon et al., 2007: 5,10). Although the report cites thousands of scientists and demonstrates a scientific consensus that the climate is warming and that this has been driven by human activity, there is a minority of scientists who oppose the outcomes of the report. Media trying to provide objective information about global warming, face the danger of being trapped into providing the public with a “false balance,” by providing equal coverage to both views and thus giving “disproportionate weight to minority views” (Jones et al., 2011: 66, 58).

Since the publication of the British Broadcast Corporation’s (BBC) Trust report in 2011, journalists of the BBC are impelled to pay less attention to climate change skeptics when discussing global warming. The report, which includes an independent assessment on the accuracy and impartiality of BBC science coverage by professor Steve Jones, found that there was cause for concern about the appropriate application of the editorial guidelines on “due impartiality” (Jones et al. 2011: 3). As this guideline entails that the impartiality of reporting should be “adequate and appropriate to the output” and that it should be “more than a simple ‘balance’ between opposing viewpoints” (BBC Editorial Guidelines), BBC’s governing body (BBC Trust) concludes that “impartiality in science coverage does not simply lie in reflecting a wide range of views, but depends on the varying degree of prominence (due weight) such views should be given” (The Trust 2014: 2). Whereas those who deny that the climate is warming, or that it is driven by human activity, are vocal, they represent a (scientifically) marginal and minority opinion (Jones et al., 2011: 68, 72). Accordingly, BBC journalists should not give them the same attention, or present them as equally valid, as for instance the scientific consensus summarized by the IPCC.

In the following, we focus on Wikipedia, which in addition to more traditional mass media is an important source informing the public understanding of science, and public opinion on climate change more specifically. We are interested to analyze what Wikipedia has to add to our understanding of the controversy and more specifically, we focus on how Wikipedians negotiate their differences, in reference to policy, on the system. This case study explores whether and how Contropedia, through its visual analysis of the edit history and talk pages of the Wikipedia article on global warming, can provide us insight into the controversies played out within the article. In particular, we will analyze the role of the IPCC and its fourth assessment report (AR4), the role of scientists denying that global warming is happening at all, and those that oppose that global warming is caused by human activity. More generally, we seek to gain a more informed understanding of what is, or was, controversial about the article. What are current and past hot topics of dispute? Has dispute about parts of the content for instance focused around specific sub-issues? And if consensus is reached, how is this achieved? Through the use of Contropedia we seek to boil down the edit activity and discussions in the talk pages and explore how Contropedia can showcase the evolution of any controversy's composition on Wikipedia.

Controversialness in the article on global warming

The article about global warming has been on Wikipedia's list of controversial issues since December 2001 and has been under arbitration since 2010, which means that "wikipedia administrators [may] impose discretionary sanctions on any editor editing this page or associated pages."¹ Figure 1 shows the article about 'global warming' with Contropedia's controversy detection algorithm run over the entire edit history.² Note in the top right that the article is locked for further anonymous editing, which means that only registered users can edit the article, and that it is starred as a featured article, which means that it is considered as one of the best articles by wikipedia's editors and that it serves as an example for other articles too.³

The *layer view* in Figure 1 provides insight into which issues in the article on global warming are controversial. The visualization is a direct modification of the wikipedia article to

¹ http://en.wikipedia.org/wiki/Wikipedia:Arbitration/Requests/Case/Climate_change, accessed on 26 August 2014 and http://en.wikipedia.org/wiki/Talk:Global_warming, accessed on 26 August 2014.

² To find out which issues within the article are controversial, Contropedia focuses on the edit activity around wiki links and takes into account wikipedia's apparatus to mitigate conflict, by considering for example the discussion of controversial edits on talk pages and requests to support claims with references. For a discussion about the measures and metrics Contropedia, see Weltevrede and Borra forthcoming; Borra et al. 2014.

³ http://en.wikipedia.org/wiki/Wikipedia:Protection_policy#semi, accessed on 26 August 2014 and http://en.wikipedia.org/wiki/Wikipedia:Featured_articles, accessed on 26 August 2014.

convey its controversial history as a layer on top of the article; the degree of redness of a wiki link indicates the degree of controversy around this issue. The reddest — and thus the most controversial — issues in the lede of the article are ‘greenhouse gas’, ‘carbon dioxide (CO)’, ‘Intergovernmental Panel on Climate Change’, ‘climate model’, and ‘mitigation’. The minified view, on the right-hand side of the visualization, provides a quick overview of those parts of the article which are most controversial, and shows that there are various sections in the article which contain multiple controversial issues.

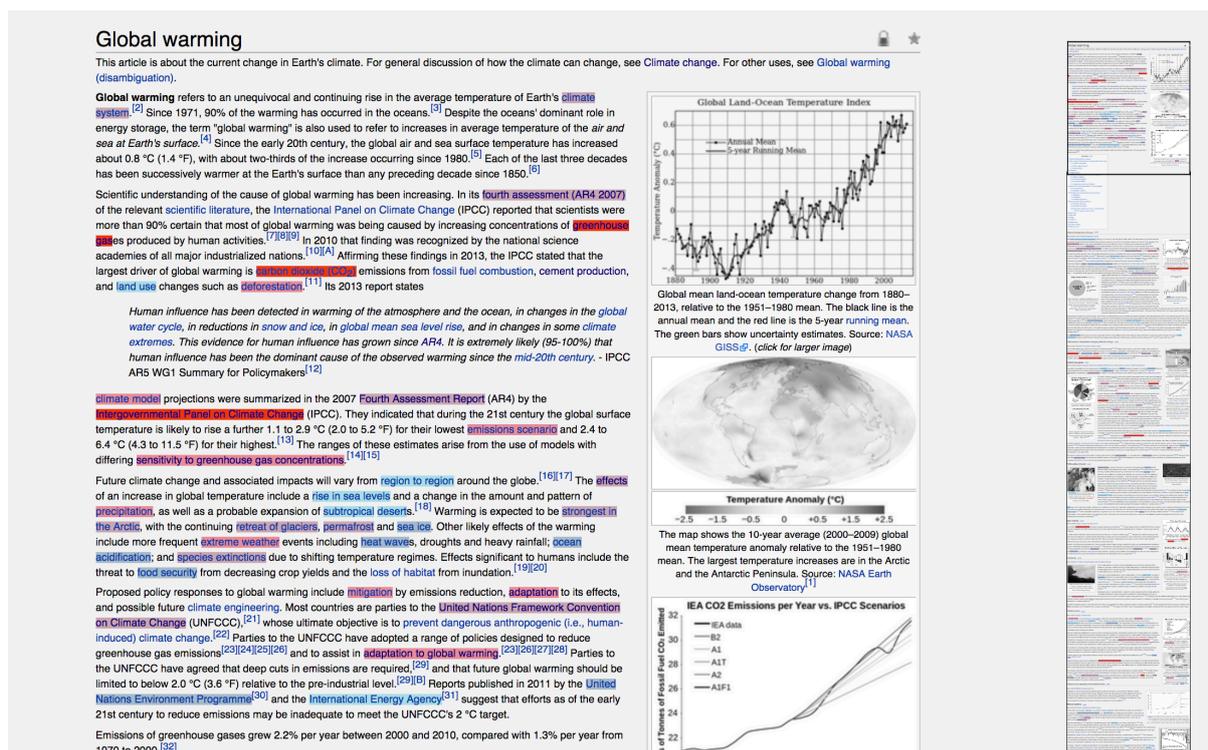


Figure 1: Controversial issues in the article on global warming. Controversiality has been calculated on the full edit history until 16 April 2014. The images are converted to grayscale. Available as an interactive visualisation [here](#).

In addition to the layer view of an article, Contropedia also features a *controversy dashboard* (Figure 2). This output ranks each wiki link in an article by its degree of controversialness. Per wiki link, the dashboard displays additional metrics such as the controversialness of an issue over time, how many times it was edited, and how many users were involved in changes to the element. While the layer view only shows the anchor text of wiki links that remained in the article until which the controversy detection algorithm is run, the dashboard also shows the linked articles that might have been removed from the main article. For example, whereas both the article ‘list of scientists opposing global warming consensus’ as well as ‘scientists opposing the mainstream scientific assessment of global warming’ were at one point linked from the global warming’ article, they are currently not linked from the article. Through this analysis of Contropedia’s

dashboard view of global warming, one dispute already surfaces: is there a ‘consensus’ where everybody agrees or is it a ‘mainstream scientific assessment’ with room for other opinions?

The Intergovernmental Panel on Climate Change

Before we can start to answer why these issues are controversial, it is insightful to see when they were controversial. In Figure 3 one of the top controversial issues from the current lede (as shown in Figure 1) is put into focus: ‘intergovernmental panel on climate change’. The top part of the timeline depicts the edit activity: the higher and darker the colors, the more edit activity. Most edit activity occurred in 2006 with an additional peak in 2007. In contrast, the small colored bar at the bottom indicates when the element was controversial and to what extent; the redder the bar, the more controversial the issue was at that time. The pace (number of substantive edits per time interval) thus defines the intensity of the controversy measure. Here, the controversialness bar shows that controversy around the issue sparked in 2005 and that the issue was most controversial throughout 2007. In the following, the edit and talk page histories of ‘intergovernmental panel on climate change’ in 2007 are analyzed to find out why the issue was controversial at the time.

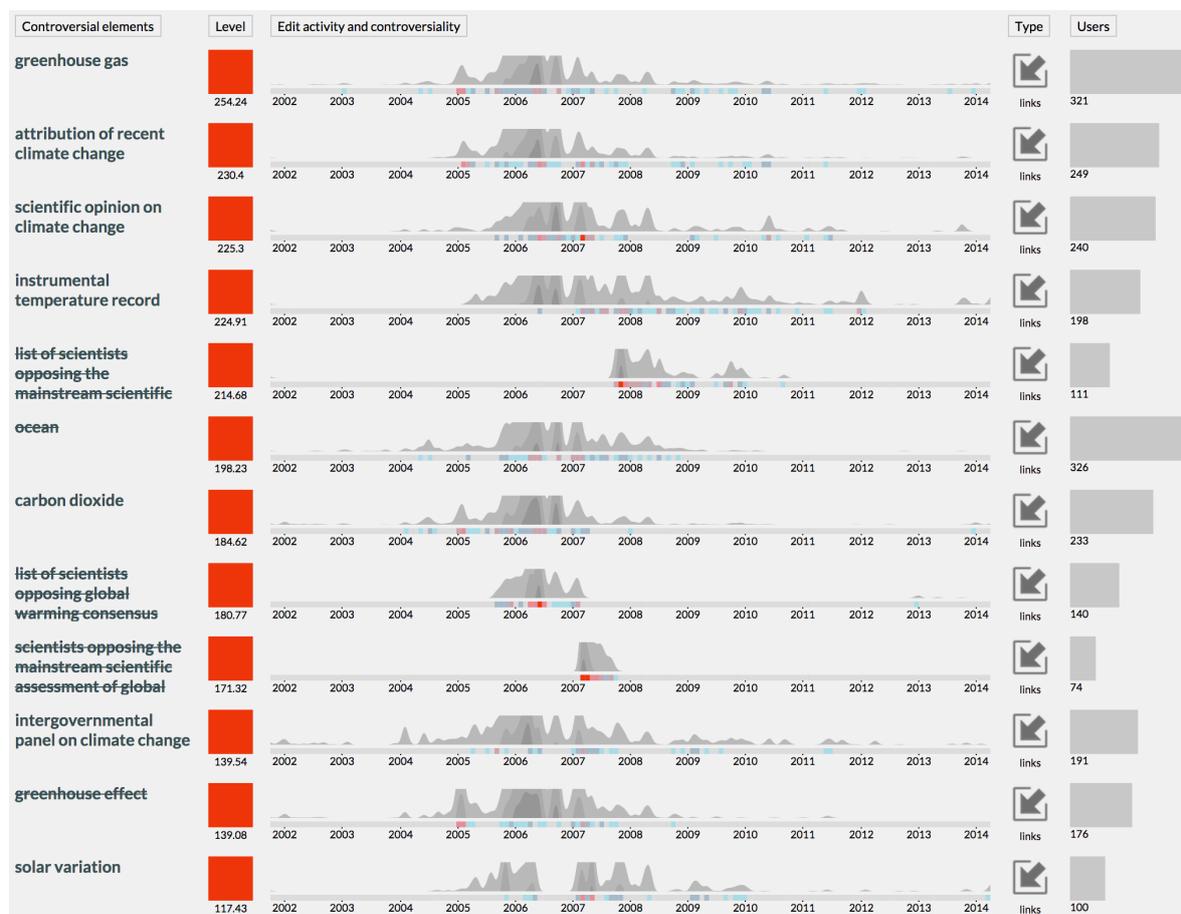


Figure 2. Partial dashboard view of the controversial wiki links in the article on global warming. Controversialness has been calculated on the full edit history until 16 April 2014. Available as an interactive visualisation [here](#).

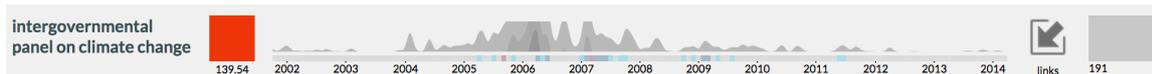


Figure 3. Detail of the dashboard view 'intergovernmental panel on climate change' in the article on Global Warming. Controversiality has been calculated on the full edit history until 16 April 2014. Available as an interactive visualisation [here](#).

Underneath the substantive disagreeing edits made to the sentences containing that element are listed (Figure 4). Inspecting the edits from 2007 it becomes clear that the main topic of dispute is about the prominence of IPCC in the article. This is exemplified by sentence changes such as those explaining that global warming is 'very likely' due to the observed increase in anthropogenic greenhouse gas concentrations (as mentioned in AR4, see e.g. Figure 5), and whether the IPCC should be the primary and authoritative source for this claim.

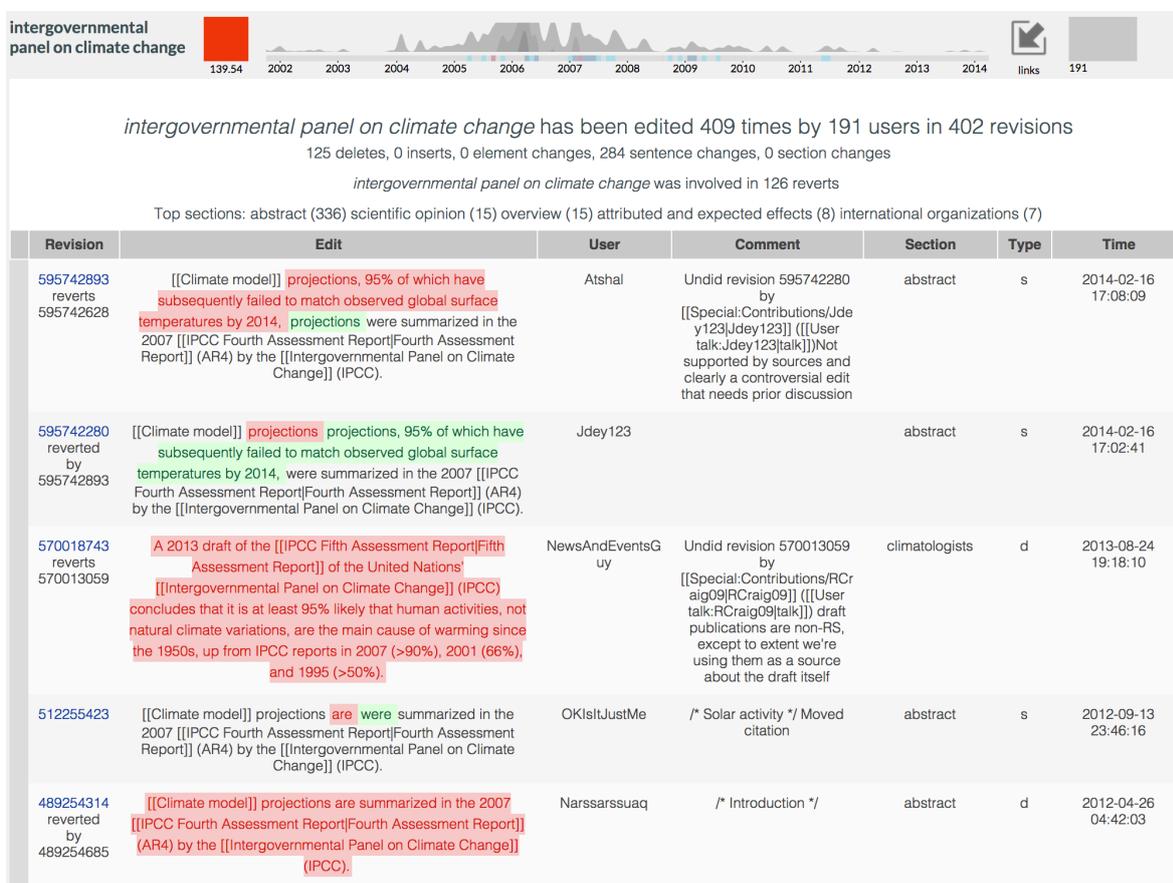


Figure 4. Detail of the dashboard view 'intergovernmental panel on climate change' in the article on Global Warming, including a partial edit history of the wiki link. The red color under the 'edit' section indicates a deletion of text and green an insertion of text. Controversiality has been calculated on the full edit history until 16 April 2014.



Figure 5. Edit in the history of the wiki link 'intergovernmental panel on climate change' in the article on Global Warming. The red color under the 'edit' section indicates a deletion of text and green an insertion of text. The comment mentions the fourth assessment report (AR4) of the IPCC as motivation for the edit.

Analyzing some key changes in the edit history we can see that on 1 January 2007 the link to the Intergovernmental Panel on Climate Change was absent from the lede.⁴ On 9 January 2007 the link is moved back to the third paragraph of the lede with the following sentence:

“Models referenced by the [Intergovernmental Panel on Climate Change](#) (IPCC) predict that global temperatures may increase by between 1.4 and 5.8 °C (2.5 to 10.5 °F) between 1990 and 2100.”⁵

Note that this is a direct quote from IPCC’s third assessment report (TAR). Following the release of AR4 in February 2007, however, ‘may’ in this sentence is changed to ‘are likely’, signifying the increased confidence by the IPCC.⁶ However, some wikipedia editors consider the fourth assessment report of the IPCC controversial. This can, for example, be inferred from a revision on 25 March 2007 by editor ‘Blue Tie’ who attaches the point of view (POV) template to the top of the article (Figure 6) and comments: “This article is nominated for a check”⁷.

Revision as of 15:49, 25 March 2007



Figure 6. POV template on the *Global Warming* article on [25 March, 2007](#).

Subsequently, in the talk page thread on ‘POV in the intro’, a direct reference is made to the prominence and authoritativeness of IPCC and AR4.⁸ Some of the wikipedians are of the opinion that the IPCC figures too prominently in the lede and the discussion on the talk page revolves around the extent to which this is in line with NPOV policy as well as to what extent opposing views are significant enough to be taken into account following the ‘due and undue weight’ policy. This wikipedia policy is part of the NPOV policy and requires that each article “fairly represents all significant viewpoints that have been published by reliable sources, in proportion to the prominence of each viewpoint in the published, reliable sources”⁹. In a second talk page thread about the POV template in 2007, the support for viewpoints on the issue of global warming are further discussed in relation to how it is phrased in the lede in March 2007 as: “this conclusion has been endorsed by numerous scientific societies and academies of science,

⁴ http://en.wikipedia.org/w/index.php?title=Global_warming&oldid=97639967, accessed on 26 August 2014.

⁵ http://en.wikipedia.org/w/index.php?title=Global_warming&oldid=99492775, accessed on 26 August 2014.

⁶ http://en.wikipedia.org/w/index.php?title=Global_warming&oldid=105516662, accessed on 26 August 2014 and Figure 5

⁷ http://en.wikipedia.org/w/index.php?title=Global_warming&oldid=117768478, accessed on 26 August 2014.

⁸ http://en.wikipedia.org/wiki/Talk:Global_warming/Archive_24#POV_in_the_intro, accessed on 26 August 2014.

⁹ <http://en.wikipedia.org/wiki/Wikipedia:UNDUE>, accessed on 26 August 2014.

a few scientists disagree about the primary causes of the observed warming”.¹⁰

By the end of 2007, the POV template is removed, the link to the IPCC has moved up to the first paragraph of the lede, and the sentence containing the link now reads:

“The [Intergovernmental Panel on Climate Change](#) (IPCC) concludes “most of the observed increase in globally averaged temperatures since the mid-20th century is very likely [due to](#) the observed increase in [anthropogenic](#) greenhouse gas concentrations”^[1] via the [greenhouse effect](#). Natural phenomena such as [solar variation](#) combined with [volcanoes](#) probably had a small warming effect from pre-industrial times to 1950 and a small cooling effect from 1950 onward.^{[2][3]} These basic conclusions have been endorsed by at least 30 [scientific societies and academies of science](#), including all of the national academies of science of the [major industrialized countries](#). While [individual scientists](#) have voiced disagreement with some of the main conclusions of the IPCC, the overwhelming majority of scientists working on climate change are in agreement with them.^[4]”¹¹

We can see that throughout the year vague terminology such as ‘numerous’ and ‘few’ (a.k.a. ‘weasel words’¹², see later) have been replaced by concrete numbers which are verified with reliable sources.

Through an inspection of the edit history and talk pages it thus becomes clear that the publication of IPCC’s fourth assessment report in 2007 is a strong drive not only for the prominence of authoritative sources in the lede but also for changes to sentences containing a link to the article on the IPCC, and for changes to other sentences in the lede. Wikipedia’s ‘due weight’ policy and how to deal with the different views proportionately, shows strong similarities with how the BBC was advised to deal with scientific opinion as ‘due impartiality’ (as opposed to ‘balanced’). However convincing wikipedia’s ‘due weight’ guideline may seem in theory, it is not immediately evident how one should weigh the different views in practice. We will elaborate on this in the next section.

Measuring ‘undue weight’

The previous section has shown that the publication of IPCC’s fourth assessment report ignited controversial edit activity as well as discussions around the wiki link ‘Intergovernmental Panel on Climate Change’. We have also seen some indication that the publication of this report has affected other parts of the lede as well. In this section we will pay further attention to Contropedia’s historical view to showcase how the controversiality of issues and content may

¹⁰ http://en.wikipedia.org/wiki/Talk:Global_warming/Archive_21#NPOV_Dispute, accessed on 26 August 2014.

¹¹ http://en.wikipedia.org/w/index.php?title=Global_warming&oldid=179874419, accessed on 26 August 2014.

¹² http://en.wikipedia.org/wiki/Wikipedia:Weasel_word#Unsupported_attributions, accessed on 26 August 2014.

change over time. Here we specifically focus on the difference in content edits to the article on global warming, before and after the release of AR4.

The most controversial issue in [2006](#), the year before the release of AR4 in 2007, is ‘list of scientists opposing global warming consensus’ while in [2007](#) the most controversial issue is ‘scientists opposing the mainstream scientific assessment of global warming.’ While both articles are in fact the same, the article had its title changed to the latter in early 2007. In the timeline of the latter it can be seen that there the controversial edit activity increases once the IPCC report is published (Figure 7).

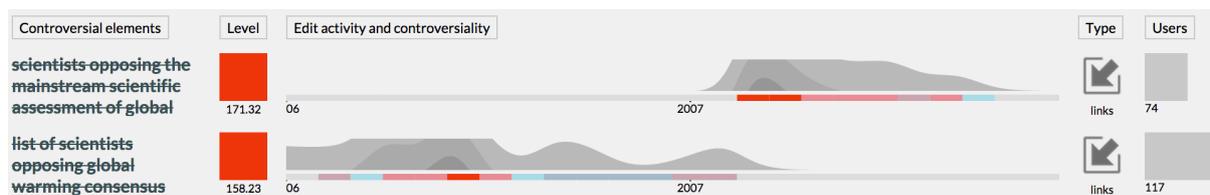


Figure 7 . Dashboard view of the issue ‘scientists opposing the mainstream scientific assessment of global warming’ from 200-02-01 until 2008-02-01. The timeline displays edit activity as grey in the horizon chart and heightened controversial edit activity is marked with red.

Zooming in on the edit histories of these two links, we again look at the substance of the dispute and discuss the differences and similarities between the two links. It becomes clear that the edit discussion is about the scope of the support base of the report in the academic community. Around both issues the main dispute in edits is about the size of the group of scientists that oppose global warming consensus/the mainstream assessment and has been changed from ‘a few’, to ‘relative few’, ‘other’, ‘a small number of’, ‘many’, ‘a number of’, ‘about two dozen’, ‘while there may be some’, ‘while there are a few’, ‘a small minority of’, ‘a growing minority’ and so on, which are considered ‘weasel words’. In wikipedia policy on weasel words, they are defined as “words and phrases aimed at creating an impression that something specific and meaningful has been said, when in fact only a vague or ambiguous claim has been communicated.”¹³ The policy advises that vague terms should be rewritten, supported with reliable sources, or tagged with the appropriate weasel word template.¹⁴ Wikipedia thus provides an interesting place to study how the ‘undue weight’ guideline is applied in practice, as the ‘weasel word,’ among others, steers wikipedians to be as concrete as possible by supporting claims with reliable sources.

If we inspect the edit history of the ‘list of scientists opposing global warming consensus,’ right before the release of the report on 2 February 2007, we can see that the wiki

¹³ http://en.wikipedia.org/wiki/Wikipedia:Weasel_word#Unsupported_attributions, accessed on 26 August 2014.

¹⁴ http://en.wikipedia.org/wiki/Wikipedia:Weasel_word#Unsupported_attributions, accessed on 26 August 2014.

link was not edited around that time, and in fact, was absent from the article.¹⁵ Previously, the wiki link, available in the article throughout 2006, has been subject to the different (vague) qualifiers for the size of the opposition described above:

“Only a small minority of climate scientists discount the role that humanity's actions have played in recent warming.”¹⁶

The small minority mentioned in this sentence links to the article on ‘scientific opinion on climate change’ and ‘discounts the role’ links to the ‘list of scientists opposing global warming consensus’, which seeks to name and list the opposition to the consensus of anthropogenic causes of global warming. In the final edit to this wiki object in 2007, the sentence containing the link has become:

“However, a few individual scientists disagree with some of the main conclusions of the IPCC.”¹⁷^[4]

The edit changes around this wiki link suggest that the opposition in 2006 was framed against the anthropogenic causes consensus without reference to reliable sources, whereas in 2007 the opposition is framed against the IPCC and its most recent report, which points at anthropogenic causes as the main causes of climate change; the IPCC thus has become the main authoritative body to which the opposition is framed against.

The controversy around the link to this article is also discussed to some length in a number of discussion threads. The thread on ‘Scientists opposing the mainstream scientific assessment of global warming’¹⁸, for instance, is about the extent to which the scientists that are listed here disagree with the findings of the IPCC report specifically, or if they oppose some other aspect of the consensus around climate change - which was how it was referenced in the Global Warming article before 2007. This is also reflected in the article ‘Scientists opposing the mainstream scientific assessment of global warming’ itself: the lists of scientists are categorized into those that “believe global warming is not occurring or has ceased”, “believe accuracy of IPCC climate projections is inadequate”, “believe global warming is primarily caused by natural processes”, “believe cause of global warming is unknown”, and “believe global warming will

¹⁵ http://en.wikipedia.org/w/index.php?title=Global_warming&oldid=105000509, accessed on 26 August 2014.

¹⁶ http://en.wikipedia.org/w/index.php?title=Global_warming&oldid=102012332, accessed on 26 August 2014.

¹⁷ In bold the text is indicated which links to ‘list of scientists opposing global warming consensus’
http://en.wikipedia.org/w/index.php?title=Global_warming&oldid=161937847, accessed on 26 August 2014.

¹⁸ http://en.wikipedia.org/wiki/Talk:Global_warming/Archive_25#Scientists_opposing_the_mainstream_scientific_assessment_of_global_warming.E2.80.8E, accessed on 26 August 2014.

benefit human society”¹⁹.

Notably, the POV of the article ‘scientists opposing the mainstream scientific assessment of global warming’ is disputed quite often because the list can never be complete (see figure 8), and because the name of the article has been changed a number of times. Generally, it is discouraged to change article titles unless there is a good reason for it, which should then be done in consensus. The article has been nominated for deletion a number of times and a name change has been suggested from these discussions. The title is relatively long and can be said to reflect that the controversy around it has not yet resolved.²⁰

The archived discussion threads from the beginning of 2007 feature the fourth assessment report very prominently.²¹ Also, in the ‘title discussion’ thread the report is mentioned. As the term ‘consensus’ is considered controversial in the previous title, in the end the editors reach consensus over a name change that refers to the ‘mainstream scientific assessment’ instead of the more general and vague ‘consensus’. As one editor makes explicit, the ‘mainstream scientific assessment’ is preferred because it “echoes the ‘assessments’ that have been formally done; e.g., TAR, AR4, U.S. National Assessment, and so on”.²²

List of scientists opposing the mainstream scientific assessment of global warming

From Wikipedia, the free encyclopedia



The **neutrality of this article is disputed**. Relevant discussion may be found on the talk page. Please do not remove this message until the dispute is resolved. (March 2014)

This is an *incomplete list* that may never be able to satisfy particular standards for completeness. You can help by *expanding it* with entries that are *reliably sourced*.

Figure 8. Disputed neutrality template on the article ‘List of scientists opposing the mainstream scientific assessment of global warming’, accessed 18 August 2014.

Returning to the problem of determining the size and weighing the proportionality of the different views, the tactic of the wikipedians to deal with this issue is to link it to a dedicated article that seeks to name and list the various scientists and scientific bodies in the various views supported with reliable sources, as is indicative of the list of scientists that oppose the mainstream assessment of global warming. Linking to a dedicated article functions both a

¹⁹

http://en.wikipedia.org/w/index.php?title=List_of_scientists_opposing_the_mainstream_scientific_assessment_of_global_warming&oldid=180784320, accessed on 26 August 2014.

²⁰ see for instance this editor’s comment:

http://en.wikipedia.org/wiki/Talk:List_of_scientists_opposing_the_mainstream_scientific_assessment_of_global_warming/Archive_11#title, accessed on 26 August 2014.

²¹

http://en.wikipedia.org/wiki/Talk:List_of_scientists_opposing_the_mainstream_scientific_assessment_of_global_warming/Archive_4, accessed on 26 August 2014.

²²

http://en.wikipedia.org/wiki/Talk:List_of_scientists_opposing_the_mainstream_scientific_assessment_of_global_warming/Archive_4#AEB2, accessed on 26 August 2014.

solution to dealing with weasel words, without adding too much detail in the main article, as well as a pressure valve for the Global Warming article by relocating controversy elsewhere. The analysis of the edit history and talk pages in the year after the fourth assessment report suggests that the report itself is a ‘reliable source’ in wikipedia policy and has helped in making the article more substantive with authoritative sources. At the same time that the global warming consensus is given a name, it has also sparked opposition to counter the authority by providing lists of opposition to the mainstream, also supported by reliable sources.

Global warming consensus?

On [16 April 2014](#), the lede to the article on Global Warming has no mention of opposing views in the lede nor links to the article about scientists opposing the mainstream scientific assessment on global warming. Controversy about global warming has been moved to one of the bottom sections of the article titled ‘discussion on global warming’ and includes the sub-sections ‘political discussion’, ‘scientific discussion’ and ‘discussion by the public and in popular media’. Each sub-section is provided with links to dedicated pages that discuss the specific controversy or discussion in more detail. Most notable in reference to the introduction of this case study, climate change denial and the global warming controversy have been situated as a media discussion in this wikipedia article, which is fed amongst others by conservative think tanks (see figure 9).



Discussion by the public and in popular media

Main articles: [climate change denial](#) and [global warming controversy](#)

The [global warming controversy](#) refers to a variety of disputes, substantially more pronounced in the [popular media](#) than in the scientific literature, regarding the nature, causes, and consequences of global warming. The disputed issues include the causes of increased [global average air temperature](#), especially since the mid-20th century, whether this warming trend is unprecedented or within normal climatic variations, whether [humankind has contributed significantly to it](#), and whether the increase is wholly or partially an artifact of poor measurements. Additional disputes concern estimates of [climate sensitivity](#), predictions of additional warming, and what the consequences of global warming will be.

From 1990–1997 in the United States, [conservative](#) think tanks mobilized to challenge the legitimacy of global warming as a social problem. They [challenged the scientific evidence](#), argued that global warming will have benefits, and asserted that proposed solutions would do more harm than good.

Some people dispute aspects of climate change science. Organizations such as the libertarian [Competitive Enterprise Institute](#), conservative commentators, and some companies such as [ExxonMobil](#) have challenged IPCC climate change scenarios, funded scientists who disagree with the [scientific consensus](#), and provided their own projections of the economic cost of stricter controls. Some fossil fuel companies have scaled back their efforts in recent years, or called for policies to reduce global warming.

Figure 9. ‘Discussion by the public and in popular media’. Section of the article on Global Warming on 16 April 2014. See an interactive version [here](#).

The link to the ‘list of scientists opposing the mainstream assessment of global warming’ has however disappeared from the article altogether. When looking up the final edits to the link at the end of 2009²³ we are again directed to the talk pages, where significant discussions are taking place about the neutrality of the article and about seeking balance in the scientific views on

²³ http://en.wikipedia.org/w/index.php?title=Global_warming&oldid=330721894, accessed on 26 August 2014.

global warming.²⁴ In reference to the link to the ‘list of scientists opposing the mainstream assessment of global warming’, one of the editors argues:

I am seriously opposed to having that list of ‘scientists’ in the lede of this article. It has been added to the final section in an appropriate manner by another editor, and that should be the only appearance it makes. Bear in mind that the skeptics represent a tiny majority of scientists - so tiny, in fact, that their views should be considered to be on the fringe. Giving them a ‘voice’ in the introduction would be a gross violation of WP:WEIGHT. -- Scjessey (talk) 13:19, 10 December 2009 (UTC)²⁵

The key piece of policy referenced here is ‘undue weight’.²⁶ The gist of the consensus that is reached from the discussion is that “in order to be included, the ‘sides’, or more accurately, ‘views’ [...] must be shown to be significant.”²⁷ It is in fact around 2010 that controversy on the article on global warming seems to have been resolved or at least seriously cooled down, indicative from the decrease in (controversial) edit activity (see figure 2). This is further supported by demarcating the dashboard view of the Global Warming article to the last four years where the wiki links are little controversial (see figure 10). Although there are still some remains of the same controversial links present in the top 10, it also shows that new issues appear and others become more controversial.

The decline of controversial edit activity in the past four years in the article overall indicates that the controversy has resolved, or at least cooled down, beyond this link to the list of opposing scientists. Future work in the Contropedia project focusing on integrating the discussion threads, templates, references and editor factions in both the dashboard and layer view will allow us to further specify which events, publications, discussions and so on have played a role resolving the controversy on the article more generally.

²⁴ http://en.wikipedia.org/wiki/Talk:Global_warming/Archive_55, accessed on 26 August 2014.

²⁵ http://en.wikipedia.org/wiki/Talk:Global_warming/Archive_55#Text_discussion.2C_2nd_section, accessed on 26 August 2014.

²⁶ http://en.wikipedia.org/wiki/Wikipedia:Neutral_point_of_view#Due_and_undue_weight, accessed on 26 August 2014.

²⁷ http://en.wikipedia.org/wiki/Talk:Global_warming/Archive_55#restatement_of_idea, accessed on 26 August 2014.



Figure 10. Dashboard view of the controversial wiki links in the article on global warming between 16 April 2010 and 16 April 2014. Available as an interactive visualisation [here](#).

Conclusion

This case study was introduced by discussing how the BBC has recently resolved the controversy by following the conclusions of the BBC Trust report on scientific reporting. The report advised to follow the editorial guideline of ‘due impartiality’ instead of the more common journalistic guideline of ‘balance’. The case study has shown that the wikipedia apparatus has a similar policy, ‘due weight’, which has been prominent in the edit history and in discussions around the global warming controversy.

What wikipedia has to add, is that it not only provides a rich account of the practical application of such an editorial guideline within the wikipedia apparatus, but that it also functions as a rich historical reference work for a detailed collection of important scientific and media publications, as well as other events that played a role in the heating up, cooling down, displacement and resolution of the controversy. The current edit history and talk pages of wikipedia, however, are in such form that they are very difficult to analyse. We argue that our tool, Contropedia, assists the use of wikipedia as a rich source for social and cultural researchers interested in the historical dynamics of any controversy with a substantive (set of) articles on wikipedia.

The case study set out to find out whether and how Contropedia, through its visual analysis of the edit history and talk pages of the wikipedia article on global warming, can provide us insight into the controversies played out within the article. Specifically because wikipedia,

which in addition to more traditional mass media, is an important source informing the public understanding of science and public opinion on climate change more broadly. Put differently, this case study sought to find out what wikipedia can add to our understanding of some of the specifics of the controversy and its historical dynamics.

These initial results suggest that the wiki links and its direct surroundings in controversial edits may indeed provide insight in the substance of controversies. The results of our case study provide us with a strong indication that the wikipedia edit history indeed shows us relevant controversial issues in the debates surrounding global warming. This case study into one of wikipedia's most controversial, lengthy and oldest articles has shown that the controversy around what is considered scientific consensus, and how to measure and position the opposition, has been edited and debated at length and in detail. The overall top most controversial issue in the article has been about scientific consensus and the opposition to it, since 2010 this controversy seems to have at least cooled down. Although the focus has been on the Global Warming article, the case study led us to conclude that a substantive analysis of the complexity of a controversy includes analyzing the ecology of related articles and talk pages that follow from the initial starting point of the analysis.

Bibliography

BBC Editorial Guidelines - BBC TV, Radio and Online standards guidelines. Available at:

<http://www.bbc.co.uk/editorialguidelines/> [Accessed August 26, 2014].

E. Borra, E. Weltevrede, P. Ciuccarelli, A. Kaltenbrunner, D. Laniado, G. Magni, M. Mauri, R. Rogers, T. Venturini (2014). "Contropedia - the analysis and visualization of controversies in Wikipedia articles." In *Proceedings of the 10th International Symposium on Open Collaboration (OpenSym 2014)*. ACM Press.

S. Jones et al. (2011). "BBC Trust review of impartiality and accuracy of the BBC's coverage of science." In *BBC Trust July 2011*, BBC.

Solomon S, Qin D, Manning M (eds) (2007) *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge (UK) and New York: Cambridge University Press.

The Trust (2014). "Trust Conclusions on the Executive Report on Science Impartiality Review Actions." In *BBC Trust July 2014*, BBC.

IPCC (2007). "Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate

Change,” Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp.

Weltevrede and Borra (forthcoming). “Controversy in the Backend of Neutral Point of View: A Device Perspective on Issue Mapping with Wikipedia.”