

SAMCoT News Letter 03/2013 (May - July 2013)

Administrative reporting

Briefing on Activities:
During this period, SAMCoT Centre Manager as well as the Centre Coordinator attended different conferences and Workshops hosted by some of our Industry Partners and the Research Council of Norway. In addition different meetings and activities were successfully implemented: 1st Board meeting, 2nd EIAC meeting, CMG Workshop, attendance POAC'13. Also administrative activities around some of the associated projects have been emphasized (i.e. application for permissions OATRC2013).

Achievements:

- Permissions OATRC2013: granted by the Government of Greenland on July 4th.
- ***Application for POAC'15:*** NTNU is elected as the host of the 23rd International Conference on Port and Ocean Engineering under Arctic Conditions (POAC), Trondheim, June14-18th, 2015.
- NTNU/SAMCoT will host the ***Fulbright Arctic Chair-Norway*** for a total period of 7 months from October 2013 to April 2014. Professor Erland Schulson (Dartmouth College's Thayer School of Engineering) is awarded the position. Professor Schulson is a world leading scientist in ice mechanics.


Professor Schulson during his presentation at POAC'13

SAMCoT Representation at POAC'13, a combination of Industry and Research Partners as well as PhDs candidates, Postdocs and MSc.

Notifications:

To All SAMCoT Participants:

- ***INVITATION TO THE SAMCoT Technical Workshop 2013***:
  Purpose: To get a status, discuss the way forward and reach strategic conclusions with impact on the WPs CTRs. For more information HERE (SAMCoT_InternationalWorkshops_Procedure)
  Place and Date: Trondheim on the 18th and 19th of September
  Further information: August 26th
- ***Reporting of In Kind and Cash costs from SAMCoT Parties:***
  SAMCoT Parties are requested to report on incurred In Kind and Cash costs related to their SAMCoT Activities for the 1st half of 2013 – DEADLINE AUG.15th. Please use the reporting template HERE. Please contact the centre coordinator if you require further information.
- ***Reporting of Dissemination Activities from Partners.***
  SAMCoT Parties feedback related to their dissemination activities linked to SAMCoT is highly needed. To organize the reporting an excel document is available to all Parties at our e-room. Please find and update the document HERE. (SAMCoT_Dissemination_Communication_Report_2013)

To SAMCoT Board members:

- The MoM of the Board meeting can be found at SAMCoT's e-room HERE
- 2nd Board Meeting 2013: Wednesday 20th November, HSVA, Hamburg.

To SAMCoT EIAC members:

- The MoM of the 2nd EIAC Meeting can be found HERE
- 3nd EIAC Meeting: NTNU, 19th September, 1600-1900

Work Package 1: Data Collection and Process Modelling

Briefing on Activities:
PhD student D. Wrangborg is in progress with his courses and scientific work. He presented two scientific papers and was a co-author to one paper at the POAC'13 conference. Research associate N. Marchenko presented two papers this spring; one at POAC'13 and one at the OMAE conference.

Research assistant A. Shestov delivered his PhD thesis; presented two papers in POAC'13 and submitted one paper for the Journal of Glaciology together with A. Marchenko. M. Karulina, from the Krylov Shipbuilding Institute presented conference paper in POAC together with E.Karulin and A. Marchenko.

D. Wrangborg and A. Marchenko participated in the UNIS/SAMCoT scientific cruise with Lance to the Barents Sea in April-May. A. Marchenko, A. Shestov and D. Wrangborg collected data on ice loads and temperature in land fast ice and in the Coal quay at Kapp Amsterdam. Marchenko and A. Shestov presented results on UCL ice rubble workshop. A. Marchenko presented activity within WP 1 in the meetings in Bureau Veritas (Paris) and Petroleum Safety Authority (Longyearbyen).

Achievements:
Eight conference papers were published (uploaded in the e-room):

- Karulin, E., Karulina, M, Marchenko, A.: Field investigations of first year ice mechanical properties in the North-West Barents Sea. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*,, ISBN 978-952-60-3635-9 and ISSN 0376-675.
- Marchenko, A.: Axially symmetric solutions of sea ice dynamics models with elastic-plastic and viscous-plastic rheology. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*,, ISBN 978-952-60-3635-9 and ISSN 0376-675.
- Marchenko, A., Wrangborg, D., Thiel, T.: Using distributed optical fiber sensors based on FBG's for the measurements of temperature fluctuations in saline ice and water on small scales. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. Under Arctic Conditions (POAC), Espoo, Finland*, ISBN 978-952-60-3635-9 and ISSN 0376-675.
- Marchenko, N., Geographical informational system for sustainable Arctic technology. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, ISBN 978-952-60-3635-9 and ISSN 0376-675.
- Marchenko, N., Navigation in the Russian Arctic. Sea ice caused difficulties and accidents. Proceedings of the 32nd International Conference on Ocean, Offshore and Arctic Engineering - OMAE2013, June 19-24, 2013, Nantes, France, OMAE2013-10546.
- Shestov, A., Marchenko, A., Thermodynamic consolidation of ice rubble in water at varying freezing point. Experiment. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*,, ISBN 978-952-60-3635-9 and ISSN 0376-675.
- Wrangborg, D., Marchenko, A., Laser scanning in Arctic sea ice research. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*,, ISBN 978-952-60-3635-9 and ISSN 0376-675.
- Wrangborg, D., Grady, R., Marchenko, A., Karulin, E., Laser scanner for analyze of tidal deformations of land fast ice in shallow Arctic regions. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, ISBN 978-952-60-3635-9 and ISSN 0376-675.

Work Package 2: Material Modelling

Briefing on Activities:

All four PhD students (Kulyakhtin, Bekele, Pustogvar and Pavlov) are in progress with their courses and their scientific work.
Kulyakhtin and Bekele presented their first papers on respectively the POAC conference in Finland and the COUPLED conferences in Spain.
The POAC conference was led by WP2 members Professor Tuhkuri and Post-Doc Polojärvi, who also presented a paper.
Polojärvi and Tuhkuri participated in the UNIS/SAMCoT scientific cruise with Lance to the Barents Sea in April.
Høyland spent May at UCL in London and in late May we arranged an Ice rubble workshop.

Achievements:

Eight conference papers were published in the period (uploaded in the e-room):

- Astrup, O. S., Helgøy, H., and Høyland, K. V. (2013). Laboratory work on freeze-bonds in ice rubble, Part III Shear box experiments. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #127, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Bekele, Y. (2013) Finite Element Modelling of Thermo-Hydro-Mechanically (THM) coupled problems in frozen ground engineering: State-of-the-art. In*: V International Conference on Computational Methods for Coupled Problems in Science and Engineering COUPLED PROBLEMS 2013 S. Idelsohn, M. Papadrakakis and B. Schrefler (Eds)*, Ibiza,Spain 2013.
- Helgøy, H., Astrup, O. S., and Høyland, K. V. (2013). Laboratory work on freeze-bonds in ice rubble, Part I Experimental set-up and freeze-bond texture. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #125, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Helgøy, H., Astrup, O. S., and Høyland, K. V. (2013). Laboratory work on freeze-bonds in ice rubble, Part II Results from individual freeze-bond experiments. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #126, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Kulyakhtin, S., Astrup, O. S., Høyland, K. V., and Evers, K.-U. (2013). Rubble ice transport on Arctic offshore structures (RITAS) Part III Analysis of model scale rubble ice stability. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #84, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Lu, W., Serr´e, N., Høyland, K. V., and Evers, K.-U. (2013). Rubble ice transport on Arctic offshore structures (RITAS) Part IV: Tactile sensor measurement of the level ice load on inclined plate. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #87, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Polojärvi, A. and Tuhkuri, J. (2013). 2D FEM-DEM simulations of punch through tests: Effects of partly consolidated rubble deformation . In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #222, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Sinitsyna, T., Shkhinek, K., and Høyland, K. V. (2013). A statistical analysis of spatial strength heterogeneity of sea ice cover. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng.Paper #197*, ISBN 978-952-60-3635-9 and ISSN 0376-6756.

Work Package 3: Fixed Structures in Ice

Briefing on Activities:

The ice-induced vibration group has worked actively on a new experimental campaign to study ice-induced vibration.

The new campaign should give important data to support the numerical model of PhD student Hendrikse and the system identification efforts by PhD student Nord.

Nord spent two week in TU-Delft to enhance his knowledge in inverse identification problems and one week on a course in Identification methods for structural health monitoring and residual lifecycle assessment, held in Udine, Italy.

Hendrikse and Nord presented papers on the POAC conference.

Achievements:

Seven conference papers were published (uploaded in the e-room):

- Ekeberg, O.-C., Høyland, K. V., and Hansen, E. (2013). Extreme keel drafts in the Fram Strait 2006 - 2011. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #60, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Justad, J. A. and Høyland, K. V. (2013). The UNIS Bore-Hole Jack; Description, experiments 2012 and a refined classification system. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #114, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Hendrikse, H. and Metrikine, A. (2013). The influence of friction at the ice-structure interface on ice induced vibrations. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #222, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Nord, T., Määttänen, M. and Øiseth, O. (2013). Frequency domain identification in ice-structure interaction. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #76, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Serré, N., Høyland, K. V., Lundamo, T., Bonnemaire, B., Evers, K.-U., and Gürtner, A. (2013a). Rubble ice transport on Arctic offshore structures (RITAS) Part I Scale-model investigations of level ice action mechanisms. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #138, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Serré, N., Lu, W., Høyland, K. V., Bonnemaire, B., Borg, L., and Evers, K.-U. (2013b). Rubble ice transport on Arctic offshore structures (RITAS) Part II 2D scale-model study of the level ice action. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #136, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Sinitsyna, T., Shkhinek, K., and Høyland, K. V. (2013). A statistical analysis of spatial strength heterogeneity of sea ice cover. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #197, ISBN 978-952-60-3635-9 and ISSN 0376-6756.

Work Package 4: Floating Structures in Ice

Briefing on Activities:
The floating structures team has been analysing data from the OATRC2012 expedition, and has submitted several journal papers.
The PhD candidate S. Sukhorukov has submitted his PhD dissertation.
E. Kim et al. have submitted the journal paper Laboratory experiments on accidental collisions of ice masses with a floating structure to CRST; S. Sukhorukov and S. Løset has got the journal paper Friction of sea ice on sea ice accepted by CRST; W. Lu et al. have submitted the journal paper Physical model and theoretical model study of level ice and wide sloping structure interactions to CRST. W. Lu was awarded with
S. Løset has given several presentations at different SAMCoT members' workshops:

- Kvaerner Workshop - Concrete Structures for Harsh Environment/Arctic Areas in Tromsø, 29-30th April, 2013, Tromsø
- DNV/Statoil workshop in Longyearbyen, 13-14th May, 2013
- Shell, internal meeting in Reiswijk, 24th May, 2013

Dr. A. Sinitsyn attended the Norwegian-Russian workshop in Arkhangelsk, 17-20th June, 2013. He presented two own papers and two papers for S. Løset.
Planning of OATRC'13.

Achievements:
Three conference papers were published (uploaded in the e-room):

- Kim, E., M. Storheim, A. Amdahl, S. Løset and R. von Bock und Polach (2013): Drop tests of ice blocks on stiffened panels with different structural flexibility. Proceedings of ICCGS2013.
- Tsarau, A., R. Lubbad and S. Løset (2013): Numerical studies of floating structures in broken ice. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #16, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Lu, W., R. Lubbad, N. Serre and S. Løset (2013): A theoretical model investigation of ice and wide sloping structure interactions. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #68, ISBN 978-952-60-3635-9 and ISSN 0376-6756.

Work Package 5: Ice Management and Design Philosophy

Briefing on Activities:

All PhD candidates (R. Yulmetov, F. Farid-Afshin, P. Norgren, M. Kashafutdinov) are in progress with their courses and their scientific work. Farid-Afshin took two courses in the spring/summer semesters. The course entitled: "Risk Influence Modelling and Risk Indicators" was intended to model factors that have a soft causal influence on the total risk. He did a mini-project in which he created a risk influencing factor structure affecting the basic events of a conventional fault tree analysis regarding an ice management operation.

The overall intension was to identify such human and organizational factors that can influence the probability of failure of an arctic operation and to treat the problem using a Bayesian mathematical framework.
The methodology can be used in an inverse manner as a tool for risk control as more operations need to be planned for future developments.
The second course at the technical university of Denmark (DTU)had as a project work a review of the non-probabilistic methods of quantifying the uncertainties and safety of structural systems. This study will serve as a background in his future work where the intention is to apply such methods to quantifying the safety of offshore floating systems.
Yulmetov, presented two papers at POAC'13. He will participate in the Research Cruise OATRC'13. R. Lubbad as Project and Cruise leader of OATRC'13 has been very dedicated to the cruise preparation, in particular the SoW.

Achievements:

Four conference papers were published (uploaded in the e-room):

- Yulmetov, R., S. Løset and K. J. Eik (2013): Analysis of drift of sea ice and icebergs in the Greenland Sea. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #77, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Yulmetov, R., A. Marchenko and S. Løset (2013): Ice drift and sea current analysis in the Northwestern Barents Sea. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #116, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Lubbad, R., E. van Raij, S. Løset and K. J. Eik (2013): Oden Arctic Technology Research Cruise 2012. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #109, ISBN 978-952-60-3635-9 and ISSN 0376-6756.
- Lednev, V.N, S.M. Pershin, R.N. Yulmetov and A.F. Bunkin (2013): Remote sensing of snow and ice by compact Raman LIDAR. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, volume Paper #82, ISBN 978-952-60-3635-9 and ISSN 0376-6756.

Work Package 6: Coastal Technology

Briefing on activities:


Photos: Jomar Finseth and Emilie Guegan, SAMCoT

From June 10th to 24th PhD-student Emilie Guegan and Jomar Finseth were on a joint field work expedition with SAMCoT-research partner Moscow State University including Sergey Buldovich, Vanda Khilimonyuk and SAMCoT PhD-student Daria Aleksuytina at the SAMCoT research site at Baydara Bay. The field expedition was successful in terms of both scientific results and HSE. Data from the instrumentation in the 2012-expedition was collected, new core samples for in situ investigations and laboratory tests collected, erosion rates measured, new thermistors were installed, a camera similar to that of Vestpynten installed for monitoring of the erosion process and the snowbank investigated, including temperature measurements. Unfortunately, technical problems with the drill rig caused the thermistors to be installed somewhat more shallow than desired. The results from the field work will go into the modelling activities of the PhDs and researchers both in Trondheim and Moscow.

Emilie Guegan participated in a class on Permafrost Engineering Applied to Transportation Infrastructure, organized by the Cold Climate Innovation Research Centre at the Yukon College.

The workpackage was present at POAC'13 in Helsinki and the SAMCoT research activites on arctic coastal processes presented at Young Engineers Day in Norwegian Geotechnical Society May 15th.

Achievements:

Field work in Baydara Bay June 11th to 24th. (Field report in October)

One conference paper was published (uploaded in the e-room):

- Finseth, J., Sessford, A., Hormes, A., Tangen, H.: (2013). Erosion Protection of a Coastal Cultural Heritage in Svalbard, Fredheim. In *Proc. of the 22th Int. Conf. on Port and Ocean Eng. under Arctic Conditions (POAC), Espoo, Finland*, ISBN 978-952-60-3635-9 and ISSN 0376-6756.