

Daniel Bailey of Skeptical Science examines the question of glacial mass balance.

Firstly, the majority of reference glaciers the world over are thinning and retreating.

<http://www.grid.unep.ch/glaciers/img/5-1.jpg>

Over time, more & more of the glaciers the world over have gone into retreat and decline. As one gets nearer the present time, this effect becomes more pronounced & more uniformly evident the world over.

<http://www.grid.unep.ch/glaciers/img/5-8.jpg>

In fact, when viewed as a group whole, the sum of glaciers everywhere tells a story of decline, retreat and loss of mass balance (few "healthy" glaciers remain the world over). And the trend has become increasingly negative over time.

<http://www.grid.unep.ch/glaciers/img/5-9.jpg>

<http://www.grid.unep.ch/glaciers/>

<http://www.geo.uzh.ch/microsite/wgms/>

<http://www.geo.uzh.ch/microsite/wgms/mbb/sum11.html>

<http://www.nichols.edu/.../global%20glacier%20mass...>

http://3.bp.blogspot.com/.../s1600/GlacierData_28Mar2012.jpg

Based on current trends, glacier recession models predict that by 2030, Glacier National Park will be without glaciers.

<http://nrmsc.usgs.gov/repeatphoto/>

http://nrmsc.usgs.gov/research/glacier_retreat.htm

<http://www.nps.gov/glac/naturescience/glaciers.htm>

In 2012—for the 23rd consecutive year—mountain glaciers worldwide lost more mass through melting than they gained through new snow accumulation. Considering all glaciers for which we have at least some records, mountain glaciers and ice caps have lost an amount of ice equivalent to slicing a 54-foot-thick slab (16.5 meters) off the top of an average glacier, and the rate of loss has accelerated in each of the past three decades.

<http://www.climate.gov/.../glacierloss1980-2012.jpg...>

<http://www.climate.gov/.../2013-state-climate-mountain...>

In fact, nearly 70% of world glacier melt since 1991 is due to human activity.

"the anthropogenic signal is detectable with high confidence in glacier mass balance observations during 1991 to 2010, and the anthropogenic fraction of global glacier mass loss during that period has increased to $69 \pm 24\%$ "

Marzieon et al 2014 - Attribution of global glacier mass loss to anthropogenic and natural causes

<http://www.sciencemag.org/.../2014/08/13/science.1254702>

"The cumulative glaciers and ice caps (GIC) surface mass balance (SMB) was negative for all regions. The SMB contribution to sea level rise was largest from Alaska and smallest from the Caucasus. On average, the contribution to sea level rise was 0.51 ± 0.16 mm sea level equivalent (SLE) yr^{-1} for 1979–2009 and ~40% higher (0.71 ± 0.15 mm SLE yr^{-1}) for the last decade, 1999–2009."

Mernild et al 2014 - Northern Hemisphere Glacier and Ice Cap Surface Mass Balance and Contribution to Sea Level Rise

<http://journals.ametsoc.org/.../10.1175/JCLI-D-13-00669.1>

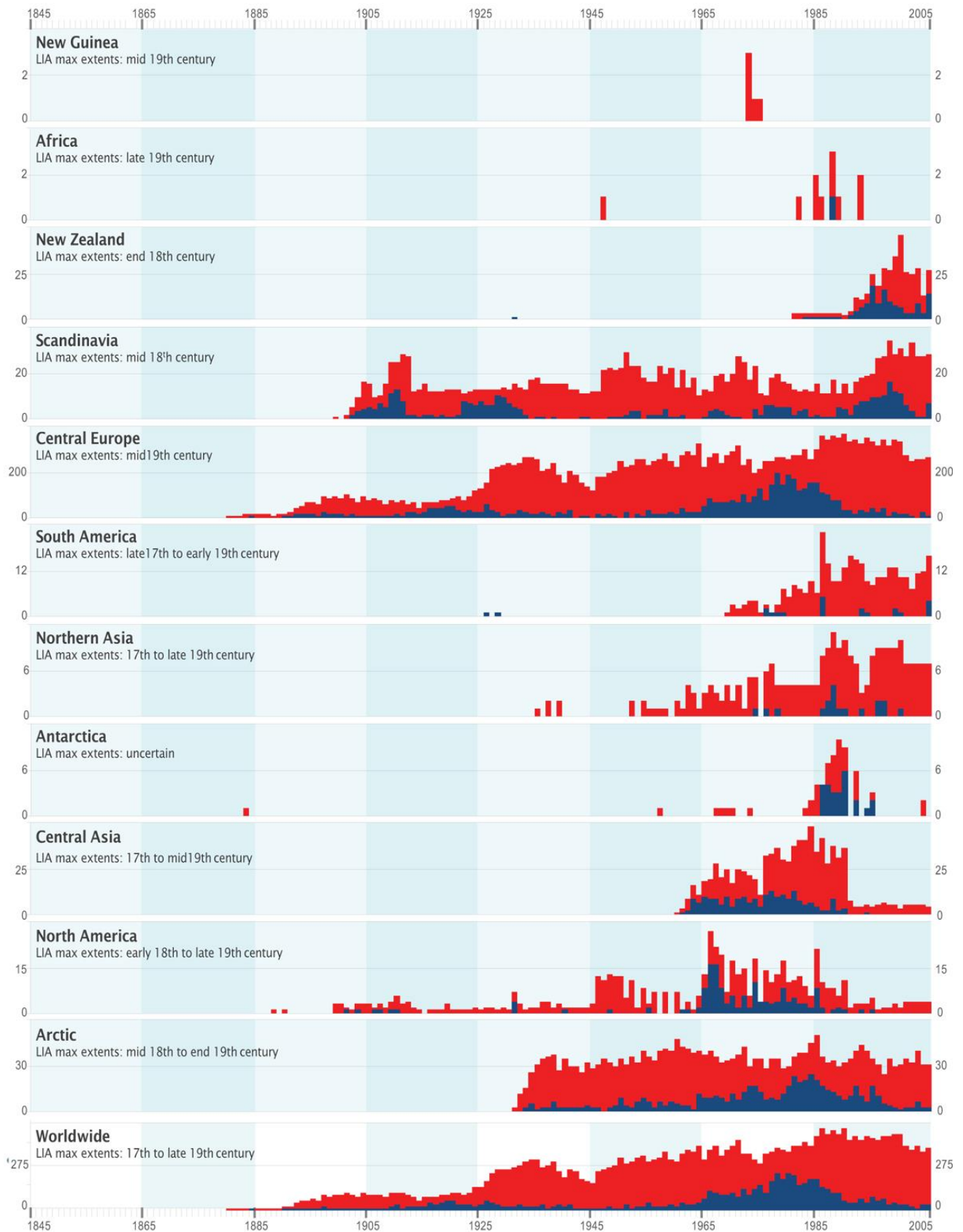


Fig. 5.1 Glacier length changes - Temporal overview on short-term glacier length changes. The number of advancing (blue) and retreating (red) glaciers are plotted as stacked columns in the corresponding survey year. This figure shows 30 420 length change observations with a time range of less than 4 years (between survey and reference year). This corresponds to almost 85 per cent of the reported data which in addition include observations covering a longer time scale and/or stationary conditions. The time period of glacier LIA maximum extents is given according to the regional information in Chapter 6. Note that the scaling of the number of glaciers on the y-axis changes between the regions. Source: figure based on data analysis by R. Prinz, University of Innsbruck, Austria; data from WGMS..