

# INTERNATIONAL INTERDISCIPLINARY PhD AND POST-DOC WINTER SCHOOL



Nansen  
Scientific  
Society  
Bergen, Norway



**The Arctic Ocean: atmosphere, ice and ocean interactions – implications for future climate and human activities**

**ESSO-National Centre for Antarctic and Ocean Research, Goa, India**

October 28-November 2, 2018

## PROGRAMME

*All lectures have been allocated up to 45 minutes as per the schedule, including 5-10 minutes for questions.*

<b>SATURDAY: 27<sup>th</sup> October 2018</b>	
12:00	Arrival at ESSO-NCAOR, Goa. Accommodation at ESSO-NCAOR campus and nearby Guesthouse.
<b>SUNDAY: 28<sup>th</sup> October 2018</b>	
9:00	Arrival at ESSO-NCAOR, Goa. Accommodation at ESSO-NCAOR campus and nearby Guesthouse.
11.00 – 12:00	Registration of student participants at ESSO-NCAOR
12:00 - 13:00	<i>Lunch @ ESSO-NCAOR campus</i>
<b>Session-I: Introduction.</b> <b>Chaired by Lasse H. Pettersson, NERSC</b>	
13:00 - 14:00	Welcome to ESSO-NCAOR, by <i>Dr. M. Ravichandran, Director, ESSO-NCAOR</i> Scientific profiles of the organization partner institutions: ESSO-NCAOR, ESSO-IITM, ESSO-NIOT, NIAS, NCMRWF, NERSC, NERCI, NANSI and NIERSC.
14:00 - 18:00	Introduction of all lecturer and student participants at the winter school: Presentation by lecturers (each 2 min) and Student participants - <b>(5 min. &amp; 2-3 slides per student)</b> . Focus on relevant studies and relation to the winter school topics.
16:00 - 16:30	<i>Tea / coffee break (integrated in above session)</i>
18:00 - 18:30	Introduction and establishment of student groups and plan for student work on the report from the winter school.  Lecture-1: Introduction of thematic student working groups and study methodology <i>Dr. M. Ravichandran, ESSO-NCAOR and Lasse H. Pettersson, NERSC</i>
19:00	<i>Welcome dinner @ ESSO-NCAOR campus</i>
20:00-20:30	<i>A sense of adventure – The life of the Norwegian scientist and Nobel laureate Fridtjof Nansen (a 30 min. movie).</i>

**MONDAY: 29<sup>th</sup> October****Inaugural Session**

09:00 - 10:00	Welcome address: <i>Dr. M. Ravichandran, Director, ESSO-NCAOR, Goa, India</i> Key note address: <i>Dr. Shailesh Nayak, Director, National Institute of Advanced Studies, Bengaluru India</i> Introduction and background for the Winter School: <i>Prof. Ola M. Johannessen, NANSI and Lasse H. Pettersson, NERSC, Bergen, Norway.</i> Address by Guest of Honour: <i>H.E. Nils Ragnar Kamsvåg (tbc), Ambassador, Royal Norwegian Embassy, New Delhi, India</i> Address by Chief Guest: <i>Dr. M. Rajeevan, Secretary, MoES &amp; Chairman, ESSO-NCAOR, Governing Council.</i> Vote of Thanks: <i>Dr. K. P. Krishnan, ESSO-NCAOR, Goa, India.</i>
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**Session-II: Introduction to Arctic research.  
Chaired by Dr. Shailesh Nayak, NIAS**

10:00 - 10:45	Lecture-2: The Indian Arctic research program. <i>Dr. M. Ravichandran, ESSO-NCAOR, Goa, India</i>
10:45 - 11:30	Lecture-3: The Arctic and monsoon variability. <i>Dr. A. Prabhu, ESSO- IITM, Pune, India</i>
11:30 - 12:00	<i>Tea / coffee break</i>
12:00 - 12:45	Lecture-4: Arctic sea ice processes and climate. <i>Prof. Ola M. Johannessen, NANSI, Bergen, Norway</i>
12:45 - 13:30	Lecture-5: Large scale climate variability associated with Arctic-Midlatitude-Tropics teleconnections <i>Dr. R. Krishnan, ESSO-IITM, Pune, India</i>
13:30 - 14:30	<i>Lunch break</i>

**Session-III: Observing the Arctic environment  
Chaired by Dr. M. Ravichandran, ESSO-NCAOR**

14:30 - 15:15	Lecture-6: Integrated Arctic observation system - INTAROS <i>Prof. Stein Sandven, NERSC, Bergen, Norway</i>
15:15 - 16:00	Lecture-7: Time series measurements in Kongsfjorden from the IndARC mooring. <i>Mrs. Divya David, ESSO-NCAOR, Goa, India &amp; Mr. B. Kesavakumar, ESSO-NIOT, Chennai, India</i>
16:00 - 16:30	<i>Tea / coffee break</i>
16:30 - 17:15	Lecture-8: Monitoring and Forecasting the Arctic Ocean – an overview <i>Lasse H. Pettersson, NERSC, Bergen, Norway</i>
17:15 - 19:00	Group preparations of questions (30 min). Plenary questions from students and discussion with today's lecturers.
19:30	Dinner @ ESSO-NCAOR campus <i>Film on Indian Polar Research Program</i>

<b>TUESDAY: 30<sup>th</sup> October</b>	
08:30 - 09:30	<i>Interactive student group work:</i> Structure and group contributions to the student report.
<b>Session-IV: The Arctic Atmosphere. Chaired by Prof. Stein Sandven, NERSC, Bergen, Norway</b>	
09:30 - 10:15	Lecture-9: Arctic amplification and surface air temperature.. <i>Dr. Leonid P. Bobylev, NIERSC, Russia</i>
10:15 – 11:00	Lecture-10: Simulation of AMOC in the IITM-ESM <i>Dr. R. Krishnan, ESSO-IITM, Pune, India</i>
11:00 - 11:30	<i>Tea / coffee break</i>
11:30 - 12:15	Lecture 11: Sea ice properties from satellite data <i>Dr. Lena Shalina, NIERSC, St. Petersburg, Russia</i>
12:15 - 13:00	Lecture-12: Air-sea-ice interactions in the Arctic. <i>Dr. Richard Davy, NERSC, Bergen, Norway</i>
13:00 - 14:00	<i>Lunch break</i>
<b>Session-V: Monitoring and forecasting the Arctic ocean and ice. Part 1. Chaired by Dr. R. Krishnan, ESSO-IITM, Pune, India</b>	
14:00 - 15:00	Lecture-13: Remote sensing of polar cryosphere with special emphasis on Arctic region. <i>Dr. Sandip Oza, SAC-ISRO, Ahmedabad, India.</i>
15:00 - 16:00	Lecture-14: Geo-Scientific Platform as a Service for retrieval of sea ice information from satellite Earth observation data. <i>Dr. Anton Korosov, NERSC, Bergen, Norway</i>
16:00 - 16:30	<i>Tea / coffee break</i>
16:30 - 18:30	Group preparations of questions (30 min). Plenary questions from students and discussion with the lecturers (60 min). <i>Interactive student group work:</i> Preparation of group contributions to winter school report for use in peer review article by the students (30 min).
19:00	Dinner and cultural program @ ESSO-NCAOR campus.

<b>WEDNESDAY: 31<sup>th</sup> October</b>	
08:30 - 10:30	<i>Interactive student group work:</i> Preparation of group contributions to winter school report for use in peer review article by the students.
10:30 - 11:00	<i>Tea / coffee break</i>
<b>Session-V: Monitoring and forecasting the Arctic ocean and ice. Part 2.</b> <b>Chaired by Dr. Nuncio Murkesh, ESSO-NCOAR, Goa, India</b>	
11.00-11:45	Lecture-15: Next generation sea ice modelling. <i>Dr. Einar Olsson, NERSC, Bergen, Norway</i>
11:45-12:30	Lecture-16: Navigating the Arctic and a changing MIZ. <i>Prof. Scott Stephenson, UConn, USA</i>
12:30 –13:15	Group preparations of questions and plenary questions from students and discussion with the lecturers.
13:15-14:00	<i>Lunch break</i>
14:00-17:00	<b>Practical exercises in parallel groups</b> Please ADD co-chairs from India here? <ul style="list-style-type: none"> <li>• Tools for analysis of sea ice information from satellite Earth observations (A. Korosov, NERSC, Dr. Nuncio, Dr. Babula Jena, ESSO-NCAOR)</li> <li>• Tools to analysis sea ice information from sea ice modelling and re-analysis (E. Olsson, NERSC, Dr. Nuncio, ESSO-NCAOR)</li> <li>• Tools to assess ship navigation in ice covered waters (S. Stephenson, UConn, L. Shalina, NIERSC)</li> <li>• Tools to analysis climate information from model analysis (R. Krishnan, ESSO- IITM, Mr. Subeesh ESSO-NCAOR, Richard Davy, NERSC)</li> </ul>
15:30 - 16:00	<i>Tea / coffee break included</i>
17:00 - 18:30	<i>Interactive student group work:</i> Preparation of group contributions to winter school report for use in peer review article by the students.
19:00	Dinner @ ESSO-NCAOR campus
20:00 - 20:50	<i>Secrets of a Frozen Ocean</i> (movie from a 1-year hovercraft expedition to the Arctic Ocean)

<b>THURSDAY: 1<sup>st</sup> November</b>	
08:30 - 10:30	<i>Interactive student group work:</i> Preparation of group contributions to winter school report for use in peer review article by the students.
10:30 - 11:00	<i>Tea / coffee break</i>
<b>Session-V: Arctic ocean circulation. Chaired by Dr. K.P. Krishnan, ESSO-NCAOR, Goa, India</b>	
11:00 - 11:30	Lecture-17: The role of Nordic Seas circulation on variability of Atlantic water temperature in the Fram Strait. <i>Sourav Chatterjee, ESSO-NCAOR, Goa, India</i>
11:30 - 12:00	Lecture-18: The Indian observation and modelling program in the Kongsfjorden, Svalbard. <i>Mr. M. P. Subeesh, ESSO-NCAOR, Goa, India</i>
12:00 – 12:30	Lecture-19: Arctic Sea-Ice Simulations with global Coupled Model <i>Ashis Mitra, NCMRWF, Delhi</i>
12:00 - 12:30	Plenum questions from the groups to lectures and discussion from today and Wednesday.
12:30-13:30	<i>Lunch break</i>
14:00-21:00	Excursion/boat cruise, cultural program and dinner – outside ESSO-NCAOR campus.

<b>FRIDAY: 2<sup>nd</sup> November</b>	
08:30 - 10:30	<i>Interactive student group work:</i> Synthesis of winter school student report and prepare for presentation of the group work.
10:30 - 11:00	<i>Tea / coffee break</i>
<b>Session-VI: The Marine Ecosystem of the Arctic Ocean Chaired by Dr. Anton Korosov, NERSC, Bergen, Norway</b>	
10:00 - 10:45	Lecture-20: Biology of the Arctic Ocean – a brief overview. <i>Lasse Pettersson, NERSC, Bergen, Norway</i>
10:45 - 11:30	Lecture-21: Microbial diversity in Arctic fjords with special reference to Kongsfjorden-Krossfjorden system in Svalbard <i>Dr. K.P. Krishnan, ESSO-NCAOR, Goa, India</i>
11:30-12:45	Lecture-22: Whether the warming Arctic has become more hospitable environment for mesophilic health significant bacteria? <i>Prof. Hatha, CUSAT, Kochi, India.</i>
12.45 -13:45	<i>Lunch break</i>
<b>Session-VII: Closing session. Chaired by Dr. M. Ravichandran, ESSO-NCAOR, Goa, India and Lasse H. Pettersson, NERSC, Bergen, Norway</b>	
13:45 - 15:30	<i>Interactive student group work:</i> Continue synthesis of winter school student report and prepare for presentation of the group work.
15:30 - 16:00	<i>Tea / coffee break</i>
16:00 - 17:00	Presentation and discussing of the integrated winter school student report.
17:00 - 17:30	<i>Valedictory Function</i>