

# Effective media reporting of sea level rise projections: 1989–2009

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## Abstract

In the mass media, sea level rise is commonly associated with the impacts of climate change due to increasing atmospheric greenhouse gases. As this issue garners ongoing international policy attention, segments of the scientific community have expressed unease about how this has been covered by mass media. Therefore, this study examines how sea level rise projections—in IPCC Assessment Reports and a sample of the scientific literature—have been represented in seven prominent United States (US) and United Kingdom (UK) newspapers over the past two decades. The research found that—with few exceptions—journalists have accurately portrayed scientific research on sea level rise projections to 2100. Moreover, while coverage has predictably increased in the past 20 years, journalists have paid particular attention to the issue in years when an IPCC report is released or when major international negotiations take place, rather than when direct research is completed and specific projections are published. We reason that the combination of these factors has contributed to a perceived problem in the sea level rise reporting by the scientific community, although systematic empirical research shows none. In this contemporary high-stakes, high-profile and highly politicized arena of climate science and policy interactions, such results mark a particular bright spot in media representations of climate change. These findings can also contribute to more measured considerations of climate impacts and policy action at a critical juncture of international negotiations and everyday decision-making associated with the causes and consequences of climate change.

**Keywords:** media studies, sea level rise, communication, climate change, science policy

## 1. Introduction

Accelerated sea level rise is a consequence of human-caused climate change (National Research Council 2010), and is one of the more commonly discussed among the public, media and policymakers. To better understand the communication of the science of sea level rise in mass media, and in particular assessments of future levels of rise, we examined the coverage of global sea level rise projections to 2100 in what have been deemed influential newspapers in the United States (US) and the United Kingdom (UK) (Carvalho and Burgess 2005, Boykoff 2007a). We then compared media representations in these sources to the projections reported in the IPCC Assessment Reports (AR) and in a sample of the peer-reviewed

scientific literature in order to assess the accuracy of media portrayals of these findings.

At first glance, sea level rise projections as an indicator of climate change may appear to be a relatively straightforward communication issue. However, media portrayals of sea level rise in the media can be complicated by competing factors operating at multiple scales, from political economic constraints on news gathering to differing norms of knowledge production in science and media practitioner communities. Mass media serve a vital role in communication processes between science, policy, and the public; thus, representations shape perceptions of the causes and consequences of climate change, and influence considerations for ongoing climate governance. Media representations stitch together formal

climate science and policy negotiations to the cultural politics of the everyday, where various actors work to make claims and articulate climate challenges in particular (and oft-competing) ways (Boykoff *et al* 2009).

As such, media coverage of sea level rise becomes not just a collection of news articles and segments produced by journalists and producers; rather, journalists' portrayals mediate and mark processes of competing frames and problem definitions, developed through dynamic and nonlinear relationships between scientists, policy actors, and the public. The process of media framing involves an inevitable series of choices to cover certain events within a larger current of dynamic activities. Stories compete for attention and permeate interactions between science, policy, media, and the public in varied ways (Boykoff 2007b, 2008).

In this milieu, a number of climate scientists have disagreed on the most responsible and effective ways to discuss sea level rise in the public sphere. For example, Stefan Rahmstorf has commented, 'This is not just my concern: there's a number of scientists who were not very happy with the impression given in the summary of the [IPCC AR4 WG1] report that sea level rise projections had dropped compared to the previous report' (Wilkinson and Frew 2007). Furthermore, Dr James Hansen of NASA GISS has complained of a 'reticence' of glaciologists to express urgency when publishing papers on and discussing sea level rise (Hansen 2007). While past research has explored how various facets of science have been captured in media reports (e.g. Bell 1994, Szasz 1995, Ladle *et al* 2005, Anderson *et al* 2005, Antilla 2008), to date none had examined in a quantitative manner media coverage of sea level rise.

## 2. Methods

This study took a two-pronged approach: (1) examinations of media coverage from 1989 to 2009 of sea level rise projections to 2100, and (2) assessments of findings on sea level rise projections to 2100 in peer-reviewed research and IPCC reports from 1990 to 2007. We chose the projections to 2100 because those numbers are the most prevalent in dialog on sea level rise.

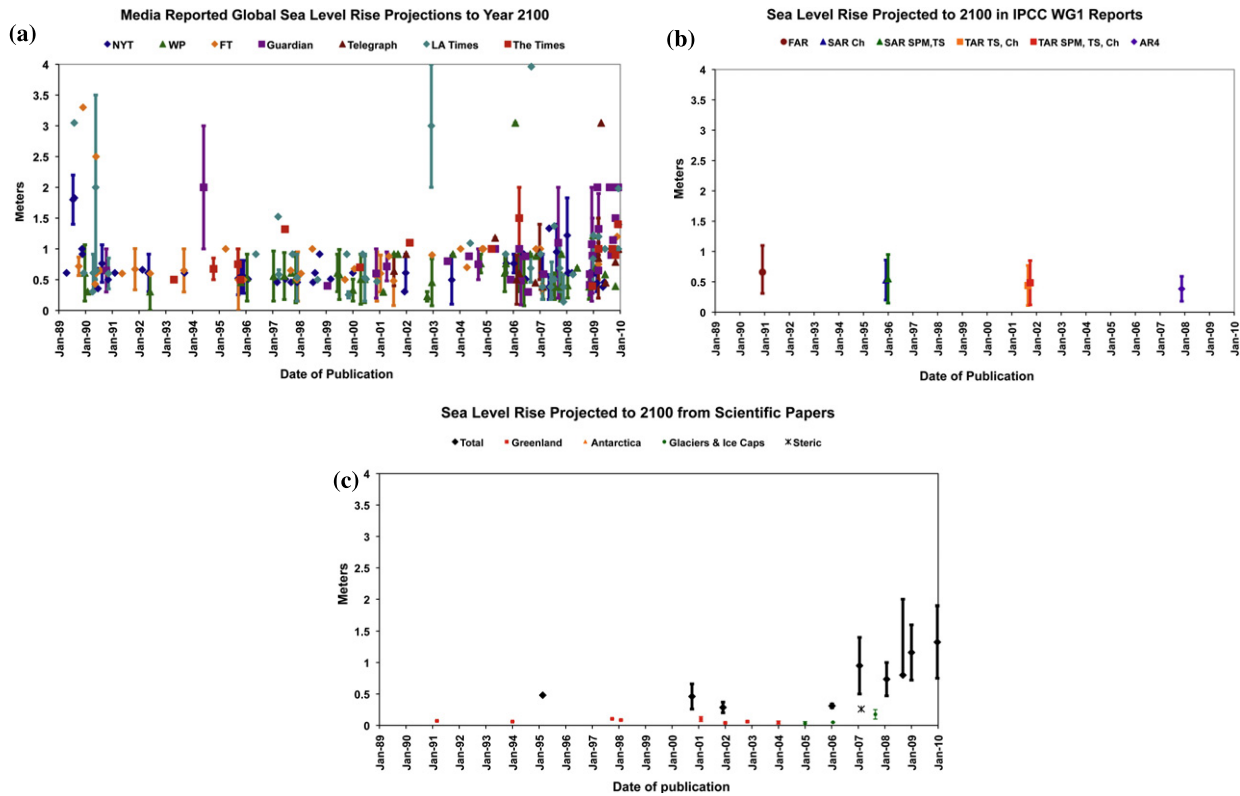
First, we searched seven newspapers (*New York Times*, *Washington Post*, *Los Angeles Times*, *Financial Times*, *The Times (London)*, *The Guardian* and *The Telegraph*) using the Boolean search terms 'sea' and 'level' and 'rise'. We assembled a population of 2028 articles total for the seven newspapers and examined them to ensure they were about sea level rise. We focus on major newspapers because these have been argued to be important indicators of larger media trends (Boykoff 2009). They have a particularly strong agenda-setting influence (Starr 2004, Gavin 2009), while they are frequent sources for stories that cascade through other media such as television, internet, and radio outlets (Pew Research Center 2009, Pérez-Peña 2010).

In each article, we looked for global sea level rise projections for the year 2100. In a few articles the projections were for a year other than 2100, in which case we scaled the projection to 2100. We determined that it is reasonable to assume the lay reader would see, for example, a projection

for 2050 and double that number for 2100. However, articles that reported current sea level rise rates but did not provide projections were not included. Moreover, articles that reported sea level rise from only one source (e.g. ice sheet melting) were not included in the data set, but many articles that do report on one source would also quote the IPCC projections for global sea level rise to 2100 and were included in our data. In addition, any numbers reported for only one part of the world oceans (e.g. Chesapeake Bay) were not included. We acknowledge that this search methodology would exclude media reports that, for example, use the term 'ocean levels' or some other phrase for sea level rise, but in piloting the study we found that this constituted a small number of articles. Overall, the phrase 'sea level rise' has been used most commonly by both the IPCC and the climate science community for the time period covered by our data. Filtering the articles in this manner left 214 articles from the seven newspapers that reported global sea level rise projections to 2100.

Second, to compare to the media coverage throughout time, we also include the sea level rise projections from all four IPCC Assessment Reports (AR) and scientific papers that calculate a global sea level rise projection to 2100. In the scientific literature, few peer-reviewed papers calculate global projections to 2100 on their own, but many quote the IPCC numbers (see below). In addition, the material covered by the working group I (WGI) sea level rise chapters focuses on current and past sea level rise. An examination of the peer-reviewed literature referenced in chapter 7 of AR4 (Bindoff *et al* 2007) revealed that a majority of the scientific papers did not calculate their own global projection for sea level rise to 2100. The sea level rise projection numbers in the IPCC Reports therefore appear to emerge from the projections of climate models running the SRES scenarios. The IPCC global sea level rise projections have decreased from the first through the fourth Assessment Reports (WGI). It should be noted, however, that the AR4 is widely thought to underestimate future sea level rise because the effects of dynamic ice loss from glaciers and ice sheets were not taken into account (National Research Council 2010). If the effect of ice dynamic losses was included in the sea level rise projection to 2100, the average number may be larger but it will also have a greater uncertainty.

In order to characterize peer-reviewed literature with sea level rise projections to 2100, we completed two searches in the ISI Web of Science. The first was the Boolean search 'sea' and 'level' and 'rise', which returned 5332 articles. The second was the Boolean search of 'sea' and 'level' and 'rise' and '2100', which returned only 107 articles. These 107 papers then became our sample for appraising the scientific literature. A large number, 76, of these papers stick to the sea level contribution from their authors' particular expertise (e.g. thermal expansion) and time-scale (e.g. past sea level rise or current sea level rise rates), but quote the IPCC projections. These were not retained in our data set because they are not giving an independent projection. There were six papers that give sea level rise projections for a doubling of CO<sub>2</sub> and are from the time when the IPCC was focusing on a doubling of CO<sub>2</sub> as a metric rather than conditions in 2100. Therefore,



**Figure 1.** Reported global sea level rise projections to 2100 in the (a) newspapers, (b) the IPCC Assessment Reports and (c) our sample of the scientific literature. Vertical bars are shown when a range of sea level rise was given. The IPCC first Assessment Report did not give a range for sea level rise to 2100, but ran three model scenarios so we have plotted the range of these three values with the center value plotted as the symbol. For the second and third Assessment Reports, the range of projections reported in the newspapers is similar to that of the IPCC. For the AR4, the newspaper articles report much greater uncertainty in the sea level rise projections and they are all showing uncertainty in the direction of higher sea level rise. Most of the scientific literature did not give a global projection to 2100 except for a few modeling papers (Bugnion and Stone 2002, Church and White 2006, Gregory and Oerlemans 1998, Gregory and Lowe 2000, Gregory *et al* 2001, Grinsted *et al* 2009, Gornitz 1995, Horton *et al* 2008, Huybrechts *et al* 1991, 2002, 2004, Landerer *et al* 2007, Meier *et al* 2007, Oerlemans *et al* 2005, Pfeffer *et al* 2008, Raper and Braithwaite 2006, van de Wal and Oerlemans 1994, 1997, van de Wal *et al* 2001, van Lipzig *et al* 2002, Vermeer and Rahmstorf 2009, Wild and Ohmura 2000).

25 peer-reviewed papers out of the original 107 remained, to enable us to show a global sea level rise to 2100 from either one source (e.g. ice sheet melting) or all sources. The papers that included all sources of sea level rise were climate modeling studies.

### 3. Results

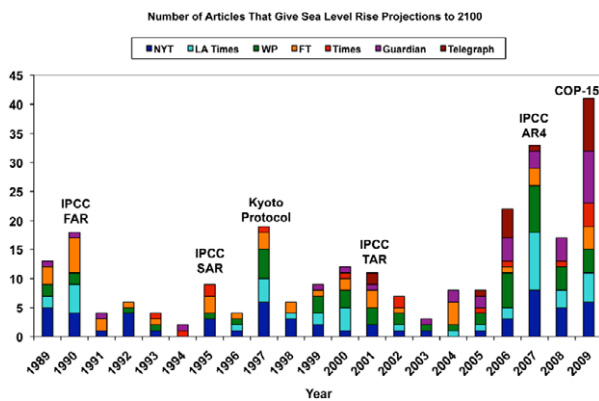
Figure 1 shows the reported global sea level rise projections for 2100 from newspapers, the IPCC WG1 Assessment Reports and our sample of the scientific literature. These show that the reported sea level rise projections in newspapers have not changed significantly in the last 20 years with the exception of a few outliers. One notable outlier was a report of 20ft of sea level rise by the year 2100 by The Times print version on 24 March 2006, but this was corrected to say 3–6ft, which appears on the online version of the report (Henderson 2006) and in figure 1(a). The ranges of sea level rise in 2100 that were reported have increased in the past 3–4 years.

The IPCC sea level rise projections to 2100 have remained relatively constant, and the reported range of sea level rise in 2100 has also decreased slightly in successive IPCC reports.

We note again that many in the scientific community believe the most recent report underestimates sea level rise projections to 2100. If the effect of ice dynamics were included in climate models, the projections would likely be higher but with a greater uncertainty. The sea level rise projections to 2100 in our sample of the scientific literature have also been relatively constant with time, but the associated uncertainty has increased in the last several years.

When we dug deeper into the articles themselves, we found that the journalists frequently quoted the most recent IPCC sea level rise projections even though most articles were about only one source of sea level rise (usually melting ice) or one particularly high profile scientific paper. This explains much of the consistency in reported sea level rise projections in the past 20 years. In the most recent 4 years, more articles discussed the uncertainty of glaciers and ice sheet behavior and reported a greater range of sea level rise in 2100, reflecting the greater uncertainty in the scientific literature.

Figure 2 shows the number of articles on sea level rise in each of the newspapers we searched. There is has been a general increase in the amount of sea level rise coverage in the past 20 years, but there have also been increases in



**Figure 2.** Number of newspaper articles that give sea level rise projections. The amount of articles on sea level rise track with the release of major IPCC reports and climate events.

coverage during certain years. Most spikes in sea level rise coverage occur in the years when an IPCC Assessment Report is released. There was also a large increase in coverage in 1997 and 2009, the years of the Kyoto Protocol and the Conference of Parties (COP-15) in Copenhagen, respectively. This suggests to us that the amount of coverage of sea level rise may be driven by events in the political process rather than the scientific results in sea level rise papers.

The numbers and ranges reported suggest, in aggregate, reporting on sea level rise among the sources that we have examined has been consistent with scientific literature on the issue. While there have been challenges over time regarding US and UK media coverage of anthropogenic climate change (e.g. Boykoff and Mansfield 2008), this study has found general success in media portrayals of this facet of climate science.

Mass media presentations of climate change remain key influences that bound discourses and shape the spectrum of possibility for climate mitigation and adaptation actions. Amid much recent criticism of climate science and the media on the high-stakes, high profile and highly politicized issue (e.g. Leake 2010, Rahmstorf 2010), accurate reporting on projections for sea level rise by 2100 demonstrates a bright spot at the interface of climate science and mass media. These findings can contribute to more measured considerations of climate impacts and policy action in the public sphere.

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