Towards a sustainable conferencing:
comparing the carbon footprint of in-person and virtual ASTMH meeting editions

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Rationale

- With 7.8 million researchers worldwide, academic conferencing generates approximately the same amount of greenhouse gases as the entire country of Uganda [1]. This is largely from air travel.
- Due to COVID-19 travel restrictions, many conferences were organized online
- Greenhouse gas emissions from virtual meetings are from electricity consumption
- We compared the emissions associated with the in-person 68th annual meeting of the American Society of Tropical Medicine & Hygiene (2019) with the virtual 69th edition in the year 2020.

Methods

In-person meeting

- Anonymized data on state or country of origin of attendees of the 2019 ASTMH meeting were used to determine travel routes (Figure 1)
- Travel distance was translated to CO_2e emissions by including both direct and indirect emissions (e.g. by radiatively active substances [2])
- CO_2e emissions were expressed in relation to average US households (48t CO_2/household/year [3].

Virtual meeting

- We calculated CO_2e emissions from electricity consumption by broadcasting and streaming the 2020 ASTMH virtual meeting.
- Streaming time was estimated based on the number of participants per symposium and per scientific session multiplied by the duration of the session to obtain total number of minutes participants were online.
- We assumed 2 Mbps downstream speed; 0.06 kWh per gigabyte transferred over the internet; ~30 W laptops of participants; a single 24-core Xeon machine (300W) as server and CO_2e emission intensity for electricity generation at 0.4 kg CO_2e kWh^{-1} [4]
- Embodied carbon was not taken into account either for airplane manufacture, nor laptop or PC manufacture

In-person meeting 2019

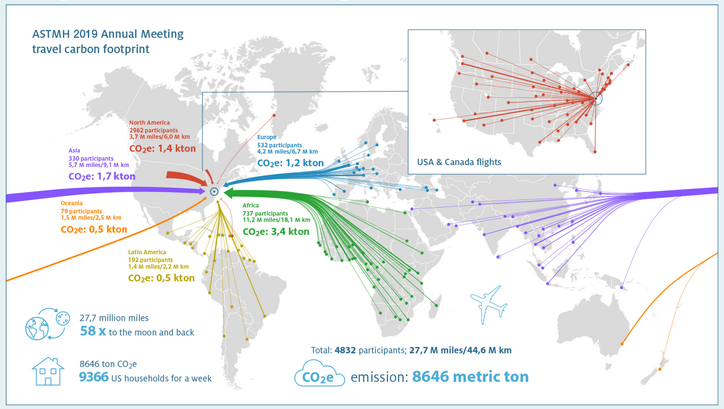


Figure 1. Travel to the ASTMH 2019 conference. Data from participants and their country, state or province of origin were used to estimate their travel distance and the travel-associated CO2 equivalent (CO_2e) emissions. Each line connects a single airport in the country, state or province of departure with the conference venue in Washington DC. The thickness of the line reflects the number of participants; the travel route is stylized whilst actual travel distance based on available flights (including flight legs) was used for calculations.

4834 participants

27,7 million miles or

44,6 million km

58 trips to the moon and back

8646 metric ton CO_2e

Virtual meeting 2020

Attendance

- The 4011 participants attended 5 plenary meetings & 177 sessions
- Virtual pre-meeting courses were not included
- Median attendance per session: 97 (interquartile range 66 – 141)
- We estimated a total 2.4 million minutes (39,719 hours of online participation

Electricity use and carbon footprint

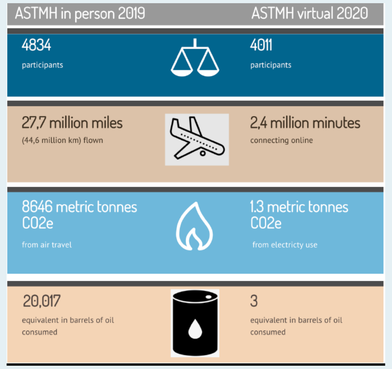
- Network-related emissions (39,719 hours) ~ 838 kg CO_2e
- Participant computer-related emissions (39,719 hours) ~ 477 kgCO2e
- Server related emissions (5 days of 12 hours) ~ 7.2 kgCO2e

4011 participants

2,4 million minutes online

1.3 metric ton CO2e

Key Messages



- As a Society, we must reduce our contribution to climate change which harms global public health, especially of populations in LMIC.
- ASTMH virtual meetings have an estimated >5,000x lower carbon footprint than in-person meetings
- Alternating in-person and virtual meetings would achieve carbon reductions that are in line with international climate goals.
- These alternating meeting forms would retain benefits of regular face-to-face contact as well as efficient low-carbon knowledge dissemination by virtual means.

References

[1] The critical role of funders in shrinking the carbon footprint of research. Bousema *et al.* Lancet Plan Health 2021

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[3] Quantifying the carbon footprint reduction opportunities for U.S. Households and communities. Jones *et al.* Environm Sci Technol 2011

[4] The carbon footprint of large astronomy meetings. Burtscher *et al.* Nature Astronomy 2020

[5] https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator