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Future ship traffic in the northern passages: impact on the Arctic atmospheric composition

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With sea ice expected to recede substantially in the Arctic during the 21st century as a result of projected climate change, shipping routes will change considerably in the decades ahead: new shipping routes through the Northern passages will be opened, which will generate new environmental problems in the Arctic. The emissions of gases and particles by the ship engines are expected to enhance the atmospheric concentration of pollutants in this region. We have used a coupled ocean atmosphere model and a global chemical transport model of the atmosphere to quantify the potential changes in the distribution of ozone, sulfates, black and organic carbon in response to future ship traffic in the Arctic. Results from the simulations will be discussed: the calculations show that, during the summer months, the concentrations and deposition fluxes of these species in the Arctic could be significantly enhanced in the decades ahead as a consequence of ship operations through the northern passages.