

# THE MELTDOWN

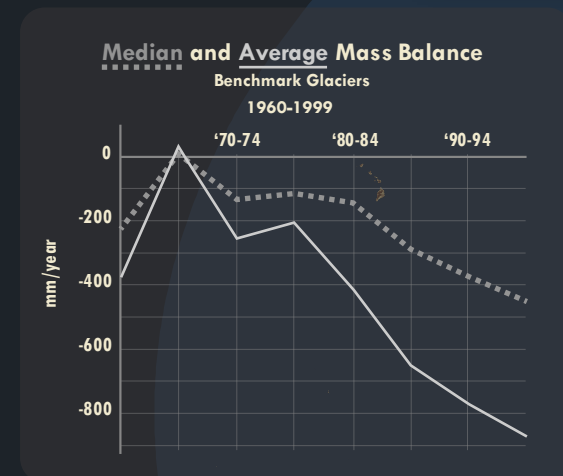
## GLACIAL MELT 2003-2009

### Glaciers

**Glaciers** are large, slowly moving masses of snow and ice that originate on land. They are generally found in high latitudes and high elevations. Made up of layers upon layers of compressed snowfall, glaciers form an intermediary substance of crystallized snow called **firn** before gradually compressing into glacial ice. Over tens of hundreds of years, glaciers gain mass through accumulated snowfall and lose mass from melting, evaporation and calving (when icebergs break off and float away in a body of water). Continental glaciers, also known as **ice sheets**, are glaciers that are greater than 50,000 sq km in area and cover entire landmasses.

For the last 50 years, the overall trend for global glacial mass balance has grown increasingly negative. As strong indicators of a warming climate, glacial melt contributes to sea level rise, increases earth's absorption of solar radiation, decreases land stability, and endangers seasonal water sources.

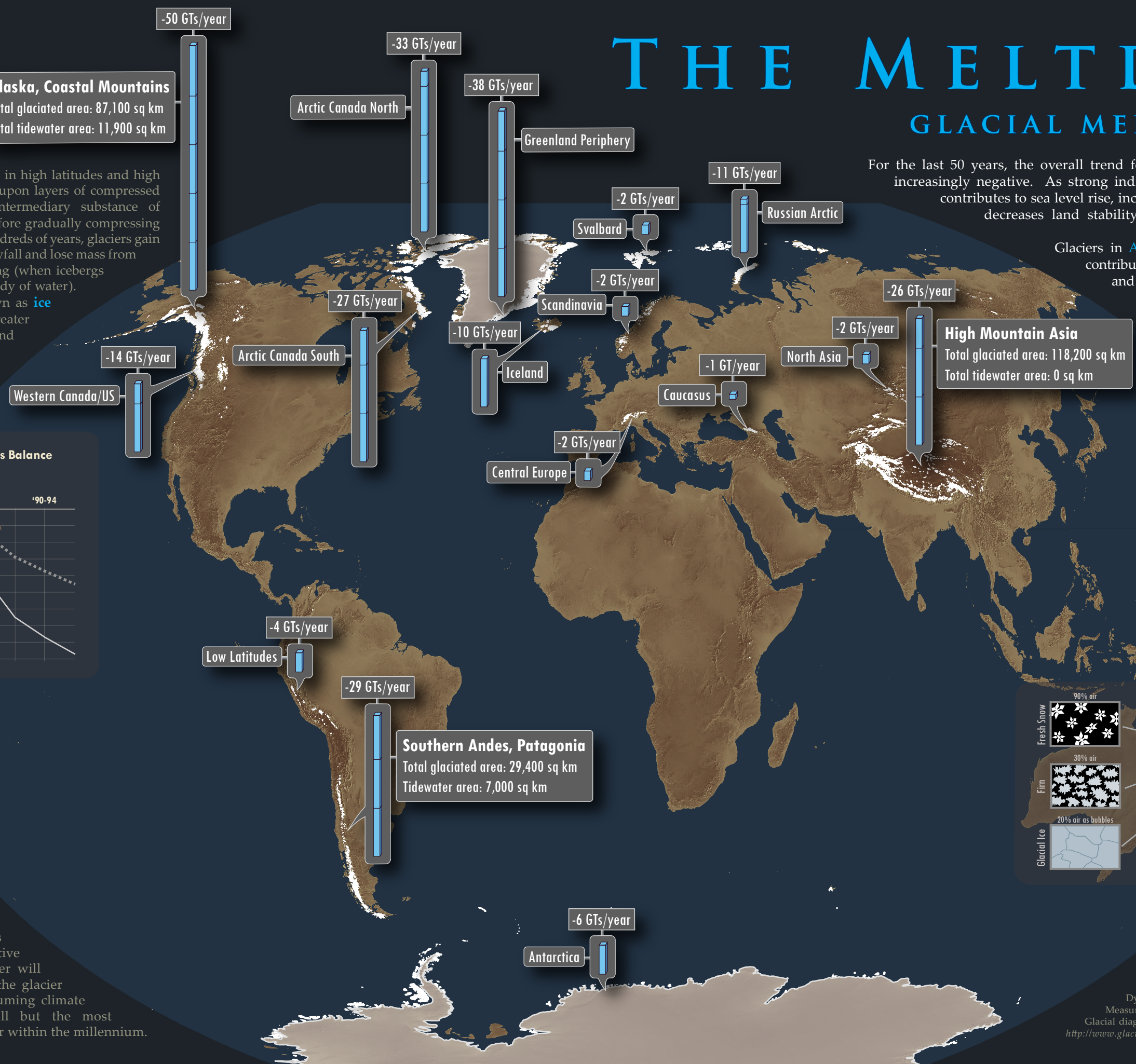
Glaciers in **Alaska**, **High Mountain Asia** and **Patagonia** contribute disproportionately to the global water cycle and sea level rise compared to their total glaciated areas and are of particular concern. In just one seven year period, these three areas have lost more than 4½ Mt. Everests of snow and ice (> 735 GTs).



### Losing Mass

Glacial **mass balance** (mm/year) is a gauge for the affinity between mass gained and lost while glacial **mass budget** (GTs) is the best approximation to glacial volume. These two measures influence a glacier's long-term behavior: if negative over a long period, the glacier will melt and retreat; if positive, the glacier will grow and advance. Assuming climate maintains current trends, all but the most resilient glaciers will disappear within the millennium.

**Alaska, Coastal Mountains**  
 Total glaciated area: 87,100 sq km  
 Total tidewater area: 11,900 sq km



**High Mountain Asia**  
 Total glaciated area: 118,200 sq km  
 Total tidewater area: 0 sq km

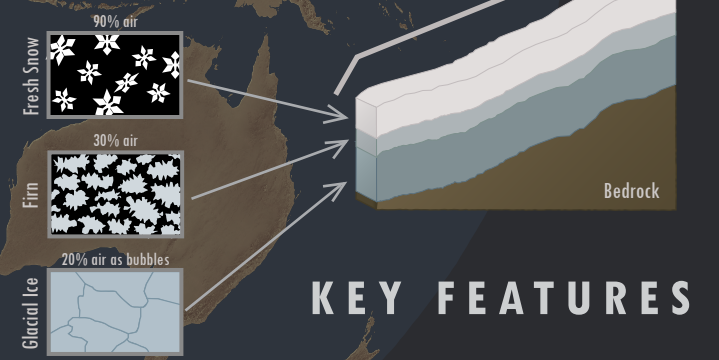
**Southern Andes, Patagonia**  
 Total glaciated area: 29,400 sq km  
 Tidewater area: 7,000 sq km

**Net change mass budget/year**

Glaciated region  
 Total glaciated area: sq km --- Area covered in glacier  
 Total tidewater area: sq km --- Area open to ocean

Mt. Everest = 161 gigatons  
 1 gigaton (GT) = 1 billion US tons

Ice sheet, excluded from mass budget



### KEY FEATURES

Map Author: J. Michelle Hu || December 2014  
 Projection: Winkel Tripel || Data sources:  
 Natural Earth; Randolph Glacier Inventory; Gardner et al. A Reconciled Estimate of Glacier Contributions to Sea Level Rise: 2003-2009. Science 340, 852 (2013); Dyurgerov, M. Glacier Mass Balance and Regime: Data of Measurements and Analysis. 2002. INSTAAR, University of Colorado  
 Glacial diagram inspired by Portland State University glacier figures at <http://www.glaciers.pdx.edu/Projects/LearnAboutGlaciers/Skagit/Basics00.html>