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China is facing great challenges in both food security and environmental sustainability against the background of global climate change. In order to meet the increasing demand for food in China, increasingly more reactive nitrogen (Nr) species have been synthesized by the Haber–Bosch process. Overuse of nitrogen (N) fertilizer has occurred widely in Chinese agriculture. Motor vehicles, power plants and industrial facilities are consuming large amounts of fossil fuels. As a consequence, gaseous Nr emissions including NH3, NOxand N2O have increased substantially since 1980, directly or indirectly contributing to the greenhouse gas (GHG) balance and climate change. The GHG emissions from N fertilizer production and transport (274 Tg CO2eq yr) and use for crop (403 Tg CO2eq yr) application occupied a major part of total agricultural emissions in China, in spite of small carbon (C) sequestration in croplands (28–37 Tg CO2eq yr) induced by N fertilizer. Strategies to reduce N fertilizer loss and GHG emissions are mentioned briefly. China has also witnessed detectable climate warming, fluctuations in precipitation and other extreme weather conditions over the last 30 years. This climate change has threatened national cereal production and may accelerate N cycling (i.e., N2O emissions) in croplands and non-arable soils. These N feedbacks should be taken into account when considering mitigation of GHG emissions.

Highlights

 Overview of N fertilizer use and its environmental damage in China. Serious atmospheric reactive N emissions and air pollution in China. N fertilizer induced greenhouse gas (GHG) emissions and C sequestration in Chinese croplands. Strategies to improve N management and mitigate GHG emissions in Chinese agriculture.

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