GEOCRI – GEO Cold Regions Initiative
Information Service for Cold Regions

Yubao Qiu and Co-Leads

22 - 24 May 2018
@ University of Colorado Boulder, Colorado USA
Thanks to former leading role for WA-01-03: Information Service to Cold Regions

from

Prof. Ellsworth LeDrew
Cold Regions are the most important environment that driven the Earth system and the Earth planet.

- Cold Regions: are the most important environment that driven the Earth system and the Earth planet.
- Frozen Water and Phase changing Domination Role
  - High Latitude
  - High Altitude
An **Information Service for Cold Regions** (or GEO Cold Regions), exploiting the GEOSS information system, is needed to **provide easy access to observations and environmental information products by users across the globe**.
Why GEO Cold Regions?

The cold regions of our planet influence our entire world.

Scientific and Societal Development Importance

- More than 100 countries around the world have cryospheric elements.
- These elements are a main source of fresh water.
- Cold regions are the most ecologically and environmentally sensitive areas, and changes to these areas
- Comprehensively affect the dynamic earth system, impacting many aspects of society in all parts of the world.
Environmental and Socio-Political Challenges

Specific Earth observation needs and requirements

- Climate & Weather
- Biodiversity & Ecosystems
- International Relations & Cooperation
- Sustainable Development, Indigenous Communities & Traditional Practices
- Health
- Agriculture, Fisheries, Hunting & Food
- Water
- Pollution & Environmental Protection
- Hazards
- Built Environment, Infrastructure & Transport
- Energy
- Mining & Fossil Fuels
- Forestry
- Shipping
- Tourism
Numbers for the activities arranged by Regions
(Courtesy: Internship of GEO Sec., Mr Joseph Nolan)
Aiming to coordinates global joint efforts for Earth observations and information services over a vast Cold Regions area including the North Pole, South Pole, High Latitude Ocean, Himalaya-Third Pole and Mountain Cold Regions.

- The **GEO Cold Region Initiative (GEOCRI)** is an initiated initiative in GEO XII at Nov. 2015, listed at GI-11: GEOCR Initiative, then approved formally in **GEO XIII Plenary**, Saint Petersburg, Russia.

- The AOS summit featured the GEO Cold Region Initiative(GEOCRI) that aims to identify, address and fill observational gaps and improve networks through coordinated observation practices and information services worldwide. See the **Statement on the GEO Cold Region Initiative (GEOCRI)**.
Mission: Develop a user-driven approach for Cold Regions information services to complement the mainly current science-driven effort, and foster the collaboration for improved Earth observations and information on a global scale.

Objectives

I. Integrating, Brokering and Promoting Earth Observations over Earth Cold Regions

II. Advocating and Practicing Data Sharing

III. Building Community Portal and Services

IV. Strengthening Capacity building and Partnerships
Five Tasks:

- **T1**: Infrastructures
- **T2**: Monitoring Network and Data
- **T3**: Integrating in situ and Remote Sensing Observations
- **T4**: User Engagement and Communication
- **T5**: Capacity Building and Knowledge Transfer
- **T6**: Management and Monitoring
<table>
<thead>
<tr>
<th>Task/Activity</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
</tr>
<tr>
<td>Task 1: Infrastructures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 2: Monitoring Network and Data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 3: Integrating in situ and Remote Sensing Observations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 4: User Engagement and Communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A4.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A4.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 5: Capacity Building and Knowledge Transfer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A5.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A5.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 6: Management and Monitoring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A6.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A6.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A6.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A6.4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GEOCRI Task and Implementation Plan
1) Community Portal Development – GEO CRI efforts
   - Data Management compatible to GEO DM Principle
   - GEOSS Data Infrastructure /Community Portal/Data Providers, Users
   - International body synergy (SAON/SOOS/WDS/CODATA/RDA…)
   - Earth Three Poles Interaction (Earth System/Climate adaptation/ Environmental changes)

2) Essential Variables for Cold Regions (GE CRI efforts – addressing the indicator)
   - Science Driven or Societal impact: applications for societal and economy development
   - Compatible to the existing EVs, and Indicators
   - Interface between the data and indicators for evaluation process
   - Deliverables: White paper published
   - GEO Essential for the Earth Three Poles
   - SBA: SDGs, Paris Agreement; Sendai Framework

3) Integration: In-situ, Remote Sensing, Model, and its Data Integrating
Example Networking and Collaborations
Networking: INTAROS overall objective

to develop an efficient integrated Arctic Observation System by
- extending,
- improving and
- unifying
existing and evolving systems in the different regions of the Arctic
Networking: IEEE Ad Hoc Committee on North & South Poles

Why this Ad Hoc Committee?

IEEE and GEO signed a MoU: GEO CRI is one of the priorities

Impact on transportation
Impact on Ecology
Impact on Security and Health

To identify ways in which IEEE can efficiently contribute to the different ongoing and planned initiatives to study and address changes that the North and South poles are experiencing from the environmental, communications, transportation, educational, and outreach points of view.
Networking: GEO CRI Synergy Activities

Activities Recently (with NERSC/FMI)

- The 2017 International Workshop on Observations and Understanding of Changes in High Mountain and Cold Regions (HiMAC2017) was held in Beijing, China on 3-4th, March, 2017


- DBAR HiMAC Work Meeting on 4th, March, 2017

Presented at INTAROS Meeting in Helsinki 2018
Coming events for GEO CRI
Events: GEOCRI Side Meeting at Polar2018

The side meeting will provide an introduction to the GEOCRI, including its main contributors, activities and services to end-users of cold region related Earth observation data. The meeting will especially highlight two ongoing GEOCRI activities: the development of the GEOCRI Community Portal and the Essential Cold Regions Variables.

Tuesday, 19 June 2018; 12.30pm – 2pm; Room A Wisshorn; Open meeting
Events: Participant to GEO Events 2018
Events: 2018 International Workshop on Observations and Understanding of Changes in High Mountain and Cold Regions (HiMAC2018)

Late Oct @ Sodankylä, Finland
If time is available...

go
Data Related Activities for High Asia
Data Activities for High Asia

- Propose a High Asia Data Committee (HiDCON)
- Data Publications experience for open data efforts
- Data Portal – Customized User Portal for High Mountain Asia
Proposing a Data Committee for the High Asia, addressing the data issue for the High Asia region, and to answer the Earth Cold Regions data issue (sharing/portal), and promote the information service for mountain cold regions over the Third Pole.
Snow, Ice and Environment Over the Tibetan Plateau

Guest Editor: Qiu Yubao; Liu Shiyin; Chu Duo; Li Guoqing

Glacier Dataset:
- Southeastern Tibetan glacier inventory,
- Distribution of glacier surface movements in the mountainous areas of Muztagh Ata,
- Areal changes of the Kharola Glacier in Tibet, China.

Lake Ice/Area Dataset:
- Daily lake ice phenology of 51 large lakes in the plateau region during 2002-2016 and
- Changes in the lake surface area of medium-to-large plateau lakes during 2000-2012

Snow Dataset:
- Automatically observed snow depths on the Tibetan Plateau during 2013-2016

Environment, climate and vegetation
- Extreme climate index of the Tibetan Plateau during 1960-2012,
- Regional phenology, vegetation coverage type and biomass during 2000-2015.

A New Journal: Big Earth Data
CAS-GMELT : A HMA Community Portal
CAS-GMELT: A HMA Community Portal

Concept of Community Portal

A Community Portal is “a community-focused ‘website’ that provides a human interface to content that may come from distributed resources.”

- Portals provide easy and open (free) access to data tools, and services.
- Data resources may be raw data and data products, but also metadata about observational programs, projects, and observational platforms.
- Externals access to resources and services, Externals can be humans or machines.
CAS-GMELT : A HMA Community Portal

An online Community Portal for the Observations (In-Situ, Satellite Data, Derived / Thematic Products, Re-Analysis Data), Tools/Algorithms, and Models for the research community of HMA, especially the glacier, snow, ice, and relevant water, energy and environmental data products.

To support the Research community of HMA, based on data sharing Policy and principle,

- Metadata management
- Store, Search and discovery of resources
- Harvesting remote resources - Interoperability
Design and Implementation of CAS-GMELT

CAS-GMELT Functions

- **Services**
  - Integrate both CAS-HiMAT and non-HiMAT resources (data, tools, algorithm)
  - Registration Service: Dialogue with the individual information providers.
  - Harvesting from public resources

- **Stakeholders/Users**
  - Externals can have access to its resources and services (humans or machines).

- **Interoperability**
  - Exchange with the international portals, especially the NASA-GMELT, BED …

- **Portal Management**
  - Documents/Publications Services
  - User management system
  - English/Chinese version
  - …

- **Data/Tools Resource**
  - Integrate both CAS-HiMAT and non-HiMAT resources (data, tools, algorithm)
  - Registration Service: Dialogue with the individual information providers.
  - Harvesting from public resources

- **Stakeholders/Users**
  - Externals can have access to its resources and services (humans or machines).

- **Interoperability**
  - Exchange with the international portals, especially the NASA-GMELT, BED …

- **Portal Management**
  - Documents/Publications Services
  - User management system
  - English/Chinese version
  - …
Design and Implementation of the GMELT

CAS-GMELT (Community Portal)

Home  Observation  Data  Tool  Publication  News&Event  About  Chinese  Login

Observation / Service  Data Portal  User / Data Policy
Design and Implementation of the GMELT

Data Portal: Website Elements
Design and Implementation of the GMELT Data Portal: Data Portal for Users and Providers
Design and Implementation of the GMELT

Observation: Information Service and Data Viewer

Two folders:
- Data Statistic/Big Data
- Service (Glacier/Snow/Lake...)
Thank You

Contact details:

Yubao QIU: qiuyb@radi.ac.cn
Hannele Savela: Hannele.Savela@oulu.fi