

International Cryosphere Climate Initiative (ICCI)
Submission regarding the Second Periodic Review and its Structured Expert Dialogue

The International Cryosphere Climate Initiative (ICCI) appreciates this opportunity to make this Submission to the Second Periodic Review (PR2) and its Structured Expert Dialogue (SED); on behalf of the broader Cryosphere scientific community. The PR2 presents an important opportunity to affirm the role of science in the development of international climate policy. The special dynamics of Cryosphere changes, in response to global warming, for long-term, essentially permanent impacts over time (“slow onset events”), even at the agreed long-term temperature goal; carry strong implications for PR2. For example, this is true for water availability in numerous river basins around the globe, as well as for sea-level rise (SLR) on a global level.

With slow-onset events in the Cryosphere already in play today, and this at levels *below* the agreed long-term temperature goal, ICCI wishes to put forward that PR2 and its Structured Expert Dialogue consider the following important aspects:

- a) Impact of temperature rise on the Cryosphere at today’s global temperature levels, and at the agreed long-term global temperature goals;**
- b) Cryosphere dynamics, including Cryosphere tipping points, at these temperatures and in turn their global impacts;**
- c) Clarification of the definition of “long-term” as an important and new priority under the Framework Convention.**

A pre-session workshop on Cryosphere dynamics and thresholds/tipping points would greatly benefit both PR2 and the GST (below). The Cryosphere scientific community stands ready to assist Parties, the SB-Chairs, the Co-Chairs of the Joint Contact Group on the PR2, the Co-Facilitators of the SED, Observers and the UNFCCC Secretariat in so doing.

Background:

We are pleased to submit our views on the meeting of the Joint Contact Group on the Second Periodic Review of the long-term global goal under the Convention and of overall progress towards achieving it, including its third meeting of the Structured Expert Dialogue, to take place at the next inter-sessional meetings in June 2022.

Climate change has brought about significant negative changes in the global Cryosphere, be it snow, ice or permafrost; in both mountain and polar regions. These changes are evident at the local, regional and global levels: including decreases in snow cover; loss of mass from ice sheets, land glaciers and sea ice; permafrost thaw and degradation; and changes in both polar oceans, including greater freshening, disturbances in ocean currents and rapidly rising acidification.

Such changes in the Cryosphere in turn influence the global climate system, ecosystems and human communities; not least because of SLR due to melting of mountain glaciers, as well as the Greenland and Antarctic ice sheets. Multiple feedbacks occur from loss of summer

Arctic sea ice, including potential extreme weather events, greater mass loss from Greenland, and increased CO₂ and methane emissions from thawing permafrost.

Loss of mountain glaciers and snow, especially in mid-latitude and tropical regions already today impacts three-four billion people reliant to some degree on this ecosystem resource. Changes are especially acute in the northern Andes, western U.S., Scandinavia and Alps where economic activities such as agriculture, power generation and tourism are at least seasonally dependent on rapidly shrinking cryosphere. The largest populations impacted are in South Asia, where impacts from Cryosphere-related changes in the Hindu Kush Himalaya range from altered water availability to flooding and landslides due to a combination of extreme rainfall and heightened meltwater, especially in the spring and summer months.

Because high latitude and polar waters absorb CO₂ more rapidly, the important fisheries in and near the polar regions, for example the North Sea, Barents Sea and Southern Ocean, already are seeing seasonal impacts of ocean acidification. These threats will grow should CO₂ emissions and atmospheric concentrations continue to rise.

All these impacts are projected to become far more damaging as global mean temperatures approach the 1.5°C Paris limit, with greater impacts should this be exceeded. Significantly, based on extensive paleo-climate data, many of these dynamics will continue to worsen and expand not only at 1.5°C, but even more so at 2°C, should global mean temperature remain at these elevated levels for extended time periods, i.e. over the “long term.”

Most importantly, nearly all of these changes are essentially irreversible and permanent on human timescales. They cannot be reversed over decades, centuries and even millennia. This is especially true if we are confronted with emissions scenarios that contain an overshoot of the maximum global temperature rise set in the Paris Agreement (well below 2°C/1.5°C, with regard to pre-industrial levels) for any significant period of time (years to decades). For damaging levels of corrosive waters in polar oceans, the buffering time is 30,000-50,000 years, and entirely dependent on peak atmospheric CO₂ levels.

In sum, higher levels of warming, for longer periods of time, will substantially increase the risk of crossing global Cryosphere thresholds (or “tipping points”). Lower levels of warming, including a return to lower temperatures (below 1°C) will substantially decrease this risk.

- ICCI therefore requests that the Second Periodic Review, and its third SED, improve our collective understanding of the long-term scenarios that will help achieve a substantial decrease in the risk of crossing global Cryosphere thresholds.

Article 2 of the Paris Agreement, in line with the results of the First Periodic Review, states that the Long-term Temperature Goal (LTTG) aims to “hold the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.” The findings of IPCC SR1.5 further emphasized this point. In spite of its importance to assess emission scenarios and their impacts however, the term “long term” remains undefined.

Increasing research evidence, including from AR6 and especially paleo-climatic findings, indicate that impacts over many centuries of temperatures remaining at 1.5°C, let alone 2°C, are not consistent with the Framework Convention goals to limit dangerous anthropogenic climate change. This is true especially as regards sea-level rise from ice sheet loss over multi-century time frames. Such changes will have global impacts that we believe should be taken into greater account during the Second Periodic Review and its Structured Expert Dialogues, as well as during the GST and its TD.

- There is therefore an urgent need that the Second Periodic Review, and in particular its third SED planned for June 2022, begin to explore the definition of “long term” in light of the Framework Convention and its Paris Agreement goals.
- Further, ICCI is of the opinion that these Cryosphere dynamics, related thresholds and their global impacts require greater attention to inform the outcomes of PR2, and also the GST; and requests that a dedicated workshop take place to better inform both processes prior to the next inter-sessional meetings in June 2022. Its scientific community stands ready to assist in this effort.