The internationally coordinated glacier monitoring and the ‚data gap' in Central Asia

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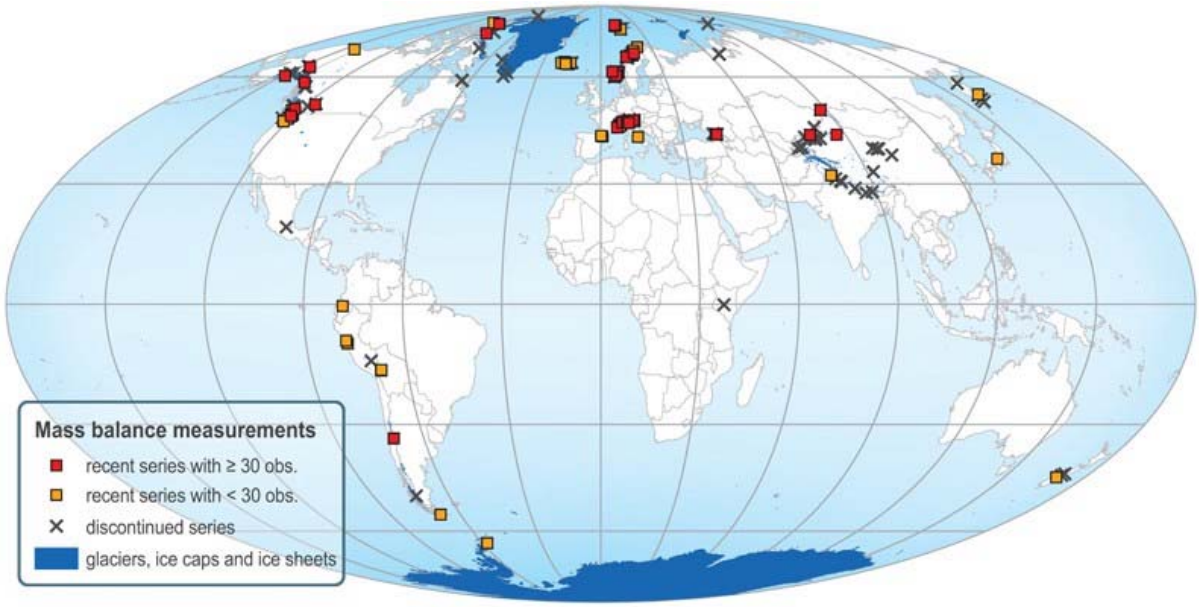
Changes in glaciers provide one of the clearest evidence of climate change and as such they constitute an Essential Climate Variable in the Global Climate/Terrestrial Observing System (GCOS, GTOS) in support of the United Nations Framework Convention on Climate Change (UNFCCC). As recommended by the International Council for Sciences (ICSU), free and unrestricted international sharing of high-quality, long-term and standardized data and information products is one of the basic requirements for advances in research, as well as for political decisions. Indeed, this data sharing perspective has a long tradition in glaciology.

The internationally coordinated collection and distribution of standardized information about glacier changes was initiated back in 1894 and is today coordinated within the Global Terrestrial Network for Glaciers (GTN-G) under the auspices of FAO, ICSU, UNEP, UNESCO, and WMO. The GTN-G is jointly run by three operational bodies involved in glacier monitoring: the World Glacier Monitoring Service (WGMS, www.wgms.ch), the U.S. National Snow and Ice Data Center (NSIDC, www.nsidc.org), and the Global Land Ice Measurements from Space (GLIMS, www.glims.org) initiative.

Central Asia – in a geographically more extended definition including the Himalaya, Karakoram, Tien Shan, Kunlun Shan and Pamir – hosts about one sixth of the global ice cover of glaciers and ice caps. Its high elevations, climatic exposure to the South Asian monsoon and mid-latitude westerlies, as well as abundant debris-covered glaciers and pro- or supra-glacial lakes make these mountain ranges an exciting spot for glacier monitoring and science. Though, the available observational time series are well distributed over the region, continuous long-term measurements are very sparse. In this presentation, we provide an overview of the internationally coordinated glacier monitoring and available datasets. The latter are discussed with a special focus on Central Asia, also considering recent initiatives towards an improvement of data coverage in space and time (new glacier inventories and field observations).

Figure 1: Worldwide mass balance measurements. The map shows the location of ice bodies with reported measurements of the glacier mass balance. Data series with surveys after 1999 are plotted as red and orange squares when having more or equal and less than 30 observation years, respectively. The locations of observation series discontinued before 2000 are shown as black crosses. Source: Figure 4.7 from WGMS (2008).

Table 1: Global and regional overview of the distribution of glaciers and ice caps as well as of reported length change and mass balance observation series. Source: Table 4.1 from WGMS (2008).



Macroregion	Area	FRONT VARIATION								MASS BALANCE						
		NoSer	NoSer 21th	First RY	First SY	Last SY	AvTR	AvNo Obs	SerDens	NoSer	NoRef Ser	NoSer 21st	First SY	Last SY	AvNo Obs	Ser Dens
New Guinea	3	3	0	1936	1941	1990	46.3	4.7	1000.0	0	0	0				0.0
Africa	6	14	11	1893	1899	2004	71.4	6.1	2333.3	1	0	0	1979	1996	18.0	166.7
New Zealand	1160	99	70	1879	1892	2005	14.4	6.2	85.3	3	0	1	1959	2005	2.7	2.6
Scandinavia	2940	67	45	1896	1899	2005	53.2	30.2	22.8	39	8	23	1946	2005	16.3	13.3
Central Europe	3785	764	417	1730	1815	2005	65.1	35.3	201.8	43	10	29	1948	2005	19.6	11.4
South America	25500	160	49	1830	1888	2005	36.4	4.1	6.3	11	1	9	1976	2005	8.1	0.4
Northern Asia	59600	24	11	1833	1895	2005	55.2	14.1	0.4	14	3	5	1962	2005	13.5	0.2
Antarctica	77000	48	7	1882	1883	2004	30.4	2.8	0.6	1	0	1	2002	2005	4.0	0.0
Central Asia	114800	310	16	1850	1893	2005	21.5	4.5	2.7	35	2	6	1957	2005	13.1	0.3
North America	124000	221	15	1720	1885	2005	36.9	5.2	1.8	45	4	24	1953	2005	15.8	0.4
Arctic	275500	93	49	1840	1886	2005	52.4	30.5	0.3	34	2	20	1960	2005	12.6	0.1
Worldwide	684294	1803	690	1720	1815	2005	46.7	20.1	2.6	226	30	118	1946	2005	15.0	0.3

Notes:
NoSer: number of series; NoSer21th: number of series with last survey after 1999; FirstRY: first reference year; FirstSY: first survey year; LastSY: last survey year; AvTR: average time range per series; AvNoObs: average number of observations per series; SerDens: number of series per 1 000 square kilometre; NoRefSer: number of 'reference' mass balance series with continuous measurements since 1976.