

GCW SURFACE OBSERVING NETWORK

(Excerpt from: http://globalcryospherewatch.org/cryonet/site_types.html)

The GCW surface observation network is comprised of a core component, called CryoNet, and contributing stations that are not part of CryoNet. The GCW network builds on existing cryosphere observing programmes and promotes the addition of standardized cryospheric observations to existing facilities in order to create more robust environmental observatories. The basic component of the GCW network is the **station**. A station measures one or more components of the cryosphere and one or more variables of each component, for example depth and density of the component snow. **CryoNet stations** must meet a minimum set of requirements, which includes providing ancillary meteorological measurements. Potential attributes of CryoNet stations are given below. All stations will be either Primary or Reference, and may have one or more additional attributes.

- *Primary* - Have a target (intent) of long-term operation and have at least a 4-year initial commitment.
- *Reference* - Have a long-term operational commitment and long-term (more than 10 years) data records.
- *Cal/val* - In addition, the station is being used for calibration and/or validation of satellite products and/or (earth system) models, or it has been used for such purposes in the past and it still provides the needed facilities.
- *Research* - In addition, the station has a broader research focus related to the cryosphere.

A **CryoNet site** generally encompasses an area greater than a conventional observing station and is comprised of two or more active GCW stations with varying capabilities that are operated as a coordinated unit. At least one station has to be a CryoNet station. A site may encompass several micro-climatological regions or extend over larger altitudinal gradients. Thus, further ancillary meteorological stations are part of a site. Different partners may operate the stations, but they are coordinated through one agency or institute. Each CryoNet site has to provide a concept describing the research approach and the site management (e.g. cooperation between different partners). CryoNet sites must also meet a certain requirements.

Typically, sites have a broader research focus related to the cryosphere compared to stations. Whereas basic sites investigate the cryosphere only, integrated sites aim to provide a better understanding of the cryosphere and/or its linkages to other components of the earth system, for example, the atmosphere, the hydrosphere, the biosphere, the oceans, soil, vegetation, etc. Potential attributes of CryoNet sites are:

- *Basic* - Monitor single or multiple components of the cryosphere.

- *Integrated* - Monitor at least two components of cryosphere or at least one cryosphere component and one other component of the earth system. Integrated sites are particularly important for the study of feedbacks and complex interactions between these components.

A GCW **contributing station** is required to measure at least one variable of at least one cryosphere component (e.g. snow, permafrost, sea ice, etc.). Contributing stations are those that provide useful measurements of the cryosphere but do not fulfill CryoNet minimum requirements, or in some other way do not provide the quality and/or consistency of data required by CryoNet stations; for example, where data records may be short or with large gaps. These stations may be in remote, hard to access regions where cryospheric observations are scarce or in regions where they complement other cryospheric measurements. Mobile platforms such as ships, drifting stations and buoys may also be contributing stations. Contributing stations may have this attribute:

- *Reference* - Have a long-term operational commitment and/or long-term (more than 10 years) data records.

Synoptic/climate stations of the NMHSs measuring cryospheric variables to WMO standards, and providing their metadata and data via WIS and WIGOS, could fulfill the necessary requirements in order to contribute to GCW and to be accepted as stations in the GCW surface network.

CryoNet Station and Site Requirements

In order for a surface station or site to be included in the core part of the GCW network, CryoNet, it must meet certain criteria. The minimum requirements are given below. *Contributing* stations, which are part of the GCW surface network but not part of CryoNet, do not have the same requirements. If a station or site meets these requirements, additional information can be provided for further evaluation through the [GCW Station/Site Questionnaire](#). [The application process is detailed GCW Website](#).

The minimum requirements of **CryoNet stations** are:

1. **Meeting Core 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 metadata describing the station characteristics and observational programme, are kept up-to-date and available in the GCW Portal as the interface to the WIGOS Information Resource (WIR).

4. **Compliance with Agreed Regulatory Practice:** 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:** Data are made freely available, and whenever possible in near real-time. In situ ancillary meteorological observations, as required by 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:

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