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The decline of fog, mist and haze in Europe during the last 30 years: a warming amplifier?

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Surface solar radiation has undergone decadal variations since the middle of the 20th century, producing global "dimming" and "brightening" effects, presumably resulting from changes in aerosol burden and clouds, even though the detailed processes involved remain to be determined. Over Europe the marked solar radiation increase since the 1980s is thought to have contributed to the sharp continental warming, but this contribution has not been quantified so far.

Here we show that a strong decline in fog, mist and haze occurred in Europe over the past 30 years, from the analysis of a multi-decade set of surface horizontal visibility data. This evolution is found for all seasons and all visibility ranges between 0 and 8 km. This decline is spatially and temporally correlated with sulphur dioxide emission trends, suggesting a significant contribution of air quality improvement.

Then, using an original statistical methodology linking local visibility changes with temperature changes, we show that this decline could have contributed on average to about 10-20% of Europe's recent daytime warming, and to about 50% in Eastern Europe. The large improvement in air quality and visibility already achieved in Europe leaves hope for a weaker future contribution and therefore a less rapid regional warming.

Those results are complemented by an impact study on weather patterns presented in the CL1 session (EGU2009-4108).