



Air pollution from ships over Europe

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Shipping sector is a large and growing source of emissions. Large quantities of nitrogen oxides (NO_x) and sulphur dioxide (SO_2) are emitted from ships affecting the chemical composition of the atmosphere in coastal areas. Changes of the world fleet over the past decades suggest a continuously increasing trend of the shipping emissions. Therefore, shipping emissions may partly offset the benefits from the reduction of anthropogenic emissions over land. The objective of this study is to assess the impact of shipping emissions on air quality degradation over Europe for a winter (January 2006) and a summer month (July 2006) using CMAQ modeling system and the TNO anthropogenic emission inventory for 2006. Results suggest that shipping emissions increase NO_2 and SO_2 mixing ratios more than 90% over the sea and close to the coastline, locally. Ship induced ozone contribution to total surface ozone exceeds 5% over the sea and near the coastline during the summer month. The largest impact is simulated over the Mediterranean Sea. Ship traffic emissions are estimated to increase $\text{PM}_{2.5}$ concentration during winter up to 40% over the Mediterranean Sea while during summer an increase more than 50% is simulated over the sea.