



Where are the world's glacial lakes and how big are they?

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Glacial lakes are rapidly growing in response to climate change and glacier melt and present an acute risk to mountain people and ecosystems worldwide. Further, the role of these lakes as a terrestrial storage sink for glacial meltwater is presently not accounted for in global sea level models. While there are many regional compilations of glacial lake extent and change, we provide the first global compilation, including nearly 13,000 lakes in 2015. We show a near doubling (88% increase) to global glacier lake volume to about 840 km³ over the past quarter century, which is equivalent to about a 2.3 mm contribution to eustatic sea level. Glacial lakes in Alaska and Yukon, Baffin Island in the eastern Canadian Arctic, and Patagonia have become much larger, with each region growing by 60-120 km³. Lakes in the High Mountain Asia regions of Nepal, northern India, Bhutan, and parts of Tibet nearly doubled in volume, but since each individual lake is fairly small, this equates to a total increase of only 3.8 km³. The rapid growth of many lakes and formation of new lakes where none existed before increases the hazard posed to downstream populations, infrastructure, and ecosystems, due to glacial lake outburst floods. Additionally, lake formation can cause rapid glacier retreat independent of climate forcing. Glacial lakes are dynamic and metastable, and will not continue to grow unabated. Eventually, many will breach their dams, some catastrophically. The larger these lakes become, the more destructive the floods. Larger lakes can cause more destructive outburst floods.