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Effects of future anthropogenic pollution emissions on global air quality

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The atmospheric chemistry general circulation model EMAC is used to estimate the impact of anthropogenic emission changes on global and regional air quality in recent and future years (2005, 2010, 2025 and 2050). The emission scenario assumes that population and economic growth largely determine energy consumption and consequent pollution sources ("business as usual").
By comparing with recent observations, it is shown that the model reproduces the main features of regional air pollution distributions though with some imprecision inherent to the coarse horizontal resolution (around 100 km). To identify possible future hot spots of poor air quality, a multi pollutant index (MPI) has been applied. It appears that East and South Asia and the Arabian Gulf regions represent such hotspots due to very high pollutant concentrations. In East Asia a range of pollutant gases and particulate matter (PM2.5) are projected to reach very high levels from 2005 onward, while in South Asia air pollution, including ozone, will grow rapidly towards the middle of the century. Around the Arabian Gulf, where natural PM2.5 concentrations are already high (desert dust), ozone levels will increase strongly.
By extending the MPI definition, we calculated a Per Capita MPI (PCMPI) in which we combined population projections with those of pollution emissions. It thus appears that a rapidly increasing number of people worldwide will experience reduced air quality during the first half of the 21st century. It is projected that air quality for the global average citizen in 2050 will be comparable to the average in East Asia in the year 2005.