

THE PEOPLE

The Speakers/Panelists*

**arranged session wise*

SaGAA OPENING REMARKS



Dr Rasik Ravindra
Former Director
National Centre for Polar
and Ocean Research, Goa

Dr Rasik Ravindra is the current Chairman of Research Advisory Committees of NCPOR, the Society of Earth Scientists (of India) and the INSA -SCAR National Committee. He is also the Senior Vice President of LIGHTS and an Expert Member of the Committee on Antarctic Governance and Environmental Protection (CAG-EP). He held the position of the Director of NCPOR (2006-2012) after relinquishing the post of Deputy Director General in GSI in 2005. Dr Ravindra participated in Indian Expedition to Antarctica in 1987-1988 for the first time and subsequently led Ninth Antarctic Expedition in 1989- 1991, revisiting the icy continent in 1996-1997, 2003-2004, 2007, 2009, and 2010 in various capacities for specific assignments, contributing to different facets of Antarctic science, logistics and policy. He led the first Indian Expedition to the South Pole in 2010 and the first Indian Arctic Expedition in 2007. Dr Ravindra was Chairman of the DST constituted Program Monitoring Committee on Dynamics of Himalayan Glaciers (2007-2012) and was appointed Chair, Panikkar Professor, in October 2012 by MoES. He has served as an elected Member of the UN Commission on Limits of Continental Shelf for the 2014-2017 Term and Secretary General of 36 th International Geological Congress (2019-20). He has received the SCAR Medal for International Coordination, the National Award for Polar Sciences and Cryosphere-2013, the National Mineral Award-1990, the Antarctic Award-2002, H. N. Siddiqui Gold Medal from IGU in 2011, Prof Prem Bahadur Verma Memorial Lecture Award, Prof R C Mishra Memorial Gold Medal 2017, Life Time Achievement Award from Paleontological Society of India, and Dr W D West Oratory Award, 2018.



Padma Shri Dr P S Goel

Raja Ramanna Chair Professor
Indian Space Research
Organisation, HQ, Bangalore

Dr P S Goel is a distinguished Indian space scientist and technologist who has made pioneering contributions to India's satellite technology, and created Ministry of Earth Sciences. He earned his B.E. in Electrical Engineering from the University of Jodhpur, M.E. in Applied Electronics and Servomechanism from the Indian Institute of Science, Bangalore, and a Ph.D. from Bangalore University. Joining ISRO at its nascent stage, he developed the Satellite Attitude Control System, and contributed to missions including Aryabhata, Bhaskara I & II, Rohini, APPLE, IRS, INSAT-2, TES, and Space Recovery Experiment (SRE) satellites. He served as Project Engineer (AOCS) for APPLE, Associate Project Director (INSAT-II), and Director, ISRO Satellite Centre (1997–2005). He was also Member of Space Commission. As Secretary, Department of Ocean Development, he transformed it into the Ministry of Earth Sciences (MoES), becoming first Chairman Earth Commission, and led landmark initiatives such as India's Tsunami Warning System, IMD modernization, and deep ocean exploration. He later served as Chairman, RAC-DRDO, President, INAE, Member National Security Advisory Board, Vice President, Aeronautical Society of India, and Vikram Sarabhai Distinguished Professor, ISRO. A Padma Shri awardee (2001), Dr. Goel is a Fellow of INSA, IASc, NASI, and TWAS, and currently serves as Hon Distinguished Professor at NIAS, and Honorary Distinguished Professor at ISRO HQ, chairing key committees for Chandrayaan-2, Gaganyaan, and the Manned Submersible Mission of MoES.



Dr B Meenakumari
Former Chairperson
National Biodiversity
Authority, Chennai

Dr B Meenakumari, is former Chairperson of the National Biodiversity Authority, is a distinguished marine biologist and one of India's leading fisheries scientists. Prior to joining the NBA, she served as Deputy Director General (Fisheries) at the Indian Council of Agricultural Research (ICAR), New Delhi—becoming the first woman scientist to hold this prestigious position. With over 38 years of service in ICAR, she also served as Director of the Central Institute of Fisheries Technology (CIFT), Cochin, where she had earlier led the Division of Fishing Technology and worked in various capacities as Scientist, Senior Scientist, and Principal Scientist. Her extensive research spans the development of advanced fishing gear for coastal and deep-sea operations, conservation of fishery resources, responsible and eco-friendly fishing methods, reservoir gear upgradation, remote sensing and PFZ validation, pollution monitoring, environmental impact assessment, and studies on marine corrosion and biofouling. Author of over 200 research publications, Dr. Meenakumari has been widely recognized with honors including the Young Scientist Award of Kerala Science & Technology, Women and Technology Innovation Award, PanjabRao Deshmukh Agricultural Scientist Award, VASVIK Award, Marie Curie Mahila Vijnana Puraskar, Dr. M. S. Randhawa Memorial Award, and the Society of Fisheries Technologists Award. Her thesis on "Innovations in Fishing Technology" was awarded DSc by the Vidyasagar University, West Bengal. Currently she is pursuing initiatives in societal applications in fisheries research and committed to conservation of the bioresources and its sustainable use in the country.



Dr Mukul Das
Director
Shriram Institute for
Industrial Research

Dr Mukul Das currently the Director of the Shriram Institute for Industrial Research in Delhi. He brings a wealth of expertise in Food Toxicology, Nanotoxicology, Carcinogenesis, and Xenobiotic Metabolism. For several consecutive years, he has been recognized in the prestigious Elsevier-Stanford list of the world's top 2% scientists. Dr. Das played a pioneering role in investigating and mitigating some of the public health crises in India: the argemone oil contamination in

cooking oil; the tragic child fatalities linked to empty stomach litchi fruit consumption at Muzaffarpur, Bihar; and association of children death to *Cassia occidentalis* seeds in Saharanpur, UP. His impactful research has significantly advanced public health and food safety standards. He has authored more than 300 scientific papers and has more than 7 patents to his credit. Under his leadership, the Shriram Institute has expanded its research and development initiatives, while enhancing its analytical and technical services for industrial sectors. With state-of-the-art facilities and Dr. Das's visionary guidance, the institute continues to reach new heights of excellence.



Prof. B. S. Balaji
Dean, School of
Biotechnology
Jawaharlal Nehru
University, New Delhi

Prof. B. S. Balaji is a distinguished biotechnology researcher and educator at the School of Biotechnology, Jawaharlal Nehru University (JNU), with over 24 years of academic and industrial experience. Holding an M.Sc., Ph.D., and an MBA in Technology Management, he specializes in radiopharmaceutical gene targeting, solid-phase peptide and peptide nucleic acid (PNA) chemistry, dendrimer synthesis, and both homogeneous and heterogeneous catalysis. His research spans interdisciplinary frontiers—from molecular imaging for cancer to the design of nanoparticles, aptamers, and metallo-dendrimers. Prof. Balaji is deeply committed to advancing science education in India. He has developed major SWAYAM MOOCs in Organic Chemistry, which have collectively attracted around 30,000 enrollments over the past few years and have been translated into eight Indian languages to enhance accessibility. His Arctic MOOC, launched in 2025, has also received significant engagement with around 5,000 enrollments. Additionally, he has developed several courses for the SWAYAM Prabha TV channel, which have accumulated more than 100,000 (1,00,000) views, reflecting his impact on nationwide STEM outreach. His dedication to inclusive education is evident in his development of 3D-printed, tactile STEM teaching tools, including Braille-enabled molecular models for visually impaired learners. In recognition of his pedagogical excellence, Prof. Balaji received the Association of Chemistry Teachers' P. R. Singh Award (2021) and the Making India Employable Award. He has also held prestigious fellowships, including the CSIR Senior Research Fellowship, the COE Postdoctoral Fellowship at Hokkaido University, and a Research Fellowship under the NIH ICMIC P50 Grant in the USA.



Dr K V George
Chief Scientist
CSIR – National
Environmental Engineering
Research Institute
(CSIR-NEERI)

Dr K V George is a Chief Scientist at the CSIR – National Environmental Engineering Research Institute (CSIR-NEERI) in Nagpur, where he has devoted over three decades to environmental research and policy-relevant science. He holds a B.E. in Civil Engineering and an M.E. in Environmental Engineering from the Government Engineering College, Jabalpur, Ph.D. in Environmental Engineering from IIT Delhi. With more than 35 years of experience at NEERI, Dr. George leads critical work in air pollution control, including air quality monitoring, emissions inventory, dispersion modelling, receptor modelling, and meteorological data analysis. As part of his leadership, he also heads the Air Pollution Control Division. He has authored a number of peer-reviewed publications and is currently supervising two doctoral research scholars. In addition, Dr. George is recognized as a QCI-NABET Functional Area Expert in air quality and air pollution – underscoring his impact on regulatory and policy frameworks. Dr. George plays a vital role in national-level studies, like technology evaluation of coal gasifiers of Morbi, the need of SO₂ emission reduction needs of Indian coal based thermal power plant, air assimilative capacity based stack height. Dr. George was a member of Indian Antarctica Expedition in 2000 for research work at MAITRI Station and spent 3 months at Antarctica.



**Ambassador
Pankaj Saran**
Member National Security
Advisory Board, Govt. of
India, New Delhi

Ambassador Pankaj Saran is the Convenor of NatStrat, a Delhi-based independent Center for Research on Strategic and Security Issues, and a commentator and consultant on security and strategic issues. He is a former diplomat with four decades of experience in foreign, strategic, and national security affairs. Ambassador Saran has served in different capacities within the Prime Minister's Office, the NSCS, the MEA, and Indian Missions abroad. He has served as Ambassador of India to Russia, High Commissioner to Bangladesh, and Head of the Northern Division in the Ministry of External Affairs dealing with Nepal and Bhutan. From 2018 to 2021, Ambassador Saran served as the Deputy National Security Adviser for Strategic Affairs, dealing with regional and global strategy formulation, maritime security, Arctic affairs, and India's neighbourhood. He has written for The Times of India, Hindustan Times, and The Economic Times, among other newspapers and journals. He is Currently Member of the National Security Advisory Board.



Amb. Sibi George
Secretary (West), Ministry
of External Affairs

Ambassador Sibi George is the Secretary (West) at the Ministry of External Affairs, Government of India. A distinguished diplomat of the 1993 batch of the Indian Foreign Service, he has previously served as India's Ambassador to Japan, Switzerland, The Holy See, The Principality of Liechtenstein, Kuwait, and the Republic of Marshall Islands. His diplomatic career began in Cairo as Political Officer, followed by assignments in Doha as First Secretary handling Consular, Community, Information and Media affairs, in Islamabad as Political Counsellor, and in Washington D.C. as both Political and Commercial Counsellor. He also served as Deputy Chief of Mission in Indian Missions at Tehran and Riyadh. At the MEA headquarters in New Delhi, he has worked in the East Asia Division, coordinated the India-Africa Forum Summit, and headed the Administration, Establishment, and Welfare Divisions. In recognition of his exemplary service, he received the S. K. Singh Award for Excellence in the Indian Foreign Service in 2014. Hailing from the Podimattam family of Pala in Kottayam district, Kerala, Ambassador George is a gold medallist in both graduation and post-graduation, and an alumnus of the American University in Cairo. He has undergone professional training at LBSNAA

Mussoorie, SSIFS New Delhi, IIM Ahmedabad, IIM Bengaluru, IIFT New Delhi, and ISB Hyderabad. He is married to Joice John Pampooorethu, an artist, and they have two daughters, Elhita Thampuran and Ayilya Thampuran, and a son, Jeff Vakhan Thampuran.



Dr M Ravichandran
Secretary
MoES, Govt. of India

Dr M Ravichandran, a distinguished physicist and seasoned earth scientist, is serving as the Secretary to Government of India in the Ministry of Earth Sciences (MoES) since October 2021. With an illustrious career spanning over polar research. Beginning his scientific journey at Indian Institute of Tropical Meteorology (IITM), Pune (1988–1997), he subsequently advanced ocean observation at National Institute of Ocean Technology (NIOT), Chennai (1997–2001), and oceanographic research at Indian National Centre for Ocean Information Services (INCOIS), Hyderabad (2001–2016). As Director of National Centre for Polar and Ocean Research (NCPOR), Goa (2016–2021), he strengthened India's scientific and strategic presence in the Arctic and Antarctic through initiatives in long-term climate observation, glaciology, and polar ecosystem monitoring. His research interests encompass atmospheric physics, ocean dynamics, polar sciences, and ocean observing systems, reflected in over 160 peer-reviewed publications with more than 7,600 citations. Internationally, Dr. Ravichandran has served as Vice-President of Scientific Committee on Antarctic Research (SCAR, 2018–2022), Council Member of International Arctic Science Committee (IASC, until 2022), Co-Chair of Indian Ocean Panel of GOOS/CLIVAR, and member of International Argo Steering Team and the SIBER program. He continues to lead India's national coordination of Arctic and Antarctic expeditions, advance research on ice-sheet melting and ocean–atmosphere coupling, and guide interdisciplinary studies aligned with the Ministry's Arctic Policy and Antarctic initiatives, reinforcing India's role in global polar and climate science.



Dr Shailesh Nayak
Director
National Institute of
Advanced Studies,
Bengaluru

Dr Shailesh Nayak is the Director of National Institute of Advanced Studies (NIAS), Bengaluru, Editor-in-Chief of the Journal of the Indian Society of Remote Sensing, and Life Trustee of India International Centre, New Delhi. He previously served as Chair, Earth System Science Organisation (ESSO) and Secretary, Ministry of Earth Sciences (MoES), Government of India (2008–2015), and as Chancellor of TERI School of Advanced Studies, Delhi. His leadership strengthened India's initiatives in climate science, weather services, polar and ocean sciences, geoscience, and ocean technology. Holding a Ph.D. in

Geology from M.S. University of Baroda (1980), Dr. Nayak began his career at ISRO's Space Applications Centre in 1978, getting to hold the position of Director – Marine and Water Resources, where he led projects on ocean colour, coastal management, glaciers, and water resources, contributing to India's Coastal Regulation Zone policies. As Director of INCOIS (2006), he established the Indian Ocean Tsunami and Storm Surge Early Warning System and developed Marine GIS, enhancing services on fishing zones, ocean forecasts, and the Indian Argo project. His research focuses on the blue economy, sustainable development, and science diplomacy. He serves on Governing Boards of In-Space, the Foundation for Ecological Security, and National Centre for Sustainable Coastal Zone Management, and chairs several national scientific committees. A Fellow of multiple national and international academies, Dr. Nayak has received the Padma Shri (2024), IGU Hari Narain Lifetime Achievement Award (2013), ISCA Vikram Sarabhai Memorial Award (2012), and Bhaskara Award (2009). He has over 190 publications and 200 invited lectures worldwide.



**Dr Sulagna
Chattopadhyay**

President, SaGAA; Editor-in-
Chief, Geography and You

Dr Sulagna Chattopadhyay is the founder-Editor of ISSN and RNI accredited Geography and You (G'nY), a journal-magazine focusing on climate change, development, and the environment in particular, being published since 2001. She has been working for nearly three decades in the field of climate change, polar studies, disaster management, and biodiversity. She has been involved in various research and outreach programmes and has co-authored two books, *Climate Change and the White World; Science and Geopolitics of the White World: Arctic-Antarctic-Himalaya* published by Springer along with six other books on varied topics. She is also a founding member of LIGHTS and has been the convenor of national and international conferences/ seminars, notable being the round table conclave on seas and oceans around India, SaGAA in 2011, 2012, 2015, 2017, 2019 and 2020. She has been a member of the National Biodiversity Authority, FICCI Geospatial Award Jury and is in the Advisory Body of CEMAS, Mumbai University, and has engaged in various efforts toward conservation and climate change. She has a deep interest in polar studies and policy and has built a think tank SaGAA for policy and advocacy of the three poles. She also won an Environmental Documentary Short Film Contest, STL-2 : 2015 for her short film titled *O Bhai Saab*. She was awarded Business Excellence and Innovative Best Practices Academia Award, 2019 by NDIM.

Technical Panel 1: Breaking the Ice | From Isolation to Cooperation in a Multipolar World



Vice Admiral Pradeep Chauhan

Director-General,
National Maritime
Foundation (NMF),
New Delhi

Vice Admiral Pradeep Chauhan, AVSM & Bar, VSM, IN (Retd), is the Director-General of the National Maritime Foundation (NMF), New Delhi, India. As a maritime practitioner, his experience stems from a four-decade-long distinguished career in the Indian Navy during which he has held four sea-going commands including that of the aircraft carrier, the Viraat. The admiral enjoys international renown as an incisive strategic analyst and is a prolific writer on maritime and strategic issues, with 105 published articles and research-papers to his credit. Defence Academy, the Defence Services Staff College, the Naval War College, and the National Defence College, with BSc, MSc and MPhil degrees under his belt, Vice Admiral Pradeep Chauhan is the Director-General of the National Maritime Foundation (NMF), New Delhi, which is India's foremost resource centre for the development and advocacy of strategies for the promotion and protection of the country's maritime interests. Under his stewardship, the NMF has gained very considerable traction and has grown in stature as the go-to knowledge-point for all Indian maritime endeavours.



H E May Elin Stener
Ambassador,
Royal Norwegian Embassy
to India, Sri Lanka, Bhutan
and Maldives

H. E. May-Elin Stener is currently Ambassador of Norway to India, Sri Lanka, Bhutan and Maldives. Prior to taking up this position, from 2020-2023, she was the Deputy Director General of the Regional department in the Ministry of Foreign Affairs of Norway, covering Africa, Asia, Latin -America and the Middle East, as well as peace and reconciliation issues. May-Elin headed the section for Horn of Africa and West-Africa between 2018-2020. She was Norway's Deputy Permanent Representative to the United Nations headquarter in New York (2014-2018) as well as Deputy Head of the Norwegian Embassy in Pretoria, South Africa (2007-2011). She has worked for the Norwegian Foreign Service since 1995, and has extensive diplomatic experience multilaterally, with a focus on humanitarian affairs. She has also been posted to the UN offices in Geneva and has headed the Section for Humanitarian Affairs in the Ministry. Stener is married with one adult daughter and two adult stepchildren. She is a lawyer by training.



Dr Mrutyunjay Mohapatra
Director General
India Meteorological
Department (IMD)

Dr. Mrutyunjay Mohapatra is the Director General of Meteorology, India Meteorological Department and 3rd Vice President of WMO. With Doctoral Degree in Physics and more than 30 years of experience in meteorology, he has made significant contributions in the improvement of early warning services of IMD, specially with respect to cyclones and impact based forecasting. He brought laurels to the country from various international and national agencies and is popularly known as "The Cyclone Man of India". He is recipient of various national and international awards and recognitions from different agencies for bringing out paradigm shifts in weather forecasting and cyclone warning services including Honorary D.Sc. from five Universities. American Meteorological Society Award for exceptional leadership and services in enhancing tropical cyclone prediction and warning systems in the Indian Ocean region and above all the United Nation Sasakawa Award 2025 for disaster risk reductions.



Amb. Pooja Kapur
Additional Secretary
(Northern Europe)
Ministry of External Affairs

Amb Pooja Kapur is a career diplomat who joined the Indian Foreign Service in 1996, Ms. Kapur has served as India's Ambassador to the Kingdom of Denmark from 2021-24 and India's Ambassador to the Republic of Bulgaria and the Republic of North Macedonia from 2017- 21. She was also India's G20 Sous-Sherpa when India was part of the G20 Troika. Ambassador Kapur has wide-ranging experience in European and Indo-Pacific affairs, alongside multilateral matters. She has served at Indian Embassies/High Commissions in Paris, London, Kuala Lumpur and Brussels. In the Ministry of External Affairs, she has headed the Central Europe Division and ASEAN Multilateral (Indo-Pacific) Division as well as held charges pertaining to India's relationship with Western Europe, South East Asia, the United Nations and the Commonwealth. Ambassador Kapur is a frequent speaker at international conferences and events and was the Chief Coordinator of the Delhi Dialogue from 2014–17. Ms. Kapur was a Chevening scholar at the University of Oxford and also has a Masters in Public Administration from the Ecole Nationale d'Administration in Paris, along with a B.A. (Honours) and M.A. in Political Science from the University of Delhi. A university topper and recipient of several academic scholarships and awards, she is a published author. Ms. Kapur speaks Hindi, English and French. She is married and has a son.

Plenary: From Poles to the Monsoon | How Cryosphere-Ocean Feedback is Rewriting India's Future Climate



Dr. A. Suryachandra Rao

Director

Indian Institute of Tropical
Meteorology, Pune

Dr A Suryachandra Rao, Director of the Indian Institute of Tropical Meteorology (IITM), Pune since June 2025, is a distinguished climate scientist specializing in climate variability and prediction, coupled ocean-atmosphere dynamics, ocean modeling, and high-performance computing. He joined IITM in 2008 and has served in various capacities, including Scientist-G, Project Director of the Monsoon Mission, and Head of the High-Performance Computing (HPC) Division, before becoming Acting Director in April 2025. Dr. Rao began his research career at the National Institute of Oceanography, Goa, and subsequently held international research positions at the Institute of Marine Affairs (Trinidad & Tobago) and the Frontier Research System for Global Change (FRSGC), Tokyo, where he also collaborated with Mitsubishi Heavy Industries on advanced climate modeling frameworks. With over three decades of research experience, Dr. Rao has made significant contributions to understanding monsoon dynamics, air-sea interactions, and coupled climate modeling, enhancing India's operational forecasting capabilities under the Monsoon Mission. His work has informed applications in agriculture, hydrology, and disaster risk reduction, while his mentorship has shaped a new generation of climate researchers. Dr. Rao's scientific excellence has been recognized through numerous honors, including the Dr. A.P.J.

Technical Panel 2: Breaking Barriers Within | National Outcomes and International Outlook



Prof. N. V. Chalapathi Rao

Director

National Centre for Earth
Science Studies (NCESS)

Prof. N. V. Chalapathi Rao is the Director of National Centre for Earth Science Studies (NCESS), Thiruvananthapuram. Holds PhD degrees from Osmania University and University of Cambridge and a Senior Alexander von Humboldt Fellow at the Technical University of Clausthal, Germany. He previously served with the Ore Dressing Division, Indian Bureau of Mines, Ministry of Mines, at Nagpur (1998-2007) before joining Banaras Hindu University (BHU) in 2007, where he became Professor in 2013. He is currently on deputation as Director, NCESS (2024-2029). His research spans the petrogenesis of kimberlites, lamproites, lamprophyres, mantle xenoliths, and Indian Shield geodynamics, including the Deccan and Rajmahal basalts, Proterozoic basins, mafic dykes, and Cretaceous–Tertiary mass extinctions. He has authored 127 SCI papers, co-edited six volumes, and supervised 17 Ph.D. and 50 Master's theses. Through his DST-SERB grants, he established national facilities like the Electron Micro Probe Analyzer (2016) and Scanning Electron Microscope (2018), benefiting researchers across India.



Dr MV Ramana Murthy
Mission Director, Deep Ocean
Mission, Ministry of Earth
Sciences

Dr. M.V. Ramana Murthy has served as Director, National Centre for Coastal Research (NCCR) for 9 years. As a Director of NCCR, Dr. Murthy is involved in providing scientific solutions to coastal issues, focusing on coastal resilience, climate adaptation, and the blue economy. Before joining NCCR, he served as the Head of the Ocean Structures & Island Desalination Division at the National Institute of Ocean Technology (NIOT). Having 32 years of experience in Ocean Technology and Coastal Research, he has successfully demonstrated many societal oriented projects such as Establishment of Desalination Plants in UT Lakshadweep, Coastal protection and Beach Restoration at Pondicherry and Urban Flood Warning System (I Flows) for Mumbai and Chennai, Monitoring Health of Coastal Waters as part of SDG 14. Recently completed projects include preparation of DPR for Kalpsar Dam with Govt of Gujarat to create a largest fresh water reservoir and Integrated Ocean Management initiative for development of framework for Blue Economy to be implemented by govt of India and Shoreline Management plans for Coastal States of Tamil Nadu, Pondicherry, Kerala and Andhra Pradesh. Recent assignment include Development of Marine Spatial Plans for the ecologically sensitive area of Lakshadweep islands for holistic development and Pondicherry, an urban city along south east coast of India and Nature based Solutions for Coastal Protection. He is AICTE – INAE Distinguished Visiting Professor under (DVP) Scheme, member of many technical and policy formulation committees and member of MoEF&CC as Expert Appraisal committee for Infra structure and CRZ projects.



Dr Kenichi Matsuoka
Scientist
Norwegian Polar Institute,
Norway

Dr. Kenichi Matsuoka is a Senior Research Scientist at the Norwegian Polar Institute (NPI), specializing in Antarctic glaciology. He earned his Ph.D. from Hokkaido University, Japan, in 2002 and subsequently served as a Research Assistant Professor at the University of Washington, USA, in 2005. Joining NPI in 2010, he qualified as a full Professor in 2013. Over the course of his career, Dr. Matsuoka has conducted extensive research on seasonal snow, mountain glaciers, and polar ice sheets. At NPI, his work has encompassed both coastal and inland regions of East Antarctica in collaboration with numerous international partners, including the National Centre for Polar and Ocean Research (NCPOR), India. He has also made significant contributions to the Scientific Committee on Antarctic Research (SCAR), serving as Norway's representative to its Physical Sciences Group, co-founding the SCAR map product Quantarctica, and chairing the RINGS Action Group as its founding chair.



Dr O P Mishra
Director
National Centre for
Seismology, MoES,
Government of India

Dr Om Prakash Mishra is the Director of the National Centre for Seismology (NCS), Ministry of Earth Sciences, India. As a distinguished Earth scientist and Fellow of the National Academy of Sciences, India, renowned for his pioneering contributions in Applied Geophysics, Seismology, and Disaster Risk Management. With over 30 years of experience across diverse domains of Earth sciences, he holds an M.Sc. Tech in Applied Geophysics from IIT (ISM) Dhanbad, a Ph.D. and D.Sc. in Seismology from the Geodynamics Research Centre, Ehime University, Japan, and a Post Graduate Diploma in Management (Finance) from AIMA, New Delhi. Dr. Mishra has held key positions including Director, SAARC Disaster Management Centre, New Delhi, and served the Geological Survey of India for nearly two decades (1995–2014). Earlier, he worked on a joint project with IDRC-Canada and CMPDIL, Coal India (1992–1995) and as a Visiting Guest Professor at GRC, Japan (2005–2006). Representing SAARC Member States, he has collaborated with multiple UN agencies such as UNDP, UNESCAP, UNISDR, UNOCHA, and UN-Habitat, as well as organizations including IRP, ADPC, ADRC, USAID, and ECO. A widely travelled academic, he has led flagship UNISDR and World Bank projects on disaster resilience in South Asia. Dr. Mishra is a Life Member of leading global scientific bodies including AGU, SSA, SSJ, JPGU, AOGS, IUGG, ISCA, MGMI, IMS, IIPA, IGU, ISES, and AEG. He has supervised 40 postgraduate and doctoral researchers, including 10 Ph.D. scholars, and authored over 150 publications, edited volumes, and thematic reports in leading international journals.

Technical Panel 3: Melting Frontiers | Forging Pathways of Ocean-Polar Synergy



**H.E. Rasmus
Abildgaard
Kristensen**, Ambassador,
Embassy of Denmark
in India

H.E. Rasmus Abildgaard Kristensen (born 1974) is Denmark's Ambassador to the Republic of India and non-resident Ambassador (designate) to Nepal, Sri Lanka, Bhutan, and the Maldives. Ambassador Kristensen assumed his position in February 2025. As Ambassador, he leads a team of experienced diplomats and public servants at the Embassy of Denmark in New Delhi. He is responsible for overseeing Denmark's engagement with India on a broad range of political, economic, commercial, consular, and other matters that shape the bilateral relationship. Ambassador Kristensen has had a distinguished career in the Danish Foreign Service, with extensive experience gained from overseas assignments and other international roles, including as Denmark's Ambassador to Indonesia, Timor-Leste, Papua New Guinea, and ASEAN from 2017 to 2020. Throughout his career, Ambassador Kristensen has specialized in international climate and energy policy. He served both as Head of Department for Green Diplomacy and Climate at the Danish Foreign Ministry and Head of the International Department at the Danish Ministry of Climate, Energy and Utilities. In addition to his diplomatic career, Ambassador Kristensen has held a senior position in the private sector as Vice President and Head of Group Public Affairs at Danfoss, a multinational cleantech company based in Denmark.



Sunil Kumar Singh
Director
National Institute of
Oceanography (NIO), Goa

Dr. Sunil Kumar Singh is the Director of the CSIR-National Institute of Oceanography (CSIR- NIO). A distinguished scientist specializing in Geochemistry and Isotope Chemistry, Palaeoclimate and Palaeoceanography, Nutrient Cycling, and Biogeochemistry, his research spans the Indian Ocean, Ganga Plain, and the Himalaya. He joined CSIR and assumed his current post on June 27, 2017, and is due to retire on March 31, 2031. Prof. Singh earned his B.Sc. (Hons.) in Physics (1989) and M.Sc. (Tech.) in Geophysics (1992) from Banaras Hindu University, followed by a Ph.D. in Isotope Geochemistry (1999) from the Physical Research Laboratory (PRL), Ahmedabad/ MSU, Vadodara. His academic journey includes post-doctoral fellowships at PRL, Ahmedabad (1999) and CNRS-CRPG, Nancy, France (1999–2002), followed by positions as Scientist-SD (2002–2004), Reader (2005–2009), Associate Professor (2010–2014), and Professor (2015–2017) at PRL, Ahmedabad. He served as Director, CSIR-NIO (2017–2019). **Dr.**



Dr. Grinson George
Director,
ICAR-Central Marine
Fisheries Research Institute
(CMFRI)

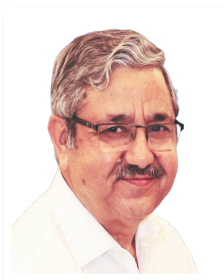
Grinson George is a distinguished fisheries scientist and administrator with over two decades of high-impact experience in research, policy, and multilateral coordination, currently serving as the Director of the ICAR-Central Marine Fisheries Research Institute (CMFRI) in Kochi. His strong scientific foundation, including a Ph.D. in Marine Science (NIO/Goa University) and Post-Doctoral research at the Plymouth Marine Laboratory (PML), UK, is centered on Fisheries Oceanography, Marine Biodiversity, and the strategic application of Remote Sensing/GIS for resource assessment and climate change impact analysis. A key aspect of his career is his extensive regional engagement; he served as the Senior Programme Specialist (Fisheries) at the SAARC Agriculture Centre (SAC) in Dhaka, where he was responsible for coordinating the fisheries and aquaculture programs across all eight South Asian Nations to promote sustainability and policy harmonization. Furthering his international profile, he was an active participant in the Indo-Sri Lanka Joint Working Group (JWG), contributed to the PML-UK REVIVAL project, and featured in a related DBT-funded PODCAST focusing on scientific outreach. He also gained hands-on expertise working in the Maldives for one year. This unique combination of advanced scientific leadership at CMFRI and proven multilateral policy coordination makes him a critical figure in marine resource management both nationally and regionally.



Dr Manish Tiwari
Scientist F
National Centre for Polar
and Ocean Research
(NCPOR), Goa

Dr Manish Tiwari is the Group Director (Arctic Operations) and a scientist at the National Centre for Polar & Ocean Research in Goa. His research interests are quantifying past climatic and oceanographic changes through isotopic and geochemical studies of marine sediment. He is particularly interested in understanding the teleconnections between the Indian monsoon system and polar regions. Dr. Tiwari holds a PhD in Geology from Physical Research Laboratory, Ahmedabad and has obtained Bachelor's and Master's degrees in Geology from Banaras Hindu University, Varanasi. He has received several awards and honours for his outstanding contributions, including the "Young Scientist Medal" of the Indian National Science Academy, the "Young Scientist Award" of the Indian Science Congress Association, and the "Certificate of Merit" by the Ministry of Earth Sciences, among others. Dr. Tiwari has also led externally funded research projects and established state-of-the-art laboratories at NCPOR. He has mentored 9 Ph.D. students, including current ones. He has more than 80 peer-reviewed scientific papers, and served as an editor and reviewer for renowned scientific journals.

Technical Panel 4: Science Without Borders | Global Models that still Work



Prof Naresh Chandra Pant

Professor (Retd.)
Department of Geology,
University of Delhi

Prof Naresh Chandra Pant, a geologist by profession, has made significant contributions in establishing the extension of East African Orogen in east Antarctica, described high-pressure metamorphism from Indian Archean craton (Bundelkhand), applied innovative and uncommon application of Electro Probe Micro Analysis for estimating the bulk composition of selected micro-domains, inferring sub-ice geology of east Antarctic shield from proximal marine sediments and many others. He is involved in Indian Antarctic activities for last three and a half decades out of which last ten years have been in management activities of the science programme of Indian Antarctic Expeditions. Besides, he has been a chief officer of the Geosciences of SCAR for the last ten years and currently is the Deputy Chief Officer. He is also a member of the SCATS. He currently Chairs the INSA national committee on SCAR. He has contributed to establishing, developing, and nurturing micro-domain characterisation laboratories in India and propagating chemical geochronology in the country. He recently retired as Senior Professor from the University of Delhi, and prior to that he has served in GSI and IIT (Kharagpur). He has received National Mineral Award (1996), the Antarctic Silver Jubilee Award, and the British Council Innovation Award in the form of ICECAP-2 project (2015-2017). Prof Pant has over hundred international and national research publications and has produced 10 doctoral students out of which three have been awarded PhD's on their work on Antarctica.



Dr Thamban Meloth
Director
National Centre for Polar and
Ocean Research (NCPOR),
Goa

Dr Thamban Meloth is the Director of the NCPOR, Goa. His field of specialisation includes cryosphere and palaeoclimatology. His current research focuses on Antarctic ice core studies, polar snow biogeochemistry and Himalayan glaciology. He was instrumental in establishing India's first and state-of-the-art Ice Core Laboratory at NCPOR in 2005, and also pioneered the Antarctic snow and ice core studies at NCPOR. He was also a member of the first Indian Scientific Expedition to the South Pole in 2010. He has conducted several expeditions to Antarctica, Arctic, Southern Ocean and Indian Ocean. In recognition of his scientific contributions, he has been awarded National Geoscience Award by Ministry of Mines, NIPR Visiting Scientist Award by the National Institute of Polar Research, Japan; Prof Naganna Gold Medal by the Mineralogical Society of India; START Young Scientist

Award by International Geosphere Biosphere Programme; and Young Scientist Award, by the Indian Science Congress Association (ISCA). He is a Fellow of the National Academy of Sciences, India and has more than 120 papers in peer-reviewed journals to his credit.



Prof Camilla Brekke
Director
Norwegian Polar Institute
(NPI), Norway

Camilla Brekke is appointed Director of the Norwegian Polar Institute (2023-). Prof. Dr. Brekke was Pro-Rector for research and development at UiT The Arctic University of Norway, Tromsø, Norway from 2021 to 2023. Brekke was Vice-Dean Research at the Faculty of Science and Technology from 2018 to 2021 and Deputy Centre Leader from 2019 to 2021 at Centre for Integrated Remote Sensing and Forecasting for Arctic Operations (CIRFA) at Department of Physics and Technology, UiT. Brekke is a full Professor since 2016. In 2009, she joined the Department of Physics and Technology, UiT as an Associate Professor. From 2002 to 2009, she was a Scientist with the Norwegian Defense Research Establishment, Kjeller, Norway. From 2001 to 2002, she was a Young Graduate Trainee with the European Space Agency, Noordwijk, The Netherlands. In 2001, she was a System Developer with Ericsson, Asker, Norway. From 2012 to 2013 (4 months) and in 2018 (4 months), she was a visiting scientist at the Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA. Her research is focused on synthetic aperture radar and ocean colour remote sensing for Arctic and marine applications. She received the Cand. Mag., Cand. Scient., and Ph.D. degrees from the University of Oslo, Oslo, Norway, in 1998, 2001, and 2008, respectively. She was an exchange student to National University of Singapore in 1998 (spring).



V Narayanan
Secretary, Department of
Space, Chairman, Space
Commission and Chairman,
ISRO

Dr. V. Narayanan, Distinguished Scientist (Apex Grade), assumed charge as Secretary, Department of Space, Chairman, Space Commission and Chairman, ISRO on 13 January 2025. A renowned rocket and Spacecraft Propulsion expert, he joined ISRO in 1984 after a brief early career with TI Diamond Chain Ltd., MRF and BHEL. He holds an M.Tech in Cryogenic Engineering and a Ph.D. in Aerospace Engineering from IIT Kharagpur, where he earned a Silver Medal, the Distinguished Alumni Award (2018) and the Life Fellowship Award (2023). Before becoming ISRO Chairman, Dr. Narayanan served as Director of the Liquid Propulsion Systems Centre (LPSC) for seven years, providing leadership in the development of liquid, semi-cryogenic and cryogenic propulsion systems for India's launch vehicles and satellites. Under his guidance, LPSC delivered 226 propulsion systems and played a pivotal role in several major missions. He also chaired the LPSC-

IPRC Coordination Committee, Project Management Council–Space Transportation System (PMC-STSS), and the Human Rated Certification Board (HRCB) for the Gaganyaan programme. A central figure in India's cryogenic propulsion capability, Dr. Narayanan led the development of the Cryogenic Upper Stage for GSLV Mk-II when foreign technology was denied. As Project Director of the C25 stage for LVM3, he ensured its successful development and operationalisation. He contributed significantly to Chandrayaan-2 and Chandrayaan-3 missions, Aditya-L1, Gaganyaan, and several next-generation propulsion systems, including semi-cryogenic and green propulsion technologies. Recipient of 26 prestigious awards, including the ASI Gold Medal, National Design Award, APJ Abdul Kalam Award (2023) and the 2024 IAA Laurels for Chandrayaan-3, Dr. Narayanan is widely respected in national and international scientific communities and has published numerous technical papers and reports.



Shri Nilesh M Desai
Director
Space Application Centre
(SAC), ISRO

Shri Nilesh M Desai, Distinguished Scientist, is the Director of the Space Applications Centre (SAC), ISRO, Ahmedabad, since 1st January 2021. Born on 1st April 1964 in Navsari, Gujarat, he graduated as a gold medalist in Electronics and Communication Engineering from L.D. College of Engineering, Gujarat University (1985–86). Joining ISRO in 1986, he has had a remarkable 35-year career dedicated to the design and development of Microwave Radar Systems and advanced applications of Earth Observation, Navigation, and Communication technologies for societal and strategic use. He has led key projects including RISAT-1 C-Band SAR, Oceansat-2 and Scatsat-1 Scatterometers, Chandrayaan-2 SAR and Lander Altimeter, and Airborne SAR for Disaster Management, among others. He also played a pivotal role in developing NavIC user receivers, SatCom hubs, and ComNav-based applications integrating communication and navigation systems. As Associate Director and Deputy Director at SAC, he provided visionary leadership in promoting indigenous space technologies and capacity-building, including UN-CSSTEAP courses on SatCom and GNSS. Shri Desai has authored or co-authored over 175 technical papers and 225 SAC/ISRO reports, and has represented India at major international forums such as ICG, Austria, France, Germany, Russia, and the UK. A recipient of ISRO's Performance Excellence Award (2018), Individual Merit Award (2010), and Team Award (2012), he is also deeply engaged in outreach through Smart India Hackathon, Vikram Sarabhai Space Exhibition, and academic mentoring. He currently serves as President of ISRS and Vice President of ISSE (Ahmedabad Chapter).

Plenary: Is the Paris Climate Agreement goal enough to save the Polar Ice Sheets?



Dr Waliur Rahaman
Scientist E,
National Centre for Polar and
Ocean Research (NCPOR), Goa

Dr. Waliur Rahaman, Scientist-E at the Isotope Geoscience Division, NCPOR, is an isotope geochemist whose research focuses on understanding Earth's surface and oceanic processes across modern to geological timescales, with a particular emphasis on paleoclimate and paleo-oceanography. He employs stable and radiogenic metal/metalloid isotopes as tools to quantify these processes. Dr. Rahaman began his research career at the Physical Research Laboratory (PRL), Ahmedabad, as a Junior Research Fellow during his Ph.D. in isotope geochemistry, and his outstanding work earned him the prestigious Alexander von Humboldt Fellowship from the Humboldt Foundation, Germany, in 2011. Since joining NCPOR in 2012, he has established ISOTRACE, a state-of-the-art metal-free clean chemistry laboratory equipped with advanced instruments such as Multi-Collector ICPMS (MC-ICPMS) and Quadrupole ICPMS for trace element and isotope analyses. Under his leadership, ISOTRACE has gained recognition as one of India's premier isotope geochemistry laboratories, reflected in its high-impact publications. Currently heading the Isotope Geochemistry Section at NCPOR, Dr. Rahaman has supervised three Ph.D. scholars and actively supports researchers from institutions including DU, BHU, AMU, IIT Kharagpur, IIT Kanpur, IISER Pune, and IISER Kolkata. His group continues to pioneer research on non-traditional stable isotopes and their applications in paleo-oceanographic studies.



Prof Sachin Kumar Sharma

Director General,
Research and Information
System for Developing
Countries (RIS), New Delhi

Professor Sachin Kumar Sharma, Director General of RIS, is a leading expert in international trade, development cooperation, and global economic governance. With over two decades of experience, he has contributed extensively to research, policy analysis, advocacy, and capacity-building across key themes such as agricultural subsidies, food security, sustainability, investment, market access, LDC graduation, transparency, and negotiations in the WTO, FAO, G20, and regional trade agreements. Prof. Sharma holds an M.Phil. and Ph.D. in Economics from Jawaharlal Nehru University (JNU), specialising in the WTO, quantitative techniques, agricultural policy, and international trade. He is proficient in econometrics, GTAP-based Computable General Equilibrium modelling, Partial Equilibrium analysis, and advanced statistical tools, bringing strong analytical rigour to trade policy research. A prolific academic, he has authored six books, numerous peer-reviewed articles, book chapters, and working papers. He regularly contributes to policy discourse through articles in major newspapers and participation in international forums. Before joining RIS, he served as a Professor at the Centre for WTO Studies (CWS), Indian Institute of Foreign Trade, where he led multidisciplinary teams of economists and legal experts on a wide spectrum of trade and development issues.



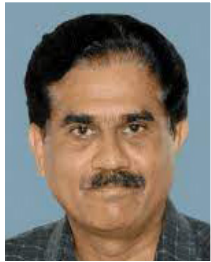
H. E. B Höskuldsson
Ambassador
Embassy of Iceland in
India, New Delhi

H. E. Benedikt Höskuldsson is the Ambassador of Iceland to India, Nepal, Sri Lanka, New Zealand, and Australia. A seasoned diplomat, he has previously served as Iceland's Special Envoy for Climate, Permanent Representative to IRENA, Member of the Nordic Development Fund Board, and Senior Advisor at Sustainable Energy for All. His postings span Vienna, Tokyo, Berlin, and Iceland's Ministry for Foreign Affairs, where he led portfolios on natural resources, energy, environment, and overseas trade. Since 2022, he has co-chaired the India-Iceland Joint Task Force on Energy Cooperation. Ambassador Höskuldsson holds degrees in Economics and International Business and is a recipient of the Order of Nordstjerne from the King of Sweden and Distinguished Alumni Award from Lewis & Clark College, Oregon, USA.



Shri Dheeraj Pande
Director, Atomic
Minerals Directorate for
Exploration and Research
(AMD), Chennai

Shri Dheeraj Pande, an eminent exploration geologist, serves as the Director, Atomic Minerals Directorate for Exploration and Research (AMD), Department of Atomic Energy (DAE), Government of India from May 1, 2024. With over 36 years of distinguished service in AMD, he has made pioneering contributions to the exploration and augmentation of atomic and critical mineral resources such as uranium, thorium, lithium and rare earth elements vital for India's energy security and technological advancement. Throughout his career at AMD, Shri Pande has been involved in diverse exploration projects and mineral resource estimation particularly across complex terrains in the Indian shield and fold belts. His scientific leadership has been instrumental in the prospecting and development of key uranium deposits in the country. For his outstanding contributions, he was honoured with the DAE Group Achievement Award-2016 and the National Geoscience Award-2019 by the Ministry of Mines, Government of India. He has published more than 50 scientific articles in various national and international journals. His published works, including studies on uranium mineralisation in the Middle Siwalik sandstones of Himachal Pradesh, highlight his scientific engagement in Himalayan geological settings.



Dr S C Shenoi

**Fmr Director,
Indian National Centre
for Ocean Information
Services (INCOIS)**

Dr. S. Satheesh Chandra Shenoi, is the Former Director of the Indian National Centre for Ocean Information Services (INCOIS). With over 40 years of research experience, Dr. Shenoi has made pioneering contributions to both marine science research and management. Beginning his career at the National Institute of Oceanography (NIO), Goa (1983–2009), he played a key role in the Arabian Sea Monsoon Experiment (ARMEX), redefining the ocean's active role in monsoonal processes and improving satellite-based sea surface temperature estimation by 50%. Following the 2004 Indian Ocean tsunami, he led critical studies that enhanced tsunami source estimation and contributed to the establishment of India's Tsunami Early Warning Centre and the Ocean State Forecasting System, placing India among the few nations with operational ocean forecasting capabilities. His earlier hydrographic and current-meter observations during 1987–1994 were instrumental in mapping and explaining the seasonal circulation patterns of the Indian Ocean. Elected Fellow of the Indian Academy of Sciences in 2007, National Academy of Science, India in 2009 and few other science academies. Dr. Shenoi has authored over 100 international research papers, with interests spanning observational oceanography, ocean currents, monsoon-ocean interactions, and satellite oceanography. He also established the International Training Centre for Operational Oceanography (ITCOcean) in collaboration with IOC/UNESCO, enhancing global capacity-building and INCOIS's international visibility.



Prof. Balaji Ramakrishnan

**Director, National Institute
of Ocean Technology
(NIOT), Chennai**

Prof. Balaji Ramakrishnan has been the Director of the National Institute of Ocean Technology (NIOT) since September 6, 2024. A Professor in the Department of Civil Engineering at IIT Bombay since 2011, he earlier served as Senior Coastal/Port Engineer at Sogreah Consultants, Dubai (UAE), contributing to major waterfront development projects across the Middle East, India, and other Asian countries. His expertise spans port, harbor, marina, and coastal infrastructure design and development. He has published extensively, including 3 monographs, 75 peer-reviewed journal papers, and 82 conference papers. His excellence has been recognized through numerous awards, notably the Professor S.P. Sukhatme Excellence in Teaching Award (2024), Distinguished Alumni Award (IIT Madras, 2022), IEI Marine Engineering Prize (2018 & 2022), Institution Prize (2015), R.J. Garde Research Award (2012), Maritime Award by the Ministry of Shipping (2006), and ASME Best Graduate Student Paper Award (2002). His research group has earned fellowships and

recognitions from UNESCO-IHE, POGO-SCOR, DST, CSIR, UKIERI, IGARSS, DAAD, AGU, PIANC-COPEDEC, OMAE-ASME, and COPRI-ASCE. Prof. Balaji has led multiple Government- and Ministry-sponsored projects for the Ministry of Earth Sciences, Ministry of Shipping, and DST, along with consulting projects for major ports, maritime boards, state agencies, and private firms. He spearheaded a landmark five-institute collaborative field campaign (IITB, NIOT, NCCR, NIO, NCU) and fostered international academic and scientific exchanges.



Ambassador Sanjay Verma

Member, Union Public Service Commission (UPSC), Former Secretary (West), Ministry of External Affairs (MEA)

Ambassador Sanjay Verma, Member of the Union Public Service Commission (since February 2024), served 34 distinguished years in the Indian Foreign Service. As Secretary (West) in the Ministry of External Affairs from March 2022 to February 2024, he oversaw India's relations with 50 European and Central Asian countries, as well as multilateral engagements with the United Nations, Commonwealth, and NAM. His extensive diplomatic career spanned economic, political, consular, diaspora, public affairs, protocol, and humanitarian assistance domains - most notably coordinating Operation Rahat in Yemen. He has served across Asia (China, Dubai, Nepal, the Philippines), Africa (Ethiopia, Djibouti), and Europe (Spain). A former university-level hockey player, his interests include collecting first-edition books, Bollywood memorabilia and collectibles, reading, music, popular Indian culture, and cinema - believing the Hindi film song to be "the finest poetry." He views cricket and cinema as parallel instruments of nation-building.



Dr Anil V. Kulkarni
Distinguished Visiting Scientist, Divecha Centre for Climate Change, Bengaluru.

Dr Anil Vishnupant Kulkarni is a distinguished scientist at the Divecha Centre for Climate Change, Indian Institute of Science, Bangalore. He acquired a post-graduation degree in Applied Geology from the University of Roorkee, now known as the Indian Institute of Technology-Roorkee. In 1987, he was awarded a Commonwealth Fellowship at McGill University, Montreal, Canada and obtained a Master's degree in Geography, followed by a doctorate in Geology, from Shivaji University, Kolhapur, Maharashtra. Dr Kulkarni has developed many remote sensing-based methods and models to understand the Himalayan cryosphere. The techniques are widely used to map snow and glaciers. The models are used to assess glacier mass balance, stream runoff, and the influence of climate change. Moreover, a velocity, slope and flow law model was developed to estimate ice-thickness distribution. The technique is used to provide a better estimate of glacier-stored water. Mass balance and climate models are combined to understand glacial mass loss under different emission scenarios, indicating the threat to water resources under high

emission scenarios. He published around 120 papers in prestigious international and national journals. These contributions made Dr Kulkarni one of the leading authorities and identified him among the top 2% of researchers worldwide in geological and geomatics engineering.



Dr V S Prasad,
Director (Scientist G)
of the National Centre
for Medium-Range
Weather Forecasting
(NCMRWF), New Delhi.

Dr V S Prasad is the Director (Scientist G) of the National Centre for Medium-Range Weather Forecasting (NCMRWF), under India's Ministry of Earth Sciences. He earned his Ph.D. in Meteorology & Oceanography from Andhra University, Visakhapatnam, and completed post-doctoral work at Kyoto University, Japan. With over three decades of experience, Dr. Prasad has played a key role in developing state-of-the-art data assimilation systems and operational ensemble forecasting in India. Under his leadership, NCMRWF conducted India's first global-scale reanalysis project.

His research focuses on data processing, satellite data retrieval, and data assimilation. He has authored over 100 scientific publications and contributed significantly to understanding Indian monsoon dynamics, extreme weather events, and numerical weather prediction systems. Dr. Prasad has been recognized with several awards, including the B. N. Desai Gold Medal, N. Melanchthon Phillip Prize, Mausam Bi-annual Award, and a JSPS fellowship.



Dr Aparna Shukla, Scientist
F, Ministry of Earth
Sciences, New Delhi.

Dr Aparna Shukla currently works as a Scientist at the Polar and Cryosphere Division of the Indian Ministry of Earth Sciences (MoES), and is based in New Delhi. Her background is in geology, and she holds a PhD on Himalayan Cryosphere specializing in the debris-covered glaciers. Aparna has served in different capacities at the top organisations in India including the Geological Survey of India, University of Kashmir and Wadia Institute of Himalayan Geology. Her current responsibilities include scientific and economic administration of the India's Polar expeditions to Arctic, Antarctica, Southern Ocean and Himalaya. She is also in-charge of Ministry of Earth Science's extramural funding to national and international projects in the cryosphere and hydrology domain. She is passionate about enabling state-of-the-art research and capacity building to advance India's interests and contributions in polar and cryosphere science. Aligning the government initiatives with national priorities and international

goals, popularising and promoting polar and cryosphere research to a larger audience remains the core of her endeavours.

As an outcome of her research in Himalayan Cryosphere, she has published >50 research papers in international journals of repute (including the Science). She has mentored many doctoral students and graduate and postgraduate trainees. She has been part of editorial board of national and international journals in the field of glaciology, geoinformatics and geomorphology.



Dr Milap Chand Sharma

Professor at CSRD, JNU

Dr Milap Chand Sharma is a Professor at the Centre for the Study of Regional Development, School of Social Sciences, Jawaharlal Nehru University (JNU), New Delhi. He holds M.A., M.Phil., and Ph.D. degrees and specializes in Glacial Geomorphology, Palaeoclimatic Reconstruction, Chronology and Mass Movements in the Himalayas. He has over 115 research communications in the Quaternary International, Quaternary Science Reviews, Geomorphology, Progress in Physical Geography, GeoScience, Anthropocene, Zeit fur Geomorphology, Nature, Nature Plants, Nature Scientific, Current Science, Geological Society of America Bulletin and others; with over 3100+ Research citations.



**Ms Karen Marie
Oseland**

Advocacy & Networking
Specialist, ICIMOD, Nepal

Ms Karen Marie Oseland is an Advocacy & Networking Specialist, HKH-Arctic Lead, at ICIMOD, where she has led the organisation's Arctic-Hindu Kush Himalaya (HKH) initiative since April 2025. She focuses on strengthening cooperation between the Arctic and Himalayan regions, bringing her deep expertise in international relations and climate diplomacy. With several years of experience in Arctic affairs, Karen has previously worked on the Climate & Arctic team at the Norwegian Embassy in Washington, D.C., collaborated with the High North Center for Business & Governance at Nord University in Bodø, and contributed to The Arctic Institute. She also offered consultancy services in Washington, D.C. on climate and nature-based solutions. From 2019 to 2020, she worked at ICIMOD as a Climate & Energy Analyst, focusing on hydropower policy and Arctic-HKH linkages. Karen holds a Master of Science in Global Affairs (Energy & Environment Policy) from New York University, and three Bachelor's degrees in Geosciences, Political Science, and Global Studies from Pacific Lutheran University. In addition, she earned a Post-baccalaureate Certificate in Geographic Information Systems from Pennsylvania State University. At ICIMOD, she is playing a key role in shaping trans-regional strategies that bridge mountain and polar regions, underlining her commitment to inclusive climate advocacy and cross-regional knowledge exchange.

Technical Session 7: Turning the Tables | From Novel Ideas to Expert Insights



Dr Avinash Kumar,
Scientist E, National
Centre for Polar and Ocean
Research (NCPOR), Goa

Dr Avinash Kumar is a Scientist E and Scientist-in-Charge (Outreach and Cooperation) at the National Centre for Polar and Ocean Research (NCPOR), Goa, India. He specializes in Marine Geology, Remote Sensing and GIS, Sea Ice and Climate Dynamics, with a research focus on understanding the role of polar regions and oceans in global climate change. His work investigates multi- and intra-decadal variability in Antarctic and Arctic sea ice, ocean-atmosphere interactions, Arctic warming linkages with Asian weather extremes, Antarctic ice-shelf prediction modelling, and the impacts of ocean heat flux, salinity, and hydrodynamic processes. Dr. Kumar holds a Ph.D. in Marine Geology from Mangalore University, an M.Sc. in Marine Geology from Cochin University of Science and Technology, and a B.Sc. in Geology, Physics, and Chemistry from Patna University. He has received several honours, including the Outstanding Employee Award (2024) from NCPOR, Certificate of Merit (2021) from the Ministry of Earth Sciences, Atal Vigyaanika Shikhar Samman (2020), and the KOPRI Asian Polar Science Fellowship (2020). His professional journey began as a Junior Research Fellow (2005–2008) under the Department of Science and Technology (DST), followed by a Senior Research Fellowship (2008–2010) under the Council of Scientific and Industrial Research (CSIR). He joined NCPOR as Research Scientist B (2010–2013), promoted to Scientist C (2013–2017) and Scientist D (2017–2021), and currently serves as Scientist E (2021–present), leading polar research initiatives and international scientific cooperation.



Dr Archana Singh
Scientist-D at the National
Centre for Polar and Ocean
Research (NCPOR), Goa

Dr Archana Singh is a Scientist-D at the National Centre for Polar and Ocean Research (NCPOR), Goa, and has been actively involved in India's Arctic research and expedition activities for over a decade. Her research focuses on Polar Ecology, Environmental Studies, and Biogeochemical Processes in the Arctic region. She holds a Bachelor's degree in Chemistry from Hindu College and a Master's in Organic Chemistry from Delhi University. In her PhD work, Ms. Archana focused on biogeochemistry and biotechnology of organic biomolecules from the Arctic environment. At NCPOR, Ms. Singh leads and co-leads several projects addressing polar biogeochemical dynamics. She has authored around 17 peer-

reviewed publications, including research articles, reviews, and book chapters, and has participated in seven Arctic expeditions and cruises, many of which she has undertaken in leadership roles.

In addition to her scientific research, Ms. Singh plays an active role in the management and operational coordination of the Indian Arctic Programme and Expeditions. She has also represented India at various Arctic Council meetings and currently serves as India's representative in the IASC Terrestrial Working Group and ICARP IV Research Priority Team 7 (RPT7). She is also the Co-Chair of the SIOS Research Infrastructure Coordination Committee.

Ms. Singh was selected as the Indian representative for the Arctic Frontiers Emerging Leaders Programme 2025, supported by the Royal Norwegian Embassy, New Delhi. A strong advocate for science communication, she has been an invited speaker at numerous scientific, policy, and public forums and has received the DST-AWSAR Award (2021) for her impactful popular science writing.



Dr Vikram Goel

Scientist-D at the National
Centre for Polar and Ocean
Research (NCPOR), Goa

Dr. Vikram Goel is a Scientist-D at the National Centre for Polar & Ocean Research (NCPOR), where he specializes in Antarctic glaciology with a focus on ice dynamics, surface mass balance, and the evolution of Antarctic coast. His research integrates geophysical techniques—including ice-penetrating radar, seismics, GNSS systems along with remote sensing and ice-flow modelling—to investigate how Antarctica's coast is responding to climate change. Dr. Goel completed his doctorate from the University of Oslo, Norway, in 2019, under Antarctic Glaciology PhD studentship program supported by the Ministry of Earth Sciences. His work is informed by extensive fieldwork across five Antarctic expeditions, during which he has conducted 1500+ km of ground-based radar surveys and participated in complex field Operations. He has been involved in several international collaborative projects, more recently leading geophysical surveys in the SENS project on the Nivlisen Ice Shelf and the multinational RAICA-CP expedition in West Antarctica. His research has been published in journals such as *The Cryosphere* and *Journal of Glaciology*, and he has contributed to landmark datasets including Bedmap3. Recognized with NCPOR's Outstanding Employee Award in 2025, Dr. Goel has been actively involved in polar science leadership roles beyond his research activities. He currently



Dr Geetha Sasikumar, Principal Scientist in the Shellfish Fisheries Division of ICAR–CMFRI, Kochi

serves as the early career researcher representative to the SCAR RINGS Action Group and as one of India's national representatives to the SCAR GeoSciences Group, contributing to the coordination of international polar research efforts.

Dr Geetha Sasikumar is a Principal Scientist in the Shellfish Fisheries Division of ICAR–CMFRI, Kochi, with nearly three decades of research experience in cephalopod and bivalve fisheries management, bivalve mariculture, stock assessment, and environmental monitoring. She has played a pivotal role in disseminating scientific bivalve farming techniques, incorporating location-specific refinements that facilitated the successful adoption and commercialization of mussel farming along the west coast of India. She holds a B.F.Sc. in Fisheries Science and an M.F.Sc. in Aquaculture from the Kerala Agricultural University, and a Ph.D. in Biosciences from Mangalore University. As a member of the 12th Indian Scientific Expedition to the Southern Ocean (ISE-SO-12), she contributed to studies on cephalopod biodiversity, squid ageing, and Antarctic trophic ecology. Her scientific output includes numerous peer-reviewed publications, technical reports, species descriptions, stock assessments, and outreach manuals, along with key contributions to national frameworks such as the Marine Fish Stock Status of India. She currently leads the national research programme on the Assessment and Management of Small-scale Bivalve and Gastropod Fisheries in India (2024–29), while also contributing to molluscan mariculture development and advancing practical strategies for sustainable marine fisheries.



Dr Lakshmi Devi P, Assistant Professor, Centre of Research in Marine Sciences, JAIN, Kochi

Dr Lakshmi Devi P, currently working as Assistant Professor, Centre of Research in Marine Sciences, JAIN (Deemed to be University), Kochi campus, completed her Master's and Doctoral Degree in Marine Biology, from the Department of Marine Biology, Microbiology and Biochemistry, School of Marine Sciences, Cochin University of Science and Technology, Kerala, India. She has 10 years of experience in post graduate and undergraduate teaching as well as research. Her areas of specialisation include Marine biodiversity, Taxonomy and Habitat Ecology and have a few papers published in this discipline. Presently, Dr Devi's scientific attempts are focused on the development of biodiversity inventory, climate change studies

and Ecosystem management. Her recent research endeavours extend to the Indian Arctic Program, wherein she acts the Co-Investigator of the on-going project on Borealisation and Climate change driven animal migrations in the Norwegian Arctic, which is critical for shaping global climate adaptation strategies.



Shri Keshav Verma
Research Associate,
Indian Council of World
Affairs (ICWA), New Delhi.

Shri Keshav Verma is a Research Associate at the Indian Council of World Affairs, New Delhi. He is pursuing Doctor of Philosophy in International Relations from the Department of International Studies, Political Science and History, CHRIST (Deemed to be University), Bengaluru. His research areas are Global Commons, Indo-Pacific, Non-Traditional Security, India's Foreign Policy, etc. Previously, he was a Senior Researcher at the Centre for East Asian Studies, CHRIST University and a Project Assistant in collaboration with George Washington University, Washington D.C., funded by the U.S. Department of State. He has published several research articles, book chapter and op-eds on various platforms such as SCOPUS, Springer, UGC CARE 1, Peer-Reviewed Journals and Think Tanks. He is also a reviewer of Journal of Political Science and International Relations, Science Publishing Group, New York.

Technical Session 8: Changes in High-Seas Realm | Innovating for Ocean Sustainability



Dr M A Atmanand

Fmr Director of the
National Institute of
Ocean Technology (NIOT),
Chennai

Dr M A Atmanand has 40 years of experience in the field of ocean technology and retired as the Director of the National Institute of Ocean Technology Chennai. He is a Guest Professor at the Indian Institute of Technology, Madras - Chennai and a Visiting Professor at the National Institute of Technology (NIT), Calicut, India. He is nominated as Chair of the Marine Systems Panel, Naval Research Board, Defence Research and Development Organisation (DRDO), Govt. of India. He is the Governor's nominee to the Planning board of Bharathidasan University.

An Instrumentation and Control Engineer by profession, he took his undergraduate degree from University of Calicut, Master's and doctorate degrees from Indian Institute of Technology, Madras, India. He has presently coined specific courses based on his vast experience in Ocean technology and is sharing the same with the students.



Ms Neetu Kumari Prasad, Joint Secretary, Ministry of Fisheries, Govt of India

Ms Neetu Kumari Prasad, is an I.A.S Officer of 2001 Batch, Telangana Cadre. Currently, She is posted as Joint Secretary (Marine Fisheries) in Department of Fisheries, Ministry of Fisheries Animal Husbandry and Dairying. She has worked extensively in Telangana State and has held several key positions such as Commissioner of Panchayat Raj and Rural Development, Commissioner of Commercial Taxes and Member Secretary of Pollution Control Board. She worked as Warangal Municipal Commissioner, Joint Secretary of Tourism Department, Dist. Collector, East Godavari District, Dist. Collector, Karimnagar District and Commissioner, PR&RD. During her tenure in Telangana, she has several achievements to her credit such as Received National Award from the Prime Minister of India for implementing Aadhar (Unique Identification Number) linkage with the social security schemes, National Award from the Prime Minister of India, for Excellence in Public Administration, received the National Award for the best state in the capacity of Commissioner Rural Development for good performance in skill development, etc.



Prof. Manell E Zakharia

Distinguished Professor,
Underwater Acoustics and
Signal Processing, France

Prof. Manell E Zakharia is a distinguished Professor in Underwater Acoustics and Signal Processing, with over four decades of expertise in sonar systems, acoustic imaging, and environmental acoustics. Affiliated with the French Naval Academy (École navale / IRENAV, Brest, France), he has made significant contributions to underwater acoustics, synthetic aperture sonar, and advanced signal processing for seabed and marine environment imaging. A former President of the French Society of Acoustics and the European Acoustics Association (EAA), Prof. Zakharia has actively contributed to the relaunch of Acta Acustica as an open-access journal and received the prestigious EAA Award in 2011 for his outstanding contributions to promoting acoustics in Europe. Prof. Zakharia Honorary Fellow of the ASI, Acoustical Society of India. His collaborations with “Expertise France – NIOT” have supported Indo-French initiatives in marine technology and the blue economy. Through his publications, technical leadership, and continued engagement in marine research, Prof. Zakharia has established himself as a leading figure at the intersection of underwater acoustics, remote sensing, and environmental monitoring.



Dr Stuti Banerjee

Senior Research Fellow,
Indian Council of World
Affairs (ICWA), New Delhi.

Dr Stuti Banerjee is a Senior Research Fellow at the Indian Council of World Affairs (ICWA), New Delhi, where she conducts research on North America, Latin America and the Caribbean, the Indo-Pacific, and the polar regions. Her work focuses on producing analytical studies on politics, economy, strategy, and security, with particular emphasis on U.S. and Indian foreign policy and the polar policies of both nations. Prior to joining ICWA, she served as an Associate Fellow at the Centre for Air Power Studies (CAPS), New Delhi, where she was part of the Nuclear Security Project studying the development of nuclear energy in Asian countries. She has also worked as a Research Intern at the Observer Research Foundation (ORF). Dr. Banerjee holds a Ph.D. from the American, Canadian, and Latin American Studies Division, School of International Studies, Jawaharlal Nehru University (JNU), New Delhi.

Technical Session 9: Building Ocean Resilience | An Ecosystem Approach



Dr R S Maheskumar,
Director and Head of
Department (Scientist-G)
at the Centre for Marine
Living Resources & Ecology
(CMLRE), Kochi

Dr R S Maheskumar currently serves as the Director and Head of Department (Scientist-G) at the Centre for Marine Living Resources & Ecology (CMLRE), under India's Ministry of Earth Sciences. In this role, he oversees the national programme for mapping and managing marine living resources, coordinating deep-sea biodiversity research, and driving ecosystem-based strategies for sustainable exploitation.

He specializes in atmospheric aerosol–cloud–precipitation interactions, a unique intersection of atmospheric science and marine ecology, which helps inform how climatic variables influence marine ecosystems. With a Ph.D. in Physics (1999, Pune University), an M.Tech in Atmospheric Sciences (Andhra University), and an M.Sc in Applied Physics (Gandhigram Rural University), Dr. Maheskumar brings strong interdisciplinary training to his leadership.

Under his direction, CMLRE contributes significantly to two major national objectives: the inventory and optimal use of commercially exploitable marine living resources, and understanding the response of these resources to environmental changes, such as acidification and ecosystem stress. He also plays a pivotal role in India's Deep Ocean Mission, specifically focussing on exploring and conserving deep-sea biodiversity within the Indian Exclusive Economic Zone using advanced technologies. Dr. Maheskumar's leadership aligns with CMLRE's broader mission: to conduct transformative research on marine ecology, deliver actionable science for sustainable blue economy practices, and strengthen India's global presence in ocean science.



Dr. Vijay Kumar,
Scientist G at the Ministry of
Earth Sciences (MoES)

Dr. Vijay Kumar is Scientist G at the Ministry of Earth Sciences (MoES), where he oversees the monitoring and coordination of programmes related to Polar Science and the Cryosphere including the Arctic, Antarctic, and Himalaya, as well as initiatives on the Southern Ocean, water cycle, ocean technology, ocean surveys, and mineral resources. His work encompasses geo-scientific studies of India's Exclusive Economic Zone, delineation of the continental shelf, exploration of polymetallic nodules, and hydrothermal sulphides.

His research expertise spans groundwater modelling, hydro-meteorological analysis, climate change, spatial modelling, and lake hydrology. Prior to joining MoES, he served at the National Institute of Hydrology (NIH), contributing extensively to R&D in hydrology, to consultancy and sponsored projects and conducting specialized training courses on hydrological aspects for field engineers. Dr. Kumar has authored over 100 papers in reputed national and international journals and conferences.



Dr Sarat Chandra Tripathy,

Scientist-F in the Polar Sciences Group at the National Centre for Polar and Ocean Research (NCPOR)

Dr Sarat Chandra Tripathy is a distinguished marine scientist currently serving as Scientist-F in the Polar Sciences Group at the National Centre for Polar and Ocean Research (NCPOR), Ministry of Earth Sciences, Goa. With a specialization in Biological Oceanography, his research focuses on phytoplankton productivity, bio-optics, biophysical interactions, and biogeochemistry of polar oceans by integrating sea-truth and satellite observations. Dr. Tripathy earned his D.Sc. in Environmental Sciences from Nagoya University, Japan (2011), following a Ph.D. in Marine Sciences from Berhampur University, conducted at CSIR-National Institute of Oceanography (2005), and an M.Sc. in Marine Biology from Berhampur University (1998, 2nd Rank). Over his career, he has received several prestigious recognitions, including the INSA grant for the XII SCAR-Biology Symposium (2017), Outstanding Poster Presentation Award at PORSEC-2008, and multiple fellowships. His professional trajectory includes key research and academic roles — from Postdoctoral Fellow at the Institute for Space-Earth Environmental Research (ISEE), Nagoya University, to progressive scientific positions at NCPOR since 2012 — underscoring his contributions to advancing marine and polar oceanographic research. Dr. Tripathy has participated in 4 Southern Ocean and 6 Arctic Expeditions and was the Expedition Leader on 8 occasions. Dr. Tripathy has authored more than 75 peer-reviewed research papers, several book chapters, and edited 02 books. He is a member of various international bodies, such as Vice-Chair & EXCOM/SSC member of SOOS, National Representative for PAME Working Group of the Arctic Council, CLIVAR/CLIC/SCAR Southern Ocean Region Panel (SORP), and SCAR Life Sciences Group.



Dr Anu Gopinath
Professor and Head,
Department of
Aquatic Environment
Management, KUFOS,
Kochi, Kerala.

Dr Anu Gopinath is a distinguished oceanographer and Professor in the Department of Aquatic Environment Management, Kerala University of Fisheries and Ocean Studies, Kochi, Kerala renowned for her expertise in polar and marine ecosystem research. Dr Gopinath is a Commonwealth Fellow and has participated in Indian Arctic Expedition three times and was the leader of the 2017 summer batch of Expedition. She is collaborating with NCPOR's Antarctic as well as Southern Ocean Programmes through various projects. Dr Gopinath was instrumental in bringing the UArctic membership to KUFOS and she has developed a MOOC course for UGC –SWAYAM platform for Arctic studies which is entitled as "Understanding the Arctic- Climate and The Need for Environmental Protection" which was listed among the top 100 courses globally by the Class Central Platform in September 2024. She is collaborating with two prestigious programmes of ISRO- National Information System for Climate Sciences (NICES) programme and data validation for India's prestigious satellite Oceansat-3 focusing on the Arabian Sea and Bay of Bengal. She is also collaborating with the Coral Bleach Alert Services (CBAS) of INCOIS Hyderabad. Dr. Gopinath has conducted pioneering studies in oceanic biogeochemistry, particularly on coral bleaching and reef degradation in the Lakshadweep archipelago, highlighting their ecological implications. Her work has been widely featured in national media, including The Hindu and Kochi Bureau, in articles such as "Indian researchers exploring the Arctic," "Kerala academic to create polar science course for UGC," and "Death knell for corals".



Dr Anilkumar P,
Joint Director,
MPEDA, Kochi

Anil Kumar P serves as Joint Director (Marketing) at the Marine Products Export Development Authority (MPEDA), where he leads initiatives to strengthen India's seafood exports through value addition, market development, and exporter capacity building. His work focuses on promoting freshwater species such as scampi, tilapia, and pangasius, advancing quality enhancement practices, and supporting industry skill development. Anil represents MPEDA at major trade fairs, business meets, and international outreach programmes, including engagements in Italy, Japan, and global seafood summits. He also serves as Treasurer of NETFISH and regularly contributes expert insights on market trends, export challenges, and sustainable fisheries practices.

Technical Session 10: The Polar Regions | Witnessing a Decade of Geopolitical Shift



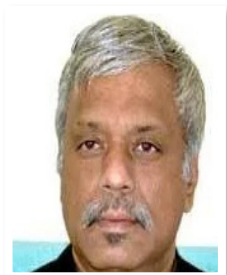
Dr Acquino Vimal,
Joint Secretary of the
United Nations Economic
and Social (UNES) Division,
MEA, New Delhi

Dr Acquino Vimal, Joint Secretary of the United Nations Economic and Social (UNES) Division, is a senior diplomat in the Ministry of External Affairs of India. He joined the Indian Foreign Service in 2000. He had served as the Ambassador of India to the Kingdom of Norway (2023-2025), where he promoted Indian-Norway relations, primarily focusing on economic and trade relations; research and academic collaboration as well as political engagement. He has also represented India at various Arctic related events in Norway, including the Arctic Council meetings, Arctic Frontiers Conference at Tromsø, Arctic Congress in Bodø and Arctic Security Conference in Oslo. He had also visited Himadri, India's polar research station at Ny Alesund as well as other research and academic institutions dealing with polar issues in India and Norway. Prior to this, he had also served in the Embassy of India in Beijing (2018-2023); High Commission of India, Kuala Lumpur (2014-15); High Commission of India, Islamabad (2011-13); Permanent Mission of India for UN in New York (2008-11); and the Indian Embassy in Tehran (2002-05). At the Ministry of External Affairs in Delhi he had served as a Desk Officer for Afghanistan and as Director in Americas Division as well as in a couple of functional Divisions of the Ministry.



Rear Admiral Monty Khanna, AVSM, NM
(Retd), Member, National
Security Advisory Board,
New Delhi

Rear Admiral Monty Khanna, AVSM, NM (Retd) was commissioned into the Indian Navy in January 1983, where he was awarded the 'Best Naval Cadet' and the Midshipman 'Sword of Honour'. A submariner and surface warfare officer, his afloat commands include the Indian Naval Submarine Sindhuvijay and the frigates Krishna and Gomati. He has held several key appointments, including Naval Assistant to the Vice Chief of Naval Staff and the Flag Officer Commanding-in-Chief, Western Naval Command, as well as serving as the Naval Attaché at Embassy of India, Washington D.C. On promotion to Flag Rank, he was appointed Assistant Chief of Naval Staff (Foreign Cooperation & Intelligence) and later served as Commandant of the Naval War College, Goa (2014-2017), where he conceived and executed the first Goa Maritime Conclave. Subsequently, he was



Dr Uttam Kumar Sinha,
Senior Fellow, Institute
for Defence Studies and
Analyses (now Manohar
Parrikar-IDSA)

Chief Instructor at the Defence Services Staff College until his retirement in August 2019. He later joined the National Security Council Secretariat (NSCS), New Delhi, as Assistant Military Adviser in December 2019, officiating as the Military Adviser from September 2022 to December 2023. A graduate of Defence Services Staff College, Wellington, and Naval War College, Newport, USA, Rear Admiral Khanna was awarded the Nao Sena Medal in 2000 and the Ati Vishisht Seva Medal in 2017. He has published over 20 professional articles in reputed journals including ORF Issue Briefs, Maritime Affairs, and the US Naval Institute Proceedings, and frequently lectures on leadership, naval and military strategy, Indo-Pacific geopolitics, developments in PLA Navy, shipbuilding, and armed forces restructuring.

Dr Uttam Kumar Sinha is a leading voice on transboundary water governance, climate change, and Arctic geopolitics. He joined the Institute for Defence Studies and Analyses (now Manohar Parrikar-IDSA) in 2001. As a Senior Fellow, he leads the Centre for Non-Traditional Security and serves as Managing Editor of Strategic Analysis, the institute's flagship journal published by Routledge. Over the years, he has held prestigious fellowships and leadership positions, including as Senior Fellow at the Prime Ministers Museum and Library (2018–2020), Academic Visitor at the Harvard Kennedy School (2015), Chevening Gurukul Fellow at the LSE (2008), and Visiting Fellow at the Peace Research Institute Oslo (2006).

Among his many publications, he is the author of *Trial By Water: Indus Basin and India-Pakistan Relations* (Penguin Random House, 2025) and the widely acclaimed *Indus Basin Interrupted: A History of Territory and Politics from Alexander to Nehru* (Penguin Random House, 2021). He writes regularly for the Times of India and Indian Express.



Commodore S Muthu Krishnan,
Dean, Faculty of Arctic
Studies, Naval War College,
Goa

Commodore S Muthu Krishnan is serving in the Indian Navy and has put in close to 28 years of commissioned service. He is a Navigation and Direction Specialist and has commanded 03 warships. He is presently posted as Dean, Faculty of Studies at the Naval War College (NWC), Goa and tenants the additional appointment of DS (Arctic Studies) at the Centre of Arctic Studies (CAS), NWC. He is an alumnus of Defence Services Staff College (DSSC), Wellington and Army War College (AWC), Mhow. He is presently pursuing his PhD in Arctic studies from the Mumbai University. He has spoken at many Arctic forums including at Oslo, Norway during Arctic Security Conference 25. He has been the guide to many researchers on Arctic Matters.



Prof Sasmit Patra,
Member of Parliament,
Rajya Sabha

Prof (Dr) Sasmit Patra, Ph.D. in Management, MBA, and B.A. (Hons.), LL.B., is a second-term Rajya Sabha Member of Parliament from the Biju Janata Dal (BJD), elected from Odisha. He currently serves as the Leader of the BJD Parliamentary Party in the Rajya Sabha and has earlier served as its Chief Whip. A National Spokesperson and General Secretary of the BJD, Dr. Patra has been a member of several key Departmental Parliamentary Standing Committees, including those on Education, Women, Children, Youth and Sports; Law and Justice; and Petroleum and Natural Gas. He has also served on Consultative Committees on External Affairs, Law and Justice, Coal and Mines, and Rural Development and Panchayati Raj, as well as on the Committees on Office of Profit, Privileges, General Purposes, and Ethics. According to the Rajya Sabha records (January 2024), Dr. Patra has asked 436 questions, introduced 16 Private Members' Bills, and participated in 1,388 debates, maintaining an impressive 92% attendance, including 100% attendance in 10 of the 14 sessions since his election in July 2019. Academically, he served as Dean and Professor at Xavier Institute of Management (XIM) University, Bhubaneswar, and is also an Advocate and member of the Supreme Court Bar Association. Renowned for his articulate and impactful parliamentary interventions, Dr. Patra is widely recognized for his contributions to national and Odisha-related policy debates that have influenced public discourse and governance.



Dr Swati Basu,

Fmr Secretary, Principal Scientific Advisor, and Fmr Director, NCMRWF

Dr Swati Basu is the Former Scientific Secretary in the Office of Principal Scientific Adviser, Government of India and an Environmental Scientist with over four decades of leadership in atmospheric and climate sciences. A Fellow of the Indian Meteorological Society and recipient of the Polar Certificate from the Norwegian Polar Institute and the WMO Fellowship, she previously served as Director, National Centre for Medium-Range Weather Forecasting (NCMRWF) and Adviser, Ministry of Earth Sciences. Holding a Ph.D. in Air Pollution Modelling from IIT Delhi, she now contributes to national science policy through various committees of Government of India and Institutes. She has the distinction of being the first Indian woman to go up to 80-degree North in the Arctic during July 2013 representing India.



Dr M Sudhakar,

Fmr Director, Centre for Marine Living Resources and Ecology (CMLRE), Kochi.

Dr M Sudhakar has served two premier research institutions of the country—NIO and NCPOR in Goa. He took charge as Director, CMLRE, Kochi in 2018 till 2020. A veteran oceanographer, he has occupied various positions such as project leader and scientist and has spent more than 1,500 days at sea on-board research vessels, as leader of expeditions to the Southern Ocean and Antarctica. He represented India at the Preparatory Commission for the United Nations Law of the Sea (PrepCom) and was an Elected Member of the Legal and Technical Commission of the ISBA for the term 2007-2011 and (2012-16). Dr Sudhakar was also a member of SCOR, ICSU, serving for the second term until 2014. He was a visiting scientist to the Aachen University of Technology, Germany; a Resource Person of the International Ocean Institute, Malta; Member, National Steering Committee for Science and Astronomy Olympiads and Member, Scientific Committee, International Geological Congress 2020. He was the 'Commissioner General' of Government of India for the Yeosu (World) Expo 2012 held in the Republic of Korea.



Mr Ishaan Gera,
Journalist, Money Control,
New Delhi

Mr Ishaan Gera is a journalist and economic commentator, currently serving as Associate Editor at Moneycontrol. He joined the publication after building his career at other top-tier Indian financial media outlets, including The Economic Times, Business Standard and Financial Express. At Moneycontrol, Ishaan covers macroeconomic trends, government policy, market dynamics, and other data-driven business stories. His work reflects a strong analytical orientation, combining empirical evidence with nuanced insights—highlighted by his articles on India’s economic growth, inflation trajectory, labor force participation, and investment patterns. He has also authored articles for Forbes India. His reporting often centers on the intersection of economics, policy, and society. Mr. Gera became a member of LIGHTS (Learning, Innovation, Governance, Humanity, Technology, Sustainability) in 2022, contributing his economic and policy expertise to the organization.

Section D

The Discourse

SaGAA VIII 2025

Plenary, Turning the
Tables Abstract, Panel
Abstracts

Plenary Abstracts

Prof (Dr) Sasmit Patra

Member of Parliament, Rajya Sabha

The Indian Parliament | Shaping Governance and collaborations in the cold regions

In the present global context, India's Polar engagement is an essential pillar of climate diplomacy. With Arctic warming accelerating four times faster than the global average and cascading risks emerging across the Himalaya, the science we generate directly impacts India's climate adaptation, food security, and disaster risk reduction frameworks. At a time when climate negotiations are increasingly shaped by data from the Arctic, Antarctic, and high mountain Asia, India's scientific presence becomes a strategic asset in global climate decision-making.

Dr Suryachandra Rao

Director, Indian Institute of Tropical Meteorology

From Poles to Monsoon | How Cryosphere–Ocean Feedback is Rewriting India's Future Climate

Arctic sea ice decline has been accelerating under global warming. Observational evidence and idealised model experiments in which the Arctic becomes seasonally ice-free under greenhouse warming reveal an association between the Arctic sea-ice decline and intense precipitation events (IPEs) over South Asia. The enhanced Arctic sea-ice melt increases mid-latitude waviness and intensifies a circumglobal teleconnection-like pattern, strengthening the subtropical high over East Asia. This, combined with a La Niña-like response in the Pacific, enhances mean summer monsoon precipitation over South Asia. In a future warming scenario, Arctic sea-ice melt is likely a contributing factor for the amplified mean and IPEs over the South Asian region. In addition to the atmosphere association, the freshening due to Arctic sea-ice melt can cause weakening of the Atlantic Meridional Overturning Circulation (AMOC). Changes in the AMOC can have a significant impact on the global climate. Sustained warming due to increased greenhouse gas emissions is projected to weaken the AMOC, which in turn can lead to changes in the location of the Intertropical Convergence Zone (ITCZ), oceanic and atmospheric large-scale circulation, tropical precipitation and regional monsoons.

Dr Waliur Rahaman

Senior Scientist, National Center for Polar and Ocean Research (NCPOR), Goa

Is the Paris Climate agreement goal enough to save the Polar Ice Sheets?

The Greenland and Antarctic ice sheets together store approximately 65 m of global mean sea-level (GMSL) equivalent. Even minor reductions in their volume can profoundly reshape coastlines, displacing hundreds of millions of people and causing irreversible loss and damage beyond the limits of adaptation. Both ice sheets have exhibited accelerating mass loss in recent decades. The West Antarctic Ice Sheet

(WAIS), being largely marine-based and grounded below sea level, is particularly vulnerable; its complete collapse could raise global sea level by 3–5 m. Observational and modelling evidence indicate that both ice sheets may already be approaching critical tipping points. However, future projections remain uncertain due to short instrumental records and poor understanding of ocean–ice–atmosphere feedbacks. Geological archives, therefore, provide crucial long-term insights into ice-sheet behaviour under warmer climatic conditions. A recent study by Rahaman et al. (2025, Nature Communications) revealed that the WAIS underwent near-total collapse during the Pliocene warm period under atmospheric–oceanic conditions comparable to those expected later this century, followed by regrowth during the Pliocene–Pleistocene transition. This finding demonstrates that the fundamental tipping thresholds governing WAIS growth and stability were established during that transitional interval. Paleoclimate analogues such as the Last Interglacial and the mid-Pliocene indicate that global temperatures only 1–2 °C above pre-industrial levels were associated with sea levels several meters higher than today. These records suggest that even the Paris Agreement’s +1.5 °C target may not be sufficient to prevent irreversible ice-sheet retreat, underscoring the urgent need for rapid decarbonization and protection of carbon sinks to climate targets to avert irreversible tipping points.

Ms Karen Marie Oseland,
Advocacy and Networking Specialist, ICIMOD, Nepal
**The Living Grasslands | Linking People, Pasture and
Policy in the Himalaya and the Arctic**

The Himalaya and the Arctic—two of the world’s most rapidly warming cryosphere regions—are linked by shared climate risks, intertwined ecosystems, and communities whose knowledge and cultures are shaped by snow, ice, and pasture. This plenary explores why these distant regions must increasingly be understood together, and how ICIMOD’s HKH–Arctic nexus is advancing that connection. The talk highlights two central pillars.

First, youth leadership: through the Hindu Kush Himalaya–Arctic Youth Leadership Forum, ICIMOD is nurturing a new generation of climate leaders equipped to work across regions, disciplines, and generations. Their voices and vision are essential to shaping the future of cryosphere action.

Second, the living rangelands: dynamic socio-ecological systems sustained by Himalayan yak herders and Arctic Sámi reindeer pastoralists. Their Indigenous knowledge - mobility, weather forecasting, pasture indicators, and collective governance - offers holistic models of resilience where climate adaptation, biodiversity stewardship, and livelihoods are deeply interconnected.

Together, these elements demonstrate why linking people, pasture, and policy across mountain and polar regions is not symbolic but necessary. The plenary calls for sustained support to safeguard rangelands, empower communities, and enable young leaders to co-create solutions for a rapidly changing climate.

Turning the Table | Reverse Panel Abstracts

Dr Archana Singh

Scientist D, NCPOR

Permafrost Thaw: Can We Stop? If Not, Then What?

Accelerated warming is destabilizing permafrost—the permanently frozen ground that stores vast reserves of ancient organic matter, dormant microbial communities, and trapped greenhouse gases. Of particular concern is methane, locked in large quantities within permafrost and far more potent than carbon dioxide in its warming effect. The cascading consequences of large-scale permafrost thaw are difficult to fully anticipate from our current vantage point. Thawing permafrost also triggers natural hazards: ground subsidence, thermokarst collapse, erosion, and widespread destabilization of land. These shifts jeopardize roads, buildings, pipelines, and entire Arctic settlements. Similar risks are emerging in the Himalayas and other periglacial regions, where warming-induced slope failure and landslides increasingly threaten infrastructure, hydropower projects, and civil societies. Compounding these challenges is the possibility that thawing ground could reintroduce ancient or stress-adapted microbes into modern ecosystems. Some may possess pathogenic traits—an unsettling reminder of how unprepared the world was for the emergence of COVID-19. Despite these risks, permafrost also represents an untapped reservoir of bioresources: novel molecules, enzymes, and extremophilic microorganisms with potential industrial and biotechnological value. Addressing both the threats and opportunities requires a multidisciplinary, multinational research effort.

A comprehensive framework for action includes:

1. Monitoring:

Mapping permafrost carbon reserves, identifying thaw hotspots, measuring greenhouse-gas emissions, and probing deep permafrost strata for microbial and biomolecular diversity.

2. Risk Assessment & Preparedness:

Implementing structured pathogen screening, genomic surveillance, and stringent BSL-2/3 biosecurity protocols to evaluate and mitigate microbial risks.

3. Mitigation & Harnessing:

Combining policy-level commitments to reduce global emissions with technological pathways to capture, convert, or biologically process methane and CO₂. In parallel, advancing bioprospecting strategies to explore valuable biomolecules, enzymes, and novel microbial strains. Given the transboundary nature of permafrost systems, this framework underscores the need for ethical governance, including clear intellectual-property rights, sample-access agreements, indigenous engagement, and transparent collaboration among Arctic and non-Arctic nations.

Dr Vikram Goel

Scientist D, NCPOR

Accelerating Coastal Antarctic Research: Learning from Recent Field Innovations

Antarctica loses virtually all its mass through its ~50,000-km long coastline, where localised climate conditions govern ice sheet stability. Predicting the future of Antarctic mass loss is thus closely tied to our understanding of how these coastal regions behave, which requires reconstructing the climatological and ice dynamical history of this region. Despite the importance of obtaining these coastal records, logistical constraints mean most coastal sites remain unvisited as crevasse fields, sea ice conditions, extreme weather, and remoteness from stations limit operations to a handful of accessible locations. Even when sites are visited, these constraints often restrict the scale and duration of scientific work. Recent innovations in field logistics, survey platforms, real-time communications, and multinational cooperation are redefining what is possible. The presenter shares insights from his field experiences and observations of the evolving technology landscape. Beyond specific examples, the discussion explores broader questions: how can we systematically identify promising innovations, evaluate their potential, and accelerate their integration into our operations? The presenter welcomes the audience's ideas and experiences.

Dr Geetha Sasikumar,

Principal Scientist,

Central Marine Fisheries Research Institute, CMFRI

Collaborative Fisheries Science and Stewardship in the Southern Ocean

The Southern Ocean (Antarctic) is a unique ecosystem, connecting the Pacific, Atlantic and the Indian Oceans, with an average depth of about 3,270 m (maximum 7,432m). Many unique Antarctic species have been commercially harvested over time from historical whaling and sealing for oil and pelts to today's fisheries targeting Antarctic krill and the Patagonian and Antarctic toothfishes. Developing collaborative fisheries science and stewardship in this region requires an integrated approach that unites nations, research institutions and policy frameworks under a shared vision of ecosystem resilience. Since the climate change reshapes sea-ice patterns, the ocean productivity and species distribution, the need for collaborative science becomes imperative. No single country can understand or manage these rapid ecological shifts alone, making a shared scientific vision essential. This incorporates joint expeditions, real-time monitoring using autonomous platforms for key resources such as krill, toothfish, icefish, cephalopods, and marine mammals and open-access data that shares the same ocean story. Through such cooperation, we can build a stewardship model rooted in trust, transparency, and shared responsibility. The Southern Ocean gives us a unique chance not just to study change, but also to shape a more resilient and compassionate approach to global fisheries governance.

Dr Lakshmi Devi P

Assistant Professor, Marine Science, Center of Research in Marine Sciences, JAIN University

Opening Arctic Sea Routes and Growing Ecological Threats

Melting of Arctic ice is opening up new navigation channels, such as the Northern Sea Route (NSR). Notably, The Northern Sea Route (NSR) draws intense interest from global powers. Russia, leveraging decades of Arctic infrastructure, is collaborating with China on the “Polar Silk Route,” a major extension of China’s Belt and Road strategy, aimed at integrating Arctic sea routes and scaling up cargo volumes to 20 million tons annually by 2030. India, with growing investments and maritime capacity is exploring connectivity through the Chennai–Vladivostok Maritime Corridor and Arctic partnerships for shipbuilding and polar navigation training. While these shorter Arctic shipping routes offer logistical and economic advantages, they introduce severe environmental and ecological risks. Among these, oil spills pose major, poorly understood risks to Arctic ecosystems, impacting critical habitats and species such as polar bears, seals, and walrus. Recent risk assessments found that 27–38% of polar bears in the Kara Sea were potentially exposed to oil contamination, underscoring the threat to biodiversity and the indigenous communities. Further, increased navigation, especially during Arctic darkness, amplifies artificial light pollution. This degrades visibility and can disrupt the circadian rhythms of Arctic wildlife, leading to increased collisions and behavioral shifts in marine mammals and birds. Icebreakers and freighters generate substantial underwater noise, interfering with communication, migration, and hunting of key marine species; especially whales and seals. This adds stress to already vulnerable populations. Most importantly, higher vessel turnover elevates the risk of bioinvasion, as ships release ballast water carrying non-native organisms or propagate them on biofouled hulls. These invasive species threaten the integrity of food webs and Arctic coastal ecosystems, with potential long-term repercussions.

Mr Keshav Verma

Research Associate, Indian Council of World Affairs (ICWA)

Bridging the Poles and the Stars: The Polar-Space Frontiers Initiative

The Polar-Space Frontiers Initiative (PSFI) proposes a new way of thinking about global commons by connecting two extreme environments — the polar regions and outer space. Although these areas seem far apart, both are cold, remote, fragile, and governed by international treaties that emphasise peaceful use and scientific cooperation. PSFI suggests using the polar regions as “Earth laboratories” where new technologies, environmental tools, and human-adaptation methods can be

tested before future missions to the Moon, Mars, and beyond. At the same time, space-based assets such as satellites, remote sensing systems, and AI-enabled Earth observation can greatly improve polar climate monitoring, biodiversity protection, and maritime governance. The initiative encourages collaboration between polar researchers, space agencies, diplomats, and private industry, especially during the upcoming Fifth International Polar Year (2032–2033). It also highlights opportunities for countries like India to strengthen cooperation in emerging areas such as space-based climate services, and science diplomacy. The initiative offers a forward-looking model for turning scientific innovation into cooperation in a fractured world.

Panel Abstracts

Technical Panel 5: HE Benedikt Höskuldsson

Ambassador, Embassy of Iceland to India, New Delhi

Emerging global trade frameworks and India's policy push for food processing

In an era when geopolitical tensions often complicate international cooperation, sustainable technologies offer a uniquely unifying platform—particularly for ocean-focused nations like India and Iceland. Both countries share a commitment to climate-resilient growth, and the fisheries and ocean economy sectors present some of the most promising avenues for collaboration. Iceland's zero-waste fish processing model, combined with its expertise in deep-sea fishing, automation, and resource efficiency, can complement India's strengths in scale, labor capacity, and expanding processing industries. Emerging trade frameworks and India's policy push for food processing and manufacturing can further accelerate joint innovation in marine and renewable technologies. Developing climate-smart "fisheries hubs" can be central to adaptation, reducing losses, strengthening resilience, and unlocking new blue-bioeconomy opportunities. Drawing on experience from the global climate and energy community, this type of partnership can demonstrate how data, technology, and inclusive planning enable sustainable, future-ready ocean economies.

Technical Panel 5:
Shri Dheeraj Pande

Director, Atomic Minerals Directorate for Exploration and Research (AMD),

Decarbonizing India's Energy Future: The Strategic Role of Nuclear Energy in Climate Change Mitigation

Climate change, driven by escalating greenhouse gas emissions, poses a critical challenge to sustainable development for the 21st century. The accelerating climate crisis has placed the world at a decisive moment where scientific innovation must converge with policy vision. Transitioning to low-carbon energy systems is essential to mitigate these impacts, wherein Nuclear power emerges as a critical component of sustainable energy policies. Nuclear energy provides a stable, large-scale and continuous power supply from small quantities of fuel, producing negligible greenhouse gas emissions during operation. Life-cycle assessments show its carbon footprint is on par with wind energy and substantially lower than fossil fuel based power generation. In addition to reducing carbon emission, nuclear power reduces reliance on imported fossil fuels and supports grid stability through high capacity factors. Yet, its global deployment has been restrained by entrenched geopolitical asymmetries, where access to technology, enriched fuel and advanced reactor systems remains concentrated in a few nations. Such concentration of capability constrains collective progress and undermines the universal goal of climate stability. As the planet approaches critical thresholds of global warming, a paradigm shift is needed: nuclear energy must be seen not as a strategic privilege but as a shared global instrument for safeguarding the Earth's climate system. India's vision offers a balanced and ethical template for this transition. Guided by the ancient Indian philosophy of Vasudhaiva Kutumbakam, (the belief that world is one family), India conceives nuclear energy as a common scientific asset to be harnessed peacefully for human welfare. Its indigenous three-stage nuclear power programme, based on a closed fuel cycle, demonstrates how self-reliance can coexist with global cooperation. Committed to achieving Net-Zero emissions by 2070 and reducing the carbon intensity of its economy by 45% by 2030, India advocates for democratizing nuclear knowledge through equitable transparent partnerships, open research exchange and equitable access to fuel-cycle services. Integrating nuclear energy into global green finance frameworks and climate adaptation agendas would allow developing nations to participate fully in the clean-energy revolution. As innovations in small modular reactors, advanced reprocessing technologies and hybrid nuclear-hydrogen systems and advanced waste-management methods mature, they can redefine the global energy architecture. Overall, nuclear power stands as a scientifically credible and strategically vital pillar for climate mitigation efforts and for realizing long-term Net-Zero goals. Achieving climate neutrality, therefore, demands cooperation rather than competition, rooted in scientific integrity, policy foresight and the spirit of shared humanity. Only through such an alliance nuclear energy can evolve from a symbol of power politics into a universal pillar of climate resilience and sustainable development.

Technical Panel 6:**Dr Anil V. Kulkarni**

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**Himalayan water security under a warm climate:
Geopolitical risks**

The Himalayan mountain has one of the largest concentrations of snow and glaciers outside the Polar Regions. The mountain generates more runoff due to high orographic precipitation and delayed release due to storage as snow and ice. Therefore, water is supplied during the hot and dry season, making many rivers, such as the Indus, Ganga, and Brahmaputra, perennial. In recent decades, the Himalayan range has experienced a higher temperature rise than the global mean, primarily due to elevation-dependent warming. Due to the increased warming, glaciers are losing mass and retreating. Glacier retreat has accelerated over the past few decades. However, the observed tendencies are not uniform across regions. Glaciers in the Great Himalayan and Pir Panjal mountain ranges are losing mass much faster than in Karakoram. Glacier-stored water in the Karakoram is much more considerable than in other mountain ranges, creating a more sustainable water source for the rivers originating in the Karakoram than in the Great Himalayan and Pir Panjal mountain ranges. It can pose a challenge for the transboundary sharing of water resources. Moreover, substantial changes in glacier area and snow cover can create new hazards and risks for the mountain communities. Retreating glaciers can cause hazards from GLOF. The seasonal snow is likely to melt early, potentially changing the seasonal pattern of stream runoff. It will also lead to the early drying of mountain streams and springs, creating a necessity for new adaptation strategies. It will need to examine current water-sharing agreements between nations and states.

Technical Panel 10:**Cmde S Muthukrishnan**

Dean, Faculty of Arctic Studies, Naval War College, Goa

Shifting power equations and disruption are both a risk and an opportunity

The opening of the Northern Sea Route (NSR) represents a structural shift in global geopolitics, trade, and security, not a distant possibility but an emerging reality. By shortening Asia–Europe transit routes, reconfiguring power balances, reinforcing Russia’s centrality, and accelerating infrastructure development, the NSR is creating a new maritime and strategic frontier. China’s growing involvement through its Polar Silk Road further intensifies shifting power equations while raising concerns of over-dependence in Moscow. For India, this disruption presents both risk and opportunity. Although geographically distant, India is strategically, economically, and climatically connected to the Arctic’s future. The panelist argues that India must move beyond ambiguity by positioning itself as a stabilising bridge between rival blocs, a credible alternative to China for Russia, and a responsible voice for the Global South. Internally, strengthened coordination, polar training, shipbuilding and strategic transformation of India’s Arctic Policy into an actionable Arctic Strategy are imperative. The concept of the “Indo-Arctic” is proposed as a new framework for India’s 21st-century strategic imagination.