Polar Record

www.cambridge.org/pol

Polar Science with Global Impact?

David Carlson

Commentary

Cite this article: Carlson D (2019). Polar Science with Global Impact? *Polar Record* **55**: 203–206. https://doi.org/10.1017/S0032247419000500

Received: 12 July 2019
Revised: 2 September 2019
Accepted: 4 September 2019

Keyword:
outreach; IPY; assessments

Author for correspondence:
David Carlson, Email: ipy.djc@gmail.com

Abstract

No one, not even those of us who sat at the center, can or will know the full outreach impact of IPY. If one remembers and trusts public reaction one can deduce that, for a short moment, IPY research and outreach worked together to put a good face on science.

Did the International Polar Year 2007–2008 (IPY) meet its goals?

International Polar Year (IPY) operated with the laudable goals of enhancing polar research while highlighting global impact. Assessing IPY outcomes against four legacy "Objectives" specified in the IPY Framework (Rapley et al., 2004, pp. 10–11),

- "lay the foundation for major scientific advances in knowledge and understanding of the nature and behaviour of the polar regions";
- "leave a legacy of observing sites, facilities and systems to support ongoing research";
- "data collected under IPY 2007–2008 will be made available in an open and timely manner" and
- "engage the awareness, interest and understanding of schoolchildren, the general public and decision-makers worldwide *in the purpose and value of polar research and monitoring*"

one might prevaricate with terms like "partially" or "difficult to say." Following best scientific practice, one should declare the null hypothesis "NO" and then attempt to refute that hypothesis with valid evidence. Against the "engage awareness" goal, any refutation would quickly cite APECS (Association of Polar Early Career Scientists, e.g. Hindshaw et al., 2019) and the supposed Education, Outreach and Communication (EOC) impact of IPY, but in doing so would need to rely on testimony, anecdote and self-administered surveys. Fundamentally, can anyone explore impacts of IPY on science without simultaneously assessing EOC? If one confronts the need to seriously assess EOC in order to assess IPY, what tools, standards and guidelines should one use?

I emphasize an oft-eliminated phrase with italics above. IPY framers expressed their objectives carefully. They wanted enhanced recognition – from schoolchildren, the public and decision-makers – of the inherent value of polar research but never explicitly endorsed increased funding for polar research even though many IPY participants saw, frequently, a projection showing hoped-for post-IPY step-function increase in research funding. Nor did those planners anticipate the "science in the right place at the right time" theme which public and media attached to IPY. Writing in 2003, they expressed "humankind's need for environmental knowledge" (Rapley et al., 2004, p. 7) but never posed IPY as an explicit climate change program. The crowd of enthusiastic climate advocates anxious to hitch their carts to the strong IPY research horse came later, for reasons and with an intensity not anticipated by the planners.

Ten years after IPY operations, with global CO_2 emissions rising while society fails to act, what can one learn by looking at IPY? I claim that one learns more looking at IPY outreach and research together than at IPY research or outreach in isolation. For consistency and convenience, I lump IPY's science projects, those that covered the large left-side area of the IPY chart (see Fig. 1), under the term "research," and the various IPY EOC activities, including those formally endorsed EOC activities represented on the right side of the IPY chart (Fig. 1), under the general term "outreach." Polar research deserves continued public attention and substantial resources, even if program definitions, funding and researchers themselves hold faint if any memory of IPY. In general, outreach has not moved apace, a delay and deficiency that limits the impact and efficacy of that research. IPY veterans wonder whether our efforts had lasting impact, whether we had fun but made only short-term (if loud) noise or indeed whether the combined research and outreach communities have motivation or tools to understand how best to maintain persistent impact?

This special issue offers a rare opportunity for reflection. These few papers do not represent the whole of IPY outreach nor do they adhere to a shared evaluation framework as advocated by Salmon and Roop (2019). They offer a glimpse of ongoing issues. I apologize beforehand that I might convey dismissive or unfriendly assessments. Likewise, I will not treat our own IPY International Programme Office (IPO) efforts gently. If subsequent activities – chief editorship of a prominent IPY-stimulated science journal for ten years and a term as Director of the World

© Cambridge University Press 2019. This is an Open Access article, distributed under the terms of the Creative Commons Attribution licence (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited.

CAMBRIDGE UNIVERSITY PRESS

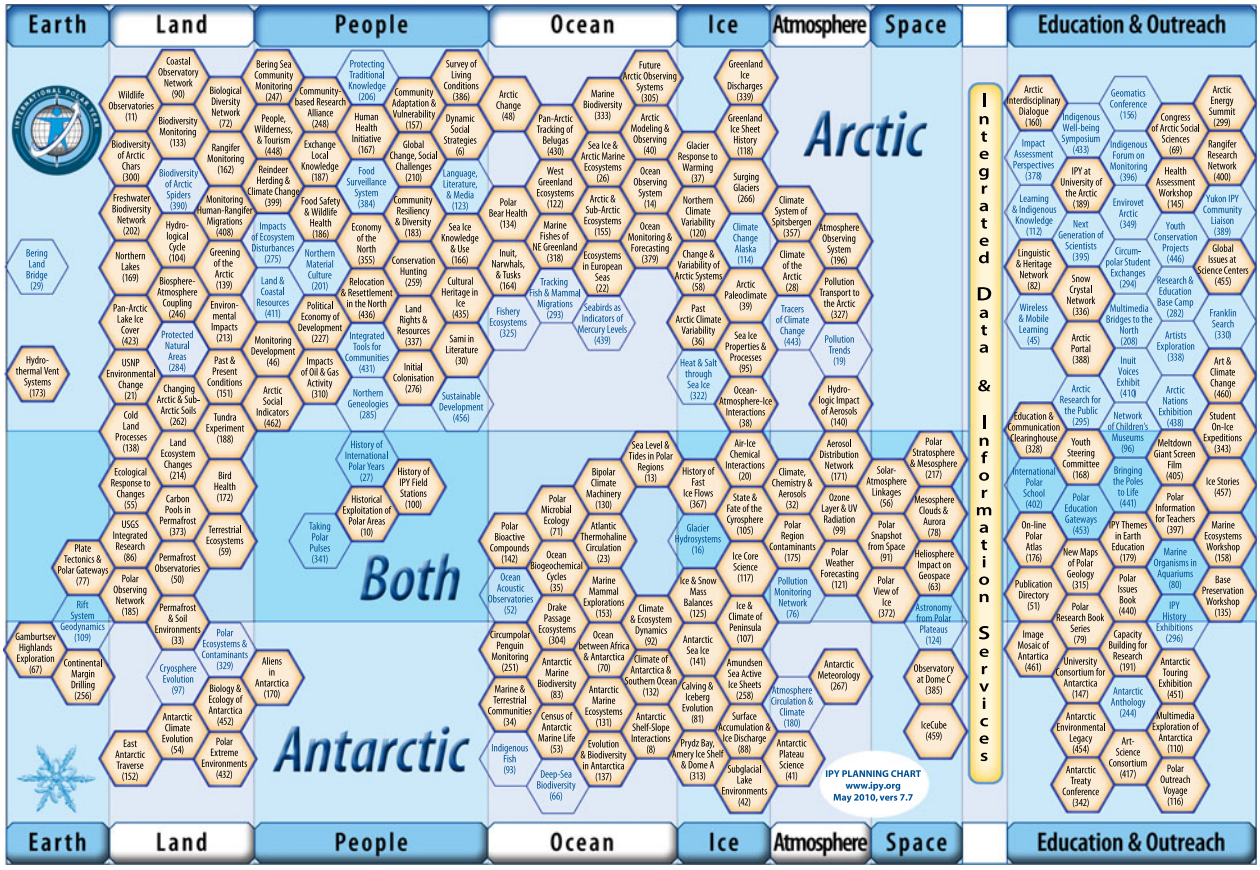


Fig. 1. Representation of projects (individual hexagons) that constituted IPY, categorized geographically (e.g. focused on the Arctic, the Antarctic or on polar regions generally) and by research topic (e.g. people, ocean, ice, etc). Each of the 170 research projects (left), the central data service and the 58 outreach projects (right) endured and passed rigorous scrutiny for international participation, data availability, probable impact, etc. In this version, hexagons with empty backgrounds represent those that failed to gain sufficient funding or that withdrew from active participation.

Climate Research Programme – have altered my views of IPY specifically and of science generally, they have not negated nor diluted my deep affection for polar and climate research and outreach communities.

The range and variety of IPY EOC activities

I credited IPY for inclusivity and the resulting unprecedented breadth of research (Carlson 2010). I also cautioned that one could probably never know, much less quantify, the "full, complete, definitive description" of IPY research but that as a consequence one would "always have much to learn and discover about IPY 2007–2008" (Carlson, 2010). If variety and complexity characterized IPY research, variety and complexity amplified 10-fold characterized outreach.

Almost 60 substantial well-organized outreach projects submitted project plans to achieve formal IPY endorsement. The IPY Polar Resource Book (formally, Polar Science and Global Climate, An International Resource for Education and Outreach (Kaiser, Zicus, & Allen, 2010) published more than 75 descriptions of polar and climate outreach ideas and initiatives, from correspondents around the world covering everything from classroom visits to formal exhibitions to fairs and festivals. The (no longer accessible) database from a post-IPY survey of outreach (Provencher et al., 2011) listed more than 500 activities from 70 countries.

Lists and counts miss the pervasive enthusiasm of IPY. From the IPO we saw, heard and received requests for participation in or endorsement of outreach activities almost daily from mid-2006 through 2008. We rejected entreaties from the adventure crowd that IPY endorse their ski-kayak-balloon-rollerblade trip across one or both poles. But we watched, cooperated with and enjoyed films, museum exhibits, concerts, live broadcasts, blogs from the field, student expeditions, stamps, commemorative coins (a small quarterly rebate on coin sales funded initial APECS activities), photography exhibits, tourism operators, reindeer herders, Arctic urban planners, news articles and celebrations. Salmon et al. (2011) documented global interest in IPY. The side-bar event described there, of prompt international response to a teacher's request for assistance, happened regularly, generally without IPO intervention; we learned about them afterwards. Friends and neighbours still sit spell-bound at the Tara video (that small hardy vessel and crew performed a remarkable Arctic drift during the IPY, The Tara Ocean Foundation, 2008) with its evocative images and sounds of fierce dark Arctic winter; who knows how many viewers saw that video shown on French television during IPY. I attended a special evening screening in Brussels for a large rapt audience. Remembering the Tara video reminds me of DVDs, hundreds of them from many sources in many languages, all with an IPY logo on the jacket. Space agencies, national agencies and private foundations distributed countless promotional IPY-labelled DVDs to researchers and teachers. Sans jackets, my 50-cm pile of IPY-labelled DVDs, at thickness of 1.25 mm each, must hold nearly 400 DVDs? I retain a few precious maps: special IPY maps produced by cartographers of the British Antarctic Survey, with Arctic one side and Antarctic – at the same scale – on

https://doi.org/10.1017/S0032247419000500 Published online by Cambridge University Press

the reverse (the IPO probably distributed several thousand); high-resolution composites of the perimeter of Antarctica assembled from latest Landsat images (I treasure an initial colourful digital version); a brightly-coloured Arctic map by Canadian Geographic (in circular format!). Who can even remember, much less assess, research and public relations impacts of IPY maps? And, of course, books. Books of history, scenery, wildlife, art. Books small and large, in many languages. At one point UNEP compiled a list of "official" IPY books (formally, the UNEP Polar Resource Library, another link that no longer works), but their list tended towards research and assessments while missing many scenery and natural history volumes. IPY books – most of them with blue jackets or blue spines – cover two meters of my shelves; authors and publishers sought benefit by attaching the IPY logo while we imagined outreach benefit to IPY itself. The IPO distributed – free of charge – nearly 4000 copies of the Polar Resource Book (Kaiser et al., 2010), each copy graced by polar photographs from Christian Morel (who, with several other professional photographers, donated images for use in IPY outreach efforts). Enthusiasm, activity, celebration, basically non-stop for two years. Does anyone know how many fun colourful and even animated versions of the IPY logo emerged? We refined IPY's message to 10 words: shrinking snow and ice, global impact, neighbours in the North. Shortened again on occasion to "polar science global impact." The public reacted! Definitely science at the right place at the right time. Careful distinction in the Framework document between polar research and climate (maintained by the IPO during delicate funding negotiations in climate-unfriendly countries) disappeared immediately in the minds of press and public. IPY fed directly into public hunger for real-time real-world climate information.

I conclude this steam-of-consciousness outburst with a single point: no one, not even those of us who sat at the centre, can or will know the full outreach impact of IPY. While researchers count publications and calculate impact factors to support promotion or buttress proposals, even the research side has difficulty to quantify tangible outcomes from IPY. If, however, one remembers and trusts public reaction one can deduce that, for a short moment, IPY research and outreach worked together to put a good face on science. As a corollary to how much one will never know, no one who did not sit in or close to the IPO can imagine the vast enthusiasm from participants and public.

Timing

Rightly or wrongly, the collapse of Larsen B in 2002 captured public attention. BBC and CNN kept polar issues in the public eye, while IPCC released its fourth climate Synthesis Report in 2007. In September 2007, the floor dropped out of Arctic sea ice (Fig. 2). Researchers now recognize abrupt rises (few) and falls (many) of sea ice extent as part of a serious continuing downward trend but at the time, with no prior examples, Arctic sea ice extent seemed to plummet. Substantial portions of press and public noticed. The good news? Press and public could see IPY: science in the right place at the right time. Shortly after, global economic conditions deteriorated, opposition to climate action strengthened, and 2008 did not produce another record low in sea ice extent. Other factors contributed to IPY attention (including that the polar research community felt that IPCC's fourth assessment downplayed ice mass losses and sea level rise) but the public caught the sea ice news and found researchers already on the job. No ten-year plans, no national scale-up to launch a new mission, just

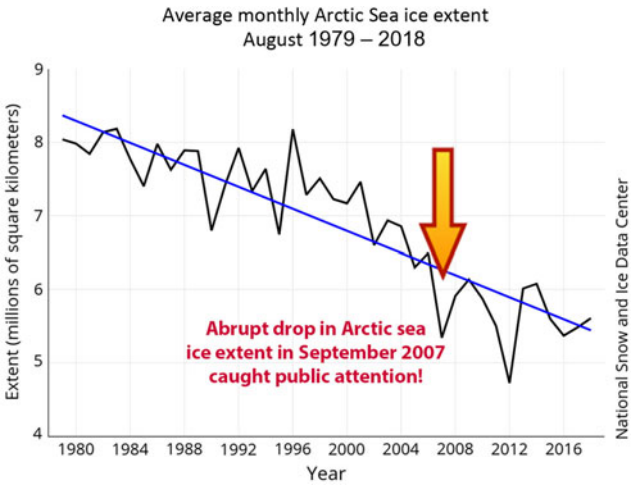


Fig. 2. Satellite record of Arctic Sea Ice Extent, recorded and processed by USA National Snow and Ice Data Center. If one imagines this chart stopping after the September 2007 data point, without the longer-term trend line, one gains a sense of the attention-grabbing nature of this data at that time.

good news that researchers had a global cooperative program called IPY, including difficult daring missions in the Arctic and Antarctic, already underway. All the better: this IPY identified teachers and journalists as important respected partners!

IPO actions

Behind the scenes, the IPO took concerted actions to initiate, stimulate and support outreach. We showed outreach on the same sheet (e.g. Fig. 1), in the same graphic size and format, as research. Today that presentation looks quite natural; not so at the time. We defended outreach against derogatory comments from prominent researchers; outreach for many of them meant and still means graduate student labor. With one position to offer against two demands, I chose to recruit an outreach coordinator instead of a data coordinator. As outreach became prominent and successful, we embedded it more deeply into the overall IPY programme. Zicus et al. (2011) described the sequence of polar days. From my point of view, those events offered repeating opportunities to help research and outreach communities discover and support each others' needs and values. We encouraged freedom of ideas and activities, not least by establishing free flexible group structures for planning and idea exchange and by keeping the outreach committee itself open, flexible and broad. We explored every option that came to our attention, often a new option for each polar day. Virtual balloons, blogs, live-streamed global radio hosted from a small community broadcast station in northern Canada – Salmon et al. (2011) recounts how we experimented with and used an evolving mix of communication technologies. Our plans focussed on teachers and journalists; I wrote a short science summary on a monthly basis to nearly 200 self-subscribed journalists. We encouraged a virus-like exchange of infectious polar enthusiasm.

Standards

IPY found no manual or guidelines for "How to conduct a large science outreach program." In particular, we found no existing validated tools or standards for outreach evaluation and assessment. Salmon et al. (2011) make a similar point: IPY started from zero to build a polar community. IPY's Polar Resource Book

https://doi.org/10.1017/S0032247419000500 Published online by Cambridge University Press

provided "Tips and Tricks" for outreach related to polar and climate science (Kaiser et al., 2010) but the dedicated volunteers who contributed to that book recognized the lack of tangible, tested shareable evaluation tools. IPY's outreach activities therefore depended on high practical standards of content and conduct. The IPO relied on people or groups with strong reputations for quality products and trusted them to instill the same high standards in their IPY projects and with their IPY colleagues. These trusted partners often included large national polar organizations with talented public relations staff. Trust proved a large, necessary and fundamental currency of the entire IPY outreach program. I acknowledge the importance of trusted individuals: L. Huffman for ANDRILL, J. Xavier for Portugal, B. Kaiser for the Polar Resource Book, J. Baeseman for APECS and above all Rhian Salmon for overall enthusiasm and coordination. Readers can trace those impacts through some of these papers.

Outreach with outreach and with research

Glaciologists, meteorologists and oceanographers had worked collectively on shared problems. For many educators, IPY represented a first opportunity for international collaboration. Obstacles of language and national (or state or local) standards became shared concerns, part of larger complex challenges of effective science communication. IPY's outreach committees, groups and events offered unusual opportunities for researchers and exhibit designers, formal and informal educators, or artists and teachers to compare notes and discover shared motivations. While national polar programs had developed successful models for insertion of teachers into field research, IPY offered an opportunity to extend those models – particularly for students – into international settings. Through the polar day events (supported by fliers in multiple languages), IPY outreach tried to showcase both the challenges of and the talents applied to polar research. Through IPY, educators as well as the general public discovered a network of researchers, fellow educators and communicators engaged in creative fun informative advocacy for the health of our planet. Those of us in the IPO can testify to remarkable levels of participant and public enthusiasm.

Volunteers

IPY represented a momentary confluence of public interest, resources, research activity and outreach energy. For most outreach participants, and often for researchers joining outreach activities, participation in IPY events occurred on top of, in addition to, regular daily work responsibilities. Most participants in most IPY events worked without compensation. For the short term, enthusiasm carried the day, and turned the attention of those few of us with paid positions towards how best to coordinate and support volunteers. All of us knew at the time that our efforts would prove unsustainable in the long run, but we shared the motivation that we could and must use the opportunity of IPY to make a difference. Several recollections and accounts in this special issue suggest that perhaps we did. APECS certainly did.

Closing thoughts

One cannot, and will not, know the full range, nor public impact of IPY outreach activities. No physical or digital archive holds documentation for even a majority of outreach events, a procedural failure by the IPY IPO but exactly what polar planners achieved when they dictated "minimal bureaucracy" (Rapley et al., 2004, p. 28). The IPO did arrange proper archival of the ipy.org web site which holds a substantial record of IPY outreach activities. We advertised archival opportunities initiated by Scott Polar Research Institute and a then-active Canadian digital polar library; these and other possibly useful links have largely disappeared. Many participants accept that IPY 2007–2008 engaged an unusual breadth of research and stimulated a vibrant collaboration of research with outreach. Personally, I mistrust estimates about numbers of individuals exposed to IPY's messages but I have no doubt that – in the public's mind – IPY represented the right science in the right place at the right time. One rarely finds opportunity to make such a statement. More than funding or policy, research and outreach responded appropriately and effectively to the IPY opportunity with enthusiasm and trust. I have too often seen science bureaucracy crush spontaneity. For a short time during IPY, spontaneity pushed back. When papers collected in this special issue provide hints of that sense of IPY outreach creativity, innovation and motivation, they do us all a valuable service.

References

Carlson, D. (2010). Why do we have a 4th IPY? In S. Barr & C. Luedecke (Eds.), *The history of the International Polar Years (IPYs)* (pp. 299–312). Berlin Heidelberg: Springer Verlag. https://doi.org/10.1007/978-3-642-12402-0_14

Hindshaw, R. S., Mariash, H., Vick-Majors, T. J., Thornton, A. E., Pope, A., Zaika, Y., ... Fugmann, G. (2019). 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

Kaiser, B., Allen, B., & Zicus, S. (2010). *Polar Science and Global Climate: An International Resource for Education and Outreach*. Pearson Custom Publishing.

Provencher, J., Baeseman, J., Carlson, D., Badhe, R., Bellman, J., Hik, D., ... Zicus, S. (2011). Polar Research Education, Outreach and Communication during the fourth IPY: How the 2007–2008 International Polar Year has contributed to the future of education, outreach and communication. Paris: International Council for Science (ICSU) doi: 10.13140/RG.2.1.4451.5369

Rapley, C., Bell, R. E., Allison, I., Bindschadler, R., Casassa, G., Chown, S., ... Zhang, Z. (2004). A Framework for the International Polar Year, 2007–2008. Retrieved from ICSU website: https://academiccommons.columbia.edu/catalog/ac:144786

Salmon, R. A., Carlson, D. J., Zicus, S., Pauls, M., Baeseman, J., Sparrow, E. B., ... Kolset, T. (2011). Education, outreach and communication during the International Polar Year 2007–2008: Stimulating a global polar community. *The Polar Journal*, *1*(2), 265–285.

Salmon, R. A., & Roop, H. A. (2019). Bridging the gap between science communication practice and theory: Reflecting on a decade of practitioner experience using polar outreach case studies to develop a new framework for public engagement design. *Polar Record*. Advance online publication. doi: 10.1017/S0032247418000608

The Tara Ocean Foundation (2008). Retrieved 2019 from https://oceans.taraexpeditions.org/en/m/about-tara/les-expeditions/tara-artic/

Zicus, S., Almeida, M., Edwards, K., Hik, D., Huffman, L., Kaiser, B., ... Xavier, J. (2011). IPY education activities. In I. Krupnik, I. Allison, R. Bell, P. Cutler, D. Hik, J. López-Martínez, ... C. Summerhayes (Eds.), *Understanding Earth's Polar Challenges: International Polar Year 2007–2008. Summary by the IPY Joint Committee*. University of the Arctic. Retrieved from http://library.arcticportal.org/1211/

https://doi.org/10.1017/S0032247419000500 Published online by Cambridge University Press