

Interventions to prevent pandemic-driven diversity loss

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The pandemic has badly affected the most diverse career stage in UK Earth sciences: early career researchers. Disrupted careers must be rescued with contingency plans, remote networks, a focus on mental health and mentor support if we are to retain diversity and talent.

In the geosciences, a discipline that has been pinpointed as particularly lacking in diversity¹, early career researchers offer a ray of hope. Those within a few years of obtaining their PhD represent the most diverse career stage in the Earth and environmental sciences. However, they are also the most vulnerable, particularly when faced with external stresses such as those experienced throughout the COVID-19 pandemic. Reduced networking opportunities, poor support for project adaptation and impacts on mental health and wellbeing during the pandemic have placed particular stress on researchers who are not yet in a permanent position. These impacts are further intensified for researchers from underrepresented groups, who are already subject to active exclusionary and discriminatory practices^{2–4}.

Here we propose contingency plans for data collection and funding, hybrid virtual-physical format conferences and long term mentoring schemes that will minimise the adverse impacts of future disruptions and help retain early career researchers—and their diversity and talent—within our discipline.

This comment is written from the perspective of UK-based early career researchers (PhD and postdoctoral level). The scale of COVID-19 disruption has been uneven around the world and so have the impacts on academic communities in other countries. While the themes we discuss are likely applicable internationally and to other career stages, we recognise that the relevance and extent of these factors vary based on both the relative impact of the pandemic and the prior research landscape.

Mitigation

Careful contingency plans that pre-emptively identify risks can aid the smooth running of research projects. This can help lessen the stress and impact of disruptions for researchers on time-limited contracts. During the pandemic access to laboratory and research facilities was restricted, fieldwork was cancelled and national and international travel was curtailed. The ramifications for those in the mid-stages of data collection and analysis were profound and great efforts will be needed to reschedule or replace lost opportunities. For instance, traversing seasonally open polar gateways to access study regions cannot instantly be re-established simply because lockdown has ended. Various factors are at play as we restart our science and not all

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scientists were equally affected. Therefore, interventions are needed to level the playing field for the current early career cohort so that we can maintain the breadth of their expertise and diversity.

Small changes could offer huge improvements to project stability, resilience and recovery. Priority spaces could be reserved on fieldwork expeditions for early career researchers who may have missed opportunities in the field due to unforeseen circumstances. Such schemes could even transcend institutes and borders, for example the DueSouth⁵ network disseminates information on alternate fieldwork opportunities in the Southern Ocean, allowing for practical skills development or restructured primary research. Switching from desktop computers to laptops as standard would equip students and postdocs with the adaptability to easily transition from institute-based to remote or flexible working. While in the event of widespread disruption, clear communication from funding bodies and research institutes would help to provide stability and reassurance to researchers. Additionally, a financial safety net to adapt projects or support international researchers who fall between state support systems, could help to ease the worries of those with insecure funding, associated with short term contracts.

Pandemics, personal health, life changes and parental leave can all unexpectedly interrupt professional life. Although drawn from the experiences of the pandemic, in less turbulent times these measures also would provide a systematic catch-all that would safeguard individuals from dropping through the cracks created when inflexible project deadlines and adversity collide.

Accessible and equitable conferences

Travel restrictions forced us to shift our gaze from departure boards to computer screens as conferences migrated from face-to-face lecture halls to virtual settings. While this rapid transition was challenging, many benefits were unveiled. The most prominent and poignant being the reduced carbon footprint⁶. The European Geosciences Union estimated that the carbon footprint of their virtual 2021 conference was 20 tonnes of carbon dioxide equivalent (tCO₂e), which pales in comparison to the usual 25,000 tCO₂e carbon footprint of the in-person format⁷. Additionally balancing conferences with caring responsibilities and squaring travel costs with limited funding became more achievable goals. Many found the virtual setting was a confidence boost and they were spurred on to approach their peers and senior academics. Although, others missed the opportunities of in-person networking and spontaneous interactions.

Together, these pros and cons make a compelling case for a hybridised virtual-physical conference format becoming the new status quo. This would allow individuals the option to either attend in-person or virtually. The enhanced accessibility would naturally improve overall representation. However, the biggest challenge will be ensuring parity between opportunities for remote and in-person attendees to present and engage. Hybrid events can offer a more accessible alternative to in person events⁸ through measures including: closed captioning for talks, prior release of slides and alternative text for images. A hybrid format will allow scientists of all career stages to return to conference halls—if they choose—reinstating the much missed opportunities for face-to-face networking within the research community. At the same time, it will allow the academic community to be trailblazers for decarbonising the way in which we come together.

Mental health

Inclusive online spaces for informal networking could help lessen feelings of isolation and stress. Those feeling the pressure of early career progression and academic mobility are already under

intense mental strain^{9,10}. For many, isolation from peers during the pandemic has compounded these stresses. Unplanned coffee breaks, settling in to new research cohorts, or simply opportunities to share common experiences and anxieties have been lost. The value of such interactions cannot be underestimated, especially for those living alone or starting positions in new locations. Academic mobility and international relocation often means researchers must live away from their family and friends. Colleagues provide more than just professional support and making inclusive spaces online more commonplace would help build powerful remote support networks. Such networks could help relieve feelings of isolation during times such as the pandemic, and also offer a geographically-independent support system for those relocating to start new research contracts and for those more reliant on flexible working due to personal or accessibility issues.

Retaining talent

Mentoring is a powerful tool to help early career researchers diversify their skill set and mature as academics in their field. Following the wake of the pandemic, there will be an increased demand for mentoring to aid recovery and substitution of lost skills so that researchers can meet short project deadlines. In the Earth and environmental sciences, formal mentorship schemes are typically short-term and are disproportionately reliant on underrepresented groups, including women¹¹, BAME and LGBTQ+ groups. Looking forward, it is important to implement longer term schemes that ensure mentoring responsibilities are shared fairly across all groups, especially as women and those with caring responsibilities have lost the most research time to the pandemic¹². A reimaged, fairer and enduring mentoring system would encourage and empower personal development among early career cohorts, helping them better navigate the new virtual landscape.

The power of mentoring schemes focused on skills and individual development can only be realised, however, if we transform our recruitment and promotion models away from academic metrics alone. Academic metrics are known to disregard the nuance of individual circumstance and disciplinary diversity¹³, and rarely reflect the true quality or potential of a candidate^{14,15}. The pandemic has further distorted the relationship between academic metrics and potential, with individuals being uniquely affected by complex, unquantifiable factors. Recruitment processes that account for context and individual experiences will not only overcome disparities in impacts of the pandemic, but will also overcome structural barriers that traditionally act to exclude underrepresented groups and help retain our best talent.

Outlook

The COVID-19 pandemic has posed, and will continue to pose, a challenge to all researchers working in the Earth and environmental sciences. Early career researchers represent the most diverse career stage but have been particularly vulnerable to the impacts of the pandemic because they have to show results within short, fixed-term contracts in order to develop their career. Action is needed to safeguard and retain the talent and diversity of the current cohort, who have been so strongly impacted by the disruption of the COVID-19 pandemic. Governments and funders, institutions and supervisors, as well as the affected researchers themselves, can take action to overcome the difficulties faced by researchers today (Fig. 1).

This, in turn, will help address wider equality and inclusivity issues within the Earth sciences.

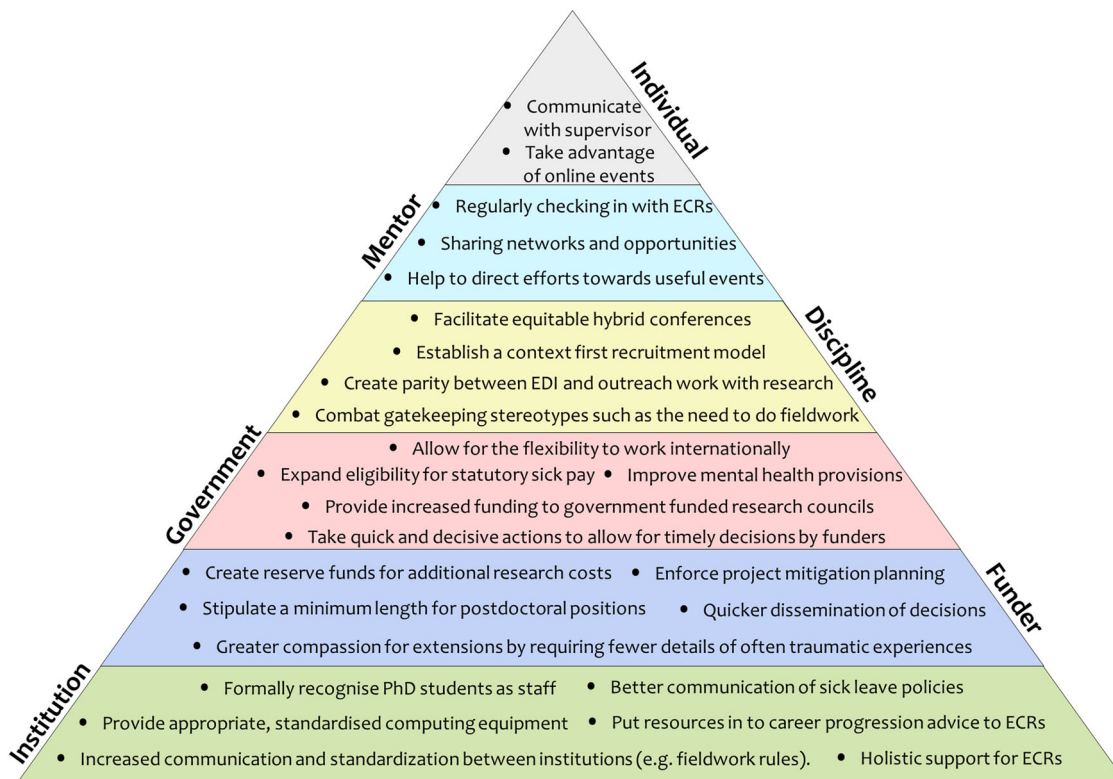


Fig. 1 A diagram indicating potential solutions to the problems faced by ECRs as a result of the COVID-19 pandemic. The tiers of the pyramid indicate the level at which we suggest these solutions could be implemented, tiers are structured by the number of actions that the stakeholder can take, not necessarily the hierarchy of responsibility as this will vary significantly between individuals' circumstances.

Radical change is difficult and often uncomfortable, but without such change we risk discarding a generation of researchers based on factors out of their control: where they happened to be during the pandemic, how dependent their project was on travel, the rules of their funders and support received from their institutions. If we can build a system out of the pandemic which places individuals, active inclusion and equality at its heart, then that will be a system that is far more resilient to weather the challenges that will face us in the future.

Received: 9 August 2021; Accepted: 29 October 2021;
Published online: 18 November 2021

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Acknowledgements

We acknowledge UK Polar Network for providing a platform for our early discussions and Paul Tol for the colour blind friendly colour palette used to create our figures.

Author contributions

B.J.F., C.J.S., A.W.N., L.D.R., G.D.T., M.D. and J.B. contributed to a panel discussion on the impact of COVID-19 on ECR's at the UK Polar Early Career Conference hosted by UK Polar Network from which this comment was conceptualised. B.J.F. led the writing of the comment with contributions from C.J.S., A.W.N., L.D.R., G.D.T., F.v.d.H., C.P. and M.I.G.I. A.W.N. and B.J.F. produced the figure with contributions from C.J.S., G.D.T. and L.D.R. All authors contributed to editing and discussions.

Competing interests

The authors declare no competing interests.

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