

Astronomers for Planet Earth: Embracing Virtual Communication Induced by the COVID-19 Pandemic to Help Tackle the Climate Crisis

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*On behalf of Astronomers for Planet Earth
Network collaboration*

Keywords

Climate, Online, Action, Environment, Astronomy, Sustainability

Astronomers for Planet Earth (A4E) is a global collective, whose main goal is to communicate the fragility of our planet from an astronomical perspective. A4E works hard to equally engage with astronomers and educators worldwide, by encouraging the communities to reduce emissions and providing a space to collaborate and share resources. These actions have led to increased sustainability and the incorporation of climate change lessons and activities into teaching and outreach. With the global shift to online communication due to Covid-19, Astronomers for Planet Earth has utilised digital tools in the form of online conferences and seminars, high-impact journal articles, webinars, social media, and video production to engage its audience and grow a membership of around 1300 astronomers in 70 countries around the world. Our article addresses the importance of communicating the climate crisis from an astronomical perspective and explores the successes and challenges of our group's virtual communication with the astronomy community and the general public thus far.

Introduction

The Covid-19 pandemic has completely reshaped social interactions and communication between colleagues, family members and friends. Like most fields, astronomy has been affected by the pandemic and, like others, was quick to adapt to the sudden changes. With teaching being shifted from classrooms to online platforms and observing being done from remote desktops instead of in-person in remote areas, the oldest

science has received a major update. Interfaces such as Skype, Zoom, Microsoft Teams and Gather (or Gather Town) are now used to host a variety of meetings, including workshops, conferences, small collaborative gatherings and even summer schools, allowing astronomers to connect across time zones for events that would otherwise have required them to (often) fly many miles with serious resulting CO₂ footprints (Burtscher, 2020). Many of these changes were thought to be impossible before the pandemic forced society to

restructure its behaviour. People across the globe have risen to the challenge of remote working/learning, balancing this with childcare (which has exacerbated gender inequality within the field (Inno, 2020)) and all the other additional commitments intensified and created by the pandemic. Despite what institutions and companies have previously claimed, the virtual model is working successfully for many (Massey, 2021). Within astronomy, conferences have seen dramatic increases in attendance

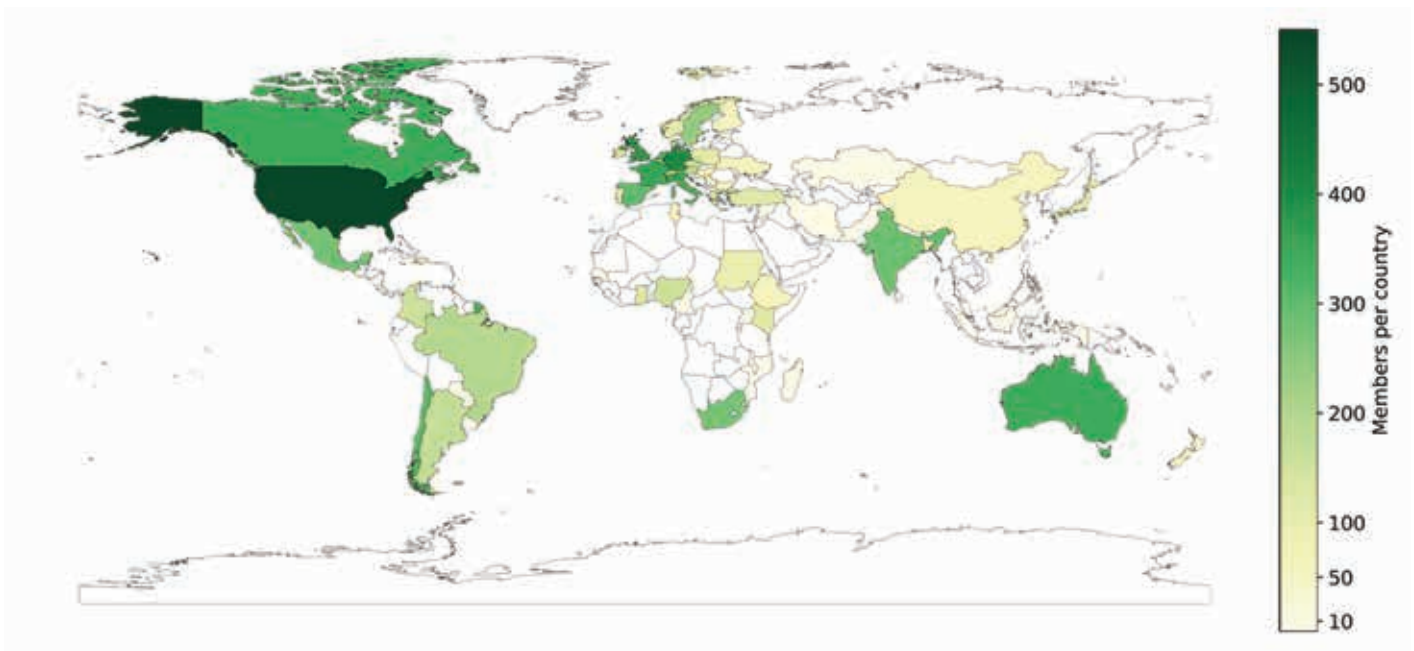


Figure 1. A colour map displaying the level of Astronomers for Planet Earth membership in mid-2021. Credit: C. Hill

and the need to provide content online has made it more accessible for everyone, especially those from the Global South. Now that vaccinations are in production and being distributed the question remains - will astronomy continue to reap the benefits of online communication post-pandemic?

The mobilisation of organisations and everyday people in response to the pandemic has shown that, when required, we can band together, adapt to the crisis and carry on. However, this is not the only crisis humanity currently faces and this is not the only time we will need to adapt. The climate emergency is here (Ripple, 2020). Unprecedented global warming is occurring, as tracked within the oceans and the Earth's atmosphere, which in turn is causing extreme weather events such as floods, heatwaves, droughts and hurricanes to become more common. Like the Covid-19 crisis, the influence of humans has been established as the root of the climate emergency we now face. Since the 19th century, the world has warmed by about 1°C and should the warming exceed 1.5°C the planet will be irrevocably altered, with horrific consequences for the planet's ecosystems (World Meteorological Organization, 2018). There still exists a window within which we can prevent exceeding the 1.5°C mark,

but this opportunity will disappear in the next few years unless we act swiftly and sufficiently (United Nations Environment Programme, 2020).

Through the regular discovery and examination of the habitability of (exo) planets, astronomers have a unique perspective on the subject of the fate of our Earth. Despite media hype about the future colonisation of other planets in our Solar System such as Mars, the reality is that within the time frame of the climate crisis, the Earth is the only home the vast majority of us will ever have. According to a new index computed by Ipsos Mori (Ipsos Global Trustworthiness Index 2019, 2019), being a scientist is considered one of the most trustworthy professions. Furthermore, astronomers tend to communicate with the public more than other scientists (Entradas and Bauer, 2018). This provides the astronomy community with a unique opportunity to convey the urgency of the climate crisis, while we still have the time to act. Recent research has also shown that astronomy as a field contributes disproportionately to the acceleration of climate change (through observing, supercomputing and travel (Stevens et al., 2020) (Jahnke et al., 2020)) which will ultimately make astronomy more difficult (Cantalloube et al., 2020). Therefore the need to mobilise and promote positive

change within and beyond our field to tackle the climate emergency is even more evident.

Astronomers for Planet Earth

Astronomers for Planet Earth (A4E) is a global organisation, created to utilise the unique perspective and reach of astronomy to assist in highlighting the need for societal change to help halt climate change (White et al., 2021). Originally formed in December 2019, A4E is a network of volunteers composed of people who have worked in, currently work in or are associated with the field, including students, amateurs, enthusiasts and academic staff. The organisation provides a community for astronomers interested in addressing the climate crisis to share resources and to engage in discussions. A4E also aims to inform the general public about the climate crisis, and to support the climate movement with an astronomical perspective. The community is truly international with around 1100 members¹ across 67 countries, as shown in Figure 1.

As A4E was started in 2019, the Covid-19 pandemic began to cause disruptions on a worldwide scale soon after its formation. Regardless, A4E's activity has always been based online, making it

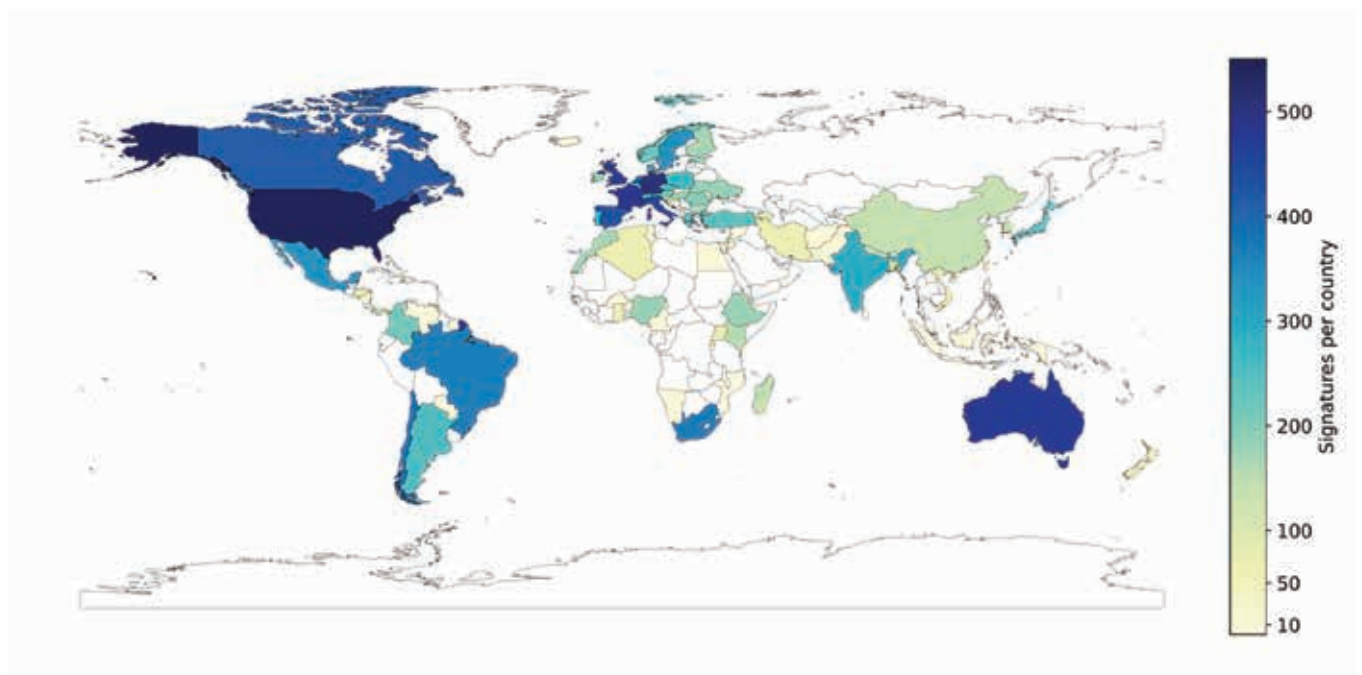


Figure 2. A colour map displaying the density of signatures to the Astronomers for Planet Earth open letter worldwide. The letter invites educators and researchers who work/have worked in astronomy to call for immediate action from astronomy-related institutes to tackle the climate crisis. Credit: C. Hill

essentially a virtual community. Building the community when you are limited to online communication requires an outlook with multiple approaches. Social media is a powerful tool when it comes to connecting people around the world, and media posts, in particular, can be used to grab attention and alert people to an organisation. A4E has an active presence on Facebook, Twitter, Instagram, Vimeo and Youtube. Twitter and Facebook have provided the most reach, with tweets and Facebook posts by A4E being seen by 1000s-10,000s of people. A4E gained a lot of exposure with a call for action on the global day of climate action on 25 September 2020. Across all social media platforms, the original post reached about 73,000 people, alerting many to the existence of a group where they could join forces to help prevent the climate crisis. Using social media and online communication, A4E has reached people all over the world, including the Global South, in contrast to astronomical conferences which are predominantly attended by scientists from the Global North (Nshemereirwe, 2018). When communication is done predominantly online, these issues can begin to be alleviated. Although A4E has members from across the globe, fewer members are from the Global South (15% at the

time of writing) and this may also be a reflection of the distribution of astronomers worldwide. This bias towards the global north can be seen in data collected by the International Astronomical Union on their own membership, who find that all the countries that have 400+ members are from the global north. While visits to the Astro4Earth site are dominated by people from the U.S. (37% at the time of writing), overall engagement with the main website of A4E is encouragingly global. Continuing to engage our colleagues and spreading the word about the organisation within the Global South is an ongoing goal.

Another aspect faced by most organisations is the need for economic sustainability. In-person conferences require a great deal of financial support, but the online nature

of A4E has managed to keep costs down thus far. The organisation hosts regular webinars and discussions with invited experts on climate and astronomy and their intersections on platforms that offer free and low-cost options (e.g. Zoom, Youtube and Vimeo). Resources are shared through Google Drive and Slack, the latter of which is also the hub for the organisation's working groups. Therefore, despite lacking official charity status or even an official bank account, A4E has been able to grow and share its message thanks to its virtual nature. However, it is worth noting that because no money is involved, all of the work done for A4E is voluntary. This presents limitations on the organisation's achievements, as no one has dedicated work hours. Now that the group has grown to about 1100 members, the pool of people available to assist is increasing, but communication becomes challenging. In the free format, interfaces such as Zoom and Slack place a limit on the number of participants and messages that can be stored in a free account, curbing the number of people who can be engaged in any one meeting and compromising the record of previous discussions within the group. To deal with this, A4E archives the Slack messages up to the 10,000 limit, so

Box 1: The Goals of A4E

1. Provide the public with information to fight climate change
2. To provide astronomers with the tools to fight climate change

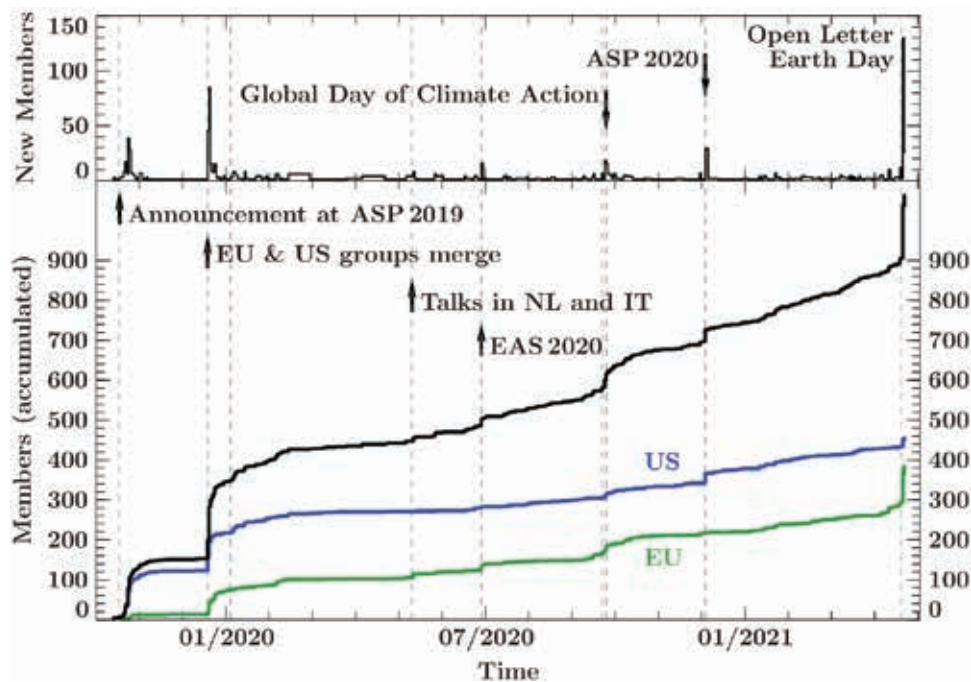


Figure 3. A graph displaying the variation in Astronomers for Planet Earth membership over time. Despite the challenges posed by the Covid-19 pandemic, membership has continued to increase thanks to Astronomers for Planet Earth's exclusively online format. ASP stands for Astronomical Society of the Pacific. Credit: T. Beuchert

there is always a record of the groups past activities and discussions.

Despite the challenges faced as a volunteer-only, virtual organisation, A4E has made significant achievements throughout the pandemic. A4E encompasses a large number of working groups. There are dedicated education groups that discuss working points such as how the climate message can be incorporated into (1) outreach talks by members and other astronomers and (2) general astronomy classes and astronomy-related teaching resources. Other working groups focus on driving change within the field. For example, recent efforts have resulted in an open letter² addressed to major astronomical institutions, asking them to commit to naming sustainability as a primary goal. At the time of writing, this letter has now been signed by over 2800 people associated with astronomy, from academics to amateurs, technicians and students from 83 different countries (illustrated in Figure 2) showing that many outside of the organisation also support the need to address the climate crisis. This effort has truly utilised the pool of expertise within the A4E community as, since the letter has been released, action is now being taken to lobby astronomical institutions

to improve their sustainability practices and a press release is now in preparation, without the support of an institution such as a university. Those skilled with social media management also continue to make sure A4E has a prominent voice, through website development and content creation. The A4E Youtube channel³ has thousands of views, with regular webinars and Q and A sessions with experts on astronomy, sustainability and environmental science.

At the academic level, the group has made several contributions to journals and at conferences. At the 2020 European Astronomical Society Annual Meeting, A4E organised a session dedicated to astronomy and the climate crisis. They are also organising a full-day special session in 2021, where talks and presentations will be given from prominent climate researchers and communicators as well as astronomers⁴. Additionally, a lunch session at the conference aims to reach the wider astronomical community with a number of high-profile talks. In the summer of 2021, A4E is organising a one-day meeting at the Astronomical Society of the Pacific⁵. As a result of A4E, individual members have come together to host sustainability sessions at other astronomy meetings for the first time (e.g. the Royal Astronomical

Society's National Astronomy Meeting 2021). An article specifically about A4E has been published in the *Bulletins of the AAS journal* (White et al., 2021). Furthermore, in 2020 the journal *Nature Astronomy* published a dedicated Climate issue (*Nature Astronomy*, 2020), with many of the articles authored and co-authored by A4E members. Thanks to these continued efforts of the A4E community, membership continued to increase throughout the pandemic (Figure 3), with significant increases in membership following our large online communication campaigns, such as the global climate strike and the launch of the open letter.

Conclusions

The example of Astronomers for Planet Earth has shown that, despite the additional complexities induced by Covid-19, action groups can not only grow but thrive by utilising various communication mediums. A4E has shown that actions involving thousands of people from across the globe can be taken to communicate the magnitude of the climate emergency and push for necessary steps to tackle the crisis. Through online seminars, conference days and presentations,

articles and meetings, the members of A4E have successfully reached out to the general public, other scientists, and the heads of astronomical institutions. In doing so, they have demonstrated that even in these unpredictable times, online communication can facilitate engagement and expansion, allowing groups like A4E to respond to the threat of the climate crisis and engage in the fight to protect our planet.

Notes

- ¹ Astronomers for Planet Earth (2021): <https://astronomersforplanet.earth/about-us>
- ² Astronomers for Planet Earth Open Letter 2021: <https://astronomersforplanet.earth/open-letter>
- ³ Astronomers for Planet Earth Youtube Channel: <https://www.youtube.com/channel/UCEmdhU0WjlqRKsSzJf5xfow>
- ⁴ Special Session 'Astronomy for Planet Earth: forging a sustainable future' European Astronomical Society 2021: <https://eas.unige.ch/EAS2021/session.jsp?id=SS30>
- ⁵ ASP2021 Summer Symposium: Astronomers for Planet Earth: <https://astro-society.org/get-involved/events/event-calendar.html/event/2021/07/23/asp2021-summer-symposium-astronomers-for-planet-earth/332162>

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Acknowledgements

A4E's work, including the production of this article, is only possible due to the immense efforts of its members. We extend our thanks to them all, and to everyone else trying to protect our planet against climate change.

Biographies

Astronomers for Planet Earth is a volunteer network of astronomers, astronomy students, and astronomy educators committed to bringing our voices to the struggle against climate change and for climate justice. The organisation was first formed from two independent groups in Europe and North America, and now has around 1100 members from 67 countries across the globe.