



Early Career Ocean Professionals Earth Observation value chain case study

www.eu4oceanobs.eu/use-cases

ECOPs advancing the ocean observation value chain

In the ever-evolving realm of Earth Observation (EO) to address coastal and Ocean challenges, a new generation of dedicated individuals, known as Early Career Ocean Professionals (ECOPs), is emerging as key catalysts for innovative solutions and positive change.

These individuals, in the early stages of their careers, bring fresh perspectives and innovative ideas, and are crucial in ensuring the sustainability and stewardship of Ocean-related projects and initiatives.

Their involvement represents a vital link in passing knowledge and efforts from experienced professionals to future generations, ensuring seamless continuity and long-term success. As complex Ocean issues and coastal-related themes, from marine litter and coastal hazards to marine biodiversity loss, gain prominence in addressing societal challenges, the role of ECOPs in Ocean science and conservation efforts becomes ever more apparent.

This case study sheds light on the importance of ECOPs throughout the EO value chain and highlights the significant efforts of various European Union (EU) programmes and projects dedicated to promoting ECOP involvement; creating synergies essential for advancing the state of Ocean observation and Ocean challenges. This case study is developed in the framework of the Horizon Europe project EU4OceanObs and the OceanBRIDGES task team of the ECOP Ocean Decade Programme, which is committed to fostering a culture that actively engages and empowers emerging talents to ensure a vibrant and resilient future for Ocean and coastal observations.



Earth Observation value chain and the role of ECOPs

The EO value chain serves as the backbone of modern Ocean observation, encompassing the entire process of collecting, analysing, transforming and sharing marine and coastal data derived from satellite, airborne, and in-situ observations. Observations are the essential foundation of the value chain. They are critical in providing the comprehensive data necessary for the development and operation of monitoring and forecasting systems, applications, and other tools that address the myriad of challenges in marine and coastal environments. From understanding climate patterns to managing marine resources and responding to natural disasters, the EO value chain is instrumental in shaping evidence-based policies and sustainable practices to better protect and restore marine environments and safeguard coastal communities.

ECOPs are defined as individuals within 10 years of their last graduation in any Ocean related field. Organised as a network programme of the UN Decade of Ocean Science for Sustainable Development (UN Ocean Decade), the ECOP Decade programme aims to elevate and strengthen the diverse perspectives of the new generation of Ocean professionals.



The programme also works to ensure knowledge exchange between experienced professionals and ECOPs alike to promote Ocean sustainability for what ECOPs have termed "The Ocean We Want". By empowering ECOPs with meaningful professional development opportunities, the network programme seeks to incorporate new ways of thinking into the global Ocean sustainability and stewardship challenges..

Today, ECOPs represent a dynamic and vital demographic within the realm of Ocean science, Ocean governance, marine conservation, and more, with expertise in a range of disciplines, from marine biology and environmental science to data analytics and technological innovation. As the leaders of tomorrow, they play a crucial role in advancing their respective fields and contributing to the sustainable management of marine ecosystems. These aspiring professionals challenge conventional thinking by bringing a new perspective for tackling emerging challenges and driving the evolution of EO technologies and methodologies.



Figure 1: Ocean Observation Value Chain. © Mercator Ocean International/ EU4OceanObs

Advancing Innovation and Technological Proficiency

Digital fluency, coupled with a deep understanding of evolving technologies, accelerates the rapid development of innovative observation techniques and advanced data analysis methods. Each succeeding generation of ECOPs not only applies their digital skills but actively propels innovation across the entire EO value chain. Their contributions span the entire chain, from development of novel observation techniques and advancements of data analysis methods to the integration of cutting-edge technologies. ECOPs ability to translate complex data into practical solutions contributes to strengthened ocean observation and forecasting systems and EO-driven services and solutions

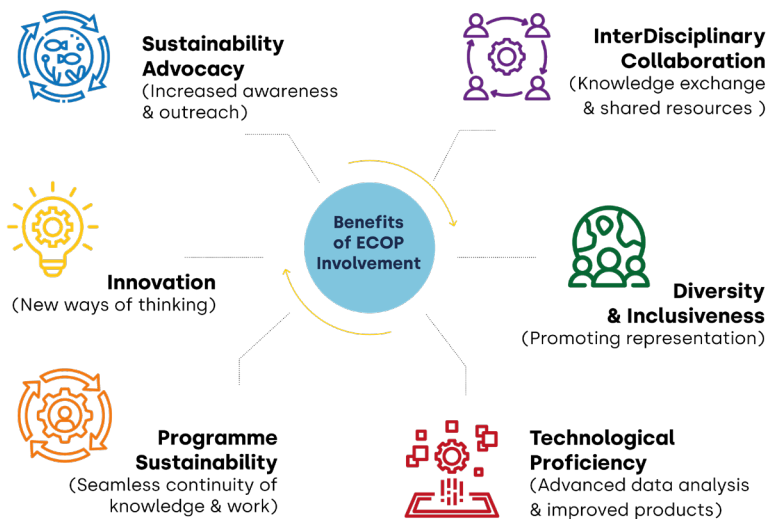


Fig. 2. Benefits of ECOP inclusion along the Earth Observation value chain.

Benefits for ECOPs

The active participation of ECOPs within all stages of the EO value chain is enormously beneficial for advancing Ocean research and knowledge, but also invaluable for ECOPs themselves. Participation in international projects allows for networking opportunities through access to a global professional community, as well as extensive career development and increased visibility. As the leaders of tomorrow, it is fundamental that ECOPs are given the opportunity to develop and grow within this sector, empowering them to actively apply their EO skills for positive social change, and ensuring they are equipped with the experience to tackle necessary contemporary challenges.

Inclusiveness and diversity

Through heightened cultural and political awareness, ECOPs help address the underrepresentation of impacted communities. By promoting diversity and inclusivity throughout the value chain, they bring together the diverse backgrounds needed to successfully address our Ocean sustainability challenges.

ECOPs also play a critical role in keeping the EO value chain relevant and accessible to future generations. They adeptly translate complex scientific concepts into accessible information and through their skilled use of social media and digital communication platforms, they engage a wider, more diverse audience, including their peers and the public. This modern approach to communication disseminates information more effectively. By sharing insights, successes, and challenges within the EO domain in a dynamic way they make the field more relatable and encourage greater involvement and interest in Ocean observation from younger generations. In this way, ECOPs ensure that the value chain not only meets the current demands but also remains vibrant and relevant.

Sustainability of EO programmes

Aligned with the goals of the UN Ocean Decade, ECOPs demonstrate a commitment to environmental sustainability through advocacy for responsible data practices and ethical use of technology. They are dedicated to shaping the future direction of Ocean and coastal observations and aspire to do so throughout their career. Yet, today, many established programmes still rely predominantly on experienced professionals to continue. It is therefore essential that ECOPs be incorporated and involved in all stages of these programmes. By participating in research cruises or equipment deployment and exchanging operational knowledge, ECOPs become deeply engaged and driven to support programme continuity throughout their future career.

Interdisciplinary Collaboration

As newcomers into the field, young professionals seek to bridge gaps and foster interdisciplinary collaborations, seeking partnerships amongst experts in various Ocean-focused sectors, from established professionals to research institutions and industry stakeholders. Their collaborative approach promotes the exchange of insights, data, and best practices, which allow us to overcome data challenges and leverage shared resources. This concerted effort expands networks and enriches our collected knowledge base.



The European Union's Support for ECOP Involvement

In recognition of the unique perspectives and contributions that ECOPs bring through their participation, the European marine science community has launched various initiatives, programmes, and projects to actively engage ECOPs in ocean observing, data sharing, modelling and forecasting and derived downstream services and applications. In doing so, we emphasise the importance of diversity in addressing Ocean challenges collaboratively.

It is paramount to celebrate and promote the involvement of ECOPs within the EO value chain, showcasing success stories and breakthroughs to inspire further innovation in Ocean-related fields. Equally important is the establishment of collaborative platforms and networks, which are instrumental in building and fostering interactions between ECOPs, experienced professionals, and policymakers. These supportive ecosystems are crucial for enabling knowledge exchange, mentorship, and active participation in all aspects of Ocean stewardship.

Within these efforts, the ECOP Ocean Decade Programme stands as a testament to the global prioritisation of young Ocean professionals within the UN Ocean Decade. The programme highlights the critical role of ECOPs in achieving the decade's ambitious goals and underscores their potential to drive significant advancements in Ocean science and sustainability. With its OceanBRIDGES task force co-founded by GEO Blue Planet and EU4OceanObs, the ECOP Programme further aims to establish a dialogue across generations of experts and stakeholders by bridging research, innovation and diversity to address Ocean challenges. By aligning with this programme, the EU reaffirms its commitment to nurturing the next generation of Ocean leaders and acknowledges the importance of integrating their unique insights and innovations in the broader context of global Ocean governance.

EU-funded initiatives, programmes and projects supporting ECOPs

GEO Blue Planet

<https://geoblueplanet.org>

GEO Blue Planet, a global initiative focusing on improving the sustainability and management of the world's Ocean through sustained Ocean and coastal observation, is a proud partner of the ECOP Ocean Decade Programme and works hard to ensure the participation of ECOPs in all of their activities and events, to bring on board the next generation of leaders, scientists and stakeholders and ensure their voice is considered in current actions.

The GEO Blue Planet EU Office also co-coordinates the Ocean Bridges Task Force (detailed on the right), and, every year, the GEO Blue Planet U.S Office recruits PhD students, supported by the NOAA National Sea Grant Knauss Marine Policy Fellowship, to help coordinate and provide scientific support for activities, as well as organise and speak at events.

EuroMarine - OYSTER

<https://euromarinetwork.eu/oyster>

EuroMarine's Orienting Young Scientists of EuroMarine (OYSTER) programme guides and supports young marine scientists, emphasising multi-disciplinary collaboration. OYSTER enhances the capabilities of ECOPs by providing exposure to diverse marine disciplines, fostering communication skills, and offering access to targeted information. Through mentorship and training, OYSTER supports ECOPs in navigating the complexities of the marine science landscape.

OceanBRIDGES

<https://www.ecopdecade.org/Ocean-bridges/>

OceanBRIDGES, officially known as «Bridging (Ocean) Research, Innovation, and Diversity across Generations of Experts and Stakeholders,» is an ECOP Ocean Decade Programme that fosters two-way expertise-sharing between ECOPs and Experienced Ocean Professionals (EOPs). The initiative aims to bridge Ocean research, innovation, and diversity across generations, offering a platform for ECOPs to contribute innovative ideas, collaborate with seasoned professionals, and gain exposure to diverse perspectives. OceanBRIDGES emphasises multi- and trans-disciplinarity, global networking, and opportunities for ECOPs to open doors to new professional opportunities. This initiative is co-founded by GEO Blue Planet.

All-Atlantic Youth Ambassadors

<https://allatlanticocean.org/all-atlantic-youth-ambassadors/>

The All-Atlantic Ocean Youth Ambassadors programme gathers dedicated individuals in early stages of their professions, focusing on promoting sustainable development and stewardship of the Atlantic Ocean. Ambassadors participate in training programmes, communication activities, and engage with leaders to develop skills for driving positive change. The programme empowers ECOPs to influence Ocean conservation locally and globally, fostering competencies in science, communication, and outreach.



European Marine Board (EMB) Young Ambassador Programme

<https://www.marineboard.eu/emb-young-ambassador-programme>

The EMB Young Ambassador Programme involves early-career scientists in shaping marine science policies and strategies. Young Ambassadors contribute their unique perspectives to advance the goals of the European Marine Board, focusing on Ocean research and governance. By providing a platform for ECOPs to engage in policy discussions, the programme amplifies their role in shaping the future of marine science.

IEEE/OES Young Professionals

<https://ieeeyes.org/young-professionals>

The IEEE/OES Young Professionals programme engages emerging leaders in Oceanic engineering and marine technology within the IEEE community. It recruits new members and actively involves them in OES activities, offering opportunities for professional growth, knowledge exchange, and networking. Their «YP-BOOST» programme selects young professionals to attend major OCEANS conferences worldwide, providing exposure to advancements in Oceanic engineering and fostering collaboration with experienced professionals.

These initiatives collectively play a crucial role in shaping the future of Ocean science, technology, and policy by nurturing the talents and potential of ECOPs. Through their empowerment, we can ensure that the next generation of Ocean professionals is equipped with the skills and knowledge necessary to tackle the challenges facing the Ocean today.

Copernicus Masters

<https://copernicus-masters.com>

The Copernicus Masters is an international competition designed to support EO innovators. It provides a platform for ECOPs to showcase their innovative ideas and contribute to the EO field. The competition encourages individuals and startups to develop applications and solutions using Copernicus EO data across various thematic areas, fostering a culture of innovation and creativity among young professionals.

Association of Polar Early Career Scientists (APECS)

<https://www.apecs.is/>

APECS is a dynamic international organisation dedicated to fostering collaboration and professional development among early career researchers with a keen interest in polar and alpine regions. With a mission to promote interdisciplinary engagement, APECS provides a platform for young scientists to connect, exchange ideas, and contribute to advancements in polar research. Through mentorship programmes, resource sharing, and active participation in conferences and outreach initiatives, APECS plays a pivotal role in supporting early career professionals as they navigate the unique challenges and opportunities presented by polar sciences.



ECOPs in Action

Action Showcase 1

Integrating Marine Litter Monitoring to Inform Action

The "Integrating Marine Litter Monitoring to Inform Action" event, held as an official side event of the UN Ocean Conference 2022, served as a platform that brought experts together in the fight against marine pollution. Convening in Cascais, Portugal, the event attracted 86 participants from 23 countries worldwide, and saw the active participation of ECOPs in its organisation and proceedings.

ECOP Contributions:

The event saw active involvement of ECOPs through the OceanBRIDGES initiative, supported by the EU-funded projects EU4OceanObs and EuroSea. In addition to the ECOPs in attendance, five invited ECOPs played a crucial role in the lead up to the event and on the day in moderating sessions and initiating intergenerational dialogues. In all, it was an invaluable opportunity for the participating ECOPs to gain important professional experience and to network with experienced professionals.



Fig. 3. Participating and organising ECOP members

Action Showcase 2

2013 – 2023: 10 years of the Galway Statement

To celebrate the 10th anniversary of the Galway Statement, a two-day conference was held in Galway, Ireland, bringing together scientists, policymakers, ECOPs, and stakeholders from diverse backgrounds. The event highlighted the achievements made over the past decade and strengthened ECOP engagement through organised “Inter-generational Dialogue Sessions” that aimed to create a platform for meaningful knowledge exchange and collaboration between Experienced Ocean Professionals (EOPs) and ECOPs alike.

ECOP Contributions:

Participating ECOPs were divided into five distinct groups, each addressing a priority area outlined in the All-Atlantic Declaration and led by an EOP, to develop a short presentation to parliament with concrete avenues for collaborative intergenerational action. ECOPs engaged in candid discussions that led to creative solutions addressing pressing environmental and societal challenges in the Atlantic Ocean. The sessions provided a glimpse into policy and decision-making processes and strengthened ECOP resolve, emphasising the critical importance of networking forums for knowledge sharing and collaboration.



Fig. 4. Participating ECOP members

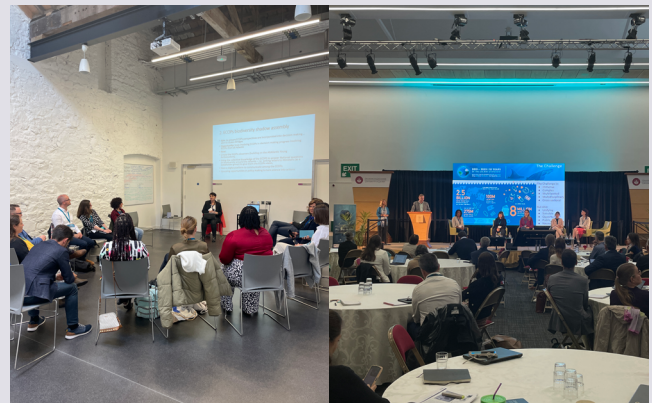


Fig. 5. (left) Group discussions led by EOP, (right) final ECOP presentation



Addressing Challenges faced by ECOPs and Opportunities for the future

Whilst the inclusion of ECOPs has proven beneficial, a range of interpersonal, institutional, and cultural challenges hinder their participation and engagement. From lack of experience, limited opportunities, to a lack of diversity within the field, these barriers need to be addressed to ensure effective ECOP empowerment. It is crucial to recognise and overcome these challenges and actively listen to the voices of ECOPs.

Challenges faced by ECOPs in Earth Observation value chain

Funding Limitations

One of the most notable challenges is financial constraints. It restricts capacity to actively engage in field research, attend conferences, and contribute meaningfully to projects. It also impedes professional growth and the realisation of ECOPs' full potential. There is a big dependency on grants and scholarships to carry out research or participate in activities, particularly within the public sector. These are limited in number and value, thus highly competitive. This constraint is particularly felt by ECOPs from minority groups and developing nations where insufficient financial aid is available.

Mentoring and training

Navigating the complexities of the Ocean space requires guidance and support, yet a scarcity of mentorship opportunities hinders ECOPs' professional development and innovation. Although pressure is placed to network with experienced professionals there are limited opportunities for it and often ECOPs lack the confidence to do so. Addressing these challenges in mentorship and training is integral to nurturing a skilled and resilient community of Ocean professionals.

Lack of Opportunities

ECOPs also encounter substantial challenges in accessing opportunities, for employment or internships, that are vital for their career progression. The limited availability of positions in the field further restricts their ability to gain the necessary experience and skills they require. This scarcity affects the ability of ECOPs to engage in or lead large-scale research initiatives as well as high-level participation in decision-making activities. Ensuring equitable access to these opportunities is fundamental to sustaining their positive impact and support the growth and integration of ECOPs into key roles within the value chain.

Competition

The heightened competition between applicants, due to lack of opportunities, poses challenges to those first entering their professional careers or searching experience. It places a large amount of pressure on ECOPs to successfully network, volunteer, and accept any opportunity that arises to enter the field. Once in, ECOPs face increasing competition in accessing permanent positions and funding. This hinders collaborations and sometimes progression.

Discrimination

Many ECOPs still experience varying degrees of discrimination, from race and gender to career stage and age. ECOPs' ideas and input are still often dismissed in favour of those of more experienced professionals.

Dedicated funding streams

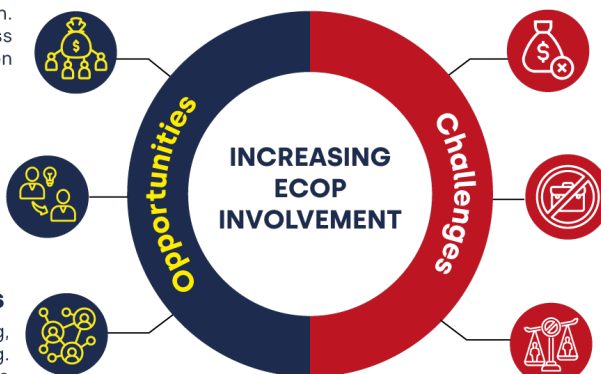
Maximize ECOP participation, representation and contribution. Mitigate financial barriers to access and support innovation

Mentorship and training

International and diverse supervisory teams to enhance knowledge exchange and skill development

Networking platforms

A digital platform for idea sharing, problem solving and networking. More efficiently harness expertise and shared resources



Funding limitations

Restricts capacity to participate in fieldwork, conferences, workshops, and trainings

Lack of opportunities

Limited to no access to a seat at decision making tables and large-scale initiatives. Limits development of vital skills

Discrimination

Race and gender discrimination reduces opportunities and representation. Input dismissed in favour of more experienced professionals

Figure 6. Opportunities and challenges of increasing ECOP involvement within the Ocean Observation value chain.

Opportunities for maximising ECOP contributions

Dedicated funding streams

Establishing dedicated funding streams is a strategic way to maximise ECOP participation, representation, and contribution. Specific funding mechanisms tailored to the needs of ECOPs, breaks financial barriers and allows their skills and expertise to be leveraged effectively. Funding streams can be structured to support research initiatives, attendance to conferences, participation in collaborative projects, and engagement in innovation endeavours within the Ocean space, as well as within policy activities and industry.

Mentorship Programmes

To further harness the potential of ECOPs internationally, impactful mentorship programmes connected with seasoned, international, and diverse supervisory teams, should be created. These programmes can provide the platform for knowledge exchange and skill development, such as manuscript writing, science communication, and networking as well as promote collaborative work environments, mental health, and discourage unhealthy competition. These relationships enhance ECOPs' visibility within the industry and contribute to continuous learning and professional growth, including confidence building.

Access to Training and Resources

Professional development is pivotal for ECOP empowerment. This includes providing access to training programmes and resources that keep ECOPs abreast of EO advancements, as well as sustained support throughout ECOP's careers. Capacity building in all aspects is crucial for equipping ECOPs with the skills and knowledge needed to tackle present-day Ocean challenges.

Networking and knowledge exchange

Creating dynamic opportunities for ECOPs to connect, collaborate, and contribute to Ocean observations is essential for their holistic development and meaningful participation. Interdisciplinary and intergenerational workshops, uniting ECOPs, experienced professionals, and relevant stakeholders, are pivotal in bridging the language gap between scientific research and policy formulation and provide invaluable networking opportunities. Such initiatives should also offer remote attendance options for those unable to travel to accommodate broader participation and promote inclusivity in knowledge-sharing.

Conclusion

This case study has underscored the importance of ECOPs in EO value chain, which encompasses ocean observing, data sharing, modelling and forecasting and the development of downstream services and applications. Their new ideas and technological proficiency substantially contribute to the field and are invaluable in addressing contemporary Ocean and coastal challenges.

Today, ECOP empowerment and development is supported not just by single initiatives but through a collective commitment from several EU programmes, projects, and services. While EU4OceanObs seeks to contribute to this momentum, it is part of a larger framework of EU commitment to driving ECOP involvement and growth. This in turn is essential for ensuring that the EO community continues to benefit from the dynamic and forward-thinking contributions of ECOPs.

It is important to commit to overcoming the many challenges that ECOPs face today. Challenges that extend beyond the EO value chain, and resonate in all areas of Ocean science, policy, and sustainable development can be overcome by creating a supportive ecosystem for ECOPs to thrive.

Communication skills

The ability to convey complex scientific concepts to diverse audiences, including policymakers and the public, is essential for bridging the gap between scientific research and actionable policies and amplifying impact. Investing in science communication skills enables ECOPs to articulate their findings clearly and concisely, transmitting the technical aspects of research but also the broader societal implications.

Networking Platforms

Dedicated networking platforms is a recurring demand from ECOPs that can significantly catalyse their participation and contribution. These platforms serve as hubs that strengthen the ECOP community through collaboration, idea-sharing, and networking with industry experts. These virtual environments also provide an ideal venue for dissemination of information, from professional and funding opportunities to achievements and challenges. The promotion of increased exchanges between ECOPs, research institutions, industry stakeholders, and governmental bodies is essential, and the creation of online platforms and forums to achieve this becomes increasingly imperative.

Acknowledgements: This use case was written and designed by independent consultant Mafalda de Freitas, funded by the European Union through the EU4OceanObs project, and with contributions from Audrey Hasson and Lillian Diarra from Mercator Ocean International. August 2024.



References

Andrews, E. J., Harper, S., Cashion, T., Palacios-Abrantes, J., Blythe, J., Daly, J., ... & Whitney, C. K. (2020). Supporting early career researchers: insights from interdisciplinary marine scientists. *ICES Journal of Marine Science*, 77(2), 476-485. <https://doi.org/10.1093/icesjms/fsz247>

Cosentino, M., & Souviron-Priego, L. (2021). Think of the Early Career Researchers! Saving the Oceans Through Collaborations. *Frontiers in Marine Science*, 8. <https://doi.org/10.3389/fmars.2021.574620>

Giron-Nava, A., & Harden-Davies, H. (2021). A generational shift in Ocean stewardship. *Oceanography*, 35(1), 76-80. <https://doi.org/10.5670/Oceanog.2021.402>.

Kostianaia, E. (2022). ECOP programme: empowering early career Ocean professionals across the world. *Marine Technology Society Journal*, 56(3), 104-105.

Mofokeng, R. P., Faltynkova, A., Alfonso, M. B., Boujmil, I., Carvalho, I. R. B., Lunzalu, K., ... & Lobelle, D. (2023). The future of Ocean plastics: designing diverse collaboration frameworks. *ICES Journal of Marine Science*. fsad055. <https://doi.org/10.1093/icesjms/fsad055>

Satterthwaite, E. V., Komyakova, V., Erazo, N. G., Gammage, L., Juma, G. A., Kelly, R., ... & others. (2022). Five actionable pillars to engage the next generation of leaders in the co-design of transformative Ocean solutions. *PLoS Biology*, 20(10), e3001832. <https://doi.org/10.1371/journal.pbio.3001832>

Shellock, R. J., Cvitanovic, C., McKinnon, M. C., Mackay, M., van Putten, I. E., Blythe, J., ... & Wisz, M. S. (2023). Building leaders for the UN Ocean Science Decade: a guide to supporting early career women researchers within academic marine research institutions. *ICES Journal of Marine Science*, 80(1), 56-75. <https://doi.org/10.1093/icesjms/fsac214>

Zhang, C., & Moore, J. A. (2023). A Road Map to Success of International Field Campaigns in Atmospheric and Oceanic Sciences. *Bulletin of the American Meteorological Society*, 104(1), E257-E290. <https://doi.org/10.1175/BAMS-D-22-0133.1>

