



SAMCoT News Letter 01/2013 (Nov.-Dec. 2012 & Jan. 2013)

Administrative reporting

Briefing on Activities:

In the last two months of 2012 several of the SAMCoT PhD students were occupied with preparing for exams and detail studies as part of their assignments. In Norway a PhD student has to take courses corresponding to approx. one full term. Fortunately most of them have finished their mandatory exams and are well into their research topics. A head count shows that we currently have 22 PhD candidates in SAMCoT and 2 Postdocs. The harvesting of this investment has started and it is now visible in a substantial scientific production consisting of theory and software development as well as journal and conference papers, and reports.

At the [SAMCoT Final Archive Open](#) folder in the e-room all dissemination can be found as well as other relevant information.

SAMCoT is becoming a Global Arctic Technology Hub leading to two new members in 2012 and so far one more applicant for 2013.

Achievements:

- November 2012: CTRs for 2013 approved by the Board: [HERE](#)
- PhDs Presentations from the SAMCoT PhD Workshop: [HERE](#)
- 1st December 2012: Progress Report to the Research Council of Norway (RCN): [HERE](#)
- January 20th, financial reports sent to the RCN: Reports sent: [HERE](#)
- The proposal for a change in the contract with the RCN has been delivered: [HERE](#)
- Brief Summary of Activities 2012: [HERE](#)
- Information related to the 2nd International Work Packages Workshop: [HERE](#)

Notification:

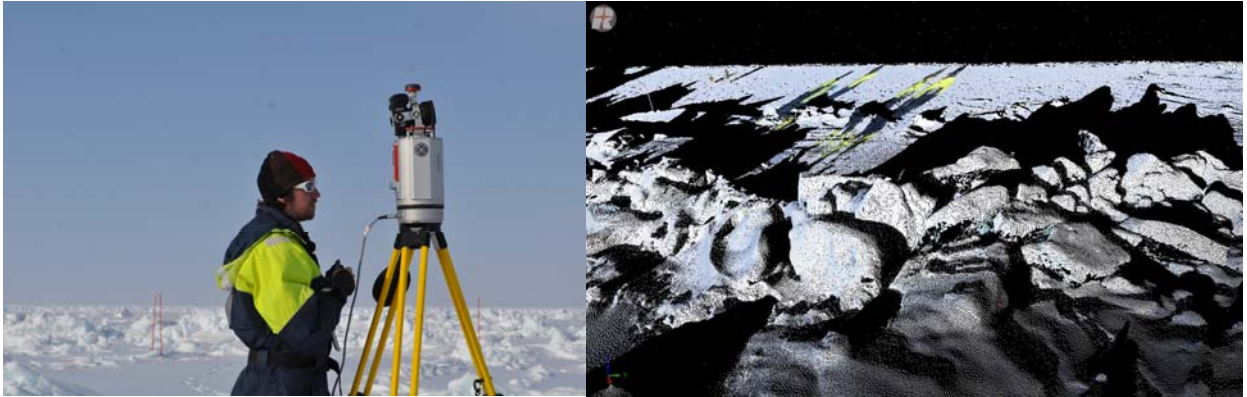
The Annual Report for 2012 will be presented to the RCN and available at SAMCoT's [webpage](#) (electronic version) on the 1st of April 2013. A paper version will be distributed to all SAMCoT Parties before the 30th of April.

Summary key figures Nov.-Dec. 2012 & Jan. 2013	
Submitted Journal Papers	6
Accepted Journal Papers	1
Submitted Conference Papers	19
Reports Produced (Admin.)	12
Reports Produced (Scientific)	23

Work Package 1: Data Collection and Process Modelling

Briefing on Activities:

The major activity in this period has been to develop instrumentation and analyze/report data collected from the different field campaigns earlier in 2012. With respect to oceanographic studies this includes sea currents analysis, under ice turbulence and CTD profiling (ADCP RDI, ADV Sontek, SBE 19, 37, 39).



Scanning of ice ridges with Riegl Vz 1000

For ice studies the analysis has included strength tests of level ice (beams, indentation, uniaxial); drilling studies of ice ridges, laser scanning of ice ridges and icebergs (Riegl Vz100), IR imaging of ice ridges and icebergs (IR Flex). In addition we have analyzed data from monitored by ice tracking beacons on sea ice and icebergs both in the Barents Sea and the Greenland Sea.

On the coastal side data are being measured of wave propagation as input to analysis to coastal erosion around shoreline (laser scanning). Deployment of ADCP AWAC 300 kHz for the monitoring of sea currents, ice draft and waves near the Vestpynten research site as well as deployment of load shackles on the mooring lines of the floating quay in Longyearbyen.

All the collected data are placed in a GI system that provides data input for the modeling of physical processes.

Laboratory experiments for the investigation of thermal expansion and permeability of saline ice were performed with Fiber Bragg Grating strain and temperature sensors (AOS GmbH).

Achievements:

Journal papers:

Marchenko, A.V., Morozov, E.G., Muzylev, S.V. (2012). Measurements of sea ice flexural stiffness by pressure characteristics of flexural-gravity waves. *Annals of Glaciology*. (accepted)

Shestov A., Marchenko A. (2012). Thermodynamic consolidation of ice ridges keels in the water at the varying freezing point. *Journal of Glaciology*. (submitted)

Marchenko A., Morozov E. (2012). Assymetric tide in lake Valunden (Spitsbergen). *Coastal Research*. (submitted)

Bogorodskii P., Marchenko A. (2012). Thermodynamic effects by the freezing of two water layers separated by sea ice. *Oceanology*. (submitted)

Conference papers:

12 conference papers submitted and 18 reports prepared (SAMCoT e-room)

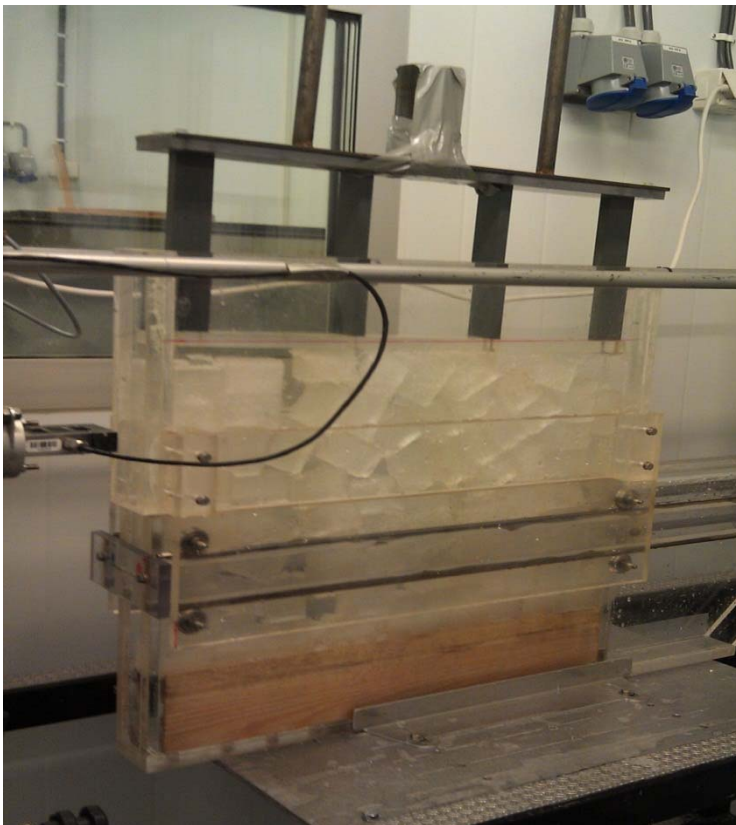
Work Package 2: Material Modelling

Briefing on Activities:

The PhD students Pustogvar and Kulyakhtin passed their exams. Pustogvar carried out initial experiments with the shear box at the NTNU Ice Laboratory and improvements of her equipment under way. Two research assistants were employed to assist in the development of laboratory equipment and to assist during experiments in the NTNU Ice Lab.

A seminar series in constitutive modelling every second week has been initiated and are well in progress.

The PhD student Stanislav Pavlov started his studies at the University College of London (UCL). Pavlov and Professor Peter Sammonds attended the UNIS HSE Course in January 2013.



Direct shear box testing in the NTNU Ice Laboratory, Pustogvar's initial experiments in 2012.

Achievements:

The PhD students have take exams and carry out initial experiments as planned.

Notifications:

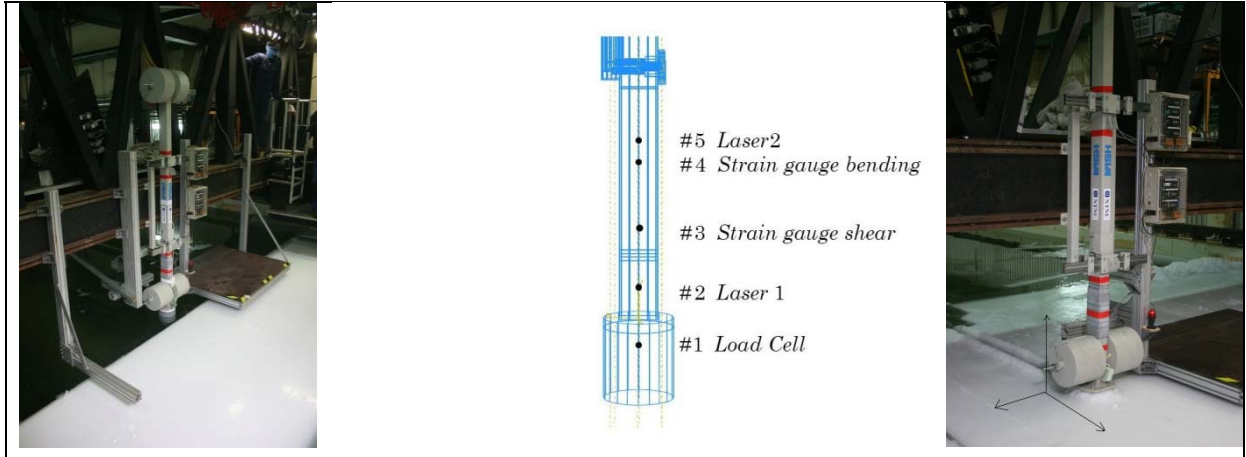
5 POAC papers will be submitted by 15 February 2013

Work Package 3: Fixed Structures in Ice

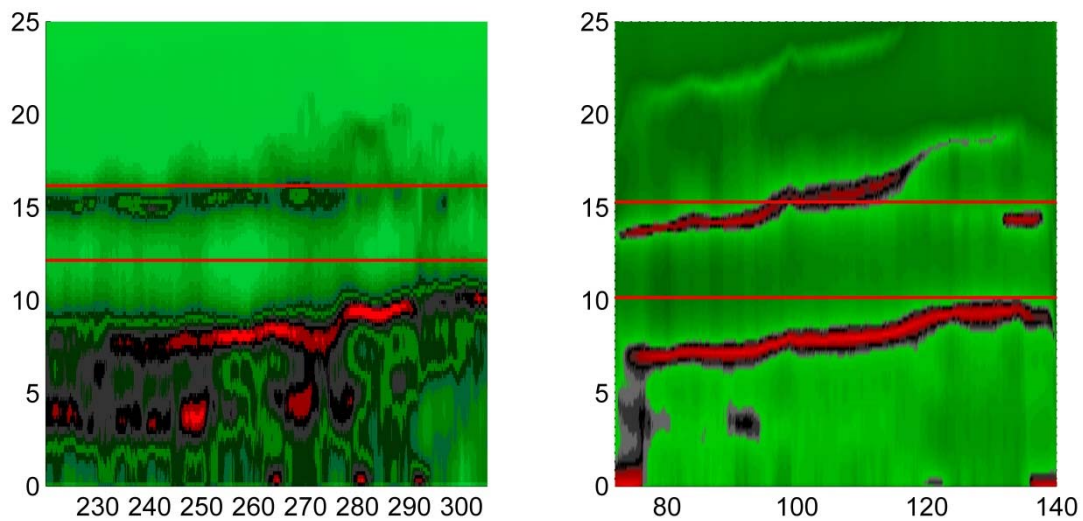
Briefing on Activities:

The PhD students Nord and Hendrikse both have good progress. Nord addresses system identification and Hendrikse numerical modelling. Hendrikse and DNV employee Erik Løkke Walter attended the UNIS HSE Course.

Work on ice ridge action overview initiated.



Test set-up for the Ice-induced vibration experiments (DIIV) analysed by Nord.



Response spectra from two of the Ice-induced vibration experiments (DIIV) analysed by Nord.

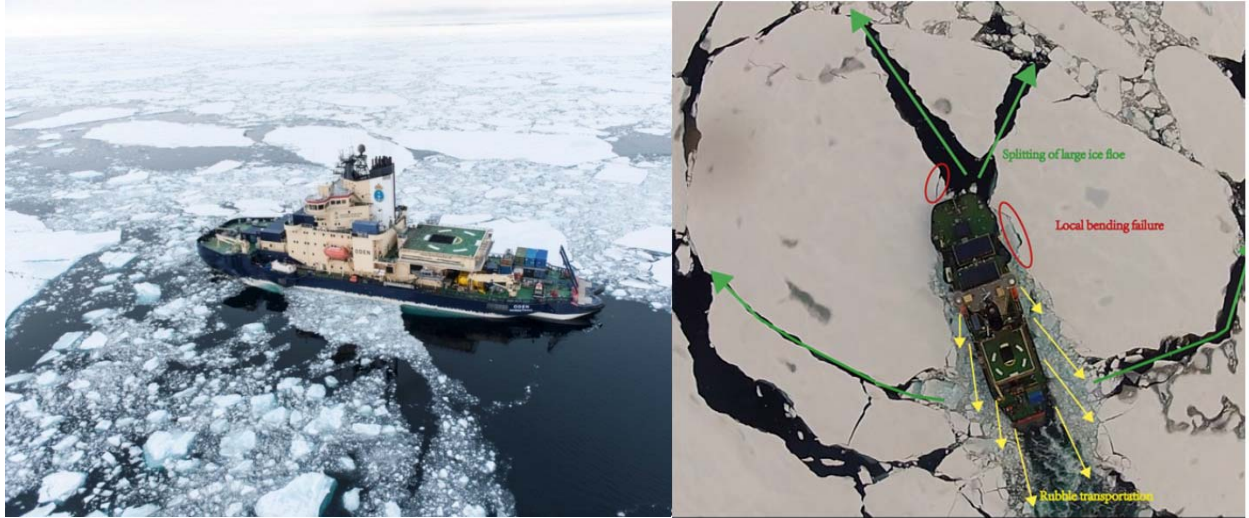
Notifications:

7 POAC papers will to be submitted by 15 February 2013.

Work Package 4: Floating Structures in Ice

Briefing on Activities:

Major activity: development of theory & software for prediction of the behaviour of floating structures in broken ice.



Left) Picture of the Oden; Right "Oden in a bird's view") illustrates the different ice-structure interaction processes in the water line and subsurface.

PhD candidate W. Lu is developing theory & software on *Ice failure mechanisms (breaking and splitting in front of the floater)*.

PhD candidate A. Tsarau (full time from 01.01.2013) is developing theory studying *The importance of the hydrodynamic effect of water on ice and floater dynamics (clearing of ice in the under-hull zone; rubble transportation and accumulation along the hull; ice loads on the hull due to friction)*. He is developing a numerical hydrodynamic ice-floater model which will be used for the investigation of the remote interaction between the floater and an ice floe.

Both studies should lead to better understanding and models of the water line processes and clearing of ice.

PhD student Chris Kijdener (started 01.01.2013). He is to study stationary dynamic regimes of ice-floater interaction. Here the method is to assume a likely motion of the floater and check if ice can cause the corresponding forcing in a stable manner.

In general the PhD students have been occupied with taking exams and preparing reports as part of their PhD courses.

Achievements:

Papers submitted (to be IPR approved + accepted):

- Lu, W., S. Løset and R. Lubbad (2012): Simulating Ice-Sloping Structure Interactions with the Cohesive Element Method. ASME Journal (submitted)
- Kim, E. et al. (2013): Laboratory experiments on accidental collisions of ice masses with a floating structure. CRST Journal (submitted).
- Sukhorukov, S. and S. Løset (2013): Friction of sea ice on sea ice. CRST Journal (submitted).
- Kim, E. et al. (2013): Drop tests of ice masses on stiffened panels with different structural flexibility. (ICCGS'13).
- Tsarau, A., R. Lubbad and S. Løset (2013): Numerical studies of floating structures in broken ice. (POAC'13).
- Lu, W., R. Lubbad, and S. Løset (2013): A theoretical model investigation of ice and wide sloping structure interactions. (POAC'13).

Reports:

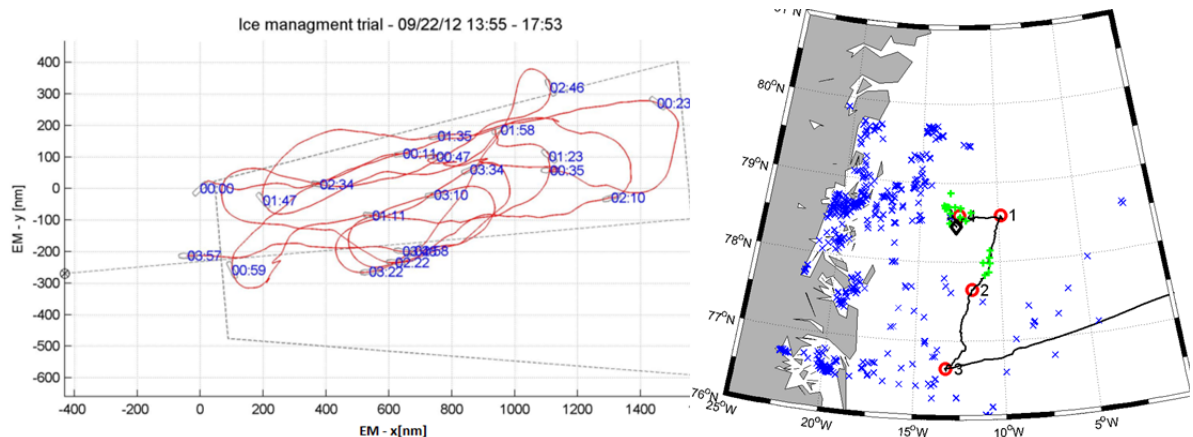
- Lindseth, S.H. (2012): Governing criteria for splitting of level ice floes. SAMCoT_WP4_2012_04

Work Package 5: Ice Management and Design Philosophy

Briefing on Activities:

Reporting the substantial amount of data gathered during *Oden Arctic Technology Research Cruise 2012* was a major activity in WP5 during the last quarter of 2012. In addition, some of the data were processed and analysed, basically

- To quantify the characteristics of sea-ice/icebergs drift and the influence of the metocean conditions,
- To examine the performance and capability of Oden for ice management, and
- For educational aspects both of MSc /PhD students, and post docs.



Left) the track of Oden during an ice management test; Right) a map showing detected icebergs where + shows location of visually detected icebergs in the period 18.09.-23.09.2012 while x shows iceberg detections from a Radarsat image of 23.09.2012. Locations for mooring deployments are shown with red circles.

Achievements:

Papers submitted (to be IPR approved + accepted):

- Lubbad, R., van Raij, E., Løset, S., and Eik, K. J., (2013): Oden Arctic Technology Research Cruise 2012. (POAC13)
- Yulmetov, R., Løset, S., and Eik, K. J., (2013): Analysis of drift of sea ice and icebergs in the Greenland Sea. (POAC13)
- Yulmetov, R., Marchenko, A., and Løset, S., (2013): Ice drift and sea current analysis in the Northwestern Barents Sea. (POAC13)

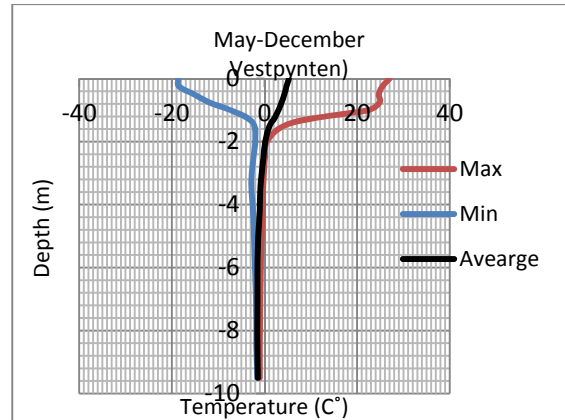
Reports

- Lubbad, R., Løset S., and Lu, W., (2012): Oden Arctic Technology Research Cruise 2012: Data report Part I&II, Reports no.: SAMCoT_WP5_2012_02_PartI and SAMCoT_WP5_2012_02_PartII
- Yulmetov, R.,(2012): Sea ice and iceberg drift modelling: a review, Reports no: SAMCoT_WP5_2012_03

Work Package 6: Coastal Technology

Briefing on activities:

As for field and laboratory activities focus has been on supplement installations at Vestpynten, with short periods of field work in both November and December, as illustrated in the picture below. Our research partners at Moscow State University have been working on laboratory testing of permafrost samples from our Arctic coastal erosion field site in Baydara Bay, as for physical, thermal and mechanical properties of frozen and warming permafrost, which will be reported in 2013. PhD students Daria Aleksuytina and Alex Usov are heavily involved in this.



Field work at Vestpynten, Svalbard, in the dark December days with Magne Wold and Håkon Tangen (WP6/SINTEF) to the left and permafrost temperatures at our field site to the right. In November Emilie Guegan (WP6/NTNU) and Anatoly Sinitsyn (WP1/UNIS) installed shallow thermistors in the bluff front to better understand the coastal permafrost degradation.

PhD-student Emilie Guegan has been focusing on publishing the existing data and on modelling of mechanisms at the Vestpynten field site. Reporting and publishing data in general have been another activity in the last period, and the some of the achievements are listed below.

Achievements:

Papers submitted (to be IPR approved + accepted):

- Wold, M. and Bæverfjord, M.G., (2013): Testing of different methods for sampling coarse soils in warm coastal permafrost. (POAC13)

Reports etc

- Moscow State University, Geology Faculty, Geocryology Department, (2012): Report on Baydara Bay Studies on Arctic Coastal Erosion, Report no.: SAMCoT_WP6_2012_05
- Finseth, J. and Bæverfjord, M.G.,(2012) Arctic coastal erosion; an overview of research fields and field surveys in the SAMCoT project, to be included in the yearly IPA report.

Notifications:

Papers to be submitted to POAC13 before deadline February 15th (to be IPR approved + accepted):

- Finseth, J., Lothe, A.E. and Bæverfjord, M.G., (2013): Building techniques and operating time for arctic coastal structures in Svalbard. (POAC13)
- Tangen, H., Marchenko, N. and Bæverfjord, M.G., (2013): Coastal Erosion in Svalbard. Investigation and presentation in GIS. (POAC13)
- Finseth, J., Sessford, E., Hormes, A. and Tangen, H.,(2013): Erosion and geohazard protection of a coastal cultural heritage in Svalbard; "Fredheim". (POAC13)

Paper to be submitted :

Guegan, E.B.M., Sessford, E. and Schomacker, A.,(2013): Time-lapse aerial Photography reveals significant coastal erosion on Svalbard, Norwegian High Arctic.