Data access and citation of global glacier datasets

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Summary. The Global Terrestrial Network for Glaciers (GTN-G) is the framework for the internationally coordinated monitoring of glaciers and ice caps in support of the United Nations Framework Convention on Climate Change (UNFCCC). Within GTN-G, datasets can be thematically categorized into those related to glacier distribution, and those with information on glacier changes. All data submitted to GTN-G are considered public domain for non-commercial use and are made digitally available through the operational services at no cost.

Keywords. Glacier data, glacier monitoring, data access, data citation, global datasets.

1. Introduction

Changes in glaciers and ice caps provide some of the clearest evidence of climate change and have impacts on global sea-level fluctuations, regional hydrological cycles and local natural hazard situations [1]. Internationally coordinated collection and distribution of standardized information about the state and change of glaciers and ice caps was initiated 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.

A GTN-G Steering Committee coordinates, supports and advices the operational bodies responsible for the international glacier monitoring, which are the World Glacier Monitoring Service (WGMS), the US National Snow and Ice Data Center (NSIDC), and the Global Land Ice Measurements from Space (GLIMS) initiative. The Steering Committee comprises a GTN-G Advisory Board that is to support, consult, and periodically evaluate the work of the GTN-G Executive Board and its three operational bodies concerning the monitoring of glaciers and ice caps.

2. Glacier databases within GTN-G

Several online databases containing a wealth of diverse data types having different levels of detail and global coverage provide fast access to continuously updated information on glacier fluctuation and inventory data.

2.1 Glacier inventory data

For world-wide inventories, data are now available through

(a) the World Glacier Inventory (WGI) containing tabular information of about 130,000 glaciers covering an area of around 240,000 km^2,
(b) the GLIMS database containing digital outlines of around 118,000 glaciers with different time stamps, and
(c) the Randolph Glacier Inventory (RGI), a new and globally complete digital dataset of outlines from about 180,000 glaciers with some meta-information, which has been used for many applications relating to the IPCC AR5 report.

2.2 Glacier fluctuation data

Concerning glacier changes, a database (Fluctuations of Glaciers; FoG, [2]) exists containing information about mass balance, front

variations including past reconstructed time series, geodetic changes and special events.

Annual mass balance reporting contains information for about 125 glaciers with a subset of 37 glaciers with continuous observational series since 1980 or earlier. Front variation observations of around 1800 glaciers are available from most of the mountain ranges world-wide. This database was recently updated with 26 glaciers having an unprecedented dataset of length changes from reconstructions of well-dated historical evidence going back as far as the 16th century. Further, geodetic observations of about 430 glaciers are available.

The database is completed by specific index datasets (e.g., glacier thickness data) and a dataset containing information on special events including glacier surges, glacier lake outbursts, ice avalanches, eruptions of ice-clad volcanoes, etc. related to about 200 glaciers.

2.3 Glacier photographs

A special database of glacier photographs (Glacier Photograph Collection; GPC) contains 13,000 pictures from around 500 glaciers, some of them dating back to the 19th century.

3. Data access and citation of glacier data

Consistency and interoperability of the different glacier databases (FoG, WGI, GLIMS, GPC) are elaborated by joint efforts within the operational bodies of GTN-G and their partners and networks. Thereby, different historical developments and methodological contexts of the datasets are major challenges for linking individual glaciers throughout the databases. All glacier datasets are made freely available through the respective operational bodies within GTN-G.

Glacier inventory data are digitally available from the website of the NSIDC which hosts the WGI and the GLIMS database, including access to the RGI. The GPC is also available from the NSIDC.

The glacier fluctuation datasets are made digitally available through the WGMS website, where the full database can be downloaded. In addition, the WGMS MetaData Browser allows browsing for glaciers with available observation series and downloading minimal data series of individual glaciers.

Digital Object Identifiers (DOI) were introduced and added to the citation recommendation for the glacier datasets, in order to facilitate versioning and accessibility of the databases.

4. Conclusions

Glacier datasets are freely available to the scientific community as well as to a vast public and are made accessible through the respective operational bodies, consolidated under the Global Terrestrial Network for Glaciers (GTN-G).

A broad sampling of glaciers around the world provides information on presently observed rates of change in glacier mass as well as on their regional distribution patterns and acceleration trends as an independent climate proxy.

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