

WORLD METEOROLOGICAL ORGANIZATION GLOBAL CRYOSPHERE WATCH

REPORT No. 9
2015

Final Report of the joint meeting of the GCW CryoNet Team and Portal Team

Second Session

Copenhagen, Denmark, 19-20 January 2015



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1. ORGANIZATION OF THE MEETING

1.1 Welcome and Opening of the meeting

The second session of the GCW CryoNet and Portal Teams took place in Copenhagen, Denmark, from 19 to 20 January 2015. The session was held at GEUS, the National Geological Survey of Denmark and Greenland. The meeting was chaired by W. Schöner.

W. Zhang, Director of the Observing and Information Systems Department of the World Meteorological Organization (WMO) welcomed all the participants on the behalf of WMO. As Chairman of the GCW Steering Group, A. Snorrason also welcomed participants and wished for a fruitful meeting.

1.2 Adoption of the Agenda

The programme for the meeting was adopted without significant changes. The final programme is attached as [ANNEX 1](#).

1.3 Working Arrangements

M. Citterio from the National Geological Survey of Denmark and Greenland (GEUS) provided the participants with all important information concerning the venue and meeting arrangements.

1.4 Participant introductions

Participants briefly introduced themselves and identified their interests and background relevant to the themes of the meeting. List of participants is provided in [ANNEX 2](#).

All documents and presentations prepared for, or given at the meeting are available online at: http://www.wmo.int/pages/prog/www/OSY/Meetings/GCW-CNT2/CryoNet_Copenhagen_Presentations.zip

2. DEVELOPMENT OF CRYONET

2.1 Introduction and aims of the meeting

The GCW CryoNet Team lead, W. Schöner, introduced the main objectives of the meeting: (a) To finalize the list of stations identified for the CryoNet pre-operational testing phase, along with the CryoNet sites minimum set of requirements; (b) To pursue the development of both the guidelines on agreed practices for in-situ measurements; and (c) The Primer to GCW CryoNet (the Guide on CryoNet).

He recalled that several documents have to be updated before the next World Meteorological Congress (Cg-17) which will be held in May-June 2015 in Geneva, Switzerland.

He reviewed the CryoNet activities that have been conducted so far (as listed below):

- 1st CryoNet Workshop (Nov. 2012, Vienna, Austria)
- Questionnaires
- Cryosphere Station inventory
- Primer to GCW CryoNet (draft)
- 2nd CryoNet Workshop (Dec. 2013, Beijing, China)

- CryoNet team meeting (Reykjavik, Island, Jan 2014)
- Joint CryoNet and Portal team meeting (Davos, June 2014)
- CryoNet Questionnaire at GCW Website
- South America CryoNet meeting (Santiago, Chile, Oct. 2014)

2.2 Reports from the CryoNet South America Workshop

G. Casassa enumerated the nine points list below. This list summarizes the main results from the CryoNet South America Workshop. To build CryoNet South (Latin) America:

1. There is high interest in the region to contribute to the CryoNet initiative.
2. National Representatives of CryoNet South America will be initially selected among the invited participants, in coordination with the national IACS correspondents.
3. Gino Casassa, National Representative for Chile, will follow up on item 2.
4. Each National Representative will contact the respective agencies, institutions and colleagues to remind them to complete the site questionnaire before 25 November 2014.
5. A Regional Group will be formed by consensus from the National Representatives.
6. Mexico will be included in the group, and the name CryoNet Latin America should be used.
7. Potential collaboration with the Latin America and the Caribbean (LAC) regional section of the International Hydrological Programme (IHP) of UNESCO will be proposed to the Snow and Ice Working Group of LAC.
8. The 2nd South America meeting is proposed to be held in the 2nd half of 2015.
9. The Regional Group will follow up on items 6, 7 and 8.

G. Casassa also provided the meeting with the nominated National Representatives for the Latin America Regional Group:

Country	Name	Institut
MEXICO	Hugo Delgado	Universidad Nacional de México (UNAM)
COLOMBIA	Jorge Luis Ceballos	Instituto de Hidrología, Meteorología y Estudios Ambientales (IDEAM)
ECUADOR	Bolívar Cáceres	Instituto Nacional de Meteorología e Hidrología (INAMHI)
PERU	Luzmila Dávila Roller; Wilson Suárez	Unidad de Glaciología y Recursos Hídricos de la Autoridad Nacional del Agua (UGRH-ANA). Servicio Nacional de Meteorología e Hidrología (SENAMHI)
BOLIVIA	Alvaro Soruco	Instituto de Investigaciones Geológicas y del Medio Ambiente (IGEMA), Universidad Mayor de San Andrés (UMSA)
ARGENTINA	Darío Trombotto	Instituto Argentino de Nivología, Glaciología y Ciencias Ambientales (IANIGLA)
CHILE	Gino Casassa	Geoestudios & Universidad de Magallanes (UMAG)

Participants recognized the need to interact more effectively with the UNESCO snow and ice working group to further develop CryoNet in the Latin America region. The meeting suggested organizing a joint session with the UNESCO's International Hydrological Programme (IHP) and CryoNet in the last quarter of 2015 or in 2016.

Action 2.2.1: Organize a joint UNESCO & Second CryoNet Latin America, location to be determined, 2Q 2016.

2.3 Lessons learned from GCW CryoNet SA and CryoNet Asia workshops

B. Goodison as vice-chair of the GSG provided an overview of the main results from the CryoNet Asia and the CryoNet South America workshops.

The aims of the CryoNet Asia Workshop were to continue efforts in implementing CryoNet and addressing identified gaps, with an emphasis on the measurement sites, observations, and issues in Asia.

To build CryoNet Asia it is necessary to:

- a) Draft the site classification system and then try to assign sites submitted by participants to test its applicability.
- b) Develop a data exchange mechanism.
- c) Compile appropriate best practices, guidelines, and standards currently being used by different agencies, organizations.
- d) Identify and pursue funding opportunities. As CryoNet sites would be operated by national entities, it is important to start the dialogue with national ministries to seek commitments to operate these sites.
- e) GCW Asia CryoNet will follow WMO's resolution on data policies and data sharing.
- f) Identify a CryoNet Asia representative for the GCW CryoNet Team.

Purposes of the CryoNet South America Workshop were to identify stations/sites that could be selected for CryoNet in South America, discuss practices that should be applied, and to foster the development of cryospheric activities in the region.

The CryoNet South America Workshop addressed several related topics, among others: (i) data sharing (e.g. regional vs national data centres) and agreed that at least metadata should be made freely available; (ii) adequate cryospheric definitions in view of their legal implications; (iii) stations for consideration as CryoNet stations. The workshop also agreed that snowpack chemistry should be included in GCW-IP.

The meeting noted that the Regional Asia group remained to be established and representatives identified. It further recommended to possibly following the WMO Regional Association structure with some exceptions (e.g. Mexico for CryoNet Latin America).

Action 2.3.1: Contact Xiao Cunde to seek nominations for GCW focal points, national representatives and experts in order to establish the Regional Asia Group.

2.4 The CryoNet site types/categories re-evaluated (site vs station)

W. Schöner, as the CryoNet team leader, introduced the discussion on the CryoNet site types/categories. He highlighted some necessary changes to the CryoNet structure that would allow more flexibility. In this regard, he called for a redefinition of the CryoNet network which is structured at the moment into three classes of observational sites.

Through the example of the Sonnblick site, the meeting redefined the structure of CryoNet. After extended discussions revolving around terminology of stations vs. sites (definition, coordinates, responsibilities, management...) the meeting agreed on a new structure of CryoNet sites (see Figure 1).

Participants further discussed the terminology issue and recalled that terms related to the cryosphere should be compliant with the WMO Integrated Global Observing System (WIGOS) terminology. The meeting decided to nominate a CryoNet representative to work jointly with the dedicated WIGOS team on the development of the observing network design

guidance. M. Citterio spontaneously agreed to act as the CryoNet representative. He will attend the related WIGOS meetings.

In the same scope, the meeting recognized that observation practices defined for the CryoNet network of in-situ measurements have to be aligned with those already existing in the Observing System Capability Analysis and Review Tool (OSCAR) database of WIGOS.

The meeting briefly addressed the issues on how to deal with drifting buoys and recognized that WIGOS already defined this specific case as mobile stations.

CryoNet Sites	
Basic Sites (Cryosphere only)	Integrated Sites (Multiple spheres)
<ul style="list-style-type: none"> • Monitor single or multiple components of the cryosphere • Observe multiple variables of each component • Measure auxiliary meteorological variables • Comply with GCW best practices • Be currently active • Commit to long-term operation • Make data freely available, whenever possible in (near) real time 	<p>In addition to CryoNet Basic Site characteristics:</p> <ul style="list-style-type: none"> • Monitor at least one other sphere (e.g., hydrosphere, biosphere, atmosphere) • Have a broader research focus • Have supporting staff • Have training capability
CryoNet Stations (Sites contain one or more stations)	
Primary Stations	Baseline Stations
<ul style="list-style-type: none"> • Have target of long-term operation • Have a 4 year initial commitment 	<ul style="list-style-type: none"> • Have long-term operational commitment • Have a long-term record (10+ years)

Figure 1: New CryoNet structure

Participants noted that a design principal document is still missing for CryoNet. This document is recognized as critical. Representativeness of stations (e.g. spatially and temporally) is an important parameter that should be taken into account in such document. As an example, participants mentioned the case of glaciers or permafrost sites that in fact, are most often chosen due to practical reasons (e.g. accessibility). The meeting decided to rather ask site managers to quantify the representativeness of their sites.

The meeting updated the CryoNet site requirements according to the new agreed structure.

Action 2.4.1: Present the new CryoNet structure to the GSG members during the following meeting to seek their consideration.

Action 2.4.2: M. Citterio, as CryoNet representative, will attend the WIGOS meeting related to observing network design.

2.5 CryoNet Sites Questionnaire

J. Key informed the meeting on the latest updates on the GCW website. He also recalled the main differences between this website and the GCW Data Portal. The website differs from

the Data Portal in that it contains more dynamic information (news, state of the cryosphere plots, highlights, calendar), as well as background, higher-level information, GCW documents, and outreach material. It links to the GCW Data Portal.

Major updates to the website concern the online site questionnaire which is a robust survey of basic GCW surface network information and detailed lists of metadata measurements. Major changes are:

- Information is stored in a database for flexibility,
- Dynamically generated site web pages,
- New structure for listing and mapping sites.

Minor changes are:

- Updated glossary,
- Added a few products to *Cryosphere Now*,
- Updated measurement methods,
- Updated handouts and other outreach materials.

Next steps of the development of the GCW website will be to update the questionnaire based on new site definitions and site-station structure (major effort); to add a database table and a search tool for Snow Watch snow product inventory; add ice thickness “trackers”; update glossary and requirements as needed and add filters to aid in searching for sites (e.g., by variable, region, elevation, etc.). He further noted that more than 30 questionnaires from South America have been submitted.

J. Key reiterated the needs required to pursue the website’s development (e.g. contributors for assessments; support for regular monitoring of real-time products and news, interesting events, community announcements, multimedia (photos, video); outreach materials).

The meeting recognized the need to take into account those recommendations to maintain and to further develop the GCW website.

Action 2.5.1: GCW members to provide cryospheric assessments (e.g. glaciers).

2.6 Site selection (draft list of CryoNet stations for Cg-17)

The meeting reviewed the list of stations identified for the CryoNet pre-operational testing phase. The meeting recalled that candidate stations that do not fulfil the CryoNet requirements will be added to the “Contributing” sites network category. This is the case, for example, of the Mount Everest site which could not be further maintained (in recent times). For the moment, this site is not selected. Instead, it is included into the “Contributing” site network.

Eventually, the meeting selected a list of 36 sites/stations to be included in the pre-operational testing phase. Participants noticed that there is no station from Norway (e.g. Svalbard). This list is going to be presented at the GCW Steering Group (GSG) meeting for consideration and approval. Depending on decision of GSG, documents submitted to Congress as well as the GCW website (map of station) will have to be updated accordingly.

Attendees noted that criteria for the “Contributing” sites/stations are yet to be defined. These criteria are a pre-requisite to allow for evaluation of candidate stations. Responsibility to develop such criteria is on the CryoNet Team; the GCW Steering Group will then review and approve.

The meeting also proposed to let the applicants decide to which network they are applying (core or contributing). In this regard, there is a need to contact Sandra Barreira (Argentina) in order to ask her to specify which category her candidate stations belong to (before approval by the CryoNet Team). The questionnaire will soon have to be designed in such way that applicants have to select one of these categories.

Participants suggested providing feedback to site managers in order to explain why their stations were or were not selected as part of CryoNet. The meeting suggested creating a subgroup of 2 to 3 people from the CryoNet Team with the aim of interacting with site managers for questions-answers follow-up. It further recommended sending a letter to the Permanent Representative (PRs) of Members with WMO with the aim to inform them about the list of site/station identified for the pre-operational testing phase and to seek their approval.

The list site/station identified for the pre-operational testing phase is given in [ANNEX 3](#).

Action 2.6.1: Submit the list of sites/stations identified for the pre-operation testing phase to GSG for consideration and approval.

Action 2.6.2: Update the GCW website accordingly to both the new CryoNet structure and the agreed list of site/station.

Action 2.6.4: Re-design the questionnaire so that applicants will have to select one of the two categories (core or contributing sites).

Action 2.6.3: Send a letter to PRs to seek approval with their sites to be included in the pre-operational testing phase.

Action 2.6.4: Contact Sandra Barreira (Argentina) and ask her to specify the categories of the proposed sites/stations.

2.7 Status of the development of Primer

W. Schöner briefed the meeting with the latest updates of the Primer to CryoNet (Guide to CryoNet). This document is circulated between all CryoNet Team members for updates.

2.8 Making CryoNet operational

The meeting discussed several items that would contribute to make CryoNet operational. Participants mainly focused on the list of stations that will be proposed to Congress and EC and on the design of CryoNet (e.g. Cryospheric variables measured, Observing practices, Metadata, Focal Points / Site managers, Data policy and Quality control).

3. FUTURE ACTIVITIES

3.1 Next meetings and/or workshops

Forthcoming activities planned to pursue the development of GCW and CryoNet are listed below:

- Fourth CryoNet and Portal Teams Meeting, Boulder, USA, 4Q 2015
- Second CryoNet Asia, Salekhard, Russian Federation, February 2016
- Joint UNESCO & Second CryoNet Latin America, location to be determined, 4Q 2015

The secretariat, with the help from GSG, will identify potential participants to attend the above mentioned meetings and workshops.

3.2 Work plan / Action sheet

W. Schöner provided the meeting with a work plan of the CryoNet Team, see [ANNEX 4](#).

M. Ondráš reviewed the list of actions identified in previous CryoNet and Portal Team sessions. The meeting suggested to set-up regular teleconferences to follow-up with identified actions.

Action 3.2.1: Set regular teleconferences to follow-up with identified actions.

4. PREPARATION FOR Cg-17

4.1 Documents to Cg-17 on GCW

M. Ondráš presented the documents prepared for Cg-17. He mentioned that these documents will have to be updated according to the decisions taken by GSG. A resolution on CryoNet will be considered after Congress.

5. ANY OTHER BUSINESS

Participants discussed the importance of developing collaborations and partnership with other international organizations and engaging with young scientist communities. In this regard, the International Network for Terrestrial Research and Monitoring in the Arctic (INTERACT) was given as an example. INTERACT *“specifically seeks to build capacity for research and monitoring in the European Arctic and beyond, and is offering access to numerous research stations through the Transnational Access program”* (for more information: <http://www.eu-interact.org>). Collaboration between GCW and INTERACT could benefit both initiatives.

Participants noted that some stations are or could be part of the two networks (if guidelines and practices are compliant to each other) and suggested to invite representatives from INTERACT to attend CryoNet meetings. However, it should be kept in mind that CryoNet is a governmental network while INTERACT is a European framework.

The meeting further suggested involving experts from others organizations and/or institutes (e.g. WGMS, permafrost community) in order to quality control CryoNet sites and stations relevant to their respective expertizes. Annett Bartsch (University of Technology Vienna) was cited as potential CryoNet expert for observing practices for permafrost. The meeting also recommended inviting some early carrier scientists to the GSG meeting in Boulder, USA.

Ø. Godøy provided the meeting with an Information and Services Working Group work plan, see [ANNEX 5](#).

6. CLOSURE OF MEETING

On behalf of all participants and the WMO Secretariat, the Chair of the GSG, Á. Snorrason and the Director of the Observing and Information Systems Department of the WMO, W. Zhang, expressed their deep appreciation to our host for outstanding arrangements.

A summary of all actions are presented in [ANNEX 6](#) and the CryoNet membership in [ANNEX 7](#).

The meeting was adjourned Tuesday 20 January 2015 at 06:00 PM.

Agenda

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- 2.4 The CryoNet site types/categories re-evaluated (site vs station)
- 2.5 CryoNet Sites Questionnaire
- 2.6 Site selection (draft list of CryoNet stations for Cg-17)
- 2.7 Practices for CryoNet in the WMO Technical Regulations and the WIGOS Regulatory Material
- 2.8 Status of the development of Primer
- 2.9 Making CryoNet operational

3. FUTURE ACTIVITIES

- 3.1 Next meetings and/or workshops
- 3.2 Work plan / Action sheet

4. PREPARATION FOR Cg-17

- 4.1 Documents to Cg-17 on GCW

5. ANY OTHER BUSINESS

6. CLOSURE OF MEETING

List of Participants

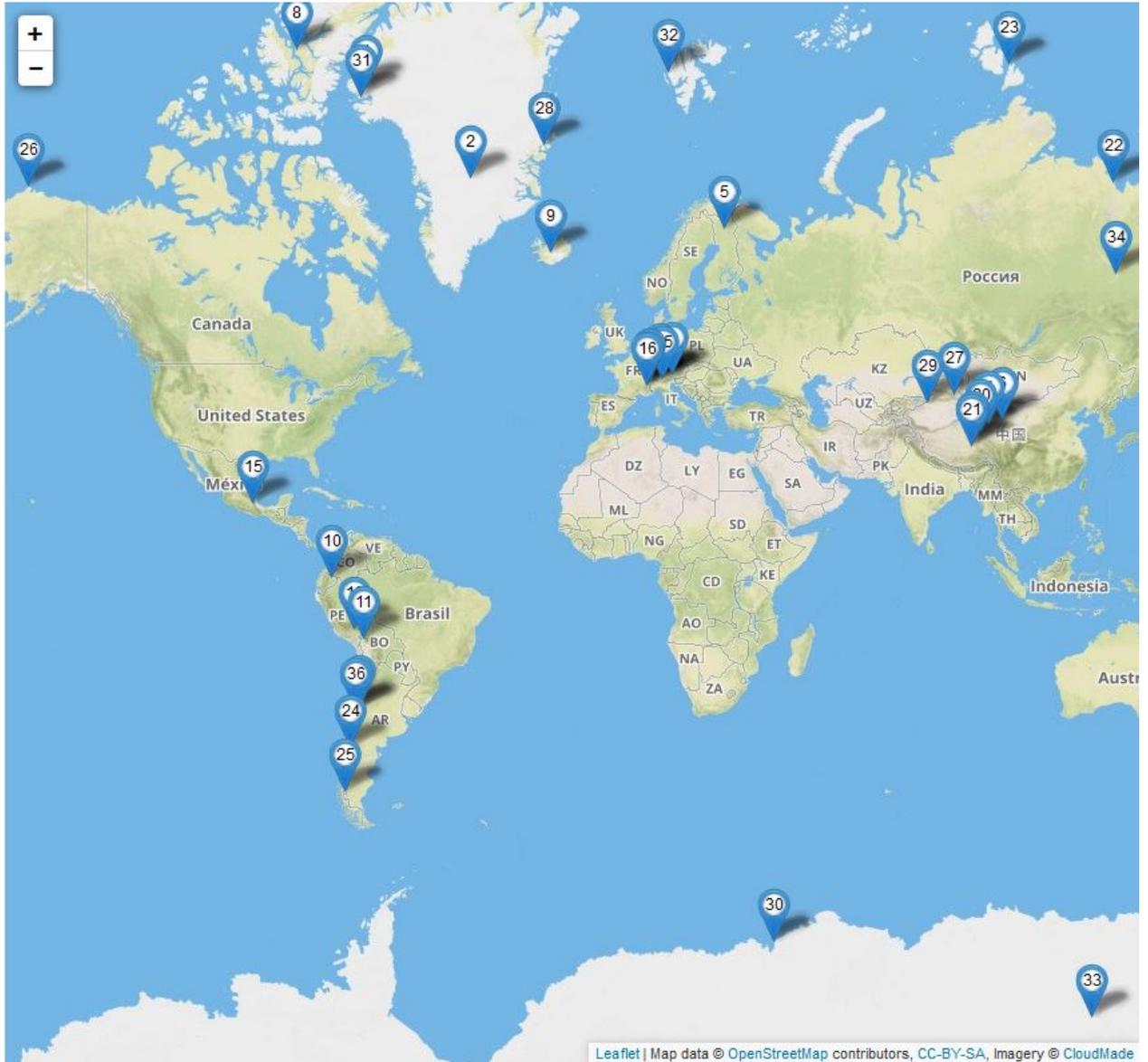
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ANNEX 3

Observing sites identified for the pre-operational testing phase of CryoNet.

Site	Operating Country	Location	Integrated?
1 SIGMA-A	Japan	Greenland	no
2 PROMICE Greenland Ice Sheet Monitoring Network	Denmark	Greenland	no
3 Sonnblick	Austria	Austria	yes
4 Qilianshan Station of Glaciology and Ecologic Environment	China	China	no
5 Sodankylä-Pallas	Finland	Finland	yes
6 Qilian	China	China	yes
7 Tanggula Cryosphere and Environment Observation Station	China	China	no
8 Eureka	Canada	Canada	no
9 Hofsjökull	Iceland	Iceland	no
10 Antisana 15 alfa	Ecuador	Ecuador	no
11 Zongo Glacier	France	Bolivia	yes
12 Morenas Coloradas Rockglacier	Argentina	Argentina	no
13 Quelccaya Ice Cap	USA	Peru	no
14 Davos	Switzerland	Switzerland	yes
15 Glaciar Norte	Mexico	Mexico	no
16 Saint-Sorlin Glacier	France	France	yes
17 Argentiere Glacier	France	France	yes
18 Mer de Glace Glacier	France	France	no
19 Gebroulaz Glacier	France	France	no
20 Xidatan	China	China	yes
21 Tanggula	China	China	yes
22 Tiksi	Russia	Russia	yes
23 Ice Base Cape Baranova	Russia	Russia	yes
24 Vuriloches	Argentina	Argentina	no
25 Aonikenk	Argentina	Argentina	no
26 Barrow Baseline Observatory	USA	USA	yes
27 Tianshan	China	China	no
28 Zackenberg	Denmark	Greenland	yes
29 The Koxkar Glacier Camp (KGC)	China	China	yes
30 Syowa	Japan	Antarctica	yes
31 SIGMA-B	Japan	Greenland	no
32 Rabben Station in Ny-Alesund	Japan	Svalbard	no
33 Dome-C	France	Antarctica	no
34 Spasskaya Pad (Yakutsk)	Japan	Russia	yes
35 Forni Glacier	Italy	Italy (Europe)	no
36 Valle Nevado	Chile	Chile	no



GCW CryoNet Team Work Plan

Activity	Deliverable	Deadline	Responsible	Members	Comment
Update documents for Cg-17		Jan.2015	Secretary		
Update GCW regulatory material		ongoing until Jan.2016	Secretary		
Editing of questionnaires by experts	Questionnaire update	Aug.2015	Gino Casassa, Jeff Key		
Update CryoNet Primer	CryoNet Primer	Mar.2015	Wolfgang Schöner	CryoNet Team	Integrate new site types structure and contributing sites
Review available and propose new GCW agreed observing practices	GCW agreed practices	Nov.2015	Thorsteinn Thorsteinsson, Charles Fierz	Gino Casassa, Michele Citterio, Wolfgang Schöner, Vasily Smolyanitsky, additional experts for cry-components tbd	Prepare a table with experts for various cryo-components to be invited for the group, entire group structured into sub-groups for cryo-components. To be established as a new task team.
Developing the process for assessment of sites proposed to CryoNet	Document on procedure for assessment of CryoNet sites	Nov.2015	Sandy Starkweather	CryoNet Team	

Consider defining minimum program for CryoNet sites	Document on minimum program for CryoNet sites	Nov.2015	Wolfgang Schöner	Charles Fierz, Michele Citterio, Christophe Genthon, Vasily Smolyanitsky, lake ice	List of variables measured for each cryo-component
Selection of CryoNet sites	List of CryoNet sites for EC	Dec.2015	Wolfgang Schöner	CryoNet Team	To be approved by EC-PORS (first info go to EC-PORS in Sep.2015, final approval by email)
CryoNet Team meeting	Report	3 days in Dec.2015	Wolfgang Schöner	Secretary	Suggested location: Boulder, suggested date: week before AGU2015
Joint CryoNet-Portal Teams meeting	Report	1day in Dec.2015	Wolfgang Schöner, Østein Godøy	Secretary	Topic for meeting (beside others): How will CryoNet (meta) data be integrated into GCW Data Portal?
2nd CryoNet Asia workshop	Report	3 days Feb.2016	Vasily Smolyanitsky	Secretary, Wolfgang Schöner	
Joint UNESCO-GCW-CryoNet meeting in SA	Report	Oct.2015	Gino Casassa		Join activities of GCW and UNESCO

Information and Services Working Group work plan

#	Task	Deliverable/activity	Due	Responsible	Status	Comment
<i>Catalogue:</i>						
1	Integrate relevant data centres	Much of the data that is relevant for GCW is hosted by non WMO data centres. Using relevant networks like CLIC, ICSU WDS, WIS and others, relevant data centres are identified and contacted.	Continuous	Øystein Godøy	Ongoing	Integration of data centres depends on the availability of metadata interoperability interfaces.
2	Software development	The GCW catalogue is depending on contributing data centres and the description these provide of their data. As this documentation varies in structure and content, translations are required to provide a unified search interface to all data. This requires continuous adaptation of the software as well as implementation of semantic translations. Interfaces to data is also likely to evolve over time and the software need to be adapted accordingly to provide higher order services on data where possible.	Continuous	Øystein Godøy	Ongoing	
3	Establish GCW Catalogue Interoperability Group	Based on the data centres already integrated with the GCW catalogue a GCW interoperability group is identified. This group will act as reference group for the development of interoperability guidelines. The group cooperates using electronic tools.	Continuous	Øystein Godøy	Not formally started	Should this relate to the combined SAON/IASC data committee and the Polar Data Forum?
4	Develop catalogue interoperability guidelines	As GCW depends on a number of data centres that belong to different data management frameworks or are independent, it is useful to develop a formal document of the interoperability standards supported as well as references to relevant documentation developed by e.g. WMO,	Drafts 2015Q3	Øystein Godøy	Not started	This depends on the involvement of a GCW interoperability group.

		ICSU WDS, Research Data Alliance and GEOSS. The purpose is to have material on best practise that may help data centres establish machine interfaces that are support the distributed nature of GCW data management while acknowledging that GCW depends on a heterogeneous community.				
5	Establish the GCW catalogue as a WIS DCPC	Following the joint CryoNet and Web Portal meeting the Davos June 2014, steps to establish the GCW catalogue as WIS DCPC is being taken. This process includes planning of the necessary steps prior to sending a formal application to WMO and subsequently the formal process of evaluation of the proposal by WMO before a potential acceptance.	Approved DCPC by 2016Q4	Øystein Godøy Bard Saadatnejad	Planning	Due estimate taking into account the approval process of WMO.
6	Analyse the problem of duplication of metadata through harvesting	Duplication of metadata records in global catalogues may arise from metadata harvesting as the same metadata may have many paths to a global catalogue. The intention is to describe this problem and to identify potential solutions including those identified by other efforts (e.g. RDA, WMO, ICSU).	2015Q4	Øystein Godøy	Not started	
7	Develop a GCW Catalogue Operations Manual	Development of a GCW Catalogue Operations Manual will increase the transparency of the GCW Catalogue. It will address issues raised in this work plan and provide the basis for bilateral agreements with contributing data centres.	2015Q4	Øystein Godøy (Steve Foreman)	Planning	
8	Develop bilateral agreements with contributing data centres	To avoid duplication of data in global catalogues like WIS and GEOSS, bilateral agreements with contributing data centres are required to define whether harvested metadata should be exposed using machine interfaces by the GCW catalogue or not. A template for agreements has to be	Draft 2016Q1 Continuous	Øystein Godøy (Steve Foreman)	Planning	This may be separated in two issues. One relating to exposure towards WIS and one on the relation between WIS and GEOSS. If there is a mechanism determining

		developed. While WIS has formal procedures for interaction between data centres, many of the GCW contributing data centres are not WMO members and a pragmatic approach is required to slightly formalise the interaction (e.g. expected service level and error handling) between the GCW catalogue and contributing data centres.				selective exposure of metadata between WIS and GEOSS that can be utilised in this context. The reference group for this work is the GCW Catalogue Interoperability Group. Check e.g how this is handled in GAW.
9	Adapt harvested metadata to WMO requirements	The metadata harvested by the GCW catalogue comes from a variety of data centres using a number of standards that differs from the WMO standards. Harvested metadata must be adapted to WMO requirements prior to potential exposure through WIS.	Continuous	Øystein Godøy Bard Saadatnejad	Ongoing	Exposure of harvested metadata through WIS depends on the consent of the originating data centre. It is especially important to avoid duplication of records in GEOSS as WIS is connected to GEOSS. Tools for adaptation of metadata is being developed, but procedures is required as well.
10	Connect GCW catalogue to WMO GTS for datasets generated by non-WMO members	Much of the GCW community and datasets are external to WMO. Some of these datasets may be useful in real time applications and to support this the GCW catalogue must be able to provide these data on GTS upon request from the GCW community.		Øystein Godøy	Not started	Real time access to requested data can also be supported through Internet, but without the guaranteed timeliness of WMO GTS.
<i>Website:</i>						
11	Implement web page to show surface network sites by category	Display core (CryoNet), contributing, and candidate sites together or separately; add tool to filter sites based on cryosphere element (e.g., display only snow sites).	March 2015	Jeff Key	Started	The Steering Group has to decide if candidate (proposed) sites should be displayed on a public web page.
12	Add database table and search tool for Snow Watch snow product inventory	The Snow Watch snow product inventory will be implemented as a database table that allows for display and filtering based on a variety of characteristics, e.g., coverage,	March 2015	Jeff Key	Not started	The first complete draft of the inventory will be available by February 2015.

		parameters, spatial resolution. This implementation can also be used for other inventories.				
13	Add ice thickness “trackers”	Add a sea ice thickness tracker based on satellite imager data, possibly with modeled ice thicknesses.	Sept 2015	Jeff Key	Started	
14	Update glossary and requirements as needed	Add additional glossary terms and sources as needed. Update observational requirements as needed.	Continuous	Jeff Key	Ongoing	
<i>Metadata and Terminology Group</i>						
15	Establish partnerships for glossary development	Partnerships with other organizations that have cryosphere interests, notably IACS, will foster community consensus for the glossary definitions. Jointly formulate a plan for completing the GCW Cryosphere Glossary.	Dec 2015	Charles Fierz, Jeff Key	Started	
16	Update glossary with additional sources	Add IPCC cryosphere term definitions to the glossary	Sept 2015	Jeff Key, Charles Fierz	Started	

Actions sheet

#	N°	Action	Responsible	Status/ Deadline
1	Action 2.2.1	Organize a joint UNESCO & Second CryoNet Latin America, City?, Country?, 2Q 2016.	Secretariat	On-going
2	Action 2.3.1	Contact Xiao Cunde to seek its collaboration to nominate GCW focal points, national representatives and experts in order to establish the Regional Asia Group.	Secretariat	May 2015
3	Action 2.4.1	Present the new CryoNet structure to the GSG members during the following meeting to seek their consideration.	CryoNet team	Done
4	Action 2.4.2	M. Citterio, as CryoNet representative, will attend the WIGOS meeting related to observing network design issues.	M. Citterio	On-going
5	Action 2.5.1	GCW members are requested to provide cryospheric assessments (e.g. glaciers).	GCW members	On-going
6	Action 2.6.1	Submit the list of sites/stations identified for the pre-operation testing phase to GSG for consideration and approval.	CryoNet team	Done
7	Action 2.6.2	Update the GCW website accordingly to both the new CryoNet structure and the agreed list of site/station.	GCW website team	Done
8	Action 2.6.4	Re-design the questionnaire so that applicants will have to select one of the two categories (core or contributing sites).	GCW website team	Done
9	Action 2.6.3	Send a letter to PRs to seek approval with their sites to be included in the pre-operational testing phase.	Secretariat	Done
10	Action 2.6.4	Contact Sandra Barreira (Argentina) and ask her to specify the categories of the proposed sites/stations.	GCW website and CryoNet teams	May 2015
11	Action 3.2.1	Organize teleconference to follow-up with identified actions.	Secretariat	On-going

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