



Blowing snow and bromine explosions-a model study

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Snow lying on sea ice could be a potentially important source of sea salt aerosol, as small snow particles, rich in salts, can be easily lifted into the air through blowing-snow events. Using a measured distribution of snow salinity on Antarctic sea ice and a blowing snow sublimation parameterization, we derive a method for estimating sea salt aerosol production, and bromine release, during blowing-snow events. Compared with sea salt aerosol production rates from the open ocean, we find that the aerosol production rate from snow can be up to an order of magnitude larger per unit area under typical weather conditions. The large sea ice cover may thus enhance the supply of sea salt and bromine release through Br depletion to the polar lower atmosphere. By considering these sea ice sources in a global 3D model, p-TOMCAT, we successfully reproduce the polar spring bromine explosions seen by satellites. Comparison with satellite BrO data shows that the model predicts more BrO than observed when the satellite image is over the marginal region between ocean and sea ice, where small albedo applies, suggesting that current satellite data may likely underestimate marine boundary layer BrO in these locations.