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Kotka Maritime Research Centre


Photo: KMRC


Photo: Finnlines


Photo: Port of Kotka

A review of multidisciplinary research on sustainable maritime traffic in the Gulf of Finland

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Contents

- KMRC introduction
- Review of selected KMRC GoF multidisciplinary research
  - Oil transportation risks
  - Chemical transportation risks
  - Safety culture in shipping
- Ongoing and future efforts

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Kotka Maritime Research Centre (KMRC)

Joint maritime research center formed by the leading Finnish universities

HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

Turun yliopisto
University of Turku

Aalto University

XAMK
Ammattikorkeakoulu

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KMRC in figures 2017

- Personnel: Researchers 32, management 4
- Publications
  - Referred scientific articles 34
  - Conference publications, abstracts 46
  - Other scientific publifications 38
- Project portfolio 3,7 M€
- Seminars and other events

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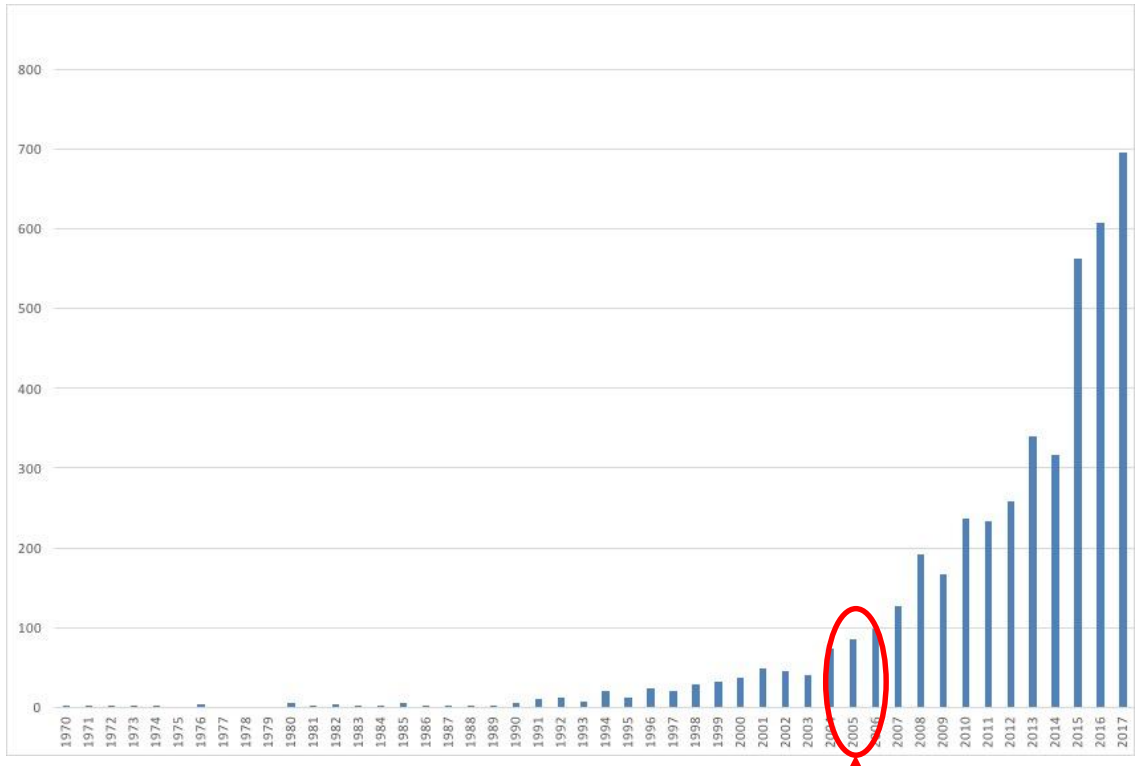
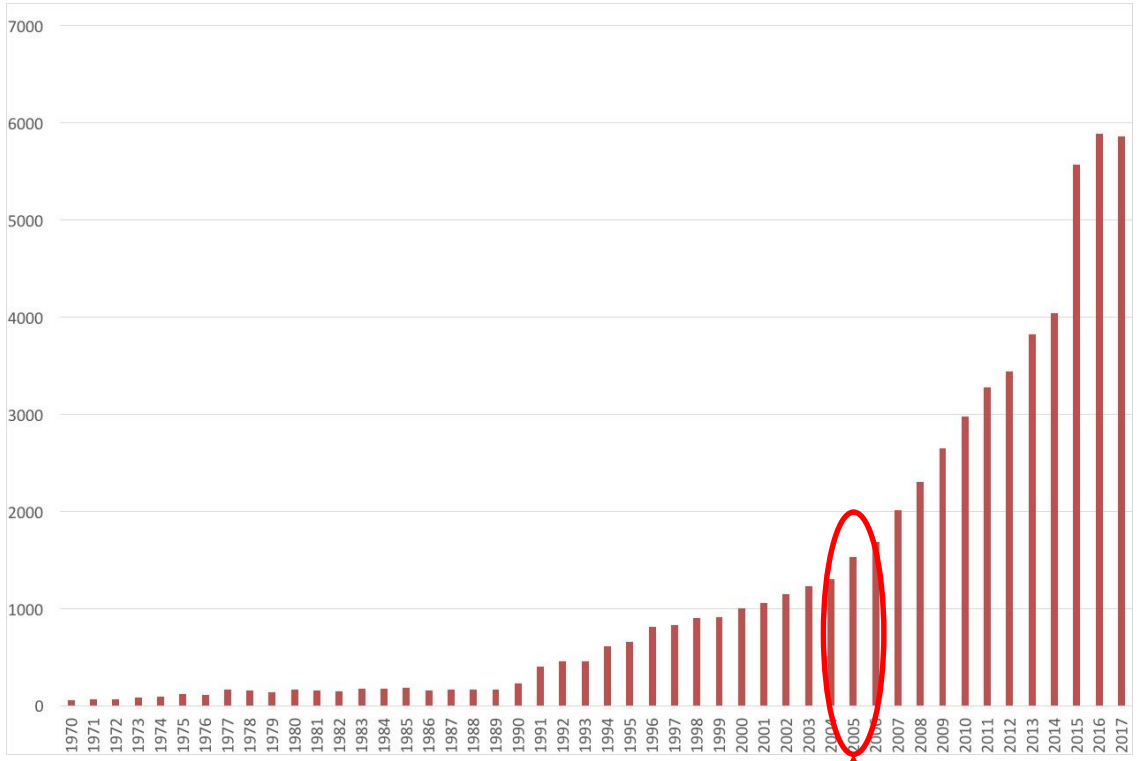
Trans- and interdisciplinary topics are increasing





KMRC founded in 2005

http://www.transdisciplinarity.ch/en/td-net/Publikationen/Publikationsradar.html

Environmental risks of oil transportation

- Open water (projects SAFGOF 2008-2011 & MIMIC 2011-2013)
  - How oil tanker traffic volumes in the GoF affects ship collision & grounding frequencies and what are the impacts to the environment
  - Collaboration of social scientists, engineers, system modelers, environmental scientists, mariners, ….
  - A result of the multidisciplinary research: **an integrative model for policy implementation evaluation**
  - Probabilistic approach – common across the disciplines
  - While some challenges in the collaboration, positive experiences on multidisciplinary approach

- In ice (WINOIL 2012-2014)
  - Developing recommendations regarding cost-effective risk management measures designed to reduce the environmental, human and financial risks in the Gulf of Finland's winter conditions
  - "Disciplines working side by side"
  - No integrative model produced

Hänninen M, Kujala P, Ylitalo J, Kuronen J. Estimating the Number of Tanker Collisions in the Gulf of Finland in 2015. 9th International Navigational Symposium on Marine Navigation and Safety of Sea Transportation TRANS-NAV 2011, Gdynia, Poland, June 15-17, 2011. Gdynia 2011, Gdynia Maritime University, pp. 189-194.
Lehikoinen A, Luoma E, Hänninen M, Storgård J, Kuikka S. Probabilistic Risk Assessment and Decision Support Tools for the Evaluation of Oil Transport in the Gulf of Finland, North-Eastern Baltic Sea. 6th International Congress on Environmental Modelling and Software (iEMSs); Leipzig, Germany; 1-5 July, 2012. 2012, International Environmental Modelling and Software Society, pp. 596-604.
Haapasaari, P, Dahlbo, K, Aps, R, Brunila, O-P, Fransas, A, Goerlandt, F, Hänninen, M, Jönsson, A, Laurila-Pant, M, Lehikoinen, A, Mazaheri, A, Montewka, J, Nieminen, E, Nygren, P, Salokorpi, M, Tabri, K & Viertola, J 2014 'Minimizing risks of maritime oil transport by holistic safety strategies (MIMIC).Final report' Kotka, pp. 59.
Lehikoinen A, Hänninen M, Storgård J, Luoma E, Mäntyniemi S, Kuikka S. A Bayesian network for assessing the collision induced risk of an oil accident in the Gulf of Finland. Environmental Science & Technology, 2015, Vol. 49, pp. 5301-5309.

Valdez Banda OA, Goerlandt F, Montewka J, Kujala P. A risk analysis of winter navigation in Finnish sea areas. Accident Analysis and Preventio, 2015, Vo. 79, pp. 100-116
Valdez Banda OA, Goerlandt F, Kuzmin V, Kujala P, Montewka J. Risk management model of winter navigation operations. Marine Pollution Bulletin, 2016, Vol 108, pp 242-262

Chemical transportation risks

- Open water and ice conditions (CHEMBALTIC 2011-2013)
  - Gathering information about the chemicals transported in the Baltic Sea, utilizing this for assessing the risk for a chemical accident and for studying the risks of port operations
  - Collaboration of engineers, social scientists, system modelers and environmental scientists
  - No integrative model developed

Häkkinen J, Malk V, Penttinen O-P, Mäkelä R, Posti A. Environmental risk assessment of most transported chemicals in sea and on land. An analysis of southern Finland and the Baltic Sea. In: Töyli, J., Johansson, L., Lorentz, H., Ojala, L. and Laari, S. (Ed.) NOFOMA 2012 - Proceedings of the 24th annual Nordic logistics research network conference. 2012.
Sormunen O-V E, Goerlandt F, Häkkinen J, Posti A, Hänninen M, Montewka J, Ståhlberg K, Kujala P. Uncertainty in maritime risk analysis: Extended case-study on chemical tanker collisions. Proceedings of the Institution of Mechanical Engineers, Part M: Journal of Engineering for the Maritime Environment, 2015, Vol. 229, pp. 303-320.
Sormunen O-V E, Häkkinen J, Posti A, Hänninen M. Tanker grounding frequency and spills in the Finnish Gulf of Finland. Scientific Journals of the Maritime University of Szczecin, 2015, Vol. 43, pp. 108-115.

Organizational factors in marine traffic safety

- Safety culture and safety management in shipping (METKU 2008-2010, CAFE 2010-13)
  - Studies on safety culture and safety management
  - Identification of safety data sources and safety indicators
  - An integrative model of safety management and safety indicators
  - Collaboration of social scientists, engineers, shipping companies & other maritime experts

Lappalainen J, Kuronen J, Tapaninen U. Evaluation of the ISM code in the Finnish shipping companies. Journal of Maritime Research, 2014, vol. 9, 23-32
Hänninen M, Valdez Banda O, Kujala P. Bayesian Network Model of Maritime Safety Management. Expert Systems with Applications, 2014, Vol. 41, pp. 7837-7846.
Valdez Banda OA, Hänninen M, Lappalainen J, Kujala P, Goerlandt F. A method for extracting key performance indicators from maritime safety management norms. WMU Journal of Maritime Affairs, 2016, pp. 1-29.

Ongoing and future research

- Ongoing topics
  - Developing tools and management options to reduce the risk of introduction of harmful aquatic organisms and pathogens (EU Strategy for the Baltic Sea Region flagship project COMPLETE) http://www.balticcomplete.com
  - Solutions for sustainable and cost-effective inland waterway traffic (INFUTURE)

- KMRC collaborative research plans
  - Projects utilizing the full spectrum of KMRC expertise
  - From multidisciplinarity to transdisciplinarity

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Thank you for your attention!

Questions? Comments? Collaboration ideas?

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