The role of climate scientists in the post-factual society

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Abstract. The politicization of and societal debate on climate change science has increased over the last decades. Here, the authors argue that the role of climate scientists in our societies needs to adapt in accordance with this development. We share our experiences from the awareness campaign Pole to Paris, which engaged the general public on climate change issues on the roads from the polar regions to Paris and through conventional and social media. Based on these experiences, as well as

10   those from other science communication initiatives, we suggest a way forward for climate scientists in the post-factual society.

1 Background

The role of climate science in the public sphere has changed significantly since the mid-1980s. Since the formation of the Intergovernmental Panel on Climate Change (IPCC) and the U.S. Senate testimony of James Hansen in 1988, climate

15   science has increasingly become a topic of political debate, media coverage and part of the daily discourse in our societies (Bolin, 2007; Ungar, 2016). With this development, it is, more than ever, crucial to establish dialogues with those outside academia in order to help trigger positive global changes (Barnosky et al., 2016).

In this commentary, we argue that the scientific community was not prepared for the intense politicization of climate change

20   science (as defined by Zürn, 2014), which has occurred over the past several decades. However, we also contend that while climate polarization has reached new levels in the last few years (Dunlap et al., 2016), it is not too late for scientists to adapt to the highly charged political environment in which the very science of climate change is often discussed. Rapley and De Meyer (2014) argue that there is a gap between the role of the climate science community and the needs of society. As young environmental scientists having actively tried to bridge this gap, we here share our experiences from climate change

25   awareness initiatives, discuss their pros and cons, and discuss possible ways forward for the climate science community in terms of its interaction with society at large.

2 Our initiative: Pole to Paris

In early 2015, the authors established the non-governmental organization Pole to Paris. The aim of the initiative was to raise awareness of the threats posed by climate change. However, it separated itself from other climate outreach actions by attempting to highlight the human-induced consequences of climate change rather than focusing on the pure scientific facts

5   that undergird the reality of Earth's dynamic climate system. Following the unexpected collapse of the 15th Conference of the Parties (COP 15) to the United Nations Framework Convention on Climate Change (UNFCCC) in Copenhagen in 2009, the 2015 21st COP (COP 21) in Paris was regarded by many in the scientific and political communities as the last opportunity to begin to tackle climate change as a global community. Thus, in an attempt to galvanize public support for a new global climate agreement, the Pole to Paris project was purposefully timed to lead on the road ending in Paris.

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The Pole to Paris project focused on reshaping the way scientists engage with the public on climate change issues. The nature of the problem – being a long-term process on a planetary scale – makes it difficult for individuals to grasp it and engage with it. In an attempt to remove this abstractness, two journeys from the poles were mapped out: the 10,000-km long bicycle ride – the Southern Cycle – from Christchurch (New Zealand) and the 3,000-km long run – the Northern Run – from

15   Tromsø (Norway), both finishing in Paris during COP 21 (Fig. 1). The public were invited to get behind these journeys and actively become engaged in the climate dialogue coincidently. The adventure component also helped to attract media attention, giving the project a platform to communicate the facts about climate change and the importance of COP 21 to the wider audience and engaging them in the journeys. Crucially, along the way, we held talks in schools, universities and many other public venues, achieving two-way communication. We collaborated with our partners to create events along the way,

20   and we shared stories from the road through conventional and social media. This provided a unique opportunity to interact with members of society not usually reached by the scientific discourse. In line with O'Neill and Nicholson-Cole (2009), we focused on the opportunities and inspiration that lie in climate action rather than spreading fearful messages of climate change. A conservative estimation is that more than one million people in 45 countries were reached through conventional and social media, which included close to 250 media outlets (e.g., airing on CNN and TNN Thailand 24 and published in

25   The Guardian and National Geographic) and almost 500,000 and 250,000 reached per Facebook post and Twitter tweet, respectively.

3 Direct successes

Looking into these numbers in more detail, the authors in 2018 conducted a statistical analysis on the reach of the videos created by Pole to Paris and shared through Facebook. These videos spanned from 20 seconds to 6 minutes in length and

30   showcased the life on the road from the Poles to Paris (i.e., challenges and joys of the run and bike ride), the various direct or indirect impacts of climate change along the way (e.g., on coral bleaching in Australia, on air pollution in China from the carbon-intensive coal use, and on glacial melt in Antarctica, Norway, and the European Alps), and on the importance of

climate action at COP 21 and home. Of the total of 42 videos, we focused the analysis on the 32 in the most active period from June to December 2015. Figure 2 shows some of its key results.

Of the 226 346 total video views after three seconds, 56 130 (25 %) and 16 703 (7 %) were still there at 30 seconds and at 95 %
5   of the video length, respectively (Fig. 2a). Of these views, 89 % (after three seconds) to 97 % (at 95 % of the video length) were unique (not shown), meaning that almost all videos were watched once and that the once watching the videos over, only watched parts of them again. Similarly, the organic viewers (as compared to the ones reached through ads) were more enduring, accounting for 74 % of the views at 95 % video length compared to 58 % after three seconds (Fig. 2a). Sorted by topic, the climate action videos were on average by far the most popular, making up 82-87 % of the watched
10   videos at the three video lengths (Fig. 2b). In comparison, the videos on the effects of climate change became relatively less popular over the length of the videos, comprising 11 % after three seconds and 8 % at their 95 % length. This contrasts the videos on the journeys themselves, which correspondingly rose from 6 % to 11 % of watched videos at the respective times.

The three most popular videos were thus, unsurprisingly, videos that promoted action on climate change through hopeful
15   messages. The by far most popular video (with more than 100,000 views and a reach of nearly 500,000) focused how young inhabitants of Southern Pacific islands feel the effects of climate change through ongoing rising sea levels and get together to fight against it. This positive message of a younger generation working for an act on climate was the common theme for these three videos, which also included a more simply produced video on the motivation for why the main runner and cyclist left their offices in climate research to engage with the general public (with almost 40,000 views and a reach of nearly
20   150,000). Out of our social media followers (more than 6,200 on Facebook, 1,200 on Twitter and 650 on Instagram), most of the Facebook ones were in the age group 25-34. This is perhaps explained by the fact that we were ourselves a team of millennials. Possibly more interestingly, the second largest group of followers was made of Generation Z, pointing to the added reach of social media compared to other science communication tools, as also pointed out by Bowman et al. (2015).

25   Generally, the later videos in the analysis period were more popular, also pointing to the increasing reach of Pole to Paris as the awareness project gained traction with kilometres covered, events held along the way, and mentions in the media. Even when the project reduced its activity after COP 21, the influence was still there, as exemplified by reaches of more than 100,000 on the less frequent Facebook posts in early 2016.

30   Correspondingly, while not posting regularly anymore, the authors were still able to reach some of Pole to Paris' followers via our still active social media channels with a survey in 2018. The survey asked a range of questions. These included whether respondents followed Pole to Paris online, whether they learned anything new as a result of Pole to Paris, whether they found Pole to Paris to be a source of inspiration. Interestingly, one of the key findings was that respondents were fairly evenly split on what they considered to be the most interesting aspects of the project. Several of the 37 respondents

highlighted more than one aspect, with 14 answers favouring the actual journeys from the Poles to Paris, 16 the same for the physical challenge of running and biking, 18 the scientific message on climate change, and 17 the human face that Pole to Paris put on climate change through stories from the ground.

5   In line with the statistical analysis of the Facebook videos, the fact that the scientific message was seen more interesting than the journeys themselves, indicates that a project like Pole to Paris can find success in disseminating scientific information to a wider audience. Among other key findings from the survey, 84 % of the respondents reported that Pole to Paris inspired them in some way. This is also a strong indicator that unconventional projects in the vein of Pole to Paris can find success in connecting with non-scientific audiences in positive ways. Moreover, more than half (54 %) indicated that they learned

10 something new through Pole to Paris, signalling the potential scientists have in bridging the gap between academia and the general public on fundamental societal issues.

Interpreting these numbers, one should keep in mind that the survey respondents already were followers of the climate awareness project Pole to Paris and thus not necessarily representative of the average population. The three year lag of this

15 feedback to the project compared to its most active period also introduce some uncertainty of remembrance and probably explain why less than 1 % of our social media followers responded to the survey. Similarly, the time passed since their publications limited the statistical analysis here to Facebook videos, as other social media data no longer were available. Even so, the numbers presented offer valuable insight on the worthiness of time spent on Pole to Paris and can help the outreach community in learning from our efforts.

20 **4 Indirect successes**

As also mentioned by Barnosky et al. (2014), the direct success of an initiative like Pole to Paris is however almost impossible to quantify. Indirectly, the Pole to Paris team members took great value from being able to deliver vital information to the public. Engaging in two-way interaction with a range of audiences – from farmers to senators, from preschool children to retirees and from Norwegians to Bangladeshis – provided invaluable insight to our own research

25 questions. Fortunate with these encounters, we faced questions and concerns often far from ours, which opened our eyes and ears and widened our perspectives. Members of the general public and academia, especially the younger ones, both expressed their enthusiasm regarding the project. Both shared how it inspired them to find the courage needed to make changes in their own lives. The Paris Agreement, of which Pole to Paris was one of many numerous initiatives building public support for, was arguably a better outcome of COP21 than the climate science community could have hoped for.

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Schimid and Petri (2017) have argued that those in the scientific community who actively attempt to communicate the seriousness of climate change to a wide audience often are met with attempts "to discredit their scientific credibility, or to

criticize the studies that are used or their underlying methods and models." As communicators of the scientific consensus, we inevitably experienced these tactics from climate sceptics in online fora. Mostly, the criticisms were from individual citizens and directed at us personally. Out on the roads to Paris, however, fact-based messaging was immensely welcomed. Considering the politicized division of the media themselves (e.g., Brüggemann and Engesser, 2017), this positive

5   experience of direct engagement supports the suggestion by Gauchat et al. (2017) that science participation and outreach could rebuild the credibility among communities most critical of scientists.

Hence, we worked hard to keep our credibility as researchers (Nordhagen et al., 2014), not partnering with organizations or initiatives on either of the climate advocacy fringes, and not favouring one political party over another. We experienced a

10   boost in personal and public credibility, more than outweighing a loss in professional credibility from our publication record hiatus while on the road, thus overall enhancing our researcher credibility. We saw our role as awareness-raisers, increasing the understanding of climate science within all societal groups. Spanning the cultural differences within these groups, we tailored the message to the audiences in line with the suggestions by Somerville and Hassol (2011). These included framing climate change as a human and not only an environmental issue, focusing on the now instead of the decades ahead, leading

15   with what we know, using a language adapted to a public discourse, being passionate, and connecting the dots between climate change and the personal experiences of the audience themselves.

While having a global focus, the ten languages spoken by the highly international group members allowed us to personally engage with a wide range of people on the road from the polar regions to Paris. Furthermore, these language skills helped

20   spread our messages to people that were unable to follow the journeys physically, as suggested by the 62 % followers on Facebook speaking English, 16 % Indonesian, 6 % Norwegian, 4 % French, 3 % Spanish and 2 % German. Similarly, the collaboration with local partner institutions offered tools of experience for successful ways of science communication within each country. This collaboration also allowed us to organize Global Voices events outside of the Northern Run and Southern Cycle (Fig. 1), during which youth came together to learn about climate change and how they could act upon it.

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The experiences from Pole to Paris were, however, not unique. Other initiatives have been launched over the lasts years to increase awareness on climate changes and train scientists in science communication. We were some of the 1.07 million people globally to take part in March for Science April 22, 2017. The series of rallies and marches defending the vital role science plays in our everyday lives was a direct result of the opposing direction on science policy taken by the current

30   administration in the White House compared with its predecessor. However, March for Science has also been criticized, as it runs the risk of creating a false picture of scientists being more driven by ideology than evidence (Editorial, 2017).

Furthermore, the authors have been involved in other more or less politically charged outreach projects. Climate Communication Cologne is an effort launched at the University of Cologne whose main objective is to facilitate science

communication to a wide non-academic audience. This takes place in various forms, such as workshops, stand-up comedy or videos, and in various arenas, from schools and universities to pubs and online communities. *Will You Hear Us* is a documentary on the tradition of caged birds in Indonesia, which has become unsustainable due to the ever-increasing demand for wild songbirds and poses a huge threat on biodiversity.

5 **5 An adapted scientist**

Based on these experiences, we identified some key components for successful science communication with non-academic audiences:

- Relevance   -
  Make sure your message is relevant to your audience and engage with them in familiar setting, with a familiar
10   format and through a familiar language.
- Listening
  Let the audience ask questions and put forward their understanding.
- Positivity
  Smile and try to focus on the possibilities rather than the doomsday.
15 - Perseverance
  Learn by doing; all experiences are valuable.
- Passion
  Knowledge of the topic is the door to communicating science, passion for it the key.

20 In our current society, we argue that the role of the 'pure scientist' (as defined by Rapley and De Meyer, 2014) is outdated and the need of the 'science communicator' is rising. The advancement of science is completely pointless if it is ignored by government as well as the general public and not suitably utilised by an educated society. Publishing an academic paper is unfinished business. As Barnosky et al. (2014) argue, it is only the beginning if our aim is to help society solve problems. However, current training of becoming scientists is not fulfilling the current need of society for clear science communication

25 and policy engagement. Thus, we argue that more emphasis should be put on communication and media, policymaker and pseudoscepticism interaction training and less on the published record.

For scientists at the beginning of their academic career, we support the notion by Brownell et al. (2013) and Rauser et al. (2017) that engaging in outreach activities helps shaping the research questions, giving more effective tools for narrowing

30 the widening gap between academia and the general public, and eventually providing a more constructive input for policy formulation on climate change. Within academia, this training gives us better tools in teaching, mentoring of younger

students and taking part in scientific discussions, as well as contributing to better written research proposals and journal publications (Stiller-Reeve et al., 2016, and references therein).

5 Whether we like it or not, climate science and scientists have become part of the daily political and media discourse. Now it is up to us to adapt and play our new role objectively while keeping our credibility. When done carefully, we have the potential, regardless of audience's political predilection, to provide trustworthy information to the climate change discourse (Hamilton, 2016). To prepare us for such a "wicked" problem (as defined by Lorenzoni et al., 2007), we argue that communication training with actors beyond academia is indispensable.

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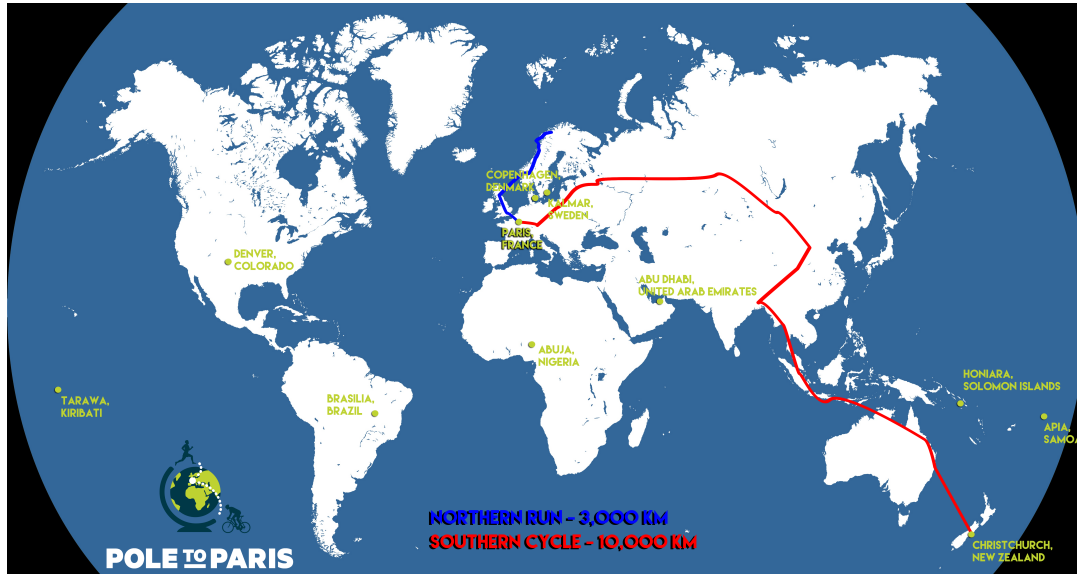
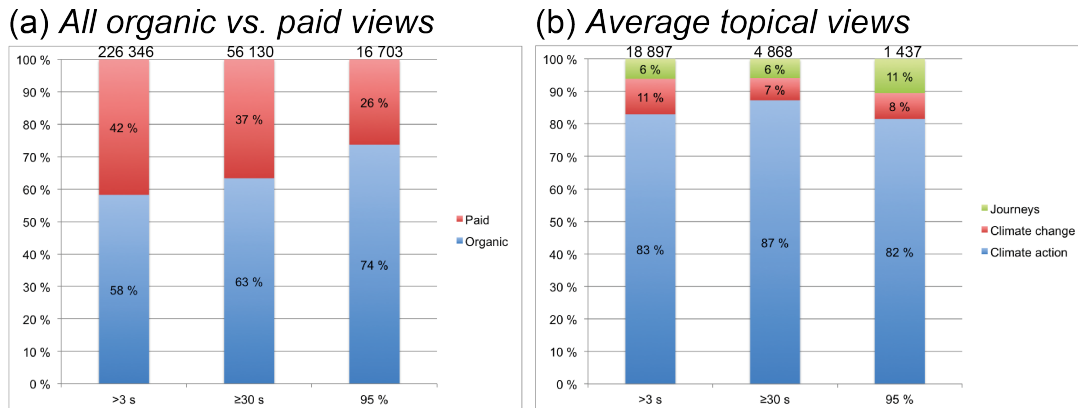


Figure 1: Map of the two Pole to Paris journeys: the Northern Run (blue trajectory) and the Southern Cycle (red trajectory); as well as the Global Voices events organized in collaboration with partners (green dots).

5 **Figure 2: Percentages of total Facebook video views after three seconds (>3 s), at 30 seconds (or to the end, whichever came first; ≧30 s), and at 95 % of the video length (including people that skipped to this point; 95 %) for (a) organic (i.e., not paid; blue columns) and paid (red columns) views and (b) videos on climate action (blue columns), climate change (red columns) and the journeys themselves (green columns). Numbers above the columns in (a) and (b) represent total and average views, respectively.**