

INDIA'S ENGAGEMENT WITH ARCTIC COUNCIL

December 2016

The Arctic Region is of special importance to India due to its critical role in governing global climate, sea level, and biodiversity. The Arctic Region is a 'driver' of the tropical climate since several studies have established a connection between the arctic region and the intensity of the monsoon in India which has a direct bearing on the Indian agriculture sector and economy. India has continued to engage actively with the Arctic Council since it joined as an Observer State in May 2013.

Background of India's Interest and Capabilities in Polar Research and the Arctic

- i. Collaboration in enhancing scientific knowledge and technological capabilities is among the primary motives of India's interest in working with the Arctic Council. India's experience with glaciological and other areas of research in the Himalayas and through permanent research stations in both Arctic and Antarctic are aimed at improving our understanding of distant but inter-linked climate forces that affect us all.
- ii. India's Antarctic program, which commenced in 1981, has accumulated a rich experience of more than three decades on scientific research in the Antarctic including through 31 scientific expeditions so far. India is among the few countries in the world to have multiple permanent bases in Antarctica (*the first station in 1983*). In the year 2010, India mounted a successful scientific expedition to the South Pole as well.
- iii. India is a stakeholder in Arctic since 1920, when it signed Svalbard treaty. India launched its first scientific expedition to the Arctic Ocean in 2007 and opened its first permanent research station on the Arctic in 2008. Located at Ny Alesund, Svalbard Area in Norway, and called the '*Himadri*', the research station focuses on polar scientific research including geological mapping and allied earth science studies, bio-geochemistry of sea-ice ecosystems, atmospheric physics and chemistry, glaciological studies and paleoclimate.
- iv. Till date, over 120 Indian scientists from 18 national institutions, organizations and universities have participated in the Indian Arctic Programme. The NCAOR (National Centre for Antarctic and Ocean Research), established in 1998 that works under the Ministry of Earth Sciences, takes the lead in launching multiple scientific expeditions to the Arctic every year. The NCAOR is equipped with a polar R&D lab including a low temperature laboratory complex at -25°C for the preservation and analysis of ice core and snow samples, not only from the Polar regions but also from Himalayas.
- v. Indian scientists have published various scientific publications in internationally peer-reviewed journals on Arctic issues.
- vi. India is an active participant in relevant Arctic science fora and committees.
- vii. In 2008, India launched a dedicated Mission on 'Sustaining the Himalayan Ecosystem' as part of its National Action Plan on Climate Change.

India's participation in the activities of the Arctic Council:

- i. India appointed its **Special Representative/Senior Arctic Official (SAO)** to the Arctic Council in July 2013.
- ii. India participated in the following **SAO Meetings** of the Arctic Council :

Whitehorse	October 2013
Yellowknife	March 2014
Yellowknife	November 2014
Whitehorse	March 2015
Anchorage	October 2015
Fairbanks	March, 2016

India's continuing and expanded relevant scientific and research activities:

- i. India's *Himadri* research station (located at Ny Alesund, Svalbard) was manned from 13 June - 31 October 2016 with 28 researchers. *Himadri*, which was established in July 2008, focuses on polar scientific research covering the major themes of biological, glaciological and atmospheric sciences. Till date over 200 researchers from several national institutes, universities and colleges have accessed the facilities at Ny-Ålesund with base support from the *Himadri* station. For the last 3-4 years, *Himadri* has been manned from March to November on an average for over 175 days/year.
- ii. In June 2016, India redeployed **IndARC**, a subsea multi-sensor moored Observatory in the Kongsfjorden, the third time since 2014 when it was first deployed. IndARC is programmed to collect sea truth data at close temporal scales even during the harsh Arctic winter. Indian scientists have been monitoring Kongsfjorden since 2010.
- iii. Measurements of atmospheric aerosols and black carbon have been an integral part of India's atmospheric science studies since 2007. A dedicated atmospheric observatory at Gruvebadet in Ny-Ålesund has been established. Mass balance studies of one of the glaciers of Ny-Ålesund (Vestre Broggerbreen glacier) have been initiated by Indian scientists, as a prelude to a long-term programme.
- iv. For the year 2016-17, India is considering proposals for initiating scientific research at the Ny-Ålesund research base in the following focus areas:
 - a. Atmospheric Science with special reference to study of aerosols, trace gases and precipitation over the Arctic
 - b. Marine Science: Dynamics and functioning of Arctic fjords (Kongsfjorden)
 - c. Environmental Chemistry: Natural contaminants in food webs and long range pollutants
 - d. Cryospheric studies: Snow and ice chemistry, glaciology
- v. A list of ongoing projects undertaken at Ny-Ålesund, Svalbard is placed at Annex-I.

- vi. A list of research papers/publications by Indian scientists/researchers in 2016 is at Annexe-II
- vii. Preparations are underway for formulating the logistic needs of the winter batch of Indian scientists and researchers scheduled to reach Ny-Ålesund by the last week of March 2017 to carry out glacier mass balance studies and characterization of aerosols. India is also exploring the possibility of the participation of the Indian Meteorological Department in the upcoming programs of the Arctic Council, especially for the betterment of the indigenous population of the Arctic Region.

India's continuing S&T collaboration with Arctic Council Member States and Observer States:

- i. India has longstanding political and economic relationships with the Arctic states individually, including through trade and investment linkages, S&T collaboration and research.
- ii. India is also an active participant in the various UN and other international platforms for addressing global issues of common concern, including trade, scientific cooperation, climate change, biodiversity, sustainable development and disaster risk reduction.
- iii. Some recent instances of collaboration with Arctic member states on polar research include participation in the VI International Meeting of the Arctic Council Member-States, Observers and Representatives of the academic community in August 2016 aboard Russian icebreaker, a joint Workshop with Norway (November 2013), Seminar with Denmark (November 2014), understanding on scientific cooperation on Arctic region with Russia (December 2014).

SUMMING UP

India takes this opportunity to thank all the Arctic Member States and the Permanent Participants for making it a part of the Arctic Council family.

Polar scientific research is a national priority for India.

India has both the political willingness as well as financial ability to support the work of the Arctic Council.

India stands ready and willing to work and collaborate closely with all the Member States, Permanent Participants and other Observers of the Arctic Council to contribute effectively towards the work of the Arctic Council.

Ongoing projects in the Arctic Region by Indian institutions/universities

Sl. No.	Project (Institutes)
1	Monitoring of Arctic clouds precipitation (ESSO-NCAOR)
2	Characterization of Polar Aerosols: Source processes and climate impacts. (SPL, VSSC)
3	Paleoenvironmental reconstructions of the Late Pleistocene deposits of Kongsfjorden in the Svalbard region, based on a multi-proxy approach. (Jadavpur University and ESSO-NCAOR)
4	Multi proxy study of late Quaternary Palaeoclimate with emphasis on marine and terrestrial palynomorphs. (BSIP)
5	Sedimentological and Geochemical Investigations of surface and subsurface sediments from lakes, Krossfjorden and Kongsfjorden system, Svalbard- paleoclimatic implications. (Goa University and MoES)
6	Quaternary climate change and sedimentation Pattern in Ny-Ålesund area, Svalbard. (GSI)
7	Biochemical Evaluation and Biomarker Characterization from Arctic Fjord Sediments (KUFOS)
8	Benthic Studies of Kongsfjorden, West coast of Spitsbergen, Svalbard (Ravenshaw, Pondichery and Andhra Universities)
9	Functional diversity of Heterotrophic Bacteria in the water column and surficial sediments of Kongsfjorden with special reference to those involved in carbon cycle. (CUSAT)
10	Long Term Environmental Monitoring of Fjord Ecosystems, Ny-Ålesund. (M.G.University)
11	Impact of glacial runoff and associated Arctic freshening on Microbial community structure: A case study in Kongsfjorden. (CUSAT)
12	Soft bottom Meiobenthic fauna as proxies of the Functional character of selected Arctic fjords. (CUSAT)
13	Study of Zooplankton ecology and Planktonic food web dynamics in Kongsfjorden (using in-situ and satellite oceanography Techniques). (CMLRE)
14	Primary productivity and Bio-optical studies for understanding dynamics Kongsfjorden and Krossfjorden fjord during summer. (ESSO-NCAOR and IIT-Chennai)

15	Mass balance and dynamics of selected glaciers of Spitsbergen, Svalbard. (ESSO-NCAOR, IIG-Mumbai and Jawaharlal Nehru University)
16	Understanding ice dynamics of the Arctic using data from Indian remote sensing satellites. (SAC)
17	Long –term Monitoring of Kongsfjorden system of Arctic region for climate change studies. (ESSO-NCAOR)

Publications/Research Papers by Indian Scientists in 2016 on Arctic

1. Dharmaprakash A, Reghunathan D, Sivakumar KC, Prasannakumar M, Thomas S. 2016. Insights into the genome sequences of an N-acyl homoserine lactone molecule producing two *Pseudomonas* spp. isolated from the Arctic. *Genome Announc* 4(4):e00767-16. doi:10.1128/genomeA.00767-16.
2. R Venkatesan, K P Krishnan, M Arul Muthiah, B Kesavakumar, David T Divya, M A Atmanand, S Rajan and M Ravichandran. 2016. Indian moored observatory in the Arctic for long-term in situ data collection. *The International Journal of Ocean and Climate Systems* 2016, Vol. 7(2) 55–61.
3. Kumar V, Tiwari M, Nagoji S, Tripathi S. Evidence of Anomalously Low $\delta^{13}\text{C}$ of Marine Organic Matter in an Arctic Fjord. *Scientific Reports*. 2016;6:36192. doi:10.1038/srep36192.
4. Singh S M, Tsuji M, Gawas-Sakhalkar P, Maarten J J E Loonen, Tamotsu Hoshino (2016). Irid feather fungi from Svalbard Arctic. *Polar Biology* 39: 523. doi:10.1007/s00300-015-1804-y
5. M Ashokan, G Latha , A Thirunavukkarasu , G Raguraman , R Venkatesan (2016). Ice berg cracking events as identified from underwater ambient noise measurements in the shallow waters of Ny-Ålesund, Arctic. *Polar Science*. <http://dx.doi.org/10.1016/j.polar.2016.04.001>.