

## CARBONFREECONF: MITIGATE THE CARBON EMISSIONS OF ACADEMICS USING CARBON-NEUTRAL VIRTUAL PLATFORMS

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**Abstract.** The carbon footprint of academics is not negligible and higher than average. This is in part due to academic conferences, implying many long-distance travels to present new research results. One way to thwart these carbon emissions would be to go virtual for most conferences, when possible. To do so, researchers need an easy way to set up their virtual conferences and manage their participants. Moreover, the platform they use should have all the necessary tools to share their research more readily. CarbonFreeConf was developed by a researcher for researchers with these goals in mind as we explain in further detail in these proceedings. In addition, virtual conferences organized with CarbonFreeConf are totally carbon-free as (the low) emissions produced during the conference (from streaming and computer energy usage) are compensated with already approved carbon removal technologies.

Keywords: carbon footprint, virtual conferences, environmental transition

### 1 Introduction

To reach our goals in terms of carbon emissions and maintain the state of the Earth (almost) as we know it (even though it is already a bit late as the mean temperature on Earth already increased by 1.1 degree compared to the pre-industrial era), the only way out is to cut down on CO<sub>2</sub> emissions very quickly. Every citizen should try to do it on its own scale and businesses should find ways to mitigate their emissions before finally (hopefully) reaching world-wide (strict) regulations in the coming years, which would lead to the end of the biggest issue we (and most other living species) face today! Researchers - especially those preaching to cut down on emissions - should be exemplary but numbers show that their carbon emissions are often greater than the rest of the population, mostly because they travel to distant places to present their research several times a year. Virtual conferences would help to reduce the carbon footprint of academics by a large factor (which depends on the research they carry out and their respective countries). CarbonFreeConf was developed to help researchers organize carbon-neutral virtual conferences (and cut-down on greenhouse gas emissions) in a few clicks providing all the tools necessary to get the most out of it. The study by Burtscher et al. (2020, see also a more succinct analyse on the CarbonFreeConf Blog) shows that the carbon footprint of virtual conferences is at least 1000 times smaller than that of in-person conferences. A cut of emissions by 3 orders of magnitude provides a strong motivation for multiplying ecologically minded conferencing.

### 2 The CarbonFreeConf platform

#### 2.1 History

The idea of developing the CarbonFreeConf platform for the research community popped up in 2017, well before the start of the Covid-19 pandemics (although it is also useful in these complicated times we currently live in). One of the thoughts I had as a young researcher was that many conferences could be organized virtually (to cut down on carbon emissions, Burtscher et al. 2020) rather than having to move a whole community across continents every time we want to share our research (though some face-to-face meetings are still essential). However, to do so, we would need simple and efficient tools to be able to organize, plan, distribute and make

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happen our virtual conferences in a few clicks. Another thought was that large virtual conferences still emit quite a lot of carbon in the atmosphere so we needed a way to offset these emissions. Both points are the essence of why CarbonFreeConf was developed.

## 2.2 *The concept of CarbonFreeConf*

CarbonFreeConf is a website where one can create a virtual conference in a few clicks (Fig. 1 left). It just needs a few inputs from the organizers, such as a title, and what the conference is about and it will then rely on those to make a (customizable) website for participants to register and see all what the conference has to offer (Fig. 1 right). The website lists the different sessions of the conference as well as their participants. Abstracts and Posters can be accessed easily as well as the conference program/timeline and some other useful tools (e.g., archived documents and video recordings). In addition, an admin panel is accessible to organizers to manage the participants (accept their talks, contact them, ...). Once a talk or poster is accepted, it can be added to the conference program automatically and it becomes visible on the conference website. Many tools are provided to make the conference/participants handling much simpler than one would expect. Based on the program, the platform then automatically creates virtual rooms for when the conference happens as well as some chat rooms for participants to discuss before and after the talks if, e.g., they did not have the opportunity to ask their questions, or want to network with their peers. At the end of the virtual experience, the carbon emissions produced by the conference are calculated (see our carbon calculator here) and offsetted via companies using direct air capture methods (see more here).

## 2.3 *Aims and perspectives*

This platform was used for the first time on a large scale for the SF2A (Société Française d'Astronomie & d'Astrophysique) virtual conference in June 2021, which gathered more than 800 astronomers and it is now archived on the associated conference website accessible here (some talk recordings are public and posters are all accessible). The main goals of the platform are:

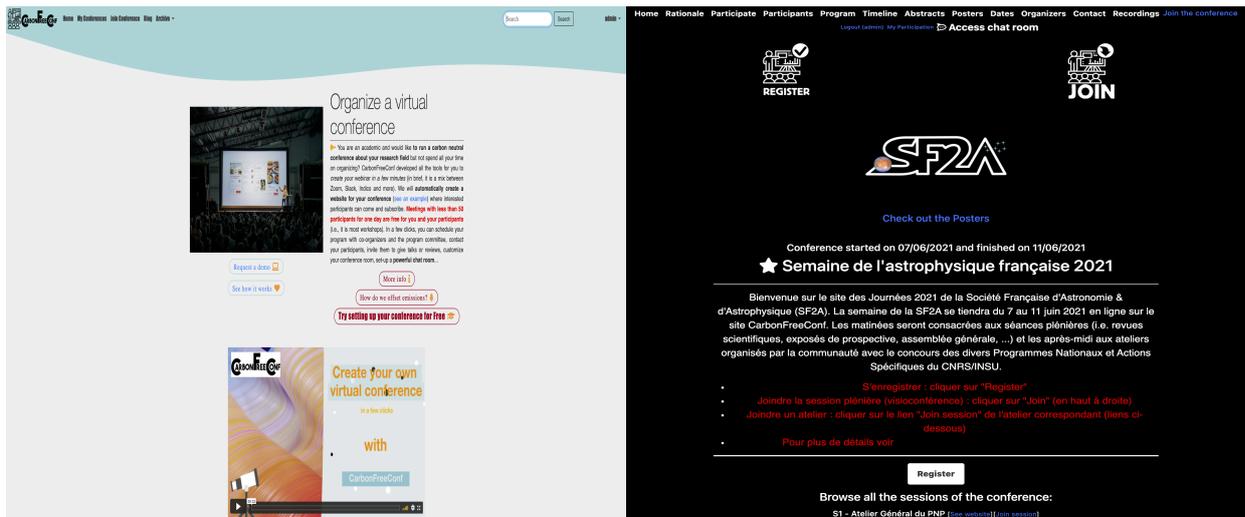
- Reduce our carbon footprint as researchers while still being able to efficiently share our research;
- Make it as simple as possible to organize a conference for up to 1000 participants (thanks to the automatic creation of a website, and tools for handling the program, the abstracts, networking, uploading posters (pdf and/or video), uploading slides, recording talks, ...). CarbonFreeConf also provides the virtual rooms for the conference itself as well as many chat rooms, tools for interactive questions & polls, ... so that researchers have it all in one place and do not have to spend time looking for that themselves and trying to connect the different bricks together (which is often impossible as, e.g., Slack-type tools do not interact with abstract handling tools, or with website creation editors, ...).

After every conference, we gather feedback from the participants to improve the platform, which has already evolved substantially since June 2021. For instance, we are now proposing an hybrid version, where participants can either meet face-to-face or join the conference virtually (e.g., if they live too far or not want to disrupt their family life). We also added a parallel coffee-break room for each session (if activated by organizers) that can be joined at any moment as well as a timeline showing all the talks from the different sessions at a given time to not miss out on anything that could be of interest to you. We also added an interactive map of the conference showing the conference with all of its sessions and posters, which makes it easy to join the different rooms or see what sessions/posters are available and explore further what the meeting has to offer in a few clicks.

The hope is that this platform can help researchers meet their carbon emission abatement goals while still be able to efficiently share their research. To do so, CarbonFreeConf relies on the research community to go forward and let us know about their needs. If you would like to send feedback please contact us at [admin@carbonfreeconf.com](mailto:admin@carbonfreeconf.com). One of the major outcomes of this platform is that talk recordings are archived for a long time and researchers can watch them when needed. It could become a very useful research library in the future that would be complementary to the classic literature. We plan to release an open-source version of the website in the future to make it easier to contribute and favoring an open research approach.

## 3 **Conclusions**

These proceedings presented a new way of carrying out conferences remotely (or in a hybrid fashion) using the CarbonFreeConf platform. This new platform aims to be simple to use and to provide all the tools needed to



**Fig. 1. Left:** The CarbonFreeConf website to organize a virtual or hybrid conference in a few clicks. **Right:** Example of a customizable website created for a virtual conference in astrophysics (see it live here).

make the most out of each conference. The main goal is to cut down on carbon emissions when organizing conferences while still being able to share our research efficiently around the world. Research is primordial and we need more initiative to cut down on emissions on every aspect of our respective research fields!

Thanks to the SF2A organizers for using the CarbonFreeConf platform and all those who helped improve it so that we can now widely use it to share our research across the world!

## References

Burtscher, L., Barret, D., Borkar, A. P., et al. 2020, Nature Astronomy, 4, 823