

**PAME I-2015 –Agenda Item 4.8(b)  
AMSA Recommendation II(H)**

**Bibliography: Air Emissions in the Arctic (Submission by Kingdom of Denmark)**

Below are some more studies on ship air emissions, in particular studies on black carbon emissions. These references supplement the references submitted by USA.

Browse, J., Carslaw, K. S., Schmidt, A., and Corbett, J. J. (2013), Impact of future Arctic shipping on high-latitude black carbon deposition, *Geophysical Research Letters*, vol. 40, 4459-4463, doi: 10.1002/grl.50876

Corbett, J. J., Winebrake, J. J., and Green, E. H. (2010), An assessment of technologies for reducing regional short-lived climate forcers emitted by ships with implications for Arctic shipping, *Carbon Management*, doi: 10.4155/cmt.10.27

Lack, D. A., Cappa, C. D., Langridge, J., Bahreini, R., Buffaloe, G., Brock, C., Cerully, K., Coffman, D., Hayden, K., Holloway, J., Lerner, B., Massoli, P., Li, S., McLaren, R., Middlebrock, A. M., Moore, R., Nenes, A., Nuaanan, I., Onash, T. B., Peischl, J., Perring, A., Quinn, P., Ryerson, T., Schwartz, P. J., Spackman, R., Wofsky, S. C., Worsnop, D., Xiang, B., and Williams, E. (2011), *Environmental Science and Technology*, 45, 9052-9060

Lack, D. A., and Corbett, J. J. (2012), Black carbon from ships: a review of the effects of ship speed, fuel quality and exhaust gas scrubbing, *Atmospheric Chemistry and Physics*, 12, 3985-4000, doi: 10.5194/acp-12-3985-2012

Lack, D., Lerner, B., Granier, C., Baynard, T., Lovejoy, E., Massoli, P., Ravishankara, A. R., and Williams, E. (2008), Light absorbing carbon emissions from commercial shipping, *Geophysical Research Letters*, vol. 35, doi: 10.1029/2008GL033906

Moldanová, J., Fridell, E., Popovicheva, O., Demirdjidan, B., Tishkova, V., Faccineto, A., and Fosca, C. (2009), Characterisation of particulate matter and gaseous emissions from a large ship diesel engine, *Atmospheric Environment*, 43 (2009), 2632-2641, doi: 10.1016/j.atmosenv.2009.02.008

Moldanová, J., Fridell, E., Winnes, H., Holmin-Fridell, S., Boman, J., Jedynska, A., Tishkova, V., Demirdjian, B., Joulie, S., Bladt, H., Ivleva, N. P., and Niessner, R. (2013), Physical and chemical characterisation of PM emissions from two ships operating in European Emission Control Areas, *Atmospheric Measurement Techniques*, 6, 3577-3596, doi: 10.5194/amt-6-3577-2013

NIRAS, Ministry of Environment and Nature (2013). Emissions from marine vessels in Greenland territorial waters (in Danish), p 1-61.

Petzold, A., Lauer, P., Fritsche, U., Hasselbach, J., Lichtenstern, M., Schlager, H., and Fleischer, F. (2011), Operation of Marine Diesel Engines on Biogenic Fuels: Modification of Emissions and Resulting Climate Effects, *Environmental Science and Technology*, 10394-10400

Petzold, A., Weingartner, E., Hasselbach, J., Lauer, P., Kurok, C., and Fleischer, F. (2010), Physical Properties, Chemical Composition, and Cloud Forming Potential of Particulate Emissions from a Marine Diesel Engine at Various Load Conditions, *Environmental Science and Technology*, 44, 3800-3805

Winther, M and Nielsen, O-K (2011): Technology dependent BC and OC emissions for Denmark, Greenland and the Faroe Islands for the time period 1990-2030. *Atmospheric Environment*, 45, p. 5880-5895.

Winther M. *et al.* (2014). Emission inventories for ships in the Arctic based on satellite sampled AIS data. *Atmospheric Environment*, 91, p. 1-14.