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The influence of European pollution on ozone in the Near East and northern Africa

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Abstract. We present a modeling study of the long-range transport of pollution from Europe, showing that European emissions regularly elevate surface ozone by as much as 20 ppbv in summer in northern Africa and the Near East. European emissions cause 50–150 additional violations per year (i.e. above those that would occur without European pollution) of the European health standard for ozone (8-h average >120 μg/m^3 or ~60 ppbv) in northern Africa and the Near East. We estimate that European ozone pollution is responsible for 50 000 premature mortalities globally each year, of which the majority occurs outside of Europe itself, including 37% (19 000) in northern Africa and the Near East. Much of the pollution from Europe is exported southward at low altitudes in summer to the Mediterranean Sea, northern Africa and the Near East, regions with favorable photochemical environments for ozone production. Our results suggest that assessments of the human health benefits of reducing ozone precursor emissions in Europe should include effects outside of Europe, and that comprehensive planning to improve air quality in northern Africa and the Near East likely needs to address European emissions.

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