

INTERNATIONAL WINTER SCHOOL ON  
**OPERATIONAL OCEANOGRAPHY: INDIAN OCEAN CIRCULATION AND SEA  
 LEVEL VARIATION**

Venue: Indian National Centre for Ocean Information Services (INCOIS), HYDERABAD,  
 INDIA

OCTOBER 16 - 21, 2016

**PROGRAMME**

<b>Sunday: October 16, 2016</b>	
	<b>Arrival at INCOIS, Hyderabad</b>
14:30 - 15:30	Registration at INCOIS
15:30 - 16:30	Welcome to INCOIS, by <i>Dr. S.S.C. Shenoi, Director, INCOIS</i> Scientific profiles of the organization partner institutions: INCOIS, NERSC, NERCI, NSS, ICTS, Univ. of Dhaka, FIO-China
16:30 - 17:00	<b>Tea / coffee break</b>
17:00 - 18:00	Introduction of Students and faculty/lecturers
18:00 - 19:00	A Sense of Adventure - a movie about Fridtjof Nansen's life
19:00	Welcome Dinner @ INCOIS
<b>Monday: October 17, 2016</b>	
Session-I: Chaired by Dr. Shailesh Nayak, MoES	
09:00 - 10:00	Inaugural Session Welcome address: Dr. S.S.C. Shenoi, Director, INCOIS Introduction to the Winter School: Prof. Ola M. Johannessen, Nansen Scientific Society, Norway Key note address: Dr. Shailesh Nayak, Ministry of Earth Sciences, New Delhi Address by Chief Guest: H.E. Nils Ragnar Kamsvåg, Ambassador, Royal Norwegian Embassy, New Delhi Vote of Thanks: Dr. T. Srinivasa Kumar, INCOIS
10:00 - 11:00	Lecture-1: Monsoon variability at intra-seasonal and inter-annual time scale and its impact on Indian Ocean Circulation by <i>Prof. P.V. Joseph, Nansen Environmental Research Centre - India, Kochi, India</i>
<b>11:00 - 11:30</b>	<b>Tea / coffee break</b>
11:30 - 12:30	Lecture-2: Operational Indian Ocean Circulation and Modelling at INCOIS by <i>Dr. S.S.C. Shenoi, INCOIS</i>
12:30 - 13:30	Lecture-3: Data assimilation as a tool to improve ocean forecasting by <i>Dr. A. Carrassi, NERSC, Bergen</i>
<b>13:30 - 14:30</b>	<b>Lunch break</b>
Session-II: Chaired by Prof. O.M. Johannessen, NERSC	
14:30 - 15:30	Lecture-4: Real time observations assimilation for real time ocean forecasting by <i>Dr. Arya Paul, INCOIS</i>
15:30 - 16:30	Lecture-5: Physics of sea level variations by <i>Dr. Jan Even Nilsen, NERSC, Bergen</i>

<b>16:30 - 17:00</b>	<b>Tea / coffee break</b>
17:00 - 18:00	Lecture-6: Operational forecasting in the Indian Ocean by <i>Dr. T.M. Balakrishnan Nair, INCOIS</i>
Session-III: Chaired by Dr. Lasse H. Pettersson, NERSC and Dr.T. Srinivasa Kumar, INCOIS	
18:00 - 19:00	<b>Introduction of five thematic students groups:</b> <ul style="list-style-type: none"> <li>• <b>Ocean Modelling</b></li> <li>• <b>Data Assimilation</b></li> <li>• <b>Sea Level Variation</b></li> <li>• <b>Real Time Ocean Observations</b></li> <li>• <b>Forecasting, Applications and Market</b></li> </ul>
<b>Tuesday: October 18, 2016</b>	
Session-I: Chaired by Dr. T. Srinivasa Kumar and Dr. Lasse H. Pettersson	
09:00 - 10:00	Student groups work: Formulation of questions to first day lectures
10:00 - 11:00	Plenum questions from the different students groups to the first day lectures and discussions
<b>11:00 - 11:30</b>	<b>Tea / coffee break</b>
11:30 - 12:30	Lecture-7: The Nansen-TOPAZ modelling and data assimilation system and forecasting in European Waters by <i>Dr. A. Carrassi, NERSC</i>
Session-II: Chaired by Dr. M. Ravichandran, INCOIS	
12:30 - 13:30	Lecture-8: The onset of monsoon in the Bay of Bengal by <i>Dr. Weidong Yu, National Marine Environmental Forecasting Center (NMEFC), Beijing, PR. China</i>
<b>13:30 - 14:30</b>	<b>Lunch break</b>
14:30 - 15:30	<b>Students poster presentations</b>
15:30 - 16:30	
<b>16:30 - 17:00</b>	<b>Tea / coffee break</b>
17:00 - 18:00	<b>Students poster presentations continue</b>
18:00 - 19:00	Lecture-9: Indian Ocean sea level variation and potential impact from the Greenland Ice Sheet by <i>O.M. Johannessen, NERSC</i>
<b>Wednesday: (October 19, 2016)</b>	
Session-I: Chaired by <i>Dr. Weidong Yu, NMEFC</i>	
09:00 - 10:00	Lecture-10: Lagrangian data assimilation by <i>Dr. Amit Apte, Centre for Theoretical Sciences, Bangalore, India</i>
10:00 - 11:00	Lecture-11: The Nansen Cloud satellite data and analysis system by <i>Anton Korosov, NERSC</i>
<b>11:00 - 11:30</b>	<b>Tea / coffee break</b>
	<b>Practical exercises</b>

11:30 - 12:30	<ul style="list-style-type: none"> <li>• <b>Ocean modelling (Francis, INCOIS)</b></li> <li>• <b>Data assimilation (A. Carrassi, NERSC &amp; A. Apte, CTS)</b></li> <li>• <b>Sea level variation (J.E. Nilsen NERSC &amp; Unnikrishnan, NIO, Goa)</b></li> <li>• <b>Real-time observations (Pattabhi Ramarao, INCOIS &amp; Anton Korosov, NERSC)</b></li> <li>• <b>Forecasting, application and market (Harikumar, INCOIS).</b></li> </ul>
12:30 - 13:30	
<b>13:30 - 14:30</b>	<b>Lunch break</b>
14:30 - 15:30	<b>Practical exercises continue</b>
15:30 - 16:30	
<b>16:30 - 17:00</b>	<b>Tea / coffee break</b>
17:00 - 18:00	Lecture 12: Upwelling along the coast of Kerala and penetration into the Bay of Bengal by <i>Dr. A. Joseph, NERCI, India</i>
18:00 - 19:00	Students groups work and formulation of questions to the lectures of the last two days including questions to the practical exercises
<b>Thursday: October 20, 2016</b>	
Session-I:Chaired by Dr. T. Srinivasa, Kumar and Dr. Lasse H. Pettersson	
09:00 - 10:00	Lecture-13: Sea level variations in India by <i>Dr. Unnikrishnan, NIO, Goa</i>
10:00 - 11:00	Plenum questions from the different groups to lectures from Tuesday and Wednesday including discussions
<b>11:00 - 11:30</b>	<b>Tea / coffee break</b>
11:30 - 12:30	Writing groups reports based on all previous days presentation and discussions. Lecturers will be available for the groups
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<b>13:30 - 14:30</b>	<b>Lunch break</b>
14:30 - 15:30	Excursion
15:30 - 16:30	
<b>16:30 - 17:00</b>	
17:00 - 18:00	
18:00 - 19:00	
<b>Friday: October 21, 2016</b>	
Session-I:Chaired by Dr. T. Srinivasa Kumar and Dr. Lasse H. Pettersson	
09:00 - 10:00	Lecture-15: Integrated operational services by <i>Dr. Srinivasa Kumar, INCOIS</i>
10:00 - 11:00	Continue writing the Report and prepare for reporting of the different topics
<b>11:00 - 11:30</b>	<b>Tea / coffee break</b>

11:30 - 12:30	Presentation of the reports from the different groups
12:30 - 13:30	Valedictory Function
<b>13:30 - 14:30</b>	<b>Lunch break</b>

### **Scientific Committee**

- ✓ S.S.C. Shenoi, Indian National Centre for Ocean Information Services (INCOIS), Hyderabad, India, Co-Chair
- ✓ Ola M. Johannessen, Nansen Environmental and Remote Sensing Center (NERSC) and Nansen Scientific Society (NANSI), Bergen, Norway, Co-Chair
- ✓ Srinivasa Kumar T., INCOIS
- ✓ Lasse H. Pettersson, NERSC
- ✓ Alberto Carrassi, NERSC
- ✓ Weidong Yu, *National Marine Environmental Forecasting Center (NMEFC)*, Beijing, PR. China
- ✓ Kauser Ahmad, University of Dhaka
- ✓ Ajith Joseph, Nansen Environmental Research Centre – India (NERCI), Cochin, India

### **Organising committee**

- ✓ Srinivasa Kumar, T., INCOIS, Co-Chair
- ✓ Lasse Pettersson, NERSC, Co-Chair
- ✓ B.M. Rao, ITCOcean, INCOIS
- ✓ Bente E. Johannessen, NANSI
- ✓ Pattabhi Ramarao E., INCOIS
- ✓ KKV Chary, INCOIS
- ✓ Nandini Menon, NERCI