Air quality has continued to improve in Finnish Lapland

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Long-term observations made by the Finnish Meteorological Institute at the Pallas Atmospheric Research Station indicate a positive trend in the quality of air in Lapland during the past 10-20 years. This favorable trend may be threatened by increased marine transport emissions from the Arctic Ocean, which may remain free of ice owing to climate change.

Trends in the concentrations of nearly sixty atmospheric pollutants have been studied using the data collected in Finland at the Pallas-Sodankylä Observatory from 1996 to 2009. Concentrations of pollutants in Lapland are very low, typically about one tenth of the background concentrations in Southern Finland. Many of the concentrations studied remained unchanged over the long term and nearly half showed a decreasing trend.

Lower concentrations were measured for many pollutants hazardous to ecosystems and humans, such as sulphur dioxide, heavy metals and some polyaromatic hydrocarbons transported from the Kola Peninsula. Long-range transports of sulphates and stable organic compounds have also been decreasing in Pallas. With respect to pollutants from transport (nitrogen compounds, volatile hydrocarbons and ozone), however, the situation remained more or less unchanged.

Climate change affects the dispersion of pollutants

Using results from nine climate models, the project assessed how the

transport of pollutants might evolve in the future. It is predicted that, with global warming, southwestern and western winds will become more common, while eastern winds will become rarer. In consequence, concentrations of pollutants carried by southwestern air currents will rise in Lapland. This group includes, for instance, nitrogen dioxide from transport. On the other hand, less pollution, such as sulphur dioxide and black carbon, will reach Lapland from the east. However, according to forecasts obtained with climate models, the changes in wind directions are so slight that the resulting changes in concentrations will be at most a couple of per cent by the year 2100.

Indirect impacts the most important

In consequence of climate change, the pollution loads in northern regions may increase because of growing emissions. By 2050, the Arctic Ocean may be totally free of ice in summer. Should this be the case, increasing ship traffic may cause pollution levels in Lapland to rise as well. The global efforts currently in progress to limit sulphur emissions from marine transport will probably prevent sulphur emissions from rising, but in the worst of cases the concentrations of nitrogen oxides and particles may double from the present level.

Research findings will be presented to the authorities at a seminar to be held in Muonio on 21 and 22 September. The study is a part of the project "Vulnerability Assessment of Ecosystem Services for Climate Change Impacts and Adaptation (VACCIA)" coordinated by the Finnish Environment Institute.

Provided by Finnish Meteorological Institute