

CRYOSPHERE 2022

International Symposium on Ice, Snow and Water in a Warming World

Harpa Conference Centre
Reykjavík, Iceland
21–26 August 2022



Organization: Icelandic Meteorological Office,

World Meteorological Organization, International Association of Cryospheric Sciences,
International Association of Hydrological Sciences, International Glaciological Society

Co-sponsors: University of Iceland, UNESCO Intergovernmental Hydrological Programme,
Danish Meteorological Institute, WSL-Institute for Snow and Avalanche Research,
Melnikov Permafrost Institute, University of Wisconsin, University of Alaska Fairbanks,
Stefansson Arctic Institute, University of Ottawa, UNESCO-IOC, Alfred Wegener Institute,
Technical University of Vienna, European Centre for Medium-Range Weather Forecasts,
International Arctic Science Committee, Arctic Monitoring and Assessment Programme,
Scientific Committee for Antarctic Research (SCAR), National Snow and Ice Data Center,
St Petersburg State University, University of Oslo, Third Pole Environment Programme,
University of Saskatchewan, National Oceanographic and Atmospheric Administration,
Agrocampus OUEST

SECOND CIRCULAR (REVISED)

March 2021

<https://www.cryosphere2022.is>



Intergovernmental
Hydrological
Programme



TECHNISCHE
UNIVERSITÄT
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Vienna | Austria



University of Colorado
Boulder

The Icelandic Meteorological Office, the WMO Global Cryosphere Watch (GCW) and the International Glaciological Society (IGS) will, in cooperation with several international scientific organizations and research institutes, host a symposium on the Earth's Cryosphere in Reykjavík, Iceland, 22–26 August, 2022. Presentations will start on 21 August. Registration will begin on 10 January 2022.

THEME

As a result of global atmospheric and ocean warming, **all components of Earth's cryosphere** are now changing at a dramatic pace. More than a quarter of the planet's land surface receives snow precipitation each year and declining snow cover in many parts of the world is causing concern over the future of snowmelt as a water resource. Mass loss continues from **glaciers and ice-fields** in all mountainous regions of the world and from **Arctic and sub-Arctic ice caps**. The two large **ice sheets in Greenland and Antarctica** are major contributors to rising sea-level and may have begun to show signs of irreversible mass loss. The areal extent and thickness of **Arctic sea ice** continues to decline and the resulting albedo changes may be affecting winter weather patterns in North America and Eurasia. Increasing attention is being given to hazards due to thinning of **lake and river ice cover** and **permafrost** degradation, including slope failure.

This symposium will bring together scientists and policy makers for a discussion on the latest results from studies of the entire cryosphere, which plays an important role in the hydrological cycle and the Earth System and is one of the most useful indicators of climate change. The symposium will allow ample time for panel discussions on scientific results, new technologies, research gaps and future perspectives in the light of the Paris Agreement that calls for limiting global warming to 1.5–2°C.

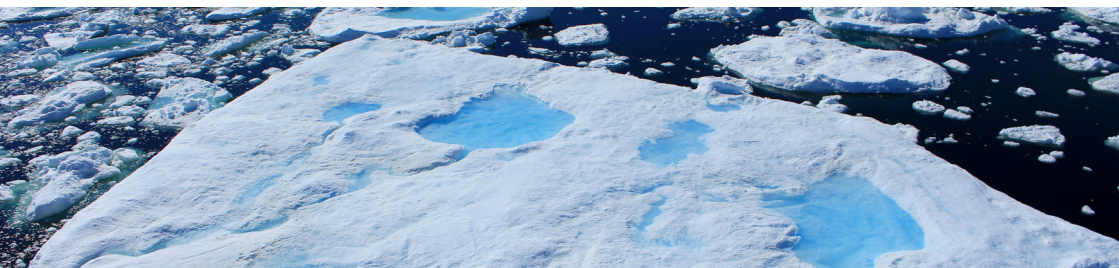
KEYNOTE SPEAKERS

Dorthe Dahl-Jensen (University of Copenhagen and University of Manitoba), **Valerie Masson-Delmotte** (Laboratoire des sciences du climat et de l'Environnement), **Eric Rignot** (University of California Irvine), **Jason Box** (GEUS, Copenhagen), **Olga Makarieva** (St Petersburg State University and Melnikov Permafrost Institute), **Mark Serreze** (National Snow and Ice Data Center, Boulder), **Mandira Singh Shrestha** (ICIMOD, Nepal), **Julia Boike** (Alfred Wegener Institute, Germany), **Michael Zemp** (World Glacier Monitoring Service), **Regine Hock** (University of Oslo), **Robert DeConto** (University of Massachusetts), **Astrid Ogilvie** (Stefansson Arctic Institute), **Bernd Etzelmüller** (University of Oslo) and **Peter Bijl** (University of Utrecht)

TOPICS

We seek presentations and papers on timely topics related to all components of the cryosphere and its changes due to global warming. Sessions will cover the following topics:

1. **Earth's snow cover:** Snow science, recent snow cover changes in mountain and polar regions; satellite monitoring of snow cover; GPR measurements of snow thickness; importance of snow cover for tourism; avalanche hazard mitigation
2. **The cryosphere and hydrology:** Importance of snow and ice melt as a water resource for mountain region populations and for hydropower utilization; runoff changes due to atmospheric warming; monitoring of changes in lake and river ice
3. **Permafrost:** Nature and distribution; ongoing changes; impacts on the hydrological cycle; monitoring challenges; increased risks of landslides due to permafrost thawing; adaption implications for populations
4. **Ocean–cryosphere interactions:** Transfer of water between the oceans and snow and ice masses on land; changes in ocean heat content; effects of declining Arctic sea-ice cover on the climate system; effects of oceanic warming on tidewater glaciers; potential changes in deepwater formation in the North Atlantic ocean; tipping points in the ocean–cryosphere system
5. **Glaciers and ice caps:** Historical changes in glacier area and mass balance all over the world; mass-balance measurements and modelling; glacier dynamics and evolution; melt processes and glaciohydrology; glacier outburst floods (jökulhlaups); glaciers in high-mountain areas and impacts of their melting on populations; future perspectives on glacially fed rivers as water resources
6. **The Greenland Ice Sheet:** Age and history; deep ice-core records; internal structure; recent changes; likely response to near-future warming; varying contribution of Greenland mass loss to sea level in different parts of the world's oceans; research on surface melt lakes and runoff; ice velocity studies



7. **The Antarctic Ice Sheet:** History; internal structure; key data from ice cores on past atmospheric composition; vulnerability of the West Antarctic Ice Sheet to rising sea level; research on subglacial water systems; Antarctica in the climate system
8. **Sea ice:** Nature and distribution; changes in area, thickness and volume; past variations; likely changes during the 21st century; importance of sea ice in the Earth's climate system; ongoing developments in the Arctic (e.g. shipping, settlements, research coverage)
9. **Climate variations, climate- and Earth-system modelling:** Representation of the cryosphere in climate models and Earth systems models; modelling of cryospheric variations and resulting hydrological changes on all time scales from ice ages through Holocene climate variations to centennial, decadal and annual variations; importance of the cryosphere as a trigger of rapid climate change
10. **Research gaps, monitoring programmes, new technologies:** Emerging methods and technologies in surface-based, airborne and spaceborne studies of snow, glaciers and ice sheets, lake and river ice conditions and permafrost, with special emphasis on the development of derived products for cryospheric and polar scientific research and applications
11. **Opportunities, adaptation and mitigation:** Importance of evaluating and estimating current and future cryospheric variations for the design and operation of societal infrastructure, such as coastal and hydrological infrastructure and hydropower systems
12. **Humans and the cryosphere: navigating complex change in the Anthropocene.** Adaptation of human beings to cryospheric environments through time, challenges to indigenous communities presented by increasingly rapid environmental and social change





ABSTRACT SUBMISSION AND PAPER PUBLICATION

Participants who wish to present a paper (oral or poster) at the Symposium will be required to submit an abstract. The International Glaciological Society 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, see https://www.igsoc.org/annals/a85_call_4_papers.pdf. The abstract should not contain any figures nor references and should not be longer than 2500 characters. Abstracts should be submitted through the conference website (<https://www.cryosphere2022.is/abstract-submission>).

Deadline for submitting abstracts: Summer 2022.

REGISTRATION

To register, visit <https://www.cryosphere2022.is> where you will be directed to the registration pages. Registration fees will be listed on the websites in January 2022. Early registration will be possible until 1 June 2022.

ACCOMPANYING PERSONS

The accompanying person's registration fee includes the Icebreaker and the Symposium Banquet. **It does not include attendance at the presentation sessions.**

VISA REQUIREMENTS

Please check whether you will require a visa to visit Iceland. If you need an invitation letter, please contact Iceland Travel Conferences at: conferences@icelandtravel.is. The sooner you do this the more likely it is that your visa will be processed in time.

TRAVEL GRANTS FOR EARLY CAREER SCIENTISTS

Travel grants will be made available for a limited number of young scientists. Detailed information will be posted on the conference website in February 2022.





UiO : University of Oslo



PROGRAM

The program will consist of plenary and topical sessions. On Day 1, world-leading researchers will present overviews of past, present and projected future changes in all components of the cryosphere, including glaciers and ice sheets, snow cover, sea ice, lake and river ice and permafrost. Sessions on Days 2–5 will cover the topics outlined above. We anticipate a total of 70 oral presentations. Panel discussions will be held on each day of the conference. Poster presentations are welcome and posters can be up all week. Additional activities will include an opening Icebreaker reception on Sunday 21 August, a Banquet dinner and optional 1- and 3-day post-conference field excursions.

VENUE AND AUDIENCE

The symposium will be held in the Harpa Conference Centre, in downtown Reykjavík, the capital of Iceland. Invited lectures will be delivered in plenary sessions. Parallel sessions will be held on specialized session topics, if a high number of abstracts is received on particular topics. We seek participation from the scientific community and from various sectors of society affected by snow and ice, either through utilization, hazard prevention or in other ways. See information on Harpa at: <https://harpa.is>

ACCOMMODATION

The conference organizers have made block bookings at hotels and guesthouses in Reykjavík. From 1 February 2022, rooms can be reserved through the registration page on the conference website. Participants can also book accommodation on their own.

PUBLIC EVENTS

Public lectures and exhibitions will be held on the symposium topics, as part of activities commemorating the 100th anniversary of the Icelandic Meteorological Office in 2020 (celebrations delayed due to COVID-19). On Sunday 21 August 2022 a public presentation will be given by writer and photographer **James Balog**, author of the award-winning documentary *Chasing Ice*.



ICEBREAKER

The Icebreaker will be held on Sunday 21 August at 18:00. Details will be announced later on the conference website and through the conference mailing list.

BANQUET

The Banquet will be held on Wednesday evening, 24 August. Information will be given on the conference website and through the conference mailing list.

FIELD TRIPS

Two post-conference field trips will be arranged, starting on Saturday 27 August:

1. A one-day trip to Langjökull, the second largest ice cap in Iceland, situated within Iceland's western volcanic zone. Participants will have the opportunity to visit a 400 m long tunnel dug into the ice cap. A lecture on glacier changes in Iceland will form part of the program.
2. A three-day tour through the glaciated and volcanic regions of South Iceland. Sights will include the glacier-capped volcano Eyjafjallajökull; the Mýrdalsjökull ice cap and floodplains inundated during eruptions in the subglacial volcano Katla; the 1783 lava flow from the devastating Skaftáreldar (Laki) eruption; Skeiðarárjökull and other outlets from the Vatnajökull ice cap; Skaftafell; Örfajökull volcano and the steadily enlarging glacier lagoon in front of Breiðamerkurjökull.

Detailed information on the field trips will be given on the conference website.

EDITORIAL COMMITTEE

Chief editor: Regine Hock (University of Oslo and University of Alaska, Fairbanks)
Scientific editors: Christophe Cudennec (International Association of Hydrological Sciences), Jeff Key (NOAA, UW-Madison), Douglas MacAyeal (University of Chicago), Tómas Jóhannesson (Icelandic Meteorological Office), Mats Granskog (Norsk Polar Institute), Isabelle Gärtner-Roer (University of Zurich), Lauren Vargo (Victoria University of Wellington), Karen Alley (University of Manitoba). Further editors will be appointed as needed.





**St Petersburg
University**



SCIENCE ORGANIZING COMMITTEE

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IMPORTANT DATES

Cryosphere 2022

Opening of online abstract submission:	10 January 2022
Opening of online registration:	10 January 2022
Abstract submission deadline:	15 March 2022
Notification of abstract acceptance:	1 May 2022
Early registration deadline:	1 June 2022
Registration deadline:	1 August 2022
Deadline for field trip registration:	1 August 2022
Symposium starts:	21 August 2022

Annals of Glaciology volume 62, issue 85

Paper submission opens:	Autumn 2021
Paper submission deadline:	Summer 2022
Final revised papers deadline:	December 2022

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 the first half of 2023.

For further information please e-mail cryosphere2022@vedur.is.