CryoNet

Network of Cryospheric Surface Observations

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Since Sept 2014:
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CryoNet within GCW

**Users and Applications**
- research, operational centres, security, impacts, adaptation

**Outreach, Education, Capacity Building**

**WMO**

**Advisory Group**

**Project Office**

**Task Teams**

**GCW Portal**
- integrating data and information

**GCW Information and Analysis**
- anomaly tracking, hot-spots, variability and change, global and regional products

**Data, Information, Services**

**Partners**
- met centres
- satellite agencies
- data centres
- specialized organizations

**Observations**
- reference stations, contributing networks, satellites

**Cryosphere Products**
- operational products, reanalyses, research datasets
Motivation for CryoNet

active compilation of standardised & quality checked data

scientific observations of the cryosphere

M. Zemp, 2011
CryoNet objectives

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 measurements
- Linking cryospheric ground truth observations to cryospheric models
- Training for cryospheric observations
- Standardized practices for cryospheric observations
- Long-term, sustainable observing and monitoring.
CryoNet activities

Coordination
Capacity building

Services ↔ Observations
CryoNet activities so far

- 1st CryoNet WS (Nov. 2012, Vienna, Austria)
- Questionaires
- Cryosphere Station inventory
- Primer to GCW CryoNet (draft)
- 2nd CryoNet WS (Dec. 2013, Beijing China)
- CryoNet team meeting (Reykjavik, Island, Jan 2014)
- Joint CryoNet and Portal team meeting (Davos, June 2014)
- Questionaire at Website
The site types of CryoNet

**Baseline Sites**
- Single sphere
- Compliant with CryoNet agreed practices
- Target of long-term continuous

**Reference Sites**
- Single sphere
- Compliant with CryoNet agreed practices
- Calibration/Validation
- Long-term financial commitment
- Long-term continuous
- Near real time availability of data where possible

**Integrated Sites**
- Multi sphere
- Compliant with CryoNet agreed practices
- Calibration/Validation
- Long-term financial commitment
- Strong research focus
- Training
- Onsite staff
## Initial CryoNet stations

<table>
<thead>
<tr>
<th>ID</th>
<th>Station</th>
<th>Elevation</th>
<th>Country</th>
<th>Region</th>
<th>Type</th>
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<tbody>
<tr>
<td>1</td>
<td>Sodankylä</td>
<td>180m</td>
<td>Finland</td>
<td>Europe</td>
<td>Integrated</td>
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<tr>
<td>2</td>
<td>Zackenberg</td>
<td>0-1500m</td>
<td>Denmark</td>
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<tr>
<td>3</td>
<td>Sonnblick</td>
<td>3105m</td>
<td>Austria</td>
<td>Europe</td>
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<tr>
<td>4</td>
<td>Weissfluhjoch/Davos</td>
<td>2540m</td>
<td>Switzerland</td>
<td>Europe</td>
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<td>5</td>
<td>SIGMA-A</td>
<td>1490m</td>
<td>Greenland</td>
<td>North America</td>
<td>Baseline</td>
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<tr>
<td>6</td>
<td>PROMICE (20+ stations across Greenland)</td>
<td>270-1850m</td>
<td>Greenland</td>
<td>North America</td>
<td>Baseline</td>
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<tr>
<td>7</td>
<td>Eureka</td>
<td>610m</td>
<td>Canada</td>
<td>North America</td>
<td>Reference</td>
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<tr>
<td>8</td>
<td>Barrow</td>
<td>11m</td>
<td>USA, Alaska</td>
<td>North America</td>
<td>Reference</td>
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<tr>
<td>9</td>
<td>Tiksi</td>
<td>n/a</td>
<td>Russia</td>
<td>Russia</td>
<td>Integrated</td>
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<tr>
<td>10</td>
<td>Cape Baranova</td>
<td>30m</td>
<td>Russia</td>
<td>Russia</td>
<td>Baseline</td>
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<tr>
<td>11</td>
<td>Tianshan</td>
<td>2130m</td>
<td>China</td>
<td>Asia</td>
<td>Integrated</td>
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<tr>
<td>12</td>
<td>Mt. Everest</td>
<td>5210m</td>
<td>China</td>
<td>Asia</td>
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<tr>
<td>13</td>
<td>Yakutsk</td>
<td>220m</td>
<td>Russia</td>
<td>Russia</td>
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<td>14</td>
<td>Dome C</td>
<td>3233m</td>
<td>n/a</td>
<td>Antarctica</td>
<td>Reference</td>
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[www.globalcryospherewatch.org](http://www.globalcryospherewatch.org)
CryoNet sites must meet a minimum set of requirements: (extraction only, not full list!)

1. The site location is chosen such that, for the variables measured, it is spatially/temporally representative for measuring one or several components of the cryosphere.

2. CryoNet sites have to be active and perform sustained observations according to CryoNet agreed practices.

3. Technical personnel are trained in the operation of the equipment at the site.

4. For reference and integrated sites, there is an intent by the responsible agencies to long-term observations of at least one of the CryoNet variables.

5. The relevant CryoNet observations are of documented quality. The measurements are made and quality controlled according to CryoNet agreed practices.
Primer to the Global Cryosphere Watch
Surface-Based Observational Network - CryoNet

Wolfgang Schöner¹, Eric Brun, Michele Citterio, Charles Fierz, Barry Goodison, 
Jeff Key, Tetsuo Ohata, Rorstein Jónsson, ...

¹ Zentralanstalt für Meteorologie und Geodynamik (ZAMG), Vienna, Austria
² Météo-France, Paris, France
³ Geological Survey of Denmark and Greenland (GEUS), Copenhagen, Denmark
⁴ Institute for Snow and Avalanche Research SLF, Davos, Switzerland
⁵ Environmental Canada, Canada
⁶ NOAA, USA
⁷ JMA, Japan
⁸ WSL - Institute for Snow and Avalanche Research SLF, Davos, Switzerland
⁹ Icelandic Meteorological Office, Reykjavik, Iceland

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<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>Wolfgang Schöner (Chair)</td>
<td>ZAMG, Austria</td>
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<tr>
<td>Matthias Bernhardt</td>
<td>LMU, Germany</td>
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<tr>
<td>Michele Citterio</td>
<td>GEUS, Denmark</td>
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<tr>
<td>Charles Fierz</td>
<td>WSL / SLF, Switzerland</td>
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<tr>
<td>Christophe Genthon</td>
<td>LGGE, France</td>
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<tr>
<td>Barry Goodison</td>
<td>Free Spirit, Canada</td>
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<tr>
<td>Gino Casassa</td>
<td>Geostudios, Chile</td>
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<tr>
<td>Kaji Luojus</td>
<td>FMI, Finland</td>
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<tr>
<td>Jeff Key (GCW)</td>
<td>NOAA, US</td>
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<td>Sandy Starkwater</td>
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<tr>
<td>Vasily Smolyanitsky</td>
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<tr>
<td>Hironori Yabuki</td>
<td>JAMSTEC, Japan</td>
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<td>Porstéinn Porsteinsson</td>
<td>IMO, Iceland</td>
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<tr>
<td>Cunde Xiao</td>
<td>CMA, China</td>
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<tr>
<td>Permafrost</td>
<td>??? – IPA</td>
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<tr>
<td>Cryospheric modelling</td>
<td>Affiliation</td>
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Feedback from the questionnaires

✓ 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
CryoNet sites must meet a minimum set of requirements:

6. Associated standard meteorological in situ observations, when necessary for the accurate determination and interpretation of the GCW variables, are made with documented quality.

7. The data and metadata including changes in instrumentation, traceability, observation procedures are submitted to a data centre, which is interoperable with the GCW portal in a timely manner. Metadata are also provided to the WMO Operational Information Resource (WIR) and maintained regularly.

8. The station characteristics and observational programme are kept up-to-date in the GCW station information database.

9. A station logbook for observations and activities that may affect observations is maintained and used in the data validation process.

10. User needs have been considered in the observation design process.