

ASTRONOMERS FOR PLANET EARTH: FORGING A SUSTAINABLE FUTURE

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Abstract. The last few years have witnessed strong consequences of the on-going climate crisis in every part of the globe that are difficult to ignore. Taking advantage of their unique view over life in the universe and their privileged attention from the public, a group of professional astronomers, astronomy students and educators, gathered in late 2019 to form the international collective *Astronomers for Planet Earth* (A4E). A4E shares resources to inform, advocate and act on the necessary environmental transition to be undertaken, both with the astronomical community and the general public. As of today, A4E gathers more than 1331 members from more than 73 countries. In this communication we provide a description of A4E, list the main activities completed up to now and give an outlook to future developments.

Keywords: SF2A-2021, S14, environmental transition, climate crisis, astronomical community

1 Statement of the A4E collective

As astronomers, we do have tools and methods that we can use to defend climate science and debunk the misconceptions used by climate deniers and delayers to blur the sense of emergency. In addition, by exploring notions of habitability and by studying the atmospheres of other planets, we have a specific view on the uniqueness and fragility of ecosystems on planet Earth, even though we are not climate scientists. Many fundamental questions about the formation of stars within galaxies and planets remain unanswered, demonstrating the complexity of the emergence of life as we know it on Earth. Astronomy also brings to society images of the cosmos that can trigger a sense of wonder and empathy. Images of planet Earth itself highlight the thin atmosphere that protects, harbors and sustains life in all its wondrous forms, not all of which are yet revealed to our eyes. Astronomy is a source of inspiration for most humans. Astronomers therefore have privileged access to the general public and can use this advantage to make their voices heard in favour of the protection of planet Earth. Therefore, we believe that, as scientists working for the citizens of Earth, we have a role to play and a responsibility to communicate about the on-going climate and environmental crises.

Astronomer for Planet Earth (A4E) is a volunteer network of current and former professional astronomers (including staff scientists and members of faculties, postdocs and PhD candidates), students in astronomy, educators, amateur astronomers, journalists and writers, working in institutes, observatories, universities, museums or planetariums, who are committed to advocate the science behind the climate crisis and associated climate justice and to take actions to fight against all arguments delaying climate action (e.g. denial, diversion, doomism, green dictatorship, individualism, competition, greenwashing, compromise etc.).

A4E is working in two directions, inside and outside the astronomical community. To provide the public with information: (i) sharing the astronomical perspective of Earth, (ii) explaining the science behind the climate change, and (iii) sharing information about solutions to the climate crises. To provide astronomers with tools: (i) establishing a community to share ideas and amplifying our voices, (ii) working together to identify opportunities for meaningful actions, and (iii) gathering resources to educate ourselves and others.

In addition, astronomers also have responsibilities with their high carbon footprint, mainly due to the nature of the field including running observatories in remote areas, running large simulations on supercomputers and frequent overseas travel to reach observatories or attend conferences all over the world. A4E therefore is pushing astronomical institutions, societies and observatories to adopt sustainable practices. The A4E collective wrote a white paper summarizing their statement, that can be found here.



Fig. 1. A4E logo

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2 Means of communication

Communication within A4E members: When signing-up to become a member of Astronomers for Planet Earth, one can opt in to appear on our public partner page and choose to receive the newsletters (groups.io platform). Members can also join the dedicated Slack space, which gathers specific channels for projects (e.g. white paper, special session to conferences, proceeding writing), working groups (e.g. website, roadmap, regional discussions), general information about A4E (e.g. webinar series, resources, related conferences announcements) or topical discussions (e.g. emotional support, reduction of waste, food habits, reducing flights). Documents used for communication are shared and accessible to all members upon demand on a dedicated Google Drive and a dedicated member section of our future website. Finally, regular online meetings for members are organised to discuss the current and future A4E projects and each topical working group organises online meetings when needed. Note that we collaborate over almost all time zones and most of us have never met in person.

Communication within the astronomical research community: Inside the astronomical community, members can touch upon the topic and potentially present A4E during conferences; suggestions of introductory slides and posters are available in the Google Drive. In addition, A4E organised special sessions on sustainability during the meetings held by the various astronomical societies, such as the American Astronomical Society (AAS), the European Astronomical Society (EAS) or Astronomical Society of the Pacific (ASP). A4E provides support if members want to organize a dedicated workshop about sustainability at a national astronomical society meeting (e.g. French Astronomical Society, SF2A or Spanish Astronomical Society, SEA). At last, the A4E website provides numerous links towards other collectives, initiatives and organisations, at different levels in academia: institutes, institutions and observatories or national initiative such as Labolpoint5 in France.

Communication with the general public: The main way of communicating is through regular social media such as Facebook and Twitter (more than 1100 followers) for short facts, and Vimeo and YouTube for videos. The collective is cooperating with other outreach organizations such as Astronomy on Tap and the Astrobites community, which gives space for members to discuss astronomy in the context of the environmental crises (see here). Various resources are shared on the A4E website and Google drive with ideas and suggestions to present, demonstrate and start discussions about the climate crisis, seen through the astronomical perspective.

3 Examples of actions led by A4E

Open Letter: A working group of A4E members recently wrote an Open Letter for astronomers to sign, calling on astronomy departments, institutions and societies to recognize the urgency of the climate crisis and to lead by example by improving institutional policies and practices to reduce the carbon footprint of researchers in astronomy. As of September 2021*, we gathered 2844 valid signatures from astronomers working in 80 countries across the globe, including current and former presidents of astronomical societies, two Nobel prize winners and has been endorsed by a number of well-known astronomical institutions.

Global climate strike 2021, making our stand: On 25th of September 2020, the organization Fridays for Future led a global climate strike. Astronomers for Planet Earth joined activists from all over the world and produced a video to encourage any individual to join the climate strike and take actions.

Webinar series: Regular 30min long webinars are organized with invited experts on various subjects relating astronomy and the environmental crises. The webinars are recorded via Zoom and made exclusively accessible to A4E members, then followed (about two weeks later) by a live Questions and Answers session with the speaker. The videos are then made publicly available on the dedicated YouTube channel.

EAS special session 2020 and 2021: During the annual European Astronomical Society (EAS) virtual meeting in 2020, A4E organized the very first Special and Lunch Sessions "Astronomy for Future: Development, global citizenship & climate action". These were among the best attended and most discussed of the conference. During EAS 2021, A4E organized a second Special and Lunch Sessions: "Astronomers for Planet Earth: Forging a Sustainable Future". The slides and recordings are available on a dedicated Zenodo repository and Youtube channel. One of the first actions of A4E was to write a letter to the EAS council urging them to take action and to install a sustainability working group. This call has been met with a lot of sympathy by the EAS council and the EAS sustainability working group has subsequently been created. Its aims are to advise EAS council on how to reduce the carbon emissions of the society (mostly generated at the EAS annual meeting) and to connect sustainability initiatives within Europe.

*On 2nd of July 2021, the European Astronomical Society hosted a press conference for this Open Letter to present its impact.

4 Conclusions and prospects for A4E

Many projects are on-going within A4E, such as updating the website, starting a blog, making new videos etc. In addition, we are preparing packages to support individual researchers and institutions to take immediate actions. These packages are meant to lower the time needed to implement these actions, while being homogeneous among institutions, and to keep track of the implemented initiatives and their results. More generally, we are working towards establishing A4E as an official organisation and are looking for funding resources. People who want to help with this process or know anyone who would like to contribute funds, please contact us.

As astronomers, we are immeasurably lucky to work in such a fascinating field. With our unique perspective on the universe, it is our responsibility to communicate, inside and outside our community, about the disastrous consequences of the anthropogenic climate crisis on our planet and our society. A4E aims at leading astronomy institutions towards sustainable working habits to cope with the environmental transition. It is also important to hear astronomers say the simple truth: there is no planet B.

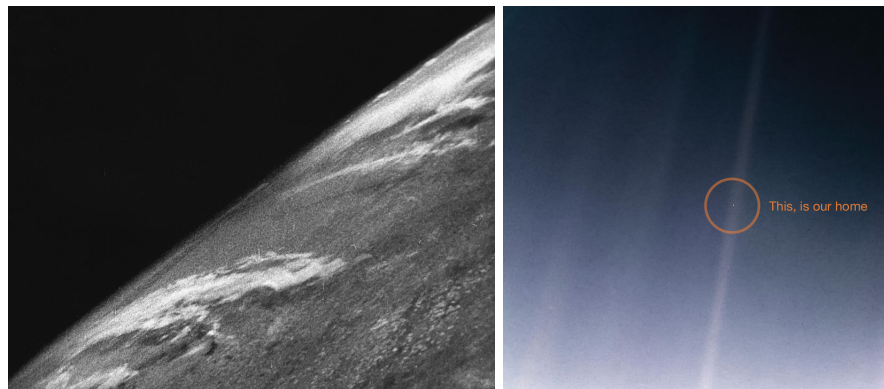


Fig. 2. Left: First photo of planet Earth from space (105 km altitude) taken in 1946. Credits: U.S. Army, White Sands Missile Range, Applied Physics Laboratory. Right: The emblematic *pale blue dot* picture highlights the sense of fragility of our planet, its place in the universe and the notion of distances in the solar system. Credits: NASA/JPL-Caltech.

A "Climate Issue" in Nature Astronomy 2020

After the successful special session "Astronomy for Future" organized during the virtual EAS annual meeting 2020, the journal Nature Astronomy proposed to summarize the contributions into several comments edited in a special September 2020 issue called The Climate Issue. The papers are kindly made freely available by Nature Astronomy and can be found at the following links:

- Bartscher et al., 'The carbon footprint of large astronomy meetings': rdcu.be/b610r
- Cantalloube et al., 'The impact of climate crises on astronomical observations': rdcu.be/b610h
- Flagey et al., 'Measuring carbon emissions at the Canada-France-Hawaii Telescope': rdcu.be/b610f
- Jahnke et al., 'An astronomical institute's perspective on meeting the challenges of the climate crisis': rdcu.be/b610n
- Portegies Zwart, 'The ecological impact of high-performance computing in astrophysics': rdcu.be/b610i
- Stevens et al., 'The imperative to reduce carbon emissions in astronomy': rdcu.be/b610k

B "Climate Issue" in Nature Astronomy 2021

After this first successful climate issue, a second edition was released on September 14th 2021.

- Bartscher et al., 'Forging a sustainable future for astronomy': <https://rdcu.be/cxPAG>
- Anderson & Maffey, 'Five steps for astronomers to communicate climate change effectively': <https://rdcu.be/cxPAR>
- Williams, 'The need for political advocacy in astronomy': <https://rdcu.be/cxPA0>