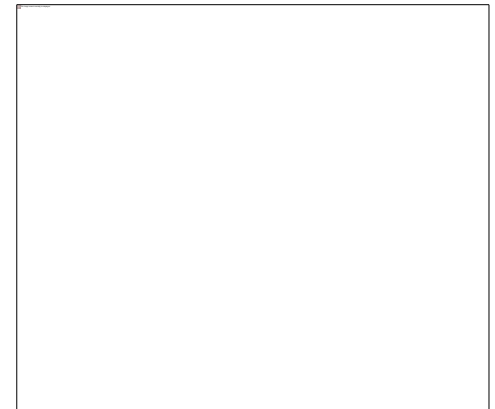
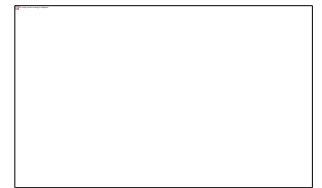




Status

Jeff Key

On behalf of the CryoNet Team (Lead: Wolfgang Schöner)

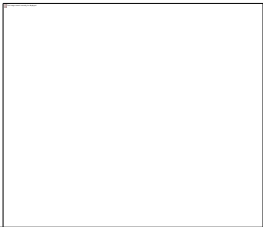


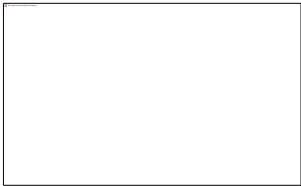
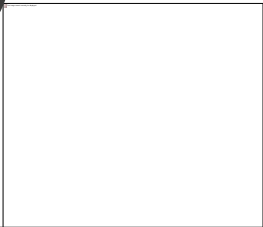
GCW observing system:












- Surface:
 - **CryoNet network**
 - GCW contributing stations
- Satellites

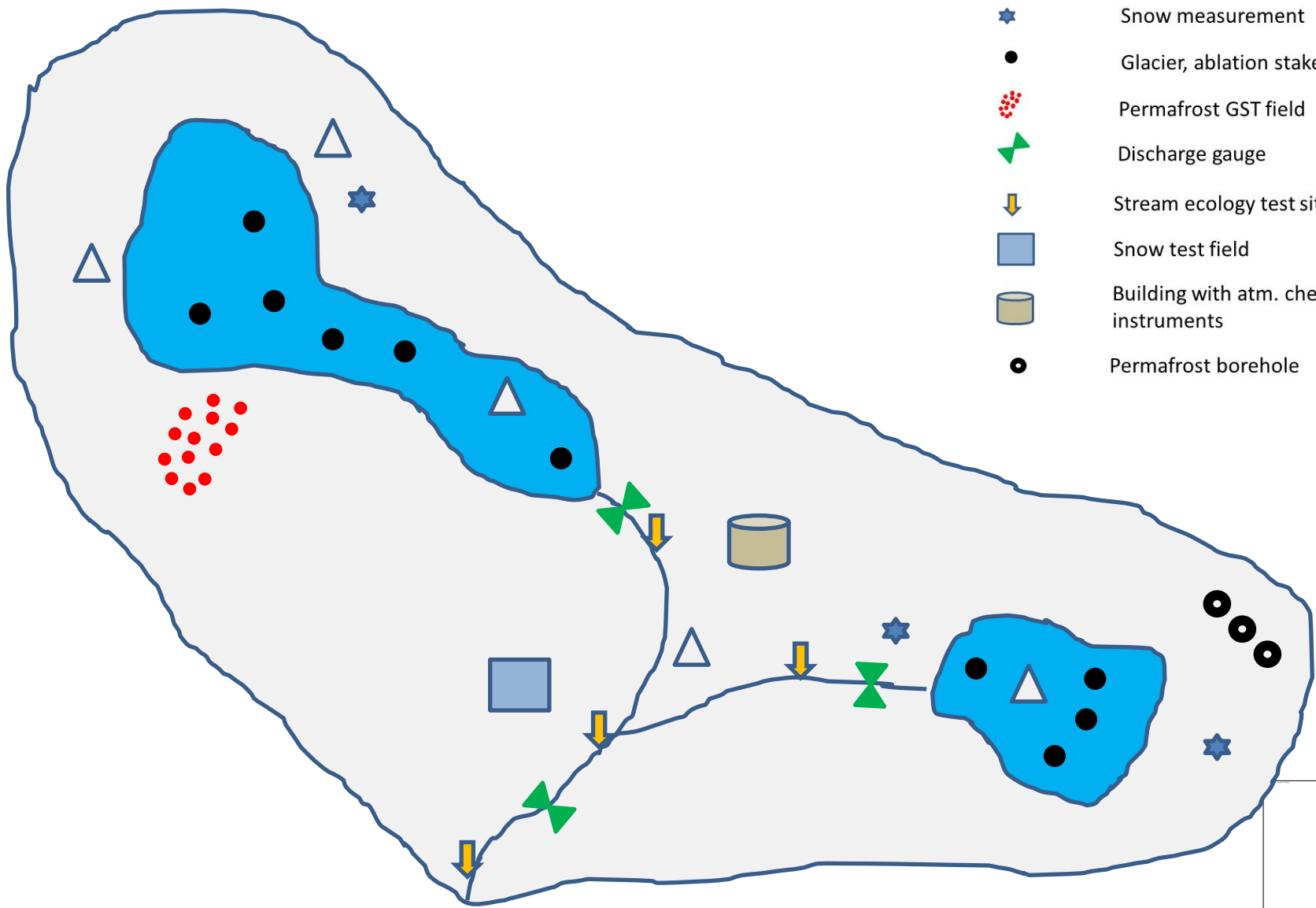


CryoNet will link with different cryospheric observational networks to achieve its comprehensive potential through:

- Extensive monitoring of the cryosphere through harmonized measurements
 - Providing cryospheric-data for improved process understanding and modelling
 - Providing calibration and validation data for satellite products
 - Linking cryospheric ground truth observations to cryospheric models
 - Training for cryospheric observations
 - Standardized guidelines for cryospheric observations
 - Long-term, sustainable observing and monitoring
- 

- 
- Description of network structure (tiered network)
 - Procedure for selection of sites/stations
 - Requirements for the stations/sites to be included
 - Data policy
 - Best practices for observations
 - Meta data and data storage and accessibility
- 

-  Glacier
-  River
-  AWS
-  Snow measurement
-  Glacier, ablation stake auto./man.
-  Permafrost GST field
-  Discharge gauge
-  Stream ecology test site
-  Snow test field
-  Building with atm. chemistry instruments
-  Permafrost borehole



CryoNet STATIONS

- measures at least one variable of a cryosphere component (e.g. snow, permafrost, sea ice...)
 - has to fulfill CryoNet minimum requirements
 - must have ancillary meteorological measurements
- has the target of long-term operation(primary) or long-term operational commitment with 10+ years record (reference)

Potential attributes: primary, reference, cal/val, research

CryoNet SITES

- contain two or more coordinated stations (at least one is a CryoNet station) with varying capabilities that are coordinated as a local cluster
- must have a concept describing the research approach and the site management

Potential attributes: basic, integrated



1. Meeting CryoNet Measurement Requirements

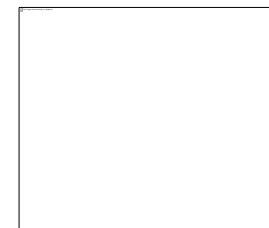
The station shall measure at least one of the variables of one of the cryosphere components (i.e. snow, solid precipitation, lake and river ice, sea ice, glaciers, frozen ground and permafrost). The station location is chosen such that cryospheric measurements are representative of the surrounding region, and such representativeness needs to be clearly described.

2. Commitment of Operational Continuity

The station must be active. The responsible agencies are committed, to the extent reasonable, to sustaining long-term observations of at least one cryosphere component. There must be a commitment to continue measurements for a minimum of four (4) years.

3. Metadata Up to Date and Availability

The station metadata (including all needed metadata describing the station characteristics and observational programme information) are kept up-to-date and available in the GCW portal as the interface to the WIGOS Information Resource (WIR) and updated regularly .





4. Compliance with Agreed Regulatory Practices

The station observational procedures, the instruments and method of observations, quality control practices, etc., should follow GCW endorsed regulations, manuals, guides and to the extent possible the recommended best practices.

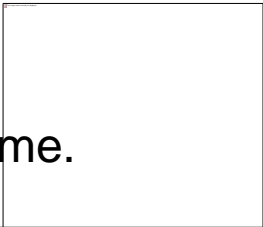
5. Data and Ancillary Data freely available

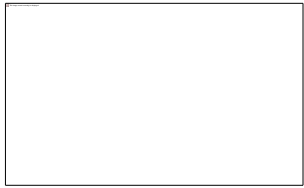
Make data freely available, whenever possible in near real time; In situ ancillary meteorological observations, as required in the CryoNet best practices, should also be available with documented quality.

6. Competency of staff

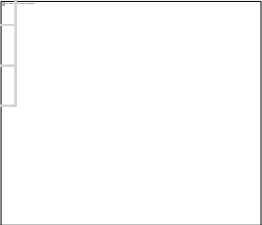
Personnel must be trained in the operation and maintenance of the station.

The requirements of **CryoNet Sites** are:

- A site comprises at least one GCW CryoNet station.
 - Integrated sites have technical supporting staff.
 - Integrated sites have training capability.
 - There is a long-term financial commitment.
 - Data are made freely available, and whenever possible in (near) real-time.
- 



ICE SHEETS		Expected minimum frequency of observations at CryoNet stations							
		Timescale							
Variable	Type	hourly	daily	weekly	bi-weekly	monthly	half-yearly	yearly	
Accumulation	manual/autom.							X	
Ablation	manual/autom.		AUTO					MANUAL	
Net balance	manual							X	
Snow depth	automatic	X							
Surface flow	manual/autom.					AUTO		MANUAL	
Ice/firn temperature	automatic	X							
Atmospheric pressure		X							
Air temperature	automatic	X							
Air humidity	automatic	X							
Wind speed	automatic	X							
Wind direction	automatic	X							
Incoming shortwave rad.	automatic	X							
Reflected shortwave rad.	automatic	X							
Incoming longwave rad.	automatic	X							
Outgoing longwave rad.	automatic	X							





CryoNet station ID Glacier



CryoNet station ID AWS



CryoNet station ID Snow measurement



CryoNet station ID ablation stake



CryoNet station ID GST test field



CryoNet station ID Discharge gauge



CryoNet station ID Stream ecology



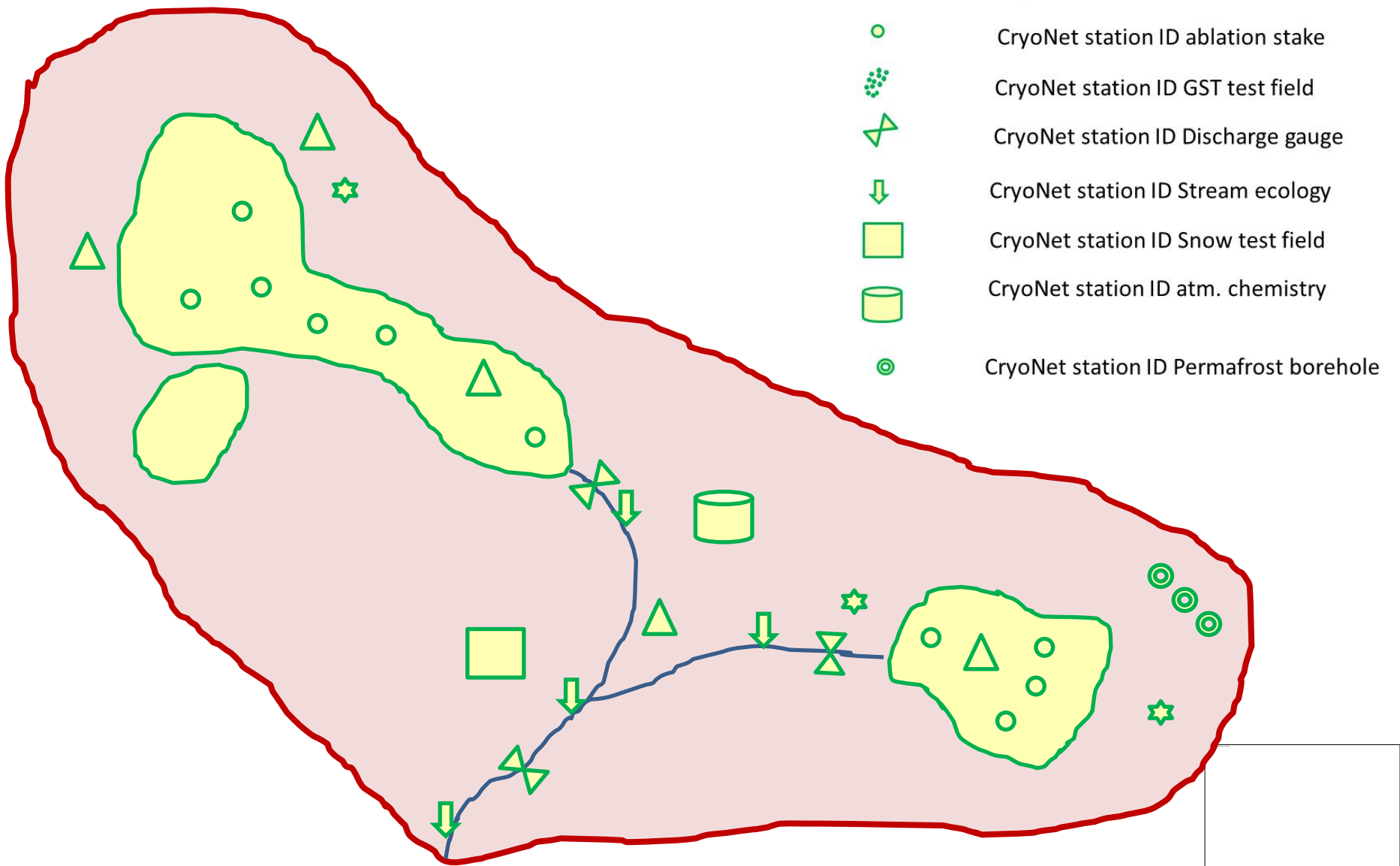
CryoNet station ID Snow test field

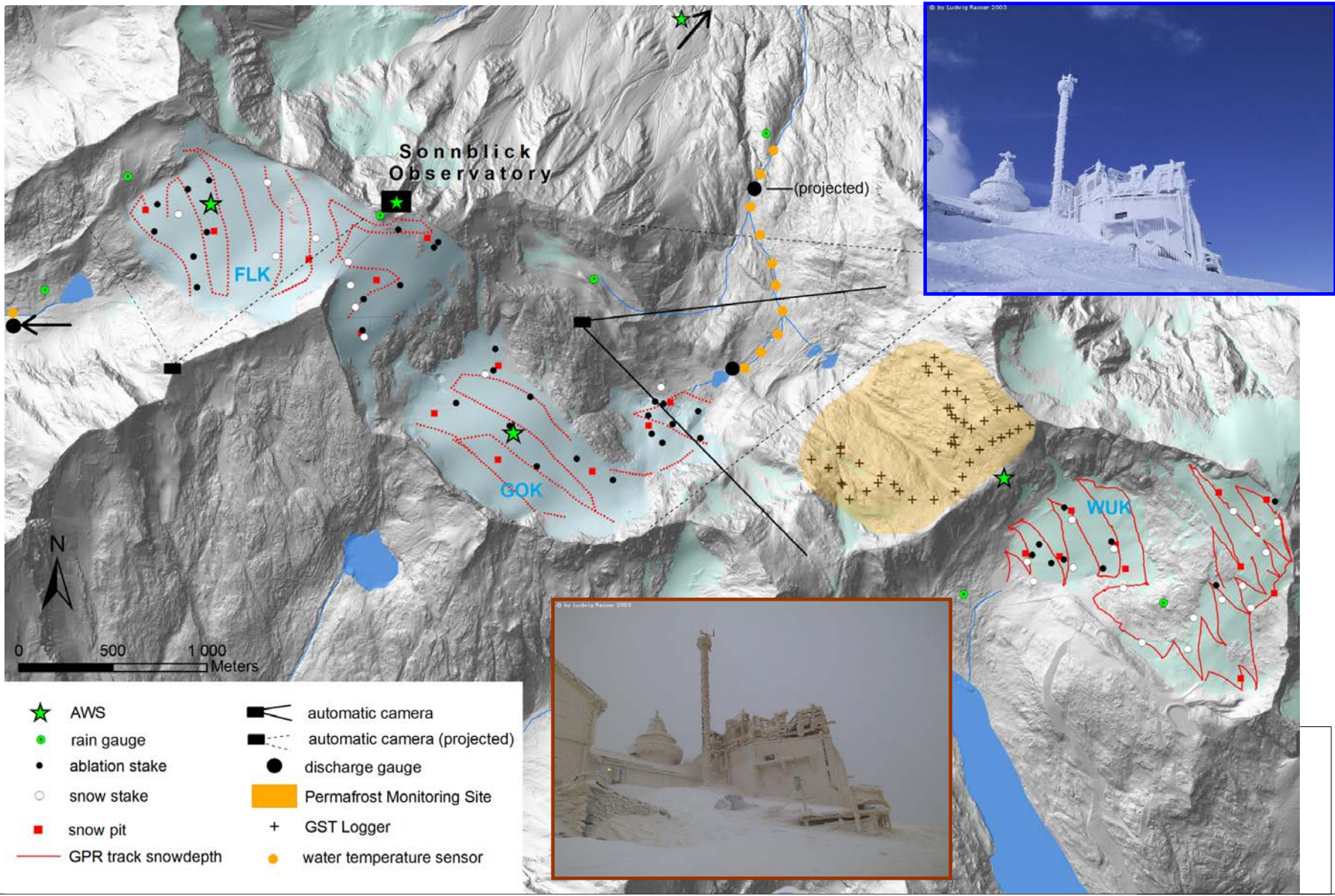


CryoNet station ID atm. chemistry

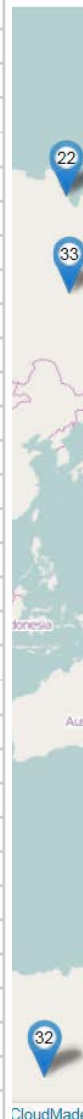


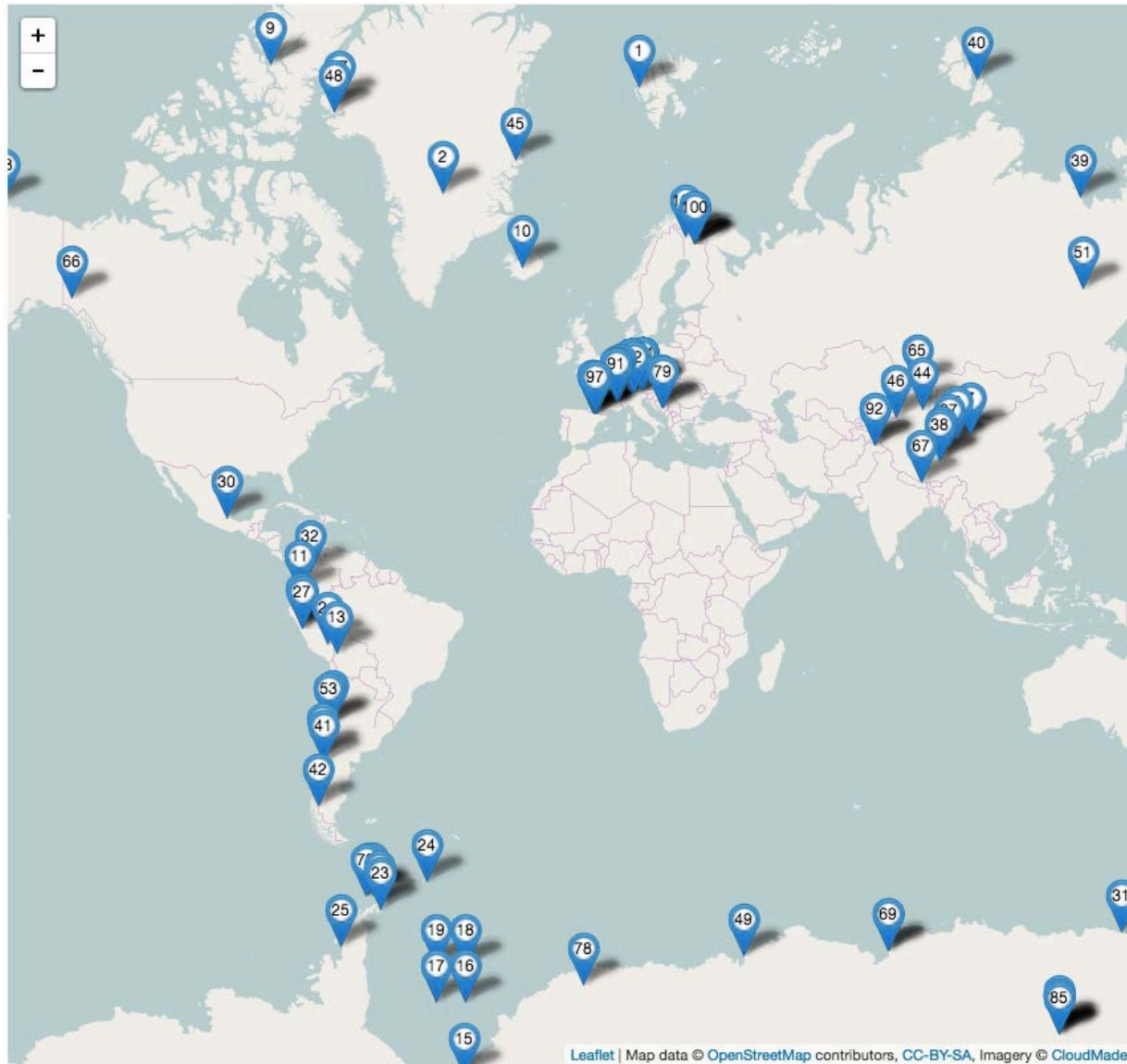
CryoNet station ID Permafrost borehole



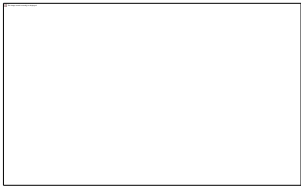


▲	Station/Site	Operating Country	Location	Type
1	SIGMA-A	Japan	Greenland	Basic
2	PROMICE Greenland Ice Sheet Monitoring Network	Denmark	Greenland	Basic
3	Sonnblick	Austria	Austria	Integrated
4	Qilianshan Station of Glaciology and Ecologic Environment	China	China	Basic
5	Sodankylä-Pallas	Finland	Finland	Integrated
6	Qilian	China	China	Integrated
7	Tanggula Cryosphere and Environment Observation Station	China	China	Basic
8	Eureka	Canada	Canada	Basic
9	Hofsjökull	Iceland	Iceland	Basic
10	Antisana 15 alfa	Equador	Equador	Basic
11	Zongo Glacier	France	Bolivia	Integrated
12	Morenas Coloradas Rockglacier	Argentina	Argentina	Basic
13	Quelccaya Ice Cap	USA	Peru	Basic
14	Weissfluhjoch - Davos	Switzerland	Switzerland	Integrated
15	Glaciar Norte	Mexico	Mexico	Basic
16	Saint-Sorlin Glacier	France	France	Integrated
17	Argentiere Glacier	France	France	Integrated
18	Mer de Glace Glacier	France	France	Basic
19	Gebroulaz Glacier	France	France	Basic
20	Xidatan	China	China	Integrated
21	Tanggula	China	China	Integrated
22	Tiksi	Russia	Russia	Integrated
23	Ice Base Cape Baranova	Russia	Russia	Integrated
24	Vuriloches	Argentina	Argentina	Basic
25	Aonikenk	Argentina	Argentina	Basic
26	Barrow Baseline Observatory	USA	USA	Integrated
27	Tianshan	China	China	Basic
28	Zackenber	Denmark	Greenland	Integrated
29	The Koxkar Glacier Camp (KGC)	China	China	Integrated
30	Syowa	Japan	Antarctica	Integrated
31	SIGMA-B	Japan	Greenland	Basic
32	Dome-C	France-Italy	Antarctica	Basic
33	Spasskaya Pad (Yakutsk)	Japan	Russia	Integrated
34	Forni Glacier	Italy	Italy (Europe)	Basic
35	Valle Nevado	Chile	Chile	Basic
36	Col de Porte	France	France	Integrated





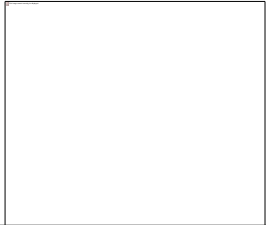
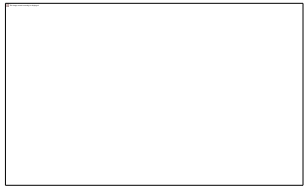
As of
September 2016



PSTG members should consider using CryoNet sites for their validation efforts. CryoNet sites will provide high quality data, with some having extensive measurements of surface energy budget and atmospheric variables.

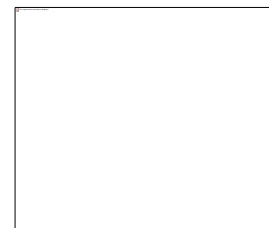
Example: WSL/SLF is establishing a Swiss Alpine Remote Sensing Site with a dedicated study plot within the Weissfluhjoch-Davos CryoNet Site.







1. A representative of the station or site completes and submits the station questionnaire (the “application”) on the GCW website.
2. For stations that are operated by the WMO Member’s national meteorological or hydrological service (NMHS), the WMO Permanent Representative (PR) of the station’s operating country sends a letter of endorsement to WMO. For stations that are operated by other national entities,... For stations that are located in a country other than that of the proponent,... For the mobile platforms operating in international waters by an international consortium,...
3. The application is examined by the WMO Secretariat for completeness.
4. The GCW CryoNet Team, in consultation with relevant experts, evaluates the application. This is normally done annually, but may be expedited in some situations. There are no site visits.





5. If the Team recommends that the station not be included in the GCW surface network, feedback is provided to the applicant. The application can be modified and resubmitted at any time.
6. If the Team recommends that the station be included in the network, the GCW Steering Group (GSG) makes its determination. If the GSG recommends that the station not be included in the GCW surface network, feedback is provided to the applicant.
7. If the GSG recommends the station for inclusion in the network, the station is conditionally accepted and enters a one-year trial period. The station shall operate according to the Minimum Requirements, including the submission of data and metadata.
8. If the GSG recommends the station for inclusion in the network, it will be presented to EC-PHORS for approval. If EC-PHORS approves the station, the final approval is made by the WMO Executive Council (EC).

