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

*Global Cryosphere Watch

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

*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

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.

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
• 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
- Meteoservis v.o.s & ZAMG
  - MR3H-FC
- Hydrological Services America
  - TBH/TBH-LP
- MTX s.r.l
  - FAK015AA
- Environmental Measurements Ltd.
  - UPG1000
- 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
CryoNet Asia is an important component of GCW