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Introduction to the Annals of Glaciology "Ice in a Sustainable Society" issue

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What is glaciology? Its definition has been a matter of dispute for decades. Arguably, no one had known it better than Gerald Seligman, founder of the International Glaciological Society (IGS) and the *Journal of Glaciology*, which later gave rise to its younger sibling, the *Annals of Glaciology*. Seligman went to the trouble of spending years documenting and advocating a broad definition of the term, against the folk etymology that glaciology were merely the study of glaciers. In a letter to his IGS fellow Peter Wordie, dated 15 October 1944, Seligman already defended the definition of glaciology as “*the study of ice in all its forms*” (Wood, 1986). He would continue championing that definition for the rest of his career, as evidenced in an editorial published 17 years later in the *Journal of Glaciology* (Seligman, 1961), even though, according to the IGS historian Peter Wood (1986): “[...] *a definition more to his own liking [...] presumably would have been a far broader one.*”

The first use of the word “glaciology” in the English language dates back to the last decades of the 19th century: the Merriam-Webster (2021) Dictionary mentions the year 1889 without disclosing the source, while Seligman (1961) cites a reference in the Oxford Dictionary to a book review published in *The Nation* (1892; notice the typo in Seligman’s citation: the correct page in *The Nation* magazine is 497, not 492). Today, Seligman’s (1961) definition and etymology of “glaciology” (namely: “*The word is derived from the Latin glacies—ice, and has always been intended to cover every form of ice*”) is

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widely accepted by glaciologists, although the epidemic pseudodoxy that glaciology should mean just the study of glaciers (and ice sheets) still lingers, sometimes even amid some scientists. Thus, it is still not uncommon to find glaciologists embroiled in disputes with experts in other fields about the glaciological relevance of topics like ice clouds, planetary ices, or Antarctic meteorites. For those still in doubt, all those topics are indeed relevant for glaciologists and their studies have been published in the *Journal of Glaciology* and the *Annals of Glaciology* (e.g. Nishio and others, 1982; Gayet and Bain, 1983; Krass, 1984; Delisle, 1993; Hvidberg, 2003; Velandia and others, 2021).

Since the time of Seligman's (1961) definition, the field of glaciology has evolved and expanded, adapting itself to the times of the space-age, digital revolution, globalisation, and climate change. Through each of these evolutionary steps, the realm of glaciology turned broader and more complex, becoming more intricately connected with the formal and applied sciences, social sciences, and humanities. The current climate crisis (Chen and others, 2021), imbued with images of ice inexorably melting and rising sea levels, has put the cryosphere in the spotlight as one of the most iconic indicators of climate change. Consequently, the environmental, social, economic, and political repercussions of a changing cryosphere can no longer be detached from ice research (Hovelsrud and others, 2011). Besides mastering the technical and scientific skills of the profession, responsible glaciologists must also be aware of the cultural, artistic, historical, philosophical, moral, and legal aspects of the glaciological practices and of glaciology itself (Craciun and others, 2022).

For all those reasons, and on the occasion of the 85th anniversary of the IGS, the *International Symposium on Ice in a Sustainable Society* (ISS) was celebrated in Bilbao on 5–10 June 2022 (Tranter and Muñoz-Marzagon, 2022). It was quite unique, in the sense that it was the first time that an IGS symposium had integrated so many disciplines, bringing together experts from the physical, social, life and environmental sciences, humanities, formal sciences and engineering, as well as artists, intellectuals and representatives from the public and private sectors, to discuss and coproduce knowledge on glaciology, sustainability and climate change. The IGS Symposium adopted an innovative structure, combining keynote lectures, oral presentations and posters with many other

types of intellectual interaction, including panel discussions, a pre-symposium workshop (Craciun and others, 2022), a week-long art exhibition, and a thematic movie festival. Additionally, Catherine Ritz was presented with the Seligman Crystal, which she had been awarded in 2021 (IGS, 2022).

Certain artistic pieces exhibited during the Symposium are described in *ICE* by Payen and others (2022), while the whole ISS Art Exhibition is going to be presented in a separate book (to be announced on the ISS Symposium website <<https://iss.bc3research.org>>). On the other hand, scientific articles presented in the Symposium are published in this volume of the *Annals*, together with additional contributions submitted after the open call for papers.

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REFERENCES

Chen D and 14 others (2021) Framing, Context, and Methods. *In*: Masson-Delmotte V and 18 others, eds. *Climate Change 2021: The Physical Science Basis*. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 147–286 (doi:10.1017/9781009157896.003).

Craciun A and 9 others (2022) *Icy Humanities: A Collaborative Symposium*. Online workshop hosted on 05 April 2022 by The Frederick S. Pardee Center for the Study of the Longer-Range Future at Boston University's Pardee School of Global Studies and the Scott Polar Research Institute at the University of Cambridge, <<https://youtu.be/vJhjUWTkchA>>.

Delisle G (1993) Global change, Antarctic meteorite traps and the East Antarctic ice sheet. *Journal of Glaciology* **39**(132), 397–408 (doi:10.3189/S0022143000016051).

Gayet J and Bain M (1983) Icing cloud microstructure from in situ measurements. *Annals of Glaciology* **4**, 66–72 (doi: 10.3189/S0260305500005255).

Hovelsrud GK, Poppel B, van Oort B and Reist JD (2011) Arctic societies, cultures, and peoples in a changing cryosphere. *AMBIO* **40**(Suppl 1), 100–110 (doi: 10.1007/s13280-011-0219-4).

Hvidberg C (2003) Relationship between topography and flow in the north polar cap on Mars. *Annals of Glaciology* **37**, 363–369 (doi:10.3189/172756403781815906).

IGS (2022) Presentation of the Seligman Crystal to Catherine Ritz. *ICE* **188**, 18–23.

Krass M (1984) Ice on planets of the Solar System. *Journal of Glaciology*, **30**(106), 259–274 (doi:10.3189/S0022143000006080).

Merriam-Webster (2021) “Glaciology.” Merriam-Webster.com Dictionary, Merriam-Webster, <<https://www.merriam-webster.com/dictionary/glaciology>>, accessed 4 Mar 2024.

Nishio F, Azuma N, Higashi A and Annexstad J (1982) Structural studies of bare ice near the Allan Hills, Victoria Land, Antarctica: a mechanism of meteorite concentration. *Annals of Glaciology* **3**, 222–226 (doi:10.3189/S0260305500002810).

Payen S, Jackson J, Phalkey N and Jackson-Payen P (2022) The melting artist. *ICE* **188**, 24–31.

Seligman G (1961) The definition of “Glaciology”. *Journal of Glaciology* **3**(29), 802–802 (doi:10.3189/S0022143000027155).

The Nation (1892) Wright’s Man and The Glacial Period. Book review. *The Nation* **55**(1435), 496–497. The Evening Post Publishing Company, New York, NY, USA.

Tranter M and Muñoz-Marzagon P (2022) International Symposium on Ice in a Sustainable Society. *ICE*, **188**, 11–17.

Velandia J, Diener A and Bansmer S (2021) Porosity formation during atmospheric ice accretion: measurements using micro-computed tomography. *Journal of Glaciology*, **67**(266), 1228–1234 (doi:10.1017/jog.2021.68).

Wood P (1986) *The International Glaciological Society: Fifty Years of Progress*. International Glaciological Society, Cambridge, UK.