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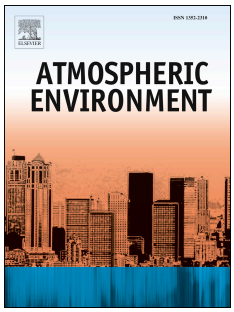

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Exploring synergies between climate and air quality policies using long-term global and regional emission scenarios

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Abstract

In this paper, we present ten scenarios developed using the IMAGE framework (Integrated Model to Assess the Global Environment) to explore how different assumptions on future climate and air pollution policies influence emissions of greenhouse gases and air pollutants. These scenarios describe emission developments in 26 world regions for the 21st century, using a matrix of climate and air pollution policies. For climate policy, the study uses a baseline resulting in forcing levels slightly above RCP6.0 and an ambitious climate policy scenario similar to RCP2.6. For air pollution, the study explores increasingly tight emission standards, ranging from no improvement, current legislation and three variants assuming further improvements. For all pollutants, the results show that more stringent control policies are needed after 2030 to prevent a rise in emissions due to increased activities and further reduce emissions. The results also show that climate mitigation policies have the highest impact on SO_2 and NO_X emissions, while their impact on BC and OC emissions is relatively low, determined by the overlap between greenhouse gas and air pollutant emission sources. Climate policy can have important co-benefits; a 10% decrease in global CO_2 emissions by 2100 leads to a decrease of SO_2 and NO_X emissions by about 10% and 5%, respectively compared to 2005 levels. In most regions, low levels of air pollutant emissions can also be achieved by solely implementing stringent air pollution policies. The largest differences across the scenarios are found in Asia and other developing regions, where a combination of climate and air pollution policy is needed to bring air pollution levels below those of today.

Keywords: Climate policy, Air pollution policy, Scenarios, Co-benefits, Representative Concentration Pathways