



45th Session of the World Climate Research Programme
Joint Scientific Committee

Climate and Cryosphere



cliC

Climate and Cryosphere

WCRP

World Climate
Research Programme

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Lima, Peru



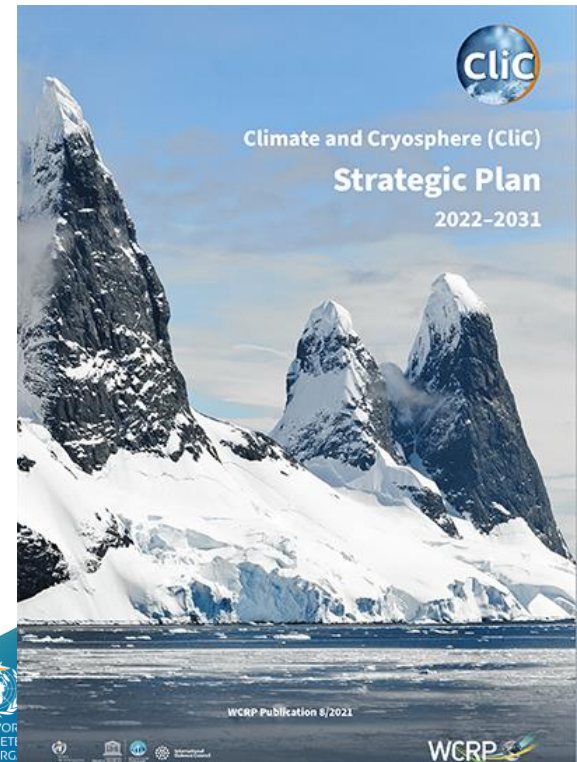


CliC Mission, Vision & Strategic Plan

Mission is “To advance understanding of climate-driven changes in the frozen parts of our planet and to support efforts to mitigate and adapt to their impacts on ecosystems and human society.”

Vision - System understanding of global and regional cryosphere that includes physical climate, ecosystems and inhabitants of cryosphere regions, and cryosphere connections and feedbacks to global climate and society.

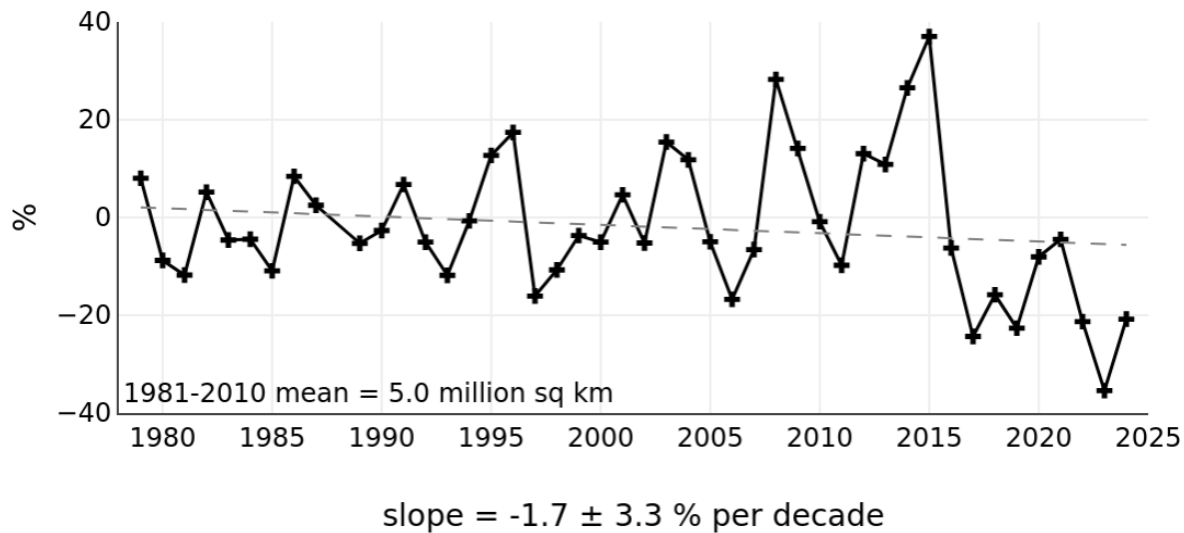
Strategic Plan 2022-2031 **being refreshed** to emphasize balance between science priorities (especially ice, snow & permafrost changes, process understanding and predictability, and their links with climate change) and impacts/application.





Assessments, impacts & projections of cryosphere loss

Southern Hemisphere Extent Anomalies Jan 1979 - 2024



National Snow and Ice Data Center, University of Colorado, Boulder

The cryosphere is changing rapidly

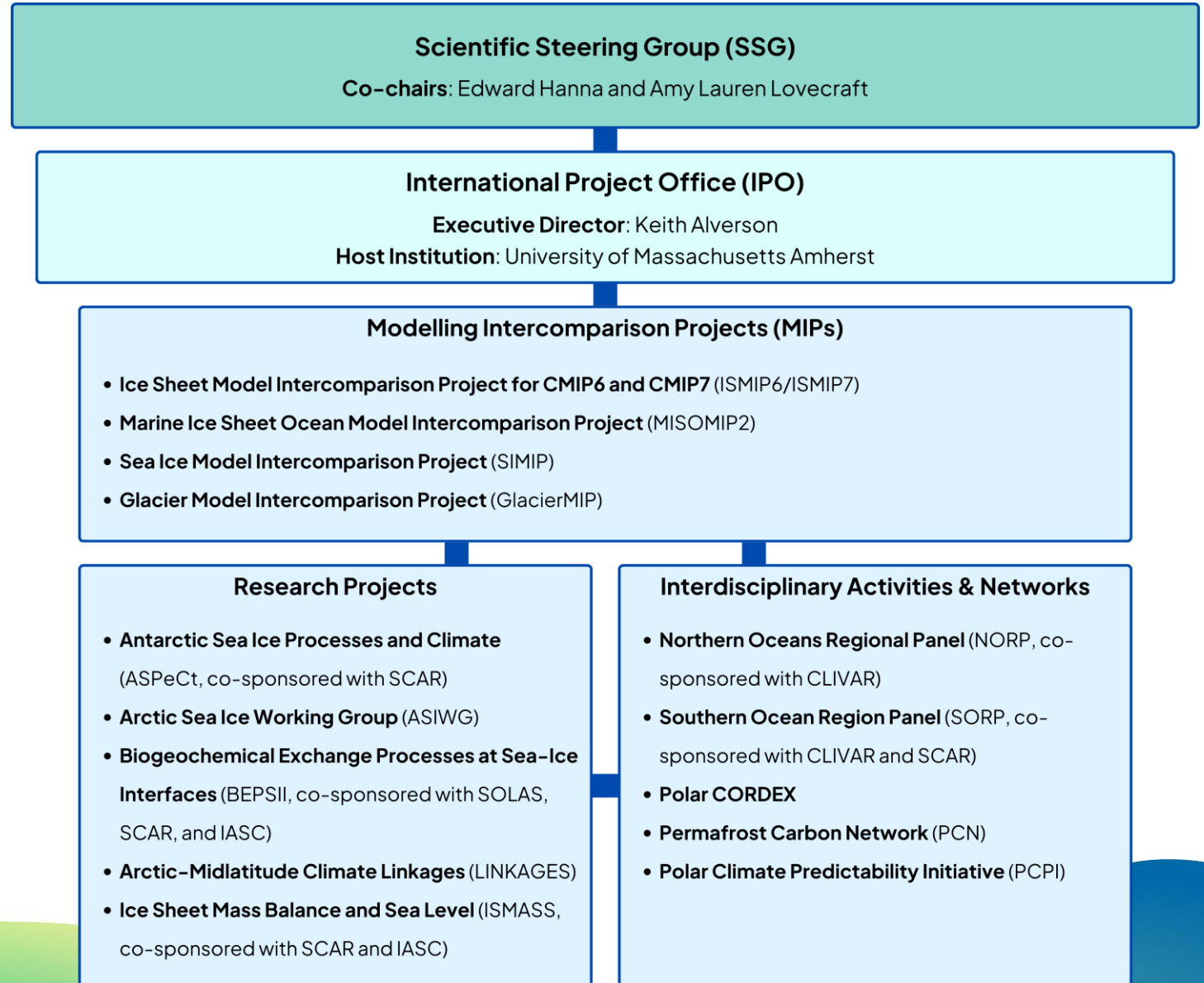
CLiC helps to support:

4 Model Intercomparison Projects (most CMIP6 endorsed) addressing knowledge gaps in ice sheets, sea ice and glaciers

10 further research projects/activities in collaboration with other groups including SCAR, IASC and CLIVAR related to sea ice processes and biogeochemistry, polar climate linkages, ice-sheet mass balance, permafrost carbon, and polar ocean responses



CliC Org. Chart





Partners

CliC Activities x Co-Sponsors	WCRP Atmospheric Processes And their Role in Climate	Climate and Ocean: Variability, Predictability and Change	WCRP Earth System Modelling and Observations	International Arctic Science Committee	WCRP Regional Information for Society	Scientific Committee on Antarctic Research	Surface Ocean Lower Atmosphere Study
	APARC	CLIVAR	ESMO CMIP	IASC	Rifs CORDEX	SCAR	SOLAS
ASIWG (no co-sponsors)							
ASPeCT						X	
BEPSII				X		X	X
GLACIERMIP (no co-sponsors)							
ISMASS				X		X	
ISMIP6/7			X				
LINKAGES				X			
MISOMIP			X				
NORP		X					
Permafrost Carbon Network (no co-sponsors)							
Polar Climate Predictability Initiative	X						
Polar CORDEX					X		
SIMIP			X				
SORP		X				X	

Future Activity	Possible Co-sponsors
IC-MONTC	WCRP Regional Information for Society (Rifs)
	WCRP Global Energy and Water Exchanges (GEWEX)
	Mountain Research Initiative (MRI)
	International Centre for Integrated Mountain Development (ICIMOD)



Highlights: logistics/communications

- CliC's **new IPO** opened at U Massachusetts Amherst with new staff in July 2023.
- **CliC website** updated and much improved: <https://climate-cryosphere.org>.
- **CliC Newsletter** re-established March 2024
- **CliC Webinars** by leading subject experts to the wider community initiated, held approximately once a month in early 2024, archived here: <https://climate-cryosphere.org/webinars/>
- CliC held its **first in-person SSG meeting since 2019** at AGU 2023 Fall Meeting.



Highlights: meetings/ECR support

- CliC supported **12 separate in-person/hybrid meetings and workshops for CliC co-sponsored activities** at multiple international conferences/venues. This included support for early career travel to these events. Many resulting high-level research papers (see reference list at end of written report).
- CliC administered **grants to early career researchers** for field work in crucial cryospheric systems to:
 - 1) investigate effect of permafrost thaw in Mongolia's Khentii Mountains on water availability
 - 2) socio-economic factors affecting water storage and availability in Chilean Andes
 - 3) novel instrumentation development to improve satellite-based sea-ice thickness estimates.



Highlights (polar climate)

- PolarCORDEX published policy-relevant science highlights from the Antarctic CORDEX project in the WMO Antarctic Treaty Paper, highlighting modelling insights about Antarctic Ice Sheet surface mass balance results and policy recommendations.
- Arctic-midlatitude climate Linkages CliC/IASC workshop on “Influence of the lower stratospheric polar vortex on cold-air outbreaks under climate warming” held at University of Lincoln, UK, in September 2023 (led by E. Hanna and J. Overland), with invited scientific paper currently being written up summarising results.



Highlights (sea ice/permafrost)

- ASIWG members have leading role in writing Arctic sea ice sections of Bulletin of the American Society's State of the Climate Report (2023) & NOAA Arctic Report Card: <https://arctic.noaa.gov/report-card/report-card-2023/sea-ice-2023/>.
- **Joint press release with call for action** published jointly by CliC's Arctic Sea Ice Working Group (AISWG) and the SCAR/CliC Antarctic Sea Ice Properties & Climate: <https://www.wcrp-climate.org/news/wcrp-news/2031-polar-scientists-call-for-urgent-action-in-view-of-rapid-arctic-and-antarctic-change?highlight=WyJ1cmdlbnQiLCJhY3Rpb24iXQ==>
- Study co-authored by members of CliC permafrost working group www.permafrostcarbon.org shows **northern permafrost is a net greenhouse gas emitter**: [The Net GHG Balance and Budget of the Permafrost Region \(2000–2020\) From Ecosystem Flux Upscaling - Ramage - 2024 - Global Biogeochemical Cycles](#)
- CliC provided funds for **mini-documentary highlighting permafrost carbon science and synthesis work** for Permafrost Carbon Network, due for Spring 2024 release.



Highlights (ice sheets)

- ISMIP7 started series of expert community workshops leading towards forthcoming IPCC AR7 cycle.
- Review Article with 29 authors based on a 2022 ISMASS workshop: Hanna, E. et al. (2024) [Short- and long-term variability of the Antarctic and Greenland ice sheets | *Nature Reviews Earth & Environment*](#)
- Important/growing new external relationship between SCAR INSTANT-ISMIP-ISMMASS. “Instabilities and thresholds in Antarctica” INSTANT Sept. 2023 Trieste conference that CliC co-funded has catalysed some important conversations and future work on improving Antarctic ice sheet model projections and reducing uncertainties in sea-level projections.



Outputs (ISMASS, joint with IASC & SCAR)



About CLIC ▾ Modeling ▾ Activities ▾ Events ▾ CLIC Grants ▾ Resources ▾ WCRP Corner ▾ Past Activities ▾

Peer-Reviewed Articles



Short- and long-term variability of the Antarctic and Greenland ice sheets

Authors: [Edward Hanna](#), Dániel Topál, Jason E. Box, Sammie Buzzard, Frazer D. W. Christie, Christine Hvidberg, Mathieu Morlighem, Laura De Santis, Alessandro Silvano, Florence Colleoni, Ingo Sasgen, Alison F. Banwell, Michiel R. van den Broeke, Robert DeConto, Jan De Rydt, Heiko Goelzer, Alexandra Gossart, G. Hilmar Gudmundsson, Katrin Lindbäck, Bertie Miles, Ruth Mottram, Frank Pattyn, Ronja Reese, Eric Rignot, Aakriti Srivastava, Sainan Sun, Justin Toller, Peter A. Tuckett & Lizz Ultee

[Read the article →](#)

[Nature Reviews Earth & Environment](#) **volume 5**, pp. 193–210 (2024)



Planned science initiatives and major events

- Workshop immediately prior to EGU April 2024 to kick off planning and scoping of **Impacts of Changes in the Mountain Cryosphere working group** (next 6-9 months) to bring together experts from different mountain regions to focus on societal impacts and hazards of elevation dependent warming, and to help develop recommendations or assessments for local risk management.
- CliC co-organized session at EGU 2024 co-convened by A. Lovecraft: *The diminishing cryosphere: transdisciplinary investigation of societal impacts* to start scoping a working group.
- CliC plans to mark its 30th anniversary with **Open Science Conference 2026**. Aims to: (i) coordinate with other WCRP activities and some key external partners (e.g. APECS, IASC, SCAR); (ii) have lasting legacy and benefit for international research, educational and stakeholder communities with interest in climate and cryosphere matters; (iii) further promote CliC.



Planned products, high-level assessments or other key outputs/publications (p1)

- CliC is putting together **Special Issue of Science** focusing on the cryosphere, to be submitted autumn 2024. Contents: 3 scientific papers assessing rapid and recent cryospheric changes in Arctic, Antarctic, and Mountain Cryosphere respectively.
- Working to collaborate with SCAR's AntClimNow to develop **Antarctic Climate Indicators assessment**; CliC and AntClimNow have joint workshop at SCAR Open Science Conference in Pucón, Chile, 2024.
- CliC recently actively represented on **ICARP IV and IPY/International Polar Decade planning groups/activities** being led by IASC and others.



Planned products, high-level assessments or other key outputs/publications (p2)

- CliC has proposed workshop at International Mountain Year, Innsbruck, Sept 2025, and is discussing a “Mountain cryosphere” annual report card.
- CliC co-chair A. Lovecraft presented poster bridging geophysical modeling and community impacts *"The Political Ecology of the Cryosphere: Theory and Praxis"* that forms basis of global author interdisciplinary scientific review paper to be published in 2025.

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Commission



International
Science Council



Linkages with WCRP activities and beyond

- Planning for a joint activity comprising summer school on polar climate and workshop on sea ice role and variability in climate system together with CLIVAR and International Centre for Theoretical Physics (ICTP), Trieste (Italy), July 2024, is underway, with NORP-SORP task team meeting fortnightly.
- SSG co-chair E. Hanna represented and presented on CliC at the SPARC July 2023 and GEWEX April 2024 SSG meetings. Tony Payne represented us at March 2024 ESMO Steering meeting.
- IPO Director, K. Alverson (remotely) represented CliC in RiFS workshop “*Robustness of Climate Information for Decisions*” April 2024. CliC seeking to partner with RiFs in future activities, perhaps focused on Mountain Cryosphere work.
- R. Bradley has been invited to serve on the Advisory Board for International Year of Glaciers' Preservation 2025.
- R. DeConto invited to participate in US Coast guard's Project Evergreen strategic foresight “Pinecone” workshop on Antarctica. This workshop, endorsed by the Vice Commandant of the U.S. Coast Guard, Admiral Steven Poulin, was held on 13-14 May at The RAND Corporation offices in Pentagon City, VA.



Partnerships with entities outside of WCRP

- Antarctica InSync was endorsed as an Ocean Decade Action and announced at the Polar Summit in Paris. SORP member Alexander Haumann is one of the Antarctica InSync coordinators and has also joined the Southern Ocean Observing System (SOOS) SSG.
- E. Hanna recently met IASC senior leadership at ASSW2024 to discuss enhancing collaboration on matters of mutual interest; CliC is actively represented together with IASC in ICARP IV/IPY planning.
- We closely coordinate several of our activities with APECS (representing cryosphere Early Career Researchers), and E. Hanna recently (March 2024) explored continued/potentially enhanced collaboration with the APECS Executive Director.
- We plan to consolidate partnership with Mountain Research Initiative (MRI) and ICIMOD (Himalayan mountain glacier changes and their impacts).
- We are cooperating with SCAR - holding our next SSG at their OSM, jointly running a workshop there on Antarctic Indicators.
- CliC co-sponsored the International Cryosphere Climate Initiative (ICCI) Cryosphere Pavilion at COP28.

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What's New?

Events: <https://climate-cryosphere.org/upcoming-events/>

***School and Workshop on Polar Climates: Theoretical, Observational and Modelling Advances.** Hosted by CLIC/CLIVAR/SCAR. ICTP, Italy. 22-31 July 2024

***Impacts of changes in the mountain cryosphere (IC-MontC)**
Contact: Ray Bradley (rbradley@umass.edu) Initial Workshop: Vienna, 13-14 April 2024

***ISMIP7 workshop focusing on designing draft protocols for ISMIP7, and how to improve historical model simulations of ice sheets.** Virginia, USA. June 2024. E. Hanna participating as CliC co-chair and part of ISMIP7 focus group.

***International Symposium on Verification & Validation of Cryospheric Models.** Northumbria University, Newcastle, UK. 4-9 August 2024



What's New?

11th SCAR Open Science Conference “Antarctic Science: Crossroads for a New Hope” Pucon, Chile - August 2024

- Polar Climate Variability and teleconnections in the past, present & future (Session Phys. 3)
- 20th CliC Scientific Steering Group Meeting
- Antarctic Indicators and Report Card Workshop

Likely **CliC Open Science Meeting in early/mid 2026** to mark CliC’s 30th anniversary, help galvanize international community, and highlight unprecedented cryosphere changes as essential climate change indicators



Suggestions, issues or challenges

- For Global Fellowship focus, potential areas of interest include: (1) the causes and impacts of extreme climate/cryosphere events; and (2) geoengineering.
- We are interested in linking with WCRP Academy re. Outreach & education; we are co-authors with them at the SCAR OSC.
- Turnaround on the 2025 extra budget application process notified by WCRP was too tight for us to be able to take full advantage in terms of gathering and submitting requests. We would appreciate more advance notice of the 2026 budget.
- We are currently short of 3 SSG members (will be 5 by end of 2024) due to 2023 freeze by JSC on recruiting new members whilst CliC is under review, and this limits what we can do, despite considerable work and efforts by current SSG and IPO members. We have forwarded a list of nominations to JSC for their approval.

Thank you. Questions?



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