CryoNet objectives and synthesis of participant questionnaire responses

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Objectives

• CryoNet, through long-term, sustainable observing and monitoring, will contribute to:

• 1) Quantification of changes in the cryosphere over a range of time and space scales
• 2) Quantification and understanding of the effects of climate change on cryosphere and vice-versa covering changes and underlying processes as well as feedbacks
• 3) Assessment of the impacts (interaction with??) of the cryosphere on other earth spheres, in particular the hydrosphere, the biosphere and the lithosphere
• 4) Verification of satellite data with in-situ measurements to enable modelling approaches for interpretation of satellite data and to extend the point information from CryoNet stations into the space domain
• 5) Standardized cryosphere observations for NWP and hydrologic model development and verification
Questionaire: general questions

- Support national needs
- Data policy on archiving, accessibility and exchange
- Cooperation with existing networks
- Inter-comparison experiments (e.g. sensors, methods)
- Standards, guidelines and training for observations
- Harmonisation of cryospheric network
- Establishment of supersite network
- Establishment of CryoNet tier#1-tier#4 network

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Mean

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<thead>
<tr>
<th>-established-in</th>
<th>Location</th>
<th>Country</th>
<th>Atmosphere</th>
<th>Snowcover</th>
<th>Permafrost</th>
<th>Glacier/ice cap</th>
<th>Lake ice</th>
<th>Sea ice</th>
<th>Ice sheet</th>
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This chart shows the establishment year, location, country, and various environmental parameters measured at different stations around the world. Each station is associated with a specific set of measurements, such as atmosphere gases, snowcover, permafrost, glacier/ice cap, lake ice, sea ice, ice sheet, and satellite linkages. The chart includes stations like Barrow, Alert, Tianshan St., Halley, and others, with data spanning from the early 19th century to modern times.
Key messages from questionnaire feedback

• Implementation of tiered network
• High need for standards and guidelines in cryospheric observations (many counts)
• Serve science and practitioners
• Cooperate with existing networks
• Fill gaps in existing networks
• Data policy and data provision
Reasons for a tiered network

Tier #1
- Space domain
- Time domain
- Data quality
- Theme extensiveness

Tier #2

Tier #3

Tier #1
- Space domain
- Time domain
- Data quality
- Theme extensiveness

Tier #2

Tier #3
Tier #1 CryoNET sites (tentative name SUPER-SITE)

**SUPER-SITE**: = CryoNET station which monitors the physical and chemical properties of all components (GCW focal areas) of the local cryosphere in its full complexity and at the highest quality standards as well as the interaction of local/regional atmosphere.

Established linkages to satellite observations and to other disciplines such as hydrology, oceanography, ecology etc.).

In many cases these stations are supported by more than one research agency, have strong scientific supporting programme and provide facilities for intensive campaigns.

Super-sites are stations/observatories with on-site technical staff for maintaining the monitoring and scientific experiments. Super-site is a “high-level label” of WMO-GCW for cryospheric observations similar as GAW global station.
Complexity of processes

Snowcover, Glaciers, Permafrost

Gases, Aerosols, Dust

LOCAL TRANSPORT
Mass and Energy Exchange, Feedbacks

REMOTE TRANSPORT

CRYOSPHERE

Snowcover, Glaciers, Permafrost

BIOSPHERE
Aims for tier #1 sites:

a) Monitoring of changes of the physical and chemical properties of the cryosphere with respect to changes of the atmosphere (climate) and including interactions between different components of the cryosphere
b) Linkage of ground truth with satellite observations (ground truth, calibration, merge both information ...) in order to monitor the global cryosphere at high spatial and temporal scale
c) Estimation of the impact of changes of cryosphere on hydrology, water management, ecology, oceanography ... c) Extensive datasets for cryospheric modelling approaches (validation, calibration)
c) Training of personal for cryospheric observations
d) Extensive information to the public
Tier #2 CryoNET sites (tentative name REFERENCE-SITE)

- **REFERENCE-SITE**: (=Cryonet station monitoring at least 1 component of the cryosphere at the level of reference site of relevant network organisation as e.g. WGMS for glaciers, GTN-P for permafrost etc.)
Tier #3 CryoNET sites (tentative name OBSERVATION-SITE)

**OBSERVATION-SITE**: (=Cryonet station monitoring at least 1 component of the cryosphere at the level of accepted GCW standards)