Face-to-face astronomy conference contributes 3,000 times more carbon dioxide than online conference

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Leiden astronomers have published two articles on more sustainable astronomy in a special section of the journal *Nature Astronomy*. Among

other things, they calculate that their online conference EAS 2020 contributed 3,000 times less carbon dioxide than the face-to-face edition a year earlier. They also show that the programming language Python, which is often used by astronomers, demands excessive electricity.

The idea for a special section on sustainability and climate arose during the virtual conference of the European Astronomical Society. This conference was supposed to take place in Leiden last June but was held online due to the corona crisis.

Conferences

The article on more sustainable conferences compares the carbon footprint of the 2019 European Astronomy Conference, held offline in Lyon, with that of the 2020 online conference in Leiden. It shows that an online conference emits three thousand times less carbon dioxide than a face-to-face meeting.

Leo Burtscher (Leiden Observatory), one of the organizers of the online conference in 2020 and first author of the article: "Of course we expected that online would emit less CO_2. But the fact that the difference was so huge came as a surprise."

Burtscher and his co-authors suggest that a combination of online lectures with regional offline meetings could be a good alternative. These face-to-face meetings provide the interaction astronomers want and could, for example, take place simultaneously at various locations throughout Europe.

Computers

The article on more economical use of computers was written by

Professor of Computational astrophysics Simon Portegies Zwart. He sums up five points of improvement: "Do your daily work, such as emailing and writing texts, on a simple laptop. If you use a supercomputer, don't go to its full capacity. If you perform calculations on a fast workstation, don't overclock that computer. For your calculations and simulations, use special computers with hardware based on graphics cards. And, very important: do not use Python if you want to do large calculations."

Many astronomers won't like the plea for less Python, thinks Portegies Zwart. That programming language is user-friendly and there are many collections of free code pieces that astronomers copy into their programs. Portegies Zwart calls for programming lectures for students to focus less on Python and more on programming languages that are much more efficient with the computer's processor.

More information: Simon Portegies Zwart. The ecological impact of high-performance computing in astrophysics, *Nature Astronomy* (2020). DOI: 10.1038/s41550-020-1208-y

Leonard Burtscher et al. The carbon footprint of large astronomy meetings, *Nature Astronomy* (2020). DOI: 10.1038/s41550-020-1207-z

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