

Implementing the 5th International Polar Year in 2032-2033 with Next-Generation Leaders

OBJECTIVES:

1. Enhance intergenerational capacities with the International Polar Year (IPY) as a global research process, reflecting the longest continuous assessment of Earth's climate.
2. Create opportunities for polar Early Career Researchers (ECRs) to help implement the 5th IPY (IPY-5) proposed for 2032-2033.

BACKGROUND AND RATIONALE:

ECRs (e.g., graduate students, postdocs and junior faculty) are next-generation leaders. A decade from now, ECRs will be well-established in their professions, revealing the opportunity for these next-generation leaders to become actively involved now in planning and organising IPY-5.

Past IPYs have significantly advanced polar and Earth system sciences across the last 150 years (Table 1), initially in response to the Little Ice Age¹, considering Earth-Sun relationships as the oldest continuous climate research program. With climate warming occurring 4 times faster in the Arctic² and 3 times faster in the Antarctic³ than elsewhere on Earth, it is timely to start thinking and preparing for IPY-5, as already initiated by the Scientific Committee on Antarctic Research (SCAR)⁴ and International Conference on Arctic Research Planning (ICARP)⁵ as well as other organizations. Planning and implementation of IPY-5 will be a long-term effort, opening the door for ECRs as next-generation leaders to make substantive contributions now via institutions, such as the Association of Polar Early Career Scientists (APECS), which emerged from IPY-4 in 2007-2008.⁶ I also have been actively involved with Polar research since 2014 contributing in Polar Law Symposia (PLS), Standing Committee on Humanities and Social Sciences (SC-HASS) of SCAR, and recently as its Equality, Diversity and Inclusion Action Group (EDI-AG)⁷ Deputy Chief Officer and representative in APECS.

As an ECR born in Iran, who is becoming a Canadian citizen – I will bring a diverse international background to this Fellowship with Science Diplomacy Center™. I currently am serving as a JSPS⁸ Postdoctoral Fellow at the Polar Cooperation Research Centre (PCRC), Kobe University, Japan: a nation that began Antarctic research in the early 20th century⁹ and became an Antarctic Treaty Consultative Party following its contributions to IPY-3 (better known as the International Geophysical Year)¹⁰ in 1957-1958.

Professor Paul Arthur Berkman (Fulbright Arctic Chair 2021-2022) will serve as my host at the Science Diplomacy Center™,¹¹ where he is President. Paul is a science diplomat, polar explorer and global thought-leader¹² who convened the *Antarctic Treaty Summit*¹³ in Washington, DC as part of IPY-4, producing the first book on SCIENCE DIPLOMACY.¹⁴ Prof. Berkman also is an Associated Fellow of the United Nations Institute for Training and Research (UNITAR), a Faculty Associate with the Program on Negotiation at the Harvard Law School and senior editor of the Springer book series on INFORMED DECISIONMAKING FOR SUSTAINABILITY¹⁵ among his other transdisciplinary contributions. Paul and I both share JSPS Postdoctoral Fellowship experiences. We began working together with the February-March 2022 webinar series on Open Science that Prof. Berkman convened with funding from the Ministry of Foreign Affairs of Japan and hosting by UNITAR.^{16,17}

RELEVANCE:

This research proposal is relevant, timely and significant. This IPY-5 project falls within the scope of my functions as a Polar ECR. This IPY-5 project has cross-cutting relevance for ECRs, considering polar research and Earth system science, inclusively. My follow-up with this Fellowship will be across my career, providing leadership with other ECRs, helping to build IPY-5 with global

vision across generations with the IPY process. This Science Diplomacy Center™ Fellowship under the mentorship of Professor Berkman will enhance my understanding of how to integrate the natural sciences, social sciences and Indigenous knowledge as fundamental elements of IPY-5. With the international dialogues that I will facilitate (see Methodology), this Fellowship will enhance participation from Japanese ECRs in various polar venues, resulting in broader participation in IPY-5 of Japanese and other ECRs around the world with Open Science.

METHODOLOGY:

Using the transdisciplinary methods¹⁸ of Open Science¹⁹ with sustainable development²⁰ framing – I will conduct a series of dialogues with in-person and virtual formats, involving members of APECS (which includes over 40,000 ECRs)²¹ through my involvement with: (1) various APECS Project Groups; (2) SC-HASS and EDI-AG and other relevant groups; (3) next-generation leaders from around the world through UNITAR and other networks affiliated with the Science Diplomacy Center™ to reach a broad audience inclusively. The webinars will be conducted virtually using the logistics of UNITAR and APECS in Month 3 and Month 9 of the Fellowship along with an in-person session at a prominent Antarctic research meeting during the interim. I will create a set of guiding questions to use with each dialogue, as with the February-March 2022 webinar series mentioned above, with resulting insights captured by rapporteurs, contributing to informed decisions (Figure 1) about the design and implementation of IPY-5.

DELIVERABLES:

The IPY-5 dialogues and resulting insights produced by the ECRs will be memorialized in peer-reviewed publications for general audiences (e.g., *Science*) and polar audiences (e.g., *Antarctic Science*), which will be shared as options (Figure 1). Moreover, outcomes from the IPY-5 dialogues will be presented in international research meetings after the Science Diplomacy Center™ Fellowship has been completed, including the next Arctic Circle in 2023. Importantly, a key deliverable will be empowerment of ECRs in IPY-5. I will present the outcome of this research at the next major Polar event, and will publish a paper in *Science*. In addition, syntheses from this IPY-5 project will be published on websites of the Science Diplomacy Center™, PCRC, UNITAR, APECS, and other affiliated partners with this Science Diplomacy Center™ Fellowship.

SUCCESS FACTORS:

The Science Diplomacy Center™ Fellowship will enhance my transdisciplinary skills and play an important role in my career development as a law-science-policy polar researcher. This IPY-5 project will contribute to PCRC leadership with polar cooperation in Japan and internationally. Importantly, implementation of this Fellowship will be highly beneficial in network building for me and the community of ECRs who are next-generation leaders with Open Science on a global scale.

BUDGET:

- Webinar month 3 through UNITAR with APECS
- Webinar month 9 through UNITAR with APECS
- Travel and logistics for Arctic Circle 2023
- Open-Access publication

Funding available:

My JSPS research grant-in-aid will cover domestic travel costs to Arctic Circle Japan Forum (March-2023, Tokyo)²² to meet with Prof. Berkman, who will be convening a follow-up to the February-March 2022 webinar series.

APPENDIX 1 REFERENCES

- ¹ Berkman P.A. 2003. International Polar Year 2007-08, *Science* 301:1669. <https://www.science.org/doi/10.1126/science.301.5640.1669b>
- ² Rantanen M., Karpechko, A.Y., Lipponen, A. et al. 2022. The Arctic has warmed nearly four times faster than the globe since 1979. *Communications Earth & Environment* 3(168):1-10. <https://www.nature.com/articles/s43247-022-00498-3>.
- ³ Clem K.R., Fogt, R.L., Turner, J. et al. 2020. Record warming at the South Pole during the past three decades. *Nature Climate Change* 10:762–770. <https://doi.org/10.1038/s41558-020-0815-z>.
- ⁴ SCAR Survey on International Polar Year 2032-2033. <https://form.jotform.com/220532776067054>.
- ⁵ “An integral aspect of the ICARP IV process during 2022 to 2025 (set to be held in Boulder Colorado in 2025) will be the inclusion of early career scientists, Indigenous Peoples, and local residents in the development of priorities and science plans to address the key questions”. See: <https://icarp.iasc.info/about/icapr-iv-process>
- ⁶ Hindshaw R., Mariash, H., Vick-Majors, T., et al. 2018.. A decade of shaping the futures of polar early career researchers: A legacy of the International Polar Year. *Polar Record*, 54(5-6):312-323. <https://doi.org/10.1017/S0032247418000591>.
- ⁷ SCAR Equity, Diversity and Inclusion (EDI) Action Group (AG). <https://www.scar.org/capacity-building/edi/home/>.
- ⁸ Japan Society for the Promotion of Science (JSPS). <https://www.jsps.go.jp/english/>.
- ⁹ Shibata, A. 2015. Japan and 100 Years of Antarctic Legal Order: Any Lessons for the Arctic? *The Yearbook of Polar Law*, Vol. VII, p. 22.
- ¹⁰ Chapman S., 1960. IGY: Year of Discovery. University of Michigan Press, Ann Arbor.
- ¹¹ Science Diplomacy Center™. <https://scidiplo.org>.
- ¹² Berkman, P.A. 2002. SCIENCE INTO POLICY: GLOBAL LESSONS FROM ANTARCTICA. Academic Press, San Diego.
- ¹³ *Antarctic Treaty Summit 2009*. <http://atsummit50.aq>.
- ¹⁴ Berkman P.A., Lang, M.A., Walton, D.W.H. and Young, O.R. (eds.). 2011. SCIENCE DIPLOMACY: ANTARCTICA, SCIENCE, AND THE GOVERNANCE OF INTERNATIONAL SPACES, Smithsonian Institution Scholarly Press, Washington, D.C., 2011. <https://repository.si.edu/handle/10088/16154>.
- ¹⁵ Berkman P.A., Vylegzhanin, A.N., Young, O.R., Balton, D.A. and Øvretveit, O. (eds). 2022. BUILDING COMMON INTERESTS IN THE ARCTIC OCEAN WITH GLOBAL INCLUSION. VOLUME 2. INFORMED DECISIONMAKING FOR SUSTAINABILITY. Springer, Dordrecht. <https://link.springer.com/book/9783030893118>.
- ¹⁶ Berkman, P.A., Baeseman, J. and Shibata, A. 2022. Arctic Science Diplomacy Maintains Russia Co-operation, *Nature* 604:625. <https://www.nature.com/articles/d41586-022-01105-3>.
- ¹⁷ Berkman P.A., Baeseman, J., Shibata, A., Madani, Z. et al. 2022. Enhancing International Scientific Cooperation: Arctic Science and Technology Advice with Ministries. *Science Diplomacy Action* 6:1-82. https://scidiplo.org/wp-content/uploads/2022/08/Science-Diplomacy-Action_Synthesis-6_Webinar-Series-Enhancing-International-Scientific-Cooperation_31JUL22-4.pdf.
- ¹⁸ Arthur, M. B., Hall, D. T. and Lawrence, B. S. 1989. Chapter 1. Generating new directions in career theory: The case for a transdisciplinary approach. IN: Arthur, M. B., Hall, D. T., & Lawrence, B. S. (eds.). HANDBOOK OF CAREER THEORY, Cambridge University Press, Cambridge. Pp. 7-25.
- ¹⁹ UNESCO. 2021. *Recommendation on Open Science*. Adopted by the General Conference of the United Nations Educational, Scientific and Cultural Organization (UNESCO) among 193 nations. <https://en.unesco.org/science-sustainable-future/open-science/recommendation>.
- ²⁰ United Nations. 2015. Transforming Our World: The 2030 Agenda for Sustainable Development, A/RES/70/1. United Nations General Assembly, New York. <https://sdgs.un.org/goals>.
- ²¹ APECS. Who We Are. <https://www.apecs.is/who-we-are.html>
- ²² Arctic Circle Japan Forum. <https://www.arcticcircle.org/forums/arctic-circle-japan-forum>.

APPENDIX 2:

TABLE 1: INTERNATIONAL POLAR YEAR (IPY) HISTORY					
Characteristic	International Polar Year (IPY)				
	IPY-1	IPY-2	IPY-3*	IPY-4	IPY-5
Dates	1882-83	1932-33	1957-58	2007-08	2032-33?
Solar Activity Focus	Solar maximum	Solar minimum	Solar maximum	IHY**	Integrated as a fundamental of climate?
Nations Participating	11	40	67	60+	All continents to be well-represented?
Disciplines	3	4	14	11	Science (natural sciences, social sciences and Indigenous Knowledge)?
Observation Distance from Earth	Ground-based	Balloon	Satellite	Satellite	Satellite?
Geographic Focus	Arctic and Antarctic	Arctic and Antarctic	Global	Arctic and Antarctic	Global?
International Security Focus	“Weather”	Radio	Satellite	‘Climate’	Sustainable Development?
Leadership by Early Career Researchers (ECRs)	Not Applicable			Establishment of APECS	ECRs participation in Leadership?

* Renamed International Geophysical Year (IGY)
 ** Solar-terrestrial focus was part of the International Heliophysical Year (IHY) in 2007.
 ***Modified from: Berkman P.A., 2020. Polar Science Diplomacy. IN Scott, K.N. and VanderZwaag, D.L. (eds.). RESEARCH HANDBOOK ON POLAR LAW. Research Handbooks in Environmental Law Series, Edward Elgar Publishing, London. pp.105-123.



FIGURE 1: PYRAMID OF INFORMED DECISIONMAKING as the engine of science diplomacy, initiated with questions inclusively to reveal questions of common concern that require Open Science to address with holistic integration, building common interests short-to-long term while enhancing research capacities as a positive feedback at local-global levels “for the benefit of all on Earth across generations.” Informed decisions “operate across a ‘continuum of urgencies’.” From References 14 and 16.