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Zurich, Switzerland, October 2019

Letter of Concern to the Attention of the UNFCCC COP25

Dear Patricia Espinosa,

On behalf of the World Glacier Monitoring Service, I kindly ask you to forward this letter of concern to the President-Designate and the Head of Delegations of the COP25 in Santiago, Chile.

Long-term, sustainable systematic observation of the Earth's climate is the foundation for our understanding of climate change and its associated impacts. The systematic monitoring of glaciers, distinct from the Greenland and Antarctic ice sheets, has been internationally coordinated for 125 years¹. Glacier mass changes are well recognized as a high-confidence indicator of climate change². It is now clear that humans are both the primary cause and will bear the greatest negative impact of glacier melt³. Since 1960, glaciers have lost more than 9,000 gigatonnes (1 Gt = 1,000,000,000,000 kg) of ice worldwide, which corresponds to a layer of ice covering all of Chile to a depth of 14 meters. The melting of this ice alone has raised global sea level by nearly 3 centimeters⁴.

Long-term observations provide evidence that current mass-loss rates are historically unprecedented on a global scale⁵, and they indicate that several mountain ranges such as the European Alps, the Caucasus, western Canada, and the Tropics could lose the vast majority of their glaciers within this century⁴. According to conservative business-as-usual climate change scenarios (RCP8.5), we face the possibility of near-complete loss of all glaciers on planet Earth by the year 2300⁶. Present and future glacier shrinkage severely impacts the local risk of geohazards⁷, regional fresh-water availability⁸, and global sea-level rise⁶, and will result in the loss of life, livelihood, cultural heritage sites, and the forced displacement of millions of people in coastal regions⁹.



On behalf of the worldwide network of glacier observers, we urge the parties of the UNFCCC: (i) to further engage promotion and cooperation in systematic observation of glaciers (and other essential climate variables), (ii) to take related scientific results seriously into consideration for the global stocktake (cf. Paris Agreement, Article 14), and (iii) to take immediate and tangible actions to halt further human-caused climate change.

As scientists, we will continue glacier monitor and, hence, document for current and future generations our society's progress in limiting climate change and related impacts.

Sincerely

Michael Zemp, Director WGMS

Copies of this letter are sent to WMO Secretary General, IPCC and GCOS secretariats

References

1. Forel, F. A. Les variations périodiques des glaciers. Discours préliminaire. *Extrait des Archives des Sciences Physiques et Naturelles* **XXXIV**, 209–229 (1895).
2. Bojinski, S. *et al.* The concept of Essential Climate Variables in support of climate research, applications, and policy. *Bulletin of the American Meteorological Society*. **95**, 1431–1443 (2014).
3. Marzeion, B., Cogley, J. G., Richter, K. & Parkes, D. Attribution of global glacier mass loss to anthropogenic and natural causes. *Science* **345**, 919–921 (2014).
4. Zemp, M. *et al.* Global glacier mass changes and their contributions to sea-level rise from 1961 to 2016. *Nature* **568**, 382–386 (2019).
5. Zemp, M. *et al.* Historically unprecedented global glacier decline in the early 21st century. *Journal of Glaciology* **61**, 745–762 (2015).
6. Marzeion, B., Jarosch, a. H. & Hofer, M. Past and future sea-level change from the surface mass balance of glaciers. *The Cryosphere* **6**, 1295–1322 (2012).
7. Haeberli, W. & Whiteman, C. Snow and Ice-Related Hazards, Risks, and Disasters. in *Snow and Ice-Related Hazards, Risks and Disasters* (ed. Shroder, J. F.) 1–34 (Elsevier, 2015). doi:10.1016/B978-0-12-394849-6.00001-9
8. Huss, M. & Hock, R. Global-scale hydrological response to future glacier mass loss. *Nature Climate Change* **8**, 135–140 (2018).
9. Marzeion, B. & Levermann, A. Loss of cultural world heritage and currently inhabited places to sea-level rise. *Environmental Research Letters* **9**, 034001 (2014).

Co-signed by WGMS National Correspondents

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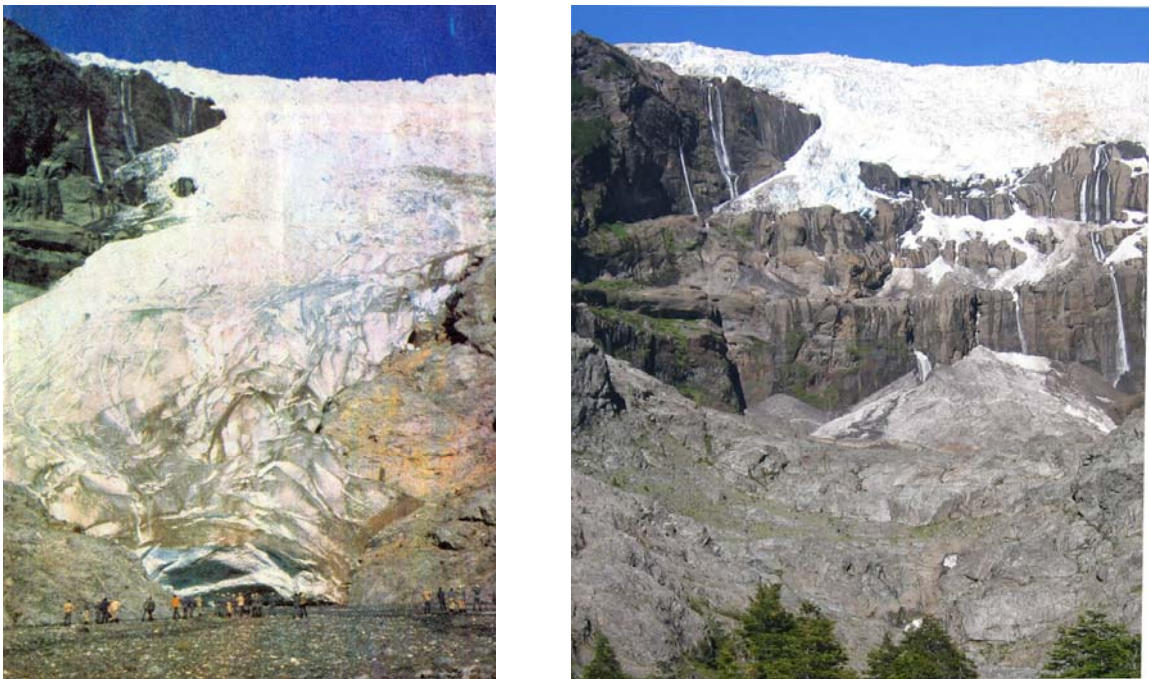
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Foladi Glacier in 1978 (left, J.F. Shroder, Jr.) and in 2016 (right, H.R. Rahimi)

ARGENTINA: Pierre Pitte

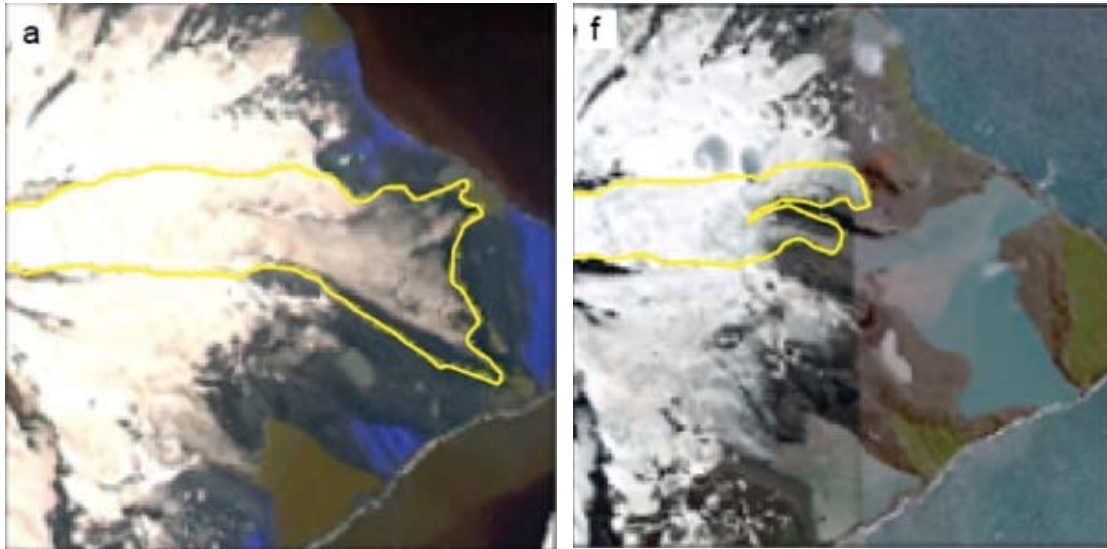
Instituto Argentino de Nivología, Glaciología y Ciencias Ambientales, Mendoza,
pierrepitte@mendoza-conicet.gov.ar



Glaciar Frias in 1983 (left, S. Rubulis) and in 2008 (right, P. Pitte)

AUSTRALIA & ANTARCTICA: Tas van Ommen

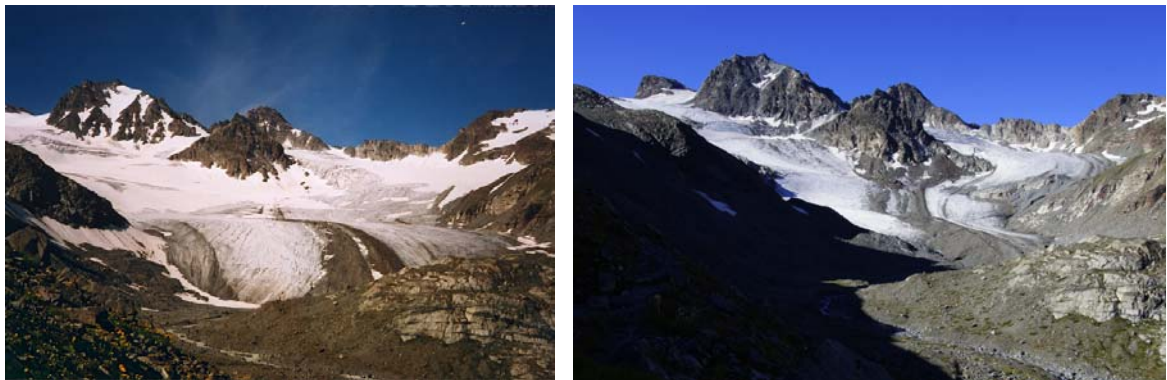
Australian Antarctic Division, Kingston Tasmania, Tas.Van.ommen@aad.gov.au



Stephenson Glacier, Heard Island, 1988 (left, SPOT/CNES) and 2014 (right, GeoEye-1/DigitalGlobe)

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Jamtalferner in 2003 (left, A. Fischer) and in 2019 (right, A. Fischer)



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BOLIVIA: Alvaro Soruco

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Glaciar Chacaltaya in 1994 (left, B. Francou) and in 2008 (right, A. Soruco)

CANADA: Laura Thomson

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Baby Glacier in 1977 (left, J. Alean) and in 2008 (right, J. Alean, swisseduc.ch)

CHILE & ANTARCTICA: Marius Schaefer

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Glaciar Morado in 1932 (left, A. Maaß) and in 2018 (G. Casassa)

CHINA: Li Zhongqin

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Urumqi Glacier No. 1 in 1997 (left, Li Zhongqin) and in 2018 (right, Li Zhongqin)

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Glaciar Conejeras in 2005 (left, J.L. Ceballos) and in 2019 (right, J.L. Ceballos)

ECUADOR & ANTARCTICA: Bolívar Ernesto Cáceres Correa

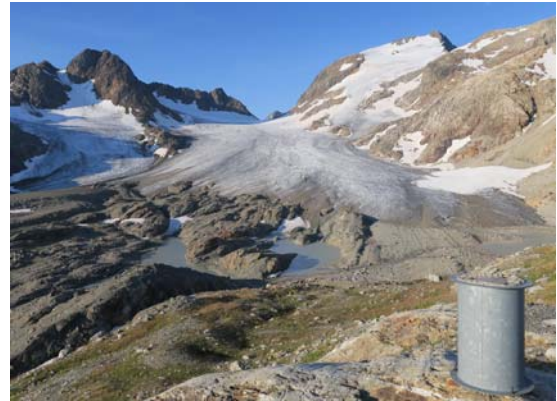
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Glaciar 15 Alpha del Antisana in 1994 (left) and in 2019 (right)

FRANCE: Christian Vincent

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Glacier du Saint Sorlin in 1999 (left, C. Vincent) and in 2018 (right, C. Vincent)

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Gergeti Glacier in 1960 (left, Inst. Geogr.) and in 2011 (right, L. Tielidze)

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Vernagterferner, Austria, in 1985 (left, M. Weber) and in 2017 (right, M. Siebers)

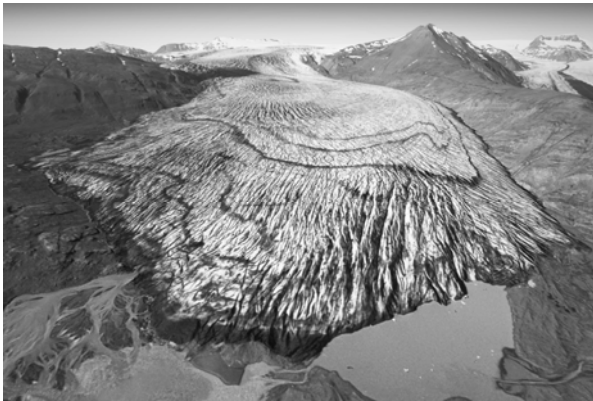


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Skalafellsjökull in 1989 (left, National Land Survey Iceland) and in 2019 (right, Kieran Baxter)

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Dokriani Glacier in 1995 (left, D.P. Dobhal) and in 2008 (right, D.P. Dobhal)

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Alamkouh Glacier in 1964 (left) and in 2010 (right, A. Mohammadi)

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Ghiacciaio del Caresèr in 2003 (left, L. Carturan) and in 2019 (right, L. Carturan).

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Tuyuksu Glacier in 1958 (left, Inst. Geography) and in 2011 (right, Inst. Geography)

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Lewis Glacier in 2006 (left, R. Prinz) and in 2014 (right, R. Prinz)

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Petrov Glacier in 1980 (left) and in 2002 (right)

MEXICO: Hugo Delgado-Granados

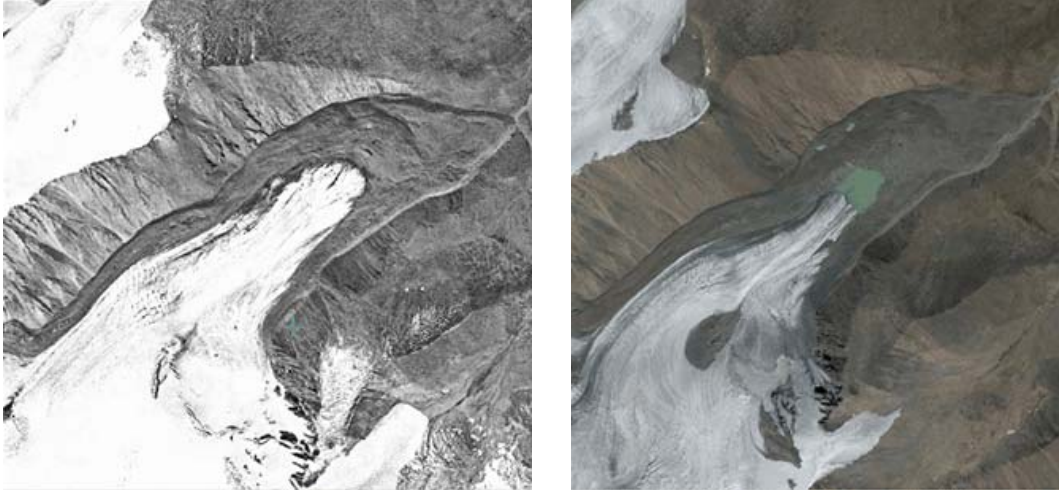
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Glaciar de la Panza, Volcán Iztaccíhuatl, in 1930 (left) and 2005 (right)

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Tumurt Glacier in 1966 (left; KH-4B) and in 2006 (right; WorldView-110)

NEPAL: Sharad P. Joshi

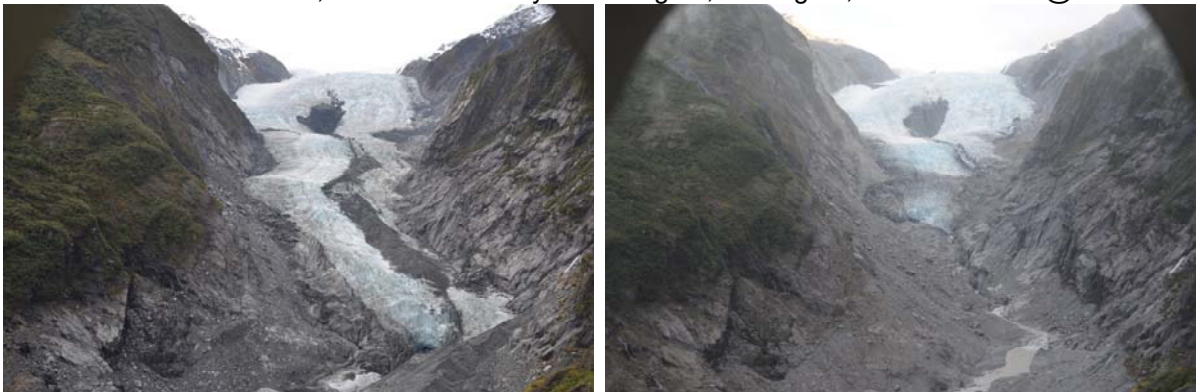
International Centre for Integrated Mountain Development, Kathmandu, Sharad.Joshi@icimod.org



Yala Glacier in 1996 (left, K. Fujita) and in 2018 (right, S. Joshi)

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Franz Josef Glacier (Kā Roimata o Hine Hukatere) in 2012 (left) and in 2019 (right)

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Bergsetbreen in 1996 (left, Hallgeir Elvehøy) and in 2016 (right, Kristen Åsen)

PERU: Luzmila Rosario Dávila Roller

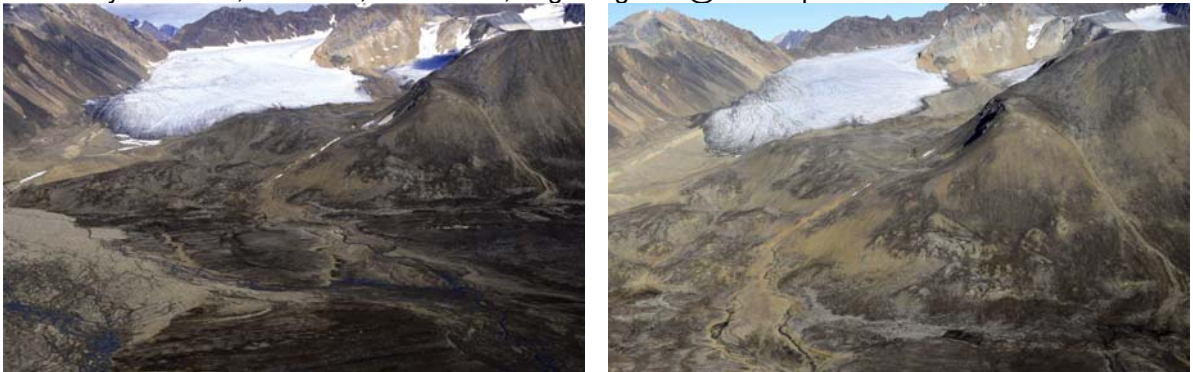
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Glaciar Yanamarey in 1981 (left, UGRH) and in 2018 (right, L.R. Dávila Roller)

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Waldemarbreen, Svalbard, in 2000 (left, A. Tretyn) and in 2015 (right, I. Sobota).

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Djankuat Glacier in 2003 (left, V. Popovnin) and in 2019 (right, V. Popovnin)

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Glaciar Maladeta in 1995 (left) and in 2016 (right)

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Isfallsglaciären in 2001 (left, P. Holmlund) and in 2019 (right, P. Holmlund)

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Pizolgletscher in 2006 (left, M. Huss) and in 2018 (right, M. Huss)

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Whitechuck Glacier in 1973 (left, N. Hinckley) and in 2006 (right, L. Pantilat)

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