



ISC (WDS)  
IUGG (IACS)  
UNEP  
UNESCO  
WMO

Department of Geography  
University of Zurich  
Winterthurerstrasse 190  
SWITZERLAND - 8057 Zurich

[www.wgms.ch](http://www.wgms.ch)

## WGMS Report 2019 & Program 2020

### 1. WGMS Background

Internationally coordinated glacier observation was initiated in 1894 with the foundation of the *Commission Internationale des Glaciers* at the 6<sup>th</sup> *International Geological Congress* in Zurich, Switzerland. Hence, in 2019, we celebrated 125 years of internationally coordinated glacier monitoring! Since 1986, the *World Glacier Monitoring Service* (WGMS) has maintained and continued the collection of standardized information about distribution and ongoing changes of glaciers. Today the WGMS is a service of the *International Association of Cryospheric Sciences* (IACS) within the *International Union of Geodesy and Geophysics* (IUGG) as well as a member of the *World Data System* (WDS) of the *International Science Council* (ISC, former ICSU), and works under the auspices of *United Nations Environment Programme* (UNEP), the *United Nations Educational, Scientific and Cultural Organization* (UNESCO), and the *World Meteorological Organization* (WMO). The WGMS maintains a scientific collaboration network of *Principal Investigators* and *National Correspondents* in all the countries involved in glacier monitoring.

Detailed information about the WGMS, its partner organizations, monitoring strategy, and data products are available on the WGMS website: <https://www.wgms.ch>

In addition, the GTN-G website gives an overview on the overarching structure of international glacier monitoring as well as on the available global datasets: <https://www.gtn-g.org>

### 2. WGMS Funding and Administration

Based on a decision in 2009 relating to the participation of Switzerland in the *United Nations Framework Convention on Climate Change* and the *Global Climate Observing System* (GCOS), the *Swiss Federal Council* decided to provide long-term funding through GCOS Switzerland to the *Department of Geography* of the *University of Zurich* for the operational lead and coordination of the WGMS. In addition, WGMS products and projects have recently been supported by national and international organizations such as the *Cryospheric Commission* of the *Swiss Academy of Sciences*, the *Swiss Agency for Development and Cooperation*, and the *United Nations Educational, Scientific and Cultural Organization*. As in the past years, the WGMS has strengthened its remote sensing capacities within ESA's *Climate Change Initiative* and in the *Copernicus Climate Change Service*.

### 3. WGMS Main Activities in 2019

The operational tasks of the WGMS include the management of its databases and website, the response to data and information requests, and the periodical contact with its scientific collaboration network of *National Correspondents*, *Principal Investigators*, and partner institutions. In addition, the WGMS is present at various national and international conferences, meetings and workshops and is actively involved in selected education and public outreach activities.

In 2019, the WGMS responded to more than 25 data and about 100 information requests. The WGMS website registered 2'500 visits per month on average and the GTN-G website about 400 visits per month. With the new website structure, a more detailed analysis of website-visits and downloads is possible, also for single products. Beside the website «home», the pages «latest mb data», «data exploration» and «database versions» were

visited most. The *wgms Glacier App* registered about 2'200 active users in 2019, mainly from German- and English-speaking countries, as well as from Latin America. Due to the facilitated online access to glacier data, the number of data requests sent by email to the WGMS is decreasing. Nevertheless, these remaining requests often require more effort because of special demands.

Beside the operational tasks, the year 2019 was designated to the 125-years jubilee of internationally coordinated glacier observations. Festivities started at the IUGG-*General Assembly* in Montréal, Canada, with a symposium, followed by three regional events (*WGMS General Assemblies*). The first was held in Zürich (Switzerland) for the National Correspondents (NCs) from Europe and North America, the second one in Almaty (Kazakhstan) for the NCs from Asia and New Zealand, and the third one was held in El Calafate (Argentina) for the NCs from Latin America. By these separate meetings, the amount of air miles was cut to almost half and travel costs were reduced substantially (in comparison to a global meeting in Europe with all NCs). Another advantage was the coordination with local partners and the focus on regional observations and challenges. The *General Assembly* concluded with a *WGMS Letter of Concern* to UNFCCC, published during the COP25 and additionally published in *Nature* as *Correspondence*. The detailed program and the final meeting report are available on the WGMS homepage: [https://wgms.ch/jubilee\\_2019/](https://wgms.ch/jubilee_2019/)

Due to the cumulated effort with the *WGMS General Assembly*, the WGMS evaluation, and the publication in *Nature*, the production of the third *Global Glacier Change Bulletin* and the update of the online productions were postponed to 2020.

After a second feedback round, a revised version of the *Self Assessment Report* for the certification of the WGMS database with the CoreTrustSeal (CTS; <https://www.coretrustseal.org/>) was submitted in May 2019. Finally, in August 2019, the WGMS officially received the Core Trust Seal (<https://www.coretrustseal.org/why-certification/certified-repositories/>).

Within the framework of the *Copernicus Climate Change Service* (C3S) and thanks to the support of several research groups, the dataset on geodetic thickness change was extended substantially: the dataset now comprises about 95'000 observations from more than 27'000 glaciers.

In addition, the WGMS completed on the following tasks in 2019:

- Control and quality check of data from the *Call-for-Data* 2016/17 (incl. *Near-time reporting* for 2017/18) and online publication of the latest database version with the respective *Digital Object Identifier*
- Actualization of the WGMS and GTN-G websites
- Set up of an additional page on «Facts and Figures» to directly report on the actual state of glaciers worldwide (<https://wgms.ch/fafs/>)
- Actualization of the WGMS cooperation- and address database (within SMD4GC project)
- Appointment of new *National Correspondents* in Iceland, Nepal, France, Norway Mainland and Norway Svalbard and now also for the United Kingdom
- Lecture series *Glacier Mass Balance Measurements and Analysis* in the fall semester at Univ. Zurich
- *Call-for-Data* for the observation period 2017/18 and *Near-time reporting* for 2018/19
- Online publication of preliminary mass balance values 2017/18 and 2018/19
- Reporting for 2019 and planning for 2020.

On request, several support letters for research projects and trainings in the field of national and international glacier monitoring (Germany, India, Mongolia, and USA) were written.

In 2019 the WGMS staff was active at several national and international meetings (with oral presentations or posters). To limit the professional travel activities and the related greenhouse gas emissions, the following events were deliberately not visited: *GCOS Joint Panel Meeting*, Marrakesh, MA; *ISC-WDS Meeting* in

Beijing, CN. Other meetings, such as the AGU *Fall Meeting*, San Francisco, US, and monthly C3S-Meetings were attended remotely (web-/teleconferences).

### 4. Global Terrestrial Network for Glaciers

In close collaboration with the *US National Snow and Ice Data Center* in Boulder (NSIDC) and the *Global Land Ice Measurements from Space* (GLIMS) initiative, the WGMS has been in charge of the *Global Terrestrial Network for Glaciers* (GTN-G) since its creation in 1998. In 2008, the three bodies proposed a generic structure and terms of reference for a GTN-G *Steering Committee* (including an *Executive Board* and an *Advisory Board*) to the IACS Bureau. This proposal was approved in 2009 and at the beginning of 2011, the *Advisory Board* (under the lead of IACS) was finally staffed with representatives from data user and producer communities, as well as from international organizations (see <https://www.gtn-g.org>). Over the past years, periodical meetings of officers from NSIDC, GLIMS, and the WGMS were held to discuss and coordinate the current key tasks. In 2019, joint conference sessions were set up at EGU in Vienna, AT, at IUGG in Montréal, CA, and at AGU in San Francisco, US, dedicated to the monitoring of glaciers from in-situ and remotely sensed observations. In combination with the conferences, meetings of the *Executive Board* were held, with attendees from all GTN-G bodies. In addition, a video exchange with the GTN-G *Advisory Board* was organized in the framework of the WGMS *General Assembly* in Zurich.

The integration of glacier datasets into the multi-temporal GLIMS database was continued at NSIDC. At WGMS, a continued focus is on complementing the glaciological observation series with geodetic volume changes of glaciers by the analysis of remote sensing data within the *Copernicus Climate Change Service* (C3S).

The relations to the international umbrella organizations were fostered at several occasions, for example with the participation of the WGMS in the GCOS *Steering Committee* (Michael Zemp) and in the WDS *Scientific Committee* (Isabelle Gärtner-Roer) with several meetings. In addition, the WGMS was actively involved in IACS working groups (*Randolph Glacier Inventory*; *Glacier Ice Thickness Estimation*) as well as in reviewing IPCC SROCC und AR6.

### 5. WGMS Capacity Building and Twinning activities

The successful complement of WGMS activities with projects supported by the *Swiss Agency for Development and Cooperation* (SDC) is continued in the project CICADA (*Cryosphere Climate services for improved ADaptation*) under the lead of the University of Fribourg (<https://wgms.ch/projects/>). Beside this, a study on the worldwide assessment of national glacier monitoring was finalized and published in *Mountain Research and Development* (Gärtner-Roer et al. 2019). This study analyzes and presents *Country Profiles* on the national glacier monitoring status that were compiled within the project SMD4GC (*Promoting Sustainable Mountain Development for Global Change*).

### 6. Program for 2020

#### 6.1 Operational service

As in previous years, the operational service of the WGMS includes data- and information requests, the hosting and maintenance of database and website, the regular contact to the *National Correspondents* and *Principal Investigators*, the quality check of submitted data, scientific reporting and the analysis of data and information for public events and publications.

In 2019, the main focus is on the production of the third volume of the *Global Glacier Change Bulletin No. 3*, covering the observation periods 2015/16 and 2016/17. In addition, other WGMS-relevant publications are planned, such as the regional analysis of volume changes of glaciers in central-west Greenland (Huber et al. 2020, *Front. Earth Sci.*), the *Ad hoc* estimation of global glacier mass changes based on latest glaciological

observations (Zemp et al. 2020, *The Cryosphere*), and finally a paper on the database structure of the *Glacier Thickness Database* (GlaThiDa 3) for *Earth System Science Data*.

Beside these tasks, the WGMS supervises MSc and Bsc theses, interns, and visiting scientists working in the field of glacier monitoring.

### 6.2 Main activities in 2020

The following schedule lists the main activities for 2020:

#### 1. Quarter (JFM)

- Annual report and balance 2019, program and budget for 2020 as well as for 2021-24.
- Check and upload of detailed data for 2017/18 and *Near-time reporting* for 2018/19.
- Publication of the paper on *Ad hoc* assessment of global glacier mass changes.
- Production of the GGCB No. 3 (based on FoG-2019-12).
- Negotiation on frame contract for the period 2021-2024, incl. new database manager position.

#### 2. Quarter (AMJ)

- Printing and shipment of GGCB No. 3.
- Internal Workshop on continuation of *wgms Glacier App*.
- Database release (FoG-2020-06).
- Publication of paper on GlaThiDa 3.0.

#### 3. Quarter (JAS)

- Actualisation of digital online products (FoG-2020-06).
- Research stay at University of Bremen.
- Safety training/crevasse rescue training.
- Preparation & workshop for *IACS Working Groups*.

#### 4. Quarter (OND)

- *Call-for-Data* for observation period 2018/19 & *Near-time Reporting* for 2019/20.
- Telecons with WGMS NCs and PIs.
- Workshop on new WGMS database concept.
- Lecture series on *Glacier Mass Balance Measurements & Analysis* (GEO851).
- Annual program 2021.

### 6.3 National and international meetings and public outreach

In 2020, the WGMS is contributing to the following meetings:

- IACS WG RGI KickOff Meeting, Zürich, CH (JAN)
- GCOS-WGMS Annual Meeting, Zürich, CH (JAN)
- ETH Flugreisen-Forum, Zürich, CH (JAN)
- IACS WG RAGMAC Virtual KickOff Meeting (JAN)
- EARSeL Workshop Bern, CH (FEB)
- Horizon2020 G3P KickOff Meeting, Potsdam, DE (FEB)
- Alpine Glaciology Meeting, Milano, IT (tba)
- C3S Review Meeting, Wien, AT (MAR)
- Swiss Polar Day, Zürich, CH (APR)
- EGU General Assembly, Wien, AT (MAY), incl. GTN-G *Executive Board Meeting & Monitoring Session*
- IACS WG RAGMAC Workshop, tbc (JUN)
- IGS-Symposium, Reykjavik, IS (SEP)

- Core Day der Strategischen Forschungsplattformen der UZH, Zürich, CH (SEP)
- Joint Swiss GCOS & GAW Symposium, Bern, CH (SEP)
- Lecture series on *Glacier Mass Balance Measurements and Analysis*, GIUZ, Zürich, CH (SEP-DEC)
- WGMS&3G (UZH) crevasse rescue course, CH (OCT)
- GCOS Steering Committee Meeting, XXX, XX (OCT)
- WGMS NC & PI Virtual Meeting (NOV)
- Swiss Geoscience Meeting, Zürich, CH (NOV)
- AGU Fall Meeting, San Francisco, US (DEC), incl. GTN-G *Executive Board Meeting* & Monitoring Session

In order to limit the professional travel activities and the related greenhouse gas emissions the WGMS abstains from attending the following meetings: *Symposium on Arctic Research*, Tokyo, JP; *Arctic Science Summit Week*, Akureyri, IS; *Glaciological Symposium*, St. Petersburg, RU; *Conference on Polar Climate*, Torun, PL; *ISC/WDS Steering Committee Meeting*, Sao Paulo, BR. The participation in the *AGU Fall Meeting*, San Francisco, US, and many project meetings will be restricted to web-/teleconferences.

### 6.4 Global Terrestrial Network for Glaciers (GTN-G) and national & international organizations

In 2020 several glacier monitoring activities of WGMS, NSIDC, GLIMS, and different IACS working groups are also coordinated. Conference sessions on glacier monitoring are set up for the EGU General Assembly in Vienna (AT), and the AGU Fall Meeting in San Francisco (USA). In combination with the EGU and AGU conferences, meetings of the *GTN-G Executive Board*, with representatives of the GTN-G bodies WGMS, NSIDC, and GLIMS are organized.