
# Loss Irreversible on Human Time Scales

"A large fraction of climate change is largely irreversible on human time scales…. Some aspects of climate will continue to change even if temperatures are stabilized. Processes related to … changes in the ice sheets, deep ocean warming and associated sea level rise and potential feedbacks linking for example ocean and the ice sheets have their own intrinsic long time scales, and may result in significant changes hundreds to thousands of years after global temperature is stabilized." IPCC AR5, Chapter 12: "Long-term Climate Change: Projections, Commitments and Irreversibility," p.1033.

As this statement from the Fifth Assessment Report of the Inter-governmental Panel on Climate Change (AR5) notes, ever-higher temperatures mean that the Earth faces a very high risk of crossing certain irreversible thresholds in its cryosphere -- those regions, particularly polar and alpine, where there is ice, snow and frozen ground. As AR5 and subsequent research make clear, this can set into motion very long-term changes that cannot be stopped or reversed, even if temperatures later decrease. Some changes, such as committed sea-level rise from the great polar ice sheets, cannot be reversed short of a new Ice Age.

The only way to constrain these risks is to not allow temperatures ever to rise this high, preferably remaining below 1.5 degrees, with significantly higher risk even with a 2.0 degree goal. Current Intended Nationally Determined Contributions (INDCs), assessed as resulting in global mean temperatures of 2.7-3.5°C above pre-industrial already by 2100, are insufficient to achieve this, in part because temperatures are rising faster and higher in these cryosphere regions than the global mean.

***We the undersigned*** members of the scientific community wish to convey to world leaders the urgent need to adopt more immediate, ambitious measures to minimize the risk that crossing these cryospheric thresholds permanently – on all conceivable human time scales – changes the Earth, human culture and ecosystems.


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***A new report, "Thresholds and Closing Windows:*** Risks of Irreversible Cryosphere Climate Change at Current INDCs," outlines these risks and is downloadable at http://www.iccinet.org/thresholds. The report summarizes the risk that such irreversible processes will begin in five key thresholds: ice sheets, polar ocean acidification, mountain glaciers, permafrost thaw, and Arctic summer sea ice. Without greater reductions than those currently pledged for COP-21 in Paris, avoiding rapid deterioration of snow and ice regions, and associated global climate destabilization may become close to impossible. Figure: The retreating Mendenhall Glacier in Alaska. Credit: energy.gov/Flickr

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