

Statement on the GEO Cold Region Initiative (GEOCRI)

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More than one hundred countries around the world have cryospheric elements, where frozen water in various forms dominates the earth's changing systems. These are the "Cold Regions" that include the Arctic, Antarctic, high-latitude oceans, the Himalaya-Third Pole region, high-altitude alpine (mountain) areas, and even some parts of the mid-latitudes. They are the most ecologically and environmentally sensitive areas to global and regional environmental change. The changes to these areas comprehensively affect the dynamic Earth system, impacting many aspects of society in all parts of the world. Recent scientific research is making it increasingly clear that "What happens in the poles doesn't stay in the poles"[1, 2, 4].



GEOCRI sketch scheme: An Arctic focus with its main networks

The Group on Earth Observations (GEO) was launched in response to calls for action by the 2002 World Summit on Sustainable Development, which recognized that international collaboration is essential for exploiting the growing potential of Earth observations to support decision making in an increasingly complex and environmentally stressed world.

†This statement was based on the GEO Cold Regions Initiative proposal to the GEO XII Plenary, the authors listed above drafted this statement. Contact: Yubao Qiu, qiuyb@radi.ac.cn, and Dominique D. Béro, dberod@geosec.org.

GEO aims to build a comprehensive Global Earth Observation System of Systems (GEOSS). A dominant feature of the Cold Regions is frozen water in its various forms, which is relevant to GEOSS through its Water, Ecosystem, Biodiversity, Health, Energy, Disaster, Climate, Weather, and Agriculture societal benefit areas.

With its strong link to user communities, GEO is developing a user-driven approach to Cold Regions that will complement the current science-driven effort [4]. A global, comprehensive Cold Regions Information Service will strengthen synergies among the activities of the Environmental, Climate, and Cryospheric communities. In particular, it will support the efforts of scientists, experts and decision makers to ensure the sustainability of these environmentally stressed areas in an increasingly complex political and economic context.

The GEO Cold Region Initiative (GEOCRI) is an emerging initiative that aims to identify, address and fill observational gaps and improve networks through coordinated observation practices and information services worldwide. Its goal is *“Promoting Earth observations data sharing and cooperation, enabling improved information services for the inter-continent cold regions, informing the stakeholder and decision makers”*.

GEOCRI’s vision, objectives and actions are to,

- Build a global **network** to archive, manage, and provide access to in-situ and remotely-sensed earth status data (especially the Cryosphere, Ecosystem/Biodiversity, Environment, etc.) and social and economic data for monitoring the global cold regions through appropriate national, regional and global systems, centres and programs.
- Provide sustained observations and information **exchange mechanism**, advocate open data policy, and free access to the earth observations data over Earth’s Cold Regions, enhance the interoperability capacity between the existing and emerging international distributed data sharing networks.
- Establish a **proactive framework** for the development of information and related services, the Global Cold Regions Community Portal, to underpin the Global Earth System of Systems implementation by expanding the outreach of, and maximizing synergies among, thematically wide GEO activities and thematically deep participant activities, thereby exploiting their complementary roles.
- Strengthen the **partnerships and synergies** with scientific communities, policy-makers, stakeholders, and funders over the cold regions’ ecological and engineering fields to address the fragile ecosystem and environmental challenges and societal influences, and improve the public awareness through the capacity building.

Under the GEO umbrella, GEOCRI is open to participation by existing international organizations and networks, national and international programmes, national and regional GEOSS, individual projects and experts, observation stations and facilities, and the private sectors. Participation is voluntary. A comprehensive list of contributions is given in Table 1.

Table 1: GEO Cold Regions Partnership (Qualitative Rating)

GEO Cold Regions Partnership (Qualitative Rating)														
Catg.	Dimension	GEO Cold Regions	GEOP AEGIS	GCW/WMO	INTERACT	PEEX	Polar View	PSTG/WMO	SAON	SIOS	SOOS	TPE	SwissEX	Other National Projects
Geographic area	Global													
	Regional													
	Arctic													
	Svalbard													
	Antarctic													
Themes	TP (Third Pole)													
	Mountains													
	Cryosphere													
	Ecosystem													
	Environment*													
Obs.	Biodiversity													
	Others (WA/CL/HD/AG, etc.)													
	Space Observations													
	In-Situ													
	Model (Simulation)													
Functions	Implementation													
	Coordination													
	Network													
	Information (Data Portal)													
	Services													
	Capacity Building													
	Resource Mobilization													
	User Engagement													
* Environment: comprehensive sets, eg. Black Carbon, Atmosphere and etc. WA: water														
* Qualitative Rating based on the mandate, there is no any comparison with each other														
* Coordination : managerial function to making different people or things work together														
* Capacity Building : approach to development that focuses on understanding														
<div style="display: flex; justify-content: space-between;"> Intl. Program/projects National Program/Projects </div>														

(Dec, 2013)

Through GEO's members and its platforms, the Plenary and Ministerial Summit, GEOCRI raises awareness and overall requirement, and provides support to individuals and programs for resource and financial mobilization at a national or international level.

Partner contributions to GEOCRI for the near-term include the Second Asia Global Cryosphere Watch (GCW) CryoNet Workshop in Russia and the Second South America CryoNet Workshop; SAON's sustained documentation and data activities; SIOS implementation on a full-fledged establishment of the knowledge centre in Longyearbyen in 2016; capacity building for research and in-situ observations throughout the pan-arctic station network INTERACT; launching a comprehensive PEEEX metadata collection and building a Modelling Demo; activating the "metadata elements" project of the IASC/SAON Arctic Data Committee in 2016, which is to identify the minimal set of metadata fields to facilitate automatic interoperability between polar data centers and repositories around the world by Canadian Cryospheric Information Network/Polar Data Catalogue; establishment of flagship stations within the Third Pole region for observation and monitoring through Third Pole Environment (TPE); harmonizing and collecting observations in Greenland and surrounding waters by Denmark; compiling the ESA – MOST Dragon 4 Hydrology and Cryosphere Theme; improvement to the Italian Arctic Data Centre (portal of the Italian research activities); improving the Snow Observations over Tibetan Plateau (SOTP); improving the Cryosphere Monitoring Programme (CMP) and Cooperative Research Activities (CRA) of the Arctic Observing and Research for Sustainability and of the Mountains as Sentinels of Change; promoting the joint observations of ocean, land and atmosphere in the Arctic region and promoting Arctic Data Archive System (ADS) by Japan, and the project "Modelling Freeze-Thaw Processes with Active and Passive Microwave Observations" (SAMP Freeze/Thaw) supported by the Netherlands Organisation for Scientific Research; enhancing the Ny Alesund observation super-site in the Arctic; launching a Chinese cubesat named TW-1A for polar sea ice observation (has been launched at Oct., 2015); promoting a Chinese Water Cycle Mission (WCOM) by China; (*Note: All the contributions are listed in the new work programme 2016-2025, version 3.0*)

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Appendix I: List to co-authors and their affiliations

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