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Editorial: Civil-disobedience movements such as School Strike for the Climate are raising public awareness of the climate-change emergency

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The IPCC (Intergovernmental Panel on Climate Change) 'Special Report on Global Warming of 1.5 °C' presented the ambitious target of needing to achieve zero net emissions by 2050 in order to meet the goals of the Paris Agreement (IPCC, 2018). This report led some governments and jurisdictions to declare a climate emergency (Climate Emergency Declaration, 2019) and prompted the rise of movements of activism and civil disobedience such as the School Strike for the Climate and Extinction Rebellion. The reach of these civil actions extends beyond those directly involved, potentially increasing wider public awareness of climate change. Here, we examine trends in indicators of this wider public awareness and engagement, and compare these with major global movements of civil disobedience focussed on climate, the release of substantive climate reports, and global governmental gatherings on climate change. We show that these global movements may be increasing public awareness of, and stimulating public engagement with, issues of climate change.

It is not easy to accurately measure public awareness and engagement with the issue of climate change at a global scale. We use two sources of information as indicators of that engagement. First, we used data on the scaled relative frequency of pertinent terms in Google searches ("global warming", "climate change", "climate action", "climate emergency", "climate crisis", downloaded from Google Trends on 31 October 2019, <https://www.google.com/trends>). Second, we used data on mentions of the specific terms "climate change" and "global warming" by the global media, assembled by the Media and Climate Change Observatory, MeCCO (Boykoff *et al.* 2019, downloaded on 4 December 2019). These sources provide monthly data on the attention paid to climate change by anyone searching the internet (from the Google data), and by the newspapers, radio and television (from the MeCCO data).

We focus on 2017 onwards; a period that includes the recent rise in activism and civil disobedience associated with climate. Although there exists substantial month-to-month variation, both data sources show an overall increase in public engagement with climate

change, especially after mid-2018 (Figure 1). The Google search data also suggest an interesting evolution of the language of climate change. While the relative popularity of the search term "global warming" has shown little systematic change, public interest in "climate action" has increased greatly since 2018. In addition, "climate crisis" and "climate emergency" have become popular search terms since early 2019. Peaks in internet searches for these specific terms coincide with the first and second global school strikes, and New York Climate Week (Figure 1a). Searches for "climate emergency" and "climate crisis" were rare before 2019, but the use of these search terms increased 20--fold during that year. Further, these last two terms have become four to five-fold more common than searches for "global warming" and may be displacing the latter, as a common standard for public discourse (Figure 1a). Newspaper, radio and television reports on climate change have also increased over this time, doubling since mid-2018 (Figure 1b).

Of course, with this brief analysis (Fig. 1) we show only correlations. Nevertheless, the data suggest that global movements of civil disobedience focussed on climate, as well as traditional scientific reports, may play an important role in increasing public awareness and engagement with issues of climate change. Peaks in this traditional media coverage often reflected the release of scientific reports, such as the "Global Warming of 1.5°C" from the IPCC, and social actions related to climate issues (i.e. School Strike for the Climate and Climate Week; Figure 1b).

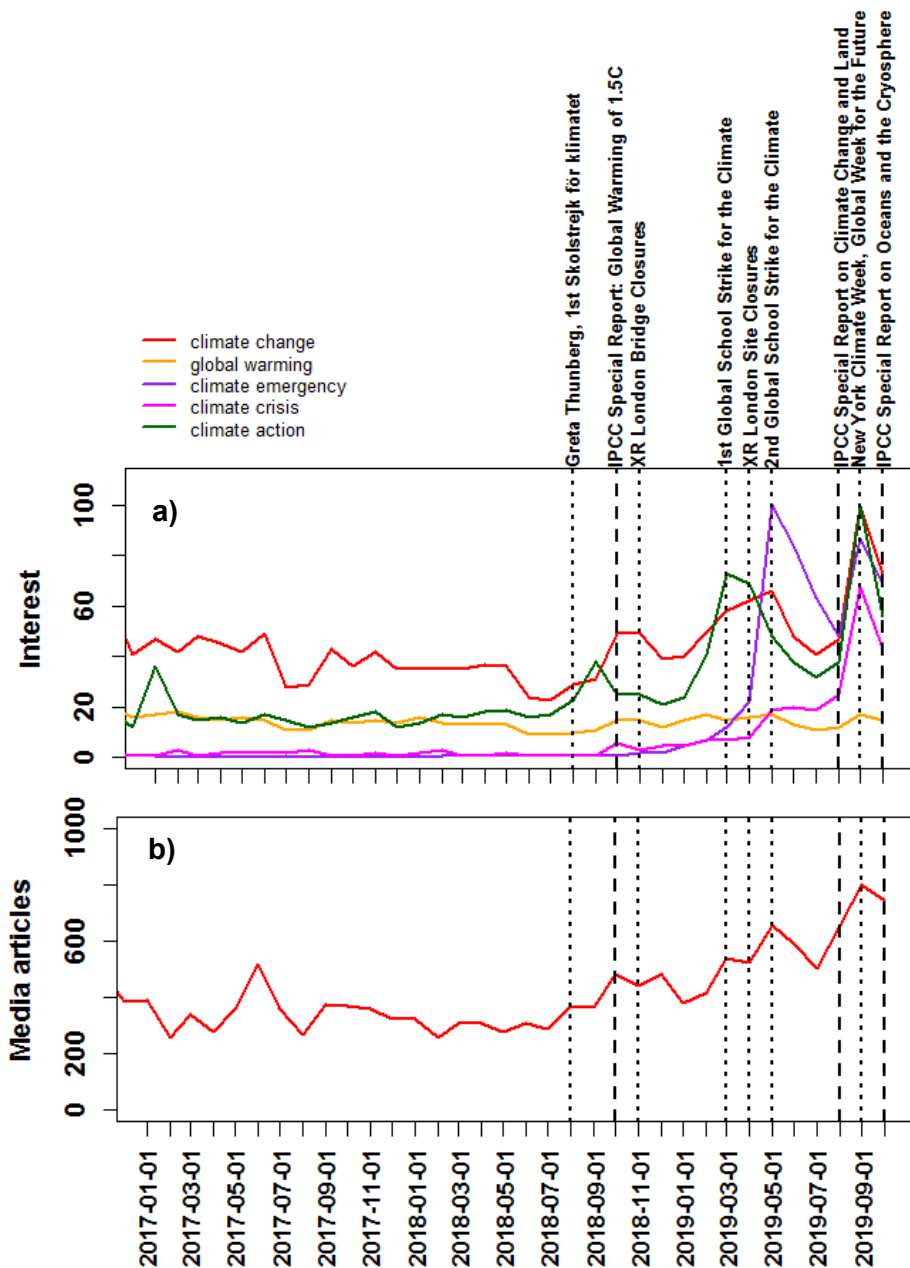


Figure 1. Measures of public engagement with climate change, 2017-2019. a) Relative frequency of relevant search terms (“climate change”, “global warming”, “climate emergency”, “climate crisis”, “climate action”) derived from Google Trends as a measure of public interest. Google Trends data express interest in a specific search term as a proportion of all searches on all topics, at a specific point in time, indexed to 100 (the maximum search interest over the presented time period). b) Global newspaper, television and radio reporting of the specific terms “climate change” and “global warming”, surveyed by MeCCO. “XR” refers to Extinction Rebellion.

Interestingly, much of the civil action since 2018 has been led by students at school or at university. These groups have been educated about climate change, have an understanding of the science, and see a need for immediate action (BBC, 2019). A recent report by Amnesty

International (2019), on a survey of 10,000 18-25-year-olds across 22 countries, reported that 41% of respondents found climate change to be the most important human-rights issue facing the world. A related environmental issue, regional air pollution, was this age group's second most important global concern. Of course, these activists and respondents represent the generation who will be affected most by failure to achieve net zero emissions by 2050, though there is no doubt wider interest and concern that transcends generations and educational backgrounds.

To address the significant challenges facing society, we need the very best science, teachers and communicators capable of translating that science to motivate and inspire wider audiences, and active engagement of the science community with the public and policy makers. While activism contributes to transformations in society, science is needed to define the nature of the problems we face, and point the way to the actions that need to be taken to address them. Science must remain objective and free from preconceived notions of right and wrong; it cannot achieve societal transformations alone. For that, we need activism by committed individuals, in the interest of their future and that of their children.

Science without activism is powerless to enact change, but activism without science can enact change without knowledge of the direction in which change is needed. To make constructive progress, both science and activism are needed to move society in the right direction with strength and purpose. The IPCC has made major contributions to gathering the scientific evidence to inspire and inform societal change since 1990 and, this year, *Global Change Biology* celebrates its 25th year of publishing the best science regarding the effects of climate change on all aspects of the biosphere.

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