

To prevent catastrophic global impacts from Earth's cryosphere, overshoot is NOT an option: our pathway to carbon neutrality matters. Here's why:

MOUNTAIN GLACIERS AND SNOW

Mountain glaciers hold about 0.5 m of global sea-level rise; but together with snow, glaciers may be most important for the services they provide to people: water resources for drinking, industry and agriculture; and for recreation and tourism.

NO MORE GLACIERS Nearly all glaciers in the world would melt if global temperatures go beyond 2°C above pre-industrial. Only small glaciers at the poles and in the Himalayas would survive.

Glaciers and snow are important to the world's security. As the planet warms and glaciers recede, water supplies are under stress, an increasingly difficult source of conflicts around the world.

Water from glaciers and snow provide more reliable sources of water, especially during the dry seasons, heat waves and droughts. The Tarim river system in NW China is almost entirely fed by glaciers and snow, and supports the world's second largest cotton industry.

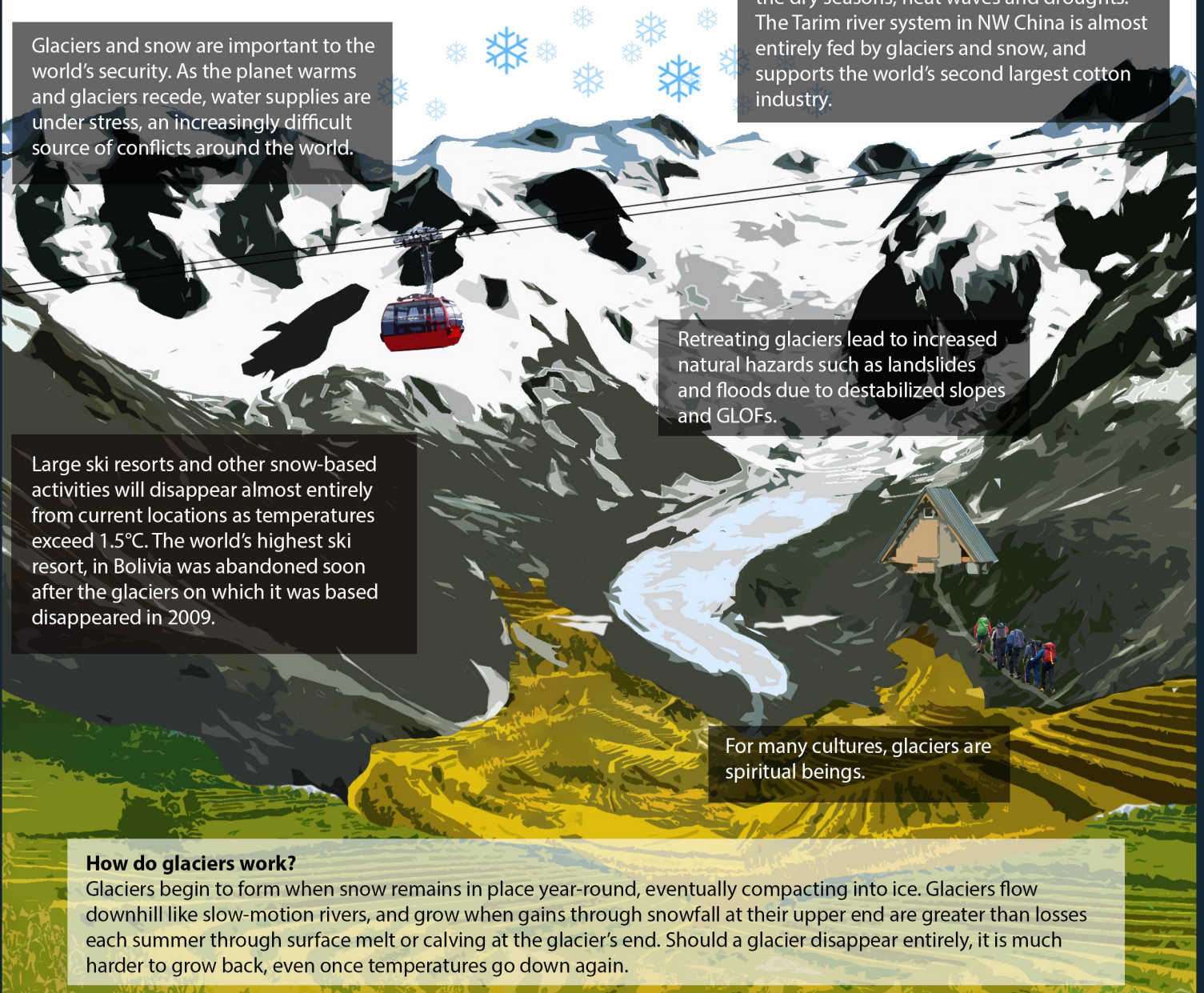
Retreating glaciers lead to increased natural hazards such as landslides and floods due to destabilized slopes and GLOFs.

Large ski resorts and other snow-based activities will disappear almost entirely from current locations as temperatures exceed 1.5°C. The world's highest ski resort, in Bolivia was abandoned soon after the glaciers on which it was based disappeared in 2009.

For many cultures, glaciers are spiritual beings.

How do glaciers work?

Glaciers begin to form when snow remains in place year-round, eventually compacting into ice. Glaciers flow downhill like slow-motion rivers, and grow when gains through snowfall at their upper end are greater than losses each summer through surface melt or calving at the glacier's end. Should a glacier disappear entirely, it is much harder to grow back, even once temperatures go down again.



MOUNTAIN GLACIERS AND SNOW

1°C

DISAPPEARANCE OF TROPICAL GLACIERS

Tropical glaciers in the northern Andes, East Africa and Papua New Guinea, are already lost even at 1°C, and all will likely disappear by 2100. These glaciers were slowly disappearing even at pre-industrial temperatures, but would have survived for many centuries or millennia without global warming. In mid-latitudes, severe glacier losses are also occurring, with snow cover decreasing as rain falls instead.

1.5°C

CRITICAL THRESHOLD

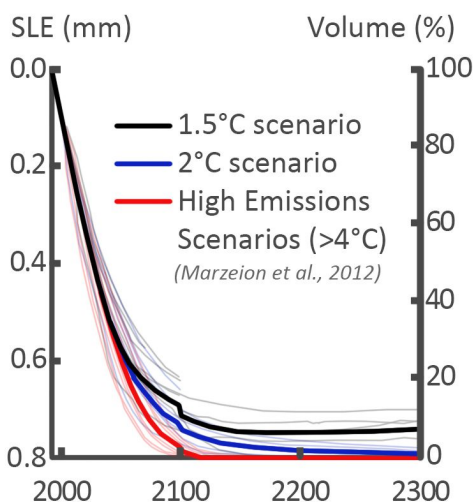
The mid-latitude glaciers and snow, in regions such as the Alps, North American Rockies, Iceland and Scandinavia, South Africa, New Zealand and Patagonia, can still preserve small but significant amounts of their ice/snow if global temperatures remain at or below 1.5°C. In the Alps, projections show that a 1.5°C limit may eventually even result in some recovery and glacier re-growth (black line, figure below).

2°/3°/4°+C

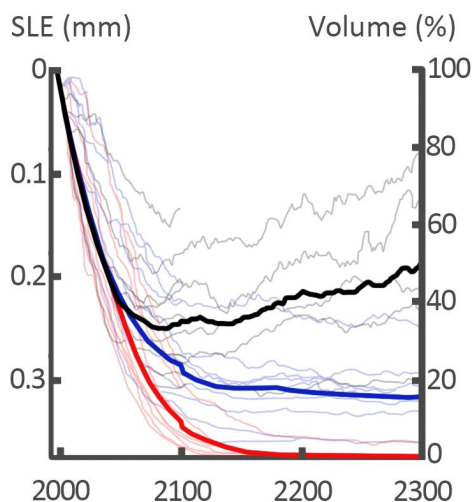
OVERSHOOT

With 2°C sustained warming, most mid-latitude glaciers will disappear entirely within a few centuries. Even Himalayan glaciers, which help provide seasonal water to 2.5 billion people, will see massive losses of two-thirds or more. At higher temperatures, this loss becomes even more rapid. Snow appears to be following a similar path of loss as mountain glaciers. Staying at or below 1.5°C will limit negative impacts on water supplies, ecosystems and economies.

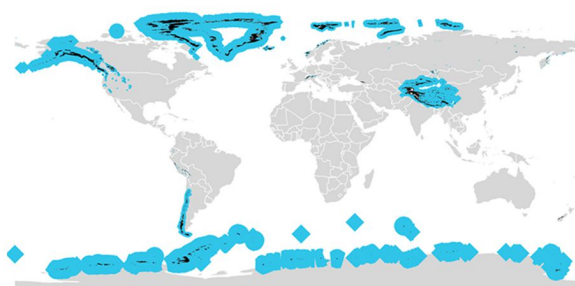
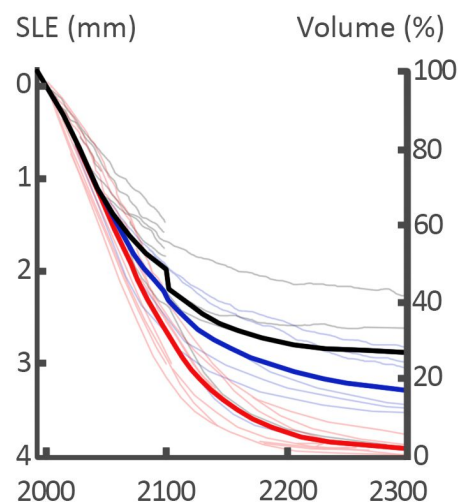
TROPICAL GLACIERS



ALPS / CENTRAL EUROPE



CENTRAL ASIA



■ Glacier location

■ Relative contribution to sea level rise

While the largest polar glaciers contribute more to sea-level rise, the smaller mid-latitude ones actually have the most significant influence on human populations in their economic, social and cultural importance.

To keep temperatures as close to 1.5°C as possible means 50% emissions reductions by 2030. The need for our children is urgent: let's get to work.