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Cover picture: Turning iceberg, Jökulsarlon glacier lagoon, Iceland, July 2019. Photo by Juergen Merz.

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From the Editor

Dear IGS member

We are now well into when we should be preparing the 2022 volume of *ICE* but as usual, we are running late – there is just too much happening.

This is the first year since 2019 we have been able to hold symposia, because covid-19 restrictions are being lifted and most people are able to travel. So far people have been slow on the uptake: there is a hesitation and a certain reluctance in people to participate in group activities. This is understandable but at the same time a bit sad as the first two symposia were very interesting (but then all our symposia are interesting!). It was especially true of the very first symposium, 'Ice in a Sustainable Society', held in Bilbao, Spain. This was a ground-breaking theme for the IGS. It incorporated several disciplines such as 'Life and Environmental Sciences', 'Social Sciences', 'Humanities' and visual and auditory arts.

Booking was slow: some countries had imposed restrictions on the mode of travel, resulting in excessive travel times; potential participants from some countries cancelled their attendance because of uncertainties relating to the perilous situation in eastern Europe. And no doubt some people were just not ready to travel.

Nonetheless, it was a very interesting symposium, which all of us enjoyed tremendously. And all credit to Sérgio Faria, one of our Scientific Editors, and his wonderful and very capable team for coming up with such an interesting concept for a symposium, one that we most certainly will revisit in the future.

Our second symposium was in Juneau, Alaska, USA. The theme was 'Maritime Glaciers', something we have very successfully addressed in the past. There was a similar hesitation leading up to the symposium, especially when news emerged that there had been a substantial increase in covid-19 cases and the University of Alaska implemented social distancing and the wearing of masks inside. Nonetheless we had a very decent number of participants, notably a large number of students and early career researchers. The younger generation is obviously more relaxed about covid-19 than us old wrinklies. We had only three cases of covid-19 during the symposium, no doubt thanks to the stringent enforcement of the precautionary guidelines.

They symposium proceeded very smoothly under the capable direction of Jason Amundsen and his excellent team. We spent a wonderful and very enlightening week listening to great talks and viewing exemplary posters. In addition, we had a superb mid-week excursion culminating in a fabulous banquet at a lodge on Orca Point and the most fantastic bbq'd salmon I have ever tasted. But almost as good was the sail up to Tracy Arm, viewing the fantastic scenery, and if you have never seen a great humpback whale weighing in excess of 30 tonnes come flying out of the sea, you better put that on your bucket list. For our next symposium, we head to Iceland in the latter part of August. The theme is 'Ice, Snow and Water in a Warming World'. This symposium is co-sponsored by several organizations and has proved to be very popular: we have received 430 abstracts in total so hopefully the attendance will be of that order.

In September we have a 'Snow' symposium in Davos, Switzerland. The uptake is good: we have received in excess of 120 abstracts.

In short, things are taking off.

I would also like to mention, in case you have not noticed, that we launched our new website at the end of May. It has been a very steep learning curve for us here in Cambridge as none of us is very familiar with WordPress. There was also the fact that we have been extremely busy with the above-mentioned symposia, with everything having to be done at the last minute because things were changing up to the last minute and we wanted everything to be as up to date as possible. We have had several positive comments on the website but the proof of the pudding is in the eating, i.e. how well we manage to maintain it and keep it up to date. So, please, if you find that there are things missing that you feel we should include in the website do let us know.

We hope you will find the site useful; I particularly recommend looking at the complete archive of our newsletter *ICE*. It includes every issue going back to January 1958. This amounts to a remarkable set of information relating to the history of glaciology.

You will also find obituaries of those glaciologists who have died since 2006. You can read about the lives of some remarkable people.

The photographs we used for the website come from our archive. These are pictures that you have sent us and, for some of them, we were not able to establish the photographer. If you come across one of your pictures, please get in touch with us so we can give credit where credit is due.

But as with all things new, it is inevitable there will be sglitches so if you notice some, please let us know at igsoc@igsoc.org.

Enjoy!

Finally, I would like to inform you that the Charity Commission has finally approved the constitutional amendments I mentioned in one of my earlier editorials. This is a great step for the IGS as now we can hold all our meetings online if need be. Of course, we would like to hold them in person but in fact because our symposia and meetings are very thematic we only get a small number of Council members attending any one of the in-person meetings so increasingly we have had to resort to co-opting members to Council to make the meeting quorate. This is now a thing of the past as Council members not able to attend the in-person meeting can now do so remotely and it is all 'legal'.

In addition we have made the Council more streamlined and thus more effective for the future.

Magnús Már Magnússon

Secretary General



5 November 2021, Blindern Campus, Georg Sverdrups Hus (GSH), Auditorium 1, University of Oslo, Oslo, Norway

The President, Francisco J. Navarro, was in the Chair.

50 persons, from 12 countries, attended of whom 33 were members.

1. The previous AGM's minutes

The Minutes of the last Annual General Meeting, published in the 2nd issue of *ICE* 2019, No. 180, and on the IGS website, were approved on a motion by R. Hock seconded by N. Karlsson and signed by the President.

2. The President's report

The President gave the following report for 2019–2021.

Ladies and gentlemen, members of the IGS and dear colleagues

Because of the covid-19 pandemic, the IGS has not held an Annual General Meeting (AGM) since 9 July 2019, so this report will cover the period from early July 2019 to early November 2021 (i.e. a total of 28 months). On the other hand, this is my last report as IGS President, so there will be not a plan of action for next year. However, I will comment on some actions currently under development but not finished and will also briefly comment on things that I would have liked to implement but was unable to, mostly because of time limitations. The latter are left as suggestions of possible actions to be undertaken by the next President, in case she thinks that they are of interest for the IGS.

I will not comment in this report on several business-as-usual duties of the IGS, which are reported separately by their corresponding people in charge. These include:

- The editorial work, carried out by our excellent editorial board, led by our Chief Editor Hester Jiskoot, together with her Associate Chief Editors, and supported by the analyses and recommendations of our Publications Committee, chaired by Gwenn Flowers.
- The finances of the IGS, maintained on a daily basis by our Secretary General, Magnús Magnússon, under the surveillance/audit of our Treasurer, Amber Leeson.
- The membership management, efficiently done by our Membership and Accounts Manager, Louise Buckingham.

 The daily running of the general IGS duties by our Secretary General. These normally include

 among many others – the arrangement and organization of symposia. Although no symposia have been held during the pandemic, Magnús has continued rearranging previously planned (and not held) symposia and planning new ones.

We should be grateful to all of the above people/ committees/boards, which make possible, with their work (volunteer in most cases), the continuation of a healthy IGS.

The actions that follow correspond, in many cases, to the work of various other committees, for which the above consideration on acknowledgement also applies. These include the Awards Committee (chaired by Ian Allison), the Nominations Committee (chaired by Doug MacAyeal), the Early-Career Glaciologists Group (EGG), chaired by Rebecca Schlegel, and the Ad-hoc committees of Governance Changes (chaired by Regine Hock), Website (coordinated by Magnús Már Magnússon) and Actions for Diversity and Inclusivity (chaired by Nanna Karlsson).

Actions undertaken during the last 28 months

In what follows, the various actions are listed in approximately chronological order of initiation.

- 1) The Ad-hoc Committee on Governance Changes, established in June 2018, did an indepth analysis of the results of the membership survey done during the previous reporting period (in particular, December 2018–February 2019), aiming to get the membership's thoughts and preferences regarding various aspects of the envisaged constitutional amendments (online attendance at Council meetings and AGMs, online voting for Officers and Council elections, Council composition, etc.). This was followed by several phases of interactions with the Council (and discussions by Council). Main rounds were held in September 2020 and May 2021, with the final one (and approval by Council) in mid-October 2021. The new amended Constitution is now ready to be launched, by the AGM of 5 November 2021, for membership voting.
- 2) In November 2019 a redefinition of the role of the national correspondents (which, so far, were actually correspondents of the *ICE*

Bulletin of the IGS), making them actual delegates and points of contact with the IGS in their respective countries or regions, and a full renovation of the set of national correspondents was initiated. In subsequent months, contacts of the President with prospective new correspondents were made and in early May 2020 the new set of correspondents was approved by Council new appointments. In total, 18 new correspondents were appointed, while 11 former correspondents continued (one of them was replaced in Sep 2021). The most important duties of the correspondents are now to encourage and keep track of membership of the IGS in their respective countries/regions (promoting both continued memberships and new memberships), to promote the publication of papers in the Journal of Glaciology and the Annals of Glaciology, as well as promoting the attendance to IGS symposia (and the organization of IGS symposia in their countries).

- 3) In March 2020, the final text for the Graham Cogley Award (honouring our former Chief Editor, sponsored by his family and offered by IACS and by IGS in alternating years) was approved by Council. The first awards by IGS, addressed to outstanding publications by early-career researchers in the *Journal* and the *Annals*, were given in June 2020 (they were awarded for the first time in 2019, by IACS).
- 4) In March 2020, the Nominations Committee was renovated. The composition of the revised committee is as follows:

Doug MacAyeal (Chair) Adam Treverrow Nanna Karlsson Liss Andreassen Jennifer Hutchings Mikhail Ivanov Francisco Navarro (Ex-Officio, President) Magnús Már Magnússon (Ex-Officio, Secretary General)

- 5) In April 2020, the IGS (online) Global Seminar Series was launched on the initiative of Tavi Murray, who has counted with the support of Rebecca Schlegel (and eventually some other EGG members) along its whole period. These seminars have been successfully continued till the present, with great attendance and active participation in the discussions following the talks.
- 6) In late April 2020, the call for nominations for the IGS Awards for the year was launched by the Awards Committee chair. Upon receipt of nominations, the committee did the assessment of the candidates during late July–early September 2020 and submitted a proposal

to Council, which approved it in mid-August 2021. The Awards were publicly announced in early October 2020. Following it, some minor changes to the Awards Guidelines were introduced in October–November 2020.

7) A full renovation of the IGS website had been envisaged for long. Accordingly, following earlier discussions in August 2020, in September 2020 a call for volunteers for an Ad-hoc Website Committee was launched. Many members answered to this call and the following committee composition was decided in October 2020:

Magnús Már Magnússon (Secretary General), Coordinator

Timothy Creyts

Francisca Bown Anna Crawford

Tandong Yao

Cuihui Xia

Adrian McCallum

Francisco Navarro (IGS President)

During October 2020–February 2021 several committee meetings were held to discuss and design structure, contents, etc. In February– May 2021, contacts and negotiations with various web developers were established. In May 2021 a decision was taken concerning the selection of web developer (RealNet). In summer 2021 discussions with RealNet on the website design were held, followed by the implementation phase. At the present moment, the implementation is at an advanced stage, so a fully new website will soon be available.

8) Following earlier discussions in summer and early fall 2020, in October 2020 the Council approved the creation of an Ad-hoc Committee for Actions on Diversity and Inclusivity. In late October 2020 there was a call for volunteers among the membership, answered by many, and in late November 2020 the following Committee composition was approved by Council:

Nanna Karlsson, Chair Francisca Bown Anna Crawford Jing Gao Dambaru Ballab Kettel Julie Palais (replaced by Eleanor Bash in June 2021) Alan Rempel Lauren Vargo Francisco Navarro (IGS President)

The Committee initiated its work soon afterwards, submitting a first report to Council in March 2021. Upon discussion by Council on the submitted D&I plan, the Committee revised its work, and a second version was submitted to Council in September 2021. For various reasons (partly, by work overload of the President) a new Council discussion has not been held yet, so the outgoing President asks the new President to consider this at the earliest convenience.

9) The Publications Committee composition was renovated in August 2020. The composition of the revised committee is as follows.

Gwenn Flowers (Chair) Liam Colgan Lizz Ultee Bryn Hubbard Tim Bartholomaus Hester Jiskoot (Ex-Officio, IGS Chief Editor): Francisco Navarro (Ex-Officio, President) Magnús Már Magnússon (Ex-Officio, Secretary General)

- 10)In the first quarter of 2021, the President dedicated great efforts, fortunately partly successful, to have many members renewing their membership. This involved more than 60 personalized mails, repeated a couple of months later if not successful on the first trial. This, together with other factors, motivates the suggested creation of a Membership Committee commented in the final part of this report.
- 11) In April 2021, following discussions held during the preceding months (and earlier in the past), a new IGS Early Career Scientist (ECS) Award was established. The first award was given in August 2021.
- 12) The Awards Committee composition was renovated in June 2021. The composition of the revised committee is as follows:

Ian Allison, Chair Elisabeth Isaksson Carleen Tijm-Reijmer Elizabeth Case

Rodrigo Fell

Shin Sugiyama

Sergey Sokratrov

Francisco Navarro (Ex-Officio, President) Magnús Már Magnússon (Ex-Officio, Secretary

General)

The above committee was in charge of assessing, in late July–early August 2021, the candidates for the 2021 Awards (for which a call had been launched in late April 2021) and making a proposal to Council, which approved it in early August 2021, followed by the public announcement in mid-August 2021 (including the first IGS ECS Award).

13)In early July 2021, a new membership fees scheme was proposed by the President and approved by Council, which aims to promote geographical diversity by granting cheaper fees (by 20/40/60%) to members as a function of the Word Bank classification of their country of residence/work as High/Upper middle/Lower middle/Low income (in terms of Gross Net Income – GNI – per capita). In all cases, fees for junior and retired members are 50% those of the corresponding ordinary membership fees. The resulting fees (in GBP) are:

Membership	High	Upper-	Lower-	Low
type	income	middle	middle	income
Ordinary	50	40	30	20
Junior	25	20	15	10
Retired	25	20	15	10

- 14) In July–August 2021, upon launching a call for nominations to the whole membership, the Nominations Committee discussed the slate for renovation of various IGS Officers and Council members. The slate included renovation of the President, two Vice-Presidents, the Treasurer (to continue her mandate) and seven Council members. This slate was approved by Council in late August 2021. The slate was submitted to the membership on 29 August 2021, asking for further nominations. No further nominations were received, so the slate (as proposed by the Committee and approved by Council) will be voted on at the AGM of 5 November 2021.
- 15) Along all of the reporting period, the Early-Career Glaciologists Group (EGG), chaired by Rebecca Schlegel, has continued to consolidate, organizing various activities during online meetings of the IGS (e.g. branch meeting) and various other organizations, contacting new junior IGS members as they joined the IGS, updating their website, and collaborating in the running of the Seminar Series, among other activities. They have also played an important role on promoting the creation of the recent ECS Award.

Some final considerations

As can be seen from the above, there are two main themes under advanced stage of development, namely the new website and the Diversity and Inclusion Plan. We hope to see both concluded soon.

Aside from that, in my view two important things remain to be done:

• Once the new Constitution is approved, I believe that a whole set of by-laws (or statutes) should be formalized, defining the way in which the Society should be run. This includes e.g. Terms of Reference (ToR) for the various standing committees, the precise way in which the slate is configured and voted, and many more. For decades, most of these things have been 'recorded' in the mind of our Secretary General, but it is certainly convenient to have them in written form. These aspects have intentionally not been included in the (proposed) amended Constitution, because the aim was to have a Constitution that could remain for a long time without changes (as the changes to the Constitution are cumbersome, requiring a voting by the whole membership, and conforming to the general rules of the Charity Commission of the UK). A set of by-laws, however, could be easily changed, as circumstances demand, simply by Council voting.

The creation of a Membership Committee, whose main mission would be promoting and keeping track of the membership, the interaction with the national correspondents with this aim and for any other purposes, to serve as focal point for receiving suggestions and complaints by members, the surveillance that IGS core values are respected/followed by every IGS member and committee, etc. In this latter sense, it would 'absorb' the current duties of the Ad-hoc Committee for Actions on D&I, or the possible duties of a hypothetical Ethics Committee, and/or an Ombudsperson, as well as the other management duties mentioned earlier. Of course, this Committee would work with the administrative support of the Membership and Accounts Manager. I could not accomplish the creation of this Committee just by lack of time. I had planned it for October 2021, but, because of intensive teaching duties, I did not find the time for it.

I end this report by thanking all IGS members, officers and committees for their support of my work, and wishing the next IGS President success during her term.

Francisco Navarro President

The Secretary General invited attendees to ask questions or to comment on the President's report.

A question from the floor asked what the meaning was for By-Laws for the constitution.

The President responded and explained that 'By-Laws' or 'Terms of Reference' were used to further define what the meaning of a particular article is. This allows for slight amendments of such 'By-Laws' or 'Terms of Reference' without having to resort to Constitutional amendments and the associated formality that entails. There were no further questions.

C Schøtt Hvidberg proposed and G Aðalgeirsdóttir seconded, that the President's report be accepted. This was carried unanimously.

3. The Treasurer's report

The Secretary General presented the Treasurer's report with the audited Financial Statements for the year ended 31 December 2020 on behalf of the IGS Treasurer, Amber Leeson.

Fellow members, ladies and gentlemen

The Society's accounts underwent an independent examination rather than a full audit this year. Throughout my report, I will refer to the Society's unaudited accounts for 2020, referring to the relevant page numbers.

The Society's finances are summarized by considering the changes from 1 January 2020 to 31 December 2020, as shown on page 15 of the accounts. In the table, the Restricted Funds refer to money associated specifically with the Seligman Crystal, the Richardson Medal and the Graham Cogley Award. The Unrestricted Funds is everything else.

Restricted Funds: increased by £5161 from £3242 to £8403 as a result of a donation of £5699 from Graham Cogley's widow in addition to the £49 received as a result of interest on investments. Two crystals were awarded in 2020 to Catherine Ritz and Andrew Fowler but those crystals were not produced because no opportunity arose to present the Crystals to the recipients. One joint Richardson Medal was awarded in 2020 to Christina Hulbe and Eric Wolff (each will receive a medal). No opportunity arose to present the medals to Hulbe and Wolff, so no inscription cost was incurred. Two grants (2019: no grants) were made to individuals in the year from the Graham Cogley Award Fund; Carlo Licciulli for £292 and Paul Webber for £295.

Unrestricted Funds: **decreased** by £2413 from £443 443 to £441 030. This is due to 1) income exceeding expenditure by £21 020 and 2) net losses on investments of £ 23 433.

Total: The Society had its net resources before revaluation gain by £26 181 but a net loss on investments of £23 433 resulting in a positive movement in the Society's funds of £2748 in 2020, compared to a gain of £19687 in 2019.

In previous years we have had a loss of £46 571 in 2018, a gain of £337 in 2017, a loss of £59 209 in 2016, gains of £35 697 in 2015, £97 204 in 2014, £8477 in 2013, £28 092 in 2012, and losses between 2008 and 2011.

We have no control over the investment gains/ losses but the surplus of $\pm 26\,181$ associated with income and expenditure is primarily caused by:

- The royalties from CUP were £30 600 greater than the previous year. Indeed, this is the most we have received in royalties from CUP since we entered into partnership with them in 2016. This is due to more papers published but not least because of the increase in the share the IGS gets from 'Read and Publish' contracts CUP has entered into on behalf of the IGS and other publishers.
- Drop in membership income of £1,533
 - 1. A drop in 'Ordinary membership' (503 in 2019 and 449 in 2020)
 - 2. A drop in the number of student members (139 in 2019 and 86 in 2020), who pay lower membership fees.
 - 3. An increase in retired membership and contributing memberships (60 retired in 2019 and 66 in 2020, 2 contributing in 2019 and 5 in 2020).

The sum of these factors meant that the income from membership dropped from £30 509 in 2019 to £28 976 in 2020. The figures relating to the drop in membership indicate the drop in income should be greater. The membership figures in 2019 are boosted by the fact that we had three successful symposia that year. We always have a substantial number of delegates joining the Society to make use of the lower registration fees for members so it is normal to see a higher membership when we are holding Symposia. The Society's policy of awarding free membership to those symposia delegates that have registered at the nonmember rate. boosts the membership but there is not a direct increase in membership income accompanying this increase in membership. The increased revenue comes instead as an increased income relating to registration fees for the symposia.

• Due to the covid-19 pandemic the IGS was unable to hold Symposia or meetings. Hence there is no income or expenditure reported in the accounts for the year ending 31 December 2020. In the past few years, attendance at symposia has fluctuated considerably (2019: 628 delegates, 2018: 180 delegates and 2017: 385 delegate). At the time of writing this it looks unlikely that the IGS will be able to organize any 'face to face' Symposia in 2021.

If we look at the difference between 'Cash at bank and in hand' (page 16 of the accounts), we can see that it decreased by about £38 000. This is a result of no bond term deposits maturing at the end of 2020, lower income from membership renewals but predominately no surplus funds from symposia whereas in 2019 we saw a considerable symposia surplus, in particular from the Winnipeg symposium.

The Society's total assets are £449 433, compared to last year's figure of £446 685. It is thus reassuring, considering the total lack of income from Symposia in 2020 due to covid-19, we have been able to maintain a slight net gain of £2748 in income after last year's net gain of close to £20 000. We continue to aim to at least break even in future years, and preferably further close the cumulative deficit that has accrued since 2007.

More detail is given below: income is itemised in notes 2–4 of the accounts, and expenditure is listed in notes 5–6 and in the unnumbered **Support costs** on page 24 of the accounts.

Income:

Note 2. Donations were £20 in 2019 compared to £20 in 2018. The society also received a donation of CDN \$10 000 (£3828) to be dedicated to an award, The Graham Cogley Award.

The award was initiated and is generously sponsored by the Cogley family and is shared between the International Glaciological Society IGS and the International Association of Cryospheric Sciences IACS, with the IGS and the IACS giving out the award in alternate years.

The IGS will give out two 'Graham Cogley Awards' to students who have published papers of exceptional quality in the *Journal of Glaciology* or the *Annals of Glaciology* within the last 2 years.

No legacies were received in 2020. In 2019 the IGS received a legacy of £3828 from the estate of Johannes and Julia Weertman.

Note 3. Incomes associated with the *Journal* and *Annals* were up in 2020 compared to 2019. In 2020 the Society received an income of £12 738 from the *Journal, ICE* & Books, up from £3602 in 2019 and higher even than the £9960 received in 2018. Similarly, for *Annals*, in 2020 we received an income of £1022, cf. £0 in 2019 and £310 in 2018.

No income was received from Meetings/ Symposia in 2020. In 2019 the IGS had an income of £120 836.

The royalties from CUP £113 284, were £30 600 greater than the previous year (2019; £74 684). Indeed, this is the most we have received in royalties from CUP since we entered into partnership with them in 2016. This is due to more papers (1818pp) cf. 122 (1487pp) in 2019) but not least because of the increase in the share the IGS gets from 'Read and Publish' contracts CUP has entered into on behalf of the IGS and other publishers.

Income from membership in 2020 was down by £1533 from £30 509 in 2019 to £28 976 in 2020. In comparison, income from membership in 2018 was £32 823. It fell by £14 527 from £47 350 to £32 823 between 2017 and 2018. We can thus see that the income from membership has dropped by £18 374 between 2018 and 2020.

In line with the drop in income, the membership numbers dropped from 721 in 2019 to 622 in 2020. The demographics has however changed slightly as can be seen in the income synopsis on page 1 of this report.

Note 4. Income from interest on investments was slightly less in 2020 than in 2019 down by £2388 from £9166 in 2019 down to £6778 in 2020. This is not surprising as interest rate hit rock bottom in 2020 because of the pandemic. In 2018 the income from investments had been £8373.

The Society continues to invest part of its capital in 'higher interest' but still 'low risk' investment accounts, and this is reviewed each year.

Expenditure:

Note 6. As mentioned above, due to the covid-19 pandemic the IGS was unable to hold Symposia ormeetings. Hence there is no income or expenditure reported in the accounts for the year ending 31 December 2020.

In 2019 the symposia expenditure was £131 097 and £94 794 in 2018.

Direct costs are down considerably in 2020 compared to 2019, from £142 911 to £62 786. The biggest reduction was in cost relating to Symposia, for obvious reasons. Staff costs including wages and salaries were by up by £1k. Because of the pandemic we were unable to occupy our office in the British Antarctic Survey from the beginning of April. As a result, we had a 'rent holiday' which meant the rent was down by £9140, from £13964 in 2019 down to £4814 in 2020. For the same reason 'travel subsistence' was down by £9302, from £9617 in 2019 down to £315 in 2020. Similarly, bank charges were down by £3588, from £4780 in 2019 down to £1192 in 2020 (this is again due to the fact we did not hold any Symposia and hence no credit card charges on registration fees and no money transfers to local organizers of Symposia.

Other direct costs showed relatively small gains or falls.

Note 7. One grant (2019: one grant) was made to institutions in the year; UAF Summer School for £2943 (2019: Polar Marine Science Gordon Research for £1061).

Two grants (2019: no grants) were made to individuals in the year from the Graham Cogley Award Fund; Carlo Licciulli for £292 and Paul Webber for £295. Due to the value of grant costs, no support costs have been allocated.

Support costs

Total support costs are down about £21.856 from last year, from £97,994 in 2019 to £76,138 in 2020. Again, this is no surprise.

Governance and bookkeeping costs are slightly down by £992, £16 147 in 2020 down from £17 139 in 2019

Summary

The Society's finances managed to break even in 2020, and we end the year at a slightly better place than when we started. The surplus this year amounts to about 0.6% growth. This is less than the 4.6% in 2019 which again was much better than the previous year's loss of ~11%. We essentially broke even in 2017 compared to the deficit in 2016 (~11% of funds) and the surpluses in 2015 (~7% of funds), 2014 (~20% of funds), 2013 (~2% of funds), and 2012 (~7% of funds), and various deficits between 2008 and 2011 (ranging from ~1% to ~27% of funds).

The Society must continue to monitor its income largely from CUP, membership fees, and Symposia registration, and its outgoings associated with running symposia and running the IGS office.

As I mentioned in my report from last year, it remains important for the IGS to hold on to and attract new authors and have them submit articles to the *Journal* and to *Annals*. The more papers published, the greater the contribution the IGS receives from CUP. This is the main single revenue stream to the Society. I'm pleased to see that our symposia this year registered high numbers of student delegates. I'm optimistic that this will result in greater engagement with the IGS and its journals by this community, including the publication of articles in the planned special editions of *Annals* associated with these symposia.

Similarly, it is increasingly important for the IGS to recruit new, and hold on to, existing members, as membership fees are another valuable revenue stream.

In general, the IGS should consider innovative ways of making the Society and our journals more attractive, in order to boost membership and submissions to our journals. In particular, we may wish to think about ways to keep our new student members engaged as they progress through their careers, for example through supporting EGG.

It is difficult to see how individual Symposia registration fees can be increased as these are already relatively high compared to, for example, EGU and AGU, but obtaining external grants to sponsor certain aspects of IGS Symposia and which therefore benefit the Society would be advantageous. It is also advantageous to have bigger symposia and collaborate with other societies and organizations as we did in 2017 in Wellington, New Zealand, where we joined up with IACS, SCAR, CliC, etc.

On the output side, the Society must monitor its expenditure associated with running Symposia and with generally running the IGS. Making greater use of online virtual meeting platforms for Council meetings and holding Council meetings at IGS Symposia (rather than at, e.g., AGU or EGU) would save the Society some expenditure. A constitutional change to allow this is in the process of being implemented by the Governance Changes Committee and is only awaiting an inperson AGM to be concluded. As of the time of writing we have not been able to hold a face-toface AGM. We are hoping this will be possible during the IGS Nordic Branch meeting in Oslo during 4–6 November 2021.

There are economies of scale to be made when the Society runs more than one symposium per year and it is significantly advantageous if the Society can run at least two per year. Salary costs (including 'national insurance' and pension contributions) are, as in many organizations of course, the most expensive item of expenditure totalling £89 735 in 2020 or 63% of all expenditure. Nota bene, expenditure was down 59% from 2019. £88 713 in 2019, or 37% of all expenditure. In 2018 salary costs were 44% of all expenditure (note however that expenditure was low in 2018 compared to other years). In 2017 salary costs were 34% of all expenditure.

This report is written by the Secretary General on behalf of the IGS Treasurer Amber Leeson who is on maternity leave. All figures were updated and the interpretation was rewritten to reflect the 2020 accounts. On the last page, the words of the Treasurer have been mostly left intact as those reflect her thoughts, only minor updates were made.

Magnús Már Magnússon on behalf of the IGS Treasurer, Amber Leeson

18 October 2021

The Secretary General invited members to discuss the Treasurer's report.

No questions or comments were put forward.

J Kohler proposed, and T Vikhamar Schuler seconded, that the Treasurer's report be accepted. This was carried unanimously.

4. Election of auditors for 2019 accounts

The Secretary General proposed that the IGS remain with our current auditors, Messrs Peters Elworthy and Moore; as they have been doing our accounts for several decades, they knew the innards of the IGS very well.

On a motion from the Secretary General, N Karlsson proposed, and LM Andreassen seconded, that Messrs Peters Elworthy and Moore of Cambridge be elected 'Independent Inspectors or Auditors', whichever is appropriate for the 2021 accounts. This was carried unanimously.

5. Elections to Council

After circulation to members of the Society of the Council's suggested list of nominees for 2021–24, no further nominations were received, and the following members were therefore elected unanimously.

The following nominations were suggested to the Council by the Nominating Committee for service for the terms indicated:

President	Gwenn Flowers	(2021–24)
	(Canada)	
Vice-President:	Andrey Glazovsky	
	(Russia)	(2021–24)
	Petra Heil (Australia)	(2021 - 24)
Elected:	Rijan Bhakta Kayastha	
Members	(Nepal)	(2021–24)
	Jing Gao (P.R. China)	(2021 - 24)
	Jack Kohler (Norway)	(2021–24)
	Lucas Ruiz (Argentina)	(2021–24)
	Akiko Sakai (Japan)	(2021–24)
	Rebecca Schlegel (UK)	(2021–24)
	Martin Schneebeli	
	(Switzerland)	(2021–24))

These appointments were unanimously approved by the AGM on a motion from G Aðalgeirsdóttir and seconded by N Karlsson.

6. Constitutional amendments

The Secretary General invited the Chair of the 'Adhoc Committee on Governance Changes', Regine Hock to introduce this item to the IGS members. Following is her report:

Background

The organizational structure of the IGS, including its main governance bodies and processes of decision making, is defined by its constitution. The first constitution was approved in 1962; it has since been amended six times, most recently in 1992. In light of the many technological advances during the last 30 years such as teleconferencing as well as other societal changes, an ad-hoc committee was initiated by Council at its meeting in Davos, Switzerland, on 20 June 2018 to review the current constitution and propose changes. The committee was also tasked to develop a membership survey with emphasis on governance to guide the committee's recommendations.

The committee's members included Regine Hock (chair), Doug Brinkerhoff (resigned in 10/2019), Hilmar Gudmundsson (resigned in December 2018), Christina Hulbe, Doug MacAyeal, Magnús Magnússon, Francisco Navarro, Rebecca Schlegel (since October 2019) and Lauren Vargo (since October 2019). The committee conducted its work via email and held several teleconferences.

Membership survey

A survey with 34 questions was prepared and launched on 17 December 2018 and remained open until 20 February 2019. The survey was fully or partially completed by 337 respondents, 65% of whom were IGS members. The detailed results from the membership survey are summarized in a report available at https://www.igsoc.org/about/ constitution/2021constitution/ and reproduced in *ICE* 185 pp.10–24 . Significant results relevant to IGS governance included:

- 1. A majority support for allowing electronic voting instead of requiring physical presence at Annual General Meeting;
- 2. Strong support for making committee chairs and chief Editor ex-officio members of the Council;
- 3. Almost ³/₄ of the respondents were in favour of some kind of change on how council members are selected, although there was little support for an open call (instead of the current nomination slate);
- 4. 39% favoured the current size of the Council but advocated to establish a smaller Executive Committee; 36% wanted to leave it as it is; a minority advocated to reduce the size
- 5. High interest to serve on IGS governance bodies (80% of respondents).

Proposed changes to the constitution

The committee's recommendation for a revised constitution is given below while the current constitution can be found at https://www.igsoc. org/about/constitution/. The most important recommendations include:

- 1. Council meetings and Annual General Meetings (AGMs) no longer require an inperson meeting but can be held via tele- or videoconferencing or a combination of inperson meeting and videoconference. The motivation is to make it easier for Council Members to participate and thus reduce the need for co-options to achieve a quorum, and to facilitate all IGS members being able to join an AGM. (Article 8)
- 2. What has previously been referred to as 'Council members' has been changed to 'Council trustees'. This is done in order to distinguish between those that are eligible to vote on matters before Council – 'trustees' –

and those that are 'ex-officio members' of the Council due to their position within the Society, but not eligible to vote.

The total number of Council trustees is reduced from 18 to 14, more specifically the number of maximum 3 Vice Presidents is reduced to 1, and the number of Elective trustees is reduced from 12 to 10. This recommendation aims at increasing the Council's efficiency and engagement. In addition, the option of teleconferencing is expected to lead to more active Council meeting participation so that a quorum can be reached even with a smaller Council. (Article 8)

- 3. The Chief Editor and the chairs of the standing committees shall be ex-officio members of the Council albeit without voting power. The motivation is to give the editor and committee chairs a permanent voice in the Council given their important role in running business within the IGS; however, the committee felt they should not have automatic voting rights since they are not elected by the Society's Members but appointed by Council. (Article 8)
- 4. Electronic voting is possible for Council elections and matters at the Annual General Meeting as well as for adopting changes to the constitution. (Articles 9, 15, 16)
- 5. It was added that the President shall have the decisive vote in case there is a tie in the Council. (Article 8)
- 6. It was added that the Council may establish Terms of Reference (ToR) (which can be modified any time by Council) to define in more detail additional modes of operation of the IGS. Topics may include, for example, rotation and election of standing committee chairs and members, and editors; voting rules of all standing committees; modes of operation of ad-hoc committees; actions in case the president is incapacitated; strengthening the role of Early-Career Scientists and the recently formed standing committee EGG in governance; guidelines for diversity/inclusion; modalities on TOR changes. (Article 19)
- 7. A statement on diversity and inclusion was added. (Article 4)

The committee discussed possible changes to Article 2 (Objects of the Society) to facilitate future changes to the *Annals of Glaciology* or *ICE*, such as a name change, however, this was discarded because any changes to Article 2 require a different, more elaborate authorization process including the Charity Commission. The committee sought to implement such changes instead under other suitable Articles where possible. We welcome any comments on the recommended changes to the Constitution. It is planned to adopt the amended version of the current constitution at the IGS Nordic Branch annual meeting in Oslo, Norway on Friday 5 November 2021.

Regine Hock

On behalf of the ad-hoc governance committee August 2021

The SG invited questions from the audience.

The SG pointed out that in the latest issue of *ICE* (number 185, 1st issue 2021), he had tried to summarize some of the history behind the drive to amend the constitution and some of the terms used in the amended version.

Regine Hock pointed out the committee had made a recommendation that so called 'Terms of Reference' be defined for the various articles which would give an easier path to make adjustments in the future.

The SG further stressed the importance of having 'virtual' meetings and 'electronic' voting.

There were no further questions.

The SG asked for a motion for the Annual General Meeting to accept the proposed amendments to the Constitution of the International Glaciological Society.

N Karlsson proposed, and E Isaksson seconded, that the proposed amendments to the Constitution

of the International Glaciological Society be accepted. This was carried unanimously.

The President pointed out that this was the penultimate step to fully approve the amended Constitution. The last step Is to circulate a ballot to the IGS members asking for approval. Our current Constitution states the following

Any alteration in the Constitution proposed by the Council or favoured by a majority at a General Meeting shall be submitted to all Members in a postal ballot and shall be adopted if approved by a twothirds majority of those returning properly completed ballot papers by a specified date which shall be not less than sixteen weeks after the issue of ballot papers.

Once this has taken place and the amendments have been approved by the membership will the amendments take effect.

7. Other business

No other items were raised.

The SG asked people, should they have any ideas/ suggestions, to contact the officers and Council members in order to bring those ideas forward.

The President asked for a motion to adjourn the AGM.

The AGM was adjourned on a motion from S Hillerup Larsen and seconded by T Zwinger at 16:50 CEST.



Elisabeth Schlosser, Austria

Instead of a complete overview of Austrian glaciological activities, here recent developments at the Universities of Innsbruck and Graz will be highlighted.

The glaciology group of the former Institute of Meteorology and Geophysics of the University of Innsbruck, now the Department of Atmospheric and Cryospheric Sciences (ACINN), has become part of the Ice and Climate group. Apart from the continuation of the long-term mass-balance measurements, research and monitoring of Hintereisferner (HEF) has been intensified and a considerable amount of glacier modelling has been added to the group activities.



Laser scanner above HEF (Photo: R. Prinz)

Hintereisferner/Rofen Valley

Hintereisferner is one of the best-studied glaciers of the Alps: the first measurements were carried out as early as the 19th century. It also has one of the longest mass-balance time series (since 1953) and is well known for its early glacio-meteorological experiments leading to a deeper understanding of the atmosphere–glacier relationship. After a temporarily rather quiet period, in recent years investigations in the HEF catchment area have been intensified and instrumental and administrative upgrades were necessary to meet the modern requirements of an open-air laboratory.

Since 2016, the catchment area has been equipped with a remotely controlled longrange terrestrial laser scanner, allowing frequent acquisitions of the glacier surface topography in high spatial resolution for geodetic massbalance surveys and for initiation or validation of numerical models.

During the Hintereisferner Experiment in 2018, a series of weather stations on the glacier surface were used to investigate the glacier boundary layer structure. From these observations, spatial aerodynamic roughness lengths and the sensitivity



One of the AWS in the HEF Experiment 2018 (Photo: R. Shone)

of heat exchange processes to larger scale synoptics were studied. Hintereisferner was also selected as a test site for a prototype sensor ('SmartStake' measuring ablation using a coiling wire system and real-time data transmission and was identified as a core region of the IACS working group on Regional Assessment of Glacier Mass Changes (RAGMAC).



Turbulence measurements on the tongue of HEF (Photo: L. Nicholson)

The HEF catchment is part of the Long-Term Ecological Research (LTER) site Rofental and a selected research basin within the International



Station Hintereis, elevation 3026m (Photo: R. Shone)

Network for Alpine Research Catchments (INARCH), a cross-cut project of Global Energy and Water Exchanges (GEWEX) project of the World Climate Research Programme (WCRP). The small research hut above the glacier has been the base for research and mass balance measurements since 1966 and is simultaneously part of INTERACT, a network of research stations providing transnational access for scientists funded by the European Union.

Rainer Prinz (Rainer.Prinz@uibk.ac.at

The Open Global Glacier Model (OGGM) and OGGM-Edu platforms

OGGM (https://oggm.org) is an open source modelling framework able to simulate past and future mass balance, volume and geometry of (almost) any glacier in the world, in a fully automated and extensible workflow. The model accounts for glacier geometry (including contributory branches) and includes an explicit ice dynamics module. Its primary goal is to facilitate modelling workflows aiming at simulating a large number of glaciers at once, by providing preprocessing tools and a large amount of processed datasets (climate, topography, velocity) at the mountain glacier scale.

Model development started at the University of Innsbruck in 2015 under the supervision of Ben Marzeion (now at the University of Bremen) and Fabien Maussion, building upon long-standing expertise in large-scale glacier modelling. Today, the model is used and developed by several working groups worldwide; in Innsbruck, a team of four persons (Fabien Maussion, Lilian Schuster, Patrick Schmitt and Anouk Vlug) are working on the project.

OGGM-Edu (https://edu.oggm.org) is an extension of the OGGM modelling framework for educational purposes. The main goal of OGGM-Edu is to provide tools and materials for instructors who want to teach about glaciers at school, in workshops or at the university. OGGM-Edu offers a variety of teaching material depending on the skill level of the audience. It revolves around four largely independent components that can be combined for a longer class: (i) open graphics, a collection of images for presentations or websites, (ii) interactive web applications where students can run glacier models or data visualization tools online, (iii) interactive notebooks for students with programming experience who arte willing to run experiments with a simplified glacier model, and (iv) OGGM tutorials for potential users of the model.

Both OGGM and OGGM-Edu are fully opensource, with an open governance model. The group is always looking for new collaborations!



800 1200 1600 2000 2400 2800 3200 3600 Alt. [m]

50 100 150 200 250 300 350 400 450 Section thickness [m]

60 120 180 240 300 360 420 480 Glacier thickness [m]

Fabien Maussion (fabien.maussion@uibk.ac.at)

'Girls on Ice Austria'

Inspiring Girls Expeditions (https://www. inspiringgirls.org/) is a program offering tuitionfree multi-day expeditions for high-school girls that interweave science, art, and backcountry travel with the aim of fostering young women's self-confidence in their physical, intellectual and leadership abilities while creating lifelong advocates for Earth science and wilderness stewardship. Supported by initial funding from the University of Innsbruck, the European Space Agency and individual donations, and with equipment from our sister organization Girls on Ice Switzerland, the first offering of Girls on Ice Austria (https://www.inspiringgirls.org/goi-

austria), was successfully held in August 2021. Nine participants aged 15–17 spent time with an all-female team of mountain guides, scientists and artists at the beautiful Bachfallenferner in the Ötztal Alos learning

the Ötztal Alps, learning a range of outdoor skills, and deepening their understanding of glaciers and science, culminating in designing and executing a suite of field experiments based around understanding the changing glacier and how it impacts its surroundings. The participants exchanged for two days with local artist lessie Pitt and at the end of the expedition designed and delivered a public temporary exhibition about their expedition experiences and scientific and artistic discoveries in the geological museum of the University of Innsbruck.

Lindsey Nicholson (Lindsey.Nicholson@uibk.ac.at)

(more at: https://www.uibk.ac.at/acinn/research/ ice-and-climate/)



(Photo: M.Habernig)

University of Graz

Ice-climate interaction has a long history at the Institute of Geography and Regional Science, University of Graz, for example with Eduard Richter, one of the great pioneers of glaciology. In recent decades, the focus traditionally had been more on geomorphological aspects, permafrost and glacier length monitoring. With the appointment of Wolfgang Schöner as a professor in physical geography in 2014, iceclimate-related topics attained a new focus in his research group CC-MoRe (Climate Change in Mountain Regions), which has grown to a visible and growing group of currently three staff and around 10 project researchers and technicians. In the following, we sketch out the current activities of CC-MoRe in relation to glaciology.

Alpine Glaciology is a backbone of activities within CC-MoRe, where long-standing monitoring sites form the basis. Professor Schöner initiated surface mass balance series in the Austrian Alps that date back to 1989 and are currently continued and scientifically used in close collaboration with ZAMG (Central Agency of Meteorology and Geophysics). The relation of permafrost and atmospheric changes was recently investigated using field and modelling tools in an interdisciplinary project together with geophysicists from TU-Vienna and the Geological Survey of Austria.

Greenland has become an ever-increasing regional focus of CC-MoRe. Back in 2007, Wolfgang Schöner initiated mass-balance monitoring on Freya glacier in northeast Greenland. This has become a particularly meaningful initiative, being the only surface mass-balance time series of a mountain glacier in a radius of over 1000 km on the heavily undersampled east coast of Greenland. To keep this time-series running requires considerable funding and stable collaboration partners, which we have found with ZAMG and GEUS (the Geological Survey of Denmark and Greenland). Process-based research and the interaction between ice surface and the atmosphere is the common ground in the Greenland-based activities of CC-MoRe. The surface mass-balance time series on Freya, for instance, can be used, together with data from an automated weather station, to quantify the fraction of meltwater that refreezes in the snowpack or on the ice surface.

Another Greenland-related focus has become the evaluation of surface stratification and its impact on snow and icemelt. A recently published article that can be seen as a strong group effort of CC-MoRe is a study on regional variability and trends in temperature inversions over Greenland based on ERA reanalysis data (Shahi et al. 2020; Fig. 1). We show in this paper, for instance, that along with a decrease in cloud cover in southwest Greenland surface-based inversions have been increasing – in line with conceptualized views of higher air pressure favoring subsidence and inversion development. A quantification of the associated effects on surface melt is the focus of ongoing follow-up studies.

Our research also calls for analyses across scales. With reanalysis data we are capable of covering the scale of Greenland in its entirety.



Trends in total summer cloud cover and surface-based inversion between 2002 and 2015 based on ERA reanalysis (left, adapted from Shahi et al. 2020); local-scale temperature stratification over a proglacial and glacial environment in East Greenland (Mittivakkat glacier); the dashed line marks the inversion at approx. 200 m above ground, which is stronger over ice cover and under oceanic influence. Figure adapted from Abermann et al. (2019) and Hansche et al. (in preparation).

In this context, current work focusses on the integration of regional climate model output in Greenland and the deduced influence of climate oscillations on surface mass and energy balance. At the other end of the spectrum are small-scale studies that allow for a process resolution that is otherwise not obtainable. As an example, we show the results of several UAV-based ascents along a valley transect in the forefield and above Mittivakkat glacier, East Greenland, where we were able to quantify the vertical extent of the inversion layer, the effect of cooling of the glacier surface and the lateral extent of ocean influence. Such small-scale process studies give a new basis for model evaluation and for an analysis of long-term changes and the associated feedbacks on glacier melt. Several ongoing projects point towards successful integration of this approach.

This leads to a final outlook on what CC-MoRe will pursue in the future, potentially relevant for a larger part of the cryophile community: Under a recently signed sponsor agreement, a private donor will support the expansion and renovation of Sermilik Research Station under the lead of the University of Graz in close collaboration with both Copenhagen University and the Austrian Polar Research Institute (APRI). Interdisciplinary research and monitoring will be a primary goal, and novel sensor applications as well as integration in existing observing networks will be important pillars. Such a research infrastructure will also open possibilities for teaching graduate excursions, which should lead to a new generation of polar scientists who will be able to further investigate important questions regarding polar areas and climate change.



Sermilik station, East Greenland. (Photo: J. Abermann)

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British Branch Meeting 6-8 September 2021, cyberspace at the University of Liverpool

The 2021 British Branch meeting was originally scheduled to be held 'in person' at the University of Liverpool in 2021 but once again we fell foul of the cursed covid-19 pandemic; hence we moved the meeting to cyberspace via Zoom. The meeting was fully virtual and was organized/hosted by the University of Liverpool under the auspices of David Ashmore. It was held over three afternoons on 6–8 September 2021 and consisted of 32 oral presentations and 10 posters.



Georgia Rose Murray presented 'Arctic Full Circle' on the second day of the meeting. She told the story of her work as a landscape artist in various Arctic locations. Here is the initial and final state of her 'concertina' landscape painting she created on a cold beach in a lonely, but scenic location.

To wind up day 1 we had a Panel Discussion for Early Career Scientists, co-organized by IGSEGG and the University of Liverpool, with four professionals with cryospheric PhDs about their career paths outside traditional academia. The panellists were Dr Arminel Lovell (CDP), Dr Charlie Bunce (Trade in Space), Dr Chris Williams (British Geological Survey), Dr Damon Davies (Scottish Parliament). Following the panellists' initial presentations questions were invited from the 'floor'.

The poster session was held at 15.00 on the second day of the meeting with poster flash talks (2 min and one (optional) slide to introduce your poster) and discussion breakout rooms (three or four per room). The session chairs were Will Harcourt and Rob Bingham.



Various screen shots of the Zoom meeting.



William Harcourt, an early-career participant, presented a talk on work being done to develop and use a 96 GHz radar in snow and ice research.



Caroline Classon deploys a miniature field assistant in her research on radionuclides in ice and snow.

Following the poster session we had a guest lecture, 'Arctic Full Circle', by Georgia Rose Murray, a Scottish landscape artist and lecturer who has worked alongside scientists over the last 6 years, responding to each season above the Arctic Circle. In this guest lecture Georgia discussed her experiences in the Arctic, and how these informed her art and research. Find out more at: www.georgiarosemurray.com.

We had 18 student oral presentations and six poster presentations. As is usual, all student presentations were closely scrutinized and the 'best' were awarded the John Glen Prize. The best oral



Helen Ockenden was the winner of the John Glen Award for best oral presentation.



Hannah Barnett won the John Glen Award for best poster.



Iram Ali took the British Branch delegates to the high Kashmir Himalaya in her presentation.

award went to Helen Ockenden and the best poster award to Hannah Barnett. The runner-up was Tilly Woods, and Will Harcourt, Dominik Fahrner and Kasia Warburton received honorable mentions.

Magnús Már Magnússon



Local host Doug Mair constantly challenged David Sugden to identify the geomorphologically significant features in his Zoom backgrounds.



Anne Le Brocq presented a video game that she and her group are creating to help give kids (and secretly, many adult glaciologists!) a way to learn about the processes and nature of ice in the polar regions.J. Abermann)

Nordic Branch Meeting

Face to Face with the Nordics, 4-6 November 2021, Oslo, Norway

Some new start PhD students will not have been to a national or international science meeting during the past 2 years because of covid lockdown restrictions. Older folk (over-23s) might just about remember face-to-face meetings, rather than the Zoom, Teams, e-platform meetings we have all become accustomed to attending. Even older curmudgeons might have inwardly rejoiced that they didn't have to travel, rub shoulders with a bunch of boring glaciologists and talk shop. And then the Nordic Branch Meeting was to be run live in Oslo.... Who could resist a few days out in Oslo, rubbing shoulders with folk and talking shop? Well not me.

This was my first venture to the Nordic Branch meeting, and I know for sure that I'll be back next vear. All those ridiculous things you read about and are told, chance conversations that strike up new ideas and collaborations, the moment in the talk about something that you know nothing about that makes you think 'wow, I get it, and I could use that idea/technique/method in my work', trying to figure out how someone that good can be so open and generous with their time and ideas, and why are they even bothering to be nice to me and listening to the b**s I come out with all those things are true in live meetings, and the Nordics were so sociable and inclusive that I felt no one was left out or felt an imposter at their first or nearly first meeting. I thought that this event would be good, both academically and socially, but it was much better than that.

First, Regine Hock and her fantastic organizing committee and helpers did a great job of gently running the show, moving us around and involving everyone. I always want to pull against the straps when being organized, but I found myself being slipped into the swing of the meeting without ever really noticing it.

The meeting started on Thursday evening with an Icebreaker at the Norwegian Water Resources and Energy Directorate (NVE), doubling up as registration and an early-career glaciology group (EGG) meeting. We had a giggle-fest finding a very prominent building on Google Maps, but the warm welcome, food, drink and company made it all the more fun to have trodden lightly down some of Oslo's darker side streets.

The science meeting took place over the next two days in the impressive Georg Sverdrups Hus Auditorium 1, on the University campus. The metro journey from the centre of the city warmed you up nicely to be mingling with live people again. Tea, coffee and snacks were readily available outside the auditorium (tusind tak), and then the talks commenced. These were just a pleasure to listen to after a long time online. It's much easier to pick up the nuance about what a speaker is excited about, is confident about, and is not so sure about. The sessions juxtaposed bright young talent with older stagers (everyone looks young to me now), and the very polite audience soon warmed up with even politer questions. These were no less penetrative or helpful despite the good manners. The poster session involved the opportunity to have a couple of alcoholic drinks, smuggled in legally I think, and was in the atmospheric dungeon Kjemikantina, more difficult to find than NVE even, where the conference banquet took place. There, a good time was had by all, and



Siri Engen (right), winner of the Ýmir Award for best student poster, was happy to discuss it with Kamilla Hauknes Sjursen over a cup of some (unspecified) liquid refreshment..



The outgoing IGS President, Francisco Navarro, attended the meeting and presented Regine Hock with the Society's Richardson Medal, assisted as always by the Secretary General.



The onerous task of registering the participants was ably handled by a team of Norwegian students

it was refreshing to realize that the boring Brits, mostly the English, I surmised, were the butt of quite a few Nordic jokes.

Elsewhere in this issue (p.4) are the minutes of the IGS AGM, which took place on the Friday. These include the last report of the the outgoing President, Franciso Navarro. The AGM also saw the presentation of Regine's very well merited Richardson Medal (see photo at foot of p.18), and the incoming President, Gwenn Flowers, gave an inspirational address via a video link from British Columbia, Canada. There really was a lot packed into this Nordic Branch Meeting.

Next year, the meeting moves to Sweden and my group will be there for sure. I felt that the earlycareer scientists received a very fair hearing and lots of enthusiastic and constructive feedback, that I'd learnt a lot and joined a stimulating and supportive community. Give me face to face with the Nordics any time.



The refreshments were excellent, as they always are at IGS events.



It was good to be back in an audience for live presentations in the auditorium.

Martyn Tranter



Participants at the 2021 IGS Nordic Branch Meeting in Oslo assembled for a group photograph.



The recipients of the Ýmir Awards for best student oral presentation and poster were, respectively, Ruitang Yang (right) and Siri Engen. Here they are posing with Tómas Jóhannesson and Liss Andreasson, the judges.



Obituary: William (Bill) Francis Budd 1938–2022

William (Bill) Francis Budd died peacefully on 23 January 2022. Bill joined the IGS in 1962, served in the IGS Council and was Chair of the Awards Committee for several years. He was awarded the Seligman Crystal in 1996.

Bill dedicated his life to science and developed scientific modelling used to study the interaction of ice sheets and climate. His models have been extensively used in international assessments of climate change and Antarctica's response to future global warming.

Bill Budd was born at Mount Hope, a small sheep-grazing town in the Riverina District of New South Wales, Australia. He obtained a BSc in Applied Mathematics from Sydney University and then completed a Diploma of Education. He taught secondary school mathematics in NSW for only 1 year before joining the Australian government's Antarctic Division as an expedition glaciologist in 1960.

Bill overwintered at the Australian Antarctic station Wilkes in 1961. He spent several months up to 100 km inland on the local ice cap, Law Dome, undertaking glaciological, geophysical and meteorological observations. The results of this program were written up, under guidance from Fritz Loewe and Uwe Radok, and presented for an MSc, which was awarded in 1965. In 1964 he spent a second year in the Antarctic at Mawson station, from where he undertook field surveys of the Amery Ice Shelf. He combined the results from both Law Dome and the Amery Ice Shelf, with his intuitive knack of developing ideas and for translating physical observations into mathematical theories, into his 1969 PhD thesis, The dynamics of ice masses. When published, this was widely recognized and used as an advanced-glaciology text and translated into several languages, including Russian. Bill produced theories and experimental confirmation of the large-scale behaviour of ice and, with Uwe Radok, Dick Jenssen and others, developed some of the first numerical models of ice sheets and of glaciers. A significant outcome of the modelling was the monograph Derived physical characteristics of the Antarctic ice sheet. This was later followed by a companion Greenland Ice Sheet version.

In 1970 the Antarctic Division established a Glaciology Section, co-located within the



Photo credit: Australian Academy of Science.

Meteorology Department at the University of Melbourne and led by Bill Budd. Over the next decade Bill developed the Australian glaciology program from what had been essentially a two- or three-person program into a team of 15 or more scientists and technicians. Bill introduced and led studies of ice-sheet mass budget, ice rheology, ice sheet thermodynamics, iceberg distribution and drift, surging glaciers, drifting snow, sea ice-climate interactions and much more. He initiated Australian ice-core drilling (initially for study of ice dynamics and later for palaeo-climate research), radio echo sounding of ice thickness and satellite remote sensing of ice. Much of what Bill Budd initiated more than 50 years ago remains core to the presentday Australian glaciological research program.

In the mid-1970s, Bill added atmospheric general-circulation models for climate and climate/ice sheet response studies to his repertoire. In 1979, the University of Melbourne established a new Chair of Meteorology. Bill resigned from Antarctic Division and became the first Professor of Meteorology at Melbourne, while retaining his strong links with the glaciology program. His research through the 1980s included modelling of ice-sheet changes through ice ages, simulations of the response of the present Antarctic Ice Sheet to climate change, and general circulation modelling of future warming. His models of the interaction of ice sheets and climate have been extensively used in international assessments of climate change and Antarctica's response to future global warming.

When the Antarctic Cooperative Research Centre was established in 1992, Bill moved from Melbourne to Hobart as Professor of Meteorology, Leader of the Polar Atmosphere Program and to continue his active collaboration with the Antarctic Division glaciology group, which also transferred to Hobart (and expanded further with new CRC employees). There he continued his work on ice-sheet and sea-ice modelling and ice/ocean/atmosphere coupled modelling. Bill's retirement from formal employment in the mid-2000s certainly did not end his scientific input or mentoring of post-graduate students and early career scientists.

Bill Budd was active in international scientific collaboration throughout his career. He was a leader in initiating the International Antarctic Glaciological Project (IAGP) in 1968, and in steering its implementation during the 1970s. IAGP was a multinational study of the East Antarctic Ice Sheet dynamics and mass balance involving large-scale over-snow traverse, airborne radio echo-sounding and ice core drilling. Bill was a Vice-President of the Scientific Committee on Antarctic Research from 1988 to 1992, and supplied considerable input, often as an office bearer, to organizations as diverse as the World Climate Research Programme, the International Glaciological Society, the International Commission on Snow and Ice, the International Association of Meteorology and Atmospheric Physics and many more.

Bill Budd's international reputation for the development of ice-sheet and climate modelling has been widely recognized by many awards and honours. These include the Polar Medal in 1969, the Edgeworth David Medal of the Royal Society of New South Wales in 1971, the Royal Society of Victoria's Research Medal in 1977, election as a Fellow of the Australian Academy of Science in 1993, and the Seligman Crystal, the highest scientific recognition of the International Glaciological Society, in 1996.

Professor Bill Budd dedicated his life to scientific progress and to the development of the next generation of scientists. He was generous, supportive and kind to more than 50 postgraduate students and the many early-career researchers whom he mentored. Bill had a knack of contributing to the development of scientific interpretations in a very subtle way. He would take great interest in emerging and young scientists, listening to their 'new' theories, observations or plans for future field work. His mentoring often led to scientists seeing the problem and the solutions from an entirely new angle. This is something that underpins many of his graduate students' careers. His wisdom and wit will be remembered by his many friends and colleagues and his legacy will continue to benefit the many research programs that he initiated and that continue today.

Ian Allison, Jo Jacka and Roland Warner



INTERNATIONAL GLACIOLOGICAL SOCIETY & BASQUE CENTRE FOR CLIMATE CHANGE



International Symposium on

Ice in a Sustainable Society



Conference Auditorium, Bizkaia Aretoa Bilbao, Basque Country, Spain 5–10 June 2022

With the collaboration of: & University of the Basque Country (Spain) Scott Polar Research Institute, University of Cambridge (UK) & Salt Road, Birmingham (UK) University of Bristol, School of Geographical Sciences (UK) & Pardee School of Global Studies, Boston University (USA) and others

> SECOND CIRCULAR December 2021 https://iss.bc3research.org/ https://www.igsoc.org/symposia/2022/bilbao2022/

The International Glaciological Society (IGS) and the Basque Centre for Climate Change (BC3) are glad to announce the International Symposium on Ice in a Sustainable Society (ISS), which will take place in Bilbao (Basque Country) from 5–10 June 2022.

During the Symposium there will be several social events and we will celebrate World Environment Day (5 June) and the 85th anniversary of the IGS. Come and attend* what will be a stimulating, innovative and productive symposium in a beautiful setting on the north coast of Spain!

THEME AND GOALS

The Symposium will focus on 'interdisciplinary relations' rather than isolated disciplines. Its main objective is to help the participants to look beyond their own specializations, identifying powerful interconnections and relationships that recognize no disciplinary borders, in order to highlight the extraordinary transdisciplinary potential of glaciology.

The goals of this symposium are:

- to assess the relevance of glaciology to a sustainable society, including the scientific, technological, social, economic and cultural dimensions.
- to serve as a transdisciplinary line of action and instrument to engage citizens, stakeholders and policymakers, promoting critical thinking about the climate crisis and providing them with the necessary tools to make better decisions, both personally and collectively.
- to encourage transdisciplinary ice research and activate participatory processes to solve complex problems.

We hope this symposium will attract experts in climate, engineering, environment, policy, economy, philosophy, arts and other specialities who will join forces to seek inter- and transdisciplinary solutions for sustainable development and climate change awareness.



*Required and recommended COVID-19 prevention measures will be followed during all ISS-related activities and remote participation options will also be offered. More details will appear soon on the local website.



COMMITMENT TO CULTURE AND SOCIETY

Within the framework of the Symposium, innovative actions and ways to connect the sciences of ice and sustainability to society will be proposed and implemented by the participants and the organizers, with the aim of contributing to more scientifically informed communities capable of actively participating in democratic processes, understanding that education and awareness raising are essential for actions to reduce human adverse effects on climate.

Besides the Symposium itself, various coordinated scientific communication, co-production and dissemination activities will be organized before and during the Symposium, including citizen participation, exhibitions, artistic performances, meetings and interactions with international experts from various areas of knowledge, from the natural sciences to the humanities. The transdisciplinary nexus of all these actions will be ice, considered in all its forms, from the cryosphere as the most sensitive component of the climate system and one of the dominant contributors to the recent rise in sea level, to glaciers as the water towers of the planet and snow as a source of tourist and economic attraction, as well as artistic and cultural inspiration.

All participants are welcome to organize or collaborate in these actions.

SUGGESTED TOPICS FOR CONTRIBUTIONS

The thematic focus of the Symposium is the recent interrelations of glaciology with the natural sciences, mathematics, applied and social sciences, and the humanities. All interpretations of this theme are welcome as submissions for presentation at the meeting. We organize the Symposium in five blocks of knowledge, whose structure follows the theme 'Glaciology meets X':

1. Glaciology meets Physical Sciences: encompasses the fundamental physics and chemistry of ice in all its forms, including snow and ice mechanics, microstructure and geochemistry; snow and firn metamorphism; thermal,



 BU





Pardee School of Global Studies

The Frederick S. Pardee Center for the Study of the Longer-Range Future



optical and dielectric properties of ice; ice phases; solar system ices; and so on. It also hosts topics related to the physical foundations of low-temperature experimental techniques and technologies, such as cryo-geochemical analyses; neutrino detection; scanning electron microscopy (SEM); Raman spectroscopy; mass spectrometry (MS); atomic force microscopy (AFM); continuous flow analysis (CFA); neutron and X-ray crystallography (XRC), etc.

- **2. Glaciology meets Formal Sciences and Engineering:** includes several themes related to mathematics, modelling and engineering. It encompasses all aspects of 'theoretical glaciology', from mathematical and numerical problems to glacier and ice-sheet modelling. Furthermore, it hosts glaciological applications in engineering and technology, including the use of ice as model material for condensed matter and materials science; issues in cold-regions engineering; architectural challenges on/in/with ice and permafrost; transportation on ice and permafrost; iceberg towing; borehole and ice-core drilling; refrigeration and cryogenic processes; food technology; technological aspects of ice-related sports; etc.
- **3. Glaciology meets Life and Environmental Sciences:** covers several themes related to biology, ecology, medicine and the environment. In particular, it incorporates cryobiology and cryospheric ecology as a follow-up to the IGS Kyoto Symposium of 2018. Furthermore, it deals with the role of the cryosphere in the climate system, including the cryospheric contribution to global and regional climate models (including CMIP6, CORDEX, etc.); ice-core paleoclimate records; glacier inventories and mass balance; sea-ice loss; permafrost degradation; (sub-/supra-/pro-) glacial lakes; etc. Finally, it provides a forum to discuss the recent conclusions from the Sixth Assessment Report of Working Group I of the IPCC (AR6 WGI).
- **4. Glaciology meets Social Sciences:** covers the socio-economic importance and impacts of the cryosphere in a changing climate. It deals with topics related to climate-change adaptation, vulnerability, risk, resilience, mitigation, equity, litigation, governance and policy.





It also addresses sustainability and the role played by the cryosphere for achieving the sustainable development goals (SDGs) following different scenarios and pathways. Finally, it offers a forum to discuss the conclusions coming up in early 2022 from the Sixth Assessment Reports of Working Groups II and III of the IPCC (AR6 WGII and AR6 WGIII).

5. Glaciology meets the Humanities: unravels the fascinating role played by ice and glaciology in the history, philosophy and culture of mankind. It includes the significance of ice and the cryosphere for the history and philosophy of science, for scientific communication and journalism, and for climate-change sensibilization and awareness. It addresses also timely themes relating ice to sports and tourism, local and indigenous knowledge, minorities rights, gender equality, etc.; as well as ice in the visual and conceptual arts, performing arts, music, literature, film, interactive media, applied arts and crafts, and so on.

ABSTRACT AND PAPER SUBMISSION AND PAPER PUBLICATION Participants wishing to present a paper (either oral or poster) at the Symposium will be required to submit an abstract by 4 March 2022.

A collection of submitted abstracts will be provided for all participants at the Symposium. The Council of the International Glaciological Society has decided to publish a thematic issue of the *Annals of Glaciology* on topics consistent with the Symposium themes. Participants are encouraged to submit manuscripts for this *Annals* volume.





REGISTRATION FEES All fees are in euros, €

Early registration until 25 March 2022

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– Participant (not IGS member): €€	615
– Student or retired (IGS member): €2	295
- Student or retired (not IGS member): \in	345
– Accompanying person (≥18): €1	190
– Accompanying person (7–17): €1	155
- Accompanying person (≤ 6):	Free
Online options*	
– Online participant (IGS member): €3	335
– Online participant (not IGS member): €4	415
Surcharges	
– Registration after 25 March 2022: add €	€40
– Registration after 8 May 2022: add further €1	100

All prices will be charged in UK£ equivalent at the exchange rate valid near the date of transaction.

The fees include:

- In-person participants: attendance at the conference sessions and activities, the Icebreaker, the midweek excursion, the Banguet and coffee-break refreshments from Monday to Friday.
- Online participants: virtual attendance at the conference sessions and activities.⁺
- Accompanying persons: the Icebreaker, the midweek excursion and the Banquet (with alcoholic drinks for those ≥ 18). Attendance at the presentation sessions is not included.

Non-member registration includes a year's membership of the IGS.

*We encourage all participants to attend the Symposium on site. If there is a worsening of the COVID-19 situation, all in-person participants will become online participants and the fee difference (if applicable) will be refunded.

+ Due to their nature, some of these activities will be face-to-face only, always following the required and recommended COVID-19 prevention measures.



GRANTS FOR STUDENTS AND EARLY CAREER SCIENTISTS

We anticipate being able to fund accommodation and registration for a limited number of early-career researchers (MSc/PhD students and early postdocs) up to and including the age of 30. Awards of full or partial scholarships will be given on a competitive basis. An announcement will be made when the early-career support budget is confirmed, and accommodation support applications will be posted at that time.

PROGRAMME & KEYNOTE SPEAKERS

On World Environmental Day (Sunday 5 June), there will be several celebration activities and a pre-symposium **icebreaker**. From Monday 6 June to Friday 10 June **oral sessions and additional forms of communication and expression** (performances, exhibitions, workshops, etc.) will cover the topics outlined above. These activities* will be interlaced with free time to facilitate the interaction and exchange of scientific and transdisciplinary knowledge between participants in an informal and entertaining manner. We anticipate more than a hundred oral presentations and several activities (workshops, performances, exhibitions). **Poster sessions** will be on Monday, Tuesday and Thursday afternoon and posters can be up all week.

On Wednesday afternoon the sessions will be replaced by the midweek excursion and on Thursday evening the **Banquet** will be held. In addition, optional tours are offered during the symposium for accompanying persons, and post-symposium for all attendees.

Keynote lectures by world-renowned experts will be delivered every day (except on Wednesday, because of the midweek excursion):

Monday: Valérie Masson-Delmotte, Co-Chair of IPCC AR6 WGI and CEA Senior Scientist at the Laboratoire des Sciences du Climat et de l'Environnement. *Tuesday*: Alexandre Anesio, Professor in Arctic Biogeochemistry at the Department of Environmental Science, Aarhus University.

Thursday: **Catherine Ritz**, 2020 Seligman Crystal Award winner, CNRS Senior Researcher at the Institut des Géosciences de l'Environnement.

Friday: **Michael Bravo**, Convenor of Circumpolar History and Public Policy Research, and Histories, Cultures, Environments, Peoples, Scott Polar Research Institute, University of Cambridge.

^{*}Due to their nature, some of these activities will be face-to-face only, always following the required and recommended COVID-19 prevention measures.



In addition to the activities during the symposium week, we will have an **Arctic environmental humanities workshop** taking place online some months ahead of the Symposium. More details will appear soon on the local website.* After the workshop, its participants will work on the conclusions drawn from the discussions and present them at the ISS Symposium.

VENUE

The Symposium will be held at the **Bizkaia Aretoa Convention Centre** in Bilbao (Basque Country, Spain). This venue is located on one of the most emblematic sites of Bilbao, which opens out onto the estuary and the Guggenheim Museum, right in the centre of Avenida Abandoibarra, between two of Bilbao's iconic bridges: the Padre Arrupe Footbridge and the Puente de Deusto.

The venue is set up to follow all the required and recommended COVID-19 prevention measures for the event.

The neighborhood of Bizkaia Aretoa is a tourist zone with numerous restaurants, cafés and bars. It is within walking distance of many of Bilbao's attractions and close to a shopping centre. It is also very well served by public transport. More information about how to get to the venue can be found on the local website: https://iss.bc3research.org/travel-and-accommodation/

LOCATION

Bilbao, with the Guggenheim Museum as its most iconic symbol, is the gateway to the Basque cultural universe. Since the 1990s it has been internationally recognized as a major example of urban transformation and revitalization, receiving numerous international prizes and serving as inspiration for many urban projects worldwide.

Bilbao is one of the three capitals of Euskadi, as the autonomous community of the Basque Country is known in Basque. With a history stretching back over 5000 years, Euskadi has a distinctive culture and a language that is unique in the world. Euskadi has managed to adapt to the times and is among the forefront regions of Europe in terms of quality of life and sustainable human development. It also maintains a strong link with the natural environment, with the sea and the mountains being the Basque traditional hallmarks of identity.

*The workshop will be moderated by Adriana Craciun (Pardee School of Global Studies, Boston University, USA), Michael Bravo (Scott Polar Institute, University of Cambridge, UK), Mark Jackson (University of Bristol, UK), Martyn Tranter (Aarhus University, Denmark), and S.H. Faria (BC3, Spain).



ACCOMMODATION

A number of rooms have been reserved in the following hotels, to provide convenient accommodation for participants (links and more information are available on the local website):

Hotel Mercure Bilbao Jardines de Albia (****):

- Individual use double room (VAT 10% included): €130
- Double room (VAT 10% included): €148

Hotel Silken Indautxu (****):

- Individual use double room (VAT 10% included): €155
- Double room (VAT 10% included): €165

Hotel Ibis Budget Bilbao City (*):

- Individual use double room (VAT 10% included): €55
- Double room (VAT 10% included): €60

You must contact these hotels and **make the bookings yourself** (if you have any problems please contact the local organization). Please note that rates may vary depending on property and the specific dates requested. To guarantee your room you must book **before 25 March 2022**.

This is the **booking procedure** to make your reservation using the telephone number/e-mail address that appears on the website of each hotel:

- Use the promo code ISS2022BILBAO.

- Provide them with your telephone number and credit card details.

Alternative affordable accommodation options are also available, e.g.: Pohstel – Premium hostel; Pil-Pil Hostel; Bilbao Akelarre Hostel; Bilbao Central hostel; Botxo Gallery – Youth Hostel; Moon Hostel Bio; and others. Please contact the local organization for more information.

SOCIAL EVENTS

Icebreaker

The Icebreaker will be held on World Environment Day, Sunday 5 June, at 18:00 at the venue (Bizkaia Aretoa). Food and beverages will be available.





Participants can also use this opportunity to complete their registration, collect their conference materials and mount posters (if applicable).

Midweek excursion: Flysch and Gaztelugatxe

A Bio-Geo field trip to the flysch and cliffs of the Basque coast will be organized in the afternoon of Wednesday 8 June. This tour will take us from Bakio beach along the coast to one of the most emblematic and touristic places in the Basque Country: the hermitage of San Juan de Gaztelugatxe.

Banquet

The Banquet will be held on Thursday evening 9 June at the Guggenheim Museum. Several activities will take place during the Banquet, including the award of prizes for the best student presentations, the celebration of IGS's 85th anniversary and the presentation of the 2020 Seligman Crystal Award (see additional information below).

IGS 85th Anniversary

On several occasions during the Symposium, and in particular at its start and during the Banquet at the Guggenheim Museum, we will celebrate the 85th anniversary of the International Glaciological Society (IGS).

2020 Seligman Crystal Award

On Thursday, 9 June 2022, the Seligman Crystal Keynote Lecture will be given by Catherine Ritz, who will receive the 2020 Seligman Crystal Award from IGS during the Banquet at the Guggenheim Museum.

OPTIONAL TOURS

Mid- & *post-symposium one-day tour:* **Bilbao + boat trip to the Bridge of Bizkaia** A one-day optional guided tour of Bilbao + boat trip to the Bridge of Bizkaia will be offered on 06 June (Monday) for accompanying persons and on 11 June (Saturday) for attendees and their accompanying persons.

Mid-symposium one-day tour: La Rioja

An optional one-day tour to La Rioja (historic wine region) will be offered on 07 June (Tuesday) for accompanying persons.





Post-symposium one-day tour: San Sebastián

We offer an optional post-symposium tour on 11 June (Saturday) for symposium attendees and their accompanying persons. It will be a oneday trip to San Sebastián (one of the three Basque capitals) that will include a visit to the Chillida Leku Museum and to the San Telmo Museum.

SYMPOSIUM ORGANIZATION

Sérgio Henrique Faria (BC3) Magnús Már Magnússon (IGS)

CULTURAL AND SCIENTIFIC STEERING COMMITTEE (CSSC)

Chair and Chief Editor: Sérgio Henrique Faria

Cultural Committee: Marcela Brugnach (BC3, Spain), Mark Carey (University of Oregon, USA), Jaime Jackson (Salt Road, UK), Sally Payen (Salt Road, UK), Neelambari Phalkey (University of Birmingham, UK)

Scientific Editors: Carolina Adler (MRI & University of Bern, Switzerland), Mark Carey (University of Oregon, USA), Christine Schøtt Hvidberg (University of Copenhagen, Denmark), Douglas R. MacAyeal (University of Chicago, USA), Muthukumara Mani (World Bank, Vietnam), Francisco Navarro (Universidad Politécnica de Madrid, Spain), Neelambari Phalkey (University of Birmingham, UK), María José Sanz (BC3, Spain), Shin Sugiyama (Hokkaido University, Japan), Martyn Tranter (Aarhus University, Denmark), Marcela Brugnach (BC3)

LOCAL ORGANIZING COMMITTEE (LOC)

Scientific Coordination: Sérgio Henrique Faria (Chair), Coordinator of Physical and Applied Sciences; María José Sanz (Vice-chair), Coordinator of Social, Life and Environmental Sciences; Marcela Brugnach, Coordinator of Humanities

Administrative Coordination: Ainara Fernández, Communications and Social Media Manager; Patricia Muñoz Marzagon, Programme and Technical Manager; Nerea Ortiz, Operations Manager

Committee: Nerea Bilbao, Alejandro Cearreta, Nicolás González, Eñaut Izagirre, Susana Jodra, Carmen Marín Ruiz, Ibai Rico, María Santolaria-Otín

FURTHER INFORMATION

If you wish to attend the Symposium, please **express your interest online** at https://www.igsoc.org/symposia/2022/bilbao2022/ Information will also be updated on the **local website:** https://iss.bc3research.org/



CONTACT Local organization Basque Centre for Climate Change Sede Building 1, 1st floor Scientific Campus of the UPV/EHU Barrio Sarriena s/n 48940 Leioa, Basque Country, Spain (+34) 944 014 690 (Sérgio Henrique Faria & Patricia Muñoz Marzagon) iss@bc3research.org

Registration, abstracts and publication International Glaciological Society

High Cross Madingley Road Cambridge CB3 0ET, UK (+44) (0)1223 355974 (Magnús Már Magnússon) igsoc@igsoc.org

IMPORTANT DATES

Ice in a Sustainable Society	
Opening of online abstract submission:	15 January 2021
Opening of online registration:	21 February 2022
Abstract submission deadline:	4 March 2022
Notification of abstract acceptance:	14 March 2022
Early registration deadline:	25 March 2022
Deadline for full refund:	22 April 2022
Deadline for refund on a sliding scale:	8 May 2022
Late registration surcharge starts:	9 May 2022
Symposium starts:	5 June 2022
Annals of Glaciology volume 64, issue 88	
Paper submission deadline:	1 September 2022
Final revised papers deadline:	1 March 2023

The Call for Papers for the *Annals of Glaciology* is posted on https://www.igsoc.org/annals/call_4_papers/a88_call_4_papers.pdf. Accepted papers will be published as soon as authors have returned their proofs and all corrections have been made.



INTERNATIONAL GLACIOLOGICAL SOCIETY

International Symposium on Maritime Glaciers



University of Alaska Southeast Juneau, Alaska, USA 19–24 June 2022

> SECOND CIRCULAR February 2022



The University of Alaska Southeast and the International Glaciological Society are pleased to announce the International Symposium on Maritime Glaciers, which will take place in Juneau, Alaska, USA, from 19–24 June 2022.

THEME

Glaciers in most parts of the world are located well above treeline. However, in maritime climates it's possible to stand on a glacier and look up at forested valley slopes. Maritime glaciers exist not because of especially cold temperatures, but because of high snow accumulation rates. In places like Southeast Alaska, snow accumulation rates often exceed 5 m per year at high elevations, melting can occur year round and can exceed 10 m per year at low elevations, and persistent rainfall is a significant component of glacier runoff. Temperate ice and wet snow are also characteristics of maritime glaciers. Due to their high mass turnover, maritime glaciers respond quickly to climate change, and surging glaciers in maritime climates have shorter surge cycles than surging glaciers found elsewhere. A small percentage of maritime glaciers terminate in water, but these glaciers have outsized impacts on sea level rise due to their large size and susceptibility to rapid change.

The glacier-to-ocean distance is generally small for maritime glaciers, and as a result these glaciers constitute a large portion of their respective watersheds, with important consequences for stream temperature and chemistry and adjacent ecosystems. The short glacier-to-ocean distance also means that glacier runoff in these environments strongly affects the physical and chemical oceanography of near-shore waters, which serves as important habitat for fish, such as salmon, marine mammals, and sea birds. Glacier transition into or out of marine systems has profound impacts on fjord circulation, water properties, and ecosystem evolution. Deglaciation of these landscapes also increases the risk of landslides and landslide-generated tsunamis. The rich marine habitat provided in part by glaciers has sustained humans for centuries, and the peoples living along these coastal waters have important stories and legends related to glacier change. Glaciers continue to be an essential component of maritime societies, although today the focus is shifting toward ecotourism.



TOPICS

We seek papers and presentations that advance the understanding of maritime glaciers and their role in landscape and ecosystem change. Key focus areas include (but are not limited to):

- 1. Instruments and methods for observing high-accumulation, high-melt glaciers
- 2. Glacier hydrology and wet firn
- 3. Glacier runoff and sediment and nutrient export
- 4. Tidewater and lake-calving glaciers
- 5. Glacier-ocean-sediment interactions
- 6. Surging glaciers
- 7. Hazards associated with landscape change: outburst floods, landslides, and tsunamis
- 8. Impacts on terrestrial and marine ecosystems
- 9. Social and indigenous perspectives

PROGRAM

The symposium will include oral and poster sessions, organized thematically around topics related to glacier processes, glacier-landscape interactions, and glacier-ecosystem interactions. Additional activities will include an opening icebreaker, a short trip to Mendenhall Glacier, a mid-week excursion to Tracy Arm, and a banquet dinner. We have also organized a pre-symposium excursion to Glacier Bay National Park.

Please check whether you will require a visa to enter the USA. If you need an invitation letter, please contact the IGS office at igsoc@igsoc.org. The sooner you do this the more likely it is that your visa will be processed in time.

ABSTRACT AND PAPER SUBMISSION AND PAPER PUBLICATION

Participants wishing to present a paper (either oral or poster) at the symposium will be required to submit an abstract by 15 March 2022. A collection of submitted abstracts will be provided for all participants at the symposium. The Council of the International Glaciological Society has decided to publish a thematic issue of the *Annals of Glaciology* on topics consistent with the Symposium themes. Participants are encouraged to submit manuscripts for this *Annals* volume.



REGISTRATION FEES All fees are in USD, \$ *Early registration* until 8 April 2022

Larry registration until 0 April 2022	
– Participant (IGS member):	\$600
– Participant (not IGS member):	\$700
– Student or retired (IGS member):	\$300
– Student or retired (not IGS member):	\$400
– Accompanying person (≥18):	\$200
– Accompanying person (7–17):	\$100
- Accompanying person (≤ 6):	Free
Online options*	
– Online participant (IGS member):	\$150

– Online participant (IGS member):	\$150
– Online participant (not IGS member):	\$200 ⁺
– Registration after 8 April 2022:	add \$50
– Registration after 15 May 2022:	add further \$100

All prices will be charged in UK£ equivalent at the exchange rate valid near the date of transaction. Note there is a cap of 150 delegates for the symposium on a first-come-first-serve basis, so register early.

The fees include:

- In-person participants: attendance at the conference sessions and activities, the Icebreaker, the mid-symposium excursion, the Banquet and coffee-break refreshments from Monday to Friday.
- Online participants: virtual attendance at the conference sessions and activities.[‡]
- Accompanying persons: the Icebreaker, the midweek excursion and the Banquet (with alcoholic drinks for those ≥21). Attendance at the presentation sessions is not included.

Non-member registration includes a year's membership of the IGS.

*We encourage all participants to attend the Symposium on site. If there is a worsening of the COVID-19 situation, all in-person participants will become online participants and the fee difference (if applicable) will be refunded.

+ If a student, you can join the IGS and online participation will then cost \$175

[‡] Due to their nature, some of these activities will be face-to-face only, always following the required and recommended COVID-19 prevention measures.



SOCIAL EVENTS

Icebreaker

We plan to hold an icebreaker reception at 5:00 pm on Sunday, 19 June, at the Forbidden Peaks Brewery near the campus of the University of Alaska Southeast. Food and beverages will be available. Participants can also use this opportunity to complete their registration and collect their conference materials.

Short visit to Mendenhall Glacier

On the afternoon of Tuesday, 21 June, we hope that participants will have the opportunity to visit the nearby Mendenhall Glacier Visitor Center and take a short hike to learn about the history of the glacier.

Mid-week excursion and banquet

A day-long boat tour to Tracy Arm, a glacial fjord with two tidewater glaciers, will take place on Thursday, 23 June. Space on the boat is limited to 130 passengers, so participation is strictly on a first-come-first-serve basis. On the return trip to Juneau participants will be dropped off at Orca Point Lodge, which is on a small island about 15 km from Juneau, for the symposium banquet. Those not participating in the excursion will be shuttled to the lodge via separate vessel.

Pre-symposium excursion

We are offering a three-day, two-night pre-symposium excursion to Glacier Bay National Park from 17–19 June.

Explore this world-famous park and learn about the effects that the Little Ice Age (LIA) advance and post-LIA retreat has had on indigenous inhabitants and on local and regional terrain. Learn about tidewater glacier retreat, the park's wildlife, and the region's post-LIA plant successions: (https://www.nps.gov/glba/index.htm).

The excursion includes catamaran whale-watching travel to and from the park, two nights stay at Glacier Bay Lodge (https://www.visitglacierbay. com/), all meals, a day boat tour of the West Arm of the park to the





tidewater faces of the Margerie and Grand Pacific Glaciers (https://www. visitglacierbay.com/tours/glacier-bay-day-tour/), and a meeting with representatives of the Tlingit indigenous community at Xunaa Shuká Hít – The Huna Tribal House (https://www.nps.gov/glba/learn/historyculture/ huna-tribal-house-project.htm).

There is a cap of 50 people that we can accommodate on this excursion. Participation is strictly on a first-come-first-serve basis, so please send an email to uas.igs2022@alaska.edu ASAP if you are interested in participating. Consult the local website for additional details on the excursion, including costs. Information will be updated once it is available.

VENUE

The symposium will be held at the University of Alaska Southeast, a small public liberal arts university located 15 km from downtown Juneau, Alaska. The university is situated between Auke Lake and Auke Bay, surrounded by old-growth temperate rainforest, and provides stunning views of the surrounding mountains.

LOCATION

Juneau, with a population of about 30 000, is a coastal community nestled in the Pacific Coastal Temperate Rainforest. The Juneau Icefield is accessible from several points along the Juneau road system, and Glacier Bay National Park is about 100 km to the west. The town has over 100 hiking trails of various lengths and difficulties and great access for sea kayaking and fishing. Black bears, deer and porcupines are commonly seen around town, and humpback whales, orcas, harbor seals and sea lions are regular visitors to the marine environment.

Juneau is the ancestral home of the Tlingit people. The modern town of Juneau was founded in 1880 by goldseekers and held three of the world's largest gold mines in the early 20th century. Now closed, traces of these gold mines can still be found scattered throughout the forests and mountains.





Although other nearby mines have opened and play an important role in Juneau's economy, the city also has strong fishing and tourism industries and, as the capital of Alaska, it is home to numerous federal and state agencies. As a result, Juneau is a vibrant community for its size.

ACCOMMODATION AND LOCAL TRANSPORT

58 rooms have been reserved in campus housing (\$55/night for single occupancy; \$27.50/night for double occupancy; \$8/day for cold breakfast and \$13/day for a hot breakfast). An additional 29 rooms have been blocked at the Ramada (\$225–\$235/night) and 30 rooms at the Baranof (\$209/night) in downtown Juneau. You must make the bookings yourself. Information on how to make the bookings will be provided on the local website once it is available.

Juneau has several other hotels, lodges, and bed and breakfasts available if you would prefer a different accommodation. Note that the symposium will be held at the height of the summer tourist season. You are encouraged to make travel arrangements early.

Shuttle buses have been arranged to shuttle delegates between downtown hotels and the university, and also for delegates wishing to eat dinner or go out at downtown establishments. Dining options near the university are limited. The university can also be reached from downtown by express bus on weekdays between 8:00 am and 6:00 pm and by taxi/Uber/Lyft.

SYMPOSIUM ORGANIZATION

Magnús Már Magnússon (International Glaciological Society)

SCIENCE STEERING AND EDITORIAL COMMITTEE

Shin Sugiyama (Hokkaido University, Chair), Brian Anderson (Victoria University of Wellington), Liss Andreassen (Norwegian Water Resources and Energy Directorate), Andy Aschwanden (University of Alaska Fairbanks), Guðfinna Aðalgeirsdóttir (University of Iceland), Etienne Berthier (Laboratoire d'Etudes en Géophysique et Océanographie Spatiales), Emily Eidam (University of North Carolina), Gwenn Flowers (Simon Fraser University), Claudine Hauri (University of Alaska Fairbanks), Mark Hopwood (Southern University of Science and Technology), Adrian Jenkins (Northumbria University), Michelle Koppes (University of British Columbia), Mike Loso (National Park Service), Andrés Rivera (Universidad de Chile), Thomas Schuler (University of Oslo), Martin Truffer (University of Alaska Fairbanks), Jun Uetake (Hokkaido University)



LOCAL ORGANIZING COMMITTEE (LOC)

Jason Amundson (Chair; University of Alaska Southeast), Eran Hood (University of Alaska Southeast), Lynn Kaluzienski (University of Alaska Southeast), Roman Motyka (University of Alaska Fairbanks), Tom Thornton (Alaska Coastal Rainforest Center), Jamie Womble (National Park Service), Andy Bliss (National Park Service)

FURTHER INFORMATION

If you wish to attend the symposium, please register your interest online at https://www.igsoc.org/symposia/2022/juneau2022/

Information will also be updated on the local website: https://uas.alaska.edu/conferences/igs2022/

Questions can be directed to uas.igs2022@alaska.edu

IMPORTANT DATES

Maritime Glaciers	
Opening of online abstract submission:	15 January2022
Abstract submission deadline:	15 March 2022
Opening of online registration:	25 March 2022
Notification of abstract acceptance:	1 April 2022
Early registration deadline:	8 April 2022
Deadline for full refund:	6 May 2022
Deadline for refund on a sliding scale:	22 May 2022
Late registration surcharge starts:	22 May 2022
Symposium starts:	19 June 2022
Annals of Glaciology volume 64, issue 87	
Paper submission deadline:	27 October 2022
Final revised papers deadline:	16 March 2023

The Call for Papers for the *Annals of Glaciology* is posted on https://www.igsoc.org/annals/call_4_papers/. Accepted papers will be published as soon as authors have returned their proofs and all corrections have been made.

Hard copy publication is scheduled for mid to late 2023.



INTERNATIONAL GLACIOLOGICAL SOCIETY

International Symposium on

Snow



Davos Congress Centre Davos, Switzerland 25–30 September 2022

FIRST CIRCULAR February 2022 https://www.igsoc.org/symposia/2022/davos2022/ The International Glaciological Society will hold an International Symposium on 'Snow' in 2022. The symposium will be held at the Davos Congress Centre, Davos, Switzerland on 25–30 September 2022.

THEME

Snow is a complex material, transient and of singular beauty. While our understanding has improved over the recent decades, it still offers numerous scientific challenges. The snow cover plays a crucial role in the climate of cold regions – from high latitudes to high elevations – and impacts societies and their activities. Because of its high climate sensitivity, snow is declining, with far-reaching consequences for the environment and humanity.

Given these prospects and improvements in advanced technologies for monitoring and modelling, we announce a symposium focused on understanding snow and its impacts on the environment, people and infrastructure.

Snow will be examined at all scales – from the microscale of snow structure to the global scale.

This meeting seeks to address various challenges by bringing together scientists from diverse communities engaged in research on snow. We welcome snow-related contributions, including ground-based observations, remote sensing, laboratory experiments, numerical modelling, data compilations and analyses, risk management, water resources, climate and social impact assessment.

SUGGESTED TOPICS

These include (but are not limited to):

- 1. Observing and modelling of snow and its changes at different scales: Snow microstructure; distribution and variability of snow cover, snow depth and SWE; Snow stratigraphy; modelling seasonal snow, including coupling of cryosphere models with regional climate models, and intercomparison of models; snow and climate projections and forecasts of seasonal snow under a changing climate, role of meteorological extreme events
- 2. Snow physics and chemistry: heat and mass transfer in snow, snow metamorphism; physical and mechanical properties of snow; snow chemistry
- **3.** Snow as a component of climate, including snow-atmosphere interactions and snow-ground interaction
- **4. Remote sensing of seasonal snow and avalanches** from local to global scale, applying platforms from ground-based to satellite, including snow on sea and lake ice, snow and avalanche mapping
- 5. Snow in motion and snow engineering: snow avalanches formation, including stability evaluation, avalanche forecasting and warning; snow avalanches dynamics, including avalanche impact, mitigation and hazard mapping; snow tribology, including winter sports and mobility on snow; snow loads on structures



- 6. Snow and biosphere, including snow-vegetation/forest interactions
- 7. Snow hydrology, including snow distribution, snow melt and runoff.

PROGRAM

True to tradition, the symposium will include oral and poster sessions interlaced with ample free time to facilitate interactions between the participants. Additional activities include an opening icebreaker, a banquet dinner and an excursion during the mid-symposium afternoon break.

We offer participants the opportunity to organize small workshops on specific topics, e.g. drone measurements of snow depth, stability tests, new methods to measure snow properties. If you are interested in conducting such a workshop, please contact the Science Steering and Editorial Committee.

ABSTRACT AND PAPER PUBLICATION

Participants who wish to present a paper (oral or poster) at the Symposium will be required to submit an abstract by 28 May 2022. Accepted abstracts will be posted on the Symposium's website. The Council of the IGS will publish a thematic issue of the *Annals of Glaciology* on topics consistent with the Symposium themes. Participants are encouraged to submit manuscripts for this *Annals* volume.

VENUE

The SLF is an interdisciplinary research and service centre located in Davos. It is part of WSL, the Swiss Federal Institute for Forest, Snow and Landscape Research, and therefore belongs to the ETH domain.

The SLF is well known worldwide as a leading research institute in its field. Around 150 staff study snow, atmosphere, mass movements, permafrost and mountain ecosystems and translate their knowledge into innovative products for practical use. Within the framework of the CERC (Climate Change, Extremes, and Natural Hazards in Alpine Regions Research Centre), the SLF investigates the effects of climate change on extreme events and natural hazards in mountain regions.

The SLF also provides various services, including the Avalanche Bulletin, advice on avalanche protection measures, and expert opinions on avalanche accidents, and is active in the development of warning systems for natural hazards.

The Symposium will take place in the Davos Congress Centre, centrally located between Davos Dorf and Davos Platz. The Congress Centre offers a selection of perfectly organized rooms, equipped with top-of-the-line presentation technology.

LOCATION

Davos is located 1560 m a.s.l. in the heart of the Canton of Grisons in the eastern Swiss Alps. September temperatures average highs of 14°C and lows of 4°C. The town of Davos is easily accessible by train. It is about 130 km southeast of Zurich from where the train journey takes about $2\frac{1}{2}$ hours. There is a major international airport in Zurich and right at the airport you can board a train (changes required at Zurich main station and Landquart).

SYMPOSIUM ORGANIZATION

Magnús Már Magnússon (International Glaciological Society

LOCAL ORGANIZING COMMITTEE

Jürg Schweizer, Martin Schneebeli, Nadine Salzmann, Marion Hofmänner, Cornelia Accola

SCIENCE STEERING AND EDITORIAL COMMITTEE

Martin Schneebeli, Nadine Salzmann, Michael Lehning, Yves Bühler, Tobias Jonas, Henning Löwe, Alec van Herwijnen, Marcia Phillips, Perry Bartelt, Charles Fierz, Betty Sovilla, Christoph Marty, Chris Pielmeier, Michael Bründl (SLF Davos), Jan-Thomas Fischer, Michaela Teich (BFW Innsbruck, Austria), Ingrid Reiweger, Franziska Koch (BOKU Vienna, Austria), Marie Dumont, Pascal Hagenmüller (CEN, MeteoFrance, Grenoble, France), Nicolas Eckert (INRAE Grenoble), Pascal Haegeli (Simon Fraser University), Karl Birkeland (US Forest Service), Ruzica Dadic (University of Wellington, NZ), Johan Gaume (EPF Lausanne), Ulrich Strasser (University Innsbruck), Hans-Peter Marshall (Boise State University), Alex Langlois (University Sherbrooke, Canada), Chris Derksen (ECCC, Canada), Shichang Kang (Northwest Institute of Eco-Environment and Resources, China), Teruo Aoki (National Institute of Polar Research, Tokyo, Japan), Juha Lemmetyinen (Finnish Meteorological Institute, Finland), Rune Engeset (NVE, Norway), Maurine Montagnat (Universitý Grenoble Alpes), Stefan Margreth (SLF, Davos), Nick Rutter (Northumbria University, UK)

FURTHER INFORMATION

If you wish to attend the Symposium, please **register your interest online** at https://www.igsoc.org/symposia/2022/davos2022/

The Second Circular will give further information about accommodation, the scientific programme, additional activities, preparation of abstracts and final papers. Members of the International Glaciological Society, as well as all those who have expressed an interest, will automatically receive notification of the Second Circular.

Information will also be updated on the IGS conference website, https://www.igsoc. org/symposia/2022/davos2022/ as it becomes available. A local website will open later in the year..



INTERNATIONAL GLACIOLOGICAL SOCIETY

International Symposium on

Sea Ice Across Temporal and Spatial Scales



Bremerhaven, Germany 4–9 June 2023

Co-sponsored by: Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research University of Bremen

FIRST CIRCULAR March 2022 https://www.igsoc.org/symposia/2023/bremerhaven2023/ The International Glaciological Society (IGS) will hold the next **International Symposium on Sea Ice** in Bremerhaven, Germany, 4–9 June 2023. Registration will begin in January 2023.

THEME

Sea Ice Across Temporal and Spatial Scales. Sea ice is an important component of the Earth's climate system and strongly affects marine ecosystems and human activities in both hemispheres. Sea ice is changing rapidly on various temporal and spatial scales, and systematic observations and modelling across these scales is required to better understand underlying processes and interactions, and to predict the ice's future fate. This symposium will invite contributions by the international sea ice research community to exchange recent findings and advances in observations, process understanding, and modelling of sea ice worldwide. While the focus of the symposium will be on the physical ocean–ice–atmosphere system, cross-cutting interdisciplinary contributions are invited from fields such as sea-ice ecology and biogeochemistry, ice engineering, human use of the sea-ice environment, and others.

TOPICS

We seek papers and presentations on any timely topic related to **sea ice across temporal and spatial scales**, ranging from case studies to year-round investigations as during MOSAiC. All contributions may include and/or combine observational, numerical, theoretical, laboratory or conceptual approaches. Key focus areas include (but are not limited to):

- **1. Sea ice in the regional and global climate:** past, present, and future variability and change of sea ice and climate on various scales, including observations, attribution and prediction, feedbacks, extreme events, polar–midlatitude linkages, Arctic–Antarctic contrasts
- **2. Sea-ice processes and ocean-ice-atmosphere interaction:** sea-ice mass balance, dynamics versus thermodynamics, ocean heat flux, surface energy balance
- **3. Snow on sea ice:** snow thickness, density, thermal and microwave properties, metamorphism, redistribution
- 4. Physical properties of sea ice: from the microscopic to the macroscopic, optics, ice mechanics
- **5. Sea ice ecology and biogeochemistry:** from microorganisms to fish and marine mammals, primary productivity, ecosystem change, particulate and dissolved organic matter, carbon cycle, gas fluxes, aerosols, bio-physical interactions and feedbacks

- **6. Methodological advances, coupling and upscaling in sea ice studies:** Remote sensing, autonomous observations and vehicles, instrumental advances, new data products, coupling sea-ice modelling with observations, advances in numerical parameterizations
- **7. Humans and sea ice:** Indigenous sea ice knowledge and use, community-based monitoring programmes, shipping and resource development in ice-covered waters, ice management, information systems, adaptation and mitigation.

In the preparation of the conference we will invite more specific proposals for sessions related to one or several of the topics above. Contact: Christian.Haas@ awi.de

PROGRAM

The symposium will include oral and poster sessions, and will be a friendly and intellectually stimulating environment to facilitate face-to-face interactions and networking. Additional activities will include an opening Icebreaker reception, a banquet dinner and a mid-symposium afternoon excursion.

ABSTRACT AND PAPER PUBLICATION

Participants who wish to present a paper (oral or poster) at the Symposium will be required to submit an abstract. Accepted abstracts will be posted on the Symposium's website. The Council of the IGS has decided to publish a thematic issue of the *Annals of Glaciology* on topics consistent with the Symposium themes. Participants and nonparticipants alike are encouraged to submit manuscripts for this *Annals* volume . A call for abstracts will be issued in the Second Circular.

SIDE MEETINGS

The organizing committee welcomes requests from groups and organizations for meeting spaces to host side meetings before or after the symposium. Send all requests to Marcel.Nicolaus@awi.de

VENUE

The symposium will take place in the waterfront hotel ATLANTIC Hotel Sail City in Bremerhaven, Germany. The hotel is centrally located at the Weser River waterfront and near the city centre, and next to many of Bremerhaven's renowned tourist attractions, such as the Climate House, German Emigration Centre and Museum, German Maritime Museum, U-Boat Museum, Bremerhaven Zoo by the Sea (with live polar bears and penguins), and New Harbor Havenwelten. There are numerous eating venues, markets and shops nearby. The Hanseatic City of Bremen, with its medieval city centre, is less than one hour away. The symposium will utilize additional meeting rooms at the Climate House, the German Maritime Museum, and the Alfred Wegener Institute, all within very short walking distance.

https://www.atlantic-hotels.de/hotel-sail-city-bremerhaven



SYMPOSIUM ORGANIZATION Magnús Már Magnússon (International Glaciological Society

LOCAL ORGANIZING COMMITTEE

Marcel Nicolaus, Gunnar Spreen, Christian Haas, Lilian Schubert, plus numerous representatives of AWI's senior and junior interdisciplinary sea-ice research community.

SCIENCE STEERING AND EDITORIAL COMMITTEE CHAIRS

Christian Haas, Marcel Nicolaus, Gunnar Spreen International Members of the Science Steering Committee and Editorial Committee will be invited after publication of the First Circular.

FURTHER INFORMATION

If you wish to attend the Symposium, please **register your interest online** at https://www.igsoc.org/symposia/2023/bremerhaven2023/

The Second Circular will give further information about accommodation, the scientific programme, additional activities, preparation of abstracts and final papers. Members of the International Glaciological Society, as well as all those who have expressed an interest, will automatically receive notification of the Second Circular.

Information will also be updated on the IGS conference website, https://www. igsoc.org/symposia/2023/bremerhaven2023/ as it becomes available. A local website will open in due course.



INTERNATIONAL GLACIOLOGICAL SOCIETY

International Symposium on

The Edges of Glaciology



Limerick, Ireland 2–7 July 2023

Co-sponsored by: MACSI (Mathematics Applications Consortium for Science and Industry), University of Limerick

> FIRST CIRCULAR May 2022

The International Glaciological Society will hold an International Symposium on **The Edges of Glaciology** in 2023. The symposium will be held in Limerick, Ireland, from 2–7 July 2023. This will be an in-person conference, although it will be hoped to provide an opportunity for virtual participation at reduced cost. The meeting will only proceed if there is sufficient in-person attendance, and participants are encouraged to turn up in the flesh if they can.

THEME

The edges of glaciology are most obviously those parts of the study of ice and ice masses which involve boundaries: grain boundaries, the glacier bed, the glacier surface, shear margins, crevasses, calving. But these and other subjects also sometimes involve philosophical edges, where different presumptions and practices can lead to controversy: for example, theories of drumlin formation or till deformation. And yet again, there are territorial edges, where glaciology lies at the interface with other disciplines, as for example in ice-shelf–ocean interactions, rheology of granular materials, firn sintering and compaction. The aim of the conference is to explore and encourage discussion of all such edges. In keeping with this aim, we hope to include some open problem-solving sessions, and will also recover the long lost final open discussion.

TOPICS

The suggested topics include, but are not limited to:

- 1. Subglacial processes
- 2. Supraglacial processes
- 3. Snow, firn and ice at the grain scale
- 4. Calving and crevassing
- 5. Glacial geomorphology
- 6. Ice shelves and oceans
- 7. Till rheology.

PROGRAM

Oral and poster presentations will be held on three and a half days. There will be ample opportunity for poster displays. There will be at least one 'open problem' session and a final open discussion. Additional activities will include an opening Icebreaker reception, a banquet dinner and a mid-symposium afternoon excursion.



ABSTRACT AND PAPER PUBLICATION

Participants who wish to present a paper (oral or poster) at the Symposium will be required to submit an abstract. Accepted abstracts will be posted on the Symposium's website. The Council of the IGS has decided to publish a thematic issue of the *Annals of Glaciology* on topics consistent with the Symposium themes. Participants and nonparticipants alike are encouraged to submit manuscripts for this *Annals* volume. All papers (including those based on posters) will be refereed and edited according to the Society's regular standards before being accepted for publication. A call for abstracts will be issued in the Second Circular.

VENUE

The meeting will be held at the University of Limerick in the west of Ireland. Easy access to the University is via Shannon Airport, or there is a coach service from Dublin airport, and the surroundings offer plenty of scope for glaciological, geological and geographical excursions (drumlins, limestone pavement, caves, hill forts, alpine flora).

ACCOMMODATION

On-campus accommodation will be in one of the student villages. Two nearby hotels (ten minute walk) are the Kilmurry Lodge and the Castletroy Park.

PERIPHERAL ACTIVITIES

We hope to organise a pre-symposium excursion to the early Christian settlement on Skellig Michael. There will be a mid-week excursion through the drumlin landscape of South County Clare to the Loop Head peninsula, and a three day post-symposium tour through the post-glacial landscape of western Ireland.



SYMPOSIUM ORGANIZATION Magnús Már Magnússon (International Glaciological Society

SCIENCE STEERING AND EDITORIAL COMMITTEE CHAIRS Andrew Fowler, Chris Clark, Felix Ng, Christian Schoof, Ian Hewitt, Jenny Suckale, Sophie Nowicki, Paul Dunlop..

LOCAL ORGANIZING COMMITTEE

Andrew Fowler, Peg Hanrahan, Ena Brophy, Megan Tuite, Mark McGuinness (photography), Iain Moyles (catering), Guy Kember (music).

FURTHER INFORMATION

If you wish to attend the Symposium, please **register your interest online** at https://community.igsoc.org/events/62a07f1b7df05b00071e3b0e/description

The Second Circular will give further information about accommodation, the general programme, and preparation of abstracts and final papers. Members of the International Glaciological Society, as well as all those who have expressed an interest, will automatically receive notification of the Second Circular.

Information will also be updated on the IGS conference website, https:// www.igsoc.org/event/limerick_2023 as it becomes available. A local website will open in due course.



Glaciological diary

** IGS sponsored

* IGS co-sponsored

2022

5–8 January 2022

Ice Core Early Career Researchers Workshop (ICECReW)

Salt Lake City, Utah, USA and Online Website: https://icedrill.org/meetings/ice-coreearly-career-researchers-workshop-icecrew

25-27 January 2022

IASC Network on Arctic Glaciology meeting and workshop on The Dynamics and Mass Budget of Arctic Glaciers Szczyrk, Poland Website: https://nag.iasc.info/workshop

1-4 February 2022

SnowHydro 2022: 3rd International Conference on Snow hydrology Grenoble, France

Website: https://snowhydro2022.sciencesconf. org/

13-19 February 2022

7th EGU Snow Science Winter School 2022: Snow and its spatial variability

Sodankylä, Finland Website: https://www.slf.ch/en/about-the-slf/ events-and-courses/snow-science-winter-school

14-18 February 2022

International Advanced Training Course on Snow and Avalanches: Practice meets science? Davos, Switzerland Website: https://www.slf.ch/more/training

27 February-4 March 2022

Ocean Sciences Meeting 2022 Honolulu, Hawaii, USA and Online HL04 Floe-scale sea ice processes: constraints from observations and models. Organizers: Alek Petty <alek.a.petty@nasa.gov>; Georgy Manucharyan <gmanuch@uw.edu> Website: https://www.aslo.org/osm2022/

14–18 March 2022

XXI Argentine Geological Congress

Puerto Madryn, Chubut, Argentina Technical Session 18: "Cryospheric Sciences" Website: http://www.congresogeologico.org. ar/trabajos

May 2022

International Firn Workshop Online

Website: https://www.colorado.edu/lab/ icesheetclimate/firn-workshop

1–4 May 2022

Year of Polar Prediction (YOPP) Final Summit

Montreal (QC), Canada Website: https://www.polarprediction.net/ meetings-workshops-and-science-sessions/ yopp-final-summit/

9-12 May 2022

2nd Symposium on Polar Microbes and Viruses Tvärminne Zoological Station, Hanko, Finland Website: https://www.arcus.org/ sites/all/modules/civicrm/extern/url. php?u=22128&qid=3787647

25 May-3 June 2022

22nd Karthaus Summer School: Ice sheets and glaciers in the climate system Karthaus, Italy

Website: https://www.projects.science.uu.nl/ iceclimate/karthaus/

5–10 June 2022

**International Symposium on Ice in a Sustainable Society (ISS)

Bilbao, Basque Country, Spain Contacts: Secretary General, International Glaciological Society (IGS); Sergio Henrique Faria <sh.faria@bc3research.org>

7–17 June 2022

****International Summer School in Glaciology** McCarthy, Alaska, USA Website: https://glaciers.gi.alaska.edu/courses/ summerschool

17 June 2022

Workshop on Machine Learning for Polar Regions

Lamont-Doherty Earth Observatory, Columbia University, New York, USA Website: https://events.columbia.edu/cal/ main/showEventList.rdo

19–24 June 2022 **International Symposium on Maritime Glaciers

Juneau, Alaska, USA Contacts: Secretary General, IGS; Jason Amundson <jmamundson@alaska.edu>

26 June-30 August 2022

School of Ice Dartmouth College, Hanover, New Hampshire, USA Website: https://icedrill-education.org/schoolof-ice//

27–30 June 2022 RINGS – SCAR Action Group

Malangen Resort, Norway Website: https://www.scar.org/scar-news/ rings-news/rings-workshop-june2022/

11-15 July 2022

International Úa user meeting 2022

Northumbria University, Newcastle, UK Contact: Hilmar Gudmundsson (hilmar. gudmundsson@northumbria.ac.uk)

11-23 July 2022

GRISO Summer School 2022

Nuuk, Greenland Website: https://griso.ucsd.edu/griso-summerschool-2022/

12-16 July 2022

WCRP Sea Level 2022 Conference Marina Bay Sands, Singapore

Website: https://www.sealevelconference.org//

6-12 August 2022

School of Ice

Oregon State University, Corvallis, Oregon, USA Website: https://icedrill-education.org/schoolof-ice//

21-26 August 2022

*Cryosphere 2022: International Symposium on Ice, Snow and Water in a Warming World Reykjavík, Iceland

Contacts: Secretary General, International Glaciological Society; Porsteinn Porsteinsson <thor@vedur.is>

29 August-2 September 2022

14th International Conference on Paleoceanography

Bergen, Norway Website: https://icp14.w.uib.no/

29 August–2 September 2022 Sea Level Summer School

Delft, Netherlands Website: https://pastglobalchanges.org/ calendar/summer-school-sea-level-changeevidence-challenges-and-policy

12–14 September 2022

Cryoseismology @ British Seismology Meeting 2022 Cambridge, UK Website: https://wserv4.esc.cam.ac.uk/bsm/

12–15 September 2022 International Mountain Conference 2022 Innsbruck, Austria

Website: https://www.imc2022.info/

16–21 September 2022 OGGM/PyGEM Global Glacier Modeling Workshop 2022

Finse, Norway Website: https://oggm.org/2022/05/09/6thworkshop-announcement/

25-30 September 2022

**International Symposium on Snow Science Davos, Switzerland Contacts: Secretary General, International Glaciological Society (IGS)

5-15 December 2022

in-the-chilean-andes/

Summer school on Cryospheric Monitoring and Water Resources in the Chilean Andes La Serena and La Laguna, Chile Website: https://chess.w.uib.no/activities/ upcoming-activities/summer-school-oncryospheric-monitoring-and-water-resources-

2023

9–10 February 2023 26th Alpine Glaciology Meeting Birmensdorf, Switzerland Contact: @VAW_glaciology

4–9 June 2023

**International Symposium on Sea Ice across Spatial and Temporal Scales

Bremerhaven, Germany Contacts: Secretary General, International Glaciological Society (IGS); Christian Haas <chaas@awi.de>; Marcel Nicolaus <marcel. nicolaus@awi.de>; Gunnar Spreen <gunnar. spreen@uni-bremen.de>

18–22 June 2023

6th European Conference on Permafrost Puigcerdà, Spain Website: http://eucop2023.com/

2-7 July 2023

**International Symposium on the Edges of Glaciology

Limerick, Ireland Contacts: Secretary General, International Glaciological Society (IGS); Andrew Fowler, University of Limerick

11-20 July 2023

IUGG General Assembly Berlin, Germany Website: https://www.iugg2023berlin.org/

4–8 September 2023 15th International Conference on Physics and Chemistry of Ice (PCI-2022) Sapporo, Japan and Online

Website: http://www.lowtem.hokudai.ac.jp/ ptdice/PCI-2022/index.html

2024

4–9 August 2024 ****International symposium on Verification and Validation of Cryospheric models** Northumbria University, Newcastle, UK Contacts: Secretary General, International Glaciological Society (IGS); Jan De Rydt <jan. rydt@northumbria.ac.uk> 2025

20–25 July 2025 IAMAS-IACS-IAPSO BACO-25 Joint Assembly Busan, South Korea



New members

Rainey Aberle

Boise State University, Boise, ID, USA raineyaberle@u.boisestate.edu

Nicole Abib

University of Oregon, Eugene, OR, USA nabib@uoregon.edu

Dr Markus Allgaier

University of Oregon, Eugene, OR, USA markusa@uoregon.edu

Lois Anderson

Department of Marine and Coastal Sciences, Rutgers Univesity. New Brunswick, NJ, USA lsa62@marine.rutgers.edu

Julia Andreasen

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