CryoNet Asia – Some Lessons from Other Regional Networks

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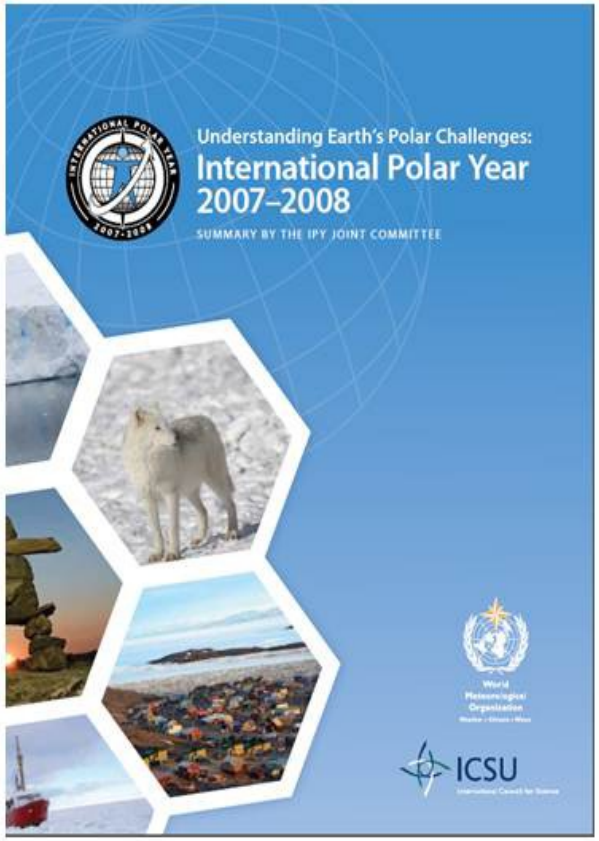
Outline

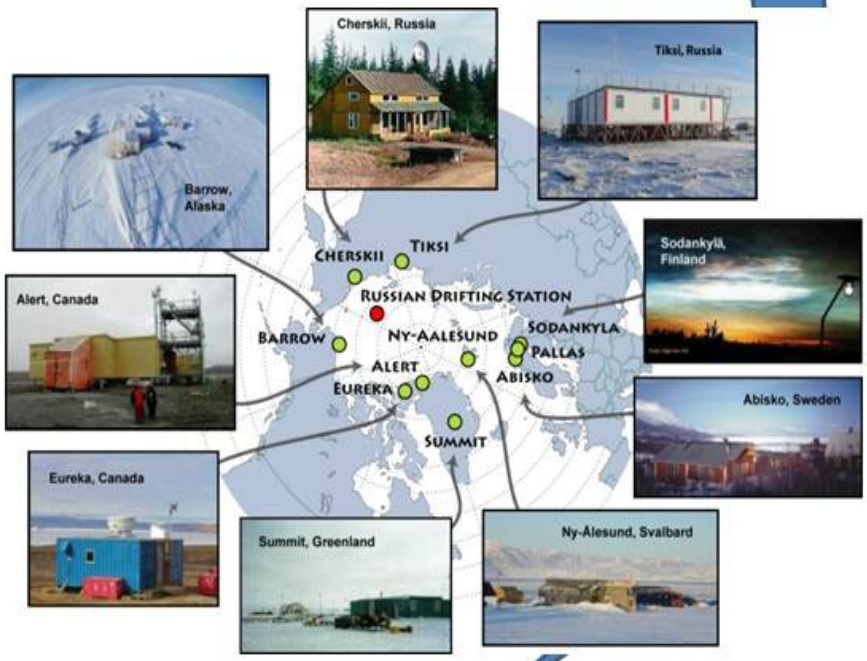
- IASOA - Pan-Arctic – Lessons learned
- Global Atmosphere Watch
- SPICE - need for intercomparison sites
- CryoClim – Remote sensing of snow cryosphere – need for reference data



Chapter 3.4 in IPY Observing Systems, Their Legacy and Data Management

International Arctic Systems for Observing the Atmosphere (and Surface)
IASOA(S)
www.IASOA.org

*Global Cryosphere Watch



*Russian Drifting Station

Some Lessons Learned from IASOA in Co-ordinating a Regional Pan-Arctic Network

- It is *easier to build and deploy* new facilities and instruments and collect data sets *than it is to use the resulting data* sets to do meaningful network science
- It is very *hard to coordinate between facilities that operate with different organization mandates and funding* structures
  - selecting GAW stations may be a good starting point for several reasons.
- *Archiving and accessing* the data is a very difficult problem
- Keeping an active, engaging, informative and useful *web site* is also very difficult
- *Difficulties in communicating between participating countries and the global network must be overcome*

Essential Characteristics of a GAW Regional or Contributing Station: already used in defining CryoNet stations

1. The station location is chosen such that, for the variables measured, it is *regionally representative* and is normally free of the influence of significant local pollution sources.
2. There are adequate power, air conditioning, communication and building *facilities to sustain long term observations* with greater than 90% data capture (i.e. <10% missing data).
3. The *technical support* provided is trained in the operation of the equipment.
4. There is a *commitment by the responsible agency to long term observations* of at least one of the GAW variables in the GAW focal areas.
5. The GAW *observation made is of known quality* and linked to the GAW Primary Standard.
6. The *data and associated metadata* are submitted to one of the GAW World Data Centres no later than one year after the observation is made. Changes of metadata including instrumentation, traceability, observation procedures, are reported to the responsible WDC in a timely manner.
7. If required, *data are submitted to a designated data distribution system in near-real-time*.
8. *Standard meteorological in situ observations, necessary* for the accurate determination and interpretation of the GAW variables, are made with known accuracy and precision.
9. The station characteristics and observational programme are updated in the GAW Station Information System (GAWSIS) on a regular basis.
10. A station logbook (i.e. record of observations made and activities that may affect

Essential Characteristics of a GAW Global Station

In addition to the characteristics of Regional or Contributing stations, a GAW Global station should fulfil the following additional requirements *(Global Stations in developing countries that fill major gaps in the global network are allowed exceptions as they strive toward these criteria)*, namely:

- Measure variables in at *least three of the six GAW focal areas* (see item 4 above).
- Have *a strong scientific supporting programme* with appropriate data analysis and interpretation within the country and, if possible, the support of more than one agency.
- Make measurements of other atmospheric variables important to weather and climate including upper air radio sondes at the site or in the region.
- Provide a facility at which *intensive campaign research* can augment the long term routine GAW observations and where testing and development of new GAW methods can be undertaken.

Solid Precipitation InterComparison Experiment – SPICE Participating Sites

15 countries hosting a total of 20 field sites;

- *Australia, Chile, Canada, Finland, France, Italy (Nepal), Japan, Korea, Norway, New Zealand, Russia, Poland, Switzerland, Spain, USA.*

Legend

1.	Caribou Creek, Saskatchewan, Canada	11.	Haukeliseter, Norway
2.	Bratt's Lake, Saskatchewan, Canada	12.	FMI/Sodankylä Arctic Research Centre, Finland
3.	Marshall Site, Colorado, USA	13.	Valdai, State Hydrological Institute, Russia
4.	CARE, Ontario, Canada	14.	Voljskaya Observatory, Gorodec, Russia
5.	Tapado AWS, Región de Coquimbo, Chile	15.	Pyramid Observatory, Nepal
6.	Formigal, Spain	16.	Gochang, Korea
7.	Col de Porte, France	17.	Joetsu, Japan
8.	Weissfluhjoch, Davos, Switzerland	18.	Rikubetu, Hokkaido, Japan
9.	Forni Glacier, Italy	19.	Guthega Dam, New South Wales, Australia
10.	Hala Gasienicowa Station, Poland	20.	Mueller Hut Weather Station, New Zealand

SPICE is a GCW Demonstration Project

Participating Sites: Alpine Climate

- **Australia**: Guthega Dam WS (New South Wales), Snowy Hydro Ltd, 1586 m
- **Chile**: Tapado WS, Centro de Estudios Avanzados en Zonas Áridas, 4318 m
- **France:** Col de Porte, Météo-France, Centre National de Recherches Météorologiques, Centre d'Etudes de la Neige, CNRM-GAME/CEN: 1325 m
- **Italy:** Forni Glacier/Upper Valtellina, EVK2CNR – UNIMI University of Milan), 2669 m.
- **Nepal:** Pyramid International Laboratory Observatory/ Lobuche/ SoluKhumbu/Nepal, EVK2CNR-UNIMI, 5050 m
- **New Zealand**: Mueller Hut WS, National Institute of Water and Atmospheric Research Ltd,1818 m
- **Norway:** Haukeliseter, Norwegian Meteorological Institute, 990 m.
- **Poland**: Hala Gasienicowa WS, Institute of Meteorology and Water Management,1520 m.
- **Switzerland:** Weissfluhjoch (Davos), MeteoSwiss and Swiss Institute for Snow and Avalanche Research (SLF), 2500 m.
- **Spain:** *ARAMON – Formigal,* AEMET (Spanish State Met. Agency), 1855 m

Experiment Field Reference

- The 1st WMO Solid Precipitation Intercomparison : **DFIR (Double Fence International Reference)** a complete system:
  - Octagonal double-fence (DFIR-fence)
  - Tretyakov gauge+shield placed in its centre.

- **SPICE: Double Fence Automatic Reference (DFAR):** a field reference configuration using:
  - Octagonal double-fence (DFIR-fence)
  - An automatic gauge (model not prescribed)
  - Alter Shield
  - Precipitation detector or precipitation type sensor

Participating Instruments: Weighing Gauges

Belfort Instrument Company
36000-1DDH

MPS Systems
TRwS204

Meteoservis v.o.s
MRW500

Snow Hydro Limited
All-Weather
Precipitation Gauge -
NOAH II

GEONOR AS
T-200BM3
(1500mm)

GEONOR AS
T-200B3
(600 mm)

OTT Hydromet GmbH
Pluvio2 200cm2

NIMH Bulgaria
Sutron TPG-0001

Participating Instruments: Heated Tipping Buckets

CAE S. p. A
PMB25R

Environmental
Measurements Ltd.
UPG1000

Meteoservis v.o.s &
ZAMG
MR3H-FC

Hydrological Services America
TBH/TBH-LP

MTX s.r.l
FAK015AA

AdolfThies GmbH&Co
KG

Precipitation Transmitter

Snow Hydro Limited
TB3

Non-Catchment type Instruments

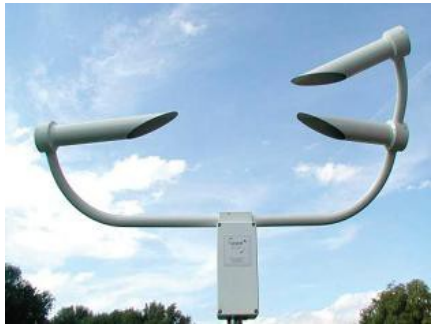
AdolfThies GmbH&Co KG
Laser Precipitation Monitor

Vaisala PWD33

OTT Hydromet GmbH
PARSIVEL2

Droplet Measurement Technologies
Meteorological Particle Sensor

YES Hot Plate



Campbell Scientific
PWS100

Snow Depth and SWE Instruments

Campbell Scientific

SR50ATH-316SS

Felix Technologies

SL300

ESW
GmbH
Jenoptik

Hydrological Services America:
Sommer GmbH & Co KG
USH-8

Snow Water Equivalent

Campbell Scientific
CS725

CryoClim (Norway)Contributions to GCW Remote Sensing of Cryosphere

- Demonstrates clearly the benefits of having services hosted by mandated agencies to provide a stable, sustainable basis for the system
- Provides inter-operability principle to support a distributed system using international protocols (e.g. WIS, INSPIRE, GEOSS)
- Emphasizes and demonstrates the benefits of common standards
- Demonstrates the importance of user engagement and keeping contact with users in delivering an operational system

CryoClim expertise and knowledge will contribute to:

- development and implementation of best practices;
- standard terminology, not only for science, but also for metadata standardization;
- methodologies for validation of products;
- documentation required to support products and their heritage, which is the basis for product intercomparison
- Contribution to the ultimate goal of defining "authoritative products" which can be compared and assessed based on standard methods and documentation

CryoClim is a national initiative providing regional and global cryosphere products and information of benefit to the global community – a successful GCW demonstration project

Challenges in International Collaboration

There are many challenges in implementing GCW:

- GCW is interdisciplinary and cross-cutting - national, regional and global in scope, addresses all time scales (NOT just climate), requires collaboration among government, academia, private sector - *HOW DO WE CUT THROUGH THE STOVEPIPES AND HARNESS THE EXPERTISE AND RESOURCES THAT EACH COMMUNITY CAN OFFER - NOT JUST NMHSs*
- Bureaucracy and rigid planning cycles at all levels slows progress
- Garnering national commitment of people and funds from different institutions
- Competition for resources often overrides collaboration
- Exchange of data and information across programmes (e.g. WMO), agencies and institutes (nationally or internationally) not necessarily done routinely
- the issue of many streams being integrated and the potential duplication of metadata as well as the risk of outdated metadata is important. Current solution is part technology and part procedures and agreements. This, together with the brokering need, is important to enable interoperability in the short and mid range.
- Overcoming the "strategic" or "commercial" designation of some cryosphere data, hence limiting exchange of data

Global Cryosphere Watch

…….CryoNet Asia is an important component of GCW