

## Open letter to the American Geophysical Union and to the European Geosciences Union

Anthropogenic greenhouse gas emissions causing global climate change have raised the average global temperature by about 1°C above pre-industrial levels. Considering our current emissions pathway, the temperature increase could reach 1.5°C by 2030 (Henley and King, 2017). In order to contain warming under 1.5°C by 2100, net emissions must be roughly halved by 2030 and reach near-zero by 2050 (IPCC SR15, 2018). These numbers are unsettling considering the already dire impacts of a 1.5°C warming on both natural and human systems (see Chapter 3 of IPCC SR15, 2018).

We, geophysicists signatories of this letter, are acutely aware of the current climate emergency. We think that changing how we conduct our research in the face of this crisis is necessary. We do not think that the content of our research justifies any form of exemption from the global obligation to cut down greenhouse gas emissions. Rather, we are convinced that a successful transition to a low-carbon world requires the best informed and equipped to act now. A shift in our research practices would convey the urgency (Kalmus 2019). It would ensure that our actions are coherent with the messages we deliver to society, preserving the credibility of these messages in the long term. It would also strengthen our calls for action and could boost the traction capacity of the scientific community as a whole.

A number of scientists and institutes have already started to take such actions and to share their commitment to a transition toward a low-carbon research culture (e.g., Le Quéré et al. 2015; Cobb et al. 2018; Jean and Wymant 2019; Janisch and Hilty 2017; Cambridge University 2019). Given that flights dominate the carbon footprint of academics, one inescapable action is flying less, particularly to international conferences. The benefits of flying to these conferences have to be weighed against the environmental cost (Hamant et al. 2019). Return flights for a single day to give one talk are not uncommon. They are sometimes only motivated by requirements of research grants or by their added value to academic CVs—even though a recent study found no relationship between air travel and academic success (Wynes et al. 2019). We argue that a systemic shift in how we communicate and evaluate research is urgently needed.

To date, the American Geophysical Union (AGU) and the European Geosciences Union (EGU), which hold yearly international conferences attended by over ten thousand geophysicists, have displayed limited ambition to reduce the carbon footprint of these conferences. We welcome ongoing discussions about the environmental cost of the EGU General Assembly and support the first steps taken to alleviate this cost (e.g., <https://www.egu.eu/news/399/egu-takes-measures-to-reduce-environmental-impact-of-its-general-assembly/> and <https://meetingorganizer.copernicus.org/EGU2019/session/33403>). We also understand that a profound reorganization of AGU and EGU conferences is challenging. Nevertheless, we believe that current efforts to monitor and reduce the carbon footprint of these conferences are still largely insufficient. We argue that Geophysical and Geosciences Unions should define a realistic yet ambitious pathway of declining carbon emissions and take appropriate measures to track this trajectory. Such major efforts are needed not only to

engage the transition to a low-carbon world, but also to ensure that geophysicists continue to feel represented by Geophysical and Geosciences Unions.

Solutions exist to reduce the number of travels and associated greenhouse gas emissions. A recent letter outlined seven ways to make travel in academia more sustainable (Hamant et al. 2019). Two of these practical solutions can be encouraged by conference organizers: video-conference systems and low-carbon transportation.

One could legitimately wonder why AGU and EGU do not yet offer video-conference options during their annual meetings. The option to present and to follow talks remotely should be offered to participants as soon as possible. Video-conferencing has many potential co-benefits for AGU and EGU, such as raising attendance from developing countries and obviating capacity issues of conference centers and accommodation. It would enable researchers from all parts of the world to access the latest research as well as present their own, enriching the geoscience community and its research output.

Naturally, we value face-to-face scientific conversations, especially for early-career scientists, and this can hardly be replaced by a video-conference access. To mitigate the emissions of attendees who can and wish to enjoy the full experience of AGU and EGU meetings, it is necessary to change their means of transportation when possible. Currently, a few isolated scientists take the initiative to replace flying by taking the train. However, there is no general incentive to do so. To take the example of Europe, we ask that EGU not only encourages its European members to come by train, but also facilitates train reservations by communicating more actively on existing booking platforms and railway options. We also ask that EGU examines the feasibility of booking dedicated trains or buses departing from the main European cities. There are already examples of organized train trips to AGU meetings with scientific and social events onboard. Although train travel is often longer, it can be made an opportunity to work better and more comfortably.

AGU and EGU have the opportunity and responsibility to be leaders in the transition to a low-carbon research culture. We demand that AGU and EGU monitor and reduce the carbon footprint of their annual conferences and go beyond promoting carbon offsetting to truly reduce emissions. We urge them to take measures to facilitate low-carbon transportation and to offer video-conference options, and urge ourselves, members of these organizations, to embrace these solutions. These measures will allow geophysicists to act in accord with their warnings to society while preserving scientific benefits of conferences. We are convinced that such a shift in practices will reinforce AGU and EGU in their mission to disseminate scientific knowledge, and better their impact on society.

## References

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