

# WP23\_25 : GEO Cold Regions Initiative

Submitted on 29<sup>th</sup> ,July([www.geocri.org](http://www.geocri.org))

Online Meeting

GEO Cold Regions

# 0. Basic Information

<b>Full title of the Initiative:</b>	<b>GEO Cold Regions Initiative</b>
<b>Short Title or Acronym:</b>	<b>GEOCRI</b>
<b>Current category in the 2020-2022 GWP:</b>	<b>New activity</b>
<b>Proposed category in the 2023-2025 GWP:</b>	<b>Pilot Initiative</b>
<b>Points of Contact and Co-Editors:</b>	<b>Yubao Qiu, qiuyb@aircas.ac.cn</b> <b>Massimo Menenti, m.menenti@tudelft.nl</b>

[GEO Work Programme 2023-2025 \(earthobservations.org\)](https://www.earthobservations.org)

This Summary Document is a compilation of overviews from the proposed Implementation Plans received by the GEO Secretariat as of **31 May 2022**.

The deadline for receiving comments is **31 August 2022**.

All Initiative can be check here.

[https://www.earthobservations.org/documents/gwp23\\_25/GWP23-25\\_summary%20document\\_v1\\_20220729.pdf](https://www.earthobservations.org/documents/gwp23_25/GWP23-25_summary%20document_v1_20220729.pdf)

# 1.1 Purpose -- Object

## Cryosphere Data Stream Services in Cold Regions through the Derived and Integrated Earth Observation Products

To facilitate the provision and standardization of satellite information products in the cryosphere-dominated cold regions to meet the needs of societies, including high elevation and high latitude cold regions.

# 1.2 Purpose--Why is the Initiative needed?

The world's cold regions, where the cryosphere and its changes characterize the Earth system and human activities, have been highly influenced by global warming in the last decades and will be ongoing to global carbon neutrality.

Its importance and driven force were described in the Conclusion and Recommendations from GEO Cold Regions Side Event in GEO X Plenary and Geneva Ministerial Summit (GEO, Switzerland, 2014), it recalls,

1. More than one hundred countries around the world have cryospheric elements.
2. Cold Regions are the most ecologically and environmentally sensitive areas, and changes to these areas comprehensively affect the dynamic Earth system.
3. A global, comprehensive Cold Regions Information Service will strengthen synergies among the activities of the Environmental, Climate, and Cryospheric communities across poles and mountain Cold Regions.
4. With its strong link to user communities, GEO is developing a user-driven (impact) approach to Cold Regions that will complement the current science-driven effort.

# 1.3 Purpose--What evidence is there to support this need?

The changing snow and ice cultivate the local and regional climate and hydrometeorological conditions that modulates the economy and societal activities.

In the last decades, more and more evidence of fast-changing snow and ice interrupting the traditional ways of life and resource supplies, e.g. water availability in the low land downstream area of HMA, new challenges, and shipping activities in the Northern Arctic Sea Routes, emerging hydrometeorological and geological disaster awareness and emergency responses in HMA and Siberia cold regions, greenness in high latitude Arctic region, infrastructure and railway stability in permafrost dominated regions, and land degradation and erosion at the coast area caused by the sea ice development, and etc.

The cold regions had their natural remote area, lack of the data calls for more shared and integrated EO data for addressing climate actions for the UN sustainable development Goals (UN SDGs).

# 1.4 Purpose--How is this Initiative unique?

The GEO Cold Regions Initiative (GEO CRI) has a strong legacy of understanding cold regions' environment through space observations, which is both relevant to GEO itself and accepted by users.

1. The Initiative will be providing high-quality information services based on high spatial and temporal resolution products to stakeholders.
2. A global, comprehensive Cold Regions Information Service will strengthen synergies among the activities of the Environmental, Climate, and Cryospheric communities across poles and mountain Cold Regions.
3. The Initiative has **been endorsed** by YOPP in 2015, and is in the process of gaining endorsements by the ISC bodies of science and GEO participant bodies, private companies of COSCO, international science programs, international research organizations, and NGOs.
4. The Initiative is about the cryosphere-dominated cold regions **world widely**, creating and maintaining information services based on the synergy of in-situ and space-borne data.

# 1.5 Purpose--Actual /intended outputs

Snow Cover	Snow Water Equivalent	Lake ice	River ice	Sea Ice
Permafrost	Frost	GLOF	Ice Jam Warning	Snow Avalanche Warning
Glacier surface flow velocity	Glacier thickness change	Glacier extent	Glacier surgery warning and adaption	Iceberg tacking
Ice Chart	Snow melt-related flooding	Rain on snow	Ice lens formation	Permafrost degradation and subsidence
Iceberg tracking Calving from the marineterminated glacier	Derived phenology in snow and ice area			

## What kinds of decisions are the outputs of this Initiative intended to support?

- Providing the assessment report on the climate actions for the SDGs ;
- Providing the snow, GLOF, ice mapping, and chart, etc., for the water availability, downstream ecosystem impact analysis, emerging risk management, even on a daily basis, and transportation on land and Northern Sea Route, such as **water availability**, and its analysis, shipping advisory, and disaster risk assessment;
- Providing the released as standard data products for at an open science basis, that others communities or stakeholder can be accessed and referenced. Capacity building to the stakeholders jointly with the users' communities.

## 2.1 Technical synopsis--Challenges need to be resolved

The challenges are mainly about the data services pattern or mechanism, demonstration of service criteria, and standard of products when the users' communities have not been fully developed.

While it is not the technique questions, the initiative will organize the task force or meeting to produce the standard, and technique (openly) for the world stakeholder, or even from the private sectors.



## 2.2 Technical synopsis--Tasks

The key tasks that must be implemented to ensure delivery of these changes, with target dates for completion.

<b>Fundamental Task (FT)</b>	<b>Expected completion</b>
Fundamental Task 1: Essential Cold Regions Variables (ECRVs) [ <b>Variables</b> ]	6/2025
Fundamental Task 2: Collections of Repository and Data Policy [ <b>Data</b> ]	6/2024
Fundamental Task 3: <b>Data criteria for service practices</b> [ <b>Service</b> ]	6/2024

  

<b>Pilot Services Practice Task (PS)</b>	<b>Expected completion</b>
Pilot Service Practice 1: Interaction on addressing the SDGs in cold regions by big data	6/2025
Pilot Service Practice 2: Information service for shipping advisory in sea ice-rich areas	6/2025
Pilot Service Practice 3: Water resource management in cold regions	6/2025
Pilot Service Practice 4: Service to the emergency disaster mitigation in cold regions	6/2025

Comments?:

# 3. Resources

## The contributing organization and its value for the Initiative

AIR-CAS:	Data, service models, and experience for shipping in Arctic Lane environment assessment	CBAS:	Data, and method for the massive data processing on the river, lake and sea ice: sea ice melting ponds, lake ice phenology, river ice fraction, and melting ponds
INAR:	Data Center and projects (like: iCUP)	NIPR:	Data Center
NESDIS/NOAA:	Data Center	CCIN/PDC:	Data Center
NEXTGEOSS:	Data Hub	PRIC:	Polar Data Center
NERSC:	Data	DLR:	Earth observation center
IPPA:	Users engagement	Third Pole Program :	Data
NIEER:	Observation, modelling, and synthesis reports on the Arctic cryosphere and vegetation	AGRS:	Data and tools for the climate changes, water, and disaster mitigation in HMA and Arctic regions
CBAS:	CASEarth Program data center	RADI:	EO Data Center
NIEER;	Cryospheric Data Center	RCEECA:	Data and projects

# 5. Stakeholder engagement and capacity building

**The countries or organizations that your Initiative would like to engage and your plans to engage them:**

WMO (we already have a meeting in July for exchanging the development), Pakistan, ICIMOD, and CIS are possible; Remote meeting and get the data tag and open sharing.

**The Initiative's approach to engaging users:**

Have fewer meetings with stakeholders, and develop the potential user's engagement.

**The user categories or regions:**

Climate actions body, private sectors on data processing, and shipping company.

**The plans for further engagement of users in the Initiative:**

Users and stakeholder meeting.

**The approach to capacity development that is being implemented by the Initiative:**

Did not plan at this moment, but while will make connections with existing summer school and other activities.

# 5. Stakeholder engagement and capacity building

## **The opportunities for commercial sector uptake of the outputs of the Initiative :**

Commercial companies are welcome to have a development co-design and co-produce.

## **The nature of this uptake and the relevant commercial sector organizations :**

The private sector can provide the resource, while needs to consider helping the resource mobilization, while this needs some stratagem plan on the private development.

## **The opportunities for further commercial sector participation in the Initiative :**

Need to have some exchange of this initiative. The stakeholder, such as the shipping and energy company and data providing company are welcome for that.

# 6.1 Governance -- The Advisory Committee

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Name	Organization
Ellsworth LeDrew	F.IEEE, F.CASI, Distinguished Professor Emeritus, University of Waterloo, Canada
Huadong Guo	Director General, International Research Center of Big Data for Sustainable Development Goals (CBAS); ISDE
Barbara Ryan	Director to WGIC
Wenjian Zhang	WMO
Hajo Eicken	International Arctic Research Center, University of Alaska Fairbanks, Fairbanks, Alaska

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Please add more ... advice!

**Function:** The Advisory Committee (AC) is GEOCRI's counselling and recommendation body. It helps to share and develop the GEOCRI vision and align the activities with the GEO Plenary.

## 6.2. Governance -- The Co-lead Team

Name	Organization	Role
Xiao CHENG	Sun Yat-sen University, China	Col
Hiroyuki Enomoto	NIPR/AERC, Japan	Col
Jeff Key	NOAA/NESDIS, USA	Col
Hanna K Lappalainen	PEEX/University of Helsinki, Finland	Col
Xin Li	ITP-CAS, China	Col
Massimo Menenti	Delft University of Technology, The Netherlands	Col/Poc
Yubao QIU	CBAS/AIR-CAS, China	Col/Poc
Stein Sandven	NERSC, Norway	Col
Vito Vitale	CNR, Italy	Col

*\* PoCs are also the main and co-editor to the new GEOCRI WP for 2023-2025.*

**Function:** Co-lead Team (PoC) is the Steering Committee for GEOCRI, for providing the implementation functions, and lead the tasks, or providing different resources to this initiative, like in-kind or projects.

# 6.3 Governance--communicate

What methods does the Initiative use to communicate with its participants?

- Email communication/e-newsletters: regularly co-lead calls.
- Regular conference calls: co-organize the meeting.
- Website: [www.geocri.org](http://www.geocri.org)
- Regular events: Planning:
- Others: Twitter ([https://twitter.com/geo\\_coldregions](https://twitter.com/geo_coldregions)) Linked In account

# 6.3 Governance--The key risks or obstruct

Description of the hazard	Description of the possible impacts	Scale of impact	Likelihood of occurrence
Human Resource shortage	Labor hours need to be secured.	Moderate	Possible
Engagement strategy	Engagement with other communitis	Limited	Not very likely

Comments:



# 7. Participants

## The active individual participants in the Initiative and their organization

**Xiao Cheng:**  
Sun Yat-sen University

**Hiroyuki Enomoto:**  
NIPR

**Jeff Key:**  
NOAA

**Hanna Lappalainen:**  
PEEX/University of  
Helsinki

**Ellsworth LeDrew:**  
F.IEEE, F.CASI,  
Distinguished Professor  
Emeritus, University of  
Waterloo

**Xin Li:**  
CAS

**Massimo Menenti:**  
TU Delft

**Yubao Qiu:**  
CBAS

**Stein Sandven:**  
NSERS

**Vito Vitale:**  
CNR-Institute of Polar  
Sciences (ISP)

**Andreas Dietz:**  
DLR

**Jiancheng Shi:**  
CAS

**Daqing Yang:**  
CAS

**Bente Lilja Bye:**  
BLB

**Peter Pulsifer:**  
University of Calgary

**Tonghua Wu:**  
NIEER

**Lanhai Li:**  
CAS

**Chen Ding:**  
IPPA/Star Cruise

**Douglas Cripe:**  
GEOSEC

**Lizong Wu:**  
PRIC

**Fengming Hui:**  
Sun Yat-sen University

**Jinghui Fan:**  
AGRS

**Shiyong Liu:**  
Yunnan University

**Masaki Kanao:**  
NIPR

Comments: ? Inviting people...

# Thank you

Contact:

[www.geocri.org](http://www.geocri.org)

[https://twitter.com/geo\\_coldregions](https://twitter.com/geo_coldregions)



Communicate and Collaborate with GEO:

